

TRANSLATION FROM ROMANIAN



TECHNICAL EXPERT REPORT ON THE MECHANICAL STRENGTH AND STABILITY OF THE SITE HIGHSCHOOL Gf+2F WITHIN TECHNICAL ENERGY COLLEGE IN VIEW OF THE THERMAL INSULATION

Site address:

Sibiu municipality, str. Energeticîenilor, nr. 1

Work beneficiary:

Sibiu City Hall

Drafted by:

S.C. EUROENVIRONMENTAL CONSULTING SRL

Technical Expert
ENG. POP GAVRIL

March 2025

Technical Expert Report
for the site: *Highschool Gf+2F within Technical Energy College, Electricienilor Street, no. 1, Sibiu Mun, Sibiu County*

1.3 Summary Report

Work name	Technical expert report on the seismic assessment of the Highschool building Gf+2F, within Technical Energy College, Sibiu				
Expert report goal	Seismic assessment for thermal refurbishment of the building				
Expert report date	March 2025				
Technical expert	Eng. Gavril Pop	Badge	525 from 9.12.1993		
Adresa	Str. Electricienilor, no. 1, Sibiu Municipality				
Category of significance (GR 766/1997)				C	
Category of significance and earthquake exposure (P 100-1)				II	
Construction year	1966				
Building function	Highschool				
Total height above ground	16,30	Number of levels	Gf+2F		
Built area (sqm)	1482	Developed area (sqm)	3.720		
Structure system	Double structure in frames made of reinforced concrete that collaborates with a system of masonry diaphragms				
Non-structural parts	Masonry partition walls, glazed closures with masonry parapet				
Seismic action (probability of exceedance in 50 years)	SLS	70%	ULS	20%	
Ultimate Limit State Verification					
Evaluation methodology used (PI00-3)	1	<u>2</u>	3		
Level of fulfilling seismic composition conditions R ₁	60				
Structural damage level R ₂	72				
Level of seismic structural insurance, R ₃	73				
The seismic risk class in which the construction was classified, R _s	I	II	<u>III</u>	IV	
Seismic risk class description	Building susceptible to moderate damage under the action of the design earthquake corresponding to the Ultimate Limit State, which may endanger the safety of the users				
Conclusions	The structure is classified into the seismic risk class R _s III, for which no intervention works are required for the strength structure. Repairs are required to the structural elements before cladding with thermal system				
The need for intervention works	Yes		<u>No</u>		
Seismic risk class before and after intervention works — thermal refurbishment, R _s	I	II	<u>III</u>	IV	

2 Evaluation report

2.1 Expert report purpose

The object of the technical expert report consists into building C5, Highschool, of the Technical Energy College, located in Electricienilor Street, no. 1, Sibiu County, The purpose of this technical expert report is to examine the strength structure of the building intended as a gym hall within the Technical Energy College, located in the municipality of Sibiu, to assess its safety level, to approve the interventions to be carried out on the building so that its current level of safety is not affected by the thermal refurbishment works planned and to indicate any measures that must be taken into account for the current thermally refurbished building, so that it can be safely operated in accordance with the regulations in force.

According to the provisions of law no. 10 / 95 art. 18 amended in 2015, the intervention on an existing building can only be carried out on the basis of a technical expert report drawn up by a certified technical expert.

2.2 Technical regulations

For the assessment of seismic loads:

- P100-1/2013- Seismic design code-part 1. Design provisions for buildings
- - for the assessment of loads:
- - SR EN 1991-1-1. Actions of superstructures. Part 1-1: General actions- Specific weights, self-weights, useful loads for buildings.
- CR 1-1-3/2012- Loads due to snow action
- - CR 1-1-4/2012 Wind action
- - for the design of concrete and reinforced concrete structures:
- - SR EN 1992-1-1 Design of concrete structures
- CR2-1-1.1/2013 Design code for structures with structural reinforced concrete walls
- - CR6-2013. Design code for masonry structures.
- Normative NP 007/97. Design code for structures made of reinforced concrete frames.
- - for foundation works and foundation land:
- - Normative NP112-2013 regarding the design of foundation works.
- - STAS 3300/1,2-85. Foundation land. General calculation principles; calculation of land in case of direct foundation.
- - regarding the legislation in force:
- Law 10/95. Law on quality in construction with all subsequent amendments.
- - GR 767/97 regarding the classification into categories of significance.

2.3 Activities carried out for drafting the expert report

To prepare the expert report, a visual inspection in the field and a photo survey were carried out. It was also verified whether the dimensions of the construction and the structural elements correspond to those in the survey. The identification of the strength structure was carried out and compliance with the project was verified since the beneficiary holds the technical book of the building

2.4 Data that formed the basis of the technical expert report

2.4.1 Structural survey prepared by S.C. Allbizz S.R.L.

2.4.2. Miscellaneous drawings from the standard project prepared in 1967 by I.P.C.T. and adapted in the field by Trustul Electromontaj when constructing the building.

2.4.3. Visual examination of the building, as well as information received from the operating staff about the building.

2.4.4. Investigations carried out on site to identify the building's load-bearing structure.

2.4.5. The preliminary design documentation regarding the thermal refurbishment of the building shows the following works:

- removal of the current external plastering;
- repair of the vertical load-bearing elements;
- replacement of the joinery, including the glazed part with energy-efficient aluminum joinery with thermal barrier and sealing of the penetrations;
- cladding the perimeter walls on the outside with 15 cm thick basalt mineral wool boards, fixed to the walls by gluing and with bolts and dowels inserted into drilled holes;
- application of plasters reinforced with synthetic fiber meshes over the basalt mineral wool;
- on the terrace, the existing thermal insulation will be completed with 25 cm basalt mineral wool.
- 10 cm of thermal insulation will be installed over the technical basement
 - the additional framework can be restored if there are affected strength elements
 - photovoltaic panels will be installed on the roof of the highschool

2.5 Site characterization

2.5.1. Seismic zone classification. The building is located in the Municipality of Sibiu. The horizontal seismic load of existing buildings is determined according to the P100-1/2013 normative and Annex A of the P100-3/2019 code, based on art. 1 of order no. 2.834/13.12.2019 regarding the approval of the P100-3/2019 seismic design code. According to the P100-1/2013 seismic design code, the horizontal acceleration of the ground $a_g=0.20g$, the corner period of the site $T_c=0.7\text{sec.}$, the importance class of the existing construction is II. The value of the ground acceleration for the present building corresponds to an average recurrence period of 225 years.

2.5.2. Snow action zone classification. According to the design code CR1-1-3-2012 for the assessment of the snow action, the snow load $S_{0,k} = 1,5 \text{ KN/sqm}$, the exposure coefficient $c_e=0.8$ (total exposure),

2.5.3. The inclusion in the wind action area. According to the design code CR1-1-4-2012, the characteristic value of the reference wind pressure in the site is $q_{ref}=0.6 \text{ KPa}$, the terrain category is III- with $z_0 =0.3$.

2.5.4. The geotechnical study was prepared on the occasion of this evaluation. 1 geotechnical drilling was carried out on the site which intercepted the following stratification:

- 0-0.70 m well-compacted fill
 - 0.7-3.50 m light brown sandy clay, plastic gravel, consistency
 - 3.50-6.00 m clayey sand with gravel, medium compaction
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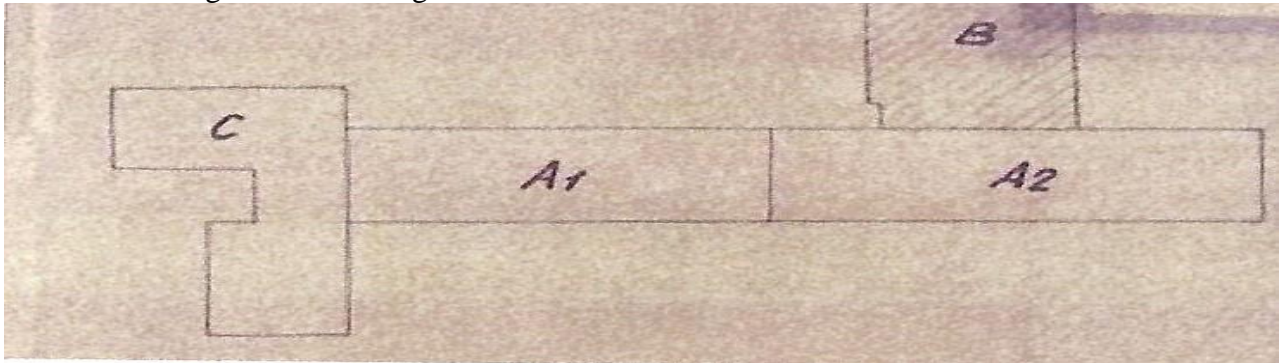
for the site: *Highschool Gf+2F within Technical Energy College, Electricienilor Street, no. 1, Sibiu Mun, Sibiu County*

The building does not show any deformations that would indicate exceeding the bearing capacity of the ground, and the refurbishment interventions bring an insignificant gravitational load. The geotechnical study shows a conventional design pressure of 270 kPa.

2.6. Building description

The High School building within the Technical Energy College, located at 1 Electricienilor Street, Sibiu Mun, is made up of four sections with the height regime Gf+2F. The building was designed by Electromontaj Trust by adapting the I.P.C.T. standard project. High school with 20 classes, from 1966 and was built in the immediate following period.

The high school has a complex plan shape that approximates the shape of an L with the long side facing Electricienilor Street and the short side facing Semaforului Street. The structure is divided into 4 sections according to the following sketch



Section A, consisting of two buildings A1 and A2 separated by a settlement joint, is a regular section with a rectangular shape in plan with a length of 57 m and a width of approximately 10.9 m. The section is divided into two openings, one hosting the 4.27 m hall and one hosting the 6.57 m classrooms. The bays are all 3 m wide. A classroom is arranged on three bays of 3 m. Starting from the end facing Vasile Aaron Street, in the first bay there is a sanitary group followed by 4 classrooms each organized in 3 bays. In the following 2 bays there is a reading room and the access hall to the high school. In the last 4 bays the secretariat, archive and the principals' offices were organized.

Section B also has an almost regular shape that can be inscribed into a rectangle with dimensions of 21.5 m x 13.39 m. The building consists into a 6.57 m opening hosting the classrooms, a 2.75 m opening hosting a hall and a 3.77 m opening hosting a stairwell, storeroom and cabinets. Section B is separated by a seismic joint from section A. Section B is organized in 7 spans of 3 m.

Section C is arranged towards Vasile Aaron Street and is organized in L shape. The building consists of a classroom and a laboratory. Towards the center of the building a corridor and a stairwell are provided. The building maintains the organization in 3 m spans of the other buildings from which it is separated by a seismic joint.

The building is provided with a technical channel where the installations are provided. Next to the classrooms, technical channels are provided through which the pipes serving each classroom are passed.

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Vertically, the building is provided with two floors. The elevation +0.00 m is the finished elevation of the ground floor. This is found approximately 60 cm above the elevation of the developed land. The height of the two floors is 3.5 m for all the buildings.

The strength structure of the buildings is similar, above the elevation + 0.00 it consists of:

- Vertical items: reinforced concrete columns with a section of 25x40 cm, 25x 25 cm, 30x 30 cm. Confined masonry walls with a thickness of 25 cm located between the classrooms and longitudinally along the traffic hall.
- Horizontal items: Floor made of reinforced concrete beams generally 25x45 cm or 25 x 35 cm. Belts over the masonry walls 25x35 and longitudinal gable beams 30x30 cm.
- The structural strength of the classrooms in building C is different from buildings A and B. They are provided with 25 x40 cm columns at a 3 m pitch similar to the other two buildings. The floors are made of 12x45 cm thick ribs, provided at a 75 cm pitch over which a 7 cm reinforced concrete slab was poured.
- The infrastructure of the building is made as follows:
 - Isolated foundations with dimensions of 1.4x1.8 m under the main columns, connected with balancing beams
 - Isolated foundations of different sizes connected together with foundation beams.
 - The foundations are common for the 4 building bodies on the joint.

2.6. QUALITATIVE EVALUATION OF THE HIGHSCHOOL BUILDING

The Gf+2F building of the high school was designed in 1966 and was built in the immediate following period. It has a structural system designed and dimensioned based on the seismic code P13/1963, the first Romanian seismic code that has been consistently improved over the years.

The Gf+2F building is designed as a building which lateral rigidity is provided by a orthogonal system of reinforced concrete frames that collaborate with an orthogonal system of masonry diaphragms. The masonry diaphragms have a sufficient thickness, are provided with bulbs at the ends and have shear sections appropriate for the height regime of the building and for the seismic intensity of the location. The columns of the frames have corresponding concrete sections that ensure an intensity of axial stress allowed by the codes for ductile behavior. The floors are generally 9 cm thick and do not show gaps that would affect the washer effect. The beneficiary owns the project on which basis the building was built.

Building A has a transverse load-bearing structure consisting of 11 frames composed at the ends of 25x40 cm pillars and a 25x25 cm pillar arranged in the longitudinal masonry wall that delimits the corridor. Additionally, the building is provided with 9 transverse walls of confined masonry provided at the ends with 25x25 cm reinforced concrete cores. In the longitudinal direction, building A is provided with a longitudinal wall of confined masonry with a thickness of 25 cm that delimits the corridor and with perimeter frames.

Building B is provided in the transverse direction with 4 masonry walls and 4 reinforced concrete frames. In the longitudinal direction, confined masonry walls are provided that border the central corridor and a masonry wall towards the thermal power plant building.

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Building C is provided with 4 longitudinal walls and 3 transverse walls of confined masonry and a series of frames.

Compared to the initial project, a framework with a wooden structure and ceramic tile covering was created. The framework has a height of 4.20 m at the ridge, where props are provided at a distance of 3 m and a ridge wedge. The panels have 15x18 cm sections. The rafters have a 10x12 section and are provided at a step of 70 cm. The props are braced.

The technical condition of the building is appropriate with some exceptions as follows:

- the exterior plasters have depreciated, crumbling and partially exfoliated areas;
- the timberwork has some leaks,
- the sidewalk is detached from the wall and has a reverse slope on certain sections. In some areas the guard sidewalk does not exist;

- there are some traces of infiltration at the base level, due to the lack of a sealing detail of the sidewalk and the gutters that show leaks. It will also be checked that there are no leaks from the rainwater or sewage networks in the area.

- the joint between the sections is not properly solved, and the plaster with which it is covered has cracked.

The construction system of the building analyzed in light of the current rules, namely "Seismic Design Code - Part I - Design Provisions for Buildings. Design Basis of Structures in Constructions", indicative P100-1/2013, and "Seismic Design Code - Part III - Provisions for the Seismic Assessment of Current Buildings, indicative P100-3/2019, the following is found:

- structural simplicity - a clear, direct and uninterrupted path of the seismic forces to the foundation ground is ensured;
- structural redundancy - the failure of a single structural element does not lead to the loss of stability of the structure;
- structural regularity in plan - the rectangular construction has a compact shape and is approximately symmetrical in plan in relation to two orthogonal directions, in terms of distribution, strength capacities and masses. The exception is building C, which shape in plan is not regular in plan;

- vertical regularity - the structural system is monotonous vertically without discontinuities that would deviate the load path, without reductions in stiffness and with masses uniformly distributed vertically.

- the rigidity and torsional resistance is partially met, the mass distribution is not uniform;

- the monolithic floors have sufficient rigidity and are correctly connected to the vertical structural elements to play the role of horizontal diaphragm;

During the geotechnical study, a foundation excavation was carried out in front of a main pillar of building C where an isolated foundation with a 1.90x1.50 m base and a foundation depth of 2.70 m from the CTN was identified, in accordance with the project data. The second excavation was carried out in building A2 in front of a main pillar, where a 1.8x1.4 m foundation and a depth of 2.7 m from the CTN were identified. Both excavations highlighted foundations similar to the project strength. The geotechnical study states that the technical condition of the foundations is good.

2.7. Knowledge level

The basis for establishing the level of knowledge KL2 — normal knowledge according to the P100-3/2019 normative document of the existing construction were:

- the geometry of the structure, the overall configuration of the structure and the dimensions of the structural elements are known from the survey and on-site surveys and disparate plans from other surveys;
- the composition of the structural elements, including the quantity and detailing of the reinforcement in the reinforced concrete elements are known based on the plans from the initial project and details were designed based on the usual practice during the construction period;
- the materials used in the structure, respectively the mechanical properties of the concrete and steel materials, are known based on the initial project.

Depending on the quantity and quality of the information obtained, the confidence factor CF=1.2 is adopted, as shown in point 4.3. of the P100-3/2019 code.

2.8. Evaluation methodology

Given that the beneficiary owns the initial projects in which basis the building was built, it was possible to check the strength of the structure in light of the regulations in force today based on the initial project, the surveys, direct and laboratory investigations through which the necessary information was obtained.

The strength structure of the building was designed for loads from its own weight, useful loads related to the school destination, climatic loads from wind and snow and seismic action.

The highschool building has the structural system designed and dimensioned based on the seismic norm P13/1963, with masonry walls working with reinforced concrete frames.

According to the norm P100—3/ 2019, the representation of the seismic action for the evaluation of structures is carried out according to the provisions of P 100-1 and annex A to P100-3, and for the evaluation by calculation using the level 2 methodology, the global seismic coefficient is determined as follows:

$$c = \gamma \times a_g \times \beta_0 \times \lambda \times \eta / q$$

$y = 1.2$ - constructions of class III importance;

$a_g = 0.20$ g for IMR = 225 years ;

$T = k_T \times H^{3/4} = 0.045 \times 7^{3/4} = 0.29$ sec ;

$k_T = 0,045$ for reinforced concrete and masonry wall structures;

$\beta_0 = 2,5$;

$\gamma = 0.85$ building with more than one floor and one opening ;

$q = 2,5$ – confined masonry structures with regularity in plan and vertically collaborating with reinforced concrete frames built between 1964-1977, acc.to P100-3, annex D, pt. D.3.3.1.6 and annex B pt. 4.2.1.

$\eta = 0.88$ according to P100-3/2013 for the critical damping fraction of 8%

According to Annex D.3. of the P100-3/2019 code, the level 1 methodology can be applied to buildings made of masonry confined regularly in plan and elevation with monolithic reinforced concrete floors with a maximum height of Gf+2F, located in areas with $a_g = 0.20$ g.

Building A

Current constructions of class II importance with a future operating life of more than 40 years. A calculation is made using the level 1 methodology

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- built area $S = 637$ sqm;
- building weight $W = 2293$ to. ;
- columns area $CA = 5.36$ sqm;
- seismic coefficient $c = 1.2 \times 0,2 \times 2,5 / 2.5 \times 0.85 \times 0.88 = 0.18$;
- basic cutting force $F_b = c \times G = 0.18 \times 2293 = 412$ to.
- concrete B200 - $f_{td} = 60$ t/sqm design strength to tension of concrete poured into walls;
 - $v_{adm} = 1,4 f_{td} / CF = 1,4 \times 60 / 1.2 = 70$ t/sqm in walls;
 - $v_{adm} = 0,7 f_{td} / CF = 0,7 \times 60 / 1.2 = 35$ t/sqm – in columns;

Checking of the vertical items:

$$F_{head,columns} = 5.36 \text{ sqm} \times 35 \text{ t/sqm} = 188 \text{ to. ;}$$

The area of the load-bearing masonry walls along the two main directions of the building was evaluated:

- longitudinal walls $A_{pl} = 10.78$ sqm ;
- transversal walls $A_{pt} = 13.9$ sqm ;

The average unit compression stress $\bar{\sigma}_0$ is then calculated, taking into account the frames contribution, which is

$$\bar{\sigma}_0 = G / (A_{pl} + A_{pt}) = 19.8 \text{ to./sqm}$$

Admissible value of the average tangential unit stress

$$v_{adm} = 1,33 T_k / (CF \gamma_m) \sqrt{1 + \bar{\sigma}_0 CF \gamma_m / (2 T_k)} = 10,46$$

tonf/sqm

where :

- $T_k = 0,12 \text{ N/mm}^2$ for masonry with cement mortar.
- $\gamma_m = 2.3$, for current masonry (after 1950)

The verification is carried out in the longitudinal direction considered weak due to the smaller area of masonry walls. '

$$F_{head,walls} = A_{pl} \times v_{adm} = 10.78 \text{ sqm} \times 10,46 = 112,84 \text{ to.}$$

$$F_{head} = F_{head,walls} + F_{head,columns} = 300,84 \text{ to.}$$

the ratio between seismic capacity and structural requirement

$$R'3 = F_{head} / F_b = 301 / 412 = 0.73$$

Building B

Current constructions of class II importance with a future operating life of more than 40 years. A simplified calculation is performed using the level 1 methodology

- built area $S = 284$ sqm;
- building weight $W = 1022$ to. ;
- columns area $CA = 2.32$ sqm;
- seismic coefficient $c = 1.2 \times 0,2 \times 2,5 / 2.5 \times 0.85 \times 0.88 = 0.18$;
- basic cutting force $F_b = c \times G = 0.18 \times 1022 = 184$ to.
- concrete B200 - $f_{td} = 60$ t/sqm design strength to tension of concrete poured into walls;
 - $v_{adm} = 1,4 f_{td} / CF = 1,4 \times 60 / 1.2 = 70$ t/sqm in walls;
 - $v_{adm} = 0,7 f_{td} / CF = 0,7 \times 60 / 1.2 = 35$ t/sqm – in columns;

Checking of the vertical items:

$$F_{head,columns} = 2.32 \text{ sqm} \times 35 \text{ t/sqm} = 81.2 \text{ to. ;}$$

The area of the load-bearing masonry walls along the two main directions of the building was evaluated:

- longitudinal walls $A_{pl} = 11.76$ sqm ;
- transversal walls $A_{pt} = 7.48$ sqm ;

The average unit compression stress $\bar{\sigma}_0$ is then calculated, taking into account the frames contribution, which is

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$$\bar{\sigma} = G / (A_{pl} + A_{pt}) = 21 \text{ to./sqm}$$

Admissible value of the average tangential unit stress

$$v_{adm} = 1,33 \text{ Tk} / (CF \gamma_m) \sqrt{1 + \bar{\sigma} CF \gamma_m / (2 \text{ Tk})} = 10,68$$

tonf/sqm

where :

- $\text{Tk} = 0,12 \text{ N/mm}^2$ for masonry with cement mortar.
- $\gamma_m = 2,3$, for current masonry (after 1950)

The verification is carried out in the longitudinal direction considered weak due to the smaller area of masonry walls. '

$$F_{\text{head,walls}} = A_{pl} \times v_{adm} = 7,48 \text{ sqm} \times 10,68 = 79,93 \text{ to.}$$

$$F_{\text{head}} = F_{\text{head,walls}} + F_{\text{head,columns}} = 161 \text{ to.}$$

the ratio between seismic capacity and structural requirement

$$R^3 = F_{\text{head}} / F_b = 161 / 184 = 0,87$$

Building C

- Next, the calculation is made for building C
- built area $S = 300 \text{ sqm}$;
- building weight $W = 1080 \text{ to.}$;
- columns area $CA = 2,95 \text{ sqm}$;
- basic cutting force $F_b = c \times G = 0,18 \times 1080 = 194 \text{ to.}$
- concrete B200 - $f_{td} = 60 \text{ t/sqm}$ design strength to tension of concrete poured into walls;
 - $v_{adm} = 1,4 f_{td} / CF = 1,4 \times 60 / 1,2 = 70 \text{ t/sqm}$ in walls;
 - $v_{adm} = 0,7 f_{td} / CF = 0,7 \times 60 / 1,2 = 35 \text{ t/sqm}$ – in columns;

Checking of the vertical items:

$$F_{\text{head,columns}} = 2,95 \text{ sqm} \times 35 \text{ t/sqm} = 103 \text{ to.}$$

The area of the load-bearing masonry walls along the two main directions of the building was evaluated:

- longitudinal walls $A_{pl} = 8,22 \text{ sqm}$;
- transversal walls $A_{pt} = 4,8 \text{ sqm}$;

The average unit compression stress $\bar{\sigma}$ is then calculated, taking into account the frames contribution, which is

$$\bar{\sigma} = G / (A_{pl} + A_{pt}) = 10,8 \text{ to./sqm}$$

Admissible value of the average tangential unit stress

$$v_{adm} = 1,33 \text{ Tk} / (CF \gamma_m) \sqrt{1 + \bar{\sigma} CF \gamma_m / (2 \text{ Tk})} = 8,65 \text{ tonf/sqm}$$

where :

- $\text{Tk} = 0,12 \text{ N/mm}^2$ for masonry with cement mortar.
- $\gamma_m = 2,3$, for current masonry (after 1950)

The verification is carried out in the longitudinal direction considered weak due to the smaller area of masonry walls. '

$$F_{\text{head,walls}} = A_{pl} \times v_{adm} = 4,8 \text{ sqm} \times 8,65 = 41,52 \text{ to.}$$

$$F_{\text{head}} = F_{\text{head,walls}} + F_{\text{head,columns}} = 144,5.$$

the ratio between seismic capacity and structural requirement

$$R^3 = F_{\text{head}} / F_b = 144,5 / 194 = 0,74$$

The evaluation shows a minimum structural insurance level $R^3 = 73\%$. It is between 65% and 90% that classifies the construction into the seismic risk class R_{sIII} with the recommendation that no consolidation measures are required.

2.9 The level of fulfilling the terms for seismic structure, R1

According to the order of the Minister of Development, Public Works and Administration No. 3.230/2022 on the approval of the technical regulation "Guide for carrying out integrated intervention works in multi-family residential buildings and public buildings, indicative RTC 1 — 2022": In order to establish the decision on carrying out intervention works to increase the energy performance of buildings through the multi-annual national program on increasing the energy performance of apartment buildings or through other programs, such as the National Recovery and Resilience Program - Component 5 — Renovation Wave or Regional Operational Programs, a technical expert report is carried out from the point of view of assuring the essential requirement "mechanical strength and stability", following the qualitative method, in accordance with the provisions of Government Emergency Ordinance no. 18/2009, on increasing the energy performance of apartment buildings, as amended and completed. In the case of applying the qualitative assessment procedure of the seismic risk class, the level of fulfilling the seismic structure conditions and the level of structural damage is determined according to the provisions of the P100-3 design code and is multiplied by factor 0.8 for buildings built between 1963 and 1977.

Establishing the seismic risk class of the building with height regime Gf is made in accordance with P100-3/2019 based on 3 categories of conditions that make the scope of investigations and analyses carried out within the assessment as follows:

The level of fulfilling the seismic design conditions marked with R1 for the level 2 methodology is established based on the criteria in Annex B, point B.3.1.2., of the code P100-3/2019:

1. Quality of the structural system:

- assessment criteria: the efficiency of the spatial cooperation of the structural elements, which depends on the type and quality of the connections between the walls in orthogonal directions and the connections between the walls and the floors; the existence of sufficient and approximately equal masonry areas in the two directions;

In this case, the efficiency of the spatial cooperation of the structural elements and the quality of the connections between the walls in the directions is ensured by the masonry weave. The percentages of walls are not approximately equal in the two directions. The structure does not meet all the construction measures specified by the standards in force.

- moderate non-compliance 5 points.

2. Masonry quality:

- assessment criteria: the quality of the elements, the joints homogeneity, the joints regularity, the level of filling with mortar, the existence of areas weakened by slots and/or niches, etc.;

- indicative criterion for maximum score: quality of materials and execution according to the regulations in force.

It is considered that the initial masonry is depreciated due to the long period of operation.

- moderate non-compliance 5 points.

3. Type of floors:

- assessment criteria: rigidity of the floors in the horizontal plane and efficiency of the connections with the walls (ability to ensure compatibility of structural wall deformations and to prevent the walls from overturning due to seismic forces perpendicular to the plan);

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- the indicative criterion for the maximum score: complete monolithic reinforced concrete floors at all levels, without gaps that significantly weaken their resistance and rigidity in horizontal plan.

- minor non-compliance 8 points.

4. Plan configuration:

- assessment criteria: compactness and geometric and structural symmetry in plan, expressed by the ratio between the lengths of the sides and by the dimensions of the setbacks in plan. In this case, there is symmetry in the plan, the transverse and longitudinal walls being regularly arranged in the plan. Also, the percentage of walls on the two directions of the structure is approximately equal.

- the indicative criterion for the maximum score: the provisions of P 100-1/2006.

- minor non-compliance 9 points.

5. Elevation configuration:

- assessment criteria: geometric and structural uniformity in elevation expressed by the absence/existence of successive floor setbacks, the existence of protrusions at the last level, discontinuities created by increasing the area of wall voids at the ground floor/at an intermediate level;

- indicative criterion for maximum score: provisions P 100-1/2006.

- minor non-compliance 9 points.

6. Distances between walls:

- assessment criteria: distances between structural walls, on each of the main directions of the building;

- indicative criterion for maximum score: structural system with hollow walls

(honeycomb) defined according to CR 6-2006.

A moderate reduction is considered due to the large distance between walls

- moderate non-compliance 8 points.

7. Elements that give lateral thrusts:

- assessment criteria: existence of arches, columns, domes, trusses, with/without elements that take over/limit the effects of thrusts;

- criterion met 10 points. (maximum score)

8. Type of foundation ground and foundations:

- assessment criteria: type of the foundation ground (normal/difficult), capacity of foundations to take over and transmit vertical loads to the ground, efforts resulting from differential settlements and earthquake action;

- indicative criterion for maximum score: normal foundation ground, continuous reinforced concrete foundations.

- minor non-fulfilment 8 points.

9. Possible interactions with adjacent buildings:

- assessment criteria: existence/absence of the risk of collision with adjacent buildings (isolated building, building with neighbors on 1, 2, 3 sides), the heights of neighboring buildings, the existence of the risk of falling of some components of neighboring buildings. In this case, the building is independent.

- moderate non-compliance 5 points. There are joints between sections but in the case of a major earthquake this is not large enough to ensure the independent behavior of the structures.

10. Non-structural elements:

- assessment criteria: the existence of major masonry elements (sills, pediments, tympanas), heavy cladding, other important decorative elements that pose a risk of collapse;

- indicative criterion for the maximum score: the absence of these elements or ensuring their stability according to the provisions of P 100-1/2013.

- minor non-fulfilment criterion 8 points (maximum score)

In conclusion, the level of fulfillment of the seismic composition conditions is assessed

$R1 = 75 * 0.8 = 60$ points.

According to chapter 8.1.1. of code P100-3/2019, for buildings with a level of fulfillment of the seismic composition conditions, $R1$ between 60-89, the buildings can be classified into the seismic risk class R_{sIII} .

2.10 Level of structural damage, R2

The level of structural damage, denoted by R2, which expresses the part of structural degradation produced by seismic action and other causes, is established based on the criteria in Annex D, page. D.3. of the P100-3/2019 code. It is found that the masonry walls have minor cracks, but there is an extensive area where the plaster is depreciated and the masonry has been subjected to the action of environmental factors. It is assessed that both vertical and horizontal elements are moderately affected on an area of max 1/3 of the entire area of the building. In conclusion, the score for the vertical elements $A_h=25$ points, respectively $A_v=65$ for the horizontal elements. In conclusion, for the degree of structural damage $R_2=90*0.8=72$ points.

According to chapter 8.1.1. from code P100-3/2019, for buildings with a degree of fulfillment of the seismic composition conditions, R2 between 70-90, the buildings can be classified into seismic risk class RsIII.

2.11 Evaluation summary

The construction subject to the expert report was assessed in accordance with the level 1 methodology.

Following the qualitative assessment of the level of fulfilling the seismic structure conditions R1, it obtained a total of 60 pts., falling into the seismic risk class RsIII.

Following the qualitative assessment of the level of structural damage R2, the structure obtained 72 pts., corresponding to the seismic risk class RsIII.

The assessment using the level 1 methodology indicates a minimum structural insurance level $R_3=73\%$. This is between 65% and 90%, which places the construction into the seismic risk class RsIII

Taking into account the values of the three indicators R1, R2 and R3, one considers, based on the code P100-3/2019, for the building of Gf- Gym Hall, located within the Technical Energy College, str. Electricienilor, no. 1, Sibiu Mun., Sibiu county, the seismic risk class RsIII. Seismic risk class Rs III includes buildings susceptible to moderate damage to the design earthquake action corresponding to the Ultimate Limit State, which may endanger the safety of users.

2.12 Proposals for intervention

The structure is classified into the seismic risk class RsIII, for which no intervention works are necessary for the strength structure.

The thermal refurbishment works are described below:

- replacement of the joinery, including the glazed part and sealing of the penetrations
- cladding of the perimeter walls on the outside with 15 cm thick mineral wool boards, fixed to the walls by gluing and with bolts and dowels inserted into drilled holes according to the manufacturers' instructions;

- application of plasters reinforced with synthetic fiber mesh over the thermal insulation;

- over the floor made of hollow strips at the last level, the current thermal and waterproofing assembly will be removed and a 25 cm thick wool thermal insulation will be installed;

Cladding the building with mineral wool and plaster does not bring significant additional loads and does not affect the integrity of the structural elements. Before enclosing the building, any defects in the structural elements will be repaired with epoxy mortars (chips, visible reinforcement, cracks, monolithics) as follows:

- the concrete surfaces with visible reinforcement will be treated by cleaning the reinforcement from rust and the concrete covering layer of the reinforcement will be restored.

- the metal sheet and the elements of the roof structure that are depreciated will be replaced, the roof layers will be restored and the missing, detached or degraded attic sheet metal sections will be completed. The load-bearing capacity of the roof structure and its anchoring method to the building will be checked;

- measures will be taken to remove accidental water losses

- the building will be surrounded by new sidewalks with appropriate slopes, sealed against the walls with bitumen plugs and the plaster of the plinths will be repaired where it is detached.

- if unsafe items are identified during the works, the builder will notify the designer and the expert in writing.

Regarding the Gf+2F building, the brise-soleil mounted in the entrance axes can be removed. Their dismantling will be done by cutting pieces that can be manipulated by man, without affecting the existing structure that remains. The vertical brise-soleil are made of masonry and are approximately 30 cm thick and are connected to the reinforced concrete columns. There are horizontal brise-soleil that are connected to the reinforced concrete belts of the structure. The dismantling will start with the vertical brise-soleil. These are cut at the edge of the reinforced concrete column without affecting its integrity. The cutting will be done in easily manipulated pieces that will not be stored on the floor or on the horizontal brise-soleil. The cut reinforcements that ensured cooperation with the column will be covered with paint immediately after cutting. No stirrups or longitudinal bars of the column will be cut.

After removing the vertical brise-soleil, the horizontal ones will be removed. Provisional support will be provided for the lintels and they will be cut with a diamond disc at the face of the beam in which they are anchored. The cutting will be done in small, easily manageable pieces. Special attention will be paid so that the reinforced concrete section or the remaining belt or beam reinforcements are not affected during cutting. The exposed reinforcements will be covered with a passivating agent and epoxy mortar immediately after cutting. The lintels will be dismantled by breaking, which could introduce vibrations into the remaining structural elements. The rubble will not be stored at the floor level and will be removed as the work progresses. The following steps will be taken to create new openings and to build existing door openings. For one of the classes, the position of the access door in the classroom will be changed. The plaster on the masonry wall will be removed along the entire length of the gap area.

If reinforced concrete strength elements are identified, these will be reported to the expert and designer in order to find a new solution or a new position of the gaps. The masonry will be dismantled over the entire height of the floor over a length equal to the provided gap, to which 25 cm is added to the left and right of the new door. The dismantling will leave the existing masonry beams visible. 2 reinforced concrete pillars 25x25 cm will be made on each side of the door with a lintel at its upper part. The pillars are anchored with chemically monolithic bars in the belt at the upper and lower part of the pillar. The existing door gap is closed with solid pressed masonry built in beams to achieve the continuity of the masonry wall. Alternatively, 15 cm reinforced concrete pillars can be provided that will be poured into the beams of the new and existing masonry.

3 Conclusions

3.1 The Highschool building, with the height regime Gf+2F located within the Technical Energy College, str. Energeticienilor, no. 1, Sibiu Mun, Sibiu county, consists into three independent sections. The building was designed in 1966 and built in the immediate period.

3.2. Building Gf+2F is designed as a building which lateral rigidity is assured by an orthogonal system of reinforced concrete frames that collaborate with an orthogonal system of masonry diaphragms. Buildings A and B are provided with a hall and classrooms built in 3 spans of 3 m. Building C consists in two classrooms and a staircase providing the vertical circulation..

3.3. Building Gf is in good technical condition although it has suffered three significant earthquakes, it is well maintained, has an orderly structure with sufficient shear surfaces, and following the evaluation it was classified as a structurally sound building according to P100-3/2019 normative, into the RsIII seismic risk class.

3.4. Cladding the building with polystyrene boards protected with plaster does not bring additional loads and does not affect the integrity of the structural elements. Before enclosing the building, any defects in the structural elements will be repaired with epoxy mortars (chips, apparent reinforcement, cracks, monolithics).

3.5. Building maintenance works will be carried out as to remove the causes of the degradations described, namely:

- measures will be taken to seal the joint between the sidewalk and the house
- downpipes that are too short and without spouts will be extended to the ground and measures will be taken to remove water from the building;
- the building will be surrounded with new sidewalks with appropriate slopes, sealed against the walls with bitumen plugs and the base plaster will be repaired where it is detached.
- depreciated and dilapidated plasters will be removed and replaced with new plasters
- brice-soleils installed in the entrance axes can be removed;
- the new door gaps can be built, being also provided by the masonry of the current ones with monitoring the steps mentioned in the chapter proposals for intervention

3.8 Other recommendations

The work must be carried out by teams of qualified workers under the guidance of a technical staff and under the supervision of the site manager, certified by MLPAT.

For all the works carried out, hidden work reports will be drawn up. Works carrying out will be led by experienced technical staff, who are directly responsible for training the staff performing the operations and for complying with the technological sheets regarding the execution of work at height.

The dangerous area in the immediate vicinity of the building undergoing thermal refurbishment will be marked with warning signs and will be supervised by trained staff. At the start of the execution, a panel will be displayed in a visible place, throughout the works duration, to identify the investment, according to MLPAT Order no. 63/N of 11.08.1998

10 days before starting the thermal refurbishment works, the Territorial Inspectorate for Construction will be notified, for taking into account and approving the determined phase program.

All the breaks that are necessary for replacing the joinery or restoring the terrace insulation will be done manually, so as not to give rise to additional vibrations, disturbing the structure. The builder will take measures for the immediate removal of the rubble resulting from the removal of plaster, terrace layers, etc., cleaning the common-use spaces (sidewalk) every day.

The execution of the terrace insulation works will be done in sections, depending on the builder's equipment, on areas that can be protected in the event of inclement weather, which could affect the finishes of the classrooms located on the last floor.

During the execution, no changes will be made to the position of the ventilation grids, the drainage columns and the terrace slopes.

The thermal restoration of the entrance will be carried out after the execution of the terrace insulation restoration works. The contractor will draw up a verified site organization project, including the entrance scaffolding anchoring system.

The builder who carries out the thermal refurbishment has to take all measures to protect the surroundings (transmission of strong vibrations or shocks, splashing of material, strong dust release, to ensure the necessary accesses, etc.)

Technical Expert Report

In order to prevent any work accidents and the consequences harmful to hygiene and human health, measures will be taken to know, acquire and observe the obligations of the following normative acts:

- General labor protection rules drafted by the Ministry of Labor and Social Protection and by the Ministry of Health;
- Labor Protection Law no. 319/2006;
- GR no. 300/2006-Minimum safety and health requirements for temporary or mobile construction sites;
- GR no. 1048/2006- Minimum safety and health requirements for the use of personal protection equipment by workers at work;
- GR no. 1051/2006- Minimum safety and health requirements for the manual handling of masses that pose risks to workers;
- GR no. 1091/2006 Minimum safety and health requirements for the workplace;
- IM 006/1996-Specific labor protection standards for masonry and finishing works (BC10/1996);
- MLPAT Order no. 9/N/15.03.1993-Regulation on labor protection in construction (Constructions Journal no. 5, 6, 7/1993).
- P118/1999 Fire protection regulation;
- MDLPL Order no. 269/04.03.2008 and Ministry of Home Affairs and Administrative Reform no. 431/31.03.2008 Regulation on the classification of construction products based on fire behavior performance - Fire reaction classes.

3.9. Under the conditions described in this expert report, the thermal refurbishment works for the Highschool Building belonging to Sibiu Technical Energy College are approved, considering that the current safety level of the building to gravitational and horizontal loads is not changed and the current classification of the building into the seismic risk class Rs III is not changed.

DRAFTED BY

Date

Eng. GAVRIL POP, technical expert certified by MLPAT 03.2025

Illegible signature,

Official stamp

Attached:

- photo survey;
- building survey drafted by S.C. Allbizz S.R.L. .

Technical Expert Report

for the site: Highschool Gf+2F within Technical Energy College, Electricienilor Street, no. 1, Sibiu Mun, Sibiu County



Photo 1. View from Semaforului street



Photo 2 – Entrance from Electricienilor street



Photo 3 – Photo from thermal system. Some plaster degradations can be seen.

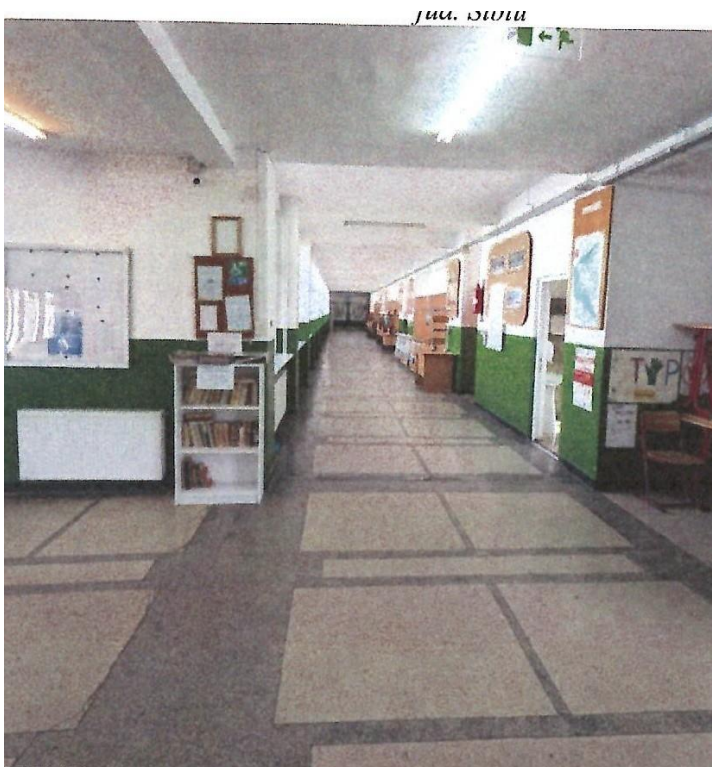


Photo 4 – Photo from the main corridor of building A



Photo 5. Photo in the classroom of building C shows the floor with dense ribs.



Photo 6 - entrance photo. one can see some parts on which the plaster fell and the absence of the guardrail on one side



Photo 7 - one can see the corner reinforced concrete column

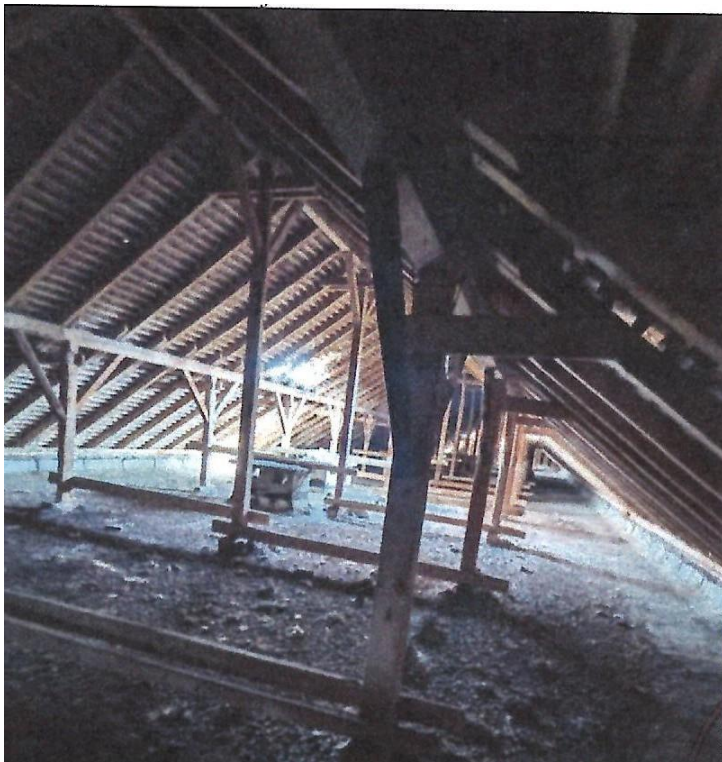


Photo 8 - Photo from the attic , one can see the shoring props, panels and rafters spaced at 70 cm



Photo 9 - Photo with the additional framework structure



Photo 10 - Joint between section A and C improperly treated



Photo 11 – Entrance from Electricienilor street. One can see the brice-soleil with the plaster fallen.

