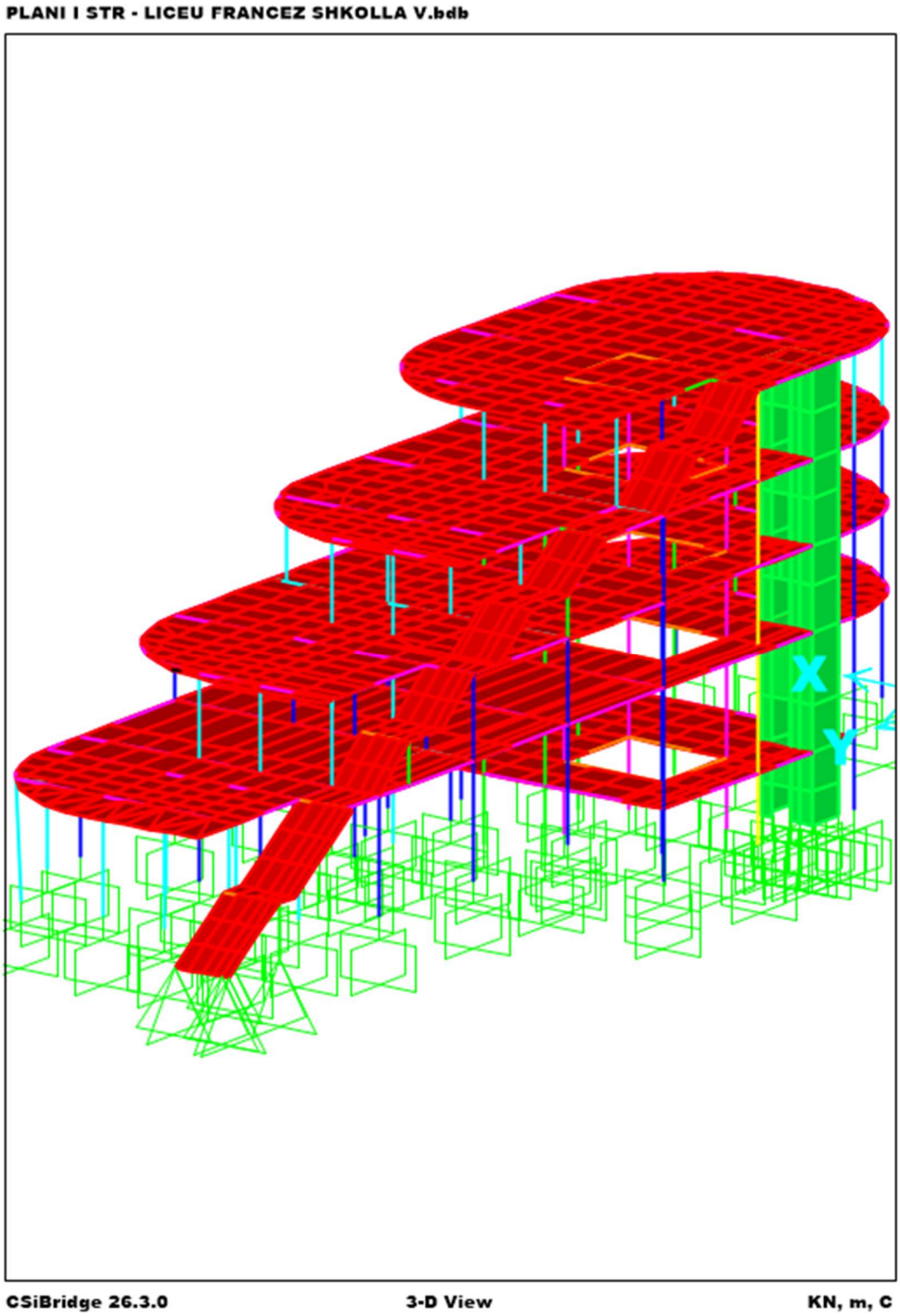
1.1.2.3. 3D Analysis model



FEM model

1.2. Loads

1.2.1. Self – weight (SW), Superimposed Load (SID), Imposed Live Load (LL)

Load Pattern Definitions

File View Edit Format-Filter-Sort Sele

Units: As Noted

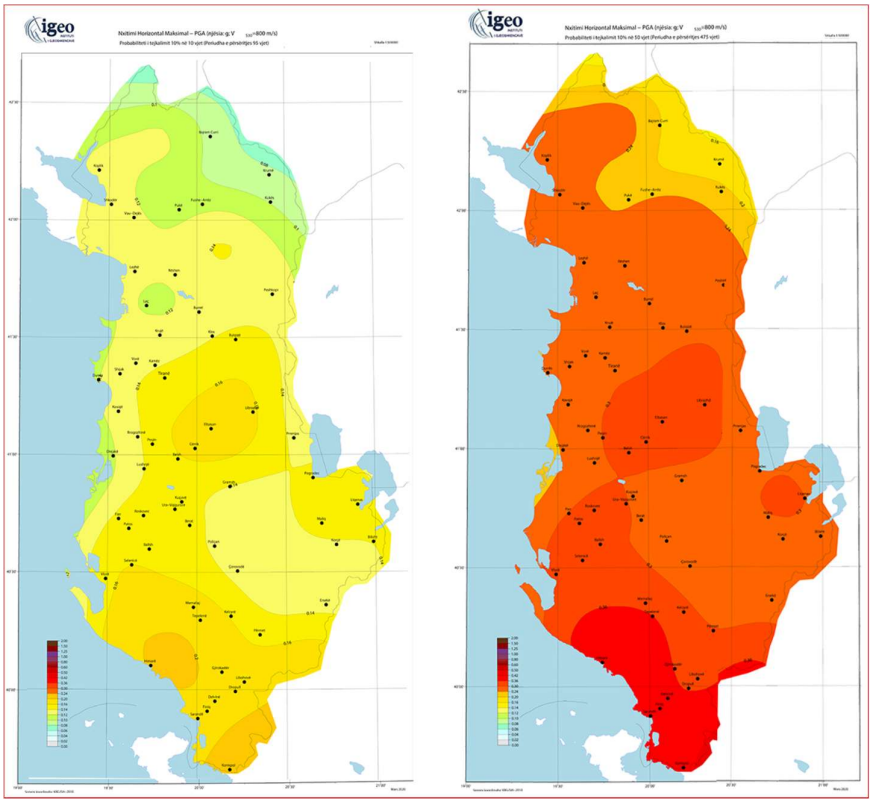
Filter:

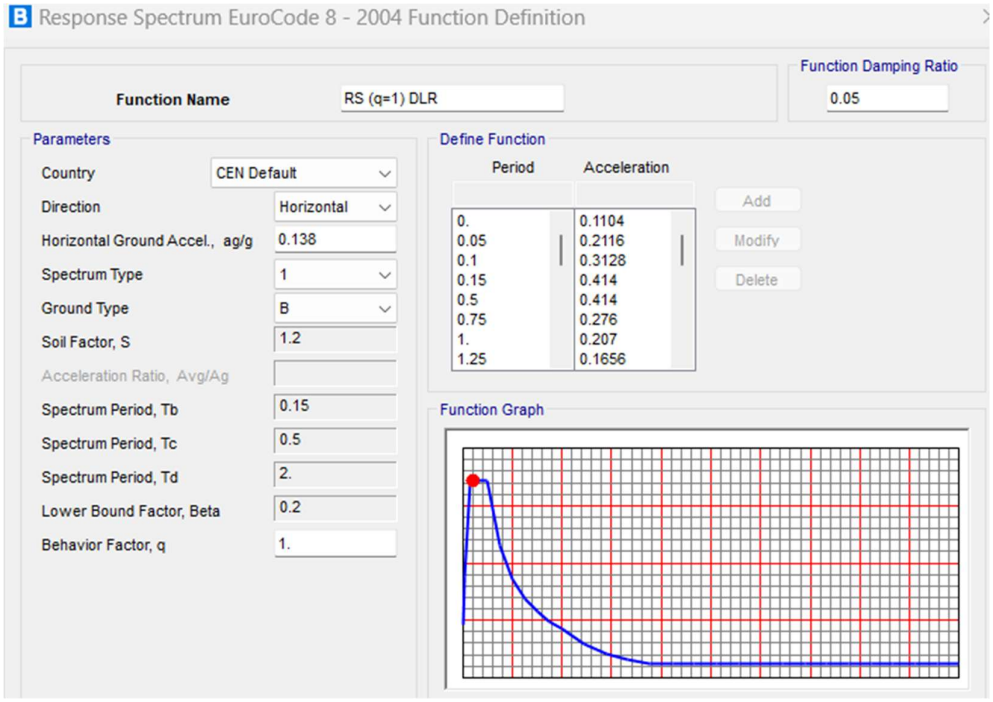
	LoadPat Text	DesignType Text	SelfWtMult Unitless
▶	GK	Dead	1
	GK2	Dead	0
	Q1-FLOOR	LL Surchr	0
	Q2-ROOF	LL Surchr	0

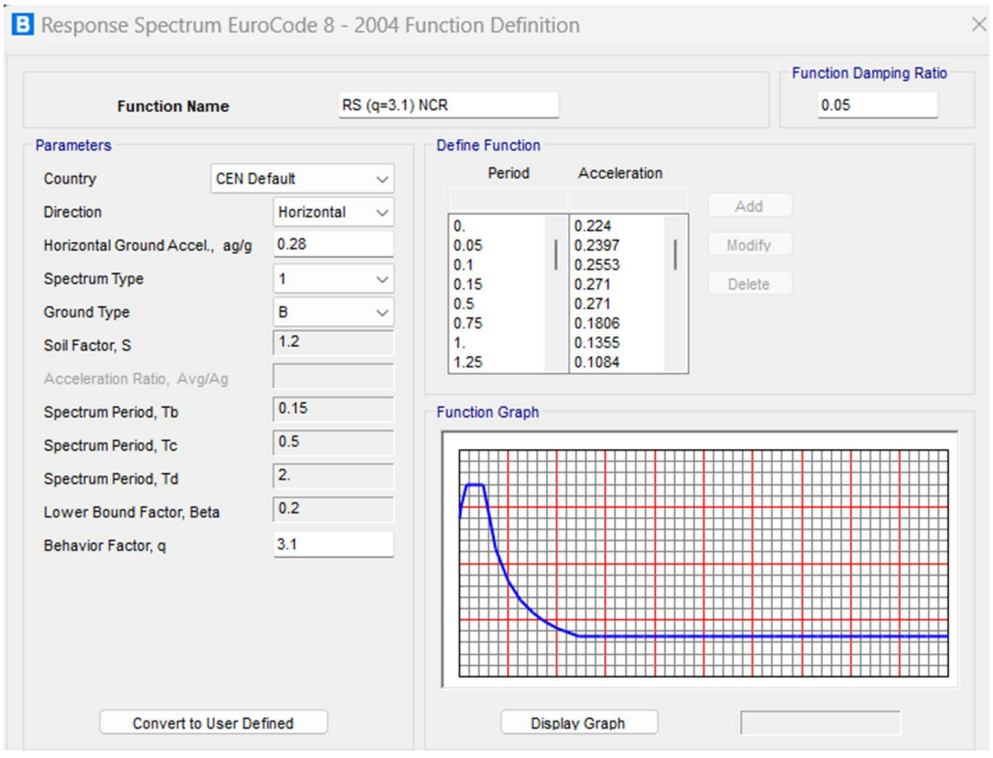
1.2.2. Seismic Load

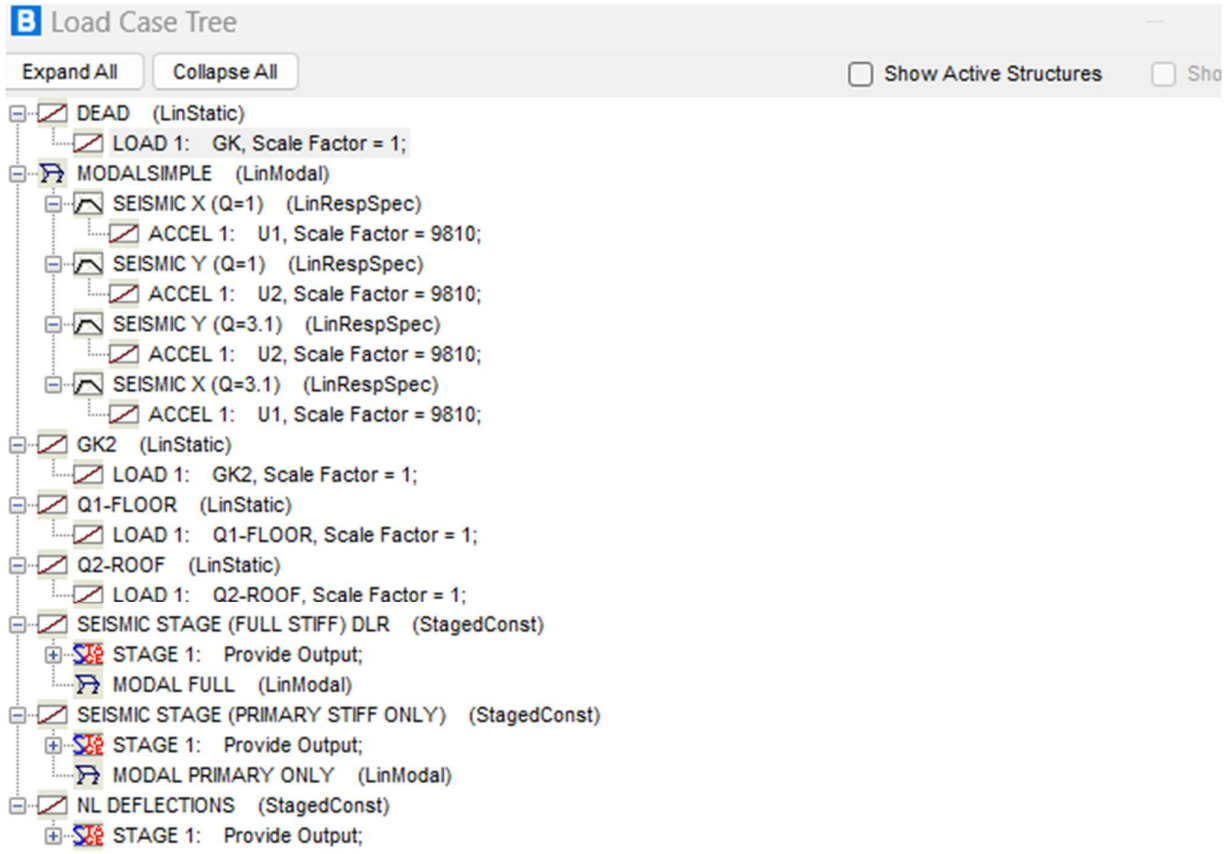
The seismic load acting on the structure has been determined in accordance with the seismic hazard map of the Republic of Albania, developed by IGJEUM. The ground acceleration has been considered for both the design earthquake (with a return period of 475 years) and the service earthquake (with a return period of 95 years).

	Korçë	0.138	0.280
	Qëndër Bulgarec	0.143	0.290



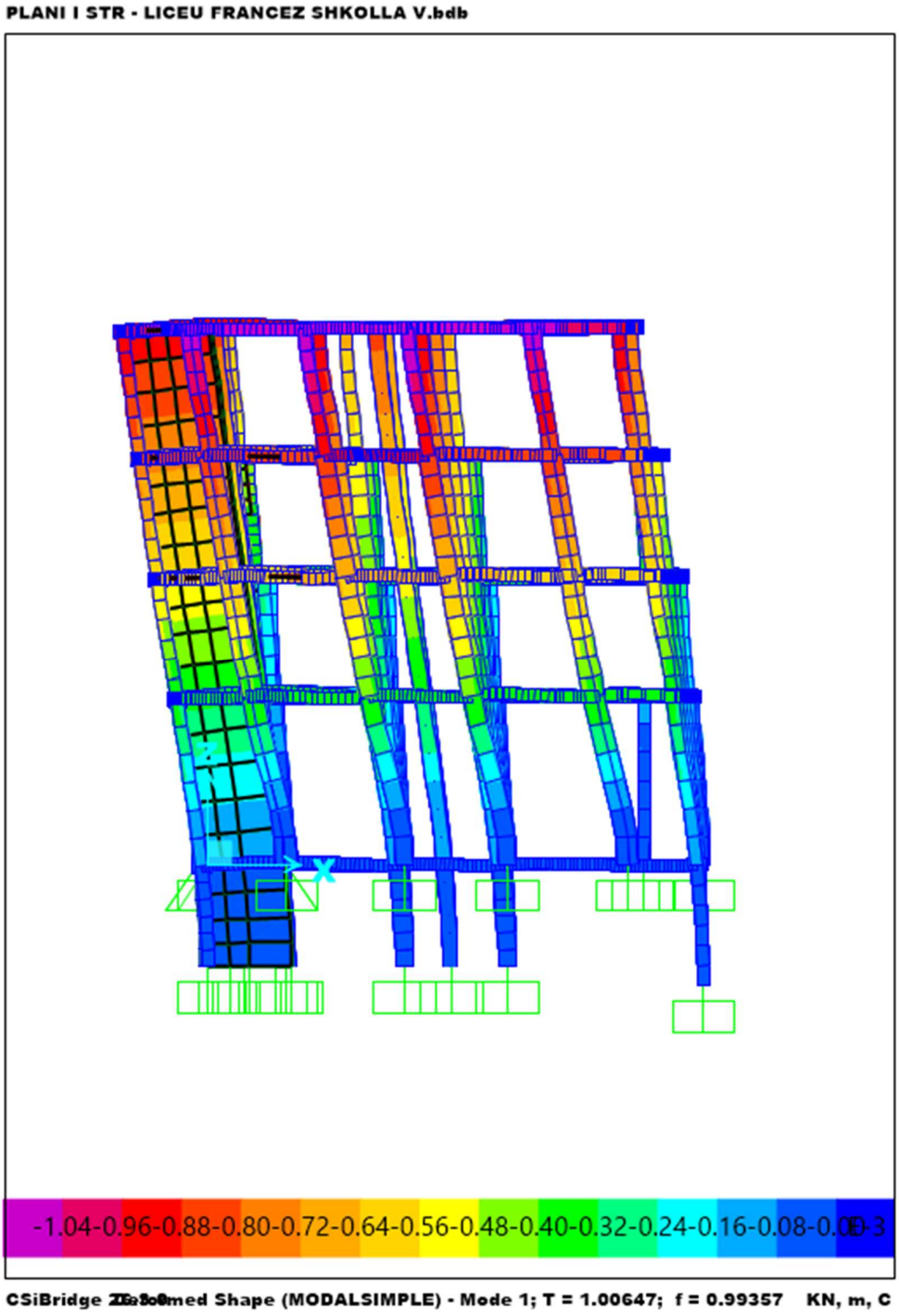

Response Spectrum EuroCode 8 - 2004 Function Definition
Function Name
RS (q=1) DLR
Function Damping Ratio
0.05
Parameters
Country
CEN Default
Direction
Horizontal
Horizontal Ground Accel., ag/g
0.138
Spectrum Type
1
Ground Type
B
Soil Factor, S
1.2
Acceleration Ratio, Avg/Ag
Spectrum Period, Tb
0.15
Spectrum Period, Tc
0.5
Spectrum Period, Td
2.
Lower Bound Factor, Beta
0.2
Behavior Factor, q
1.
Define Function
Period
Acceleration
0. 0.1104
0.05 0.2116
0.1 0.3128
0.15 0.414
0.5 0.414
0.75 0.276
1. 0.207
1.25 0.1656
Add
Modify
Delete
Function Graph


Response Spectrum EuroCode 8 - 2004 Function Definition
Function Name
RS (q=3.1) NCR
Function Damping Ratio
0.05
Parameters
Country
CEN Default
Direction
Horizontal
Horizontal Ground Accel., ag/g
0.28
Spectrum Type
1
Ground Type
B
Soil Factor, S
1.2
Acceleration Ratio, Avg/Ag
Spectrum Period, Tb
0.15
Spectrum Period, Tc
0.5
Spectrum Period, Td
2.
Lower Bound Factor, Beta
0.2
Behavior Factor, q
3.1
Define Function
Period
Acceleration
0. 0.224
0.05 0.2397
0.1 0.2553
0.15 0.271
0.5 0.271
0.75 0.1806
1. 0.1355
1.25 0.1084
Add
Modify
Delete
Function Graph
Convert to User Defined
Display Graph

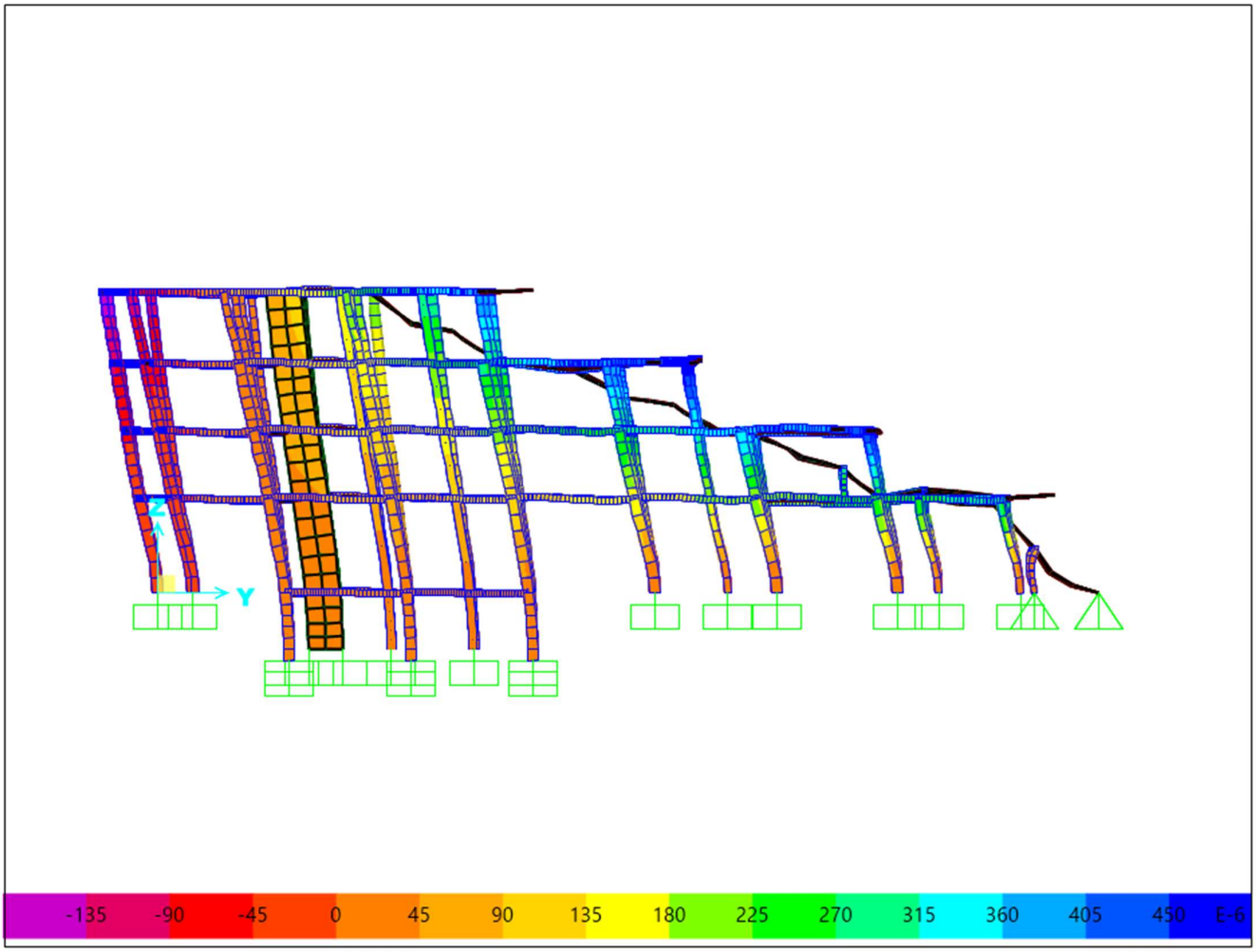

Load Case Tree
Expand All
Collapse All
Show Active Structures
DEAD (LinStatic)
LOAD 1: GK, Scale Factor = 1;
MODALSIMPLE (LinModal)
SEISMIC X (Q=1) (LinRespSpec)
ACCEL 1: U1, Scale Factor = 9810;
SEISMIC Y (Q=1) (LinRespSpec)
ACCEL 1: U2, Scale Factor = 9810;
SEISMIC Y (Q=3.1) (LinRespSpec)
ACCEL 1: U2, Scale Factor = 9810;
SEISMIC X (Q=3.1) (LinRespSpec)
ACCEL 1: U1, Scale Factor = 9810;
GK2 (LinStatic)
LOAD 1: GK2, Scale Factor = 1;
Q1-FLOOR (LinStatic)
LOAD 1: Q1-FLOOR, Scale Factor = 1;
Q2-ROOF (LinStatic)
LOAD 1: Q2-ROOF, Scale Factor = 1;
SEISMIC STAGE (FULL STIFF) DLR (StagedConst)
STAGE 1: Provide Output;
MODAL FULL (LinModal)
SEISMIC STAGE (PRIMARY STIFF ONLY) (StagedConst)
STAGE 1: Provide Output;
MODAL PRIMARY ONLY (LinModal)
NL DEFLECTIONS (StagedConst)
STAGE 1: Provide Output;

1.3. Results

1.3.1. Modal shapes

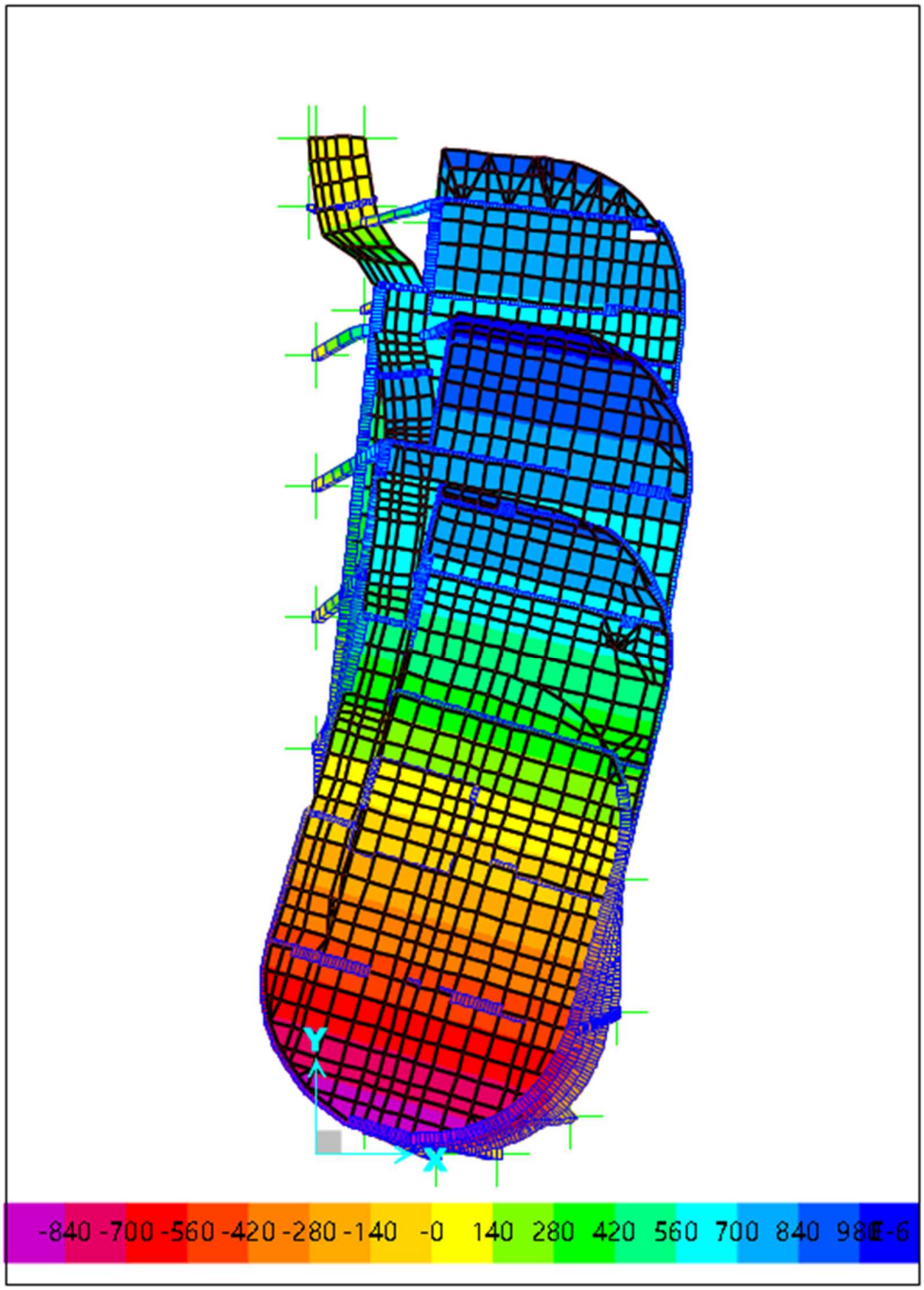


PLANI I STR - LICEU FRANCEZ SHKOLLA V.bdb



CSiBridge 26.3.0 **Deformed Shape (MODALSIMPLE) - Mode 2; T = 0.87624; f = 1.14123** **KN, m, C**

PLANI I STR - LICEU FRANCEZ SHKOLLA V.bdb



CSiBridge 2[illegible]med Shape (MODALSIMPLE) - Mode 3; T = 0.69332; f = 1.44234 KN, m, C

Modal Participating Mass Ratios

File View Edit Format-Filter-Sort Select Options

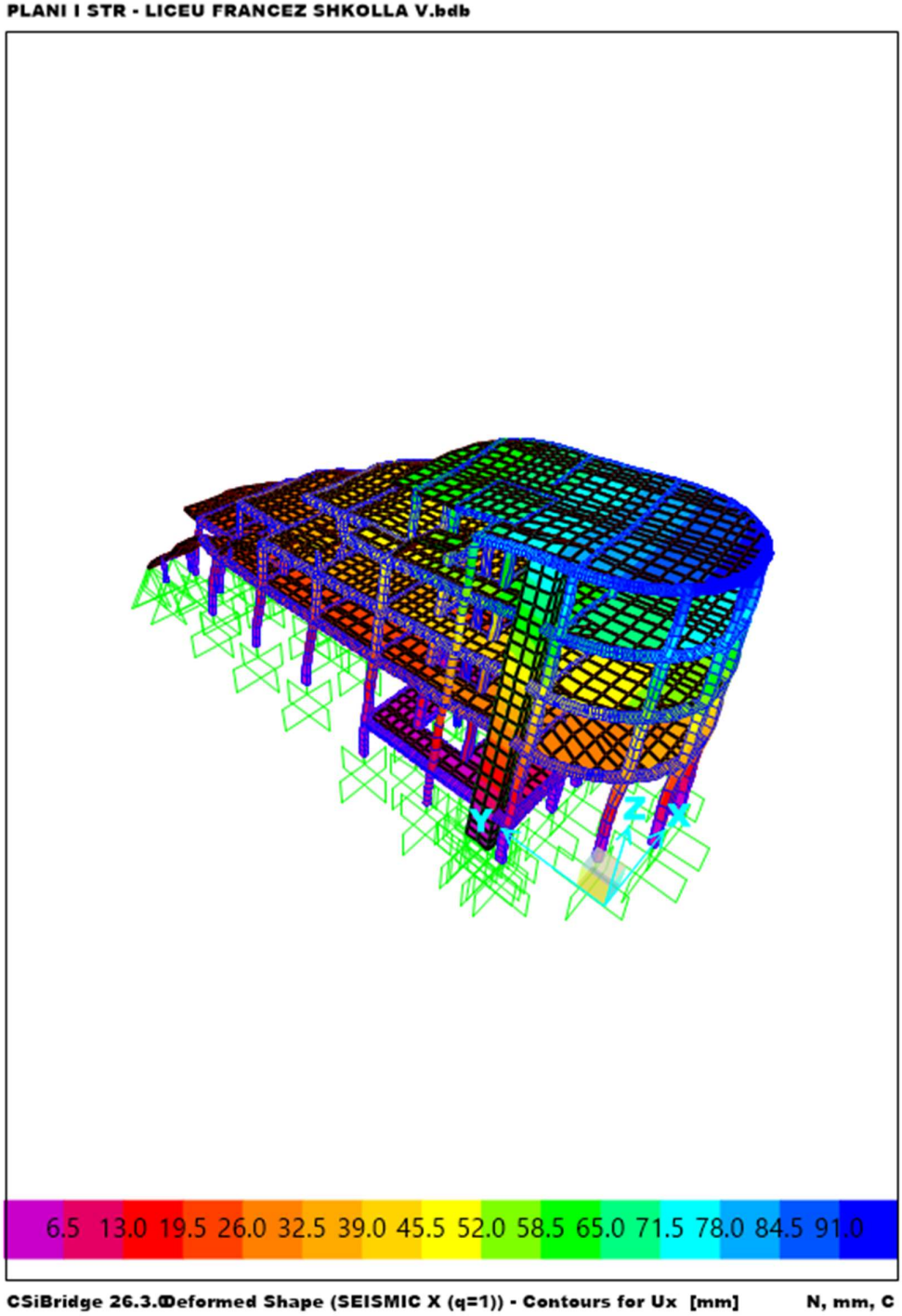
Units: As Noted

Filter:

	OutputCase Text	StepType Text	StepNum Unitless	Period Sec	UX Unitless	UY Unitless	UZ Unitless	SumUX Unitless	SumUY Unitless	SumUZ Unitless	RX Unitless	RY Unitless	RZ Unitless	SumRX Unitless	SumRY Unitless	SumRZ Unitless
▶	MODALSIMPLE	Mode	1	1.006473	0.67311	0.04055	7.126E-05	0.67311	0.04055	7.126E-05	0.00124	0.1133	0.10421	0.00124	0.1133	0.10421
	MODALSIMPLE	Mode	2	0.876244	0.09177	0.65641	1.159E-06	0.76488	0.69696	7.242E-05	0.02293	0.0024	0.05451	0.02417	0.1157	0.15872
	MODALSIMPLE	Mode	3	0.693316	0.07887	0.10294	1.024E-05	0.84376	0.7999	8.265E-05	0.00454	0.01532	0.67144	0.02872	0.13103	0.83016
	MODALSIMPLE	Mode	4	0.396879	0.01493	0.04603	2.129E-05	0.85869	0.84593	0.0001	0.0132	0.03929	0.03491	0.04192	0.17031	0.86507
	MODALSIMPLE	Mode	5	0.294799	0.0471	0.0344	0.00073	0.90579	0.88033	0.00083	0.02848	0.12032	0.00041	0.0704	0.29064	0.86547
	MODALSIMPLE	Mode	6	0.262294	0.01406	1.727E-06	7.868E-05	0.91984	0.88033	0.00091	0.00067	0.04019	0.07536	0.07107	0.33082	0.94083
	MODALSIMPLE	Mode	7	0.246314	0.00016	0.00045	0.0099	0.92	0.88078	0.01081	0.0004	0.00353	0.00011	0.07146	0.33436	0.94094
	MODALSIMPLE	Mode	8	0.235618	0.01418	0.0505	0.00017	0.93418	0.93128	0.01098	0.0256	0.02119	0.01047	0.09706	0.35555	0.95141
	MODALSIMPLE	Mode	9	0.2032	1.529E-05	6.071E-07	0.01105	0.93419	0.93128	0.02203	0.02075	0.00545	9.554E-07	0.11782	0.361	0.95141
	MODALSIMPLE	Mode	10	0.184644	0.00399	5.987E-05	0.00258	0.93818	0.93134	0.02461	0.00327	0.00277	0.00294	0.12108	0.36376	0.95435
	MODALSIMPLE	Mode	11	0.168234	3.812E-05	0.00067	0.00577	0.93822	0.93201	0.03038	9.822E-05	0.00667	5.402E-05	0.12118	0.37044	0.95441
	MODALSIMPLE	Mode	12	0.16009	5.063E-06	0.00018	0.00254	0.93822	0.93219	0.03292	0.01555	0.00055	1.248E-05	0.13674	0.37099	0.95442

Mass participations on the modes

1.3.2. Max displacement and interstory drifts



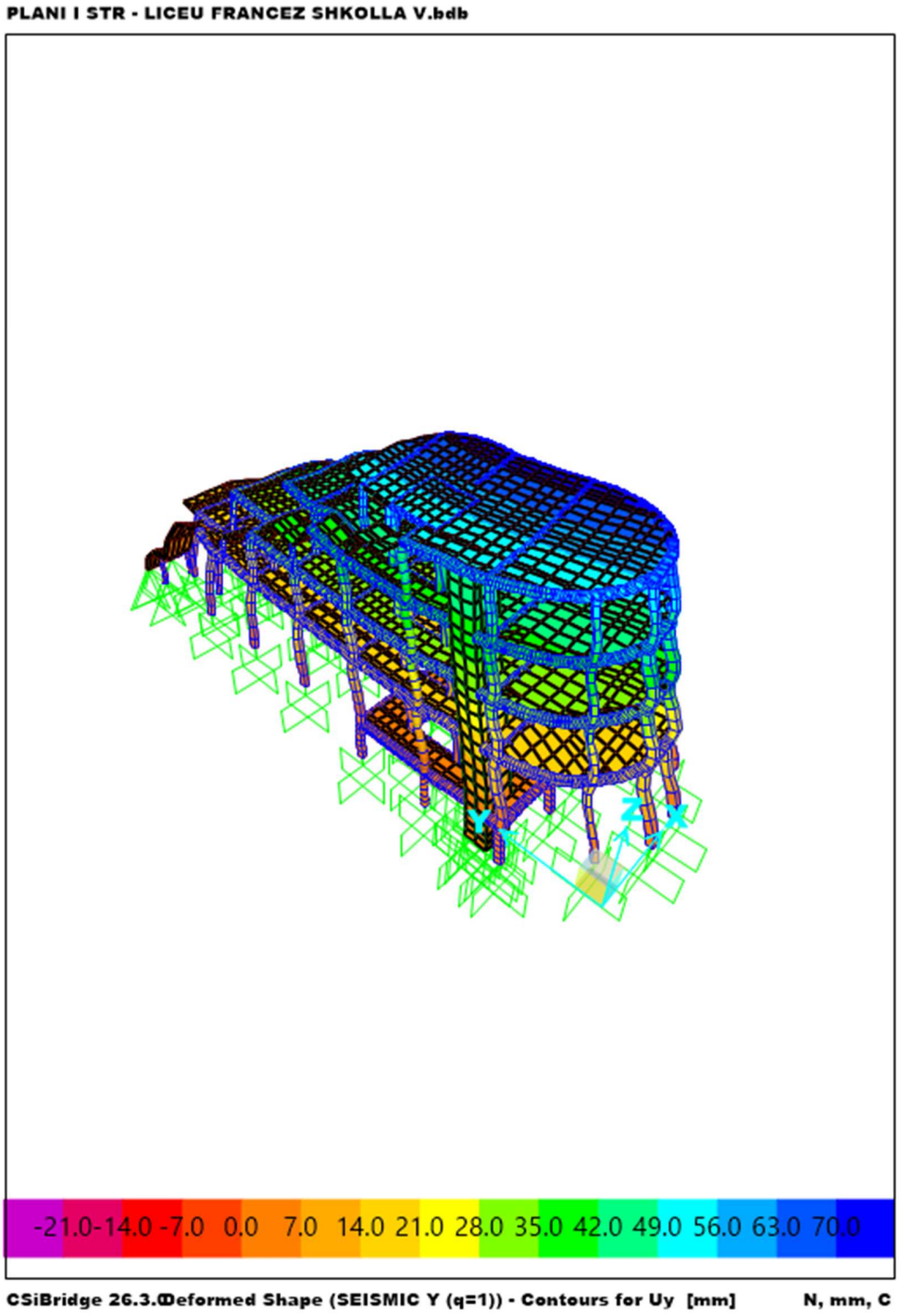
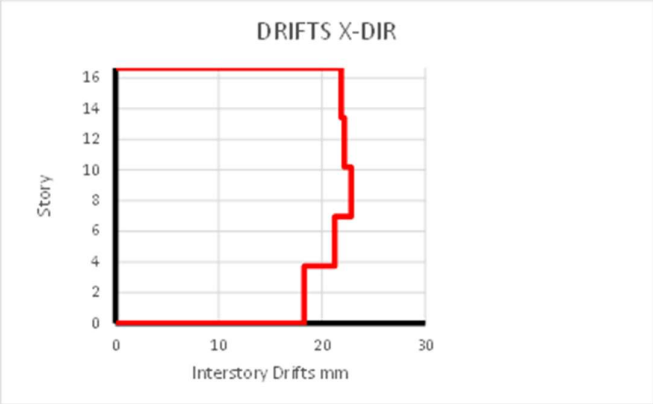

PLANI I STR - LICEU FRANCEZ SHKOLLA V.bdb
-21.0 -14.0 -7.0 0.0 7.0 14.0 21.0 28.0 35.0 42.0 49.0 56.0 63.0 70.0
CSiBridge 26.3.0 Deformed Shape (SEISMIC Y (q=1)) - Contours for Uy [mm]
N, mm, C

TABLE: Joint Displacements							
Joint	OutputCase	CaseType	StepType	U1	drv	drv/h	Limitations
Text	Text	Text	Text	mm	mm	-	
0	SEISMIC X (q=1)	LinRespSpec	Max	0	0	0	
FIRST ST	SEISMIC X (q=1)	LinRespSpec	Max	18.26985	18.26985	0.004898	**0.0075**
SECONF FLOOR	SEISMIC X (q=1)	LinRespSpec	Max	39.501406	21.23156	0.006573	**0.0075**
THIRD FLOOR	SEISMIC X (q=1)	LinRespSpec	Max	62.318261	22.81686	0.007064	**0.0075**
FOURTH FLOOR	SEISMIC X (q=1)	LinRespSpec	Max	84.475915	22.15765	0.00686	**0.0075**
ROOF	SEISMIC X (q=1)	LinRespSpec	Max	106.331783	21.85587	0.006767	**0.0075**



From the review of the drift table, it is observed that the drifts are within the limiting values specified by Eurocode 8, under the condition that the non-structural elements are ductile. The drift check has been performed for the serviceability limit state. The stiffness of the structure has been reduced by 50% in order to account for the cracked section. The structure has been analyzed for the serviceability earthquake

TABLE: Joint Displacements - Absolute							
Joint	OutputCase	CaseType	StepType	U2	drv	drv/h	Limitations
Text	Text	Text	Text	mm	mm	-	-
0	SEISMIC Y (q=1)	LinRespSpec	Max	0			
FIRST ST	SEISMIC Y (q=1)	LinRespSpec	Max	*5.20*	5.20	0.0014	**0.005**
SECONF FLOOR	SEISMIC Y (q=1)	LinRespSpec	Max	*24.04*	18.85	0.0032	**0.005**
THIRD FLOOR	SEISMIC Y (q=1)	LinRespSpec	Max	*40.75*	16.71	0.0042	**0.005**
FOURTH FLOOR	SEISMIC Y (q=1)	LinRespSpec	Max	*56.78*	16.03	0.0040	**0.005**
ROOF	SEISMIC Y (q=1)	LinRespSpec	Max	*74.53*	17.74	0.0042	**0.005**

Drifts are within limits

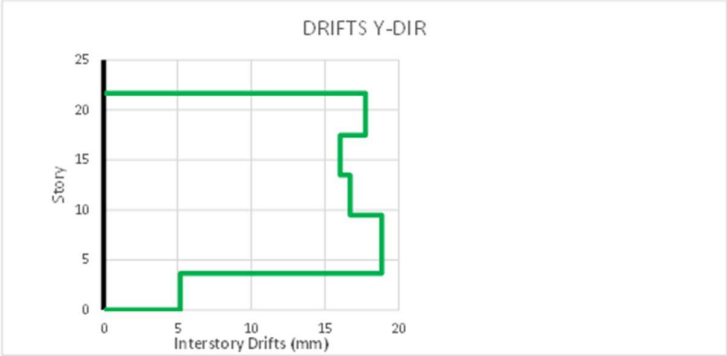
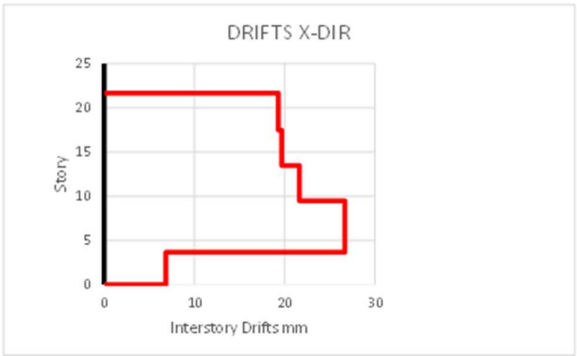
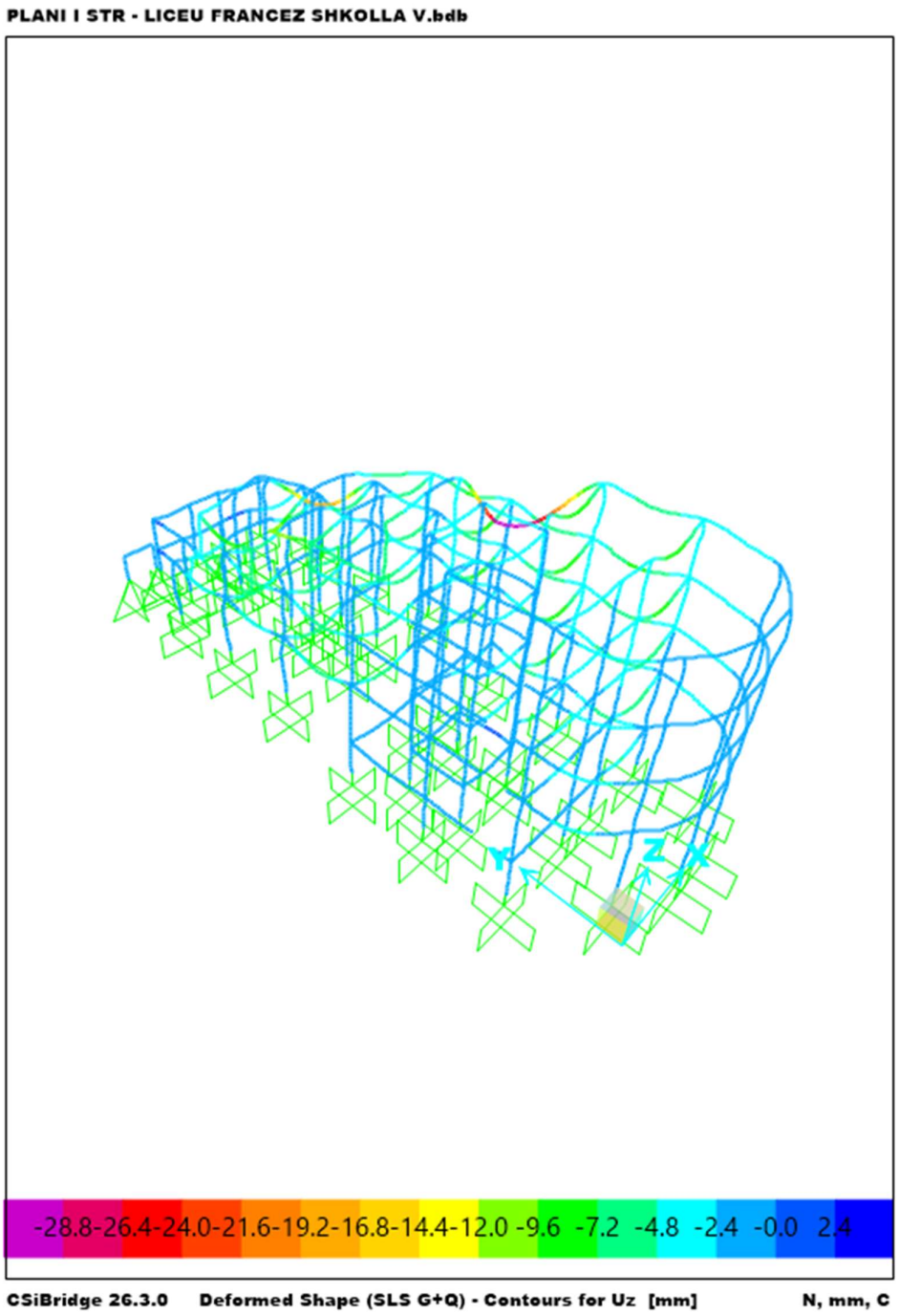


TABLE: Joint Displacements							
Joint	OutputCase	CaseType	StepType	U1	drv	drv/h	Limitations
Text	Text	Text	Text	mm	mm	-	
0	SEISMIC X (q=1)	LinRespSpec	Max	*0.00*	0.00	0	
FIRST ST	SEISMIC X (q=1)	LinRespSpec	Max	*6.84*	6.84	0.0019	**0.005**
SECONF FLOOR	SEISMIC X (q=1)	LinRespSpec	Max	*33.50*	26.66	0.0046	**0.005**
THIRD FLOOR	SEISMIC X (q=1)	LinRespSpec	Max	*55.13*	21.63	0.0054	**0.005**
FOURTH FLOOR	SEISMIC X (q=1)	LinRespSpec	Max	*74.80*	19.67	0.0049	**0.005**
ROOF	SEISMIC X (q=1)	LinRespSpec	Max	*94.11*	19.31	0.0046	**0.005**

Drifts are within limits



1.3.3. Deflections



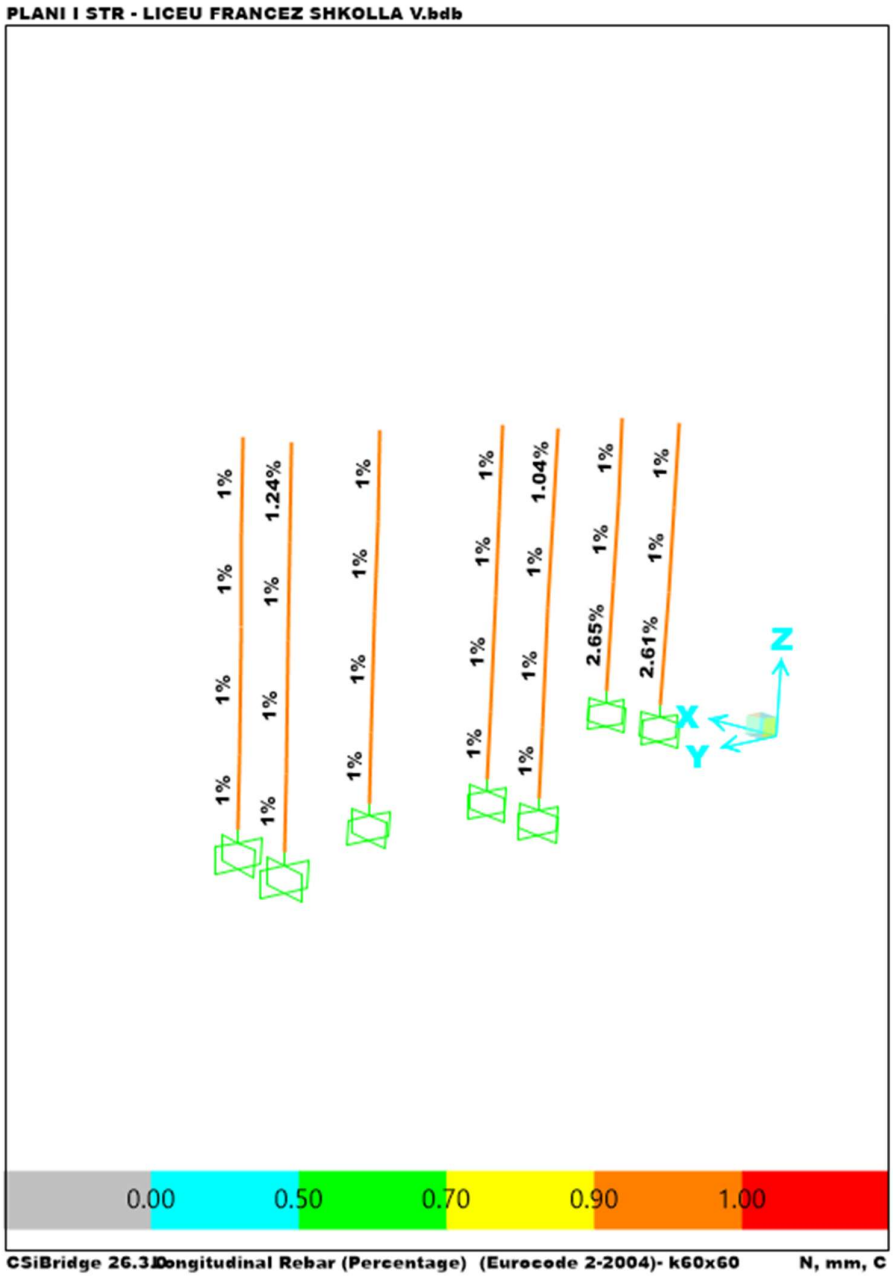
Max displacements 29mm

Limitation L/300=8000/250=32mm>29mm

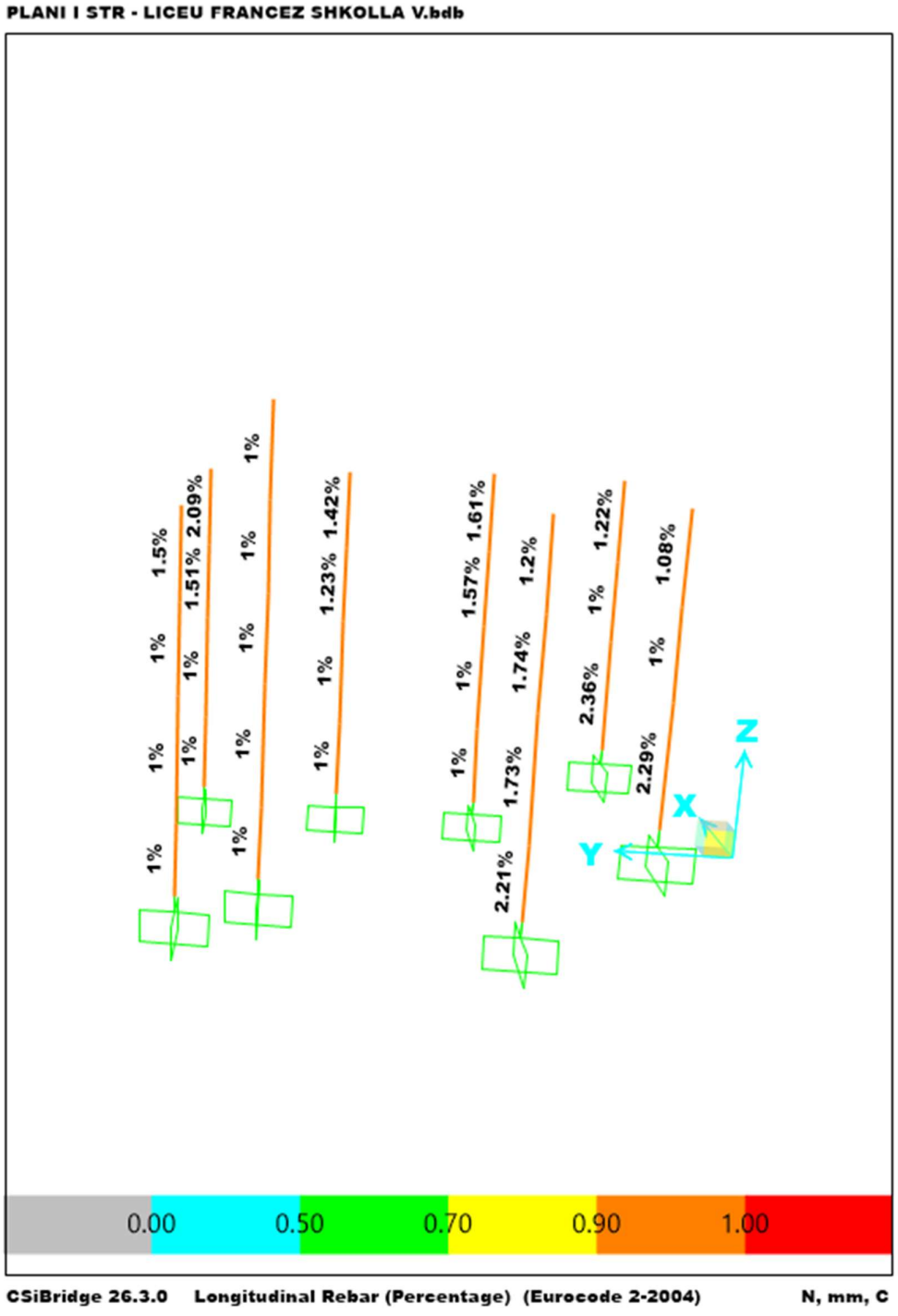
The long-term deflections are within limits, but more refine analysis must consider/perform for the Detailed design stage.

1.3.4. Steel reinforcement of structural elements

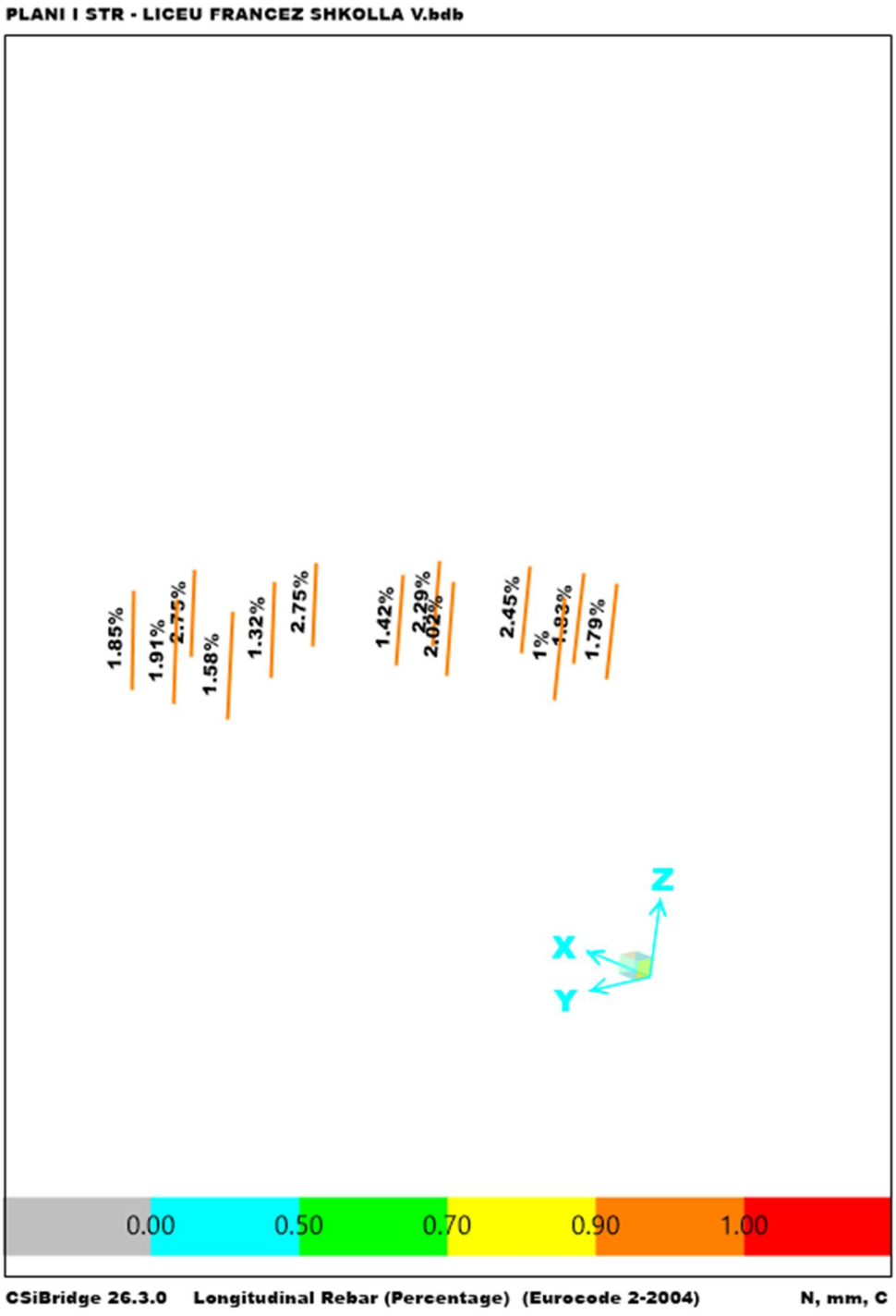
Columns K60x60



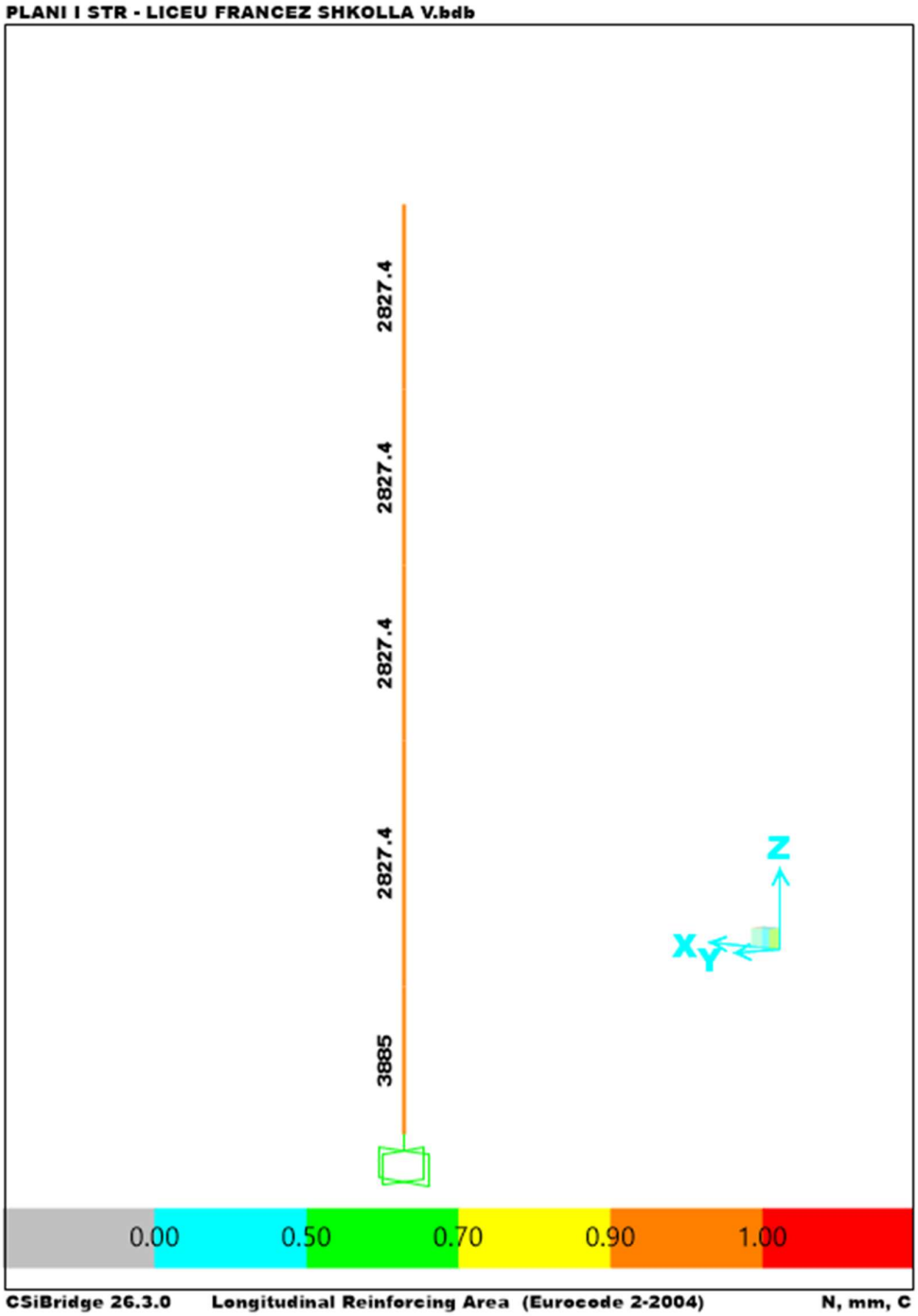
Columns K40x60



Columns K40x40

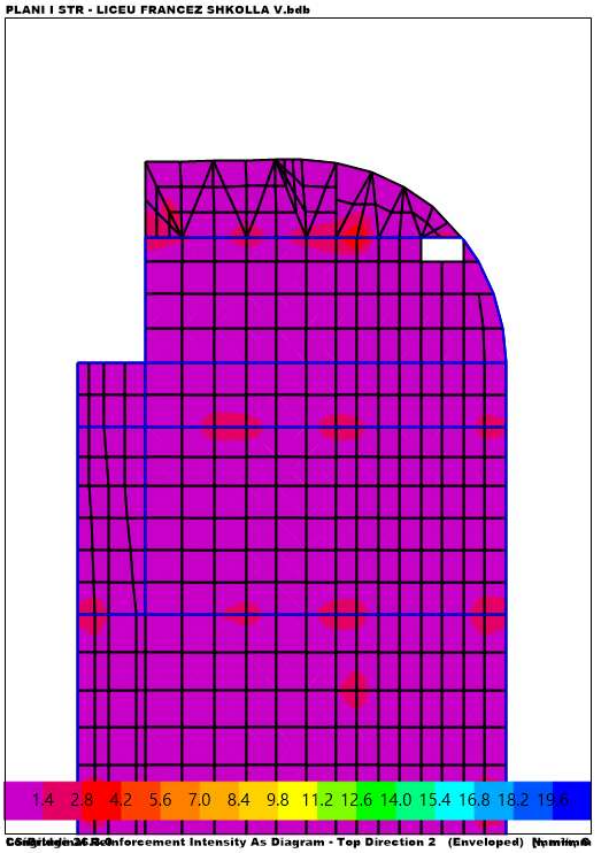


Column D60


PLANI I STR - LICEU FRANCEZ SHKOLLA V.bdb
2827.4
2827.4
2827.4
2827.4
3885
Z
X
Y
0.00
0.50
0.70
0.90
1.00
CSiBridge 26.3.0
Longitudinal Reinforcing Area (Eurocode 2-2004)
N, mm, C

Slab reinforcement

Bottom at span 1000mm2/m



Top at cantilever 2000mm2/m

Conclusion

- The structure has been designed in accordance with the Structural Eurocodes.
- The structural drifts and displacements satisfy the limitations specified by Eurocode 8.
- The structure meets the Life Safety performance level.

Ing. Arben Dervishaj

Ing. Ermal Spahiu

TECHNICAL REPORT OF ELECTRICAL PROJECT

Project:	Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça
Object:	Dormitory Building
Client:	Albanian Development Fund
Location:	Korça, Korça Municipality
Electrical Eng:	Besart DALLIU, Lic. No: E.1412/2
Electrical Eng:	Bashkim SHAHINAJ, Lic. No: E.0185/6

JANUARY / 2026

Content

1. GENERAL

1.1 Entry

Electrical installation works must respect all design conditions and standards that are currently in force in Albania (KTP - STASH) and for special elements that are not provided for in these standards, we must refer to Euro norms (EN) and Eurostandards (EN, ED) and the recommendations of CEI, CENELC, DIN, VDI/VDE.

The design of the electrical project of the facility will include the construction of the following electrical systems:

1. *Fire Detection System*
2. *System of Metallic Cable trays;*
3. *Power Grid System;*
4. *Normal Lighting System;*
5. *Emergency and Evacuation Lighting System;*
6. *IT and Wi-Fi system;*
7. *SystemCCTV;*
8. *System of Emergency Voice Alarm Communication;*
9. *Grounding and Atmospheric Protection System*
10. *Low voltage Electrical single line diagram;*

The design of the above electrical systems for the "Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça – Dormitory Building" building, located in municilality of Korça, was done by adapting and responding to the requirements set forth in the design task. The construction of electrical systems will be closely related to the interior space of the building.

The electric project foresees energy supply and solutions for electrical installations and security systems in the building. The calculations were made based on the power of the mechanical equipment given by the mechanical designer as well as on other loads, mainly lighting, service plugs, workstations, mechanical equipment, etc.

1.2 Quality of material and place of installation

All materials that will be used in electrical plants must be adapted to the environment where they are installed and must have such characteristics as to resist mechanical, abrasive, thermal or moisture actions and other agents to which they may be exposed during work.
All materials, lighting, etc. must comply with CE Norms.

It is recommended in the choice of materials, the preference of European products. All materials must have the data plate and possible instructions for use that use CE symbols.

1.3 Basic criteria for electrical works

Earthing System:
- TNC-S system for the main panel of the building
- TNS system for subpanels

Nominal working voltage (Ue):	400 V (L/L) and230 V (L/N);
Nominal insulation voltage (Ui):	≥ 690 V;
Test voltage of low voltage equipment:	1 min. 50Hz 3500V;
Frequency:	50 Hz
Nominal service:	Non-stop
U drop between source and load:	Maximum 4% in AC
Cosine fi:	0.9 in the main supply

The size of the neutral cable:
- According to codes and standards
- As ½ of the phase section for sections larger than 16mm2.
- In the same section as that of the phase in case of supplying the equipment that caused it
- accordion (PC, server, Motorr).

Short circuit capacity and endurance:
- CEI 947.2 P1 (cycle 0 – 3 min. – CO)
- Icu ≥ 16 kA Main Panel
- Icu ≥ 10 kA Distribution Panels

1.4 Protective pipes, description of pipes and junction boxes

Conduits must always be mechanically protected and covered. These protections can be; pipes, cable channels, passages, pipelines or pits in building structures, etc. In this particular case, it is thought that the installations will be made with underground plastic pipes that communicate through the electric wells for each branch of the network as well as the connections to the electric lighting poles.

1.5 Cables and wires

In order to realize electrical plants in public buildings, the following types of cables (conductors in branches) have been chosen.

Inside the building:
- FS17: unipolar conductor insulated with PVC, in the case of hidden installation in pipes under plaster, plaster walls or rigid pipes.
- FG16-OR16 600/1000V; multipolar cable with PVC sheath insulation, in the case of supplying lines, in ducts or in pipes in the case of external installations on the ground.

1.6 Cable insulation

The cables used in the systems of the first category must be adapted to the nominal voltage against the ground and voltage (Uò/U) not lower than 450/750V, while those used in the signaling and control systems not lower than 300/350V:
- U0 - nominal voltage to earth;
- U - nominal voltage.

Distinctive colors of cables

The conductors and cables used in the realization of electrical plants must be marked with the colors provided in the unifying tables. In particular, two green-yellow colors should be used for the protection and equipotential conductors, and light blue for the neutral conductor.
The norm does not determine the special colors for the phase conductors, but they must be marked in the same way for the entire plant from the colors black, gray and brown.

Minimum sections and allowable voltage drop

The section of conductors is calculated based on the power and length of the circuit (the voltage drop must not exceed 4% of the voltage value in the gap). The conductor section is selected from among the unified values. In any case, the given values of the allowed current, for different types of conductors, from the unification tables should not be exceeded.

The minimum section of the conductors of the neutral

The section of the neutral conductor must not be smaller than that of the corresponding phase conductors. For conductors of multi-phase circuits, with a section greater than 16mm² (for copper conductors), the normal CE conditions must be met.

Section of ground and defense conduits

The section of the earth and protection conductors, that is, of the conductors that connect the parts that must be protected from direct contact with the earthing plant, must not be smaller than what is indicated in the CEI 64-8 norm: the minimum section of the earth conductor must be no smaller than that of the protection conductor with these respective minimums:

1.7 The decrease in tension

The section of conductors calculated as a function of the working power and the length of the circuit (so that the voltage drop does not exceed 4% of the voltage in the gap) must be selected through the unified ones.

1.8 Insulation resistance

For all parts of the plant that are included between two successive fuses or automatic machines, or located before the fuse or before the last automatic machine, the insulation resistance to earth or between conductors belonging to phases with different polarity must be greater than ;

- 500 ohm for systems with nominal voltage against the ground that includes from 50V to 500V.
- 250 ohm for systems with a nominal voltage against the ground of less than 50V

1.9 Power of connection

The sectioning devices used at the meter level must be calculated with a short-circuit current of at least 25kA for three-phase and single-phase switches. The choice of the type and the calculation of the section of the conductors based on the power of the device that will feed and the automata for each circuit of the supply of electrical equipment according to the relevant norms has been made. To respect the values and characteristics of the equipment according to the drawings of the electric frames.

2. ELECTRICAL PLANT

2.1 General data of the facility, determination of the installed and required power

In order to realize this system, the installed and required power has been calculated and the calculations have been made for the supply of all the electrical loads of the facility and the loads for the heating, air conditioning, ventilation systems, hydrosanitary plants that may be installed in the future.

From the calculations performed, taking into account all the parameters and targets of the equipment of the mechanical plants and machines located in the dormitory building, we have the following result:

1. Active Installed power	**Pinst = 526kW**
2. Active Demand power	**Pkerk = 249 kW**
3. Apparent Demand power	**Skerk = 273.33 kVA**
4. Demand Coefficient	**Kkerk = 0.473**
5. CosØ Power Factor	**Cos Ø = 0.9**
6. Power elec. of the largest electric motor	**Max power = 46kW**

2.2 Power supply

The main power supply cable will be FG16R16 with a section according to the value presented in the single-wire scheme. The system used is the TN-S system.

For all main supply lines, the neutral conductor (blue color) is separated from the grounding protection conductor (yellow & green).

2.3 Backup power supply

In the event of a breakdown in the public supply network, OSHEE plans to install a diesel generator as a backup power supply for the bulding. All electrical systems of the two buildings, as well as mechanical systems of particular importance such as water pumps, MNZ fire pumps, drainage pumps, elevators, etc., will be supplied by the generator. In this network, not only HVAC systems are connected.

The power of the generators is in accordance with the power calculations given above. The installation site is at the back of the building, close to the installation of the air conditioning system equipment. Generators are devices that cause noise, and for this reason, finding a suitable place is very important.
In any case, the generators come with a noise blocking cage (canopy) and have a noise level not greater than 68db at a distance of 7m. They must be of the type with efficiency in fuel consumption and low level of air pollution. The powers given in the preventive and project refer to "prime" power and not "stand by". The calculated power of the diesel generator equipment is 110 kVA.

The generator cable lines run through perforated metal conduits mounted in the ceiling. The control system is automatic and the network connection scheme is given in the drawings. Generators are grounded in their vicinity. Grounding resistance should be equal to or less than 4ohm.

Before implementation, the contractor must submit a "shop drawing" type project for the installation of the generator according to the place where they will be installed and the manufacturer's recommendations.

In any case, the generators must be supplied after the installations have been made and the validation of the electricity supply system has been completed in order to match the power of the generators with the real demand of consumers. It is important that in this process the recommendations of generator manufacturers and equipment that will be placed under generators, such as elevators, pumps, machines with large output currents, etc., are taken into account.

2.4 Uninterruptible power supply (static UPS units)

The project envisages the installation of a central UPS group.

The telephone switchboard, LAN system, computer sockets, camera surveillance, control of personnel entrances, control circuits in panels will be supplied from the static power supply groups with uninterrupted electricity (no break supply).

The necessity of installing such groups is explained by the fact that all the above systems
computers remain unsupplied with energy for a period of 10-15" which is the time of putting the generator set into operation. In the event of a supply blackout, the inverter (UPS device) immediately feeds the consumers connected to it, allowing them to be fed through the accumulator batteries, which are part of the UPS.

Two UPS devices will be installed in the facility:

- UPS 2kVA in the IT racks in the facility.

When the voltage of the normal network, or even of the diesel generator, is restored or appears, the power of the consumers is restored again outside the batteries. The inverter will be equipped with a switch (by-pass) which, in special cases (eg UPS service or testing), will manually exclude the UPS device from connecting to the network.

2.5 Main distribution in low voltage

2.5.1 standards

- IEC 60439 : Low-voltage switchgear and controlgear assembly - Part 1 Type tested and partially type tested assembly.
- IEC 60947 : Low-voltage switchboards and their control

2.5.2 Dimensions / weight

- There are no special specifications. Access to the cabinet and access cable in accordance with local space conditions
- Assembly in the technical room and its control

2.5.3 Method of assessment

All the cabinets, including the eaves and internal wiring included in the price.

2.5.4 Subdistribution in low voltage

According to the schemes and drawings, the sub-distribution panels for the lighting of special points will be positioned at the corresponding points of the energy connection.

- The electrical scheme of the protective framework fulfills the technical conditions for the use of electrical networks. Thus, it is intended to have a main protection device which serves to shut down the entire network in cases where it is required, but it is also valuable for selective protection in relation to the protection machines below it.
- For the road lighting line, it is intended to use an electric transmitter which is controlled by the corresponding creposcular relay. Reserve machines are also provided for cases where additions or replacements may be required.
- The road lighting protection and control panel will be mounted inside the premises where the power connection will be made close to the existing frame where this supply will be received, but always in a separate box independent from the other frames.

The above guidelines are not strict and minor changes are accepted. All conductors of all output cables must be connected to the terminals.

2.5.5 Low voltage distribution

Low voltage distribution starts from the Main Electrical up to the low voltage installation for every socket, switch and light fixture. The distribution of low voltage will be prepared by means of rails or cables, which are described below:

The main panel shall be metal, painted, corrosion resistant, and sealed. Its dimensions depend on the electrical equipment that will be installed, which depend on the electrical load of the object.

The main low voltage panel must contain at least:
- The main automatic machine with 4 poles, 400V, with amperage depending on the load
- Four-pole automatic switch for each floor (where each floor is equipped with a three-phase line for a better safety distribution of the load)
- Phase signals shown on its cover
- Grounding clamp connected to the grounding system

Assembled together with the components, it must be done by an electrical specialist under the supervision of the engineer. All the connection of conductors and cables inside the panel will be done by means of special capicords for each type of section and with tapes and adhesives.
The metal panel must be connected to the grounding system.

An example of a low voltage main panel is specified as follows:
- Surface mounting (manufactured on fabric from sheets)
- Fabrics manufactured with oven-baked steel sheets
- Dimensions: according to design

Min. Installation temperatures -25 ° C Max.
Installation temperatures 60 °C
IK Code 07
Wire heating test 750 ° C

Key boxes for vending machines
The key boxes of the vending machines are the electrical panels for the special area, the same as the floor panels, with a difference that the number of panels is reduced. These boxes will be used in different areas. The mounting of the boxes on the plaster will be done by means of screws with holders, while these under the plaster will be fixed with mortar and should not be above the level of the plaster.

The machines used in public areas are magneto-thermal and with differential protection.
Circuit breakers are overload protection units. They are placed in the boxes of automata, in the floor panels and in the main low voltage panel.

According to the number of the phase they protect, they are single-phase and three-phase.
According to Amperage, they are divided into 6A: 10A; 20A, 25A, 32A, 40A, 50A, 63A, 100A
According to Ampere they are divided 125A; 160A; 250A; 400A;
According to the number of poles, the machines are divided: two polar and four polar.

2.6 Electrical installation infrastructure

2.6.1 Wires and Cables

All wires and cables must have the approval certificate from the approval authorities and the factory certificate. They will be made with multi-polar cables FG16-OR16, resistant against burning and emission of toxic gases.

For security lighting circuits, the cables will be double-insulated fire-resistant type FTG18OM16. All cables will be verified and calculated according to:

- Purpose of use
- Verification of voltage drop
- Verification of heating during short connections

Conductors shall be single core PVC insulated copper conductors within the conductor. Isolated conductors should be colored dark to identify the phase and neutrino.
All cases where the PVC cables end in a fuse distribution board, electrical equipment, etc. must be left free for an amount allowed to be removed later in case it is necessary without causing them to be withdrawn.

The number of cables installed in pipes or ducts should be such as to allow easy labeling without damaging the cables and should never be more than 40%.

PVC insulation of multiple or single-wire cables and wires must be able to withstand up to 600/1000V.

All cables placed inside the pipes must be insulated with high-conductivity PVC.

Flexible cables consist of multi-strip wires and depending on what we have:

- Three-wire cable, 1 neutral, 1 earth (for mono phase system)
- Cable with four wires, 3 phases and 1 neutral (for the three-phase system, without ground)
- Cable with five wires, 3 phases and 1 neutral and 1 ground (for the three-phase system, with ground)

2.6.2 Ducts and accessories

Electrical installation can be done in two ways:

- Under plaster embedded in flexible PVC pipe
- On PVC plaster and metal gutters

Installation equipment under the plaster are:

- flexible PVC pipe with different dimensions depending on the dimension and the number of wires to be placed in it.
- Distribution Boxes
- Boxes for fixing plugs or switches
- All of them must be placed before the plastering is done.

Electrical installations under the plaster must be done according to the following steps:

- The opening of the channels in the wall with such a dimension that the flexible tube can be inserted freely and such a depth that it does not protrude above the final level of the plaster.
- Fixing of flexible cables and PVC pipes temporarily with mortar and later covered with plaster.
- After the plastering is done, the insertion of wires or cables will be inserted freely and it should be taken into account that free amounts are left on both sides for installation needs.
- Ducts and flexible PVC pipes must be fixed at a distance of 0.4 m suspended from the ceiling horizontally or vertically towards plugs or switches without creating arcs or corners.

2.6.3 Tubes, boxes

Inside the building, all cables will be placed in pipes according to the drawing of the typical installations of a building. This means that inside and under the ceiling the installation will be of the closed type. Changing the type of installation must be done with a collection box.

The distribution boxes, depending on the system to be used, are under the plaster and above it so that the method of fixing them is with mortar or screws. The materials and their technical characteristics are the same as for flexible pipes.

The dimensions of distribution boxes vary according to circumstances and needs. They are circular, square, rectangular in shape and their covers are of different colors. It is important that the connection of the cables or wires inside the boxes would have been made with junto.
Marking

All cables must be labeled according to the distribution panel scheme with their circuit number.
If cables or conductors are installed for later use or free space this will also be noted on the label. the same information must be provided at both ends of the cables and conductors.

2.6.4 Cable tray system

Cable tray systems of the system under the plaster with flexible pipes must be completed in accordance with all the technical conditions of the electrical installation. The sewer system must be of appropriate standards.

The sewer system consists of devices such as:

- Cable trays with different dimensions, depending on the number of wires / cables, plugs, switches, etc., should be installed in it with a length of 2 m;
- Angles (serve to form an angle in the installation) that depend on the channels that have been used;
- T-shaped deflection;
- Channel with two separate divisions.

The installation of metal channels should be done with screws, and placed 0.4m below the ceiling level.

2.6.5 Sockets and switches

For the network of power outlets, the project envisages the installation of standard outlets, Shuko type 2 modules, 2P+T, 16A, 250V, white color for the outlets fed by the network. The sockets will be installed in plastic boxes 3 and 4 modules inside the wall, for flat mounting and must have a color that goes with the covers of the lighting switches.

In each classroom where there are workstations, two 16A, 250V, 2P+T power sockets are planned to be installed, with mains power. In addition to the room sockets, service sockets are also planned to be installed in the rooms. All plugs are of the Shuko type equipped with grounding. All plugs are 2 modules with grounding, 2P+T, 16A, 250V.

3. LIGHTING SYSTEM

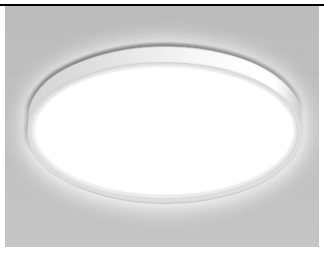
Regardless of the environment that will be lit, the lighting calculation is made according to the UNI EN 12464 standard, creating a uniform well-lit surface in every part of it and quiet for the work of the staff and all people. The lighting is designed according to the typology of the premises, fulfilling the conditions and norms on the type of lighting, lighting levels and the riskiness of the lighting installation.

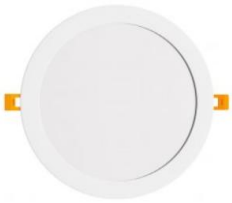
School structures integrate together environments with diversity in use and their features, such as classrooms, gymnasiums, cafeterias, libraries, offices, laboratories, bathrooms with or without showers, etc. To establish some rankings in this variety of environments, you can refer to the MAS Guide "On the design of school buildings, norms and standards" The standards for university lighting are also based on SH EN 12464-1.

Lighting must fulfill:

1. Visual comfort, ie. Achieving a sense of well-being that contributes to improving student productivity.
2. Visual performance, that is, the ability of students to concentrate even in difficult and long-term conditions.
3. Security, ie. The guarantee that lighting does not negatively affect the visual health of students.

For the internal lighting of the parking lot and other premises within it, the entire lighting network has been designed and according to the typology of the premises, the following types of lighting have been installed:

LED industrial lighting, 43W, IP65	Circular LED light, 20W, IP20 with built-in sensor
	
Circular LED spotlight, 24W, IP44	LED pendant light, 40W, IP40

	
LED Track Light with 4 adjustable spots	LED pendant luminaires with LED lamp 30W, IP20
	

The external lighting aims to make the pedestrian streets useful even at night, highlighting the architectural aspects of the buildings, guaranteeing the safety of the building and passers-by. Pedestrian crossings and the perimeter of the facility must be illuminated with sufficient uniformity. An average illumination Emes > 5 lx and a minimum illumination Emin > 2 lx are recommended for these areas.

The entire lighting system is supplied by means of a separate automaton installed in the K/S electrical panel. As for the light control, the control and command will be done by a relay with twilight probe.

4. EMERGENCY LIGHTING AND EVACUATION SYSTEM

The emergency and evacuation lighting system has been implemented according to European standards, as follows:

- Exit routes according to EN 1838
- Central battery system according to EN 50171, EN 50172,
- Emergency lighting according to EN 60598-1, EN 60598-2-22

Inside the building will be equipped with an emergency lighting system according to the standards in force. All products must be equipped with the CE mark and supplied by companies certified according to ISO 9001. According to the EN 1838 standard, the minimum continuous level of illumination in escape routes will be ensured to be 1 lux.

The following areas are respected in the design of the emergency lighting system:

- Exit routes (corridors, stairs, etc.) and exit signs, where lighting of 1 lux must be achieved along the exit route;
- Open areas > 60m2 require anti-panic lighting with a minimum illumination of 0.5 lux
- Stairs must receive direct light from emergency lighting, so that the minimum illumination is 1 lux.
- At every change of direction, emergency lighting must be installed.

The emergency system has been implemented by placing emergency lights in all corridors, exits and on the road in case of evacuation, to indicate the direction of the exit. These lights are battery-powered, with 3-hour autonomy.

Emergency lights must be with Ni-Cd batteries. Their placement will be done in such a way as to ensure a level of illumination of 5lux, while the independence of their operation for the interruption of the network must be at least 1 hour. Security lighting (stair signs, exit directions) will be with 8W LED bulbs.

5. IT NETWORK SYSTEM, TF AND WI-FI

The LAN network, the Internet and the internal telephone network will be installed in accordance with the norms and standards that form the requirements of the beneficiary. This system will be special for each workstation and the communication between them will be done by the server, installed in a special area, ensuring all the criteria and security requirements for this type of fields as the architectural solution is given.

The project envisages the installation of the Internet and telephone system. Internet sockets have been placed in the classrooms, according to the drawings given in the electrical project. All the signals from the internet plugs that are installed will be collected in the computer RACK, which is installed in the environment defined for its installation. On each floor, it is planned to install a rack to place all the equipment of the floor, in the technical environment as shown in the electrical project.
The RACKs that will be installed in this project are as follows:

- RACK 19", 22U, D800xW600xH1200mm, located in the technical environment on floor +0 for dormitory building, from where the installation of all IT and security equipment will be done.

In the RACK will be mounted, all the elements of the data system, together with the telephone and the CCTV camera system. The data and wifi network sockets will be supplied with uninterrupted Cat.6A FTP cables directly from the floor RACK. Telephone sockets are supplied with FTP Cat.6A continuous cables directly from the RACK.

The extension of data, telephone and wifi cables from the RACK of the first floor to the distribution boxes will be done through the metal channel of the cables located in the corridor, while in the premises of the rooms they pass through strong flexible PVC pipes d=25mm in the parts placed inside the wall and with tigid pipes in the parts of the visible installations.

6. FIRE DETECTION SYSTEM

A fire detection and alarm system will be installed for each area and according to the standards. The system will be intelligent, addressable where each sensor will signal especially for each field it covers. The fire control center analyzes the signal center and when it is sure about the fire it gives the alarm. The announcement is made in several ways, through sirens installed inside the areas or outside, through boxes installed in the building and by fixed or mobile phone for intervention in these cases.

The fire detection system will be suitable according to the fields with smoke, temperature, gas detectors, etc., which will be separate elements connected to the BUS network and communication with active fire protection to give the message that it is active. last in case of automatic intervention for fire extinguisher.

The fire detection system provides for a smoke/heat detector system inside the building, as shown in the drawings. In each building/floor, there will also be a siren which, in case of alarm, will work in an audible and visual way to alert the administration staff and students. In the indoor areas, near the exits, the manual buttons for activating the alarm will be placed. Placement of elements and details are given in the project drawings.

7. CCTV SYSTEM

7.1 Design parameters

- High quality CCTV monitoring system throughout the building for security reasons.
- Corridor monitoring.
- Monitoring of all external doors.
- Camera position and lens specification for a minimum of ½ of the monitoringthe average height of the person at the maximum distance.
- Color indoor IP camera.
- Central monitoring station

7.2 System configuration

The CCTV system is designed by fixed cameras installed mainly in the passage corridors to ensure high quality surveillance throughout the building. All cameras will be connected with Cat.6A cables according to the drawing from the main equipment located in the Rack.

Through Cat.6A, the video signal and PoE power supplies from the switches will be enabled. In the case when the length of the cable will be more than 100m, optical fiber will be used with a converter for the video signal and power supply from the UPS.

The system contains:

- IP camera, fixed, IP67, with 2.8-12mm color varifocal lens
- Manageable POE Switch for connecting cameras and their supply
- NVR for video management and recording

For outside areas will be the main entrances, as well as other requirements that will be coordinated with the beneficiaries, a fixed low light camera will be used, suitable for installation, anti-intrusion protection, with IP-67 case and with motion detection, etc.

For the internal area, high-resolution cameras will be used, located at key monitoring points. All data will be recorded on the server with the capacity calculated with the time requested by the beneficiary. In the monitoring room, the images of the Internet cameras will be displayed, which covers all of them divided on the screen by how many cameras we have.

All system equipment located in the rack will be supplied with uninterrupted power from the UPS. The equipment will be suitable for rack mounting. Video/Monitoring will be connected to the security room in the technical premises

8. EMERGENCY VOICE ALARM COMMUNICATION SYSTEMS

The Emergency Voice Alarm Communication systems is IP based and will be used to provide information to personnel in emergency and special cases. All components such as speakers, switchboard, distributor and connector components will be installed according to the placement as shown in the electrical project.

The following areas/rooms for dormitory building will be equipped for voice announcement:

- Main entrance dhe halls
- Restaurant and kitchen
- Corridors, on each floor of the building.

This system consists of a Central Center divided into zones where each zone contains the component components of the system in each quota of the object (see the main scheme of the voice and audio public announcement system). The sound and audio public announcement system is divided into 4 zones, divided according to the levels and functions of the building.

The main elements of this system are from:

- Central unit of the voice and audio public announcement system, according to EN 54-16 and EN-60849 standard certification, with 4 zones and with integrated class D amplifier, 1x240W, and with the possibility of expansion, with the possibility of network communication with the Hz center or with the BMS system;
- Input device (1 microphone with 4 zones for calling object zones)
- Output devices (ceiling type metal audio box 6W and 10W / 100V).

9. EQUIPOTENTIAL SCHEMES, PROTECTION AGAINST ATMOSPHERIC DISCHARGES AND GROUNDING

9.1 Equipotential schemes

All equipment that requires connection to equipotential schemes will be equipped with an equipotential box placed behind each door to which all metal parts on the floor, wall or ceiling will be connected, as well as a two-pole socket of which they will be connected to the equipotential scheme. The implementation of the squipotential scheme during implementation will be completely separate from the grounding and lightning rod scheme.

Inside the equipotential box, a copper busbar with holes should be provided to realize all the connections of the equipotential points. The equipotential scheme starts in each room and ends at the electrodes placed on the ground outside the building.

9.2 System of protection from atmospheric emissions

The system will include the installation of strips and arrows on the terrace for protection from these atmospheric discharges, as well as the calculation of ground arresters for the protection of electrical panels. The network of protection from atmospheric discharges will also provide protection from these shocks to devices of weak currents, such as the LAN network, security systems, etc.
The scheme will be realized considering that Rr is smaller or equal to 10 Ω. the contour on the surface of the ground and on the terrace should be made with zinc tape 30x3.5mm and with zinc rods L=1.5m, while the circuit circuit and connection of the electrodes on the ground with a conductive tape 30x3.5mm.

For each deduction, the disconnector will be placed for measurement. The number of deductions is contained in the relation n=P/15 +2 and the resistance of the lightning rod will be calculated from the relation and should be: Rr ≤ 10 ohm.

VO with the part of the lightning rod on the terrace to connect all the metal elements.

9.3 Grounding network

During the implementation of the grounding scheme, it should be considered that elements such as the sigma of the soil, the type of soil, its moisture should be well studied for the final resistance to be less than or equal to 2 Ω during the calculation.
The number of electrodes depend on the realization of the RT. During differential measurement with currents commanded from 2mA-30mA, the differential relay should operate within this range.

10. CONFORMITY WITH ALBANIAN AND EUROPEAN STANDARDS ADOPTED BY THE ALBANIAN STATE

All the equipment, components and materials of the electrical and electronic plant that will be supplied and installed must be cataloged products of the last two years and have the quality mark of the country where they are produced stamped on them, e.g. for Italian products, the quality mark is IMQ (quality mark of the Italian state). They must also have the CE seal, which expresses the correspondence of each of them with the relevant European directive, especially for the main safety requirements.

In the absence of the quality mark, a relation for conformity with the standard issued by an authorized institution of the Albanian state is required. In the absence of this document, the installer must issue a declaration of conformity under personal responsibility that guarantees that all the components of the electrical and electronic plant that he has implemented are in accordance with the standards, codes and technical regulations of the Albanian state and the adopted European standards or codes . In the case when there are no standards, the relation of conformity is based on the general principles of security.

Conformity of a component of the electrical and electronic plant with the relevant standard can be declared by the installer also through the catalog of the manufacturer of this component. The above also applies to the materials used as aids during the work, for which the installer remains responsible.

TECHNICAL REPORT OF ELECTRICAL PROJECT

Project:	Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça.
Object:	School Building
Client:	Albanian Development Fund
Location:	Korça, Korça Municipality
Electrical Eng:	Besart DALLIU, Lic. No: E.1412/2
Electrical Eng:	Bashkim SHAHINAJ, Lic. No: E.0185/6

JANUARY / 2026

Content

1. GENERAL

1.1 Entry

Electrical installation works must respect all design conditions and standards that are currently in force in Albania (KTP - STASH) and for special elements that are not provided for in these standards, we must refer to Euro norms (EN) and Eurostandards (EN, ED) and the recommendations of CEI, CENELC, DIN, VDI/VDE.

The design of the electrical project of the facility will include the construction of the following electrical systems:

1. *Fire Detection System*
2. *System of Metallic Cable trays;*
3. *Power Grid System;*
4. *Normal Lighting System;*
5. *Emergency and Evacuation Lighting System;*
6. *IT and Wi-Fi system;*
7. *SystemCCTV;*
8. *System of Emergency Voice Alarm Communication;*
9. *Grounding and Atmospheric Protection System*
10. *Low voltage Electrical single line diagram;*
11. *Electric Transformer room TM/TU*

The design of the above electrical systems for the "Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça-School Building" building, located in municilality of Korça, was done by adapting and responding to the requirements set forth in the design task. The construction of electrical systems will be closely related to the interior space of the building.

The e;lectrik project foresees energy supply and solutions for electrical installations and security systems in the building. The calculations were made based on the power of the mechanical equipment given by the mechanical designer as well as on other loads, mainly lighting, service plugs, workstations, mechanical equipment, etc.

1.2 Quality of material and place of installation

All materials that will be used in electrical plants must be adapted to the environment where they are installed and must have such characteristics as to resist mechanical, abrasive, thermal or moisture actions and other agents to which they may be exposed during work.
All materials, lighting, etc. must comply with CE Norms.

It is recommended in the choice of materials, the preference of European products. All materials must have the data plate and possible instructions for use that use CE symbols.

1.3 Basic criteria for electrical works

Earthing System:
- TNC-S system for the main panel of the building
- TNS system for subpanels

Nominal working voltage (Ue):	400 V (L/L) and230 V (L/N);
Nominal insulation voltage (Ui):	≥ 690 V;
Test voltage of low voltage equipment:	1 min. 50Hz 3500V;
Frequency:	50 Hz
Nominal service:	Non-stop
U drop between source and load:	Maximum 4% in AC
Cosine fi:	0.9 in the main supply

The size of the neutral cable:
- According to codes and standards
- As ½ of the phase section for sections larger than 16mm2.
- In the same section as that of the phase in case of supplying the equipment that caused it
- accordion (PC, server, Motorr).

Short circuit capacity and endurance:
- CEI 947.2 P1 (cycle 0 – 3 min. – CO)
- Icu ≥ 16 kA Main Panel
- Icu ≥ 10 kA Distribution Panels

1.4 Protective pipes, description of pipes and junction boxes

Conduits must always be mechanically protected and covered. These protections can be; pipes, cable channels, passages, pipelines or pits in building structures, etc. In this particular case, it is thought that the installations will be made with underground plastic pipes that communicate through the electric wells for each branch of the network as well as the connections to the electric lighting poles.

1.5 Cables and wires

In order to realize electrical plants in public buildings, the following types of cables (conductors in branches) have been chosen.

Inside the building:
- FS17: unipolar conductor insulated with PVC, in the case of hidden installation in pipes under plaster, plaster walls or rigid pipes.
- FG16-OR16 600/1000V; multipolar cable with PVC sheath insulation, in the case of supplying lines, in ducts or in pipes in the case of external installations on the ground.

1.6 Cable insulation

The cables used in the systems of the first category must be adapted to the nominal voltage against the ground and voltage (Uò/U) not lower than 450/750V, while those used in the signaling and control systems not lower than 300/350V:
- U0 - nominal voltage to earth;
- U - nominal voltage.

Distinctive colors of cables

The conductors and cables used in the realization of electrical plants must be marked with the colors provided in the unifying tables. In particular, two green-yellow colors should be used for the protection and equipotential conductors, and light blue for the neutral conductor.
The norm does not determine the special colors for the phase conductors, but they must be marked in the same way for the entire plant from the colors black, gray and brown.

Minimum sections and allowable voltage drop

The section of conductors is calculated based on the power and length of the circuit (the voltage drop must not exceed 4% of the voltage value in the gap). The conductor section is selected from among the unified values. In any case, the given values of the allowed current, for different types of conductors, from the unification tables should not be exceeded.

The minimum section of the conductors of the neutral

The section of the neutral conductor must not be smaller than that of the corresponding phase conductors. For conductors of multi-phase circuits, with a section greater than 16mm² (for copper conductors), the normal CE conditions must be met.

Section of ground and defense conduits

The section of the earth and protection conductors, that is, of the conductors that connect the parts that must be protected from direct contact with the earthing plant, must not be smaller than what is indicated in the CEI 64-8 norm: the minimum section of the earth conductor must be no smaller than that of the protection conductor with these respective minimums:

1.7 The decrease in tension

The section of conductors calculated as a function of the working power and the length of the circuit (so that the voltage drop does not exceed 4% of the voltage in the gap) must be selected through the unified ones.

1.8 Insulation resistance

For all parts of the plant that are included between two successive fuses or automatic machines, or located before the fuse or before the last automatic machine, the insulation resistance to earth or between conductors belonging to phases with different polarity must be greater than ;

- 500 ohm for systems with nominal voltage against the ground that includes from 50V to 500V.
- 250 ohm for systems with a nominal voltage against the ground of less than 50V

1.9 Power of connection

The sectioning devices used at the meter level must be calculated with a short-circuit current of at least 25kA for three-phase and single-phase switches. The choice of the type and the calculation of the section of the conductors based on the power of the device that will feed and the automata for each circuit of the supply of electrical equipment according to the relevant norms has been made. To respect the values and characteristics of the equipment according to the drawings of the electric frames.

2. ELECTRICAL PLANT

2.1 General data of the facility, determination of the installed and required power

In order to realize this system, the installed and required power has been calculated and the calculations have been made for the supply of all the electrical loads of the facility and the loads for the heating, air conditioning, ventilation systems, hydrosanitary plants that may be installed in the future.

From the calculations performed, taking into account all the parameters and targets of the equipment of the mechanical plants and machines located in al building, the total power of the electrical power transformer, including the existing building, the new school building and the dormitory, we have the following results:

A. Summary table of powers for the complete electrical transformer station

1. **Active Installed power**	**Pinst =960 kW**
2. **Active Demand power**	**Pkerk = 390 kW**
3. Apparent Demand power	**Skerk = 433.33 kVA**
4. **Demand factor**	**Kkerk = 0.536**
5. Simultaneity factor	**Knj = 0.757**
6. CosØ Power Factor	**Cos Ø = 0.9**

B. Summary table of powers for the New school building

7. **Active Installed power**	**Pinst = 385 kW**
8. **Active Demand power**	**Pkerk = 216 kW**
9. Apparent Demand power	**Skerk = 240 kVA**
10. **Demand Coefficient**	**Kkerk = 0.56**
11. CosØ Power Factor	**Cos Ø = 0.9**
12. Power elec. of the largest electric motor	**Max power = 33kW**

2.2 Power supply from electric transformer station

Electricity supply from a separate MV transformer for the facility is planned.

For this, an electric cabin will be built in the technical area on the -1st floor provided in the project, which will serve the new building through a special dry type transformer with a power of 630kVA. This will also make it possible to reduce energy costs, since metering fees will be applied in TM.

The electricity supply will be made from the TU Main Electric Panel of the facility, which is located in the low voltage technical room in the electrical cabinet and is presented in the relevant plans in the drawing. All the distribution and connection of electrical sub-frames will be done from the main panel according to single-wire schemes.

The main power supply cable will be FG16R16 with a section according to the value presented in the single-wire scheme. The system used is the TN-S system.

For all main supply lines, the neutral conductor (blue color) is separated from the grounding protection conductor (yellow & green).

2.3 Backup power supply

In the event of a breakdown in the public supply network, OSHEE plans to install a diesel generator as a backup power supply for the bulding. All electrical systems of the two buildings, as well as mechanical systems of particular importance such as water pumps, MNZ fire pumps, drainage pumps, elevators, etc., will be supplied by the generator. In this network, not only HVAC systems are connected.

The power of the generators is in accordance with the power calculations given above. The installation site is at the back of the building, close to the installation of the air conditioning system equipment. Generators are devices that cause noise, and for this reason, finding a suitable place is very important.
In any case, the generators come with a noise blocking cage (canopy) and have a noise level not greater than 68db at a distance of 7m. They must be of the type with efficiency in fuel consumption and low level of air pollution. The powers given in the preventive and project refer to "prime" power and not "stand by". The calculated power of the diesel generator equipment is 180 kVA.

The generator cable lines run through perforated metal conduits mounted in the ceiling. The control system is automatic and the network connection scheme is given in the drawings. Generators are grounded in their vicinity. Grounding resistance should be equal to or less than 4ohm.

Before implementation, the contractor must submit a "shop drawing" type project for the installation of the generator according to the place where they will be installed and the manufacturer's recommendations.

In any case, the generators must be supplied after the installations have been made and the validation of the electricity supply system has been completed in order to match the power of the generators with the real demand of consumers. It is important that in this process the recommendations of generator manufacturers and equipment that will be placed under generators, such as elevators, pumps, machines with large output currents, etc., are taken into account.

2.4 Uninterruptible power supply (static UPS units)

The project envisages the installation of a central UPS group.

The telephone switchboard, LAN system, computer sockets, camera surveillance, control of personnel entrances, control circuits in panels will be supplied from the static power supply groups with uninterrupted electricity (no break supply).

The necessity of installing such groups is explained by the fact that all the above systems
computers remain unsupplied with energy for a period of 10-15" which is the time of putting the generator set into operation. In the event of a supply blackout, the inverter (UPS device) immediately feeds the consumers connected to it, allowing them to be fed through the accumulator batteries, which are part of the UPS.

Two UPS devices will be installed in the facility:

- 15kVA central UPS, for workstations in the school building, with 10min autonomy;
- UPS 2kVA in the IT racks in the facility.

When the voltage of the normal network, or even of the diesel generator, is restored or appears, the power of the consumers is restored again outside the batteries. The inverter will be equipped with a switch (by-pass) which, in special cases (eg UPS service or testing), will manually exclude the UPS device from connecting to the network.

2.5 Main distribution in low voltage

2.5.1 standards

- IEC 60439 : Low-voltage switchgear and controlgear assembly - Part 1 Type tested and partially type tested assembly.
- IEC 60947 : Low-voltage switchboards and their control

2.5.2 Dimensions / weight

- There are no special specifications. Access to the cabinet and access cable in accordance with local space conditions
- Assembly in the technical room and its control

2.5.3 Method of assessment

All the cabinets, including the eaves and internal wiring included in the price.

2.5.4 Subdistribution in low voltage

According to the schemes and drawings, the sub-distribution panels for the lighting of special points will be positioned at the corresponding points of the energy connection.

- The electrical scheme of the protective framework fulfills the technical conditions for the use of electrical networks. Thus, it is intended to have a main protection device which serves to shut down the entire network in cases where it is required, but it is also valuable for selective protection in relation to the protection machines below it.
- For the road lighting line, it is intended to use an electric transmitter which is controlled by the corresponding creposcular relay. Reserve machines are also provided for cases where additions or replacements may be required.
- The road lighting protection and control panel will be mounted inside the premises where the power connection will be made close to the existing frame where this supply will be received, but always in a separate box independent from the other frames.

The above guidelines are not strict and minor changes are accepted. All conductors of all output cables must be connected to the terminals.

2.5.5 Low voltage distribution

Low voltage distribution starts from the TU Main Electrical Panel in the electrical room, up to the low voltage installation for every socket, switch and light fixture. The distribution of low voltage will be prepared by means of rails or cables, which are described below:

The main low voltage panel will be located in the technical room, supplied with low voltage from the TM electrical cabin connected to the 20kV TM network.

The main low voltage panel shall be metal, painted, corrosion resistant, and sealed. Its dimensions depend on the electrical equipment that will be installed, which depend on the electrical load of the object.

The main low voltage panel must contain at least:

- The main automatic machine with 4 poles, 400V, with amperage depending on the load
- Four-pole automatic switch for each floor (where each floor is equipped with a three-phase line for a better safety distribution of the load)
- Phase signals shown on its cover
- Grounding clamp connected to the grounding system

Assembled together with the components, it must be done by an electrical specialist under the supervision of the engineer. All the connection of conductors and cables inside the panel will be done by means of special capicords for each type of section and with tapes and adhesives.
The metal panel must be connected to the grounding system.

An example of a low voltage main panel is specified as follows:

- Surface mounting (manufactured on fabric from sheets)
- Fabrics manufactured with oven-baked steel sheets
- Dimensions: according to design

Min. Installation temperatures -25 ° C Max.
Installation temperatures 60 °C
IK Code 07
Wire heating test 750 ° C

Key boxes for vending machines
The key boxes of the vending machines are the electrical panels for the special area, the same as the floor panels, with a difference that the number of panels is reduced. These boxes will be used in different areas. The mounting of the boxes on the plaster will be done by means of screws with holders, while these under the plaster will be fixed with mortar and should not be above the level of the plaster.

The machines used in public areas are magneto-thermal and with differential protection.
Circuit breakers are overload protection units. They are placed in the boxes of automata, in the floor panels and in the main low voltage panel.

According to the number of the phase they protect, they are single-phase and three-phase.
According to Amperage, they are divided into 6A: 10A; 20A, 25A, 32A, 40A, 50A, 63A, 100A
According to Ampere they are divided 125A; 160A; 250A; 400A;
According to the number of poles, the machines are divided: two polar and four polar.

2.6 Electrical installation infrastructure

2.6.1 Wires and Cables

All wires and cables must have the approval certificate from the approval authorities and the factory certificate. They will be made with multi-polar cables FG16-OR16, resistant against burning and emission of toxic gases.

For security lighting circuits, the cables will be double-insulated fire-resistant type FTG18OM16. All cables will be verified and calculated according to:

- Purpose of use
- Verification of voltage drop
- Verification of heating during short connections

Conductors shall be single core PVC insulated copper conductors within the conductor. Isolated conductors should be colored dark to identify the phase and neutrino.
All cases where the PVC cables end in a fuse distribution board, electrical equipment, etc. must be left free for an amount allowed to be removed later in case it is necessary without causing them to be withdrawn.

The number of cables installed in pipes or ducts should be such as to allow easy labeling without damaging the cables and should never be more than 40%.

PVC insulation of multiple or single-wire cables and wires must be able to withstand up to 600/1000V.

All cables placed inside the pipes must be insulated with high-conductivity PVC.

Flexible cables consist of multi-strip wires and depending on what we have:

- Three-wire cable, 1 neutral, 1 earth (for mono phase system)
- Cable with four wires, 3 phases and 1 neutral (for the three-phase system, without ground)
- Cable with five wires, 3 phases and 1 neutral and 1 ground (for the three-phase system, with ground)

2.6.2 Ducts and accessories

Electrical installation can be done in two ways:

- Under plaster embedded in flexible PVC pipe
- On PVC plaster and metal gutters

Installation equipment under the plaster are:

- flexible PVC pipe with different dimensions depending on the dimension and the number of wires to be placed in it.
- Distribution Boxes
- Boxes for fixing plugs or switches
- All of them must be placed before the plastering is done.

Electrical installations under the plaster must be done according to the following steps:

- The opening of the channels in the wall with such a dimension that the flexible tube can be inserted freely and such a depth that it does not protrude above the final level of the plaster.
- Fixing of flexible cables and PVC pipes temporarily with mortar and later covered with plaster.
- After the plastering is done, the insertion of wires or cables will be inserted freely and it should be taken into account that free amounts are left on both sides for installation needs.
- Ducts and flexible PVC pipes must be fixed at a distance of 0.4 m suspended from the ceiling horizontally or vertically towards plugs or switches without creating arcs or corners.

2.6.3 Tubes, boxes

Inside the building, all cables will be placed in pipes according to the drawing of the typical installations of a building. This means that inside and under the ceiling the installation will be of the closed type. Changing the type of installation must be done with a collection box.

The distribution boxes, depending on the system to be used, are under the plaster and above it so that the method of fixing them is with mortar or screws. The materials and their technical characteristics are the same as for flexible pipes.

The dimensions of distribution boxes vary according to circumstances and needs. They are circular, square, rectangular in shape and their covers are of different colors. It is important that the connection of the cables or wires inside the boxes would have been made with junto.
Marking

All cables must be labeled according to the distribution panel scheme with their circuit number.
If cables or conductors are installed for later use or free space this will also be noted on the label. the same information must be provided at both ends of the cables and conductors.

2.6.4 Cable tray system

Cable tray systems of the system under the plaster with flexible pipes must be completed in accordance with all the technical conditions of the electrical installation. The sewer system must be of appropriate standards.

The sewer system consists of devices such as:

- Cable trays with different dimensions, depending on the number of wires / cables, plugs, switches, etc., should be installed in it with a length of 2 m;
- Angles (serve to form an angle in the installation) that depend on the channels that have been used;
- T-shaped deflection;
- Channel with two separate divisions.

The installation of metal channels should be done with screws, and placed 0.4m below the ceiling level.

2.6.5 Sockets and switches

For the network of power outlets, the project envisages the installation of standard outlets, Shuko type 2 modules, 2P+T, 16A, 250V, white color for the outlets fed by the network. The sockets will be installed in plastic boxes 3 and 4 modules inside the wall, for flat mounting and must have a color that goes with the covers of the lighting switches.

In each classroom where there are workstations, two 16A, 250V, 2P+T power sockets are planned to be installed, with mains power. In addition to the room sockets, service sockets are also planned to be installed in the rooms. All plugs are of the Shuko type equipped with grounding. All plugs are 2 modules with grounding, 2P+T, 16A, 250V.

3. LIGHTING SYSTEM

Regardless of the environment that will be lit, the lighting calculation is made according to the UNI EN 12464 standard, creating a uniform well-lit surface in every part of it and quiet for the work of the staff

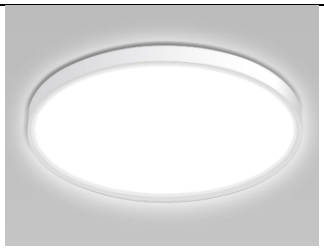
and all people. The lighting is designed according to the typology of the premises, fulfilling the conditions and norms on the type of lighting, lighting levels and the riskiness of the lighting installation.

School structures integrate together environments with diversity in use and their features, such as classrooms, gymnasiums, cafeterias, libraries, offices, laboratories, bathrooms with or without showers, etc. To establish some rankings in this variety of environments, you can refer to the MAS Guide "On the design of school buildings, norms and standards" The standards for university lighting are also based on SH EN 12464-1.

Lighting must fulfill:

1. Visual comfort, ie. Achieving a sense of well-being that contributes to improving student productivity.
2. Visual performance, that is, the ability of students to concentrate even in difficult and long-term conditions.
3. Security, ie. The guarantee that lighting does not negatively affect the visual health of students.

For the internal lighting of the parking lot and other premises within it, the entire lighting network has been designed and according to the typology of the premises, the following types of lighting have been installed:

LED industrial lighting, 43W, IP65	Circular LED light, 20W, IP20 with built-in sensor
	
Circular LED spotlight, 24W, IP44	LED pendant light, 40W, IP40
	
LED Track Light with 4 adjustable spots	LED pendant luminaires with LED lamp 30W, IP20
	

The external lighting aims to make the pedestrian streets useful even at night, highlighting the architectural aspects of the buildings, guaranteeing the safety of the building and passers-by. Pedestrian

crossings and the perimeter of the facility must be illuminated with sufficient uniformity. An average illumination Emes > 5 lx and a minimum illumination Emin > 2 lx are recommended for these areas.

The entire lighting system is supplied by means of a separate automaton installed in the K/S electrical panel. As for the light control, the control and command will be done by a relay with twilight probe.

4. EMERGENCY LIGHTING AND EVACUATION SYSTEM

The emergency and evacuation lighting system has been implemented according to European standards, as follows:

- Exit routes according to EN 1838
- Central battery system according to EN 50171, EN 50172,
- Emergency lighting according to EN 60598-1, EN 60598-2-22

Inside the building will be equipped with an emergency lighting system according to the standards in force. All products must be equipped with the CE mark and supplied by companies certified according to ISO 9001. According to the EN 1838 standard, the minimum continuous level of illumination in escape routes will be ensured to be 1 lux.

The following areas are respected in the design of the emergency lighting system:

- Exit routes (corridors, stairs, etc.) and exit signs, where lighting of 1 lux must be achieved along the exit route;
- Open areas > 60m2 require anti-panic lighting with a minimum illumination of 0.5 lux
- Stairs must receive direct light from emergency lighting, so that the minimum illumination is 1 lux.
- At every change of direction, emergency lighting must be installed.

The emergency system has been implemented by placing emergency lights in all corridors, exits and on the road in case of evacuation, to indicate the direction of the exit. These lights are battery-powered, with 3-hour autonomy.

Emergency lights must be with Ni-Cd batteries. Their placement will be done in such a way as to ensure a level of illumination of 5lux, while the independence of their operation for the interruption of the network must be at least 1 hour. Security lighting (stair signs, exit directions) will be with 8W LED bulbs.

5. IT NETWORK SYSTEM, TF AND WI-FI

The LAN network, the Internet and the internal telephone network will be installed in accordance with the norms and standards that form the requirements of the beneficiary. This system will be special for each workstation and the communication between them will be done by the server, installed in a special area, ensuring all the criteria and security requirements for this type of fields as the architectural solution is given.

The project envisages the installation of the Internet and telephone system. Internet sockets have been placed in the classrooms, according to the drawings given in the electrical project. All the signals from the internet plugs that are installed will be collected in the computer RACK, which is installed in the environment defined for its installation. On each floor, it is planned to install a rack to place all the equipment of the floor, in the technical environment as shown in the electrical project.
The RACKs that will be installed in this project are as follows:

- RACK 19", 42U, D600xW1000xH600mm, located in the technical environment on floor +0 for school building, from where the installation of all IT and security equipment will be done.
- RACK 19", 22U, D600xW800xH600mm, located in the technical environment on the +2 floor for school building, from where the installation of all IT and security equipment will be done.
- RACK 19", 22U, D600xW800xH600mm, located in the technical environment on the +3 floor for school building, from where the installation of all IT and security equipment will be done.

In the RACK will be mounted, all the elements of the data system, together with the telephone and the CCTV camera system. The data and wifi network sockets will be supplied with uninterrupted Cat.6A FTP cables directly from the floor RACK. Telephone sockets are supplied with FTP Cat.6A continuous cables directly from the RACK.

The extension of data, telephone and wifi cables from the RACK of the first floor to the distribution boxes will be done through the metal channel of the cables located in the corridor, while in the premises of the rooms they pass through strong flexible PVC pipes d=25mm in the parts placed inside the wall and with tigid pipes in the parts of the visible installations.

6. FIRE DETECTION SYSTEM

A fire detection and alarm system will be installed for each area and according to the standards. The system will be intelligent, addressable where each sensor will signal especially for each field it covers. The fire control center analyzes the signal center and when it is sure about the fire it gives the alarm. The announcement is made in several ways, through sirens installed inside the areas or outside, through boxes installed in the building and by fixed or mobile phone for intervention in these cases.

The fire detection system will be suitable according to the fields with smoke, temperature, gas detectors, etc., which will be separate elements connected to the BUS network and communication with active fire protection to give the message that it is active. last in case of automatic intervention for fire extinguisher.

The fire detection system provides for a smoke/heat detector system inside the building, as shown in the drawings. In each building/floor, there will also be a siren which, in case of alarm, will work in an audible and visual way to alert the administration staff and students. In the indoor areas, near the exits, the manual buttons for activating the alarm will be placed. Placement of elements and details are given in the project drawings.

7. CCTV SYSTEM

7.1 Design parameters

- High quality CCTV monitoring system throughout the building for security reasons.
- Corridor monitoring.
- Monitoring of all external doors.
- Camera position and lens specification for a minimum of ½ of the monitoringthe average height of the person at the maximum distance.
- Color indoor IP camera.
- Central monitoring station

7.2 System configuration

The CCTV system is designed by fixed cameras installed mainly in the passage corridors to ensure high quality surveillance throughout the building. All cameras will be connected with Cat.6A cables according to the drawing from the main equipment located in the Rack.

Through Cat.6A, the video signal and PoE power supplies from the switches will be enabled. In the case when the length of the cable will be more than 100m, optical fiber will be used with a converter for the video signal and power supply from the UPS.

The system contains:

- IP camera, fixed, IP67, with 2.8-12mm color varifocal lens
- Manageable POE Switch for connecting cameras and their supply
- NVR for video management and recording

For outside areas will be the main entrances, as well as other requirements that will be coordinated with the beneficiaries, a fixed low light camera will be used, suitable for installation, anti-intrusion protection, with IP-67 case and with motion detection, etc.

For the internal area, high-resolution cameras will be used, located at key monitoring points. All data will be recorded on the server with the capacity calculated with the time requested by the beneficiary. In the monitoring room, the images of the Internet cameras will be displayed, which covers all of them divided on the screen by how many cameras we have.

All system equipment located in the rack will be supplied with uninterrupted power from the UPS. The equipment will be suitable for rack mounting. Video/Monitoring will be connected to the security room in the technical premises

8. EMERGENCY VOICE ALARM COMMUNICATION SYSTEMS

The Emergency Voice Alarm Communication systems system will be used to provide information to personnel in emergency and special cases. All components such as speakers, switchboard, distributor and connector components will be installed according to the placement as shown in the electrical project.

The following areas/rooms for school will be equipped for voice announcement:

- Main entrance
- Corridors, on each floor of the building
- Auditorium hall.

This system consists of a Central Center divided into zones where each zone contains the component components of the system in each quota of the object (see the main scheme of the voice and audio public announcement system). The sound and audio public announcement system is divided into 4 zones, divided according to the levels and functions of the building.

The main elements of this system are from:

- Central unit of the voice and audio public announcement system, according to EN 54-16 and EN-60849 standard certification, with 4 zones and with integrated class D amplifier, 600W, and with

the possibility of expansion, with the possibility of network communication with the Hz center or with the BMS system;
- Input device (1 microphone with 4 zones for calling object zones)
- Output devices (ceiling type metal audio box 6W and 20W / 100V).

9. EQUIPOTENTIAL SCHEMES, PROTECTION AGAINST ATMOSPHERIC DISCHARGES AND GROUNDING

9.1 Equipotential schemes

All equipment that requires connection to equipotential schemes will be equipped with an equipotential box placed behind each door to which all metal parts on the floor, wall or ceiling will be connected, as well as a two-pole socket of which they will be connected to the equipotential scheme. The implementation of the squipotential scheme during implementation will be completely separate from the grounding and lightning rod scheme.

Inside the equipotential box, a copper busbar with holes should be provided to realize all the connections of the equipotential points. The equipotential scheme starts in each room and ends at the electrodes placed on the ground outside the building.

9.2 System of protection from atmospheric emissions

The system will include the installation of strips and arrows on the terrace for protection from these atmospheric discharges, as well as the calculation of ground arresters for the protection of electrical panels. The network of protection from atmospheric discharges will also provide protection from these shocks to devices of weak currents, such as the LAN network, security systems, etc.

The scheme will be realized considering that Rr is smaller or equal to 10 Ω. the contour on the surface of the ground and on the terrace should be made with zinc tape 30x3.5mm and with zinc rods L=1.5m, while the circuit circuit and connection of the electrodes on the ground with a conductive tape 30x3.5mm.

For each deduction, the disconnector will be placed for measurement. The number of deductions is contained in the relation n=P/15 +2 and the resistance of the lightning rod will be calculated from the relation and should be: Rr ≤ 10 ohm.

VO with the part of the lightning rod on the terrace to connect all the metal elements.

9.3 Grounding network

During the implementation of the grounding scheme, it should be considered that elements such as the sigma of the soil, the type of soil, its moisture should be well studied for the final resistance to be less than or equal to 2 Ω during the calculation.
The number of electrodes depend on the realization of the RT. During differential measurements with currents commanded from 2mA-30mA, the differential relay should operate within this range.

10. ELECTRICAL TRANSFORMER STATION TM/TU 20/0.4KV

The MV/LV electric transformer station will be built new inside the building, on the basement floor -1s. The power transformer that will be installed will be a dry type, with a power of 630 kVA, to cover and supply all electrical loads of the building. The cabin must be built respecting all the technical conditions of implementation, and implementing the implementation project part of this project.

The electric cabin consists of:

1. A dry type power transformer (Cast Resin), with reduced loss, Eco Design model, A0-10 AK, with power Sn=630kVA, 20/0.4kV, with MV and LV terminals.
2. Medium voltage input/output 20kV with SF6 gas including:
3. A transformer protection switchgear cubicle with SF6 protection and load separator, earthing knife, 24kV MV power switch and busbars equipped with a flat MV terminal (capcord) in order to connect the cable of one device.
4. A low voltage panel, according to the scheme given in the project.
5. Cables for connecting MV and LV electrical equipment and panels.
6. Electric cabin earthing system.

11. CONFORMITY WITH ALBANIAN AND EUROPEAN STANDARDS ADOPTED BY THE ALBANIAN STATE

All the equipment, components and materials of the electrical and electronic plant that will be supplied and installed must be cataloged products of the last two years and have the quality mark of the country where they are produced stamped on them, e.g. for Italian products, the quality mark is IMQ (quality mark of the Italian state). They must also have the CE seal, which expresses the correspondence of each of them with the relevant European directive, especially for the main safety requirements.

In the absence of the quality mark, a relation for conformity with the standard issued by an authorized institution of the Albanian state is required. In the absence of this document, the installer must issue a declaration of conformity under personal responsibility that guarantees that all the components of the electrical and electronic plant that he has implemented are in accordance with the standards, codes and technical regulations of the Albanian state and the adopted European standards or codes . In the case when there are no standards, the relation of conformity is based on the general principles of security.

Conformity of a component of the electrical and electronic plant with the relevant standard can be declared by the installer also through the catalog of the manufacturer of this component. The above also applies to the materials used as aids during the work, for which the installer remains responsible.

TECHNICAL REPORT OF ELECTRICAL PROJECT

Project:	Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça
Building:	Existing School Building
Client:	Albanian Development Fund
Location:	Korça, Korça Municipality
Electrical Eng:	Besart DALLIU, Lic. No: E.1412/2
Electrical Eng:	Bashkim SHAHINAJ, Lic. No: E.0185/6

JANUARY / 2026

CONTENT

1. GENERAL

1.1 Entry

Electrical installation works must respect all design conditions and standards that are currently in force in Albania (KTP - STASH) and for special elements that are not provided for in these standards, we must refer to Euro norms (EN) and Eurostandards (EN, ED) and the recommendations of CEI, CENELC, DIN, VDI/VDE.

The design of the electrical project of the facility will include the construction of the following electrical systems:

1. *Power Network System;*
2. *Normal Lighting System;*
3. *IT and Wi-Fi system;*

The design of the above electrical systems for the "Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça" existing building, located in municilality of Korça, was done by adapting and responding to the requirements set forth in the design task. The construction of electrical systems will be closely related to the interior space of the building.

The e;lectrik project foresees energy supply and solutions for electrical installations and security systems in the building. The calculations were made based on the power of the mechanical equipment given by the mechanical designer as well as on other loads, mainly lighting, service plugs, workstations, etc.

1.2 Quality of material and place of installation

All materials that will be used in electrical plants must be adapted to the environment where they are installed and must have such characteristics as to resist mechanical, abrasive, thermal or moisture actions and other agents to which they may be exposed during work.
All materials, lighting, etc. must comply with CE Norms.

It is recommended in the choice of materials, the preference of European products. All materials must have the data plate and possible instructions for use that use CE symbols.

1.3 Basic criteria for electrical works

Earthing System:

- TNC-S system for the main panel of the building
- TNS system for subpanels

Nominal working voltage (Ue):	400 V (L/L) and230 V (L/N);
Nominal insulation voltage (Ui):	≥ 690 V;
Test voltage of low voltage equipment:	1 min. 50Hz 3500V;
Frequency:	50 Hz
Nominal service:	Non-stop
U drop between source and load:	Maximum 4% in AC
Cosine fi:	0.9 in the main supply

The size of the neutral cable:

- According to codes and standards
- As ½ of the phase section for sections larger than 16mm2.
- In the same section as that of the phase in case of supplying the equipment that caused it
- accordion (PC, server, Motorr).

Short circuit capacity and endurance:

- CEI 947.2 P1 (cycle 0 – 3 min. – CO)
- Icu ≥ 16 kA Main Panel
- Icu ≥ 10 kA Distribution Panels

1.4 Protective pipes, description of pipes and junction boxes

Conduits must always be mechanically protected and covered. These protections can be; pipes, cable channels, passages, pipelines or pits in building structures, etc. In this particular case, it is thought that the installations will be made with underground plastic pipes that communicate through the electric wells for each branch of the network as well as the connections to the electric lighting poles.

1.5 Cables and wires

In order to realize electrical plants in public buildings, the following types of cables (conductors in branches) have been chosen.

Inside the building:

- FS17: unipolar conductor insulated with PVC, in the case of hidden installation in pipes under plaster, plaster walls or rigid pipes.
- FG16-OR16 600/1000V; multipolar cable with PVC sheath insulation, in the case of supplying lines, in ducts or in pipes in the case of external installations on the ground.

1.6 Cable insulation

The cables used in the systems of the first category must be adapted to the nominal voltage against the ground and voltage (Uò/U) not lower than 450/750V, while those used in the signaling and control systems not lower than 300/350V:

- U0 - nominal voltage to earth;
- U - nominal voltage.

Distinctive colors of cables

The conductors and cables used in the realization of electrical plants must be marked with the colors provided in the unifying tables. In particular, two green-yellow colors should be used for the protection and equipotential conductors, and light blue for the neutral conductor.
The norm does not determine the special colors for the phase conductors, but they must be marked in the same way for the entire plant from the colors black, gray and brown.

Minimum sections and allowable voltage drop

The section of conductors is calculated based on the power and length of the circuit (the voltage drop must not exceed 4% of the voltage value in the gap). The conductor section is selected from among the unified values. In any case, the given values of the allowed current, for different types of conductors, from the unification tables should not be exceeded.

The minimum section of the conductors of the neutral

The section of the neutral conductor must not be smaller than that of the corresponding phase conductors. For conductors of multi-phase circuits, with a section greater than 16mm² (for copper conductors), the normal CE conditions must be met.

Section of ground and defense conduits

The section of the earth and protection conductors, that is, of the conductors that connect the parts that must be protected from direct contact with the earthing plant, must not be smaller than what is indicated in the CEI 64-8 norm: the minimum section of the earth conductor must be no smaller than that of the protection conductor with these respective minimums:

1.7 The decrease in tension

The section of conductors calculated as a function of the working power and the length of the circuit (so that the voltage drop does not exceed 4% of the voltage in the gap) must be selected through the unified ones.

1.8 Insulation resistance

For all parts of the plant that are included between two successive fuses or automatic machines, or located before the fuse or before the last automatic machine, the insulation resistance to earth or between conductors belonging to phases with different polarity must be greater than ;

- 500 ohm for systems with nominal voltage against the ground that includes from 50V to 500V.
- 250 ohm for systems with a nominal voltage against the ground of less than 50V

1.9 Power of connection

The sectioning devices used at the meter level must be calculated with a short-circuit current of at least 25kA for three-phase and single-phase switches. The choice of the type and the calculation of the section of the conductors based on the power of the device that will feed and the automata for each circuit of the supply of electrical equipment according to the relevant norms has been made. To respect the values and characteristics of the equipment according to the drawings of the electric frames.

2. ELECTRICAL PLANT

2.1 General data of the facility, determination of the installed and required power

In order to realize this system, the installed and required power has been calculated and the calculations have been made for the supply of all the electrical loads of the facility and the loads for the heating, air conditioning, ventilation systems, hydrosanitary plants that may be installed in the future.

From the calculations performed, taking into account all the parameters and targets of the equipment of the mechanical plants and machines located in the existing school buidling, we have the following result:

1. **Installed active power**	**Pinst = 50 kW**
2. **Active computing power required**	**Pkerk = 38 kW**
3. Full computing power required	**Skerk = 42.2 kVA**
4. **Demand Coefficient**	**Kkerk = 0.757**
5. CosØ Power Factor	**Cos Ø = 0.9**
6. Power elec. of the largest electric motor	**Max power = 3kW**

2.2 Main distribution in low voltage

2.2.1 standards

- IEC 60439 : Low-voltage switchgear and controlgear assembly - Part 1 Type tested and partially type tested assembly.
- IEC 60947 : Low-voltage switchboards and their control

2.2.2 Dimensions / weight

- There are no special specifications. Access to the cabinet and access cable in accordance with local space conditions
- Assembly in the technical room and its control

2.2.3 Method of assessment

All the cabinets, including the eaves and internal wiring included in the price.

2.2.4 Subdistribution in low voltage

According to the schemes and drawings, the sub-distribution panels for the lighting of special points will be positioned at the corresponding points of the energy connection.

- The electrical scheme of the protective framework fulfills the technical conditions for the use of electrical networks. Thus, it is intended to have a main protection device which serves to shut down the entire network in cases where it is required, but it is also valuable for selective protection in relation to the protection machines below it.
- For the road lighting line, it is intended to use an electric transmitter which is controlled by the corresponding creposcular relay. Reserve machines are also provided for cases where additions or replacements may be required.
- The road lighting protection and control panel will be mounted inside the premises where the power connection will be made close to the existing frame where this supply will be received, but always in a separate box independent from the other frames.

The above guidelines are not strict and minor changes are accepted. All conductors of all output cables must be connected to the terminals.

2.2.5 Low voltage distribution

Low voltage distribution starts from the TU Main Electrical Panel in the electrical room, up to the low voltage installation for every socket, switch and light fixture. The distribution of low voltage will be prepared by means of rails or cables, which are described below:

The main low voltage panel will be located in the technical room, supplied with low voltage from the TM electrical cabin connected to the 20kV TM network.

The main low voltage panel shall be metal, painted, corrosion resistant, and sealed. Its dimensions depend on the electrical equipment that will be installed, which depend on the electrical load of the object.

The main low voltage panel must contain at least:

- The main automatic machine with 4 poles, 400V, with amperage depending on the load
- Four-pole automatic switch for each floor (where each floor is equipped with a three-phase line for a better safety distribution of the load)
- Phase signals shown on its cover
- Grounding clamp connected to the grounding system

Assembled together with the components, it must be done by an electrical specialist under the supervision of the engineer. All the connection of conductors and cables inside the panel will be done by means of special capicords for each type of section and with tapes and adhesives.
The metal panel must be connected to the grounding system.

An example of a low voltage main panel is specified as follows:

- Surface mounting (manufactured on fabric from sheets)
- Fabrics manufactured with oven-baked steel sheets
- Dimensions: according to design

Min. Installation temperatures -25 ° C Max.
Installation temperatures 60 °C
IK Code 07
Wire heating test 750 ° C

Key boxes for vending machines
The key boxes of the vending machines are the electrical panels for the special area, the same as the floor panels, with a difference that the number of panels is reduced. These boxes will be used in different areas. The mounting of the boxes on the plaster will be done by means of screws with holders, while these under the plaster will be fixed with mortar and should not be above the level of the plaster.

The machines used in public areas are magneto-thermal and with differential protection.
Circuit breakers are overload protection units. They are placed in the boxes of automata, in the floor panels and in the main low voltage panel.

According to the number of the phase they protect, they are single-phase and three-phase.
According to Amperage, they are divided into 6A: 10A; 20A, 25A, 32A, 40A, 50A, 63A, 100A
According to Ampere they are divided 125A; 160A; 250A; 400A;
According to the number of poles, the machines are divided: two polar and four polar.

2.3 Electrical installation infrastructure

2.3.1 Wires and Cables

All wires and cables must have the approval certificate from the approval authorities and the factory certificate. They will be made with multi-polar cables FG16-OR16, resistant against burning and emission of toxic gases.

For security lighting circuits, the cables will be double-insulated fire-resistant type FTG18OM16. All cables will be verified and calculated according to:

- Purpose of use
- Verification of voltage drop
- Verification of heating during short connections

Conductors shall be single core PVC insulated copper conductors within the conductor. Isolated conductors should be colored dark to identify the phase and neutrino.
All cases where the PVC cables end in a fuse distribution board, electrical equipment, etc. must be left free for an amount allowed to be removed later in case it is necessary without causing them to be withdrawn.

The number of cables installed in pipes or ducts should be such as to allow easy labeling without damaging the cables and should never be more than 40%.

PVC insulation of multiple or single-wire cables and wires must be able to withstand up to 600/1000V.

All cables placed inside the pipes must be insulated with high-conductivity PVC.

Flexible cables consist of multi-strip wires and depending on what we have:

- Three-wire cable, 1 neutral, 1 earth (for mono phase system)
- Cable with four wires, 3 phases and 1 neutral (for the three-phase system, without ground)
- Cable with five wires, 3 phases and 1 neutral and 1 ground (for the three-phase system, with ground).
-

2.3.2 Tubes, boxes

Inside the building, all cables will be placed in pipes according to the drawing of the typical installations of a building. This means that inside and under the ceiling the installation will be of the closed type. Changing the type of installation must be done with a collection box.

The distribution boxes, depending on the system to be used, are under the plaster and above it so that the method of fixing them is with mortar or screws. The materials and their technical characteristics are the same as for flexible pipes.

The dimensions of distribution boxes vary according to circumstances and needs. They are circular, square, rectangular in shape and their covers are of different colors. It is important that the connection of the cables or wires inside the boxes would have been made with junto.
Marking

All cables must be labeled according to the distribution panel scheme with their circuit number.
If cables or conductors are installed for later use or free space this will also be noted on the label. the same information must be provided at both ends of the cables and conductors.

2.3.3 Sockets and switches

For the network of power outlets, the project envisages the installation of standard outlets, Shuko type 2 modules, 2P+T, 16A, 250V, white color for the outlets fed by the network. The sockets will be installed in plastic boxes 3 and 4 modules inside the wall, for flat mounting and must have a color that goes with the covers of the lighting switches.

In each classroom where there are workstations, two 16A, 250V, 2P+T power sockets are planned to be installed, with mains power. In addition to the room sockets, service sockets are also planned to be installed in the rooms. All plugs are of the Shuko type equipped with grounding. All plugs are 2 modules with grounding, 2P+T, 16A, 250V.

3. LIGHTING SYSTEM

Regardless of the environment that will be lit, the lighting calculation is made according to the UNI EN 12464 standard, creating a uniform well-lit surface in every part of it and quiet for the work of the staff and all people. The lighting is designed according to the typology of the premises, fulfilling the conditions and norms on the type of lighting, lighting levels and the riskiness of the lighting installation.

School structures integrate together environments with diversity in use and their features, such as classrooms, gymnasiums, cafeterias, libraries, offices, laboratories, bathrooms with or without showers, etc. To establish some rankings in this variety of environments, you can refer to the MAS Guide "On the design of school buildings, norms and standards" The standards for university lighting are also based on SH EN 12464-1.

Lighting must fulfill:

1. Visual comfort, ie. Achieving a sense of well-being that contributes to improving student productivity.
2. Visual performance, that is, the ability of students to concentrate even in difficult and long-term conditions.
3. Security, ie. The guarantee that lighting does not negatively affect the visual health of students.

4. IT NETWORK SYSTEM, TF AND WI-FI

The LAN network, the Internet and the internal telephone network will be installed in accordance with the norms and standards that form the requirements of the beneficiary. This system will be special for each workstation and the communication between them will be done by the server, installed in a special area, ensuring all the criteria and security requirements for this type of fields as the architectural solution is given.

The project envisages the installation of the Internet and telephone system. Internet sockets have been placed in the classrooms, according to the drawings given in the electrical project. All the signals from the internet plugs that are installed will be collected in the computer RACK, which is installed in the environment defined for its installation. On each floor, it is planned to install a rack to place all the equipment of the floor, in the technical environment as shown in the electrical project.
The RACKs that will be installed in this project are as follows:

- RACK 19", 42U, D600xW1000xH600mm, located in the technical environment on floor -1 for exiting school building, from where the installation of all IT and security equipment will be done.

- RACK 19", 22U, D600xW800xH600mm, located in the technical environment on the +0 and +1 floor for dormitory building, from where the installation of all IT and security equipment will be done.

In the RACK will be mounted, all the elements of the data system, together with the telephone and the CCTV camera system. The data and wifi network sockets will be supplied with uninterrupted Cat.6A FTP cables directly from the floor RACK. Telephone sockets are supplied with FTP Cat.6A continuous cables directly from the RACK.

The extension of data, telephone and wifi cables from the RACK of the first floor to the distribution boxes will be done through the metal channel of the cables located in the corridor, while in the premises of the rooms they pass through strong flexible PVC pipes d=25mm in the parts placed inside the wall and with tigid pipes in the parts of the visible installations.

5. EQUIPOTENTIAL SCHEMES, PROTECTION AGAINST ATMOSPHERIC DISCHARGES AND GROUNDING

5.1 Equipotential schemes

All equipment that requires connection to equipotential schemes will be equipped with an equipotential box placed behind each door to which all metal parts on the floor, wall or ceiling will be connected, as well as a two-pole socket of which they will be connected to the equipotential scheme. The implementation of the squipotential scheme during implementation will be completely separate from the grounding and lightning rod scheme.

Inside the equipotential box, a copper busbar with holes should be provided to realize all the connections of the equipotential points. The equipotential scheme starts in each room and ends at the electrodes placed on the ground outside the building.

5.2 Grounding network

During the implementation of the grounding scheme, it should be considered that elements such as the sigma of the soil, the type of soil, its moisture should be well studied for the final resistance to be less than or equal to 2 Ω during the calculation.
The number of electrodes depend on the realization of the RT. During differential measurement with currents commanded from 2mA-30mA, the differential relay should operate within this range.

6. CONFORMITY WITH ALBANIAN AND EUROPEAN STANDARDS ADOPTED BY THE ALBANIAN STATE

All the equipment, components and materials of the electrical and electronic plant that will be supplied and installed must be cataloged products of the last two years and have the quality mark of the country where they are produced stamped on them, e.g. for Italian products, the quality mark is IMQ (quality mark of the Italian state). They must also have the CE seal, which expresses the correspondence of each of them with the relevant European directive, especially for the main safety requirements.

In the absence of the quality mark, a relation for conformity with the standard issued by an authorized institution of the Albanian state is required. In the absence of this document, the installer must issue a declaration of conformity under personal responsibility that guarantees that all the components of the

electrical and electronic plant that he has implemented are in accordance with the standards, codes and technical regulations of the Albanian state and the adopted European standards or codes . In the case when there are no standards, the relation of conformity is based on the general principles of security.

Conformity of a component of the electrical and electronic plant with the relevant standard can be declared by the installer also through the catalog of the manufacturer of this component. The above also applies to the materials used as aids during the work, for which the installer remains responsible.

TECHNICAL REPORT

HYDROSANITARY SYSTEM

BUILDING: Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça

CLIENT: ALBANIAN DEVELOPMENT FUND

Designed:

Mechanical Engineer Ermir GJOKA Liç- M.1174/2
Mechanical Engineer Erjon ALIMANI Liç- M.1248/3

TIRANE 2026

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I. SANITARY WATER SUPPLY PLANT

1. Plant description, design standards, and calculations.

During the design of the sanitary water supply plant, the needs for consumption of cold and hot sanitary water were taken into account. Referring to this requirement, the calculation of the necessary quantity for this water was made, as well as the determination of the necessary reserve in emergency cases when water from the network is missing. This system will function through a pumping station where we have two pumps in the Technical area on the -1 floor of the school. Also included in this system will be the supply group, as well as a group of filters at the entrance to the plant.
Hot water for the school will be produced non-centralized, but in each area small electric boilers will be installed which will serve only for that area, while for the dormitory it will be produced centralized located in the Technical area on the ground floor.

2. Plant sizing.

The dimensioning of the sanitary water supply plant consists of:
✓ Distribution scheme.
✓ Calculation of the nominal flow for each sanitary equipment
✓ Calculation of the total flow
✓ Working pressure.
✓ Longitudinal losses per unit of pressure.
✓ Dimensioning of the distribution network.
✓ Max. speed of water circulation.
✓ Dimensioning of the pumping station (constant speed)
✓ Dimensioning of the autoclave.
✓ Dimensioning of electric boilers

- The distribution scheme is detailed and with drawings. It starts in the technical environment from the pumping station, continues through the complementary components and ends in each device, for each of which the calculation has been made. The selected scheme is the joint supply scheme of all bathroom devices in the Central Building and the Administration.
- The calculation of the flows will be done through the following table, in which the nominal flow and nominal pressure per device are expressed.

Aparatet	Ujeiftohte [l/s]	Ujeingrohte [l/s]	Presioni [m k.u.]
Lavaman	0,10	0,10	5
Bide	0,10	0,10	5
WC ta	0,10	—	5
Vaska	0,20	0,20	5
Dushi	0,15	0,15	5
Lavaman kuzhine	0,20	0,20	5
Lavatrice	0,10	—	5
Lavastovilie	0,20	—	5
Pisuar	0,10	—	5

Table. 1: Design Flows for Each Plumbing Equipment

2.1.Water pump station.

The water supply will be made from the main city network which will serve both for sanitary water and for the water needed to supply the fire protection tank. The main one is the pumping station, which consists of two pumps, one for the school premises and one for the dormitory. The pumps are double, one of which is in operation, ensuring the parameters calculated in accordance with the daily water needs diagrams and the network configuration, while the other pump is in reserve in case of a defect and is intended to operate alternately.

2.2.Sanitary Water Expansion Vessel

The Sanitary Water Expansion Vessel serves the sanitary water pump, this device helps the pump by protecting the pump from frequent discharges, which come as a result of the demand for sanitary water from the sanitary nodes of the building. On the other hand, this device also serves to stabilize the water pressure in the supply pipes in the building.
Usually at each outlet of the sanitary nodes the water pressure is 1 bar and the water flow may be insufficient and unstable in high places, in such cases it is necessary to use an autoclave.
An autoclave is a pressure vessel, where the pump charges it based on the discharges to obtain a pressure greater than that of the water network. Once the desired pressure is reached, the pump turns off and the system keeps the autoclave itself charged

2.3.Water tank

The calculation of the water tank is made in such a way as to provide a quantity of water for a required autonomy of 48 hours. The specifications (pressure, quantity, capacity, etc.) are determined by the designer based on the diagram of daily use by consumers.
The volume of the water tanks will be calculated depending on the project scheme and autonomy.

In our case, the water tank must be of reinforced concrete construction, and their shape will be divided into two parts, with the sole purpose of having a water reserve in the facility in case of cleaning of one tank. The tank must be equipped with floats, level indicators and no-entry points for cleaning.

2.4.Sanitary hot water

The sanitary hot water will be produced by electricity and in our case the hot water producers will be electric boilers. The sanitary hot water producer has been selected to ensure supply throughout the day. Its size has been calculated in function of the needs for sanitary hot water.

2.5.Sanitary water distribution system

The sanitary water pipe system will meet the requirements of the norms and standards determined and selected in the design phase as well as possible requirements. The pipes of this system are divided according to their material as follows:

Multilayer pipes (Pe-X) will be used in the water supply from pumps, tanks, i.e. from the machine room premises. Also, since the multilayer plastic pipes (Pe-X) are resistant to corrosion, they must be placed in places where the aforementioned materials cannot be placed due to corrosion and the aggressiveness of water. These pipes have very high mechanical properties which are maintained even at very low temperatures and in the presence of boiling water.
The pipes and all their parts as well as the relevant fittings can be welded together with butt joints or through polyfusion or with electric sleeves or flange systems. Duhet kujdesur qe tubat plastike, te plotesojne kerkesat of the necessary pressure and temperature by giving an argumentative profile of the channel section where the pipe should lie.

2.6. Drinking water sluice gates

Gate valves will be used to control the flow in water pipes. They will be made of stainless steel and will be of the threaded ball type. For gate valves used in a water supply line, they must withstand a pressure 1.5 times higher than the working pressure and must withstand a minimum pressure of 10 bar. In special cases, at the request of the project, check valves are also used, which are gate valves that allow the movement of water in only one direction. These must be placed in the suction pipe of the pumps or in their delivery pipe. They are also placed at the entrance to the building to block the water that enters. They are of the gate type, which, through a hinge, opens in only one direction. All work related to their installation and placement in the facility must be done according to the technical requirements of the supervisor and the project.

Ball Valve

Non-return valve

Filter

2.7.Sanitary Equipments

2.7.1. *Toilet and flush cassette*

They are made of porcelain with international technical standard data and must be of the French type. French type toilets are fixed to the floor or wall with brass brackets, screws and threaded plugs without interrupting the wall tile covering. Before fixing them, the connection to the water discharge pipes must be made. The toilet can have an outlet from the bottom of its body or a side outlet at the back of the toilet. In toilets with a side outlet, the outlet pipe must be at a height of 19 cm from the floor.
In the lowest part of the surface of the collection pit there is a hole with a minimum diameter of 90 mm. The upper part of the toilet is oval or circular in shape depending on the project requirement, their type and model. French type toilets are 38-40 cm high and are placed according to the project requirement and the Supervisor. The horizontal distance of their placement from other hydrosanitary equipment (sink, bidet, etc.) must be at least 30 cm.

2.7.2. *Washbasin*

In the toilet facilities, the appropriate hydrosanitary equipment (sinks) must always be provided, which will be made of porcelain. The sinks must ensure high water conductivity, resistance to mechanical shocks, insulating protection against water, elimination of noise during operation, resistance to corrosion and chemical agents, ease of work in them and simple repair possibilities.
The porcelain sinks and their support are fixed to the wall with brass clamps, screws and threaded plugs without interrupting the wall tile covering. After fixing it to the wall, the chrome-plated brass mixer must be placed on the sink and the sink must be connected to the siphon sewer pipes and water discharge pipes. At the same time, the sink must also be equipped with its own metal tap.
The drain must be placed in the lowest part of the surface of the collection pit with the dimensions of the drain. The sink has a collection pit with dimensions of 40/60 x 36-45 cm depending on the type and model chosen. The dimensions of the sink depend on their type and model. Sinks are placed at a height of 75-85 cm according to the project requirements. The horizontal distance of their placement from other hydrosanitary equipment (bidet, WC, etc.) must be at least 30 cm.

Sinks are connected to the drain pipes by means of a drain, a siphon-shaped pipe made of PVC material. The above connection can be made with three branches inclined at an angle of 45 or 60 degrees. The connection pipe must be PVC with the same technical characteristics as the drain pipes. The length of these pipes is 20 - 40 cm. Their diameter will be in function of the drain outlets where they are placed. The sinks are connected to the water supply system by two flexible pipes with a length of 30 - 50 cm and a diameter of 1/2 ", which connect the tap to the hot water and ordinary water supply pipes. Appropriate rubber bands must be placed at the point of connection of the tap to the sink, to prevent water leakage.
All work related to their installation and placement in the facility is done according to the technical requirements of the supervisor and the project. The sink connections to the drain pipes must be done with the appropriate Rehau-PP pipes.
A model of the sink that will be used together with the quality certificate, certificate of origin, test certificate and warranty will be given for review to the Investor's Supervisor for approval before being placed in the facility.

II. WASTEWATER DISPOSAL PLANT

2.1 Wastewater discharge system, dimensioning

The dimensioning and design of all components and accessories of the wastewater and rainwater drainage system will be carried out taking into account all the determining elements as follows:

- ✓ Distribution scheme (internal discharges of H/S devices + columns + collectors + wells);
- ✓ Determination of the nominal discharge flow for each H/S device;
- ✓ Determination of the design flow of discharges;
- ✓ Drawings and dimensions of internal wastewater discharges;
- ✓ Drawings and dimensions of rainwater drainage pipes;
- ✓ Drawings and dimensions of wastewater and rainwater wells.

The dimensioning of the pipes will be done in function of the calculated flow for wastewater and rainwater, their circulation speed and slope, etc. The speed should be 1.0-1.2 m/sec and the slope of the pipes within the limits of (0.5 – 0.8) %.
The length of the pipes will be 6-10 m. The diameters and thicknesses will be selected in accordance with the project data. The characteristics such as pressure, manufacturing plant, year of manufacture, etc. should be stamped on the outer diameters of each pipe.

2.2 Pipe materials

For water discharges inside the premises, high-temperature thermostabilized polypropylene plastic pipes will be used that meet all quality requirements according to the EN 1451 standard Requirements for the testing and quality of pipes. These pipes must provide perfect resistance to corrosion, high resistance to chemical agents, light weight, and easy repair options.

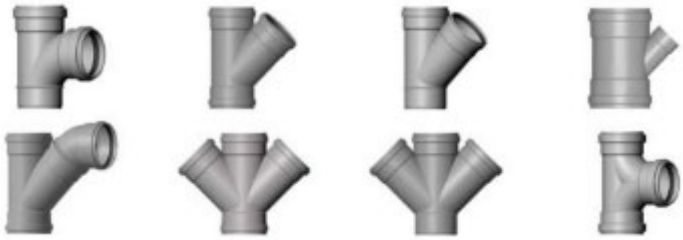
The discharge pipes are connected to the sanitary equipment or group of equipment on each floor by means of delivery pipes. The connection of the delivery pipes to the discharge columns must be made with three-branches inclined at an angle of 45 or 60 degrees. The delivery pipes can be laid along the walls, above or below the floor, taking into account the conditions set for the installation of the internal sewage network. The connection of the delivery pipes to the discharge columns must be made with three-branches inclined at an angle of 45 or 60 degrees. The delivery pipes can be laid along the walls, above or below the floor, taking into account the conditions set for the installation of the internal sewage network. The length of these pipes must not exceed 10 m. Their diameter will be in function of the outlets of the sanitary equipment that are installed.

Each vertical discharge column is equipped with control points which must be placed every two floors starting from the lower part of the column.

2.3 Fittings for exhaust pipes

For connecting the discharge pipes to each other and to the sanitary equipment or their groups, the appropriate fittings made of RAU – PP plastic material will be used, which meet all the quality requirements according to the EN 1451 standard (Requirements for testing and quality of pipes).

These fittings (connecting parts) must ensure corrosion resistance, high resistance to chemical agents, light weight, easy repair, transportation and installation, simple and fast.



Their dimensions (diameter) will be a function of the calculated amount of wastewater, the type of sanitary equipment, the speed of water movement and the diameters of the relevant pipes.
During the calculations, the speed of water movement should be taken as 1-2 m/sec, while the filling rate will be 0.5-0.8 of the pipe section.

Their diameter and thickness should be according to the data in the technical drawings. Data on the outer diameter, length, pressure, manufacturer's name, the standard they refer to, the year of manufacture, etc. should be printed on each fitting.

The diameter of the fittings should be the same as the diameter of the discharge pipe to which it will be connected and in no case smaller than the largest wastewater delivery pipe that is connected to it. In cases of changing the diameter of the discharge and delivery pipes, the fittings must be adapted to each of them.

2.4 Floor drain

For floor water discharges, RAU – PP culverts will be used, which meet all quality requirements according to the EN 1451 standard (Requirements for testing and quality of pipes.

- ✓ The culverts can be made of plastic, stainless steel and bronze.
- ✓ The culverts must ensure high water permeability, resistance to corrosion and chemical agents, easy repair, transport and connection possibilities.

The discharge culverts must be placed in the lowest part of the surface where the water will be collected. Usually they are not placed near the junction of the floor with the walls, but as close as possible to the middle of the floor.

The discharge culverts are connected to the discharge columns by means of a PP pipe. The connection of the culverts to the discharge columns can be made with three branches inclined at an angle of 45 or 60°. The connection pipe must be PVC with the same technical characteristics of the water discharge pipes. The length of these pipes is 20 - 30 cm. Their diameter will be in function of the outlet of the pipe where they are placed. In cases of change in the diameter of the pipe with that of the delivery pipe, the appropriate reductions will be used.

2.5 Wastewater and rainwater sewage manholes.

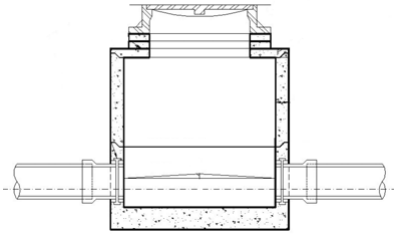
For the collection of wastewater, collection type manholes with water-tight concrete construction and a circular cast iron cover will be used. Their construction shape is square, rectangular or circular, while according to their organization they can be with one room with two or more rooms. The dimensions are 60x60 cm.

Rainwater manholes must be square in shape with a depth of not less than 50 cm. The dimensions are 40x40 cm with a square water-tight cover.

All types of manholes mentioned above can have walls made of prefabricated concrete elements, or with concrete poured in place.

The material from which both the frame and the cover are made must be cast iron. The manholes must meet the following technical requirements:
External bearing load; Soil pressure;
Water pressure.

The dimensions of the manholes are calculated in function of the flows and are determined by the designer in the relevant drawings.



Also, the dimensions of the collectors that discharge wastewater and rainwater have been calculated and dimensioned in function of the flows and their material has been selected: PE, corrugated on the outer surface and smooth on the inner surface, with dimensions ranging from 200 - 300 mm.

TECHNICAL REPORT

HEATING, VENTILATION AND AIR CONDITIONING (HVAC) PROJECT

BUILDING: ESTABLISHMENT OF THE EDUCATIONAL INFRASTRUCTURE OF THE FRANCO-ALBANIAN LYCEUM OF SCIENCES AND INNOVATION .

CLIENT: ALBANIAN DEVELOPMENT FUND

ADDRESS: KORCA MUNICIPALITY

Designed:
Mechanical Engineer Ermir GJOKA Liç- M.1174/2
Mechanical Engineer Erjon ALIMANI Liç- M.1248/3

TIRANA 2026

SUMMARY TABLE

1. GENERAL

1.1. Field of Work

The scope of work covers the supply, installation, testing, erection, commissioning of the following:

a) Outdoor and indoor units of the VRF system.
b) Condensate Discharge Network
c) Copper pipes connected with all accessories.
d) All necessary accessories for installation, etc.
e) Air Duct Network
f) Dimensioning and Positioning of Supply and Extraction Air Grilles
g) All Flow Balancing Dampers and Fire Dampers
h) VRF and Air Plant Control System

It will be the contractor's responsibility to prepare all necessary technical documentation for the approval and certificate of completion of the plant by the works supervisor, without which the work will not be considered completed and will not be undertaken.

The complete installation of the Air Conditioning System will strictly confirm the specifications and instructions given in the Albanian Standards and Norms in Force as well as the European ones, as well as the recommendations of the manufacturers of the offered system.

1.2.Warranty / Defect Liability Period

- The Contractor shall provide a warranty against manufacturing defects for 12 months from the full delivery of the works (System Acceptance) or as specified in the legal works contract.
- In case of failure of any particular part of any equipment more than three times during the warranty period. It will not be repaired but the complete part will be replaced by the contractor and the warranty for this particular part will be extended by one year from the date of the last replacement.
- In case it is found that the above failure is due to any connected part of the equipment, that part shall also be corrected or replaced by the contractor to avoid such failure. The warranty for such replaced part shall be extended by one year from the date of replacement.
- In the event of failure of any particular equipment that fails more than three times during the warranty period, as mentioned in point-b above, the contractor shall replace that equipment at his own cost with another equivalent brand approved by the works supervisor.
- The manufacturer's/contractor's warranty as mentioned in point-b above for such
  Replaced equipment will be kept valid for at least one year from the date of the last replacement.

1.3.working

The installation shall be of the best quality and shall conform to the specifications as below or the Albanian/European Standard Specifications in every respect or the latest trade practices and shall be subject to the approval of the Works Supervisor. All materials and/or works which in the opinion of the Engineer are defective or unsuitable shall be immediately removed from the site and replaced with suitable materials and/or works immediately.

1.4.Inconsistencies in drawings

If there is any discrepancy due to incomplete description, ambiguity or lack of proper information in the drawings and other documents related to this project, before the commencement of work or during execution, the Works Supervisor or Contracting Authority must be informed and their decision will be final and binding on the Contractor.

1.5.Materials

All materials to be supplied by the Contractor shall be new, best of their kind and shall confirm the latest Albanian and European standards in the field of VRF/VRF air conditioning installations. All packaged items shall arrive at the site only in their original packaging. Any item found damaged shall be replaced by the Contractor at his own expense.

1.6.Measuring and Testing Instruments

The Contractor shall provide, free of charge, all equipment, instruments, labour and all other assistance required by the Works Supervisor or their representatives for the measurement and testing of the Works. Prior to testing, the Contractor shall submit the testing methodology, which shall be approved by the Supervisor and at a time agreed upon by all parties, the tests shall be carried out. Relevant minutes shall be kept for each test carried out.

1.7.Site Maintenance

It shall be the Contractor's responsibility to clean up, from time to time, all waste and excess material created by the activities of his workers.

1.8.Safety Codes and Work Rules

(i) In connection with the entire implementation of the contract for contractual installations, the contractor shall, at his own expense, regulate the provisions of occupational safety according to the laws in force.

(ii) The Contractor shall provide the necessary barriers, warning signals and other safety measures during the placement of pipelines, various installation materials, equipment etc. or wherever necessary to avoid accidents. The Contractor shall be liable, in accordance with Albanian law and regulations, for any accident that occurs for any reason.

1.9.Completion of Tender Requirements, Program Submission, Drawing Approval and Commencement of Work

Tender completeness:

All miscellaneous equipment, fixtures, materials to be installed, as well as all other accessories that are useful and necessary for the proper assembly and efficient functioning of the various equipment and components of the work shall be deemed to be included in the tender, regardless of whether such items are specifically mentioned in the tender or not.

Program submission:

Within fifteen days from the date of commencement of works, the contractor shall submit his schedule for the submission of drawings, supply of equipment, installation, testing, commissioning and handover of the installation to the Works Supervisor. This schedule shall be adjusted taking into account the progress of construction and the priority assigned by the Engineer-in-Charge. Items such as piping etc. which directly affect the progress of construction shall be given priority.

Submission of Site Drawings:

The contractor must submit shop drawings to the supervising engineer for approval before work begins.

Starting work:

The Contractor shall commence work as soon as the drawings submitted by him are approved in full or in part, as the case may be.

1.10. Sending Materials to the Site and Their Safe Storage

The Contractor shall deliver the materials to the site in consultation with the Engineer-in-Charge. Suitable lock-up storage shall be provided free of charge temporarily. However, guards and storage shall be the responsibility of the Contractor. The delivery schedule of the material shall be framed keeping in view the progress of the construction. The safe storage of all machinery and equipment supplied by the Contractor shall be the responsibility of the Contractor until final acceptance by the Client.

All material samples must be approved by the supervisor before being sent to the site.

1.11. Coordination With Other Disciplines

The contractor must coordinate with all other disciplines involved in the job site so that the work of other contractors (if any) is not hindered due to a delay in his work. Piping, installations or any other work that directly affects the progress of the work of other contractors has priority.

1.12. Care for the Construction Site

During the execution of the works, care shall be taken by the contractor to avoid damage to the facility. He shall be responsible for repairing all such damage and restoring it to its original finish at his own cost. He shall also remove from time to time all unwanted materials and waste arising from the installation from the work site.

1.13. Inspection and Testing

Initial inspection and testing

(i) The initial inspection of materials and equipment at the manufacturer's works shall be carried out by the Engineer-in-Charge or his representative. For items/equipment requiring initial inspection at the manufacturer's works, the contractor shall indicate the date of testing of the equipment at the manufacturer's works prior to delivery. The contractor shall give sufficient advance notice of the

proposed dates for such tests to the client's representative(s) to facilitate his presence at the testing. The Engineer-in-Charge may at his discretion witness such testing. The material/equipment shall be inspected at the manufacturer's/authorized dealer's premises prior to delivery to the site by the contractor.

(ii) The materials duly inspected by the Engineer-in-Charge or his authorized representative shall be sent to the site by the contractor.

(iii) No additional payment shall be made to the contractor for the initial inspection/testing of the manufacturer's works by the representative of the engineer in charge. However, the client shall bear the expenses of his substituted representative in carrying out the initial inspection/testing.

1.14. Security Measures

All equipment must incorporate appropriate safety provisions to ensure the safety of operating personnel at all times. The initial and final inspection reports must explicitly state the safety provisions incorporated in each piece of equipment.

1.15. Tender, Site and Applied Drawings

Tender drawings

The drawings attached to the tender documents are intended to show the areas for various equipment, the routes of pipelines. The equipment offered must be suitable for installation in the spaces shown in these drawings.

Drawings for approval for issuing drawings to be implemented

The Contractor shall prepare and submit the following drawings and have them approved by the Engineer-in-Charge before the commencement of work. However, the approval of the drawings shall not relieve the Contractor from his responsibility to supply the equipment/materials as per the agreement. In case of any discrepancy between the approved drawings and the agreement, the decision of the Engineer-in-Charge shall be final and binding on the Contractor.

(a) Submit drawings of the equipment to be installed at the facility.

(c) Site drawings showing the layout of all piping, pipe diameters and lengths, external and internal fittings and isometric drawings showing connections to various fittings.

(d) Electrical wiring diagrams for all electrical equipment and controls including sizes and capacities of various cables and devices

(e) Dimensional drawings of all electrical and control panels,

(f) Drawings showing details of supports for pipes, etc.

(g) Any other drawings related to the work.

As Built Design drawings

All applied drawings must be submitted in electronic and printed format to the works supervisor.

(a) Installation drawings that provide full details of all equipment, including details of their installation.

(b) Drawings giving the sizes and lengths of all pipes and the sizes and locations of all types of air

conditioning equipment, and including isometric drawings for all piping including pipe connections to the various equipment.

(c) Drawings giving the sizes and lengths of all air ducts and the sizes and locations of all types of air supply and exhaust grilles, manual dampers and fire dampers as well as all elements of the project together with the relevant notes.

(d) Check wiring drawings with all control components and sequence of operations to explain the operation of control circuits.

(e) Schematic diagrams.

1.16. Final Installation Documents

At the completion of the work, the client will be provided with the following sets of documents: -

(a) Implementation drawings as mentioned above

(b) Manufacturer's technical catalogs of all equipment and accessories.

(c) Operation and maintenance manual of all major equipment, detailing all adjustments, operation and maintenance procedures.

(d) As well as all necessary documentation as specified in the legislation in force for the supervision of the implementation of the works.

1.17. Instruction/Training Manual

The Contractor shall provide the responsible consultant/engineer with the instructions and operating manual in 3 copies. The Contractor shall instruct the client's staff in the operation and maintenance of the entire installation for at least fifteen days.

The manual should contain detailed technical data and drawings for each installed equipment, installation, testing, operation and maintenance procedures, spare parts manual and recommended reserves for the 3-year maintenance period of each equipment.

2. AIR CONDITIONING SYSTEM .

2.1 Entry

The facility is being built in Vlora. It is a building with the function of apartments and hotel rooms. It is necessary to ensure thermal comfort in all areas so that the activities carried out can develop normally. These requirements have been considered in proportion to living standards as well as their impact on the cost of school rehabilitation.

2.2 External and internal design conditions.

2.1.1 External design parameters

Korca Municipality

- Altitude above sea level, 899 m
- Latitude, 40 Degrees and 36 minutes.

Design conditions for heating

- Design outdoor temperature -10 ºC
- Relative humidity 80%

Design conditions for cooling

- Design outdoor temperature 38 º C
- Relative humidity 55%

2.3 Proposed multi-zone air conditioning system

The new developments that have accompanied the new situation of our planet, Earth, draw our attention to the care we must show in contributing to improving the situation of the planet as well as improving our living conditions.
Globally, the increase in carbon dioxide levels has led to an increase in average regional temperatures, which has impacts on nature and civil life.
In this sense, VRF systems (variable flow refrigerant systems in the thermodynamic cycle) present heating/cooling technologies with absolute minimum energy consumption and ideally balanced multifunctional comfort.
These systems are classified as "built-on-site systems", that is, systems where outdoor and indoor equipment are combined according to their manufacturer in terms of number, capacity, refrigerant pipes, and connection distances.

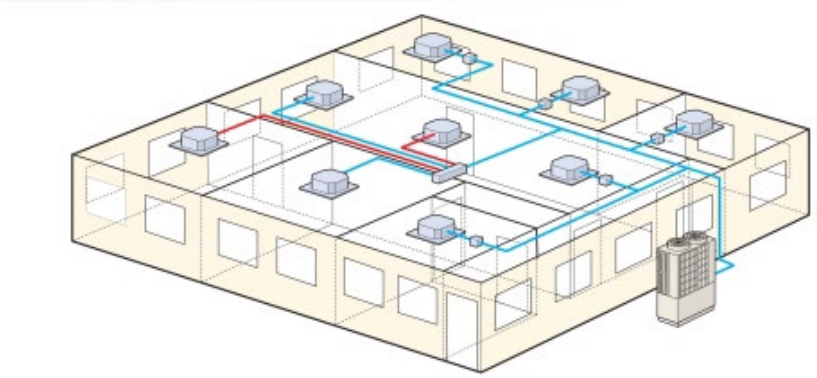


Fig. 1 VRF system typology

VRF systems as multi-zone classified systems represent a central system that functions for several different thermal comfort zones. The characteristic of multifunctional buildings with different comfort and operating times is that they require systems with independent comfort and operating times that, at maximum capacity, operate no more than 10% of the seasonal operating time. VRF systems not only have high efficiency at maximum capacity (COP) from 3.7 to 4.52 but, they have absolutely high efficiency in partial load operation that goes from 5.6 to 6.4 which makes these systems absolutely the most economical in terms of energy consumed.

These devices are direct expansion and have a very good performance coefficient, reaching COP 4.5, which reduces energy consumption during the period of use.

2.4 System description

2-pipe VRF system

The system consists of the outdoor unit, the refrigeration cycle piping system, the indoor units with two-way valves and temperature sensors (Fig.2).

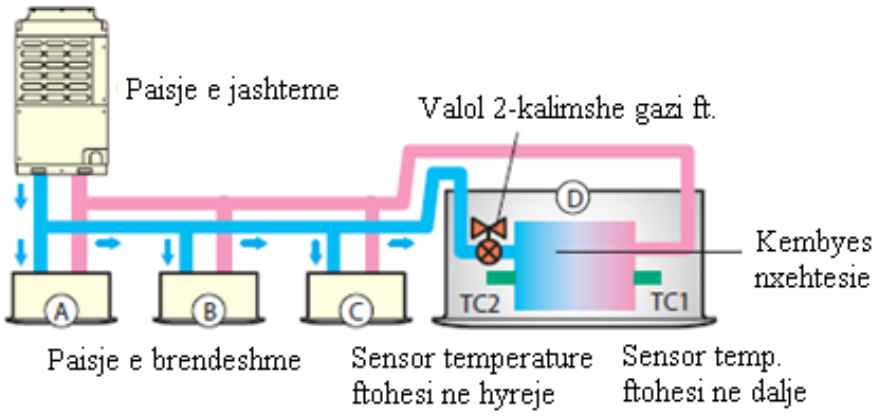


Fig.2 The principle scheme of the VRF system

The piping system (copper pipes for cooling, liquid pipe and gas pipe) from the outdoor unit on the terrace descends into vertical channels in the interior of the building and enters the corridors from where they enter each room to connect to the indoor unit (cassette or duct type) in the ceilings.

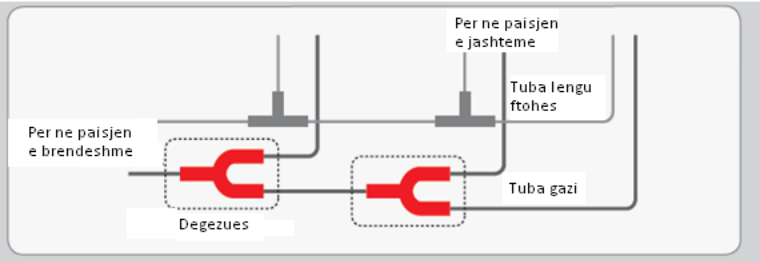


Fig.3 The principle scheme of the VRF system

All equipment must be silent and all ducted equipment must be installed with a low noise level according to the intended destination. Each room is independently controlled in terms of on/off function, temperature level and air speed.

2.5 Heat losses

Regarding thermal losses, all factors that directly contribute to the removal of heat from the interior spaces have been carefully analyzed. The main factors that make this heat loss possible are:

- Heat transfer coefficient in wall structures.
- Heat transmission coefficient in window structures.
- Heat transmission coefficient in door structures.
- Heat transfer coefficient in floor and roof structures.
- Infiltration factor (natural ventilation)
- The orientation factor of the object, north-south, east-west.

One of the main factors in calculating thermal loads is the population of the rooms, and the lighting, which in this case contribute positively. All of these that we mentioned were considered in the process of thermal analysis and calculations. Thermal calculations were made possible through calculation tables, which were analyzed in the EXEL computer program.
From the point of view of the thermal capacity of the equipment, we underline that the peak load capacity varies considerably during the day based on the variation of the occupancy of the premises, which has been irregularly predicted. In order to avoid over-dimensioning of the equipment capacities, the effects have been analyzed in advance as well as the preliminary forecast of energy consumption.

2.6 Air Handling Units

100% fresh air supply system

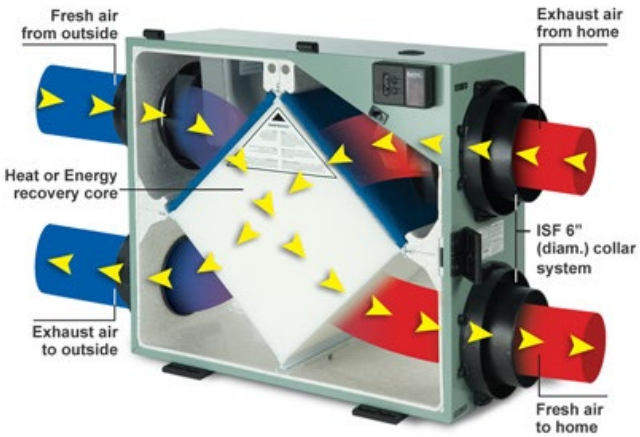
This system serves to supply the building's fresh air needs. The uniqueness of this central system lies in the fact that 100% fresh air is used at all times, which is completely replaced with indoor air, which due to the nature of the functioning of the premises is polluted with dust, etc. This form of air exchange ensures the supply of oxygen and clean air to all premises of the building and avoids the possibility of air pollution.

The device that carries out this process is the air treatment unit. This device is composed and sized according to the size of the area it serves. The composition of this unit consists of three sections, the fresh air treatment section and the polluted air removal section and the thermal energy recovery section from the polluted air that will be released into the atmosphere into the fresh air that will be supplied to the indoor spaces.

- *G4 fresh air inlet cleaning filters*
- *G4 air purification filter for polluted air intake*
- *Heat exchanger with an efficiency of not less than 50%*
- *Fan in delivery / Fresh air return*

The rotors of the supply and return fans must be connected directly to the axis of the electric motor, avoiding belt transmissions. This affects the cleanliness of the air as well as the electrical efficiency of the electric motor.

These air handling units will ensure the supply of fresh air to all areas as given in the project implementation drawings. The technical characteristics for the production of these air handling units will be given as follows:



Also, all air handling units must be built in accordance with European standards EN 1886, and must be accompanied by a Eurovent certificate according to the standard: OM-5-2014, which must meet the following conditions:

- Mechanical resistance of the outer fabric, maximum relative flexibility, not more than 4 mm/m (class D1)
- The property of air infiltration in the canvas, not more than 0.15 l/sm2 at -400Pa, and not more than 0.25 l/sm2 at +700Pa (class L1).
- By-pass filtration, flow rate based on nominal flow, not more than 0.5 %. (class F9)
- Thermal transmission, not more than 1 W/m2K. (class T2)
- Thermal resistance of thermal joints, not less than 0.6 m2K/W. (class TB2).

2.7 Air distribution system (ventilation / air conditioning)

All air ducts must be constructed and installed in accordance with the drawings and the relevant EN and DIN standards. The ducts must be laid in a straight line, must be smooth on the inside, must be free from vibrations under all operating conditions and must be free from pressure loss. The entire air duct system including clamps, supports, insulation, gaskets, flexible ducts, sound absorbers, flexible duct connections, must be selected, manufactured and installed for a service life of 10 years.

2.8 Dimensions of air ducts

All air ducts must be manufactured to the dimensions shown on the drawing. The dimensions of the ducts are the actual dimensions of the air passages. Changes in the dimensions of the ducts (reductions) and in their shape must be made gradually.

2.9 Testing

All air ducts (supply and return) shall be tested and hermetically sealed in such a way that the entire system, including flexible connections to the air terminal units, shall not leak more than 4% of the maximum design air volume at the design static pressure of the air duct. The test shall be carried out by means of approved equipment, which shall consist of a centrifugal test fan, a calibrated air section nozzle, a calibrated differential pressure gauge and other equipment necessary for carrying out the test. The minimum test pressure shall be 500 Pa. The entire section of air ducts under test shall be checked for noise and leakage, repaired and retested. Repair shall be carried out even when the leakage of the air ducts is within the specified limits.

2.10 Installing

Air ducts must be installed in a neat and clean area. The methods of securing these ducts to structures and walls must be coordinated and approved by the Engineer.

2.11 Material for the construction of air ducts

All air ducts, except where otherwise specified, shall be constructed of galvanized sheet metal. All galvanized sheet metal shall be coated with 275 g/m² zinc. Clamps and brackets shall be protected by galvanized sheet metal. The thickness of the galvanized sheet metal shall be in accordance with the size of the air duct flange, the size of which is given in the table below.

Brinja me e gjere e kanalit	*Trashesia e llamarines*
Deri ne 30 cm	δ=0.6 mm
Nga 35 ÷ 75 cm	δ=0.8 mm
Nga 80 ÷ 120 cm	δ=1.0 mm
Nga 125 ÷ 200 cm	δ=1.2 mm
Mbi 200 cm	δ=1.5 mm

The connection of air ducts between themselves or to elements such as elbows, trousers, reductions, must be done through flanges. The method of attachment must be carried out according to the details given in the drawing.

2.12 Thermal insulation of air ducts

All supply air ducts installed indoors must be painted with thermal paint in order to preserve their aesthetic appearance. The paint to be used for thermal insulation of air ducts must be with refractory grains of constant granulometry (0.2-0.5) and homogeneously distributed in the mixture. It limits the noise level to 6-8 dB(A) and provides very good protection against corrosion.

- Color: Beige/brown with pulp, fine-grained Alkalinity (PH): 7.0-7.5
- Thermal conductivity: λ=0.123 W/m*K
- Specific gravity: 0.91 gr/cm3

2.13 Flexible Channels and Connections

Fans and other vibrating equipment in their connections to the ducts must be connected on both sides with flexible ducts. These flexible ducts must be suitable for the working pressure of the ducts at the point of installation. Flexible ducts mean a strip placed between two connections in the duct that does not exceed 100 mm of the duct length. Flexible ducts must be manufactured from damage-resistant piece lining and with a mineral-based factory coating.
Flexible connections must be securely fastened and must not leak or cause excessive noise. In the case of air distribution terminal units, detachable metal strip clamps must be used.
These pipes will be delivered in two forms: insulated and uninsulated.
The construction will be: Aluminum reinforced with two sheets of polyester, thermally insulated with glass wool:

Color: aluminate
Length: standard
temp. of work 25 ºC / +220 ºC

Density 16 kg/m³
Thickness 25 mm

2.14 Elbows and branches

Standard radius elbows (R = D) will be used. Short radius elbows and square elbows will be used only in cases where spaces are narrow.
All branches must be at 45º, except when otherwise specified in the drawings.

2.15 Filter support frame

The filter holder frames and their components must be standard products from the current catalogue. These devices must be selected with a service life of 12 years. The filter panels must be removable from the upper side of the air flow. The filter holder frames will be such that they are compatible with standard filter panels.
When the device is loaded with all the specified filters, it will allow zero air flow around their frames and must remain in this condition until the end of its service life. The filter support frames must be able to support the weight of the filters when the latter are filled with filter materials. The filter frames must be strong and must not have any deformation even under the maximum weight of the filters that will be ready to be cleaned. The filter frames, gaskets and their clamps must withstand up to 500 filter replacements.
No special tools are required to replace the filters.

2.16 Air conditioning supply and return grilles (mounted on the air duct)

The grille shall be mounted as shown in the drawings. The grille shall be finished in natural anodized aluminum. The model and appearance of the grille shall be approved by the engineer. The inner surface of the grille shall have double-row blades. The grilles shall be equipped with dampers for regulating the air volume that regulate the amount of air. The grille and all its components shall be protected from corrosion. For the installation of the grille, all necessary brackets and screws shall be provided, and this device shall be installed in the openings left in the air duct through a neck of not less than 10 cm and in the positions and details shown in the drawings shown in the drawing.

RELATION TECHNICAL

FIREFIGHTING SYSTEM

OBJECT: " ESTABLISHMENT OF THE EDUCATIONAL INFRASTRUCTURE OF THE FRANCO-ALBANIAN LYCEUM OF SCIENCES AND INNOVATION, MUNICIPALITY OF KORÇA"

CLIENT: ALBANIAN DEVELOPMENT FUND

Designed by : **Mechanical Engineer Ermir GJOKA Liç- M.1174/2**
Mechanical Engineer Erjon ALIMANI Liç- M.1248/3

TIRANA 2026

SUMMARY TABLE

1. Fire protection and rescue system

1.1 entry

The design of the Fire Protection and Rescue System project is based mainly on Albanian legislative provisions, with European standards and norms considered as supporting and complementary. This project, through the implementation and construction of its facilities, aims to provide protection for human lives and minimal damage to material goods from the possibility of fire in buildings. The laws, Council of Ministers, Directives, as well as international norms and standards on which the design of this project is based, are as follows.

Laws, Council of Ministers, and Ordinances of the Albanian state

Law No. 152/2015 Date 21.12.2015	For fire protection and rescue service,
DCM, No. 626, Date 15.7.2015	For the approval of housing design regulations, Chapter X, Fire Protection in Buildings
Order, No. 424, Date 24.7.2015	On the approval of technical regulations for fire protection and rescue in residential buildings
Order, No. 425, Date 24.7.2015	For the receipt, administration of technical and graphic documentation of the fire protection project and for the rescue and issuance of technical acts.
Order No. 45 Date 09.04.2004	On the protection of material values from fire in warehouses and storehouses
Law No. 8766/2001 Date 05.04.2001	For Safety and Fire Protection
Law No. 8766/2001 Date 26.03.2001	For Civil Emergencies
Decision no. 162 Date 19.4.1965	On fire protection measures in the design of buildings of all types

Complementary International Standards and Norms, "UNI EN"

EN 2	Classification of Fires
EN 13501	Fire classification of construction products and building elements.
UNI 9795:2010	Project of automatic fire detection system and fire alarm systems
EN 12845	Fixed fire extinguishing systems – Automatic sprinkler systems – design, installation and maintenance.
EN 1366	Fire resistance tests for service installations
EN 1028	Installation of Stationary Fire Protection Pumps
EN 12416	Fixed fire extinguishing systems - Powder systems
EN 14384	Column type fire hydrant installations
EN ISO 14557	Fire hose – Rubber and plastic suction hose and hose assembly parts.
UNI 10779:2007	Fire extinguishing equipment – Hydrant system. Design, installation and operation

UNI 11292:2008	The environment intended for the installation of the pump group for fire protection systems. Functional and constructive requirements.
EN 15004:1	Fixed fire extinguishing systems – Gas fire extinguishing systems, design, installation and maintenance
EN 15004:7	Fixed fire extinguishing systems – Gas fire extinguishing systems, physical data and design of gas fire extinguishing system, for IG-01 extinguishers.
EN 545:2010	Ductile iron pipe, fittings, accessories and their connections for pipelines - requirements and test methods.
EN 10216	Seamless steel pipes for pressure purposes – Technical conditions of supply
EN 10217	Welded steel pipes for pressure purposes – Technical supply conditions.
EN 10220	Seamless steel pipes and welded steel pipes – Dimensions and weights per unit length.
EN10255	Seamless steel tubes suitable for welding or threading. Technical conditions of supply

2. Types of fire protection in buildings.

2.1 Passive fire protection system in buildings

The project for passive fire protection of buildings consists of determining evacuation routes, dividing the building into safe areas (compartmentalization), and selecting materials for the construction of the building structure, referring to their fire-resistant properties, which are determined by their resistance to fire over time, as well as the classes of combustible materials. For the selection of materials to be used during the construction of the building, we rely on the recommendations and definitions given in ***the Order, No. 424, Date 24.7.2015*** , for determining the fire resistance of structural elements, the degree of fire, and the classification of materials.

R	*Resistance of the external parts of the building to fire expressed in minutes (0-120)*
REI	*Resistance of the internal parts of the object expressed in minutes (0-120)*
RE	*The resistance of the doors of the rooms, the latter expressed in minutes*
Fireproof Height	*It is the height of the objects expressed in meters, with the following division: 0-24 meters, 24-54 meters, over 54-80 meters, over 80 m*
Class 0	*Non-combustible materials*
Class 1	*Materials that burn with difficulty, and only in the presence of fire*
Class 2	*Combustible materials*
Class 1 IM	*They are materials and equipment for furnishing, which have as their components materials such as laminated wood plus cotton, wool, etc., as well as their by-products, which are used for interior furnishings.*

Also, for the method and manner in which the classification of the building type is made, the recommendations and definitions expressed in the content of ***the Order, No. 424, Date 24.7.2015, point 6.1 Classification, are used,*** and the classification of the building type is also made, which are expressed in Table A.

Building type	**Fireproof height of the building**	**Maximum area of premises in (m^2)**	**Maximum area (m^2) of floor which corresponds to a degree in building**	**Type The cage THE stairs and THE AT LEAST A cage for elevator**	**"REI" characteristics of the stairwell and the elevator, THE smoke filter, doors, of the elements of subdivisions IN floors**
a	on 12-UP 24 m	8 000	500	ANY DETERMINATION	60 (**)
			500	of AT LEAST THE protected If NOT the requirements of point 7.2 are met.	60
			550	of AT LEAST THE EVIDENCE of indoor smoke	60
			600	The EVIDENCE of smoke	60
b	on 24 UP 32 m	6 000	500	ANY DETERMINATION	60 (**)
			500	of AT LEAST THE EVIDENCE OF THE indoor smoke if NOT requirements are met of POINT 7.2.	60
			550	of AT LEAST THE EVIDENCE OF THE SMOKE THE INTERNAL	60
			600	of EVIDENCE of smoke	60
c	on 32 UP 54 m	5 000	500	of AT LEAST THE EVIDENCE of smoke THE INTERNAL	90
d	on 54 UP 80 m	4 000	500	of AT LEAST THE EVIDENCE indoor smoke with ventilation filter not with THE SmAll that 0.36 m^2.	90
e	on 80 m	2 000	350(*)	of AT LEAST THE EVIDENCE of smoke THE INTERNAL with filter ventilation not with small that 0.36 m^2.	120

2.2 Active fire protection system in buildings

The project for active protection of buildings from fire consists of the selection and dimensioning of water systems for extinguishing fires, as well as mobile (protative) means, which are cylinders with chemical extinguishing agents, powder, foam, gases, etc. Fire extinguishing systems are divided into two types, which are characterized by the method of their activation.

- *The first fire extinguishing system, which is also the classic one and requires human intervention to be activated, is the manually activated system.*
- *The second fire extinguishing system, which is activated without human presence, is the automatically activated system.*

Manually activated fire extinguishing systems include internal and external hydrant systems. In the event of a fire in the building, one or more specialist personnel grab the hydrants positioned at specific locations, open the hand valves and activate the system by spraying water to extinguish the fire.

Automatic fire extinguishing systems include sprinkler systems. In the event of a fire in the premises where these systems are installed, even without the presence of people, these systems are automatically activated, localizing the fire area and neutralizing it.

Components of these systems

- *Installations with internal hydrants*
- *External hydrant installations*
- *Automatic sprinkler systems*
- *foam canisters*
- *powder canister*
- *halogen gas cylinders*

The methodology for selecting the appropriate fire extinguishing system in buildings is clearly defined in ***Order No. 424, Date 24.7.2015.*** Specifically, for this purpose, ***point 24. Firefighting Systems comes to our aid.***

2.3 Zoning and classification of fires.

To use extinguishing agents during a fire, first an analysis of the combustible materials in that area must be done, and based on this analysis, a classification of fires is made and then the agent and extinguishing equipment to be used in that area is selected. From what we mentioned above, as well as based on norms and standards, fires are divided into 6 classes which are expressed in the following table:

FIRE CLASSIFICATION TABLE				
1		Class	or	Fires originating from solid objects such as wood, paper, plastic and textiles
2		Class	B	Fires originating from flammable materials, such as benzene, benzene, petroleum, alcohol, oils, etc.
3		Class	C	Fires originating from gaseous materials such as methane, propane, butane, LPG, etc.
4		Class	D	Fires originating from metallic materials such as aluminum, magnesium, sodium, etc.
5		Class	E	Fires originating from live equipment.
6		Class	F	Fires originating from cooking food in kitchens

Table 1: Fire Classes

3. Architecture and Construction in the function of fire protection.

3.1 Construction characteristics of the building

The building in question is intended to serve the high school and the necessary services for the student community. The building consists of different areas that help achieve the purpose for which this building is built. Specifically, these areas are:

- *Educational Center*
- *Lecture Hall*
- *Seminar Hall*
- *library*
- *chancery*
- *Conference Hall*
- *Office*
- *deanery*
- *Lecture Hall*

The building in question has a height of 35 m. Based on ***the Order, No. 424, Date 24.7.2015, point 6.1*** for the classification of buildings, all the constituent buildings of this building are classified as Building Type A where the fireproof height of the building is over 12 ÷ 24 m. The maximum area of the premises for each building is less than 5000 m^2, and the maximum area of the floor corresponding to a staircase in the building is less than 500 m^2.

For the type of stairwell and at least one elevator cage. Characteristics REI 60 is provided for the stairwell and elevator cage.

In order to increase the guarantee for the lives of people present, when they are in the conditions of a fire and to enable their rapid and safe evacuation, from the place of occurrence it is mandatory that the exits and evacuation routes, especially the spaces and passages in them, are always kept free. They are also made present through phosphorescent and illuminated indicator boards. In this way, general passive fire protection measures also include:

- *Positioning signs in visible locations and posting instructions on actions that personnel should take in the event of a fire;*

- *Positioning of signs indicating the positions of fire extinguishers and hydrants, escape routes and emergency exits;*
- *Removing flammable materials from parking areas and placing them in safe places to prevent the spread of fire;*
- *Keeping escape routes clear;*
- *Careful maintenance and continuous control of electrical installations in accordance with the relevant rules for such installations;*
- *Inspection by qualified and trained personnel of all compartments, warehouses, etc. at all times to eliminate conditions that could lead to the creation of a fire.*

The part of the project on signage and symbolism used is all based on ***Order No. 425 dated 24.07.2015*** of the Minister of Internal Affairs, which in module No. 2 defines the general requirements for conventional and indicative signs of the technical and graphic documentation of the fire protection and rescue project.

3.2 Structural characteristics of the building

Structurally, the facilities and buildings are designed with non-combustible structural elements and partition structures of type R 60. Even the partitions of security areas (compartments) with technical premises will be of type no lower than REI 60. These constructive characteristics meet the requirements of ***Order, No. 424, Date 24.7.2015,***

Escape stairs will be made of non-combustible structures of at least REI 60 type and equipped with doors of at least REI 60 type.

To increase the guarantee for the lives of people present, when they are in the conditions of a fire and to enable their rapid and safe evacuation from the scene, it is mandatory that exits and evacuation routes, especially the spaces and passages in them, are always kept clear. They are also made present through phosphorescent and illuminated indicator boards.

4. Mechanical fire protection installation project.

Overall, taking into account the characteristics of the building and its destination, the following extinguishing substances were used:

- *Water fire protection system, with internal hydrants for the entire building*
- *Portable fire extinguishers in all positions indicated in the project.*

4.1 Portable fire extinguishers

The determining factors to be considered when designing active fire protection were:

- *The nature and extent of the fire and the size of the area to be protected*
- *Probability and speed of fire spread in different areas*
- *Requests under Order, No. 424, Date 24.7.2015 and Order, No. 425, Date 24.7.2015,*
- *Additional requirements according to European norms and standards EN 12845, UNI 10779, for automatic and manual fire extinguishing systems.*

The project also precisely defines the areas related to fire classes and the locations where portable fire extinguishers are located. Portable EN3 powder fire extinguishers will be of class 34A 233BC. In

the environment where electrical cabinets or electrical panels are located, it is planned to place a CO2 fire extinguisher.

Fig. 2.1 Carrelato

Fig. 2.2 Fire Extinguishing

Fig. 2.3 Cassette hydrant

4.2 Manual fire extinguishing system

For a manually activated fire extinguishing system, water spraying is used; for this purpose, a system with internal hydrants is used.

The determining factors that are taken into consideration during the design are the nature and extent of the fire, the size of the area to be protected, the probability and speed of fire spread, as well as the requirements according to ***Order, No. 424, Date 24.7.2015,*** as well as the supporting norms EN12845, and UNI 10779.

For connection to the auto-motor pump and other equipment of the specialized group of PNMZSH, they are provided in accordance with the UNI 11779 standard.

4.2.1 Fire extinguishing system with manual activation Hydrants.

The manually activated fire extinguishing system consists of column hydrants installed outside, as well as internal hydrants installed inside the buildings, in protected areas near the stairs and corridors. These hydrants are connected through a ring network of pipes installed outside and serving the building in question. In the building, UNI 45 UNI-EN 671-1 Wall Fire Hydrants are installed. The hydrant supply lines are dimensioned to guarantee the simultaneous operation of 3 UNI 45 internal hydrants, in the most unfavorable positions, guaranteeing a flow rate in each hydrant of 120 l/min, with a residual pressure in the hydrant of 2-3 bar; the length of the internal hydrant pipes is 30 m.

4.2.2 Pipelines and recorders and pipe hanging

The pipes and fittings to be used will comply with the following standards:

- *S235JR and Fe360 steel pipes according to UNI 10025, UNI EN 10029;*
- *elbows, bends and wall thicknesses according to UNI EN 10024;*
- *CE fasteners and screws/bolts, according to UNI 5727;*
- *anti-vibration sleeves with steel flanges according to UNI EN 1092-1;*
- *external anti-corrosion spray painting (Catramina HD), with minimum thickness >=150 microns, referring to UNI 12845;*
- *painting in the water area against corrosion by spraying two-component epoxy-bituminous tar EPOXITAR, with a minimum thickness of >=150 microns, referring to UNI 12845;*
- *painting the technical area with anti-rust and further treatment with two-component EPOX Zinc-coated epoxy, in accordance with UNI 11292.*

The supports will be made of fire-resistant materials and such that they can support without

deformation a minimum load of 100kg over 5 times their weight filled with water. Their shape will refer to the UNI 7145 standard.
The pipe supports will be studied by the contractor and will be submitted for approval to the works supervisor along with the construction drawings.

The sizing of the supports will take into consideration:

- *the weight of pipes, valves, fittings and in general all dependent components;*
- *stresses created by seismic vibrations, hydrostatic tests, hydraulic hammers and safety valve intervention;*
- *stresses created by thermal expansions;*

The position of the supports will be chosen based on:

- *size of pipes;*
- *their passageways;*
- *the presence of concentrated loads (pumps, valves, etc.);*
- *the structure available for attachment;*
- *thermal expansion movements.*

All supports must be studied and constructed in such a way that they do not transmit noise and vibrations to the structure.

Diameter rated The piping (mm)	distances IN vertical (m)	distances IN horizontal (m)
DN20	1.5	1.6
DN25 UP DN40	2.0	2.4
DN 50 UP DN65		2.5
DN80		3.0
DN100 UP DN125		4.2

4.2.3 Liaison group with PNMZSH brigades

From the MNZ distribution collector in the technical environment on the 1st floor, a connection point with the specialized PNMZSH brigades, equipped with the relevant device, is also foreseen, near the entrance to the parking lot. The connection will include:

- *no.1 outlet for UNI 70 connection in accordance with UNI 808 standard, with a diameter not less than DN70, protected against the entry of foreign bodies into them;*
- *no.1 shut-off valve which allows intervention in its components without the need to empty the plant;*
- *no.1 non-return valve;*
- *no.1 safety valve set at 1.2Mpa (12bar) for controlling overpressure from the pump. At the same time, on both exit stairs on each floor, a DN65 valve ("Landing Valve") is provided for connecting the PNMZSH brigades to the hydrant network.*

4.2.4 Firefighting plant pumping group

The fire-fighting system pumping unit will be located in the technical area on the underground floor

and will comply with the EN 12845 standard. This unit will serve both the sprinkler system and the hydrant system. The pumping unit will consist of 3 pumps:

Station pumping for the protection system THEir composite fire RECALLING EN 12845 standard ,

Electric Motor Pump

Flow : ***V=36 m³/h***

Pressure : ***H =60 mkH2O***

Power : ***18.5 kW***

Current : ***33.2 A***

Connection electrical , ***3 ~400 V, 50 Hz***

-Diesel Engine Pump

Flow : ***V=36 m³/h***

Pressure : ***H =60 mkH2O***

Power : ***17.5 kW***

Electric Motor Test Pump

Power : ***1.1 kW***

Current : ***2.7 A***

pumps must the be the assembly by crop the chartered by institutions relevant .

The pilot pump will keep the system pressurized by withstanding small pressure losses, preventing the main pump from starting to re-pressurize and preventing false alarms. The pilot pump will be automatically controlled.
In case of fire, when the pressure in the fire network drops below a certain level, the electronic controller will automatically activate the electric service pump and transmit a fire signal to the visual alarm. If the electric service pump does not start for any reason, the motor pump, "stand-by" comes into operation within 15 seconds. Its functions are
same as the functions of the main service electric pump, but serves as a backup in case of malfunction of the service electric pump. This pump must have an oil reserve for 4 hours of operation.
The plants will operate in both automatic and manual modes.
Exhaust of motor pump gases, flexible motor/pipe connection according to UNI 11292; thermal insulation and protection of persons from contact with it through a PROMAFLEX hood according to UNI 11292;

4.2.5 Calculating the amount of water

The amount of water required is equal to the continuous water requirements for extinguishing the fire and the time available for its elimination. This amount determines the necessary water storage available for fire protection for an autonomy of 1 hour of the automatic fire extinguishing system (about 36,000 liters available for the MKZ system).

Hydrants

A quantity of water must be guaranteed that will supply ***3 UNI45 Hydrants/ 2 UNI70 Hydrants***

An internal hydrant should have a flow rate of ***V = 120 lit/min.***

An outdoor hydrant must have a flow rate of ***V = 300 lit/min.***

The most unfavorable hydrant must have a pressure of min/max ***P = 2÷4.5 bar.***

The duration of water supply must be no less than ***60 minutes.***

Referring to the above definitions, we will finally have an amount of water for the hydrants of:

V = 3*120*60 = 21600 liters/h

✓ **V = 2*300*60 = 36000 liters/h**

Based on the above calculations, based on norm 10779 and standard EN 12845, the most unfavorable variant is selected, and in our case the pump flow will be selected, **36 m ^{3} /h.**

The B/A tank must be equipped with electronic and mechanical visual level indicators, which must signal the drop in the water level in the tank below a specified value. This signal must be transmitted to the central control panel of the pumping group and through it to the relevant signalers. The user must also guarantee the timely replacement of this reserve by using it for sanitary purposes.

TECHNICAL REPORT

HYDROSANITARY SYSTEM

BUILDING: Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça

CLIENT: ALBANIAN DEVELOPMENT FUND

Designed:

Mechanical Engineer Ermir GJOKA Liç- M.1174/2
Mechanical Engineer Erjon ALIMANI Liç- M.1248/3

TIRANE 2026

TABLE OF CONTENTS

I. SANITARY WATER SUPPLY PLANT

1. Plant description, design standards, and calculations.

During the design of the sanitary water supply plant, the needs for consumption of cold and hot sanitary water were taken into account. Referring to this requirement, the calculation of the necessary quantity for this water was made, as well as the determination of the necessary reserve in emergency cases when water from the network is missing. This system will function through a pumping station where we have two pumps in the Technical area on the -1 floor of the school. Also included in this system will be the supply group, as well as a group of filters at the entrance to the plant.
Hot water for the school will be produced non-centralized, but in each area small electric boilers will be installed which will serve only for that area, while for the dormitory it will be produced centralized located in the Technical area on the ground floor.

2. Plant sizing.

The dimensioning of the sanitary water supply plant consists of:
✓ Distribution scheme.
✓ Calculation of the nominal flow for each sanitary equipment
✓ Calculation of the total flow
✓ Working pressure.
✓ Longitudinal losses per unit of pressure.
✓ Dimensioning of the distribution network.
✓ Max. speed of water circulation.
✓ Dimensioning of the pumping station (constant speed)
✓ Dimensioning of the autoclave.
✓ Dimensioning of electric boilers

- The distribution scheme is detailed and with drawings. It starts in the technical environment from the pumping station, continues through the complementary components and ends in each device, for each of which the calculation has been made. The selected scheme is the joint supply scheme of all bathroom devices in the Central Building and the Administration.
- The calculation of the flows will be done through the following table, in which the nominal flow and nominal pressure per device are expressed.

Aparatet	Ujeiftohte [l/s]	Ujeingrohte [l/s]	Presioni [m k.u.]
Lavaman	0,10	0,10	5
Bide	0,10	0,10	5
WC ta	0,10	—	5
Vaska	0,20	0,20	5
Dushi	0,15	0,15	5
Lavaman kuzhine	0,20	0,20	5
Lavatrice	0,10	—	5
Lavastovilie	0,20	—	5
Pisuar	0,10	—	5

Table. 1: Design Flows for Each Plumbing Equipment

2.1.Water pump station.

The water supply will be made from the main city network which will serve both for sanitary water and for the water needed to supply the fire protection tank. The main one is the pumping station, which consists of two pumps, one for the school premises and one for the dormitory. The pumps are double, one of which is in operation, ensuring the parameters calculated in accordance with the daily water needs diagrams and the network configuration, while the other pump is in reserve in case of a defect and is intended to operate alternately.

2.2.Sanitary Water Expansion Vessel

The Sanitary Water Expansion Vessel serves the sanitary water pump, this device helps the pump by protecting the pump from frequent discharges, which come as a result of the demand for sanitary water from the sanitary nodes of the building. On the other hand, this device also serves to stabilize the water pressure in the supply pipes in the building.
Usually at each outlet of the sanitary nodes the water pressure is 1 bar and the water flow may be insufficient and unstable in high places, in such cases it is necessary to use an autoclave.
An autoclave is a pressure vessel, where the pump charges it based on the discharges to obtain a pressure greater than that of the water network. Once the desired pressure is reached, the pump turns off and the system keeps the autoclave itself charged

2.3.Water tank

The calculation of the water tank is made in such a way as to provide a quantity of water for a required autonomy of 48 hours. The specifications (pressure, quantity, capacity, etc.) are determined by the designer based on the diagram of daily use by consumers.
The volume of the water tanks will be calculated depending on the project scheme and autonomy.

In our case, the water tank must be of reinforced concrete construction, and their shape will be divided into two parts, with the sole purpose of having a water reserve in the facility in case of cleaning of one tank. The tank must be equipped with floats, level indicators and no-entry points for cleaning.

2.4.Sanitary hot water

The sanitary hot water will be produced by electricity and in our case the hot water producers will be electric boilers. The sanitary hot water producer has been selected to ensure supply throughout the day. Its size has been calculated in function of the needs for sanitary hot water.

2.5.Sanitary water distribution system

The sanitary water pipe system will meet the requirements of the norms and standards determined and selected in the design phase as well as possible requirements. The pipes of this system are divided according to their material as follows:

Multilayer pipes (Pe-X) will be used in the water supply from pumps, tanks, i.e. from the machine room premises. Also, since the multilayer plastic pipes (Pe-X) are resistant to corrosion, they must be placed in places where the aforementioned materials cannot be placed due to corrosion and the aggressiveness of water. These pipes have very high mechanical properties which are maintained even at very low temperatures and in the presence of boiling water.
The pipes and all their parts as well as the relevant fittings can be welded together with butt joints or through polyfusion or with electric sleeves or flange systems. Duhet kujdesur qe tubat plastike, te plotesojne kerkesat of the necessary pressure and temperature by giving an argumentative profile of the channel section where the pipe should lie.

2.6. Drinking water sluice gates

Gate valves will be used to control the flow in water pipes. They will be made of stainless steel and will be of the threaded ball type. For gate valves used in a water supply line, they must withstand a pressure 1.5 times higher than the working pressure and must withstand a minimum pressure of 10 bar. In special cases, at the request of the project, check valves are also used, which are gate valves that allow the movement of water in only one direction. These must be placed in the suction pipe of the pumps or in their delivery pipe. They are also placed at the entrance to the building to block the water that enters. They are of the gate type, which, through a hinge, opens in only one direction. All work related to their installation and placement in the facility must be done according to the technical requirements of the supervisor and the project.

Ball Valve

Non-return valve

Filter

2.7.Sanitary Equipments

2.7.1. *Toilet and flush cassette*

They are made of porcelain with international technical standard data and must be of the French type. French type toilets are fixed to the floor or wall with brass brackets, screws and threaded plugs without interrupting the wall tile covering. Before fixing them, the connection to the water discharge pipes must be made. The toilet can have an outlet from the bottom of its body or a side outlet at the back of the toilet. In toilets with a side outlet, the outlet pipe must be at a height of 19 cm from the floor.
In the lowest part of the surface of the collection pit there is a hole with a minimum diameter of 90 mm. The upper part of the toilet is oval or circular in shape depending on the project requirement, their type and model. French type toilets are 38-40 cm high and are placed according to the project requirement and the Supervisor. The horizontal distance of their placement from other hydrosanitary equipment (sink, bidet, etc.) must be at least 30 cm.

2.7.2. *Washbasin*

In the toilet facilities, the appropriate hydrosanitary equipment (sinks) must always be provided, which will be made of porcelain. The sinks must ensure high water conductivity, resistance to mechanical shocks, insulating protection against water, elimination of noise during operation, resistance to corrosion and chemical agents, ease of work in them and simple repair possibilities.
The porcelain sinks and their support are fixed to the wall with brass clamps, screws and threaded plugs without interrupting the wall tile covering. After fixing it to the wall, the chrome-plated brass mixer must be placed on the sink and the sink must be connected to the siphon sewer pipes and water discharge pipes. At the same time, the sink must also be equipped with its own metal tap.
The drain must be placed in the lowest part of the surface of the collection pit with the dimensions of the drain. The sink has a collection pit with dimensions of 40/60 x 36-45 cm depending on the type and model chosen. The dimensions of the sink depend on their type and model. Sinks are placed at a height of 75-85 cm according to the project requirements. The horizontal distance of their placement from other hydrosanitary equipment (bidet, WC, etc.) must be at least 30 cm.

Sinks are connected to the drain pipes by means of a drain, a siphon-shaped pipe made of PVC material. The above connection can be made with three branches inclined at an angle of 45 or 60 degrees. The connection pipe must be PVC with the same technical characteristics as the drain pipes. The length of these pipes is 20 - 40 cm. Their diameter will be in function of the drain outlets where they are placed. The sinks are connected to the water supply system by two flexible pipes with a length of 30 - 50 cm and a diameter of 1/2 ", which connect the tap to the hot water and ordinary water supply pipes. Appropriate rubber bands must be placed at the point of connection of the tap to the sink, to prevent water leakage.
All work related to their installation and placement in the facility is done according to the technical requirements of the supervisor and the project. The sink connections to the drain pipes must be done with the appropriate Rehau-PP pipes.
A model of the sink that will be used together with the quality certificate, certificate of origin, test certificate and warranty will be given for review to the Investor's Supervisor for approval before being placed in the facility.

II. WASTEWATER DISPOSAL PLANT

2.1 Wastewater discharge system, dimensioning

The dimensioning and design of all components and accessories of the wastewater and rainwater drainage system will be carried out taking into account all the determining elements as follows:

- ✓ Distribution scheme (internal discharges of H/S devices + columns + collectors + wells);
- ✓ Determination of the nominal discharge flow for each H/S device;
- ✓ Determination of the design flow of discharges;
- ✓ Drawings and dimensions of internal wastewater discharges;
- ✓ Drawings and dimensions of rainwater drainage pipes;
- ✓ Drawings and dimensions of wastewater and rainwater wells.

The dimensioning of the pipes will be done in function of the calculated flow for wastewater and rainwater, their circulation speed and slope, etc. The speed should be 1.0-1.2 m/sec and the slope of the pipes within the limits of (0.5 – 0.8) %.
The length of the pipes will be 6-10 m. The diameters and thicknesses will be selected in accordance with the project data. The characteristics such as pressure, manufacturing plant, year of manufacture, etc. should be stamped on the outer diameters of each pipe.

2.2 Pipe materials

For water discharges inside the premises, high-temperature thermostabilized polypropylene plastic pipes will be used that meet all quality requirements according to the EN 1451 standard Requirements for the testing and quality of pipes. These pipes must provide perfect resistance to corrosion, high resistance to chemical agents, light weight, and easy repair options.

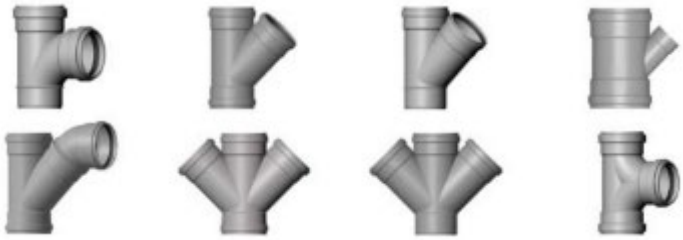
The discharge pipes are connected to the sanitary equipment or group of equipment on each floor by means of delivery pipes. The connection of the delivery pipes to the discharge columns must be made with three-branches inclined at an angle of 45 or 60 degrees. The delivery pipes can be laid along the walls, above or below the floor, taking into account the conditions set for the installation of the internal sewage network. The connection of the delivery pipes to the discharge columns must be made with three-branches inclined at an angle of 45 or 60 degrees. The delivery pipes can be laid along the walls, above or below the floor, taking into account the conditions set for the installation of the internal sewage network. The length of these pipes must not exceed 10 m. Their diameter will be in function of the outlets of the sanitary equipment that are installed.

Each vertical discharge column is equipped with control points which must be placed every two floors starting from the lower part of the column.

2.3 Fittings for exhaust pipes

For connecting the discharge pipes to each other and to the sanitary equipment or their groups, the appropriate fittings made of RAU – PP plastic material will be used, which meet all the quality requirements according to the EN 1451 standard (Requirements for testing and quality of pipes).

These fittings (connecting parts) must ensure corrosion resistance, high resistance to chemical agents, light weight, easy repair, transportation and installation, simple and fast.



Their dimensions (diameter) will be a function of the calculated amount of wastewater, the type of sanitary equipment, the speed of water movement and the diameters of the relevant pipes.
During the calculations, the speed of water movement should be taken as 1-2 m/sec, while the filling rate will be 0.5-0.8 of the pipe section.

Their diameter and thickness should be according to the data in the technical drawings. Data on the outer diameter, length, pressure, manufacturer's name, the standard they refer to, the year of manufacture, etc. should be printed on each fitting.

The diameter of the fittings should be the same as the diameter of the discharge pipe to which it will be connected and in no case smaller than the largest wastewater delivery pipe that is connected to it. In cases of changing the diameter of the discharge and delivery pipes, the fittings must be adapted to each of them.

2.4 Floor drain

For floor water discharges, RAU – PP culverts will be used, which meet all quality requirements according to the EN 1451 standard (Requirements for testing and quality of pipes.

- ✓ The culverts can be made of plastic, stainless steel and bronze.
- ✓ The culverts must ensure high water permeability, resistance to corrosion and chemical agents, easy repair, transport and connection possibilities.

The discharge culverts must be placed in the lowest part of the surface where the water will be collected. Usually they are not placed near the junction of the floor with the walls, but as close as possible to the middle of the floor.

The discharge culverts are connected to the discharge columns by means of a PP pipe. The connection of the culverts to the discharge columns can be made with three branches inclined at an angle of 45 or 60°. The connection pipe must be PVC with the same technical characteristics of the water discharge pipes. The length of these pipes is 20 - 30 cm. Their diameter will be in function of the outlet of the pipe where they are placed. In cases of change in the diameter of the pipe with that of the delivery pipe, the appropriate reductions will be used.

2.5 Wastewater and rainwater sewage manholes.

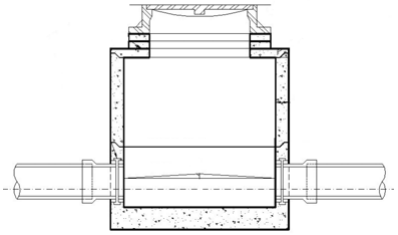
For the collection of wastewater, collection type manholes with water-tight concrete construction and a circular cast iron cover will be used. Their construction shape is square, rectangular or circular, while according to their organization they can be with one room with two or more rooms. The dimensions are 60x60 cm.

Rainwater manholes must be square in shape with a depth of not less than 50 cm. The dimensions are 40x40 cm with a square water-tight cover.

All types of manholes mentioned above can have walls made of prefabricated concrete elements, or with concrete poured in place.

The material from which both the frame and the cover are made must be cast iron. The manholes must meet the following technical requirements:
External bearing load; Soil pressure;
Water pressure.

The dimensions of the manholes are calculated in function of the flows and are determined by the designer in the relevant drawings.



Also, the dimensions of the collectors that discharge wastewater and rainwater have been calculated and dimensioned in function of the flows and their material has been selected: PE, corrugated on the outer surface and smooth on the inner surface, with dimensions ranging from 200 - 300 mm.

TECHNICAL REPORT

HEATING, VENTILATION AND AIR CONDITIONING (HVAC) PROJECT

BUILDING: ESTABLISHMENT OF THE EDUCATIONAL INFRASTRUCTURE OF THE FRANCO-ALBANIAN LYCEUM OF SCIENCES AND INNOVATION .

CLIENT: ALBANIAN DEVELOPMENT FUND

ADDRESS: KORCA MUNICIPALITY

Designed:
Mechanical Engineer Ermir GJOKA Liç- M.1174/2
Mechanical Engineer Erjon ALIMANI Liç- M.1248/3

TIRANA 2026

SUMMARY TABLE

1. GENERAL

1.1. Field of Work

The scope of work covers the supply, installation, testing, erection, commissioning of the following:

a) Outdoor and indoor units of the VRF system.
b) Condensate Discharge Network
c) Copper pipes connected with all accessories.
d) All necessary accessories for installation, etc.
e) Air Duct Network
f) Dimensioning and Positioning of Supply and Extraction Air Grilles
g) All Flow Balancing Dampers and Fire Dampers
h) VRF and Air Plant Control System

It will be the contractor's responsibility to prepare all necessary technical documentation for the approval and certificate of completion of the plant by the works supervisor, without which the work will not be considered completed and will not be undertaken.

The complete installation of the Air Conditioning System will strictly confirm the specifications and instructions given in the Albanian Standards and Norms in Force as well as the European ones, as well as the recommendations of the manufacturers of the offered system.

1.2.Warranty / Defect Liability Period

- The Contractor shall provide a warranty against manufacturing defects for 12 months from the full delivery of the works (System Acceptance) or as specified in the legal works contract.
- In case of failure of any particular part of any equipment more than three times during the warranty period. It will not be repaired but the complete part will be replaced by the contractor and the warranty for this particular part will be extended by one year from the date of the last replacement.
- In case it is found that the above failure is due to any connected part of the equipment, that part shall also be corrected or replaced by the contractor to avoid such failure. The warranty for such replaced part shall be extended by one year from the date of replacement.
- In the event of failure of any particular equipment that fails more than three times during the warranty period, as mentioned in point-b above, the contractor shall replace that equipment at his own cost with another equivalent brand approved by the works supervisor.
- The manufacturer's/contractor's warranty as mentioned in point-b above for such
  Replaced equipment will be kept valid for at least one year from the date of the last replacement.

1.3.working

The installation shall be of the best quality and shall conform to the specifications as below or the Albanian/European Standard Specifications in every respect or the latest trade practices and shall be subject to the approval of the Works Supervisor. All materials and/or works which in the opinion of the Engineer are defective or unsuitable shall be immediately removed from the site and replaced with suitable materials and/or works immediately.

1.4.Inconsistencies in drawings

If there is any discrepancy due to incomplete description, ambiguity or lack of proper information in the drawings and other documents related to this project, before the commencement of work or during execution, the Works Supervisor or Contracting Authority must be informed and their decision will be final and binding on the Contractor.

1.5.Materials

All materials to be supplied by the Contractor shall be new, best of their kind and shall confirm the latest Albanian and European standards in the field of VRF/VRF air conditioning installations. All packaged items shall arrive at the site only in their original packaging. Any item found damaged shall be replaced by the Contractor at his own expense.

1.6.Measuring and Testing Instruments

The Contractor shall provide, free of charge, all equipment, instruments, labour and all other assistance required by the Works Supervisor or their representatives for the measurement and testing of the Works. Prior to testing, the Contractor shall submit the testing methodology, which shall be approved by the Supervisor and at a time agreed upon by all parties, the tests shall be carried out. Relevant minutes shall be kept for each test carried out.

1.7.Site Maintenance

It shall be the Contractor's responsibility to clean up, from time to time, all waste and excess material created by the activities of his workers.

1.8.Safety Codes and Work Rules

(i) In connection with the entire implementation of the contract for contractual installations, the contractor shall, at his own expense, regulate the provisions of occupational safety according to the laws in force.

(ii) The Contractor shall provide the necessary barriers, warning signals and other safety measures during the placement of pipelines, various installation materials, equipment etc. or wherever necessary to avoid accidents. The Contractor shall be liable, in accordance with Albanian law and regulations, for any accident that occurs for any reason.

1.9.Completion of Tender Requirements, Program Submission, Drawing Approval and Commencement of Work

Tender completeness:

All miscellaneous equipment, fixtures, materials to be installed, as well as all other accessories that are useful and necessary for the proper assembly and efficient functioning of the various equipment and components of the work shall be deemed to be included in the tender, regardless of whether such items are specifically mentioned in the tender or not.

Program submission:

Within fifteen days from the date of commencement of works, the contractor shall submit his schedule for the submission of drawings, supply of equipment, installation, testing, commissioning and handover of the installation to the Works Supervisor. This schedule shall be adjusted taking into account the progress of construction and the priority assigned by the Engineer-in-Charge. Items such as piping etc. which directly affect the progress of construction shall be given priority.

Submission of Site Drawings:

The contractor must submit shop drawings to the supervising engineer for approval before work begins.

Starting work:

The Contractor shall commence work as soon as the drawings submitted by him are approved in full or in part, as the case may be.

1.10. Sending Materials to the Site and Their Safe Storage

The Contractor shall deliver the materials to the site in consultation with the Engineer-in-Charge. Suitable lock-up storage shall be provided free of charge temporarily. However, guards and storage shall be the responsibility of the Contractor. The delivery schedule of the material shall be framed keeping in view the progress of the construction. The safe storage of all machinery and equipment supplied by the Contractor shall be the responsibility of the Contractor until final acceptance by the Client.

All material samples must be approved by the supervisor before being sent to the site.

1.11. Coordination With Other Disciplines

The contractor must coordinate with all other disciplines involved in the job site so that the work of other contractors (if any) is not hindered due to a delay in his work. Piping, installations or any other work that directly affects the progress of the work of other contractors has priority.

1.12. Care for the Construction Site

During the execution of the works, care shall be taken by the contractor to avoid damage to the facility. He shall be responsible for repairing all such damage and restoring it to its original finish at his own cost. He shall also remove from time to time all unwanted materials and waste arising from the installation from the work site.

1.13. Inspection and Testing

Initial inspection and testing

(i) The initial inspection of materials and equipment at the manufacturer's works shall be carried out by the Engineer-in-Charge or his representative. For items/equipment requiring initial inspection at the manufacturer's works, the contractor shall indicate the date of testing of the equipment at the manufacturer's works prior to delivery. The contractor shall give sufficient advance notice of the

proposed dates for such tests to the client's representative(s) to facilitate his presence at the testing. The Engineer-in-Charge may at his discretion witness such testing. The material/equipment shall be inspected at the manufacturer's/authorized dealer's premises prior to delivery to the site by the contractor.

(ii) The materials duly inspected by the Engineer-in-Charge or his authorized representative shall be sent to the site by the contractor.

(iii) No additional payment shall be made to the contractor for the initial inspection/testing of the manufacturer's works by the representative of the engineer in charge. However, the client shall bear the expenses of his substituted representative in carrying out the initial inspection/testing.

1.14. Security Measures

All equipment must incorporate appropriate safety provisions to ensure the safety of operating personnel at all times. The initial and final inspection reports must explicitly state the safety provisions incorporated in each piece of equipment.

1.15. Tender, Site and Applied Drawings

Tender drawings

The drawings attached to the tender documents are intended to show the areas for various equipment, the routes of pipelines. The equipment offered must be suitable for installation in the spaces shown in these drawings.

Drawings for approval for issuing drawings to be implemented

The Contractor shall prepare and submit the following drawings and have them approved by the Engineer-in-Charge before the commencement of work. However, the approval of the drawings shall not relieve the Contractor from his responsibility to supply the equipment/materials as per the agreement. In case of any discrepancy between the approved drawings and the agreement, the decision of the Engineer-in-Charge shall be final and binding on the Contractor.

(a) Submit drawings of the equipment to be installed at the facility.

(c) Site drawings showing the layout of all piping, pipe diameters and lengths, external and internal fittings and isometric drawings showing connections to various fittings.

(d) Electrical wiring diagrams for all electrical equipment and controls including sizes and capacities of various cables and devices

(e) Dimensional drawings of all electrical and control panels,

(f) Drawings showing details of supports for pipes, etc.

(g) Any other drawings related to the work.

As Built Design drawings

All applied drawings must be submitted in electronic and printed format to the works supervisor.

(a) Installation drawings that provide full details of all equipment, including details of their installation.

(b) Drawings giving the sizes and lengths of all pipes and the sizes and locations of all types of air

conditioning equipment, and including isometric drawings for all piping including pipe connections to the various equipment.

(c) Drawings giving the sizes and lengths of all air ducts and the sizes and locations of all types of air supply and exhaust grilles, manual dampers and fire dampers as well as all elements of the project together with the relevant notes.

(d) Check wiring drawings with all control components and sequence of operations to explain the operation of control circuits.

(e) Schematic diagrams.

1.16. Final Installation Documents

At the completion of the work, the client will be provided with the following sets of documents: -

(a) Implementation drawings as mentioned above

(b) Manufacturer's technical catalogs of all equipment and accessories.

(c) Operation and maintenance manual of all major equipment, detailing all adjustments, operation and maintenance procedures.

(d) As well as all necessary documentation as specified in the legislation in force for the supervision of the implementation of the works.

1.17. Instruction/Training Manual

The Contractor shall provide the responsible consultant/engineer with the instructions and operating manual in 3 copies. The Contractor shall instruct the client's staff in the operation and maintenance of the entire installation for at least fifteen days.

The manual should contain detailed technical data and drawings for each installed equipment, installation, testing, operation and maintenance procedures, spare parts manual and recommended reserves for the 3-year maintenance period of each equipment.

2. AIR CONDITIONING SYSTEM .

2.1 Entry

The facility is being built in Vlora. It is a building with the function of apartments and hotel rooms. It is necessary to ensure thermal comfort in all areas so that the activities carried out can develop normally. These requirements have been considered in proportion to living standards as well as their impact on the cost of school rehabilitation.

2.2 External and internal design conditions.

2.1.1 External design parameters

Korca Municipality

- Altitude above sea level, 899 m
- Latitude, 40 Degrees and 36 minutes.

Design conditions for heating

- Design outdoor temperature -10 ºC
- Relative humidity 80%

Design conditions for cooling

- Design outdoor temperature 38 º C
- Relative humidity 55%

2.3 Proposed multi-zone air conditioning system

The new developments that have accompanied the new situation of our planet, Earth, draw our attention to the care we must show in contributing to improving the situation of the planet as well as improving our living conditions.
Globally, the increase in carbon dioxide levels has led to an increase in average regional temperatures, which has impacts on nature and civil life.
In this sense, VRF systems (variable flow refrigerant systems in the thermodynamic cycle) present heating/cooling technologies with absolute minimum energy consumption and ideally balanced multifunctional comfort.
These systems are classified as "built-on-site systems", that is, systems where outdoor and indoor equipment are combined according to their manufacturer in terms of number, capacity, refrigerant pipes, and connection distances.

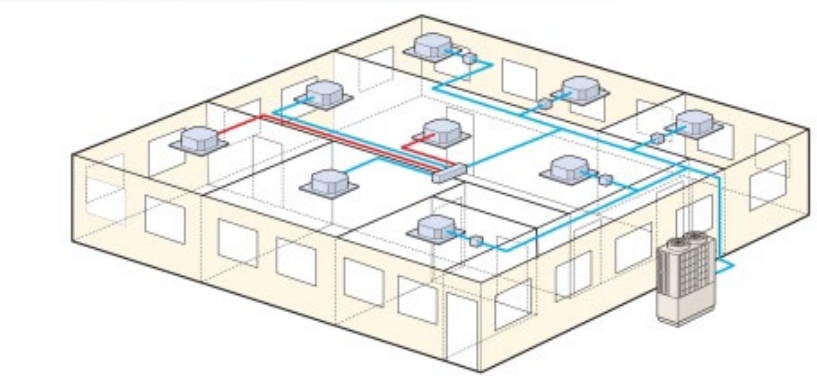


Fig. 1 VRF system typology

VRF systems as multi-zone classified systems represent a central system that functions for several different thermal comfort zones. The characteristic of multifunctional buildings with different comfort and operating times is that they require systems with independent comfort and operating times that, at maximum capacity, operate no more than 10% of the seasonal operating time. VRF systems not only have high efficiency at maximum capacity (COP) from 3.7 to 4.52 but, they have absolutely high efficiency in partial load operation that goes from 5.6 to 6.4 which makes these systems absolutely the most economical in terms of energy consumed.

These devices are direct expansion and have a very good performance coefficient, reaching COP 4.5, which reduces energy consumption during the period of use.

2.4 System description

2-pipe VRF system

The system consists of the outdoor unit, the refrigeration cycle piping system, the indoor units with two-way valves and temperature sensors (Fig.2).

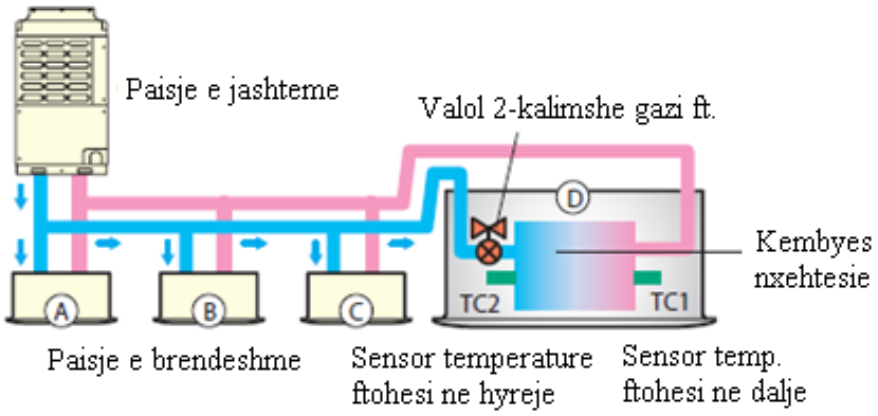


Fig.2 The principle scheme of the VRF system

The piping system (copper pipes for cooling, liquid pipe and gas pipe) from the outdoor unit on the terrace descends into vertical channels in the interior of the building and enters the corridors from where they enter each room to connect to the indoor unit (cassette or duct type) in the ceilings.

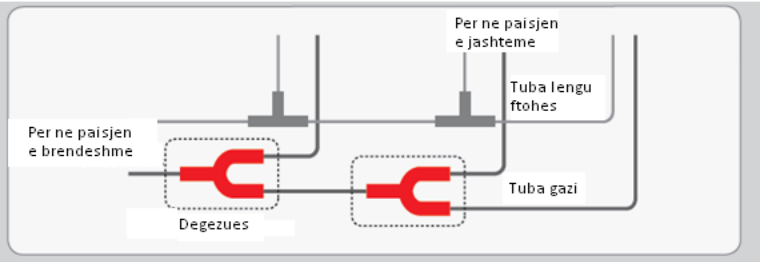


Fig.3 The principle scheme of the VRF system

All equipment must be silent and all ducted equipment must be installed with a low noise level according to the intended destination. Each room is independently controlled in terms of on/off function, temperature level and air speed.

2.5 Heat losses

Regarding thermal losses, all factors that directly contribute to the removal of heat from the interior spaces have been carefully analyzed. The main factors that make this heat loss possible are:

- Heat transfer coefficient in wall structures.
- Heat transmission coefficient in window structures.
- Heat transmission coefficient in door structures.
- Heat transfer coefficient in floor and roof structures.
- Infiltration factor (natural ventilation)
- The orientation factor of the object, north-south, east-west.

One of the main factors in calculating thermal loads is the population of the rooms, and the lighting, which in this case contribute positively. All of these that we mentioned were considered in the process of thermal analysis and calculations. Thermal calculations were made possible through calculation tables, which were analyzed in the EXEL computer program.
From the point of view of the thermal capacity of the equipment, we underline that the peak load capacity varies considerably during the day based on the variation of the occupancy of the premises, which has been irregularly predicted. In order to avoid over-dimensioning of the equipment capacities, the effects have been analyzed in advance as well as the preliminary forecast of energy consumption.

2.6 Air Handling Units

100% fresh air supply system

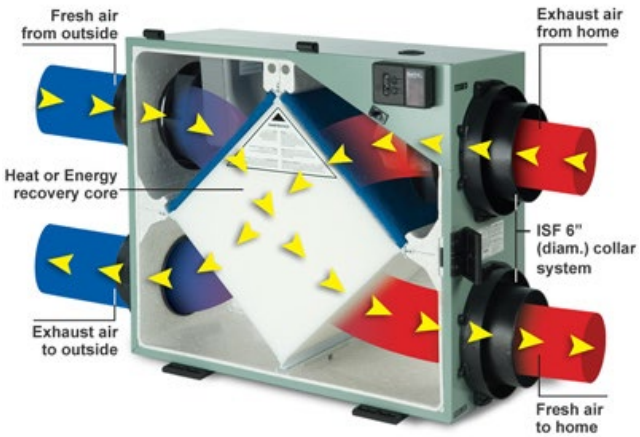
This system serves to supply the building's fresh air needs. The uniqueness of this central system lies in the fact that 100% fresh air is used at all times, which is completely replaced with indoor air, which due to the nature of the functioning of the premises is polluted with dust, etc. This form of air exchange ensures the supply of oxygen and clean air to all premises of the building and avoids the possibility of air pollution.

The device that carries out this process is the air treatment unit. This device is composed and sized according to the size of the area it serves. The composition of this unit consists of three sections, the fresh air treatment section and the polluted air removal section and the thermal energy recovery section from the polluted air that will be released into the atmosphere into the fresh air that will be supplied to the indoor spaces.

- *G4 fresh air inlet cleaning filters*
- *G4 air purification filter for polluted air intake*
- *Heat exchanger with an efficiency of not less than 50%*
- *Fan in delivery / Fresh air return*

The rotors of the supply and return fans must be connected directly to the axis of the electric motor, avoiding belt transmissions. This affects the cleanliness of the air as well as the electrical efficiency of the electric motor.

These air handling units will ensure the supply of fresh air to all areas as given in the project implementation drawings. The technical characteristics for the production of these air handling units will be given as follows:



Also, all air handling units must be built in accordance with European standards EN 1886, and must be accompanied by a Eurovent certificate according to the standard: OM-5-2014, which must meet the following conditions:

- Mechanical resistance of the outer fabric, maximum relative flexibility, not more than 4 mm/m (class D1)
- The property of air infiltration in the canvas, not more than 0.15 l/sm2 at -400Pa, and not more than 0.25 l/sm2 at +700Pa (class L1).
- By-pass filtration, flow rate based on nominal flow, not more than 0.5 %. (class F9)
- Thermal transmission, not more than 1 W/m2K. (class T2)
- Thermal resistance of thermal joints, not less than 0.6 m2K/W. (class TB2).

2.7 Air distribution system (ventilation / air conditioning)

All air ducts must be constructed and installed in accordance with the drawings and the relevant EN and DIN standards. The ducts must be laid in a straight line, must be smooth on the inside, must be free from vibrations under all operating conditions and must be free from pressure loss. The entire air duct system including clamps, supports, insulation, gaskets, flexible ducts, sound absorbers, flexible duct connections, must be selected, manufactured and installed for a service life of 10 years.

2.8 Dimensions of air ducts

All air ducts must be manufactured to the dimensions shown on the drawing. The dimensions of the ducts are the actual dimensions of the air passages. Changes in the dimensions of the ducts (reductions) and in their shape must be made gradually.

2.9 Testing

All air ducts (supply and return) shall be tested and hermetically sealed in such a way that the entire system, including flexible connections to the air terminal units, shall not leak more than 4% of the maximum design air volume at the design static pressure of the air duct. The test shall be carried out by means of approved equipment, which shall consist of a centrifugal test fan, a calibrated air section nozzle, a calibrated differential pressure gauge and other equipment necessary for carrying out the test. The minimum test pressure shall be 500 Pa. The entire section of air ducts under test shall be checked for noise and leakage, repaired and retested. Repair shall be carried out even when the leakage of the air ducts is within the specified limits.

2.10 Installing

Air ducts must be installed in a neat and clean area. The methods of securing these ducts to structures and walls must be coordinated and approved by the Engineer.

2.11 Material for the construction of air ducts

All air ducts, except where otherwise specified, shall be constructed of galvanized sheet metal. All galvanized sheet metal shall be coated with 275 g/m² zinc. Clamps and brackets shall be protected by galvanized sheet metal. The thickness of the galvanized sheet metal shall be in accordance with the size of the air duct flange, the size of which is given in the table below.

Brinja me e gjere e kanalit	*Trashesia e llamarines*
Deri ne 30 cm	δ=0.6 mm
Nga 35 ÷ 75 cm	δ=0.8 mm
Nga 80 ÷ 120 cm	δ=1.0 mm
Nga 125 ÷ 200 cm	δ=1.2 mm
Mbi 200 cm	δ=1.5 mm

The connection of air ducts between themselves or to elements such as elbows, trousers, reductions, must be done through flanges. The method of attachment must be carried out according to the details given in the drawing.

2.12 Thermal insulation of air ducts

All supply air ducts installed indoors must be painted with thermal paint in order to preserve their aesthetic appearance. The paint to be used for thermal insulation of air ducts must be with refractory grains of constant granulometry (0.2-0.5) and homogeneously distributed in the mixture. It limits the noise level to 6-8 dB(A) and provides very good protection against corrosion.

- Color: Beige/brown with pulp, fine-grained Alkalinity (PH): 7.0-7.5
- Thermal conductivity: λ=0.123 W/m*K
- Specific gravity: 0.91 gr/cm3

2.13 Flexible Channels and Connections

Fans and other vibrating equipment in their connections to the ducts must be connected on both sides with flexible ducts. These flexible ducts must be suitable for the working pressure of the ducts at the point of installation. Flexible ducts mean a strip placed between two connections in the duct that does not exceed 100 mm of the duct length. Flexible ducts must be manufactured from damage-resistant piece lining and with a mineral-based factory coating.
Flexible connections must be securely fastened and must not leak or cause excessive noise. In the case of air distribution terminal units, detachable metal strip clamps must be used.
These pipes will be delivered in two forms: insulated and uninsulated.
The construction will be: Aluminum reinforced with two sheets of polyester, thermally insulated with glass wool:

Color: aluminate
Length: standard
temp. of work 25 ºC / +220 ºC

Density 16 kg/m³
Thickness 25 mm

2.14 Elbows and branches

Standard radius elbows (R = D) will be used. Short radius elbows and square elbows will be used only in cases where spaces are narrow.
All branches must be at 45º, except when otherwise specified in the drawings.

2.15 Filter support frame

The filter holder frames and their components must be standard products from the current catalogue. These devices must be selected with a service life of 12 years. The filter panels must be removable from the upper side of the air flow. The filter holder frames will be such that they are compatible with standard filter panels.
When the device is loaded with all the specified filters, it will allow zero air flow around their frames and must remain in this condition until the end of its service life. The filter support frames must be able to support the weight of the filters when the latter are filled with filter materials. The filter frames must be strong and must not have any deformation even under the maximum weight of the filters that will be ready to be cleaned. The filter frames, gaskets and their clamps must withstand up to 500 filter replacements.
No special tools are required to replace the filters.

2.16 Air conditioning supply and return grilles (mounted on the air duct)

The grille shall be mounted as shown in the drawings. The grille shall be finished in natural anodized aluminum. The model and appearance of the grille shall be approved by the engineer. The inner surface of the grille shall have double-row blades. The grilles shall be equipped with dampers for regulating the air volume that regulate the amount of air. The grille and all its components shall be protected from corrosion. For the installation of the grille, all necessary brackets and screws shall be provided, and this device shall be installed in the openings left in the air duct through a neck of not less than 10 cm and in the positions and details shown in the drawings shown in the drawing.

RELATION TECHNICAL

FIREFIGHTING SYSTEM

OBJECT: " ESTABLISHMENT OF THE EDUCATIONAL INFRASTRUCTURE OF THE FRANCO-ALBANIAN LYCEUM OF SCIENCES AND INNOVATION, MUNICIPALITY OF KORÇA"

CLIENT: ALBANIAN DEVELOPMENT FUND

Designed by : **Mechanical Engineer Ermir GJOKA Liç- M.1174/2**
Mechanical Engineer Erjon ALIMANI Liç- M.1248/3

TIRANA 2026

SUMMARY TABLE

1. Fire protection and rescue system

1.1 entry

The design of the Fire Protection and Rescue System project is based mainly on Albanian legislative provisions, with European standards and norms considered as supporting and complementary. This project, through the implementation and construction of its facilities, aims to provide protection for human lives and minimal damage to material goods from the possibility of fire in buildings. The laws, Council of Ministers, Directives, as well as international norms and standards on which the design of this project is based, are as follows.

Laws, Council of Ministers, and Ordinances of the Albanian state

Law No. 152/2015 Date 21.12.2015	For fire protection and rescue service,
DCM, No. 626, Date 15.7.2015	For the approval of housing design regulations, Chapter X, Fire Protection in Buildings
Order, No. 424, Date 24.7.2015	On the approval of technical regulations for fire protection and rescue in residential buildings
Order, No. 425, Date 24.7.2015	For the receipt, administration of technical and graphic documentation of the fire protection project and for the rescue and issuance of technical acts.
Order No. 45 Date 09.04.2004	On the protection of material values from fire in warehouses and storehouses
Law No. 8766/2001 Date 05.04.2001	For Safety and Fire Protection
Law No. 8766/2001 Date 26.03.2001	For Civil Emergencies
Decision no. 162 Date 19.4.1965	On fire protection measures in the design of buildings of all types

Complementary International Standards and Norms, "UNI EN"

EN 2	Classification of Fires
EN 13501	Fire classification of construction products and building elements.
UNI 9795:2010	Project of automatic fire detection system and fire alarm systems
EN 12845	Fixed fire extinguishing systems – Automatic sprinkler systems – design, installation and maintenance.
EN 1366	Fire resistance tests for service installations
EN 1028	Installation of Stationary Fire Protection Pumps
EN 12416	Fixed fire extinguishing systems - Powder systems
EN 14384	Column type fire hydrant installations
EN ISO 14557	Fire hose – Rubber and plastic suction hose and hose assembly parts.
UNI 10779:2007	Fire extinguishing equipment – Hydrant system. Design, installation and operation

UNI 11292:2008	The environment intended for the installation of the pump group for fire protection systems. Functional and constructive requirements.
EN 15004:1	Fixed fire extinguishing systems – Gas fire extinguishing systems, design, installation and maintenance
EN 15004:7	Fixed fire extinguishing systems – Gas fire extinguishing systems, physical data and design of gas fire extinguishing system, for IG-01 extinguishers.
EN 545:2010	Ductile iron pipe, fittings, accessories and their connections for pipelines - requirements and test methods.
EN 10216	Seamless steel pipes for pressure purposes – Technical conditions of supply
EN 10217	Welded steel pipes for pressure purposes – Technical supply conditions.
EN 10220	Seamless steel pipes and welded steel pipes – Dimensions and weights per unit length.
EN10255	Seamless steel tubes suitable for welding or threading. Technical conditions of supply

2. Types of fire protection in buildings.

2.1 Passive fire protection system in buildings

The project for passive fire protection of buildings consists of determining evacuation routes, dividing the building into safe areas (compartmentalization), and selecting materials for the construction of the building structure, referring to their fire-resistant properties, which are determined by their resistance to fire over time, as well as the classes of combustible materials. For the selection of materials to be used during the construction of the building, we rely on the recommendations and definitions given in ***the Order, No. 424, Date 24.7.2015*** , for determining the fire resistance of structural elements, the degree of fire, and the classification of materials.

R	*Resistance of the external parts of the building to fire expressed in minutes (0-120)*
REI	*Resistance of the internal parts of the object expressed in minutes (0-120)*
RE	*The resistance of the doors of the rooms, the latter expressed in minutes*
Fireproof Height	*It is the height of the objects expressed in meters, with the following division: 0-24 meters, 24-54 meters, over 54-80 meters, over 80 m*
Class 0	*Non-combustible materials*
Class 1	*Materials that burn with difficulty, and only in the presence of fire*
Class 2	*Combustible materials*
Class 1 IM	*They are materials and equipment for furnishing, which have as their components materials such as laminated wood plus cotton, wool, etc., as well as their by-products, which are used for interior furnishings.*

Also, for the method and manner in which the classification of the building type is made, the recommendations and definitions expressed in the content of ***the Order, No. 424, Date 24.7.2015, point 6.1 Classification, are used,*** and the classification of the building type is also made, which are expressed in Table A.

Building type	**Fireproof height of the building**	**Maximum area of premises in (m^2)**	**Maximum area (m^2) of floor which corresponds to a degree in building**	**Type The cage THE stairs and THE AT LEAST A cage for elevator**	**"REI" characteristics of the stairwell and the elevator, THE smoke filter, doors, of the elements of subdivisions IN floors**
a	on 12-UP 24 m	8 000	500	ANY DETERMINATION	60 (**)
			500	of AT LEAST THE protected If NOT the requirements of point 7.2 are met.	60
			550	of AT LEAST THE EVIDENCE of indoor smoke	60
			600	The EVIDENCE of smoke	60
b	on 24 UP 32 m	6 000	500	ANY DETERMINATION	60 (**)
			500	of AT LEAST THE EVIDENCE OF THE indoor smoke if NOT requirements are met of POINT 7.2.	60
			550	of AT LEAST THE EVIDENCE OF THE SMOKE THE INTERNAL	60
			600	of EVIDENCE of smoke	60
c	on 32 UP 54 m	5 000	500	of AT LEAST THE EVIDENCE of smoke THE INTERNAL	90
d	on 54 UP 80 m	4 000	500	of AT LEAST THE EVIDENCE indoor smoke with ventilation filter not with THE SmAll that 0.36 m^2.	90
e	on 80 m	2 000	350(*)	of AT LEAST THE EVIDENCE of smoke THE INTERNAL with filter ventilation not with small that 0.36 m^2.	120

2.2 Active fire protection system in buildings

The project for active protection of buildings from fire consists of the selection and dimensioning of water systems for extinguishing fires, as well as mobile (protative) means, which are cylinders with chemical extinguishing agents, powder, foam, gases, etc. Fire extinguishing systems are divided into two types, which are characterized by the method of their activation.

- *The first fire extinguishing system, which is also the classic one and requires human intervention to be activated, is the manually activated system.*
- *The second fire extinguishing system, which is activated without human presence, is the automatically activated system.*

Manually activated fire extinguishing systems include internal and external hydrant systems. In the event of a fire in the building, one or more specialist personnel grab the hydrants positioned at specific locations, open the hand valves and activate the system by spraying water to extinguish the fire.

Automatic fire extinguishing systems include sprinkler systems. In the event of a fire in the premises where these systems are installed, even without the presence of people, these systems are automatically activated, localizing the fire area and neutralizing it.

Components of these systems

- *Installations with internal hydrants*
- *External hydrant installations*
- *Automatic sprinkler systems*
- *foam canisters*
- *powder canister*
- *halogen gas cylinders*

The methodology for selecting the appropriate fire extinguishing system in buildings is clearly defined in ***Order No. 424, Date 24.7.2015.*** Specifically, for this purpose, ***point 24. Firefighting Systems comes to our aid.***

2.3 Zoning and classification of fires.

To use extinguishing agents during a fire, first an analysis of the combustible materials in that area must be done, and based on this analysis, a classification of fires is made and then the agent and extinguishing equipment to be used in that area is selected. From what we mentioned above, as well as based on norms and standards, fires are divided into 6 classes which are expressed in the following table:

FIRE CLASSIFICATION TABLE				
1		Class	or	Fires originating from solid objects such as wood, paper, plastic and textiles
2		Class	B	Fires originating from flammable materials, such as benzene, benzene, petroleum, alcohol, oils, etc.
3		Class	C	Fires originating from gaseous materials such as methane, propane, butane, LPG, etc.
4		Class	D	Fires originating from metallic materials such as aluminum, magnesium, sodium, etc.
5		Class	E	Fires originating from live equipment.
6		Class	F	Fires originating from cooking food in kitchens

Table 1: Fire Classes

3. Architecture and Construction in the function of fire protection.

3.1 Construction characteristics of the building

The building in question is intended to serve the high school and the necessary services for the student community. The building consists of different areas that help achieve the purpose for which this building is built. Specifically, these areas are:

- *Educational Center*
- *Lecture Hall*
- *Seminar Hall*
- *library*
- *chancery*
- *Conference Hall*
- *Office*
- *deanery*
- *Lecture Hall*

The building in question has a height of 35 m. Based on ***the Order, No. 424, Date 24.7.2015, point 6.1*** for the classification of buildings, all the constituent buildings of this building are classified as Building Type A where the fireproof height of the building is over 12 ÷ 24 m. The maximum area of the premises for each building is less than 5000 m^2, and the maximum area of the floor corresponding to a staircase in the building is less than 500 m^2.

For the type of stairwell and at least one elevator cage. Characteristics REI 60 is provided for the stairwell and elevator cage.

In order to increase the guarantee for the lives of people present, when they are in the conditions of a fire and to enable their rapid and safe evacuation, from the place of occurrence it is mandatory that the exits and evacuation routes, especially the spaces and passages in them, are always kept free. They are also made present through phosphorescent and illuminated indicator boards. In this way, general passive fire protection measures also include:

- *Positioning signs in visible locations and posting instructions on actions that personnel should take in the event of a fire;*

- *Positioning of signs indicating the positions of fire extinguishers and hydrants, escape routes and emergency exits;*
- *Removing flammable materials from parking areas and placing them in safe places to prevent the spread of fire;*
- *Keeping escape routes clear;*
- *Careful maintenance and continuous control of electrical installations in accordance with the relevant rules for such installations;*
- *Inspection by qualified and trained personnel of all compartments, warehouses, etc. at all times to eliminate conditions that could lead to the creation of a fire.*

The part of the project on signage and symbolism used is all based on ***Order No. 425 dated 24.07.2015*** of the Minister of Internal Affairs, which in module No. 2 defines the general requirements for conventional and indicative signs of the technical and graphic documentation of the fire protection and rescue project.

3.2 Structural characteristics of the building

Structurally, the facilities and buildings are designed with non-combustible structural elements and partition structures of type R 60. Even the partitions of security areas (compartments) with technical premises will be of type no lower than REI 60. These constructive characteristics meet the requirements of ***Order, No. 424, Date 24.7.2015,***

Escape stairs will be made of non-combustible structures of at least REI 60 type and equipped with doors of at least REI 60 type.

To increase the guarantee for the lives of people present, when they are in the conditions of a fire and to enable their rapid and safe evacuation from the scene, it is mandatory that exits and evacuation routes, especially the spaces and passages in them, are always kept clear. They are also made present through phosphorescent and illuminated indicator boards.

4. Mechanical fire protection installation project.

Overall, taking into account the characteristics of the building and its destination, the following extinguishing substances were used:

- *Water fire protection system, with internal hydrants for the entire building*
- *Portable fire extinguishers in all positions indicated in the project.*

4.1 Portable fire extinguishers

The determining factors to be considered when designing active fire protection were:

- *The nature and extent of the fire and the size of the area to be protected*
- *Probability and speed of fire spread in different areas*
- *Requests under Order, No. 424, Date 24.7.2015 and Order, No. 425, Date 24.7.2015,*
- *Additional requirements according to European norms and standards EN 12845, UNI 10779, for automatic and manual fire extinguishing systems.*

The project also precisely defines the areas related to fire classes and the locations where portable fire extinguishers are located. Portable EN3 powder fire extinguishers will be of class 34A 233BC. In

the environment where electrical cabinets or electrical panels are located, it is planned to place a CO2 fire extinguisher.

Fig. 2.1 Carrelato

Fig. 2.2 Fire Extinguishing

Fig. 2.3 Cassette hydrant

4.2 Manual fire extinguishing system

For a manually activated fire extinguishing system, water spraying is used; for this purpose, a system with internal hydrants is used.

The determining factors that are taken into consideration during the design are the nature and extent of the fire, the size of the area to be protected, the probability and speed of fire spread, as well as the requirements according to ***Order, No. 424, Date 24.7.2015,*** as well as the supporting norms EN12845, and UNI 10779.

For connection to the auto-motor pump and other equipment of the specialized group of PNMZSH, they are provided in accordance with the UNI 11779 standard.

4.2.1 Fire extinguishing system with manual activation Hydrants.

The manually activated fire extinguishing system consists of column hydrants installed outside, as well as internal hydrants installed inside the buildings, in protected areas near the stairs and corridors. These hydrants are connected through a ring network of pipes installed outside and serving the building in question. In the building, UNI 45 UNI-EN 671-1 Wall Fire Hydrants are installed. The hydrant supply lines are dimensioned to guarantee the simultaneous operation of 3 UNI 45 internal hydrants, in the most unfavorable positions, guaranteeing a flow rate in each hydrant of 120 l/min, with a residual pressure in the hydrant of 2-3 bar; the length of the internal hydrant pipes is 30 m.

4.2.2 Pipelines and recorders and pipe hanging

The pipes and fittings to be used will comply with the following standards:

- *S235JR and Fe360 steel pipes according to UNI 10025, UNI EN 10029;*
- *elbows, bends and wall thicknesses according to UNI EN 10024;*
- *CE fasteners and screws/bolts, according to UNI 5727;*
- *anti-vibration sleeves with steel flanges according to UNI EN 1092-1;*
- *external anti-corrosion spray painting (Catramina HD), with minimum thickness >=150 microns, referring to UNI 12845;*
- *painting in the water area against corrosion by spraying two-component epoxy-bituminous tar EPOXITAR, with a minimum thickness of >=150 microns, referring to UNI 12845;*
- *painting the technical area with anti-rust and further treatment with two-component EPOX Zinc-coated epoxy, in accordance with UNI 11292.*

The supports will be made of fire-resistant materials and such that they can support without

deformation a minimum load of 100kg over 5 times their weight filled with water. Their shape will refer to the UNI 7145 standard.
The pipe supports will be studied by the contractor and will be submitted for approval to the works supervisor along with the construction drawings.

The sizing of the supports will take into consideration:

- *the weight of pipes, valves, fittings and in general all dependent components;*
- *stresses created by seismic vibrations, hydrostatic tests, hydraulic hammers and safety valve intervention;*
- *stresses created by thermal expansions;*

The position of the supports will be chosen based on:

- *size of pipes;*
- *their passageways;*
- *the presence of concentrated loads (pumps, valves, etc.);*
- *the structure available for attachment;*
- *thermal expansion movements.*

All supports must be studied and constructed in such a way that they do not transmit noise and vibrations to the structure.

Diameter rated The piping (mm)	distances IN vertical (m)	distances IN horizontal (m)
DN20	1.5	1.6
DN25 UP DN40	2.0	2.4
DN 50 UP DN65		2.5
DN80		3.0
DN100 UP DN125		4.2

4.2.3 Liaison group with PNMZSH brigades

From the MNZ distribution collector in the technical environment on the 1st floor, a connection point with the specialized PNMZSH brigades, equipped with the relevant device, is also foreseen, near the entrance to the parking lot. The connection will include:

- *no.1 outlet for UNI 70 connection in accordance with UNI 808 standard, with a diameter not less than DN70, protected against the entry of foreign bodies into them;*
- *no.1 shut-off valve which allows intervention in its components without the need to empty the plant;*
- *no.1 non-return valve;*
- *no.1 safety valve set at 1.2Mpa (12bar) for controlling overpressure from the pump. At the same time, on both exit stairs on each floor, a DN65 valve ("Landing Valve") is provided for connecting the PNMZSH brigades to the hydrant network.*

4.2.4 Firefighting plant pumping group

The fire-fighting system pumping unit will be located in the technical area on the underground floor

and will comply with the EN 12845 standard. This unit will serve both the sprinkler system and the hydrant system. The pumping unit will consist of 3 pumps:

Station pumping for the protection system THEir composite fire RECALLING EN 12845 standard ,

Electric Motor Pump

Flow : ***V=36 m³/h***

Pressure : ***H =60 mkH2O***

Power : ***18.5 kW***

Current : ***33.2 A***

Connection electrical , ***3 ~400 V, 50 Hz***

-Diesel Engine Pump

Flow : ***V=36 m³/h***

Pressure : ***H =60 mkH2O***

Power : ***17.5 kW***

Electric Motor Test Pump

Power : ***1.1 kW***

Current : ***2.7 A***

pumps must the be the assembly by crop the chartered by institutions relevant .

The pilot pump will keep the system pressurized by withstanding small pressure losses, preventing the main pump from starting to re-pressurize and preventing false alarms. The pilot pump will be automatically controlled.
In case of fire, when the pressure in the fire network drops below a certain level, the electronic controller will automatically activate the electric service pump and transmit a fire signal to the visual alarm. If the electric service pump does not start for any reason, the motor pump, "stand-by" comes into operation within 15 seconds. Its functions are
same as the functions of the main service electric pump, but serves as a backup in case of malfunction of the service electric pump. This pump must have an oil reserve for 4 hours of operation.
The plants will operate in both automatic and manual modes.
Exhaust of motor pump gases, flexible motor/pipe connection according to UNI 11292; thermal insulation and protection of persons from contact with it through a PROMAFLEX hood according to UNI 11292;

4.2.5 Calculating the amount of water

The amount of water required is equal to the continuous water requirements for extinguishing the fire and the time available for its elimination. This amount determines the necessary water storage available for fire protection for an autonomy of 1 hour of the automatic fire extinguishing system (about 36,000 liters available for the MKZ system).

Hydrants

A quantity of water must be guaranteed that will supply ***3 UNI45 Hydrants/ 2 UNI70 Hydrants***

An internal hydrant should have a flow rate of ***V = 120 lit/min.***

An outdoor hydrant must have a flow rate of ***V = 300 lit/min.***

The most unfavorable hydrant must have a pressure of min/max ***P = 2÷4.5 bar.***

The duration of water supply must be no less than ***60 minutes.***

Referring to the above definitions, we will finally have an amount of water for the hydrants of:

V = 3*120*60 = 21600 liters/h

✓ **V = 2*300*60 = 36000 liters/h**

Based on the above calculations, based on norm 10779 and standard EN 12845, the most unfavorable variant is selected, and in our case the pump flow will be selected, **36 m ^{3} /h.**

The B/A tank must be equipped with electronic and mechanical visual level indicators, which must signal the drop in the water level in the tank below a specified value. This signal must be transmitted to the central control panel of the pumping group and through it to the relevant signalers. The user must also guarantee the timely replacement of this reserve by using it for sanitary purposes.

TOPOGRAPHIC REPORT

Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça

Address: Municipality of Korça

CONTENTS

1. TOPOGRAPHIC REPORT

1.1 Instruments and methodology

The geodetic and topographic works for the facility were carried out on the basis of the general and specific technical requirements required. The group of surveyors organized the work and carried out the works based on the experience gained in previous works of this nature. Before the start of the topographic works, the necessary cartographic and geodetic materials as well as the relevant equipment were provided.

To ensure the unique geodetic connection of all projects, we used the geodetic data of the state triangulation and leveling network. The system used by the Republic of Albania is the KRGJSH projection.

The survey was done in the international system with the KRGJSH projection. with an ellipsoid WGS84. Given the area and the pace of development it has, it is more fruitful to use this system. With this system, geodetic coordinates for each point above the earth's surface can be easily determined through the use of GPS.

To connect to the State Coordination System, the connection to the "AlbCors" System provided by the "State Authority for Geospatial Information" was used.

During the field reconnaissance, the points of the range and the leveling marks were placed at the points fixed in the field. The fixed points in the field were provided with coordinates in the projection KRGJSH.ellipsoid WGS84 and quotas. Before the start of the survey, a detailed reconnaissance of the terrain was carried out, which served to accurately determine the working methodology, the way of construction of the geodetic network, the survey polygonometry, the technical leveling as well as the organization of the work.

The field fixation of polygonal survey points was carried out with concrete nails embedded in concrete objects. They are placed in visible and immobile places. Their identity is fixed in red ink written near the fixed point in places visible from the existing road or terrain. They are placed in stable places, on the side of the road or near it, they have a mutual view, thus ensuring the connection and continuity of work from the design phase to that of its implementation.

Each fixed point in the field has its number, coordinates, as well as the height obtained through geometric and geodetic leveling (see the plans of the objects where the coordinates of the support points are located). This data ensures that they can be easily found in the field.

The fixed points of the terrain are defined in the layout of the building that is included in the project.

1.1.1 Choice of instruments

Already knowing the characteristics of the urban situation, which in its entirety is an area with low density and high visibility, the Topographic Group selected and operated in the field with GPS Hyper VR, both for the construction of the support network and the completion of the details of the relief.

GPS Hiper VR

Accuracy:
RTK (L1+L2):
H: 3 mm + 0.4 ppmV: 5 mm + 0.5 ppm

The measurements of the objects were carried out by means of the TopCon GT 1000 Total Station, which technically provide the measurements of angles and distances with the necessary accuracy for the design of the roads.

In order to ensure the high technical requirements in the survey works, it was determined that the accuracy of the instrument met the requirements of the 1:500 survey scale.

1.2Surveys

Based on the points thrown by the AlbCors System , the frequency of the polygonometry network has been made throughthe Total station.

The entire surface of the area of interest has been fully surveyed and its representation in 2D and 3D has been made, showing every measured element. The relief fully reflects all its constituent elements where there were broken objects, terrain, roads, etc. The topogeodetic works carried out are based on the full skills of professional preparation, the use of modern technologies for field measurements and computer data processing, to meet the technical requirements set by the designers. Each pointtaken in the field has X, Y, Z coordinates, presented in the project.

The processing of the topographic material in the office was done with the Autocad Civil 2025 program as well as from where the attached two-dimensional survey was obtained.

In the graphic material of the project, the survey of the object in 2D, 3D as well as the points of Polygonometry is given.

Figure 1-1 The layout of the building, in the aerial photo of 2025

Figure 1-2 Rilevim i

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Ing.Gezim Salja

No. License T0066/4

LEGJENDA/ Legenda:

SHËNIME/ Notes:

PROJEKTI / Project:

Ngritja e Infrastrukturës Arsimore të Liceut Franko-Shqiptar të Shkencave dhe Inovacionit, Bashkia Korçë / Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Municipality of Korça

Klienti: FONDI SHQIPTAR I ZHVILLIMIT
Client: ALBANIAN DEVELOPMENT FUND

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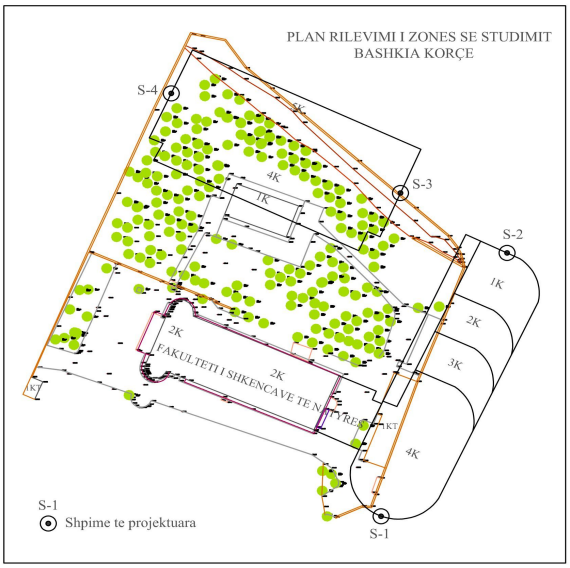
REPORT

On the geological engineering conditions of the site construction: "Establishment of the Educational Infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation", Municipality of Korça



Charge — **Albanian Development Fund (ADF)**

Compile the study — **Studio "Archispace" Ltd.**

Tirana, October 2025

Report content

Graphic material

Topographic map with the location of the construction site, scale 1: 25000

Geological map of the region, scale 1: 25 000

Hydrogeological map of the region, scale 1: 25 000 Geological -

lithological columns of the construction site, scale 1: 50

1. Introduction

The study of the geological and engineering conditions of the land where the building of the Faculty of Natural and Human Sciences is located, where two buildings will be built according to the plan made available by the ordering party, is being compiled by the studio "Archispace" Sh.pk with the representative of the geological and engineering and seismological engineer Mr. Gjon Kaza for the construction of the educational infrastructure of the Franco-Albanian Lyceum of Sciences and Innovation, Korça Municipality.

The construction site of these two buildings is located within the territory of the Faculty of Natural Sciences and Humanities and is bordered to the west by “Mother Teresa” Street, to the east and northeast by “Thoma Huaja” Street, and to the south by the Japanese Park with the building of the Court of First Instance and the building of the National Museum of Media and Art, where in 2008 a drilling study was conducted by the Gjon Leka studio on the territory of this Museum. I think that the situation is the same in the square where this geological-engineering study is being compiled.

In this study we will present the columns of these drillings carried out with the respective layers.

To accomplish the task, a careful survey of the square was carried out, where in addition to the surveys carried out to determine the lithological layers that build the square and the foundations of these buildings, a broader reconnaissance was also carried out in the territory around the buildings and throughout the neighborhood to identify any geodynamic phenomena and to make the most accurate representation of the geological structure and the layers that build the foundations of these buildings that will be built.

From the documentation of the exposures on the northern and southern sides of the construction site and based on the study compiled by the Gjon Leka studio at the National Museum and the drillings carried out by the ALTEA GEOSTUDIO 2000 studio, the separation of layers with different physical and mechanical properties that build the proposed construction site was made. The report is accompanied by photographs of the sites where the construction of the Faculty of Natural Sciences building will be carried out as well as the relief of the surrounding area. On the basement where the one-story building is located, one object will be built from 1 floor to 5 floors, while the other will be built in the southeast to east part adjacent to the Faculty building with 1 to 4 floors.

This study is valid only as a general idea project. While for the project implementation phase, we suggest that a minimum of two 10m deep drillings be carried out in the proposed square for the headquarters building.

Purpose of the study. The purpose of this study is to determine the physical-mechanical characteristics of the soils and rocks encountered in the area where the above-mentioned facilities will be built. The data obtained from field and laboratory work will serve designers to predict the foundations of the facilities that meet the technical conditions for the construction of the foundations of these facilities. This study will provide recommendations for the method of founding these important facilities as well as the organization of the floors of these buildings to eliminate differentiated settlements and for the protection of the slopes of the foundation pit.

Objective of the Works

In short, the report examines the issues that are supported by the geological works according to the program approved by the client and implemented by the**studio « Archispace » sh.pk with the studio's geologist as representative.**

1. All previous geological works carried out by the author of this study and by other local authors which were carried out for other purposes, but have cognitive value, have been reviewed. All published and unpublished studies for the area in question have been reviewed.

2. The old geological works that were carried out for the Korça area have been studied, as well as the geological and geomorphological maps of the area where the aforementioned buildings will be located.

3. Various works have been carried out according to the program drawn up above, but combined with existing works which are very important for understanding the geological phenomena that have occurred in the development of the geological history of this area.

4. Laboratory testing of samples taken in the field from drilling is also of particular importance.

To carry out this study, previous works carried out in the area in question were used, such as:

1. Geological-engineering and geotechnical study conducted by the Geology-Geodesy enterprise for the city of Korça, Tirana 1950-1990.

2. Geological engineering and geotechnical studies carried out by**"ALTEA & GEOSTUDIO 2000"** for the city of Korca, 1996-March 2021.

3. Geological studies carried out in the area where the TAP gas line passes from**"ALTEA & GEOSTUDIO 2000"**year 2012- July 2021.

4. Study of the geological-engineering conditions of the construction site of a**""New building with a height of 4-5-8 floors"**on "Republika" Boulevard, in Korça.

5. Report on the geological-engineering conditions of the construction site of the object: Museum Center 2nd floor + basement Korça. Author: Prof. Dr. Defrim Shkupi and Geological-Engineering Engineer Gjon Leka, year 2008.

Geographical location and existing situation

The territory targeted for the construction of two buildings 1-5 floors and 1-4 floors, is the territory where the Faculty of Natural Sciences and Humanities is located in the Municipality of Korça, has a considerable surface area which is covered with tall plants and is located in the eastern part of the city, on Mother Teresa Street. It is bordered on three sides by the urban area of the city and on the eastern side by a hilly relief. In the vicinity of this area are the Japanese Park, the National Museum of Medieval Art, the Oriental Museum as well as several other important institutions such as the Korça District Court.

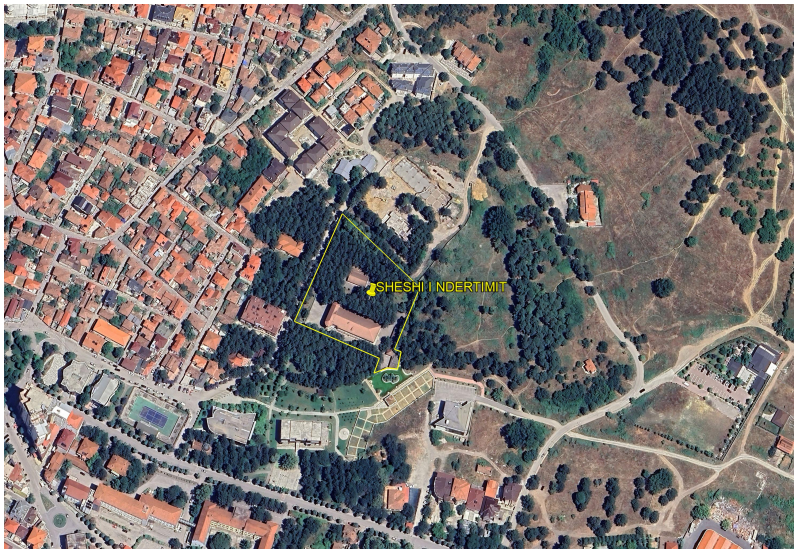
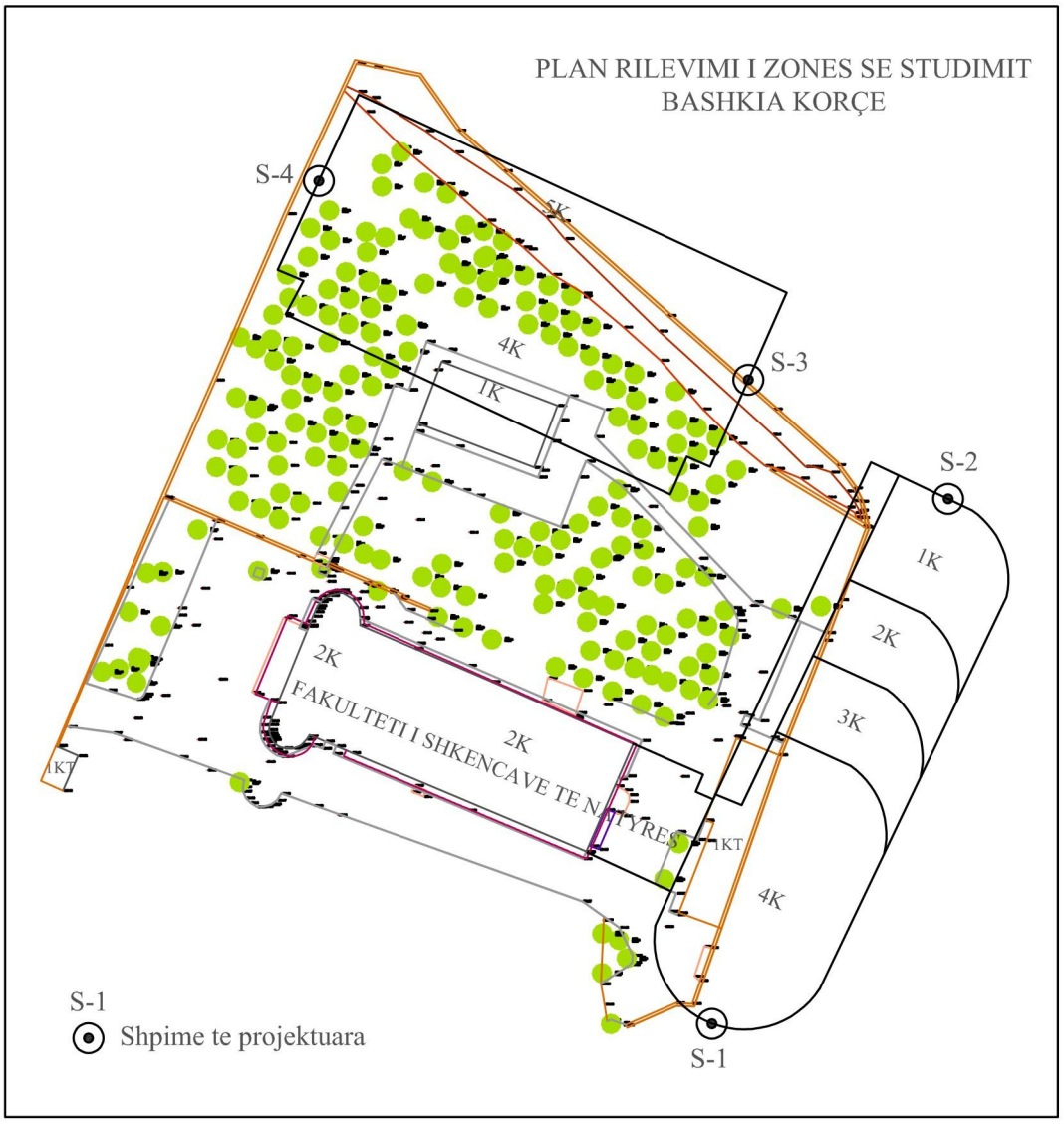


Fig.1. Position in relation to the city of Korça



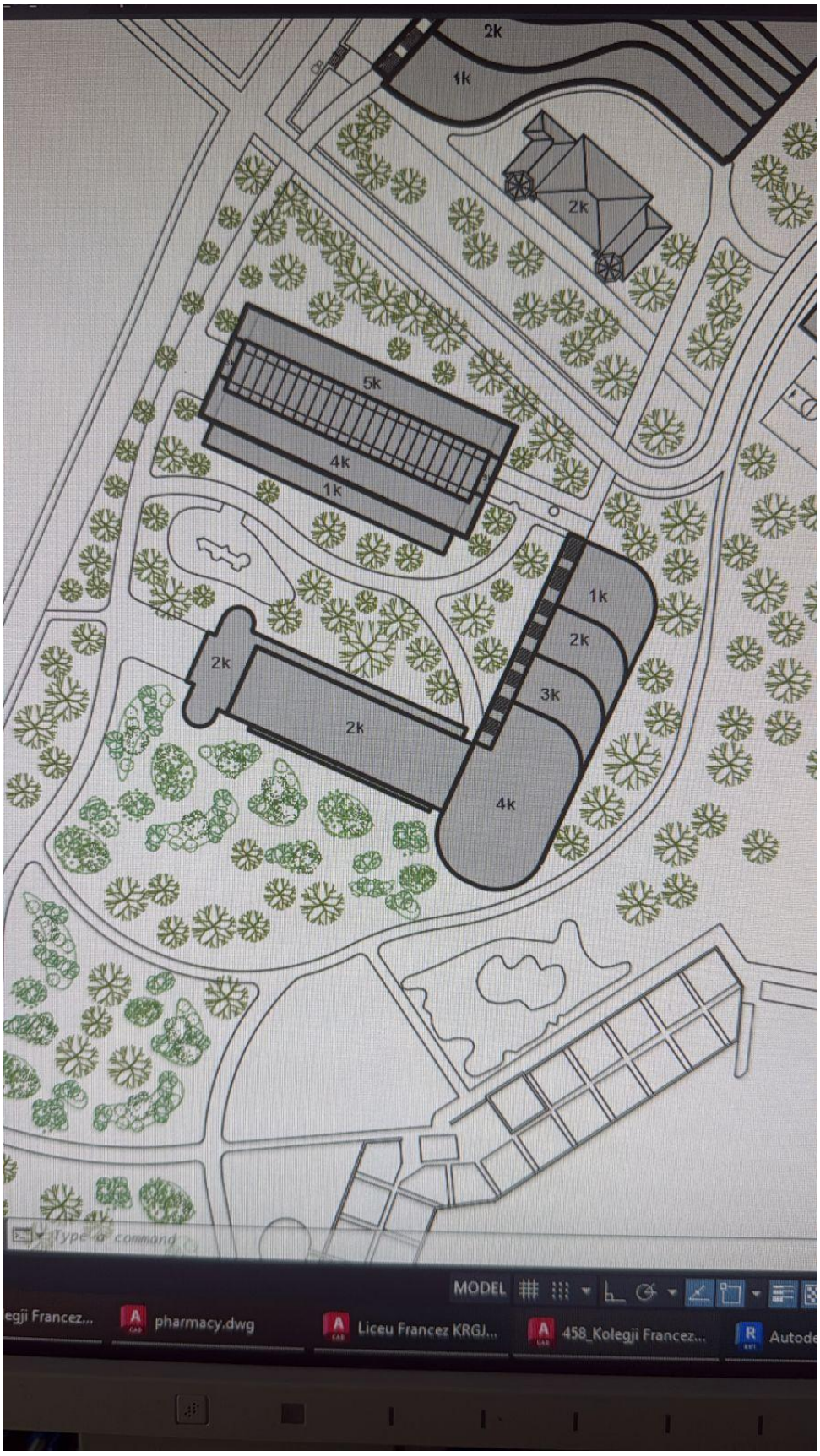


Fig.2 View of the buildings to be constructed