

Kosovo Challenge Fund - Support Programme to vocational education and training (VET) in Kosovo

Project

**KCF 200007 - KOS Gjakove, Technical School "Kadri
Kusari", Gjakove, Kosovo**

Document title

**Technical Specifications Construction– Short version for
Contractor**

Document date

July 2025



In cooperation with:

CES clean energy solutions GesmbH Schnbrunner Str.
297, 1120 Wien, Austria office@ic-ces.at | www.ic-ces.at

<u>1</u>	Construction Technical Specifiactions	3
1.1	Locantion and project description.....	4
1.2	Plans	5
1.3	Tecchnical description of Works.....	9
1.4	Details of Materials.....	10-17
<u>2</u>	Mechanical Technical Specifiactions	17
2.1	Mechanical Installations.....	18
2.2	Technical Details	19
2.3	Maps and design.....	18

Design Assignment for the Annex of the “Kadri Kusari” School | Ground Floor + 1 (P+1)

The design assignment for the annex of the “Kadri Kusari” School | P+1, was developed in consultation with the engineering department of the Municipal Assembly of Gjakova. The requirements specified that the project must be fully developed in accordance with the norms and standards outlined in the *Guide for School Facility Spaces*.

The requirements were limited to the creation of adequate spaces for two classrooms, sanitary facilities, and one space for optimal functioning, ensuring functional connections as well as specifications for interior and exterior materials.

The building was required to be of optimal dimensions and functional, so it could be accommodated within the grounds of the existing school as an annex.



LOCATION OF THE BUILDING FOR THE “Annex of the ‘Kadri Kusari’ School | P+1”

The project parcel is located in the municipality of Gjakova, as an annex to a school facility constructed in 1978. The annex consists of a ground floor and one upper floor (P+1).

ARCHITECTURE AND FUNCTIONAL CONNECTIONS OF THE BUILDING

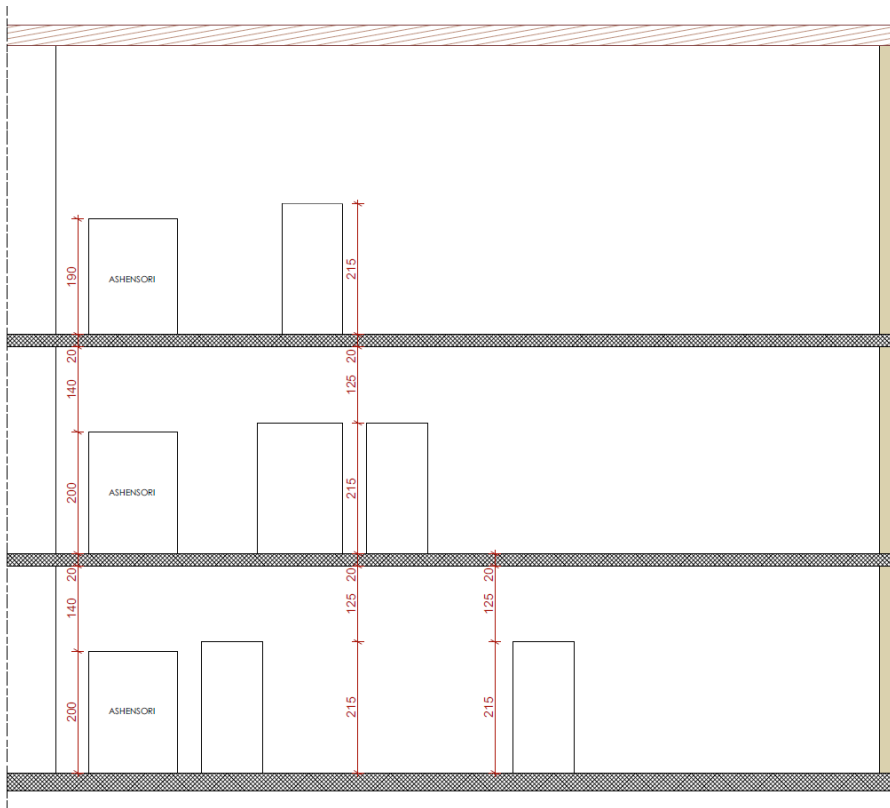
The Annex of the “Kadri Kusari” School is designed as a two-level structure (Ground Floor + 1). Access to the building is provided through the existing school corridor as well as via an elevator. At the front of the building is the schoolyard, designated for students and teachers.

The structure is raised using a skeletal system consisting of reinforced concrete columns, with solid intermediate slabs and perimeter beams only. The foundation is planned to be a strip footing embedded below ground level, ensuring protection against frost-related impacts.

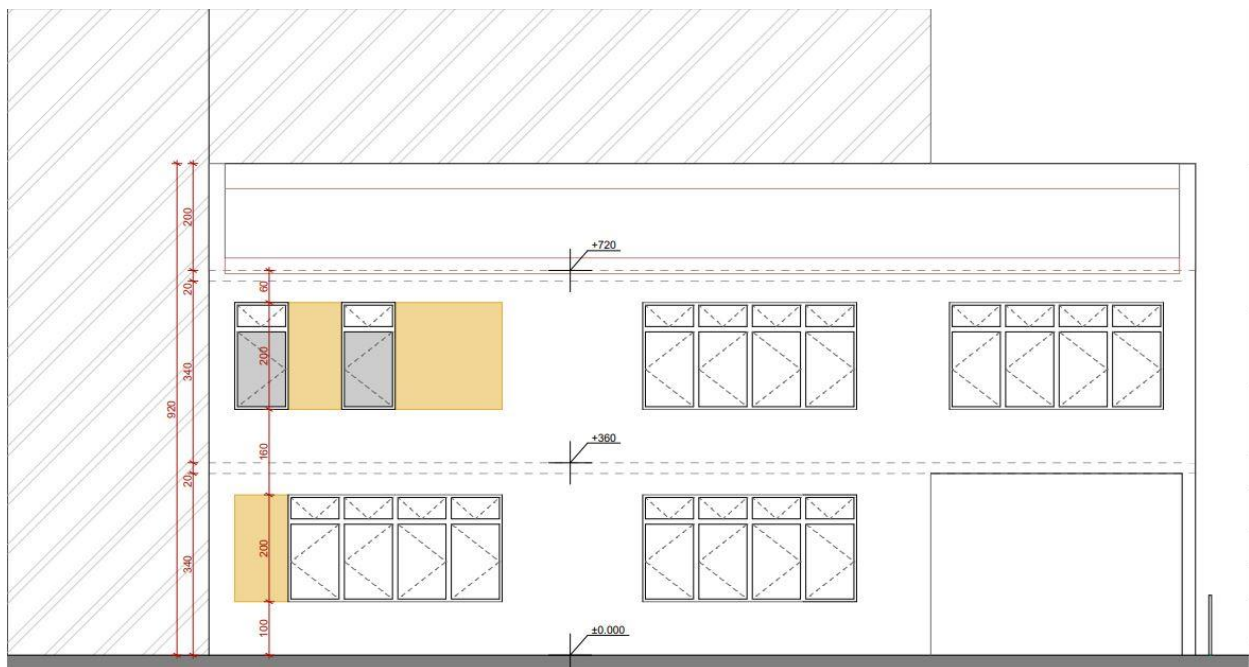
The building’s exterior walls are designed to be constructed using 25 cm wide clay blocks, while interior partitions will be made using clay blocks of widths 25 cm, 15 cm, and 10 cm. The façade is planned to be mostly a simple, minimalist design.

All rooms are provided with natural lighting and ventilation, except for two of the sanitary units, which due to their layout cannot be naturally ventilated. For these spaces, artificial ventilation will be implemented via suspended ceilings. The building will have a single-pitch sloped roof with a 10% incline.

The transition from the existing structure to the annex is enabled by openings in the corridor wall of the school. These openings will serve as doorways and elevator access to the new annex. The wall to be modified, as shown in the architectural drawings, is made of clay blocks, and the openings are straightforward to implement. The new structure will be built adjacent to the existing building without causing damage or interfering with its structural integrity, complementing it with additional spaces on both ground and upper levels, including a roof opening to allow easy access to the elevator’s technical room.



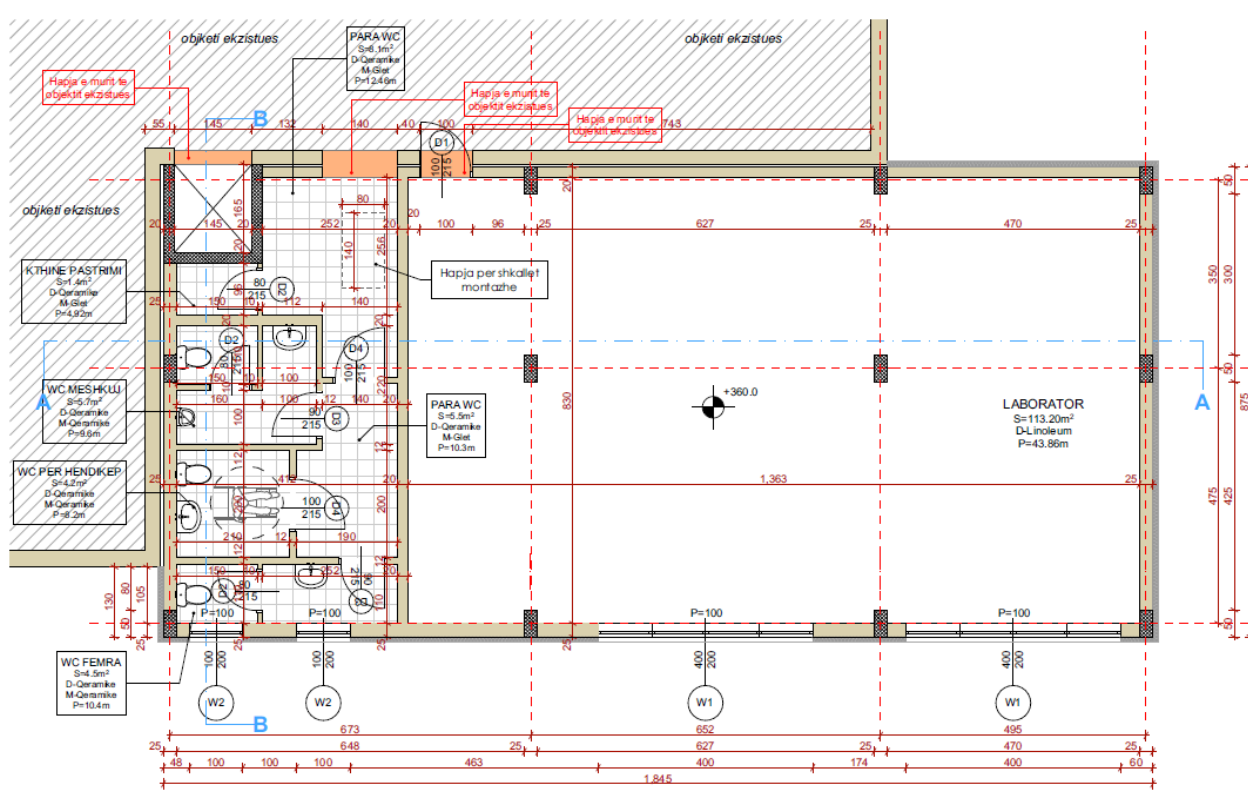
HAPJET E MURIT TE OBJEKTIT EKZISTUES!



The floor plan shows a rectangular apartment layout with the following details:

- Entrance:** Located on the left side, featuring a door and a small storage area. Annotations include "Hajlā e murtis te objekti eksistues" (Existing masonry wall) and "objekti eksistues" (Existing object).
- Rooms:**
 - DHOMĒ MĒSIMI (Left):** S=51.18m², D-Linoleum, P=29.55m.
 - DHOMĒ MĒSIMI (Right):** S=52.08m², D-Linoleum, P=29.14m.
- Bathroom:** Located between the two rooms, containing a toilet and a sink. It has a door labeled "D=1.00" and a window labeled "P=100".
- Living Area:** Located on the right side, containing a sofa and a coffee table. It has a door labeled "D=1.00" and a window labeled "P=100".
- Windows:** Two windows are shown, each with a label "W1" and a dimension of "P=100".
- Dimensions:** The plan includes numerous dimensions in millimeters (mm) and meters (m). Key dimensions include:
 - Overall width: 1,845 mm.
 - Overall depth: 3,000 mm.
 - Room widths: 648 mm (left room), 627 mm (right room).
 - Room depths: 670 mm (left room), 830 mm (right room).
- Annotations:** Several red boxes contain text: "Hajlā e murtis te objekti eksistues" (Existing masonry wall) and "objekti eksistues" (Existing object).

KCF 200007 – Technical Specification



The following section provides the room areas in tabular form, along with the total gross area of the building in question.

#	Area Description	NET AREA
K00 01	Classroom 1	51.18 m²
K00 02	Classroom 2	52.08 m²
Total NET		103.26 m²
Total		121.55 m²

#	Description		Area Net
K01 01	Toilets		31.64 m ²
K01 02	Laboratory		113.20 m ²
		Total – NET	144.84 m²
		Total	165.52 m²

CONSTRUCTION PHASES

1. **Demolition Works**
2. **Preliminary/Preparatory Works**
3. **Earthworks and Gravel Works**
4. **Concrete Works**
5. **Reinforcement Works**
6. **Masonry Works**
7. **Plastering Works**
8. **Painting Works**
9. **Thermal Insulation, Leveling, and Flooring Works**
10. **Waterproofing Works**
11. **Ceramic Works**
12. **Carpentry Works | Doors and Windows**
13. **Façade Works**
14. **Roofing and Sheet Metal Works**
15. **Miscellaneous Works**
16. **Electric Elevator Installation**
17. **Electrical Installation Works**
18. **Mechanical Installation Works**
19. **Water Supply & Sewage Installation Works**

NOTE:

The materials proposed in the technical description and bill of quantities serve as a reference point for the required quality. Accordingly, all of these materials can be replaced by others that have equivalent or superior quality characteristics, provided that this is demonstrated with certificates or attestations issued by their respective manufacturers.

Below, all works will be elaborated individually, and the materials to be used in each item will be described. For more detailed information regarding the characteristics of the proposed materials in the project, please refer to the technical datasheets and material catalogs specified, as well as the instructions from the respective manufacturers.

01. DEMOLITION WORKS

This phase includes the demolition of the existing annex of the “Kadri Kusari” school, which is a single-story building (P+0) measuring 9.0 x 14.0 meters with a height of 3.2 m. The walls are made of 25 cm blocks, and the roof consists of a frame with tiles. Demolition also includes removal of existing doors and windows.

02. PREPARATORY WORKS

This includes cleaning the site from all objects and obstacles that could hinder progress, thereby clearing the parcel intended for the fire station center. Subsequently, the site fencing is established, informational signage is placed, and the temporary electric, water supply, and sewage networks are arranged, along with placing a container at the site.

03. EARTHWORK AND GRAVEL WORKS

First, humus and soil are removed from the entire area where the building will be constructed. Then, excavation for strip foundations is carried out according to the project’s specified depth and dimensions. After leveling, the soil is compacted using rollers to achieve the required density.

A compacted layer of gravel/crushed stone with a fraction size of 60/90 mm is laid to the elevation -145.0 m, followed by a 5 cm thick layer of lean concrete (blinding concrete) to support the perimeter foundation walls.

Once the strip foundations are cast, the interior spaces of the foundations are backfilled with crushed stone/gravel fraction 31/63 mm and compacted in layers according to the project elevations. Before this, Austrotherm XPS 30 thermal insulation is applied along the inner sides of the perimeter walls to eliminate thermal bridges in the concrete structure.

Another layer of crushed stone/gravel fraction 0/31 with a thickness of 40 cm is spread and compacted under the entire building footprint. On top of this, Austrotherm XPS 30 insulation is placed and leveled with fine sand as needed. This insulation layer serves as the base for direct placement of the floor slab.

04. CONCRETE WORKS

This includes the concreting of all structural elements, starting with the strip foundations measuring 60x40 cm, the lean concrete layer under the perimeter walls, the ground floor slab, the

top slab, concrete columns of various sizes, beams, lintels above doors and windows, columns and tie beams for stabilizing attic walls, and other elements.

The lean concrete layer (C16/20) is 5 cm thick to facilitate faster and easier work and to create a base for positioning reinforcement without contamination.

All reinforced concrete elements must be made with concrete of class C25/30, with some specific elements like floor slabs and foundation walls having waterproofing admixtures, which will be detailed in the waterproofing section.

CONCRETE – When using ready-mix concrete, the mixing recipe from the factory and consistency according to ISO-4109 must be requested. Concrete samples in 20x20 cm cubes should be taken from each batch and tested in authorized labs after proper curing. After the reinforced concrete works, hardness testing with a rebound hammer should be done in the presence of the supervising authority.

NOTE: Concrete works can only begin after verification of formwork strength and correct reinforcement positioning. Concrete must be adequately and evenly vibrated, especially in areas with waterproofing admixtures. Mixing and application of admixtures in the perimeter walls and foundation slab must be done under supervision.

MATERIALS: Portland cement PC 45S must come with producer certificates, and usage expiration dates must be checked. Cement bags should be inspected upon opening for any signs of moisture or lumping.

AGGREGATE (GRAVEL): The aggregate must comply with the designed granulometric composition consisting of at least three fractions for optimal mix and must be free from organic matter and harmful debris.

05. REINFORCEMENT WORKS

These works include cutting, bending, tying, and shaping of reinforcement bars for all reinforced concrete elements as specified by the static calculations and technical specifications. Different diameters of reinforcement bars will be used as per structural design.

Reinforcement bars must be clean and free of corrosion, and PVC spacers of various types should be used to ensure proper cover thickness and protection after placement.

Before purchasing reinforcement, manufacturer certificates must be obtained, and bar diameters verified, with laboratory testing if necessary. All reinforcement should meet quality grade B500B according to EN-10080 standard.

06. MASONRY WORKS

All exterior walls and some interior walls with a thickness of 25 cm will be built with fired clay blocks, Giter G5 blocks, with dimensions 19x25x19 cm, laid with continuous mortar made from a mixture of fine sand and ready-made binder materials such as "SharrMall" in a ratio of 3:1, plus water as needed. The rest of the partition walls will be built with 12 cm and 15 cm blocks.

07. PLASTERING WORKS

Plastering works include plastering the interior walls using different materials depending on the purpose of the space. The main task is applying the base coat with pre-mixed material on all walls and ceilings (there will be no suspended ceilings in this building).

For this, ready-made bagged materials like RÖFIX 510 or similar with a minimum thickness of 15 mm will be used; in areas that will be tiled, a minimum thickness of 10 mm will be applied, as specified in the project details.

Preparation includes applying a spraying mortar like RÖFIX 670 or similar, using metal strips to determine mortar thickness, metal corners, and reinforcing fiberglass mesh to prevent cracking where materials change (such as from masonry to beams or reinforced concrete columns), and reinforcing vertical corners between walls.

In most of the building, except sanitary nodes and technical/storage niches, finalizing the walls will be done with two finishing layers of putty (each at least 1 mm thick) such as RÖFIX 225 or similar materials. All plastering and finishing must be performed under optimal conditions and temperatures not below +5°C.

08. PAINTING WORKS

Painting works cover interior surface painting. For all niches, paint that meets specific requirements will be used: high mechanical resistance to wet abrasion, chemical resistance to disinfectants, acids, solvents, physical durability with the ability to be decontaminated, matte surface finish, and hygienic properties allowing cleaning of even the toughest stains without polluting the air.

A polyurethane-based paint meeting these criteria will be used. For common areas like the entrance, corridors, and storage, StoColor Puran paint is planned.

Paint on walls and ceilings must be applied in two coats to achieve a uniform, spot-free appearance. Before painting, the surface must be prepared with an appropriate primer such as StoPrim Plex (a water-based acrylic) or another suitable type for interior use, to consolidate the surface, reduce absorption, and improve adhesion.

09. THERMAL INSULATION, LEVELING AND FLOOR COVERING WORKS

Thermal insulation includes insulating various parts like the ground slab on soil, the top slab, and the space under the ceiling.

For the ground slab on soil, highly load-bearing, moisture-resistant insulation panels such as Austrotherm XPS® 30 with 10 cm thickness will be laid over a compacted gravel base within the plinth walls, leveled with fine sand as needed. This layer also serves as the base for placing the reinforcement for the slab at ground level.

For the top slab, highly load-bearing insulation panels such as Austrotherm XPS® A120, 12 cm thick, will be installed in two layers (6+6 cm) to cover joints. Adhesives or fine sand may be needed for proper leveling. On top of the insulation, a separation layer of PE foil and screed at least 4 cm thick will be applied.

Leveling works include leveling most indoor floor areas with screed of different thickness depending on niche usage and final floor material. Screed is done over polyethylene (PE) foil as a separation layer, after two layers of polystyrene insulation of various characteristics have been laid.

Leveling layers include:

- 4 cm screed
- Aluminum foil/sub-layer for underfloor pipe heating
- Austrotherm EPS® A100 thermal insulation, 3 cm thick
- Austrotherm EPS® T650 acoustic insulation, 2 cm thick

The first 3 cm layer ensures thermal insulation and allows routing cables and pipes for installations; the 2 cm layer mainly provides acoustic insulation to reduce impact noise transfer. A 5 mm thick polyethylene perimeter strip is used to prevent noise transmission from floor leveling to partition walls.

Concrete surfaces must be perfectly smooth; special rolling equipment is used for grinding. Expansion joints must be installed at every transition between spaces and not farther than 6 m apart.

10. WATERPROOFING WORKS

Waterproofing will be done unconventionally. Instead of classic bituminous materials or reinforced bituminous membranes applied by torch, special additives will be used in concrete to make it waterproof.

One additive, Isomat Aquamat Admix, is a crystalline additive that remains permanently active, waterproofing concrete against both positive and negative water pressure. It also improves frost resistance, protects reinforcement from corrosion, reduces capillary water rise, and does not weaken concrete strength. It is approved for potable water tanks, pools, tunnels.

Recommended dosage: 1 kg additive per 100 kg cement.

This concrete with additive is planned for the ground floor slab and foundation walls to prevent capillary water rise.

At the interface between the foundation slab and vertical elevator core walls, where water ingress risk is high, expandable sodium bentonite strips (Isomat Waterstop 1520) will be

installed before concrete pouring. These strips expand up to three times when in contact with water, sealing cracks permanently.

In sanitary nodes (toilets and cleaning rooms), liquid waterproofing like Isomat Aquamat Flex (a two-component polymer-cement-based product) will be applied, suitable as a base for tile adhesives.

This waterproofing must be applied in at least two layers of max 1 mm thickness each. Components A (powder) and B (liquid) are mixed to a viscous mass and applied on cleaned, moistened surfaces of floors and plastered walls.

Corners between walls and floors will be reinforced with wide polyester fabric strips or fiberglass mesh to prevent cracking.

Walls in sanitary nodes will be waterproofed vertically up to at least 30 cm height.

Before application, concrete cavities must be filled with fast-setting material or cement mortar with additives; existing floor joints must be widened in a V shape and filled accordingly.

All manufacturer's instructions must be strictly followed.

11. CERAMIC WORKS

These works include tiling walls and floors in sanitary nodes with first-class ceramic tiles chosen by the investor/supervisory authority. Tiles must meet requirements for dimensional accuracy, thickness, flatness, edges, moisture absorption, mechanical strength, temperature and frost resistance, chemical resistance, and stain resistance.

Floor tiles must be glazed, with size, color, and texture approved by the supervisory body in consultation with the investor's representative. Tiles must be slip-resistant (minimum R12), temperature and frost-resistant, with low moisture absorption, abrasion-resistant, and suitable for heavy traffic with shoes and potential dirt that can scratch surfaces. Tiles are adhered with wide 4 mm joints on a dry, clean base with prior waterproofing.

Sanitary node walls will be tiled with glazed tiles with size, color, texture approved as above. Wall tiles must be resistant to temperature changes, frost, low moisture absorption, abrasion, chemicals, and stains. Joints must be 3 mm wide over a dry, clean base with prior waterproofing, up to ceiling height.

Tile adhesive must be high-quality, flexible, and waterproof (e.g., Ceresit CM 11 Plus). Joint filler must also be flexible and water-resistant (e.g., Ceresit CE 40).

All external corners and tile plinths will use metal/aluminum rounded profile corner strips matching grout color. Internal vertical tile joints and the junction between floor and wall must be sealed with sanitary silicone resistant to mold (e.g., Ceresit CS 25). The junction between tiles

and window frames must also be sealed with sanitary silicone to avoid direct contact and vibration transfer.

12. CARPENTRY WORKS | DOORS AND WINDOWS

Installation of doors and windows will follow types and specifications in carpentry drawings and schedules.

External PVC Windows – Custom-made according to carpentry plans. GENEIO windows offer excellent thermal insulation with a frame made from RAU-FIPRO fiber composite, making them very stable and lightweight.

Each position has specified profiles for frames, sashes, "T" profiles, and opening direction adaptations. Glass packages are double-glazed, 25 mm thick (4+17+4), with Low-E glass and argon gas filling.

Windows will be installed with at least 2 screws per profile, max 80 cm apart, and gaps filled with polyurethane foam. Opening mechanism will be Wink Haus – autoPilot Concept or equivalent. All windows have steel reinforcements and corner profiles for mounting additional elements like sills.

Interior Doors – Mostly panel doors with various fillings depending on use, covered with painted steel sheet by Hörmann or similar manufacturers.

Most doors will be OIT type with:

- 40 mm thick wooden core panels with tubular channels covered by 0.8 mm plastified steel sheet
- White color (RAL 9016 Traffic White)
- Two-part metal frame, 1.5 mm thick for block walls, profiles 21180 or telescopic 21168 allowing dry mounting
- Middle steel profile type 41102
- Security level WK2 according to DIN ENV 1627
- Thermal insulation $UD=2.5 \text{ W/m}^2\text{K}$ DIN 52619
- Stainless steel handles with rosette covers
- 3-piece chromium matte hinges
- 6 mm transparent glass
- Door height (single leaf) 200 cm

Note: After installation and foam hardening, protective strips must be removed and adhesive residues cleaned per manufacturer instructions.

➤ ELEVATOR TECHNICAL SPECIFICATION

TYPE OF ELEVATOR: Passenger

TYPE: Electric

CAPACITY: 6 persons

NOMINAL SPEED: 1.0 [m/s]

CONTROL: Microprocessor

DRIVE: Electric motor with frequency converter

VOLTAGE: 3x380 [V], 50 [Hz]

SIGNALING:

- At the main station: digital indicator of the cabin
- Digital indicator of travel direction
- At all stations: digital indicator of travel direction
- Inside the cabin: digital indicator of cabin position
- Optical and acoustic overload signal
- Acoustic “alarm” signal

SHAFT:

- Construction: concrete
- Dimensions: Rectangular - width: $A_p = 1400$ [mm]; length: $B_{pus} = 1600$ [mm]
- Pit depth: 1200 [mm]
- Shaft doors: type: telescopic with one door
- Door dimensions: 900 x 2000 [mm]

Note: The elevator should have all the safety requirements as per EU and technical standards in force.

➤ STRUCTURAL INFORMATION (STATIC)

1.0 GENERAL DATA ABOUT THE BUILDING

The building, with two floors (Ground + 1), is planned to be constructed on a relatively flat terrain with good load-bearing conditions. The structure consists of a massive skeletal construction with strip foundations. The intermediate floor slabs are massive, with beams embedded within the slab. Vertical structural elements—columns and walls—are positioned specifically to form regular frames and ensure proper structural behavior. The masonry is planned to be constructed with giter blocks, connected to structural elements as required by regulations. Masonry in this building does not serve a load-bearing function.

2.0 STRUCTURAL SYSTEM AND OTHER CONSIDERATIONS

The building employs a skeletal structural system, where columns and beams serve as the main load-bearing components. After pouring the slab of one level, the columns for the next level are constructed, followed by the slab with beams.

The structural system includes:

- **Strip foundations:** Dimensions $b \times h = 60 \times 40$ cm
- **Columns:** Dimensions $b \times h = 25 \times 50$ cm
- **Slabs:** Thickness $h_f = 20$ cm
- **Beams:** Dimensions $b \times h = 25 \times 50$ cm

Structural calculations were performed using **TOWER 8**, a finite element-based software. Calculations follow **Eurocode (EC)** for both ultimate limit state and serviceability limit state, which determine load impacts and reinforcement requirements. Specific load cases and positions were also analyzed and detailed reinforcement was provided.

3.0 FOUNDATIONS

Strip foundations with dimensions 60×40 cm have been adopted, offering sufficient stability. These are placed at a depth that satisfies geotechnical and climatic conditions for the region. The choice ensures higher stiffness and uniform load distribution. The resulting settlements and deformations from the building's weight are within allowable limits, based on geomechanical investigations—even without considering gravel layers used to improve soil characteristics post-excavation.

If weak soil or high groundwater is encountered, the following is to be done:

- Place a coarse gravel layer (0–150 mm, primarily 60–150 mm) for stabilization
- Above that, place a 30 cm thick gravel layer (0–63 mm fraction), compacted to a modulus of 80 MPa

Foundations must be made with **C-25/30 class concrete**, per EC standards, with adequate aggregate grading. A **protective concrete cover** of 5 cm on all sides is required. **Waterproofing additives** (e.g., hyperplasticizers) for **exposure class XC2** must be included to protect against groundwater pressure.

4.0 VERTICAL ELEMENTS – COLUMNS AND WALLS (REINFORCED CONCRETE)

Vertical elements vary in size depending on the architectural layout and structural needs. Columns are well-distributed thanks to the building's design. **Concrete work and reinforcement must strictly follow the project details** without unauthorized changes.

Use **C-30/37 class concrete** for columns and walls. Protective cover must be **25 mm**, especially important due to high humidity and potential water exposure. Dimensions and positions of vertical elements are specified in the graphic part of the project: (Positioning of Structural Elements).

5.0 INTERMEDIATE SLABS

Intermediate slabs are 20 cm thick and contain both drop and hidden beams in both directions. Together with the beams, the slab ensures adequate stiffness at that level.

Concrete class: **C-25/30**

During casting:

- Use surface or deep vibrators for proper compaction
- Ensure protective covers according to EC standards
- Add reinforcement around openings (e.g., stairwells) to prevent edge cracking

6.0 BEAMS

Beams are structural elements at intermediate levels, oriented in two orthogonal directions. Dimensions: **25×50 cm**, offering sufficient stiffness, static performance, and usability.

Beams are poured with the slab using **C-25/30 concrete**. Maintain **protective cover of 25 mm** to avoid segregation and corrosion. Covers also protect against fire and high temperature effects that may compromise steel properties.

7.0 MATERIALS USED

Structural elements use:

- **Reinforced concrete:**
 - **C-30/37** for vertical elements
 - **C-25/30** for slabs and beams
- **Reinforcement steel:** ribbed bars type **S-500B**

➤ MECHANICAL WORKS

1. Heating Units

Heating units are to be installed on supports, depending on the type of unit. The number of supports is determined based on the length of the units. The supports must be fixed using cement mortar; the use of gypsum is strictly prohibited. Upon completion of installation and successful verification of the entire hot water heating system, all brackets and supports must be cleaned of

corrosion and mortar, and then painted with a base coat and an oil-based paint resistant to temperatures up to **120°C**.

2. Piping

The piping will be installed as described in the technical specifications and shown in the graphical documentation.

- Black steel pipes will be used.
- Pipe joints must be made by **welding**.
- Welded areas must be properly executed with sufficient weld thickness, so that the pipe diameter is not altered.
- Pipe joints are **not allowed** to pass through walls or floor structures, but should be located where interventions are easily possible.
- When pipes pass through walls, they must be installed in such a way that **thermal expansion** does not damage the mortar or the wall itself. In all such cases, cylindrical rings must be installed.
- Pipe sections that pass through walls must be **primed twice with a base coat**.
- Horizontal piping must be installed with a slope of **0.3%** toward the boiler room.
- All brackets, hangers, and supports must be fixed to walls using cement mortar. The use of gypsum is prohibited.
- Drilling of reinforced concrete columns and any structural elements of the building may only be done **with permission and instructions** from the responsible construction authority.
- All visible pipework, brackets, and supports must be cleaned of corrosion and mortar, and painted with **oil-based paint resistant to 120°C**, suitable for hot water heating.
- **Pipe insulation** must be done using **mineral wool** wrapped in galvanized sheet metal:
 - For pipe diameter up to Ø40 mm → insulation thickness **b = 30 mm**
 - For pipe diameter up to Ø60 mm → insulation thickness **b = 40 mm**

3. Inspection and Adjustment

After completing the installation of the piping and heating units, the system must be **tested with cold water under pressure up to 6 bar** in the presence of the responsible authority.

Once installation is complete, the heating units are also tested with cold water under **6 bar pressure**, again in the presence of the responsible authority. **Test protocols** must be recorded in the construction logbook.

➤ ELECTRICAL INSTALLATIONS

Electrical Panel Requirements Within the Building

The building must include electrical panels for supplying the **Ground Floor, First Floor, and Second Floor**. The energy distribution panels for the Ground Floor, First Floor, and Second Floor must be from reputable manufacturers such as **ABB** or similar. The **basement panels** must also be selected from manufacturers like **ABB, Gewiss, Legrand, Schneider**, etc.

The panels must be **indoor-mounted** with **IP43 protection**, and designed to accommodate the required components according to the **single-line diagram**. They should be constructed from **2 mm pressed steel sheets**, coated with a **polyester layer** painted in **RAL 7032**, or made from **plastic materials**.

Installation Requirements:

- **Cable entries and exits** must be from the **bottom side** of the panel.
- All necessary components must be included:
 - **Insulators**
 - **Copper cable lugs**
 - **Busbar materials**
 - **Mounting and reinforcement rails**
 - **Flexible conductors**
 - **Grounding bars**
- A **20% space reserve** must be maintained for future expansion.
- **Grounding and neutral bars** must be **separated**.

Panel Components Must Include:

- Appropriately rated **magneto-thermal circuit breakers**
- **Residual Current Devices (RCDs / FID switches)**
- **Fuses (1P, 3P)** for protection of respective circuits

These components must comply with the building's specific technical requirements.

All panels must be **factory-assembled by the manufacturer**, and **type-tested certificates (A-tests)** must be provided for **each panel**.

Socket Installation

Unless otherwise specified, sockets must be installed at a height of **30 cm above the finished floor level**, while in **bathrooms** they must be installed at a height of **110 cm**.

- All **single-phase sockets** are supplied with **NYM-J or NYY-J 3×2.5 mm² cable**.
- All **three-phase sockets** are supplied with **NYN-J 5×2.5 mm² cable**.
- All sockets must be wall-mounted using **3-module or 4-module boxes**.
- In bathrooms and other areas defined in the project (e.g., **toilets, substations, laundry rooms, etc.**), sockets must have **protective covers**.

Switch Installation

Unless otherwise specified, switches in all rooms must be installed at a height of **110 cm above the finished floor**. Locations are indicated in the project documentation.

- Switches are connected using **NYM-J 3×1.5 mm² cable**.
- Switches and push-buttons must be wall-mounted using **3-module or 4-module boxes**.

In cases where two or more switches or sockets need to be installed next to each other, the installer must select a **manufacturer** that provides compatible multi-module systems — for example, **BTicino** or similar.

Lighting Levels

Lighting levels for spaces with designated purposes are defined in the design brief and comply with the **lighting standard EN12464:2002 - Light and Lighting**.

Classrooms:

LED lighting fixtures are planned, specifically **LED panel lights of type LED PANEL CAPRI SLIM 60x60, 40W**.

- These lights are controlled using **alternating and crossover switches**.

Toilets:

Lighting fixtures with **integrated sensors** are planned, specifically:

- **LED 10W, 720 lumens,**
- Dimensions: **Ø260mm x 90mm,**
- **4000K color temperature,**
- Equipped with **emergency backup battery,**
- Model: **VT-12, SKU: 817...**
- These lights are controlled using **PIR motion presence sensors**.