SPECIFICATIONS

FOR THE EXTENSION OF THE FACILITY OF THE TECHNICAL SCHOOL IN KOSOVKA DJEVOJKE STREET NO. 18 in GRADIŠKA at c. no. no. 2376 and 2375/1 K.O. Gradiška 1

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1. Specifications

a) Technical Specifications

General Requirements

These General Requirements take precedence over the Technical Specifications, BoQ and apply to all types of work.

Introduction

The General Requirements pertain to all types of works described in the Technical conditions, in the Bill of Quantity and Main Design, as well as the works which may occur during the execution of works and are necessary for completion of project.

The obligation of the Contractor is to study these Technical Specifications in detail, to examine in advance the Design documentation and terrain at the construction site, in order to get a clear picture of the type and scope of works involved. In case that the technical documentation is not clear enough, the Contractor should ask for clarifications in written form. If the Contractor finds discrepancies in the technical documentation he is obliged to inform the Supervisor.

All works included in the Bill of Quantity must be carried out in accordance with the technical description of positions, general technical conditions, requests of the design documentation, details of the project, as well as requirements of the Supervisor

The Contractor's scope of works shall include all required activities to ensure the correct and proper realization of construction / adaptation works.

The Contractor is responsible for complete and accurate performance of works in accordance with national low and professional standards.

The Contractor must be fully acquainted with all local regulations, local standards, common practice of trade and circumstances for their execution. Nevertheless, it is understood that, whenever local regulations, local standards, or any common practice of trade, are subject to any interpretation, clarification, ambiguity, or dispute, a ruling by the Supervisor will prevail, always provided that such ruling will be fully in compliance with and will be based on the subject local regulations, local standards , as well as in accordance with common practice of trade, and any such ruling by the Supervisors and subsequent instruction in that respect, will not constitute any ground for variation order and/or any additional payment.

Communication between the Contractor and the Employer and/or Beneficiary, during the works will be carried out exclusively through the Supervisor. The Beneficiary is responsible for the design.

All works must be carried out precisely and professionally. Prior to application, the Supervisor must examine all material and all his comments referring to material and quality of work will be obligatory for the Contractor. The agreed prices include all fully completed works and final products ready for use.

Standards:

The stated Technical Description / Specifications are an English translation of the descriptive part of the Main Design published in Bosnian. Whenever this document refers to standards (national, European, etc.) and manufacturers, it should be read "or equivalent"

Any standard that meets the same functionality and describes the same level of quality or better can be replaced by any of the listed standards.

Specified manufacturer's products:

Manufacturer's name or catalogue number, if shown in the Technical Specification or indicated on the Drawings or Bill of Quantities, are given only for indicative purposes and for general reference only. It shall be understood that the actual material supplied shall meet the requirements of the Specifications, and if necessary, the material specified under such manufacturer's name or catalogue indicated for reference, shall be modified under the direction of the Supervisor.

Alternative materials:

If during the course of the Contract certain materials or items required for use in the Works should be unobtainable, despite the best effort of the Contractor, the Contractor may offer for the approval of the Supervisor alternative materials or items, provided that they possess the minimum requirements of the originally specified material.

In the event of acceptance of any alternative materials or items a suitable price reduction shall be made in respect of any decrease in value but no price addition shall be made in respect of increase in value.

In the event of refusal of any alternative materials or items the Contractor shall not be relieved of any of his obligations under the Contract and shall be solely liable for any delay or loss occasioned by his failure to provide the material or items as specified.

Testing and Quality control

The Contractor will arrange all testing and quality control, which will be carried out according to relevant standards by authorized independent institutions. Copies of all the test results must be delivered by the Contractor to the Supervisor immediately after testing. The Supervisor will monitor and control all test results and test certificates according to the Technical Specifications. Unless otherwise specified in the Bill of Quantities the Contractor will bear all the costs of testing and quality control defined in these Technical Specifications.

Daily work register (log book)

The Log Book prepared in two copies shall be kept on the Site and the Contractor's Representative shall record site information on daily basis. The Log Book must be available to the Supervisor, the Employer or other authorised parties under the terms of the national

regulation. At the Supervisor's request, the Contractor has to provide all necessary information for the daily completion of the works dairy and attachments.

Measurement Book

The Measurement Book is where all measurements of the items are registered. The Contractor shall prepare two copies of the Measurement Book and the Book must be available to the Supervisor, the Employer or other authorised parties under the terms of the national regulation.

Inspection Book (Inspection Records)

The Inspection Book has to be available, in two copies, on the site and where the State Inspectorate registers the visits, comments or orders. The Inspection Book must be available to the Supervisor, the Employer /Contacting Authority under the terms of the national regulation..

Note: Construction Permit

The Construction Permit is not part of the Contractors obligation. The Contractor shall assume that the Beneficiary will obtain the Construction Permit.

General Items

If the following general positions are not mentioned in the BoQ, they will not be paid for separately, but should be included in the unit price of the Bid.

Contractor's Mobilisation & Demobilisation:

The Contractor should organize: geodetic marking of the new facility, preparatory works, safety measures on the site and school yard, etc. The Contractor should install, maintain and later dismantle all necessary offices, storage for tools, space for materials, service roads, temporary works, information board, deliver required machinery.

The Contractor will secure the construction site, will place the signs, provide lights and guards, and will keep them in position throughout the performance of the works until the handover. During the works execution the Contractor should ensure the safety of all participants in the works as well as security and organization of the construction site.

The Construction site has to be generally cleaned after the works are completed and the Contractor has to remove all the machinery which was used on the site.

Unless specifically given in the BoQ items, Contractor's temporary installations and facilities including fences, information board, mobilization, demobilization on the site, all demolition, dismantling and surveying works on the site are included in unit prices and not paid separately.

Working hours

The working time of 8 working hours will eventually be divided into two parts, depending on the school shifts. The contractor will agree with the Beneficiary on the most efficient work schedule. Possible work in two shifts (in average 8 hours per day) will not be charged separately

Accommodation for Supervisor

The Contractor shall provide one working space (desk and a chair) in their own office space for the use of the Supervisor.

Facility Maintenance Project (hereinafter referred to as As-Built Design) and Operation and Maintenance Manuel

Contractor hall prepare any required shop drawings and reflect the same on the as-build drawings, if applicable.

The Contractor shall prepare and submit: As-Built Documentation for installation works.

The Contractor shall submit to the Supervisor, all such documentation as well as all warranties and/or guarantees and operation manuals for the installed plant and equipment, all in three copies and in electronic format.

Unless specifically given in the BoQ items, preparation the Contractor drawings, testing, commissioning, issuing certificates, preparing as-build design and operation and maintence manuals are included in unit prices and not paid separately.

School adaptation _protection measures

In cases of reconstruction and adaptation of a part of the building, it is necessary for the Contractor to take all measures to protect the existing part of the building where construction works are not performed. Particularly school children and staff. It is necessary that the Contractor, in the cases of possible damage to that part of the building, which he caused during the execution of works, to reimburse the same at his own expense. It is necessary for the Contractor to protect a construction site and enable uninterrupted work and technological process on the part of the school that is not being adapted.

Quality Assurance and Environmental, Social, Health and Safety Management

A comprehensive Quality Assurance System (QAS), covering all aspects of the Contract and the Works must be implemented, documented and maintained by the Contractor during the entire implementation period of the Contract.

The Contractor shall make sure that the quality control complies with national and international standards.

Specifications for Environmental, Social, Health and Safety Management (ESHS) of the Works, is in these specifications under b), and will not paid separately.

Right of Access and Audit

The Employer shall be guaranteed unlimited access at any time to all documents and quality assurance documentation associated with the Contract. This also includes the same unlimited access to all production and manufacturing facilities.

When the Employer wants access to suppliers, manufacturers or sub-Contractors, the Supervisor will give due notice to the Contractor, whereby the time and purpose of the visit will be specified with the agreement of all parties involved.

INTRODUCTION AND EXPLANATION

The subject of these technical conditions is the extension of the Technical School building in Kosovke djevojke street no. 18 in Gradiška at cp. no. 2376 and 2375/1 K.O. Gradiška 1 (new survey), with the formation of a building plot. This Bid concerning on this subject and Main design.

The separate Bid will be prepared for equipping with the accompanying infrastructure necessary for the functioning of the building.

This Technical specification defines the conditions for the extension of the existing building, as well as the use of the building and land, in full compliance with the provisions of the Law on Spatial Planning and Construction (Official Gazette of the RS No. 40/13, 106/15, 3/16 and 84/19).

1. EXISTING SITUATION

State of construction

Location description

The object in question is located in Street Kosovke djevojke no. 18, on the land marked as cp. no. 2376 K.O. Gradiška 1 (new survey), in Gradiška.

By visiting the site, it was established that the land on which the mentioned building is located has been built and arranged. The plot of the building has a connection to the existing road and is equipped with infrastructure.

The surrounding area is built with residential, commercial and business buildings.

The building in question has GF+2 floors, with one part of the building having GF+1 and P floors, the total height of which is the same. The structure of the building is reinforced concrete. A multi-gable roof was built over part of the GP+2 storey building, while the roof over the GF+1/GF storey building is flat and impassable (domes in the roof structure were constructed to provide ventilation and lighting). Access to the roof over part of the building with floorsGFP+1/GF is possible from the corridor on the first floor.

The premises of the "Technical School" Gradiška are located inside the building. On the ground floor of the building there is an entrance (hall), classrooms, workshops for the practical part of teaching. On the first floor, there are offices, a meeting room, and an office. There are classrooms on the second floor

2. TECHNICAL DESCRIPTION OF ARHITECTURE

INTRODUCTION

The technical document was done according to the given location conditions. When designing this facility, all applicable technical regulations and norms related to the design of this type of facility were applied.

LOCATION

The location intended for the construction of a new building is located in Gradiška, on flat ground, on a plot marked with lot no. 2376 and cp. 2375/1, ko Gradiška 1. The location is equipped with complete infrastructure, which includes the presence of the city's water and sewage network, electrical and telecommunication installations

The approach to the building is made from the direction of Kosovka djevoje street, and according to the proposed solution shown on the plot situation. The space around the building

will be arranged in accordance with the needs for the given type of building, namely: access paths, sidewalks, green areas, decorative greenery, parking spaces etc.

ARCHITECTURAL SOLUTION OF THE BUILDING:

The building has horizontal rectangular overall dimensions of 9.00 x 12.33 m. The number of floors of the building is marked as GF+2, where the clear height of the useful space of the ground floor is about 3.21 m, and the first and second floors are 2.90 m. All classrooms are naturally ventilated and lit. The window parapets are at a height of 100 cm (from the finished plates).The character of the object is permanent.

STRUCTURAL SOLUTION AND MATERIALIZATION

FOUNDATION:

The foundation of the building is provided with foundation strip and foundation beams. The foundation strips are 100 and 85 cm wide and 70 cm high. The foundation beams are 40 and 25 cm wide and 90 cm high. Since the new building is adjacent to the existing one, when excavating the foundations, the foundations of the existing building should be taken into account. Before carrying out the works, it is necessary to check the quality of the soil in the foundation area once again, and if you notice poor quality soil, you must consult a geologist and a designer who will provide other foundation conditions and corrections to the foundation dimensions.

CONSTRUCTION:

The supporting structure of the building is a structural system made of reinforced concrete columns and beams connected to each other. The mezzanine structure above all floors is also a reinforced concrete slab 18 cm thick. Reinforced concrete beams have dimensions of 58x40 cm. The roof structure is made as a classic wooden gable.

COMMUNICATIONS

All communications within the building are of the horizontal type, formed in the form of corridors and stairs that are located in the existing building (school).

WALLS

The internal walls are plastered on both sides with an extension plaster, plastered and finally painted with a semi-dispersive paint at the designer's choice. All external walls are 25 cm thick, plastered on the inside, coated on the outside with a demit facade with a heat-insulating layer of fire-resistant styrofoam 12 cm thick, and then painted with a facade paint of Investor’s choice.

CEILINGS

Ceilings in all rooms are plastered with an extension mortar in the ratio 1:2:6, then plastered and painted with semi-dispersive paint.

FLOORS

All floors are designed as floating. In this way, the necessary thermal insulation would be provided. In all parts, the already mentioned floors, would have the following layers:

- double layer of waterproofing
- thermal insulation
- plastic foil
- cement screed
- ceramic tiles

All floor coverings are glued to the base (cement screed) with various adhesives (depending on the type of floor). Precisely for these reasons, it would be desirable to make the cement screed as flat as possible, in order to avoid the appearance of irregularities on the floor during the installation of the final covering. Cement screed should be separated from the wall by a minimum of 0.5 cm, using felt, in order to prevent the transmission of sound through the wall and construction into neighboring rooms.

LOCKSMITH AND JOINERY

All facade joinery of the building is made of PVC box five-chamber profiles, where the spaces between windows on the same floor and between floors are designed according to Article 12 of the Rulebook on technical standards for fire protection in buildings intended for public use where a large number of people gather, stay or work ("Official Gazette of the RS No. 11/18). Glazing on the facade joinery would be made with thermopane glass 4+16+4 mm.

The installation of all carpentry would be the dry way using screws and foam.

ROOF STRUCTURE

The roof structure is a classic wooden, two-gable structure, which, in its position and arrangement, follows the roof structure on the part of the school that has been built .The roof covering is sheet metal. Drainage of rainwater from the roof is solved by a system of horizontal and vertical gutters made of galvanized sheet metal.

INSTALLATIONS

The bid envisages the installation of electrical installations, lightning rods and mechanical installations. All installations will be processed in separate attachments, in accordance with the current conditions and installation design standards. Heating is provided by radiators that are connected to the existing boiler room with a solid fuel boiler through a floor distribution. The layout of the radiators, the capacity and the place of connection will be defined by the mechanical installation project. This bid does not include the phase of mechanical installations, but it will be designed in a separate project. According to the thermodynamic calculation, the facility meets all regulations and standards on thermal stability for the III climate zone.

3. TECHNICAL DESCRIPTION OF THE CONSTRUCTION

The building is structurally designed as a masonry structure with horizontal and vertical cerclages and plates. The roof structure of both buildings is designed as a wooden one. The roofs are gabled. The pitch of the roof is 14°, and the covering is sheet metal. The roof structural elements are the elements of the load calculation:

- Own weight of the roof structure and covering

- Snow for the slope of the roof

- Wind according to JUS regulations

The mezzanine structure is a reinforced concrete slab 18 cm thick. The structural system is a plate supported on beams. On the basis of the known load values, structural calculation was carried out. The concretes are made of concrete brand MB 30, reinforced with the necessary reinforcement according to the structural calculation.

The load-bearing walls are made of giter block d=25 cm in extended mortar. The load-bearing walls are reinforced with vertical cerclages at all corners and at the junction of the walls. The building is founded on foundation strips under all load-bearing walls and the central foundation strip. The dimensions of the foundation strips are 100x70 cm, MB 30. From the foundation, leave anchors for posts. The permissible bearing capacity of the soil is σdoz=300 kN/m2.

OPENINGS IN PANELS

Often there are openings in the panels that we have not treated in the formwork and reinforcement plan, as well as during the static calculation (openings for the passage of pipes, ventilation, chimneys, ceiling openings, etc.), and when performing them, it is necessary to reinforce around the hole

. • If the openings (holes) are larger, reinforcement can be done with the so-called hidden beams that have the same height as the plate, and the width as needed (range) and are reinforced according to all the rules of the surrounding supports (longitudinal reinforcement of the upper and lower zone with stirrups)

• Relatively smaller openings (holes) in the plate are not harmful, circular or rectangular in shape , and can be constructed with proper placement of reinforcement that accepts tensile stress concentrations. As a rule, it is considered that it is sufficient to distribute the same amount of reinforcement around the opening that is interrupted in the appropriate direction due to the opening.

4. WATER SUPPLY AND SEWERAGE TECHNICAL DESCRIPTION

A/ LIST OF LAWS, REGULATIONS, REGULATIONS AND STANDARDS WITH WHICH THE BID COMPLIED

1. Law on Spatial Planning and Construction ("Official Gazette of RS" No. 40/13,106/15,3/16)104/18, 84/19;

2 . Law on Safety at Work ("Official Gazette of RS" No. 1/16
3. Law on Fire Protection ("Official Gazette of RS" No. 94/19);
4. Regulations on technical norms of fire protection in buildings intended for public use in which a large number of people gather or stay, or work ("Official Gazette of the RS" no. 62/20);
5. Rulebook on technical norms for stable fire alarm installations ("Official Gazette of RS" no. 71/20);
6. Law on standardization in the RS ("Official Gazette of the RS" no. 13/02 7.
Rulebook on technical requirements for fire safety of external walls ("Official Gazette of the RS" no. 11/18 7. Rules on technical fire safety requirements for external walls ("Official Gazette of RS" no. 11/18).
8. Regulations on technical norms for the hydrant network for fire extinguishing ("Official Gazette of the RS" no. 66/20);

9. Regulations on technical norms for the protection of warehouses against fire and explosions (SL.list SFRJ No. 24/87
10. Rulebook on technical norms for low voltage electrical installations (SL.list SFRJ no. 53/86 and 54/88).
11.
12. Rulebook on technical norms for the protection of power plants and devices against fire ("Official Gazette of the SFRY" no. 74/90);
13. Rulebook on technical norms for the protection of low-voltage networks and associated transformer stations ("Official Gazette of SFRY" no. 13/78);
14. Rulebook on technical norms for the operation and maintenance of power plants ("Official Gazette of SFRY" no. 19/68);
15. Technical regulations on lightning rods ("Official Gazette of the SFRY" no. 13/68,13/78
16. Regulations on technical norms for ventilation and air conditioning systems of plants ("Official Gazette of the SFRY" No. 38/89

17. Rulebook on technical norms for the protection of tall buildings from fire ("Official Gazette of the SFRY" no. 7/84);
18. Rulebook on technical norms for the protection of warehouses against fire and explosions ("Official Gazette of the SFRY" no. 24/87);
19. Group of BAS standards with mandatory application

B/ DANGERS AND DAMAGE THAT MAY OCCUR WHEN USING WATER AND SEWAGE INSTALLATIONS

1. Improper selection of materials
2. Untested network under the required pressure
3. Method of protecting pipelines from corrosion and other influences
4. Improperly provided piping fittings
5. Method of intervention in case of installation splashing
6. Insufficient number of fire extinguishers

C/ MEASURES INTENDED FOR ELIMINATING DANGERS AND HARM WHEN USING THE INSTALLATION OF WATER PLUMBING AND SEWERAGE

1. The location of the building is in Gradiška. Access to the location in question is from Kosovka djevojke Street.
2. Water supply is provided from the existing

Ø 150mm water supply network.
3. The water supply installation will be chlorinated and tested before commissioning. The water quality will be at the level of drinking water, ie. it will be chemically and bacteriologically tested and correct for use
4. Dimensioning of the pipeline was carried out on the basis of hydraulic calculation
5. The water supply installation is separated from the sewerage and the passage through the sewer shafts is avoided
6. It is applied prescribed and tested water supply material in accordance with existing regulations and standards
7. The technical description envisages testing the water supply network before putting it into operation
8. Pipe insulation is provided in accordance with the standards for this type of work
9. Appropriate fittings are provided
10. In case of splashing of the installation, interventions should be carried out with the application of safety measures at work
11. Fecal and rain sewage from the building are connected to the existing mixed collector. The internal treatment of the installation is properly selected so that there is no possibility of leakage and contamination of the surrounding soil.
12. The sewage distribution was solved in accordance with the architectural project
13. When designing the sewage system, care was taken to properly dimension the network in accordance with the regulations and norms provided for this type of installation
14. When solving of the sewage system, care was taken to ensure a sufficient number of ventilation verticals
15. Audits and audit manholes are provided at all critical points so that intervention is possible.

16. The prescribed and already tested sewage material was applied in accordance with regulations and standards.
17. Prescribed drops have been adopted in accordance with current regulations.

This phase of the project deals with the installation of the internal hydrant network for the extension of the building in Gradiška. The
existing building is connected to the water supply and sewerage network, and for the needs of the extended part of the building, this is not necessary.

Hydrant network

To protect the built-up building in this location from fire, the project envisages the creation of an internal hydrant network. The traffic concept and layout of the buildings enable the access of the fire engine to the building itself, thus solving an important part of fire protection. The fire hydrant network was constructed according to the Rulebook on Technical Norms for the Fire Hydrant Network ("Official Gazette of the RS" No. 66/20) and the Law on Fire Protection ("Official Gazette of the RS" No. 94/19).
The network supply is from the existing Ø 150mm pipeline. Water consumption can be measured using a water meter located in the manhole.
For the internal hydrant network, it is planned to install one ZPHNO50 on the ground
floor. There are hydrants in the existing building on the first and second floors. For the internal hydrant network, galvanized metal pipes with an internal diameter of 52 mm are used, that is, a hydrant connection with the smallest internal diameter of Ø 52 mm, type C. The hydrant is placed in a visible and accessible place. The internal hydrant network is constantly under water pressure.
Internal fire protection is provided by means of an internal fire hydrant ZPHNO52, which is

mounted in a convenient and visibly accessible place. The hydrant cabinet is placed so that the valve of the internal hydrant is at a height of 1.50m from the floor, and the cabinet is marked with a hydrant mark (H).

When using an internal hydrant and associated equipment according to the BAS EN671-2 standard, the distance between the hydrants is determined so that the entire area to be protected is covered with a jet of water, taking into account that the length of the hose is 15m, and the length of the compact jet is 5m.
The hydrant is placed in a 50/50 sheet metal cabinet with a door and a lock. The cabinet is mounted in wall niches or on the wall. On the door must be written
in fluorescent color a capital letter,,H,,.In the cabinet there is a hydrant valve 52 mm F535S, a synthetic rubber hose Ø 52 mm, length 15 m with a brass nozzle 52/12 F462.

5. ELECTROPHASE TECHNICAL DESCRIPTION

The subject of this BID is the development of the main electrical installation project in the building, which represents the upgrade of the existing educational institution - Technical School Gradiška. The purpose of the object is the implementation of practical theoretical teaching.

The upgraded facility is powered by the GRO school, and each RT separately with a cable type PP-Y 4x10mm2. Electricity is measured in the MRO. The distribution system is TN-CS. Connect each of the three RTs with a P/F 16mm2 conductor to the ground potential from the branch of the grounding device. Install in the GRO the main load switch with a trigger that is controlled by the fire alarm control panel and shuts off the power supply to the entire facility in the event of a fire. A ROS 40A is installed in the GRO for each RT for protection and eventual maintenance. In RTs, install ZUDS 0.03 mA, as well as surge arresters, all according to the attached single-pole scheme.

Equalization of the potential (bathroom, house, apartment, business building) implies the galvanic
connection of all metal parts, which could come under voltage, to the grounding. It is necessary to connect plumbing and other metal installations (eg heating), bathtubs, boilers, water tanks, metal door and window frames, etc. Applying this additional protection measure prevents the occurrence of excessively high contact voltage if the insulation breaks. Equalization should be
performed via a special busbar. The potential equalization busbar is part of the grounding device.
It is a 25x4 mm copper strip installed in a standard box. This box is installed in the wall in the basement of the building or in the facade as close as possible to the house connection. All metal parts are connected to this busbar with a copper conductor with a minimum cross-section of 6 mm2.

INSTALLATION OF CONNECTORS AND OTHER CONSUMERS

Installation of single-phase and three-phase power sockets is foreseen. Installation is performed with cables
of the following type:
- PP-Y 3 x 2.5 mm2
- PP-Y 5 x 2.5 mm2
- PP-Y 5 x 6 mm2
- PP-Y 5 x 10 mm2.

The installation is mostly planned to be carried out in protective PVC pipes. The horizontal routing
of electrical installations is planned partly in cable racks, and partly in protective
pipes made of hard PVC material on the ceiling. Vertical guidance is carried out through installation
hard protective PVC pipes that are fixed directly to the panel wall or metal support. It is not allowed to run the installations diagonally. Each end of the laid cable must be single-wired mark with permanent marks for traceability in maintenance

Branching of cables should only be done in distribution boxes, and between two connection points the cable
must be in one piece. The type and section of power cables can be seen in the single-pole diagram. All cables must have a third and fifth protective yellow-green conductor. All sockets have
protective contacts of the Shuko type. Switches are placed at a height of 1.5 m from the finished floor.
General-purpose sockets are installed at a height of 0.4 m from the finished floor, unless otherwise
provided on the graphic attachment. In the wet node, use sockets with covers, which
must have a degree of protection IP X4 (according to JUS N.A5.070:1982).

INSTALLATION OF LIGHTING AND PANIC LIGHTING

Installation of lighting and panic lighting should be carried out with cable type:
• PP-Y 2 x 1.5 mm2,
• PP-Y 3 x 1.5 mm2,
• PP-Y 4 x 1.5 mm2 and
• PP-Y 5 2.5 mm2,
laid in PVC pipes with a diameter of 11 mm. Branching of cables must be done in distribution boxes and it is not allowed to extend cables outside them. Lighting is controlled by
lighting switches, contactors, FOREL and, if necessary, installation of alternating current switches.
In wet rooms, install lighting fixtures with a minimum degree of protection IP 44.

GROUNDING PLUG

According to JUS IEC 1024-1, the grounding element is an element or a set of elements that provide direct
contact with the ground by conducting the atmospheric discharge current into the ground. A Fe/Zn strip 25 x 4 mm is used as a grounding conductor
, which is laid at a depth of 0.8 m in the excavated trench. The trench is dug
at a distance of 1 m from the building to obtain a rectangular contour (see graphic attachment) or into
the foundation of the building.
In the attachment, the points of connection of the lightning protection installation with the grounding installation are marked with numbers . The underground joints of the grounding installation are
connected to the ground line by welding or by means of a cross piece "JUS N B4 936", where the joint must be filled
with bitumen to protect against moisture penetration. It is necessary to leave the required number of extracts from the tape
(brenta grounding, branch for GRO Brenta, branches for connecting gutters, roof covering and metal structure of the building).

SYSTEM FOR EQUALIZATION OF POTENTIAL

Potential equalization is foreseen by placing boxes for equalization of potential to which the metal elements of the building as well as mechanical installations will be attached. A central grounding busbar (CSU) is installed in the GRO . The GRO and the potential equalization system are connected to the CSU.
The CSU is connected to the grounding branch. From the main busbar for equalization of the potential, an earth wire (Fe/Zn strip 25 x 4 mm) leads to the grounding device (Fe/Zn strip 25 x 4 mm). As conductors for the main potential equalization, use copper conductors P/F 16 mm2 that connect the CSU to the potential equalization boxes (KIP). Connection between individual metal parts of the building with KIP is a yellow-green conductor of type P/F 4(6, 10) mm2.
After the potential equalization measure has been performed, it is necessary to measure the efficiency of the applied measure. By measuring the impedance between simultaneously accessible exposed conductive parts and foreign conductive parts , the following conditions must be met:

$Z \leq U_1/I_a$
U_1 – permissible contact voltage (50 V),
I_a – reaction current of the protective device.

FIRE ALARM INSTALLATIONS

To protect the building from fire, equipment was installed for automatic detection and alarming of fire occurrences in the entire area.
For this purpose, an addressable fire alarm control panel with 2 zones, expandable up to 20 zones, was selected, to which optical, thermal and manual detectors are connected. Manual detectors, optical and thermal detectors are connected in one zone. The external and internal sirens are in a different zone.
The central device - the PPZ fire control panel is mounted in such a way that it is easily accessible for servicing and operation.
A backup power supply as well as a telephone communicator with a voice message should be located next to the switchboard.
The central device includes: optical smoke detectors, manual detectors in red housing DMZ 1191, internal alarm siren, external alarm siren mounted on the building. Alarm notification is performed locally on sirens with the possibility of notification via PTT line to a professional fire department or a person in charge of safety and security at work in the facility and the owner.
The lines for connecting the central unit and the detector (other elements) are JEB-H(St)H E30 2x2x0.8 mm2, self-extinguishing cables, which for safety reasons should be placed in PVC pipes regardless of the way of installation. The installation between individual elements on the route must be carried out in one piece without extension. Connecting the element and the control unit to the installation must be carried out by the authorized service technician of the equipment supplier, as well as commissioning the system and issuing a corresponding certificate on the system's function for all.
The cable for disconnecting the main switch of the building in the GRO in the event of a fire is led from the fire alarm control panel . Provide an optical sensor in the GRO itself and connect it to the corresponding zone.
Next to each sensor on the ceiling, place a self-adhesive label of the required dimensions with the serial

number of the sensor and the zone that will be visible from the floor, all for the sake of easier maintenance. Provide
equipment that will support the expansion of the fire alarm system to the entire school, after the technical
acceptance of the object.

SYSTEM OF STRUCTURED COMPUTER-TELEPHONE NETWORK

The principles of structural cabling are defined by the standards ISO/IEC 11801, EN 50173, EIA/TIA
568B, whereby these standards take into account all the necessary elements for the realization of
multimedia communication systems of one object with the following types of services:

- Voice transmission ,
- Data transmission,
- Image transmission and
- Control signal transmission.

The essential advantage of this type of structural cabling is the use of a single cable
system for all installations that transmit any information in a bandwidth of up to
600 MHz. The only interface to the user is a wall socket with RJ-45 connectors, to which either a computer or a telephone can be
connected, which is further led through the cable system to the appropriate
distributor and active equipment.
The computer network connects to the RACK with the active computer network equipment in the cabinet on the first floor.
Connect the equipment using a CAT 6 cable, with appropriate terminations.

TECHNICAL REQUIREMENTS FOR ELECTRICAL INSTALLATION

General conditions

1. These technical conditions are an integral part of the electrical installation project and as such are
mandatory for the contractor.
2. All installations will be carried out in accordance with the attached plans, technical description,
estimate, these technical conditions and the Rulebook on technical standards for electricity.
low voltage installations ("Official Gazette of the FRY" no. 53/1988 and 54/1988).

3.1.2 Work and material requirements

1. All material used for this installation must be of first class quality and built according
to JUS standards (or IEC, for materials for which JUS has not been adopted).
2. All equipment is supplied complete for assembly and use, unless it is otherwise stated.

3. When performing the works, the contractor is obliged to take into account the already performed works on the building. If the work carried out during the installation of electrical installations
is damaged unnecessarily and due to carelessness and incompetence, the costs of the damage will be borne by the contractor of the electrical installation.

4. When placing cables or conductors in pipes, all conductors belonging to one
circuit must be placed in the same pipe, or cable.
5. Drilling and cutting of iron or reinforced concrete beams and columns must not be done without the knowledge and approval of the supervisory authority for these works.

6. Connecting conductors can only be done in junction boxes and cabinets.
7. Metal protective coverings of pipes and cables must not be used as return conductors nor as conductors for protective grounding.

8. Pipes or PVC hoses and cables of all types should be laid in a straight line vertically and horizontally. Curvilinear laying can be done exceptionally. When laying the pipes horizontally, they must have a slight slope towards the boxes or shafts. Inserts made of insulating material should be placed on the free pipes.
9. Pipes laid in the wall or floor must not be covered with material that would corrode them.
10. The placement of conductors and cables in pipes should be done so that the conductors can be pulled out without difficulty, except in special cases.
11. Placement of boxes is done at a distance of about 60 cm from the ceiling, or in accordance with the needs of the customer.

12. Conductors of different circuits can be placed through the same box.
13. Switches and fuses are placed only on phase conductors.
14. Only waterproof equipment can be installed in wet rooms.
15. Cables or conductors similar to cables should be fastened using clamps at a distance of
- 30 cm from a cross-section of 1.5 mm2
- 40 cm from a cross-section of 2.5 to 4 mm2
- 50 cm from a cross-section greater than 6 mm2

When passing through partition walls, pipes between wet and dry rooms should be laid in such a way that moisture cannot penetrate into their openings and water cannot collect. Pipes should be made of moisture-resistant material and be installed with a slope towards the wet room. When laying pipes through the outer wall of the building, treat the inner room as dry compared to the outer space.
17. When the lines pass through the wall between a dry and wet room, the lines must be terminated in dry rooms with accessories for wet rooms.
18. Continuation of conductors or their connection must not be done by twisting, but only with clamps.
19. The joining of different materials can only be done via a lead washer with a thickness of 2 mm.

Conditions for the disposition of equipment

1. When laying in parallel, lay horizontal lines as follows:
- at the top of the wall, telecommunication lines are laid,
- 10 cm below them, installation lines below 1000 V are laid.
2. Distribution boxes on parallel conductors are placed one at a time below the other at an angle of 45o. At the intersections that are made at right angles, the distance between the conductors must be at least 10 mm.
If this is not feasible , a 3 mm thick insulating insert is installed .
3. Parallel running of lines with smoke ducts or heating pipes should be avoided. If this is not possible, the lines should be placed at a distance of about 5 cm. When crossing lines with chimneys, etc. the distance between the lines should be at least 3 cm for the same reasons. Electric lines should be protected from heating with appropriate thermal insulation.

4. Install the lighting switches on the side of the door from which it opens.
Installation height from the floor 1.2 m. The height of plug boxes in residential premises is 40 cm, and in all others it should range from 50 - 120 cm.
5. Meter cabinets for measuring electricity consumption should be placed so that the meters are no lower than 60 cm and no higher than 220 cm. Place other switchboards according to the project,
that is, according to special operating or usage conditions and usual practice.

Test conditions

1. After making the installation, the contractor is obliged to measure the resistance of the installation and test
the protective grounding according to the JUS.N.B2 standard. 741 (point 5.1.3.4).
2. The insulation resistance between the installation conductor and earth must be at least 220 kΩ for each circuit when all switches are on and the equipment is installed without consumers. The resistance is measured with a megameter, with a voltage of 220 V. The measurement results are entered in the building log.

Special conditions

1. The project includes delivery of complete materials, transport, assembly,
masonry, painting and preparatory finishing works.
2. Before starting work, the contractor is obliged to check the project on site and to make the necessary corrections arising for any reason in cooperation with the supervisory authority. He is also
obliged to point out to the investor the necessary additions and possible more rational technical solutions.
Minor changes in the project can be made by the supervisory authority. For major changes, the designer's consent is required.
3. The prior
consent of the investor is required for the performance of unforeseen or increased planned works.
4. The contractor is obliged to remove all waste generated during the execution of these works from the construction site to a place designated by the supervisory authority.
5. For the correctness of the performed works, the contractor provides a guarantee period according to the terms of the contract.
6. The installation can be put into permanent operation only after a technical inspection and a permit for use.

Final Regulations

1. Regulations of these conditions that do not apply to the project will not be enforced.
2. Everything in the project that contradicts the standards and regulations will be canceled with the consent of the supervisory body.

TECHNICAL CONDITIONS FOR ASSEMBLY OF GROUNDING AND LIGHTNING PROTECTION INSTALLATIONS

General conditions

1. These technical conditions are part of the project and as such are mandatory for the contractor.
2. Grounding should be carried out according to the drawings, technical description, Rulebook on technical standards for grounding residential buildings..
3. The lightning protection installation should be carried out according to the blueprint, technical description, Rulebook on

technical norms for the protection of buildings against atmospheric discharge (Official Gazette of the FRY No. 11/96) and Yugoslav standards.

Requirements for work and material

1. All lightning conductors and grounding lines should be made from as long whole pieces as possible with as few joints as possible. To make the installation, lightning rod and grounding, use standard elements according to JUS N. B4. 900 hot-dip galvanized.
2. In the case of various bends, detours and breaks in lightning conductors, if the existence of the two closest points of these lines is less than 1/10 of the detour line, a bridge must be made between these points.
3. Distances between holders-supports of lightning conductors should be less than 1.3 m for receiving lines, 2 m for drains, and it decreases depending on the position and length of the lines.
4. Connections and branching of conductors should be made with standard connectors. At least two M-8 screws must be used for a 10 cm overlap length when connecting tape to tape.

5. The connection of the strips to the sheet can be done by soldering.
6. Making joints with screws should be avoided.
7. Different materials can be connected to each other only with the use of a lead insert with a thickness of at least 2 mm.
8. All connecting points and earth lines from the measuring point up to 30 cm below ground level should be protected from corrosion with a suitable coating - minium and oil paint. All connecting points in the ground should also be anti-corrosively protected - pouring with lead.
9. The lines should be laid or protected in such a way that they are not exposed to mechanical damage loads.
10. When laying the lines, you should take into account the consequences of the stretching of the lines due to temperature changes.

11. The position of the lines must be such that it allows an easy inspection of the installation and does not prevent the snow from sliding.
12. Places on the roof where the roof supports are connected - the supports must be carefully protected from leaks.
13. Connections must achieve a solid galvanic and mechanical connection. Special safety is required for hard-to-reach joints.
14. As a rule, connections should be made in easily accessible places.
15. Electrical equipment must be connected to the grounding device via the grounding screw built into the equipment itself.
16. The transient resistance of one grounding device may not exceed 20 ohms, unless other values are given for certain cases.

17. Grounding conductors may not be buried without the prior consent of the supervisory authority
18. During testing, the grounding device must be made of receiving and draining conductors.
19. After the construction of the grounding device, it is obligatory to measure the transient resistance of the grounding, the ground potential, the contact and step voltage. If illegal values are established (above the regulations), improve the grounding device in agreement with the designer.

Supervision

1. If necessary, the supervisory service can make minor changes to the project. For major changes, the designer's or investor's consent is required.
2. The contractor is obliged to point out to the investor all the necessary additions and changes to the works that
occur during the execution, because the incorrectness of the installation cannot be justified as a consequence of an error in the project.
3. All changes to the approved project must be entered by the contractor into the finished project, which
will be handed over to the investor after completion of the works.
4. The guarantee period for the performance of these works is determined by the performance contract.

Final regulations

1. Everything in the project that contradicts the standards and regulations will be canceled with the consent of the supervisory authority.

5. HEATING AND COOLING TECHNICAL DESCRIPTION

CALCULATION OF THERMOTECHNICAL CHARACTERISTICS

Calculation of thermotechnical characteristics was made on the basis of JUS U.J5.600. standards

CALCULATION OF TRANSMISSION AND VENTILATION HEAT LOSSES

The calculation of transmission and ventilation heat losses was made according to DIN 4701 and the ASHREA method, and the following parameters were adopted:

- external project temperature -20°C

- heating interruption 9-12 hours

- object is located in the zone of moderate winds

- the position of the object is normal

Internal project temperature is determined on the basis of the design task and conditions of the standard according to the purpose of the premises.

HEATING FACILITIES

Heating of the building is provided by the existing central hot water system with forced circulation. Radiators of appropriate sizes based on heat losses are provided as heating elements in the classrooms.

PIPE NETWORK

For the distribution of hot water from the boiler room to the main switchboards located in the corridor, steel seamless pipes of appropriate diameters and vertical lines are used through the

floors to the switchboards. An aeration pot is placed on top of each vertical line. Pipes are insulated with pipe insulation 13 mm thick. The supply of radiators from the distribution box in the corridor is separate for each radiator with insulated Pex-AL-Pex pipes 16x2mm with insulation.

SYSTEM VENTING

In order to remove air from the installations, a manual vent valve is placed on each heating element, automatic vent valves are installed in each distribution box and each vertical line has vent containers.

TESTING OF INSTALLATIONS

After the installation of the pipe network and heating elements is completed, the entire installation is subjected to cleaning and testing for tightness.

COMMISSIONING

After completion of assembly and connection to the heat source, a warm test is performed and all malfunctions are eliminated, regulation and adjustment are performed, and the system is brought to full functionality.

BOILER ROOM

The system is connected to an already existing boiler room, which is not the subject of this BID.

1. GENERAL, TECHNICAL CONDITIONS for performing works on central heating installations.

1.1 The offered price for the delivery and installation of the installation or some of its parts includes the delivery and installation of the associated material and structural elements with transport to the construction site, unloading and storage at the construction site, as well as transport from the warehouse to the installation site, if in the description of the works, or the pre-measurement is not otherwise regulated.

1.2 If it is not stated otherwise in the bill of quantities, the contractor must deliver new materials and structural elements that correspond to JUS, or in the absence of these, to DIN regulations.

1.3 All material and structural elements that are installed must be tested by an official material testing center and be acknowledged and verified for their purpose.

1.4 All parts of the installation must be designed so that it is possible to perform economically justified additional insulation. The regulations of DIN 14421 apply in all respects to the installation of thermal insulation.

1.5 Installation of steel pipes, unless otherwise stated in the plan or description, must correspond to the regulations of JUS C B5. 221 or DIN 2440 and DIN 2448.

1.6 Assembly of pipelines should be done by welding, and connection of pipes with assemblies should be done with threaded joints or other flanged joints defined by the relevant regulations.

Also follow the regulations when using sealing elements for joints.

1.7 When installing the pipeline, it must be installed with the required slope, and secured and attached with clamps, hangers made of flat iron or suitable consoles. The distance between individual supports must be such as to ensure the continuity of the pipeline.

1.8 The installed pipeline must have the possibility of proper stretching without harmful resistance, i.e. it must not lead to tearing or damage to the pipeline or elements for carrying the pipeline, nor building elements. All fixed points (immovable supports) must be of high quality, so that the pipeline cannot move in those places. On all pipe passages through walls and between floor structures install pipe sleeves. Install rosettes at the points of their penetration. All connections with heating elements (valves, hollanders) must be accessible.

1.9 Fittings for closing pipelines and all instruments for measurement and regulation must correspond to the relevant standards. The material and construction of the fitting must correspond to its purpose (type of energy carrier, pressure, temperature, etc.
1.10 The installation of central heating must be carried out according to the attached project documentation, that is, according to JUS, DIN and VDI standards. All possible deviations from the mentioned are allowed only with the written consent.

1.11 The contractor is obliged to draw attention to the preparatory works of other contractors, which precede his works, in a timely manner and before the start of the works. The deadlines for the completion of these works must be determined in advance. The contractor is obliged to provide timely data on the load on the building elements, that is, on the weight and size of the elements that will be mounted, which could lead to disruption of the stability of the construction part of the building. Also, the contractor must make all openings in the building structures only in agreement with supervisor and with his approval.

1.12 The contractor is obliged, to carry out his works in such a way that he does not delay the execution of other works on the building.

1.13 The supervisor is obliged to ensure the conditions for the normal work of the central heating contractor, i.e. to introduce the contractor into the work when the degree of completion of other works on the building allows it.

1.14 Upon completion of installation, the contractor is obliged to inspect them immediately, before closing the openings, holes, slits, and before installing the insulation, i.e. painting.
If possible, it is necessary to immediately carry out a warm test, and check whether the installation behaves correctly, ie. whether it is impervious, and whether all the heating bodies are heating and whether the pipeline can expand unhindered.

1.15 Upon completion of the assembly work, the contractor must ensure the even distribution of heat in all parts of the installation. The final regulation should be carried out during the period of operation of the installation, i.e. during the heating period.

1.16 The contractor is obliged to do and deliver to the customer:
- all instructions for operating the installation, which are necessary for the safe and economical operation of the installation
- installation blueprints, with a description of the works for everything that is not visible from the installation

1.17 At the request of the supervisor, the contractor is obliged to measure the installation.
In doing so, the following should be fulfilled:
-trial measurement to be carried out after 4 months of operation of the installation
- measure the internal temperature in the middle of the closed room at a height of 1.5m from the floor with a thermometer with the possibility of reading 0.5C.

2. CONTRACT TERMS

2.1 When assigning the works in question, the investor is obliged to comply with the valid regulations on the assignment of investment works.

2.2 When performing the works in question, the investor and the contractor are obliged to comply with the regulations on the construction of investment facilities.

2.3 After the work is completed, a technical inspection and acceptance of the works will be carried out, according to the provisions of the Rulebook on technical inspection and acceptance of the completed building and works.
2.4 Upon completion of the technical inspection and acceptance of the executed works, the inspection will be carried out, i.e. after the expiration of the warranty period (which cannot be less than one year), the qualitative acceptance of the executed works will be carried out, and according to the provisions of the Regulations on inspection and super inspection of the constructed buildings and works.

2.5 All works that are not explicitly mentioned in the description of the works, nor in the estimate, but which are considered contracted even without this, and must be performed without the right to payment, and within the works that are explicitly named, affected and contracted, are called secondary works.

2.6 Secondary works are the following:
- measurements that are necessary for the execution and calculation of the contracted works, including the provision of the necessary measuring instruments and workforce.
- water and electricity supply from the distribution point on the construction site (provided by the investor) to the contractor's workplace.
- provision of the necessary tools and furniture for the contractor's workers.
- transfer of materials and installation elements from the warehouse on the construction site to the place of
installation, as well as possible transfer back to the warehouse, even in the case when the same is provided by the investor.

- provision of hygienic conditions in the premises used by the contractor's workers
(such as cleaning, heating, etc.)
- removal of all impurities and waste resulting from the performance of related works.
- protection of the performed works and materials taken over by the contractor, until handing over
to the investor.
- security and protective measures according to the existing regulations of hygienic and technical
protection.
- provision of scaffolding with a working platform up to 2m and all auxiliary equipment

(belts, helmets, ropes, ladders, etc.)
- marking pipelines, openings in walls, etc. For the purpose of carrying out construction works, even if they are carried out by another company.
- cold and warm trial of the installation, and giving instructions for handling the installation, as well as providing a blueprint of the completed installation.
- removal and re-adjustment of the heating elements in order to paint them, and a cold test after performing these works.

2.7 Side works do not include:
- thermal insulation of pipelines, devices and appliances.
- works on punching holes and opening slits, as well as closing them.
- measurement of the operation of the installation.
- training of the customer's personnel.

2.8 If the contract regulates a single price for the completed work, it will be measured and calculated as follows:
- pipelines, including arches (which are measured over the outer edge of the uninsulated arch), per meter due according to type and dimension. In doing so, the lengths of all pipeline closing bodies, regulatory bodies and condensate separators are taken into account, if they are threaded. Bodies with flanged joints are not measured.
- elements for attaching pipes, materials for connecting and strengthening the pipe network, material for welding, sealing and all other auxiliary consumables required for assembly are calculated as a percentage of the value of the installed pipes.
- supplied heating elements by m2, type and dimensions
- fittings for closing and regulation by piece, type and dimensions
- thermal insulation per m2, according to the type and thickness of the insulation.

3. GENERAL CONDITIONS OF INSTALLATION

3.1 After the introduction into the work, the central heating contractor is obliged to perform the work according to this BID and Main Design and according to the established dynamics of building the building.

3.2 The delivered material and equipment, in addition to meeting the previous conditions, must be inspected and trimmed before installation, and properly protected from physical and chemical influences.

3.3 The placement of heating elements must meet the applicable regulations (distance from the floor and wall according to DIN 1703). The consoles, legs and holders must be mounted as prescribed so that the heating element is in a stable position. The heating element must be placed so that the conditions of the project solution are met methods of removing air from the system.

3.4 The position of the heating body in relation to the pipe network must be such that the fittings around the heating body are accessible.
3.5 The distance of the heating element from the vertical pipe network must be such as to allow unhindered thermal dilatation of the vertical or horizontal pipe network. If the construction solution of the building allows, and if it is not defined by the project documentation, the heating element should be at least 300 mm away from the vertical distribution network.

3.6 The connection of the heating elements with the pipe network must be made with a threaded connection (dissolvable Hollander connection), and the sealing of the connections must be done according to current regulations with tow, sealing tape, etc.

3.7 Installation of fittings on heating bodies (radiator valve, screw-hollander, vent and drain tap) must correspond to their purpose and be accessible for manipulation.

3.8 If the documentation does not specifically specify, the pipeline must be separated from the walls or building elements by a minimum of 10 cm (if it is not insulated) in order to enable painting of the pipeline and building elements.

3.9 When installing pipelines, it is necessary to use the pipe segments, bends defined by the project and regulations. If bends for pipelines below NO 25 are not specifically emphasized, they are made by bending the pipeline at the installation site (hot or cold bending).

3.10 Interconnection of pipelines (forking, branching, T-pieces, etc.) must be carried out in such a way as not to reduce the profile of the pipelines.

3.11 All waste material at the connection points (whether the connection was made by welding, soldering, screw or flange connection) must be carefully removed, thus ensuring the cleanliness of the pipeline from the inside, and the aesthetic appearance of the connections from the outside.

3.12 All consoles, holders and supports of the pipeline must correspond to their purpose, their shape and appearance must not dictate the function or the aesthetic appearance of the object. If not specifically defined in the project documentation, the built-in consoles, holders and supports, in addition to ensuring the continuity of the pipeline, must ensure unhindered thermal dilatations. All these elements must be properly protected and painted (an integral part of the pipeline).

3.13 All fittings and devices placed on the distribution pipeline must be accessible for manipulation, as well as for eventual replacement.

3.14 Built-in heating elements, pipe network, fittings and equipment must not, by their bad position, call into question the functionality of the construction solution of the building. The installation of central heating must not prevent the installation and functionality of the building assemblies and elements provided for in the project (open doors, windows and access to sinks, bathtubs, etc.).

Technical High School Gradiska
Position of the new school extension building with classrooms
Kosovke djevojke
Kosovke djevojke
Google Earth
Image © 2022 CNES / Airbus

At these locations, connections will be made between the existing school building and the new one