

CONTENT OF MAIN DESIGN OF WATER SUPPLY AND SEWERAGE

GENERAL DOCUMENTATION

TERMS OF REFERENCE

TEXTUAL DOCUMENTATION

- Technical description
- General technical conditions for performing work
- Recapitulation of the bill of quantities

NUMERICAL DOCUMENTATION

- Bill of quantities

GRAPHICAL DOCUMENTATION

- Attachment 1 Layout – existing plan, R 1:50
- Attachment 2.1 Layout – newly designed plan (sewer installations), R 1:50
- Attachment 2.2 Layout – newly designed plan (water installations), R 1:50
- Attachment 3 Axonometric scheme of water installations, R 1:50



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GENERAL DOCUMENTATION

Note: General documentation for all Main design is enclosed in book 0.



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TEXTUAL DOCUMENTATION

- **Technical description**
- **General technical conditions for performing work**
- **Recapitulation of the bill of quantities**



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TEHNIICAL DESCRIPTION

INVESTOR:	Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy
FACILITY:	Secondary school of Electrical Engineering "Vaso Aligrudić" Podgorica
DESIGN:	WATER SUPPLY AND SEWERAGE DESIGN
LOCATION:	C.P. 1193 C.M. Podgorica I
PLACE OF CONSTRUCTION:	Municipality of Podgorica

GENERAL INFORMATION ABOUT THE FACILITY

The building of the "Vaso Aligrudić" high school of electrical engineering is located at kp. 1193 KO Podgorica I. This project dealt with the adaptation of part of the building. The other part of the building belongs to another educational institution.

DESIGN BASES

The following documentation was used as the basis for the project:

- architectural - building bases
- Terms of reference

LEGISLTATION

- Law on Spatial Planning and Construction of Structures ("Official Gazette of the Montenegro", No. 064/17 of 06.10.2017, 044/18 of 06.07.2018, 063/18 of 28.09.2018)
- Law on Geological Research;
- Law on Protection and Rescue;
- Law on Electronic Communications;
- Ordinance on measures for protection against natural disasters;
- Law on Occupational Safety ("Official Gazette of the Montenegro", No.. 79/04, 26/10 and 73/10.)
- Law on Amendments to the Law on Occupational Safety ("Official Gazette of the Montenegro", No. 04/10.)

- Ordinance on the method of preparation, scale and more detailed content of technical documentation for the construction of the facility ("Official Gazette of the Montenegro", No. 044/18 of 06.07.2018.)
- Other relevant legislation.

A: WATER SUPPLY

During the tour of the facility, it was not possible to determine from which position the sanitary devices in the facility are currently supplied. For this reason, connections are provided at the position of the existing hydrants in the building.

Note: After the start of construction works and the dismantling of the existing sanitary facilities, it is necessary to determine the factual situation (position of the supply pipe, etc.), and to harmonize the distribution of water installations with the actual situation on the ground.

The distribution network for sanitary elements, which is installed in the floors and in the walls, will be made of polypropylene pipes PPR and profiled pieces for 20 rods that are joined by welding (delivery of materials with appropriate certificates according to the project). Pipe diameters, which are determined by hydraulic calculation, are given in the graphic attachments as outer diameters. The table shows the outer diameters of PPR pipes and their corresponding inner diameters:

Outer diameter	Inner diameter
DN 20	1/2"
DN 25	3/4"
DN 32	1"

On the branches for sanitary blocks and some taps, permeation valves, with a nickel-plated plug and rosette, are provided for sanitary cold water. Install the valves in visible and easily accessible places, as suggested in the graphic attachments. All newly designed water pipes are coated with 4 mm thick insulation.

The installation of a hot water boiler with a volume of 50 liters is planned in the bathroom.

The internal water supply network will be installed partially in the wall, in special slots, with the necessary insulation, above which tiles or plaster will come, partially in the floor with the same prescribed thermal protection. In places where water and sewage pipes overlap, water pipes are placed above sewage pipes.

The examination of the internal water supply network will be carried out according to the regulations for that type of work. The network will be put under a pressure of at least 12 bar and the deviation, i.e. pressure drop, will be observed after 24 hours. Any deviation greater than 10% means that the net is not installed correctly. The test is carried out before the sanitary devices are installed. After installing the sanitary devices, flushing will be carried out, followed by disinfection of the network and rinsing again. The appropriate authorized institution should provide the Investor with a certificate on the quality of the water that will be used in the facility after all the described procedures. For all pressure, disinfection and rinsing tests, the Contractor and the Supervisory Authority are obliged to draw up reports.

B: USED WATER SEWERAGE

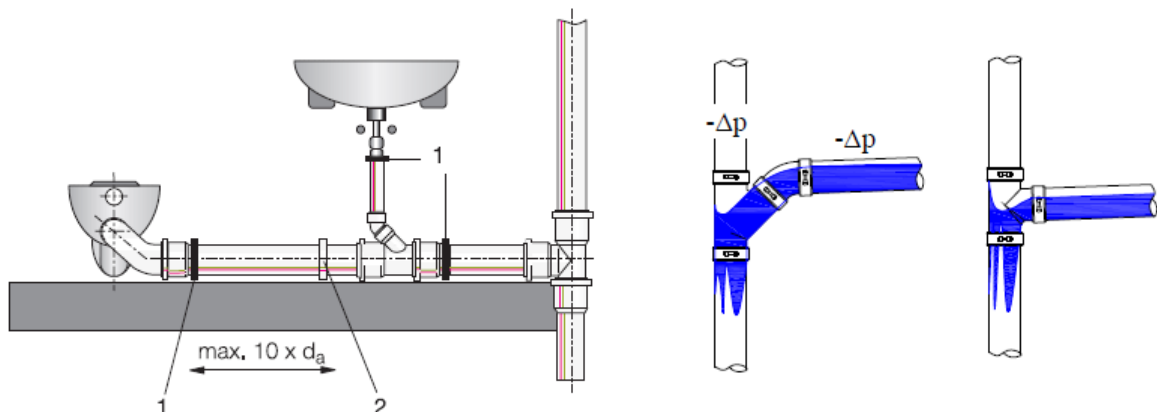
FECAL WATER DRAINAGE FROM WET NODES IN THE FACILITY

During the tour of the facility, it was not possible to determine the position of the existing sewer lines in the facility.

Note: After the start of the construction works and the dismantling of the existing sanitary facilities, it is necessary to determine the factual situation (the positions of the sewerage verticals), and to adjust the distribution of the sewage installations to the actual situation on the ground.

The used water is collected by horizontal distributions, and then the water is drained from the point of connection to the existing drain.

When connecting horizontal lines to vertical lines, the rules from "European Standard EN12056, Appendix 2000, 2002" were followed. According to those standards, the horizontal line is connected to the vertical line at an angle of 87°-88.5°.





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The technical solutions for guiding the installations through the building are harmonized with the architectural and construction project. When solving the horizontal sewerage network, care was taken to provide the optimal solution, with the shortest possible separations, in order to ensure the efficient drainage of waste water to the connection. All pipes in the facility should be installed with a minimum slope of 1.0%.

The horizontal and vertical internal sewer distribution is designed from PP sewer pipes with profiles from D50 to D110mm, laid in the floor, ceiling or wall. All pipes are designed from low-noise PP pipes.

Fasten the verticals and distribution with steel clamps with a rubber insert for less noise. Isolate sewage penetrations through the panels with sound isolators or specially designed pieces, all according to the manufacturer's instructions.

C: SANITARY ELEMENTS AND GALANTRY

The project envisages the dismantling of all existing sanitary facilities (toilet and sink).

The selection of sanitary equipment and haberdashery will be carried out according to the proposal of the Architectural Designer and the Investor.

Responsible engineer:

Aleksandar Pot, Spec. Sci. građ.



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TECHNICAL CONDITIONS FOR PERFORMANCE OF INTERNAL INSTALLATIONS

In order to ensure good installation according to the project, its flawless functioning and good maintenance, the contractor must adhere to the technical conditions that are attached as a mandatory component of the project documentation. These conditions regulate matter that is not specified by the project itself, JUS, EN standard, GN standards or other regulations.

1. PRELIMINARY MEASURES

The Contractor is obliged to adhere to the approved project in everything. Before starting work, he is obliged to compare the installation project with the actual situation on the construction site and remove any ambiguities with the supervisory body. Before each possible change, the contractor is obliged to inform the supervisory body in a timely manner and consult with the designer. The contractor for the subject installations is obliged to correctly cooperate with other contractors on the facility during the construction in accordance with the agreed dynamics.

2. LAYING LINES

When creating a sewerage network, it is necessary to first make the connection to the street canal, then the foundation network, and finally vertical lines with branches.

All horizontal water supply lines are laid in a slope towards the lowest outlet. Changing the direction of the pipe will be performed by the arches and not the elbows. Pipes must not run through the walls obliquely but perpendicular to the wall surface.

3. PIPES IN STRUCTURES

Firm construction of pipes in walls and other constructions is not allowed. The openings for the passage of pipes through the structures must be large enough, and the space between the pipes and the structures filled with plastic material, to prevent damage to the pipes. When passing through the structural walls, the water pipes will be protected by a protective pipe, whose diameter is 40 mm larger than the outer diameter of the water pipe, and the interspace will be filled with a permanently elastic putty.

When passing through the walls, the sewer pipes must not be firmly installed, but the space between it and the wall must be filled with permanently elastic putty.



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Any unforeseen dents, penetrations, cracks in walls and other structures can be performed only with the prior permission of the supervisory authority.

4. PIPE PROTECTION

Water pipes must not pass through the walls of chimneys, ventilation ducts, through ducts, that is, nowhere where they may be exposed to pollution, freezing, heating, and corrosion.

Pipes must be thermally insulated in places where they are exposed to freezing. The insulation must be done carefully and the lines must not be closed, buried before they are inspected by the supervisory authority. The same goes for sound insulation.

During the execution of works on the installations in question, during the suspension of work, the pipes must be temporarily blocked in a suitable manner, so as not to contaminate, fill with material or damage.

5. JOINTS

The connection of pipes or fittings must be performed professionally and carefully according to the prescribed norms and standards for this position. When connecting, the inner diameter of the pipe must not be narrowed by the ends, parts of the armature, hemp or in any other way, nor deformed by bending the pipe.

Plastic pipes are joined by gluing or rubber rings. Joining pipes through wall penetrations and in other constructions must be avoided.

6. PIPE ATTACHMENT

Lines can be attached to walls and ceilings with clamps, ie hangers, at intervals depending on the diameter and type of pipe. Lead and plastic pipes in warm spaces should be on a solid surface along their entire length.

7. FITTINGS

The installation of previously inspected fittings must be reported precisely, taking into account the good and easy handling and on the aesthetic appearance.

Drains, mixers and other fittings that are handled must be attached to the walls using wall tiles on the corners.

8. SANITARY APPLIANCES

The installation of sanitary devices must be performed neatly, cleanly and precisely, taking into account the good functionality and aesthetic appearance of the whole. They

are fastened with plastic or metal brackets. Cantilevered devices should withstand a load of 981N in the most unfavorable place.

Height of installation of sanitary devices, unless otherwise stated in the description of works, measured from finished floors are:

- Washbasin, front edge ----- 80cm
- Shelf-Shelf ----- 125cm
- Mirror, to the middle ----- 155cm
- Towel holder ----- 75cm
- Wall faucet ----- 110cm
- High-prefabricated cistern, bottom ----- 200cm
- Toilet paper holder ----- 80cm
- Toilet bowl wall, front edge ----- 65cm

9. INSTALLATION TESTING

The water pipe network, unless otherwise specified by regulations, is placed under a test pressure at least twice the working pressure for 30 minutes.

The test procedure is as follows:

All openings on the pipe network are closed with plugs, so a pressure pump and a manometer are mounted on it. After filling the network as well as the accompanying air discharge, the water pump compresses the water to the prescribed test pressure. In case the hand on the manometer drops, it is necessary to visually inspect the entire network, and to find a fault. It is often difficult to visually detect the place of failure, which is manifested by sweating and dew on the pipes, so various methods are used, including palpation with the hands. After troubleshooting, re-testing is performed until correctness is established. When the correctness is determined, the water is discharged from the network.

Before use, it is necessary to perform a bacteriological analysis of water to determine its correctness. In case the analysis gives a negative result, chlorine-chlorination disinfection is performed by an authorized organization. In this particular case, the dose of chlorine is prescribed by an authorized representative of the sanitary service who is fully responsible for the disinfection procedure, the possible consequences of the procedure itself and for safety disinfection workers. After the chlorination procedure, rinsing with clean drinking water is started until clean drinking water with a tolerable chlorine concentration is obtained.

A record must be kept of the chlorination performed, which certifies the person under whose control it was performed pipeline disinfection.



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Testing of the sewerage network in whole or in part is performed as follows:

Sewer testing is performed under a pressure of at least 0.3 bar. Testing of the lower drainage network should be performed before the trenches are backfilled. The test is reduced to the control of the projected slope of the channel and the tightness of the pipe connection. The slope is controlled by a level or straightener and a spirit level. In order to test the tightness of the pipe connection, it is necessary to fill the system with water by first plugging the channel at the lowest part. In the event of a water leak, the seal must be resealed and then the test repeated. Only after that is the backfilling of the trench started.

Testing of installations is performed in the presence of the supervisory body, and the contractor, about which minutes are kept. Testing is performed at the expense of the contractor.

ANNEX ON SAFETY AT WORK

1. General obligations

- The contractor is obliged to make a special study on the arrangement of the construction site and work on the construction site.
- The manufacturer of tools with mechanized drive is obliged to submit instructions for safe work and to confirm on the tool that the prescribed measures and norms of safety at work have been applied, ie to submit a certificate on applied safety regulations at work with the tool.
- The contractor is obliged to inform the competent labor inspection body about the start of work for 8 (eight) days before the works.
- The contractor is obliged to draft normative acts in the field of occupational safety (Ordinance on occupational safety, Ordinance on inspections, testing and maintenance of tools, devices and tools for work, etc.).
- The contractor is obliged to train workers in the matter of safety at work and to acquaint workers with working conditions, dangers and harms related to work and to check the ability of workers for independent and safe work.
- The contractor is obliged to determine jobs with special conditions, if such jobs places exist.

- When procuring tools and devices, along with the documentation that accompanies the tools and devices, data on their acoustic properties must be obtained, from which it will be seen that the noise at workplaces will not exceed the permitted values.

1.1. Special safety measures at work

The safety of workers during movement during work and transportation is achieved by securing the trenches by digging and night lighting of the construction site. Substances that can be considered harmful and dangerous are not used during the works on the pipelines.

Excavation of the soil to a depth of 100 cm (for foundations, sewers, etc.) can be done without digging, if the strength of the soil allows it. Excavation of the soil to a depth of more than 100 cm may be carried out only with the gradual securing of the sides of the excavation.

Expanding the sides of the excavation is not necessary if the sides are made at an angle of internal friction of the soil (natural slope of the terrain) in which the excavation is carried out, or when digging to a depth of 200 cm and with an angle of 60°.

Trenches and channels must be constructed in such a width that enables uninterrupted work on spreading the sides, as well as the work of workers in them.

The minimum width of trenches or channels with a depth of 100 cm is determined freely. At a depth of more than 100 cm, the width of the trench or channel must be such that the clear width of the trench or channel after the opening is at least 60 cm.

Wood and other material used during excavation for digging the sides of trenches and channels must, in terms of their strength and dimensions, correspond to the purpose for which they are intended in accordance with the applicable technical regulations, ie Yugoslav standards.

The excavation of trenches and channels must correspond to the geomechanical characteristics and soil pressure in which the excavation is performed, as well as to the appropriate static calculation.

Excavated material from trenches and canals must be discarded at such a distance from the edge of the excavation that there is no possibility of that material collapsing into the excavation. The distance between the individual formwork elements and the excavation side must be determined in such a way as to prevent the soil from falling off, in accordance with the soil properties.



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Formwork to support the sides of the excavation (trench, channel, pit) must protrude at least 20 cm above the edges of the excavation, to prevent the material from falling from the ground into the excavation.

When manually removing soil from the excavation, for depths over 100 cm, intermediate floors laid on special supports must be used. Intermediate floors must not be loaded with more than the amount of excavated material, which the worker must be familiar with before starting work and must have edge protection at least 20 cm high.

The formwork must be removed and the excavation backfilled must be carried out according to the instructions and under the supervision of an expert. If the removal of the payment could endanger the safety of the workers, the payment must be left in the excavation.

The means for connecting and securing the support parts, such as wedges, fittings, screws, nails, wires, etc., must comply with the applicable domestic standards.

If excavation of land for a new facility is carried out to a depth greater than the depth of the foundation of the existing facility, such work must be performed according to a special project, with the provision of safety measures at work and measures to secure the neighboring facility.

The stability of the machine must be taken into account during machine excavation. When digging, the excavated earth should be placed at a distance that does not endanger the stability of the excavation sides. Excavation edges may only be loaded with machinery or other heavy equipment if anti-collapse measures have been taken due to such loads.

If pipes, lines, etc. are laid in the trenches and channels of the unexpanded sides of the excavation, in places where the access of workers to the bottom of the excavation is necessary in order to perform the necessary works on those pipes, lines, etc. the sides of the trench or channel must, at the required length, be secured against collapsing by breaking up.



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QUALITY CONTROL AND ASSURANCE PROGRAM

In order to implement the Program of control and assurance of the quality of materials and the execution of works provided for in the project, the contractor must fully respect:

- Law on Spatial Planning and Building Construction (Official Gazette of Montenegro, no. 064/17 of 06.10.2017 and 044/18 of 06.07.2018)

In order to ensure the quality of materials and performed works, the contractor must familiarize his subcontractors with all provisions of this Program, general and special conditions of costs, and all technical details contained in the main project.

The basic requirement, which is prescribed by this Program, is the obligation to install materials, assemblies and equipment, which has a technical permit according to the Law on Spatial Planning and Construction of Buildings, a certificate or declaration of compliance, and corresponds to the mentioned technical regulations and norms.

Tests will be carried out for the elements of the facility, which are important for achieving essential characteristics, when this is prescribed by special regulations.

GENERAL TERMS

Installation is carried out on the basis of the project. An integral part of the project are:

- all attached drawings
- technical description
- general and technical conditions

These technical conditions are supplements and explanations for this type of installation, and as such, are an integral part of the project, and therefore mandatory for the contractor.

The installation must be carried out according to the graphic attachments, technical description, and valid regulations and technical rules of the profession. The project must be certified in accordance with the Law on Spatial Planning and Building Construction.

The contract for the execution of installations is concluded on the basis of an offer. In the bid prices, the contractor is obliged to offer the execution of the complete installation, according to the description of the preliminary measurements, drawings, technical description and these conditions.

The price of the offer should include all the work and material for the installation as well as the necessary tests.

Upon completion of the installation, the contractor is obliged to submit to the investor the project of the actually executed installation for the purposes of maintenance of the building, if during the execution there are changes in relation to the designed solution.

Before the start of the works and the procurement of all materials, the contractor is obliged to inspect the location and the project and to warn the investor of any deviations of the project from the actual situation. If, during the project review, the contractor finds that part of



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the project is not suitable or considers that the project will not be functionally satisfactory, he is obliged to warn the expert supervision in writing.

If expert supervision assesses that the contractor's objections are justified, it will order the investor to amend the main project and revise it and inform the competent inspection body.

Changing the project by the contractor without the written approval of the supervisor and the investor is not allowed. The investor is recommended to consult the designer for each change, because in the event that the investor and the contractor make changes to the project, the designer will not be held responsible for the proper functioning of the installed installation.

During the execution of the works, the contractor is obliged to keep a construction diary in which he writes the start of the works and writes the work performed every day. In the construction diary, the supervising engineer writes all comments on the execution of the installations, as well as any possible changes in the project.

After completing the installation of the plumbing installation, it is necessary to test the installation under a pressure of 12 bar, to test the drainage installation for function and tightness. The test should be performed in the presence of the supervising engineer, who signs the test report. Only after the test has been successfully completed can the channel be closed.

After the completion of the building, i.e. immediately when the construction conditions allow, perform a re-test of the complete installation, after that perform disinfection of the water supply installation.

The contractor provides a warranty period for his works. The warranty period starts from the day of the final report of the professional supervision for the installations, that is, from the day the installation is handed over for use by the investor.

During the warranty period, the contractor is obliged, at the request of the investor, to remove in the shortest possible time any defect in the installation that was caused by the use of low-quality material or caused by unsound assembly. Parts subject to normal wear and tear in operation, such as seals and the like, are excluded from the warranty. If the contractor does not respond to the invitation and does not remove the defects within a certain period, the investor can have the defects removed at the expense of the contractor.

After the expiration of the warranty period, the investor maintains a super-colaudation and disposes of the warranty contractor. If the investor does not maintain the super approval within the specified period, the guarantee period is automatically terminated.

Before ordering materials from the supplier and delivering the materials to the building, the contractor is obliged to check the quantities according to the specification in the offer and shown in the drawings, as well as the necessary control and measurement of the constructed state of the building in relation to the designed state.



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TECHNICAL CONDITIONS

Before preparing the offer, the contractor should carefully review the technical documentation, familiarize himself with the current situation, and request all explanations, if necessary, from the designer and investor.

In this sense, the bid items for equipment, materials and works specified in this project must contain all procurement of materials with precisely specified types and types of equipment, etc., as well as all necessary transportation, transfer around the construction site and installation to the final product, so that they are of the bidder, all quantities were checked and corrected as necessary.

The contractor is obliged to comply with all conditions from this project, valid regulations and standards for the installation of water supply and sewerage.

Arbitrary changes to the project, contracted equipment and materials are not allowed without the approval of the designer and the authorized representative of the investor.

All material used in the construction of water installations, sanitary devices and sewerage in terms of quality and technical solution must correspond exactly to the existing regulations for this profession, as well as to the description in the bill of quantities and the conditions of the competent utility companies. Material and equipment must have appropriate certificates according to valid standards. If the contractor uses material that does not meet the quality of the required technical norms and standards, it must be removed at the request of the supervising engineer.

All works must be carried out exactly according to the drawings and description, and according to the instructions of the designer and supervising engineer. All installation must be done professionally and with high quality.

Work on the installations can be started only after the project has been reviewed and confirmed by the competent authorities and after the contractor has been introduced to the work according to the installation project.

The cold and hot water lines must be made of the first-class material specified in the preliminary measurements and technical description.

The necessary thermal insulation must be carried out for all lines. The pressure test of the water supply system must be performed after the final installation of the pipeline. If after a 12-hour test the installation does not fail anywhere, it is considered correct.

Test the sewerage installation for function and tightness.

All tests must be attended by a supervising engineer.

Installations should be checked:

- do they work without noises and knocks
- whether the installation is leak-proof even at operating temperatures

- is the hot water circulation correct?
- whether the valves and control switches work correctly and can be adjusted easily
- do the control switches work according to the required design parameters (hydro stations)
- do all the control instruments show the correct data
- are there nameplates on all the basic elements of the plant with instructions on functioning and handling

Backfilling and closing of pipelines in trenches, floors, floor channels and wall cuts can only be carried out after a successful test has been carried out and the continuation of the work has been permitted in the minutes.

After the completion of the works, and before starting to use the building, it is necessary to disinfect the water installation.

Sanitary items and associated fittings must be protected from mechanical damage immediately after installation.

TESTS THAT NEED TO BE PERFORMED AND CERTIFICATES THAT NEED TO BE ATTACHED

The tested and completed installation must function in such a way as to ensure the fulfillment of the essential requirements placed on the building in particular:

- not be a transmitter or a source of fire;
- does not harm people's hygiene and health;
- is not a source or transmitter of noise;
- does not affect people's health, and does not pollute any work or other environment;
- does not impair the safety of the building and users.

To meet the expected requirements, the Installations should be checked:

- do they work without noises and knocks
- whether the installation is leak-proof even at operating temperatures
- is the hot water circulation correct?
- whether the valves and regulators work properly and can be adjusted easily
- do the control switches work according to the required design parameters (hydro stations)
- do all the control instruments show the correct data
- are there nameplates on all the basic elements of the plant with instructions on functioning and handling

Regarding the performed tests and their results, it is necessary to attach certificates, test protocols and achieved results, namely:

- Certificate of functional test and proof of impermeability of sewage installation
- Certificate on pressure water installation testing
- Certificate of completed disinfection and flushing of the water supply network



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- Drinking water quality test certificate and proof of sanitary suitability for drinking water
- Certificate on pressure testing and functional testing of hydrant network installations
- Certificates of installed equipment, plants and materials
- Proof of the achieved plant capacity

MEASUREMENTS AND CONTROL REVIEW

All devices should be checked and functionally tested at least once a year.

The control of devices and equipment such as measuring devices, pressure regulators, filters and the like is carried out several times a year, according to the need and technical requirements.

All devices and equipment that have a special purpose and special technical requirements should be checked and serviced according to the special technical instructions provided with the mentioned devices.

Preventive maintenance, control and service can only be performed by persons who are technically qualified and authorized by the responsible person.

INSTRUCTIONS FOR MANAGEMENT OF CONSTRUCTION WASTE

During the execution of construction works, a large amount of less and more hazardous construction waste will be created.

When excavating the ground for the purpose of carrying out works on the buried floor, a large amount of soil material will be created, which in itself is not harmful to the living environment, however, considering the urban location of the construction site, it must be removed. If there is a need for leveling the rest of the plot, i.e. raising the level of the surrounding terrain, this earthen material can be used for that purpose, if it is proven during excavation that its structure meets the desired quality. If there is no need for leveling, it is the duty of the contractor, in agreement with the investor, to ensure the transport of this material to the landfill of earth material, determined in advance for this purpose by the authorized body.

During the execution of craft works, a large amount of construction waste will be generated, which is the product of trimming, cutting, fitting, packaging of various products and tools. If these products are safe for the environment, in the short term, a temporary warehouse should be found on the construction site itself. As the work comes to an end, the waste material should be sorted according to the chemical composition and nature of the material (paper and cardboard, PVC from construction material packaging, construction wood used as formwork and construction, metal created by cutting and cutting off reinforcement and other construction elements... etc.) . The material sorted in this way should be recycled, that is, sent for processing and melting, and if there is monetary compensation, that money should be used for the costs of removing other waste.

Other types of construction waste generated on the construction site, which are not safe for the human environment, must be handled with special care. Surpluses and parts of waterproofing, possible asbestos waste resulting from demolition or finding on the ground, oil, fuel, bitumen, bitumen, varnishes, lubricants, possible herbicides, cleaning agents, and other dangerous chemicals must be packed immediately after finding them, i.e. after the end of use. in bulletproof packages without the possibility of leakage and handed over for permanent processing and destruction in the shortest possible time, to a company authorized for such works by the competent authority. The spilling of these substances into any kind of watercourses, sewage canals, sewage collectors or marine recipients must be prevented at all costs.

During the execution of the works, a large amount of water is used, which must later be discharged into the sewer collectors. If this water was used for washing and wetting the material, it can carry with it dissolved mineral content that is harmless to the environment and can be discharged without prior processing. However, if the washing water is



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NUMERICAL DOCUMENTATION

- **Bill of quantities with accounting**

BILL OF QUANTITIES AND ACCOUNTING - INTERNAL INSTALLATIONS OF THE FACILITY
Adaptation of SECONDARY SCHOOL OF ELECTRICAL ENGINEERING "VASO ALIGRUDIĆ"

A: WATER INSTALLATIONS

No.	Description of equipment, materials and works	Units	Quantity	Unit price	Total price [€]
I	INSTALATION WORKS				
1	PPR pipes				
	Procurement, transport and installation of polypropylene pipes for working pressure of 20 bar and fittings according to the valid standard, for working pressure of 20 bar.. Horizontal distributions in wet nodes are made of polypropylene pipes of projected diameter. Fasten the verticals with steel clamps. Place rubber or plastic pads between the pipes and clamps. DN is the outside diameter of the pipe. Calculation per m1.				
	PPR PN 20 DN20	m'	24.50		
	PPR PN 20 DN25	m'	29.00		
	PPR PN 20 DN32	m'	4.00		
2	PPR valves				
	Procurement, transport and installation of ordinary permeable valves with the necessary fittings, connecting material, rosette and cap made of stainless steel.				
	valve 3/4"	pcs	2.00		
	valve 1/2"	pcs	4.00		
3	Pipe isolation				
	Coating of hot and cold water pipelines and thermal inolation d = 4mm. Break the insulation at the valve location. It is calculated per meter of installed insulation according to the pipe diameters.				
	PPR DN20	m	24.50		
	PPR DN25	m	29.00		
	PPR DN32	m	4.00		
TOTAL INSTALLATION WORK (€)					

II	OTHER WORKS				
1	Desinfection and rinsing				
	After the installation of the water supply network is completed and the watertightness is tested, the contractor submits a request to the authorized organization to disinfect the water supply network with chlorine solution in order for it to be safe to drink. The same organization issues a certificate of disinfection. The analysis of chemical and microbiological correctness of water should be done in an authorized laboratory. The water must comply with the Ordinance on the hygienic quality of drinking water. Calculation per m.				
		m	57.50		
2	Pressure test				
	Testing of the water supply network at a test pressure, 3 bar higher than the working one, or at least 10 bar. After the installation of the water supply network, seal all drains with plugs. pressure for at least 24 hours If the pressure drops, find the fault location, remove and put the installation under test pressure again, perform the test in the obligatory presence of the supervisory body and the authorized person and make a special report. Calculation per m.				
		m	57.50		
3	Removing existing installations				
	Dismantling of existing water installations, valves and the like, with loading and removal to the landfill. The price includes the eventual plugging of the existing main supply pipelines.				
		sum	1.00		
4	Connecting to an existing network				
	Connecting the newly designed water installations to the existing water network.				
		sum	1.00		
TOTAL OTHER WORKS (€)					
TOTAL WATER INSTALLATION (€)					

B: FECAL SEWAGE INSTALLATIONS					
No.	Description of equipment, materials and works	Units	Quantity	Unit price	Total price [€]
I	INSTALLATION WORKS				
1	PP pipes and shaped pieces *low noise				
	Procurement, transport, distribution and installation of low-noise PVC sewer pipes for internal sewage (max 15db at a flow rate of 2l/s). Pipes are provided for all horizontal and vertical distribution of the internal sewage network, in the projected fall. The connection of pipes and shaped pieces will be made with a socket head and a rubber sealing ring (Q ring). After laying the pipe, perform a leak test.				
	PVC DN50	m'	8.00		
	PVC DN75	m'	20.00		
	PVC DN110	m'	4.00		
2	Drain				
	Supply, transport and installation of a floor drain in a wet joint, with a built-in water seal and a stainless steel cover, with perforations for draining water with a diameter according to the project. Make the connection carefully and safely. Calculation per piece.				
		pcs	1.00		
TOTAL INSTALLATION WORK					
II	OTHER WORKS				
1	Testing and rinsing				
	In agreement with the supervision, test the entire network or part by part. Seal the openings, except for the highest ones, and fill the net with water. Keep the net under the set pressure for at least three hours. Perform an inspection and mark all places that leak. Drain the water and rectify any faults. Repeat the test. The examination is performed with the obligatory presence of the supervisory body and the authorized person, and a special record must be made. Calculation per m.				
		m	32.00		
2	Removing existing installations				
	Dismantling of existing sewage installations, with loading and removal to the landfill.				
		sum	1.00		
3	Connection to the existing sewage network				
	Connection of newly designed sewage installations to the existing sewage network				
		sum	1.00		
TOTAL OTHER WORKS (€)					
TOTAL FECAL SEWAGE INSTALLATIONS (€)					

C: SANITARY ELEMENTS AND GALANTRY					
No.	Description of equipment, materials and works	Units	Quantity	Unit price	Total price [€]
1	INSTALLATION WORKS				
1	Dismantling of existing sanitary facilities				
	Dismantling of existing sanitary facilities, including toilets, wash basins and sinks, removal and disposal to the landfill.				
		sum	1.00		
2	Washbasin				
	Procurement, transport and installation of sinks of domestic or foreign manufacturers made of class I sanitary ceramics. The sink must have a drain hole, an overflow and a plug to close the drain hole. Along with the sink, get appropriate brinox hoses and all the accompanying elements, which are necessary for connection to the network and sanitary fittings. Calculation per piece.				
	Washbasin with mounting elements	pcs	9		
	Faucet	pcs	9		
	Mirror with shelf	pcs	9		
	Towel holder	pcs	9		
	Container for liquid soap	pcs	9		
3	Toilet				
	Supply, transport and installation of a Class I sanitary ceramic toilet together with a built-in cistern, with a horizontal spout, a cover board with a frame made of high-quality plastic, with a holder for a paper and roll paper box and a stand for a toilet brush. The toilet bowl is mounted on a steel structure.				
	Installation element for toilet bowl	pcs	2		
	Toilet bowl complete with board and button	pcs	2		
	Toilet brush set	pcs	2		
	Toilet paper holder	pcs	2		
3	Kitchen sink				
	Procurement, transport and installation of sinks with accompanying equipment. Calculation per piece.				
	Sink (granite)	pcs	1		
	Faucet (granite)	pcs	1		
4	Water heater				
	Procurement, transport and installation of electric water heaters. The water heater is equipped with a safety - non-return valve in case of pressure higher than the permitted nickel water heater tube and all associated fittings for the connection between the water supply and the water heater.				
	Water heater 50 lit.	pcs	1		
5	EK valve				
	Procurement, transport and installation of EK valves for sink / sink connection . Calculation per piece.				
		pcs	15		
TOTAL SANITARY ELEMENTS AND GALANTRY (€)					

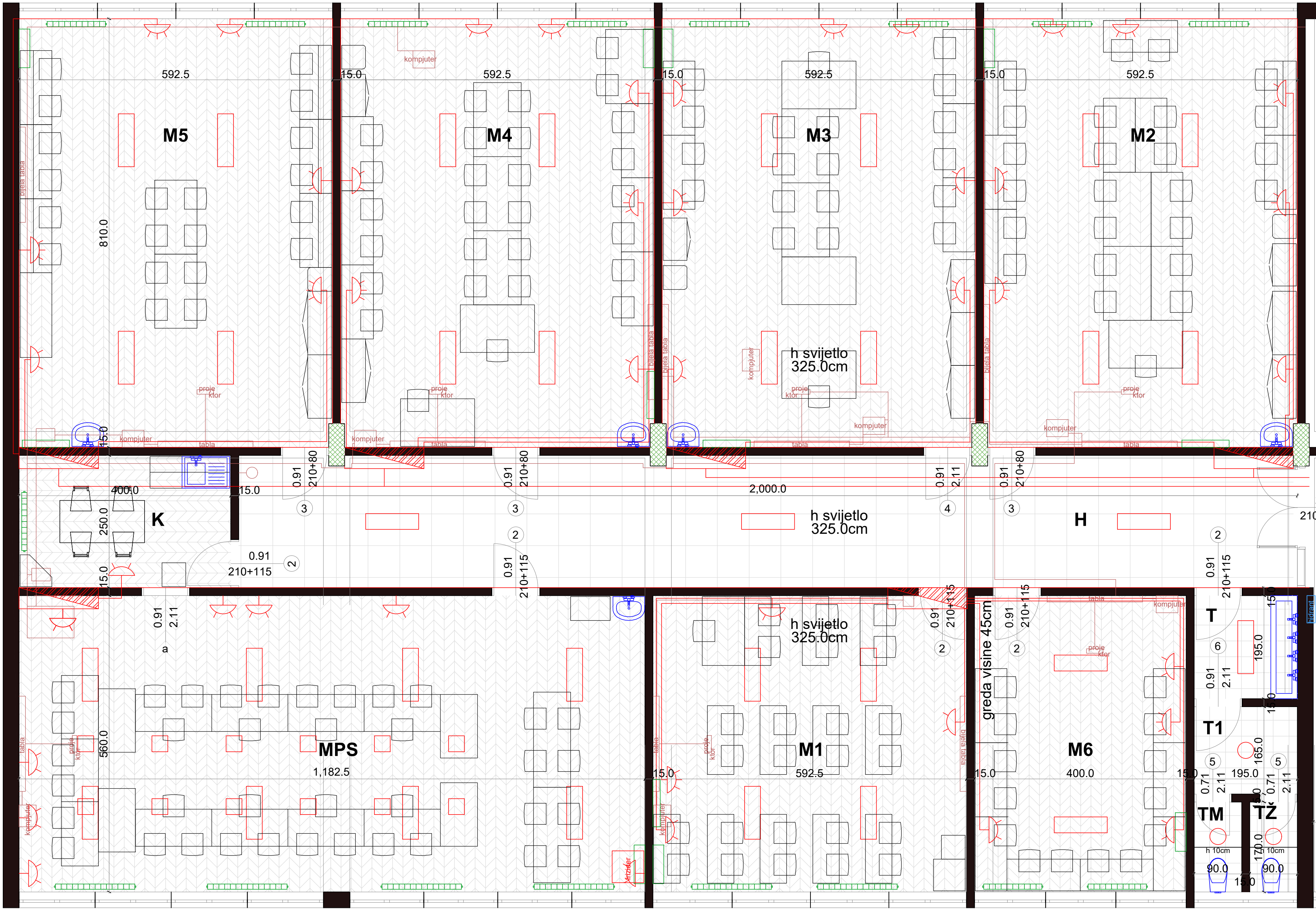
COSTS RECAPITULATION			
A	WATER INSTALLATION		
B	FECAL SEWAGE INSTALLATIONS		
C	SANITARY ELEMENTS AND GALANTRY		
TOTAL without VAT:			
unexpected works 10%			
TOTAL without VAT:			
VAT:			
TOTAL with VAT:			



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GRAPHICAL DOCUMENTATION

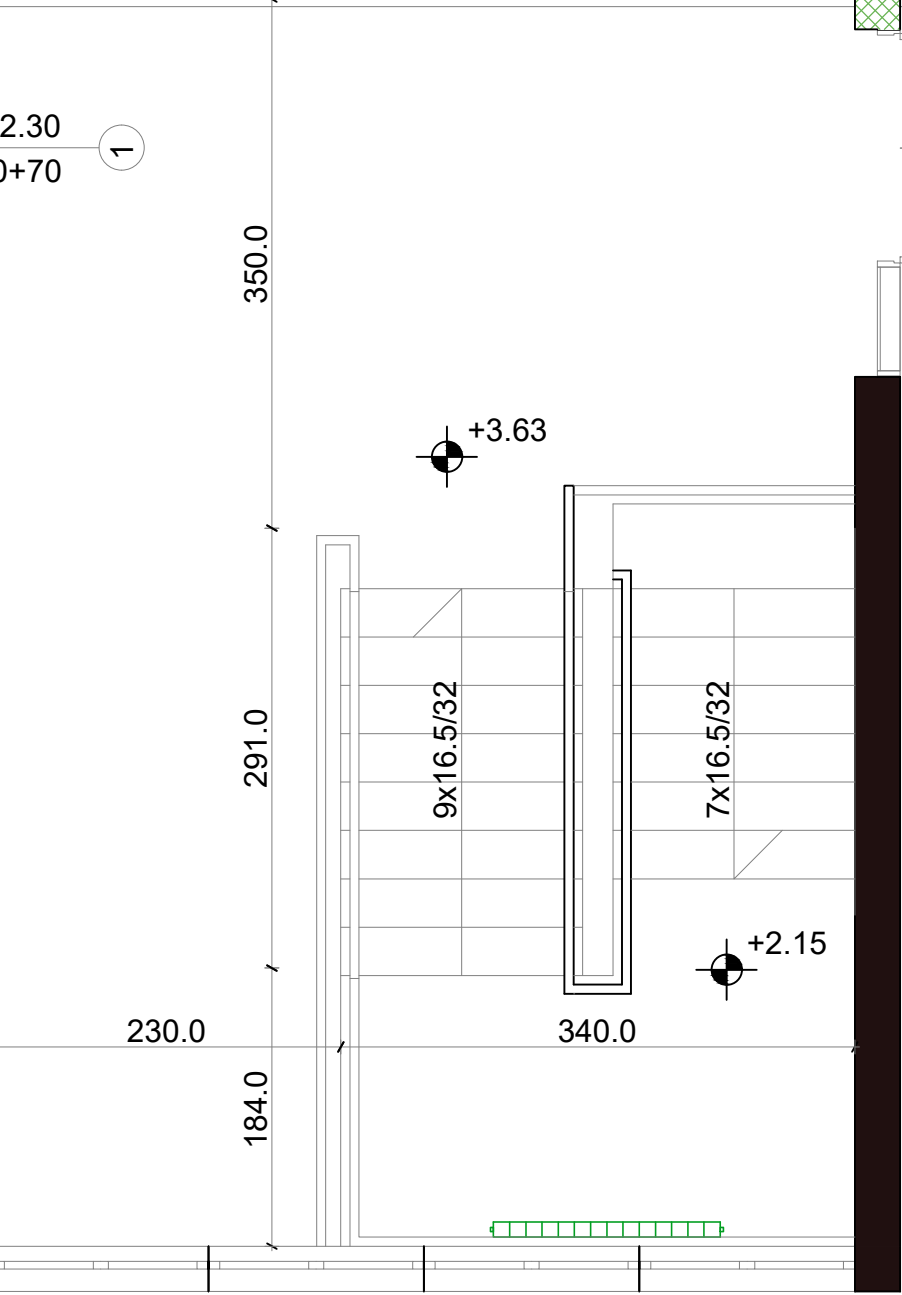
- **Attachment 1** **Layout – existing plan, R 1:50**
- **Attachment 2.1** **Layout – newly designed plan (sewer installations), R 1:50**
- **Attachment 2.2** **Layout – newly designed plan (water installations), R 1:50**
- **Attachment 3** **Axonometric scheme of water installations, R 1:50**



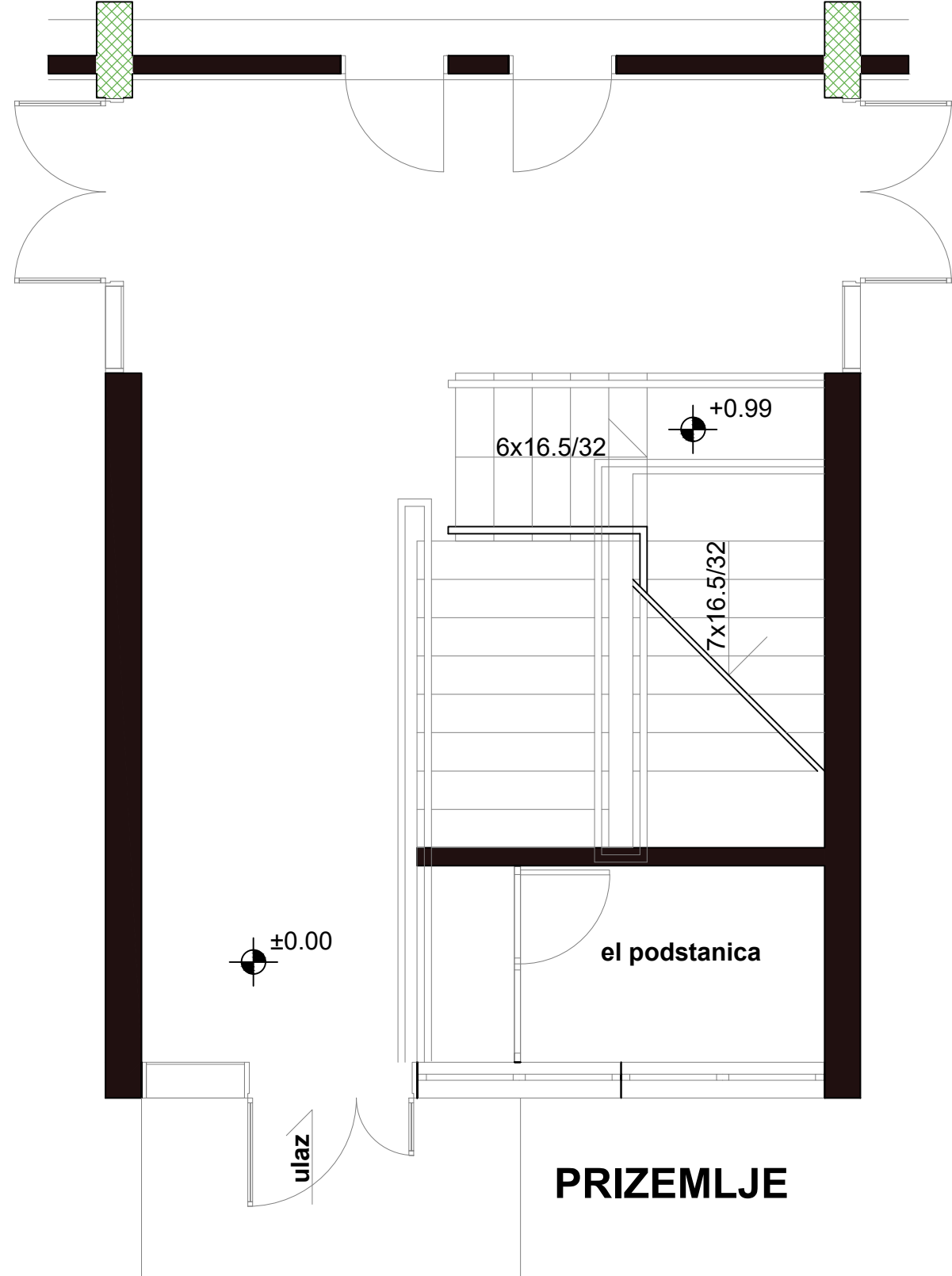
- elektro instalacije
jake struje
- elektro instalacije
slabe struje
- instalacije vodovoda i
kanalizacije
- termotehničke
instalacije
- protivpožarna
zaštita
- postojeći
namještaj

Br.	Prostorija	Pod	Površina
H	koridor	kamene ploče	49.63 m ²
T	toalet pranje ruku	keramičke pločice	3.80 m ²
T1	toalet predprostor	keramičke pločice	3.22 m ²
TM	toalet muški	keramičke pločice	1.53 m ²
TZ	toalet ženski	keramičke pločice	1.53 m ²
M1	multifunkc. kabinet	parket	33.18 m ²
M2	multifunkc. kabinet	parket	47.93 m ²
M3	multifunkc. kabinet	parket	47.93 m ²
M4	multifunkc. kabinet	parket	47.93 m ²
M5	multifunkc. kabinet	parket	47.96 m ²
M6	multifunkc. kabinet	parket	22.40 m ²
MPS	multifunkcionalna sala	parket	66.22 m ²
K	čajna kuhinja	parket	10.00 m ²
ukupna neto pov.			383.25 m ²

greda visine 35cm

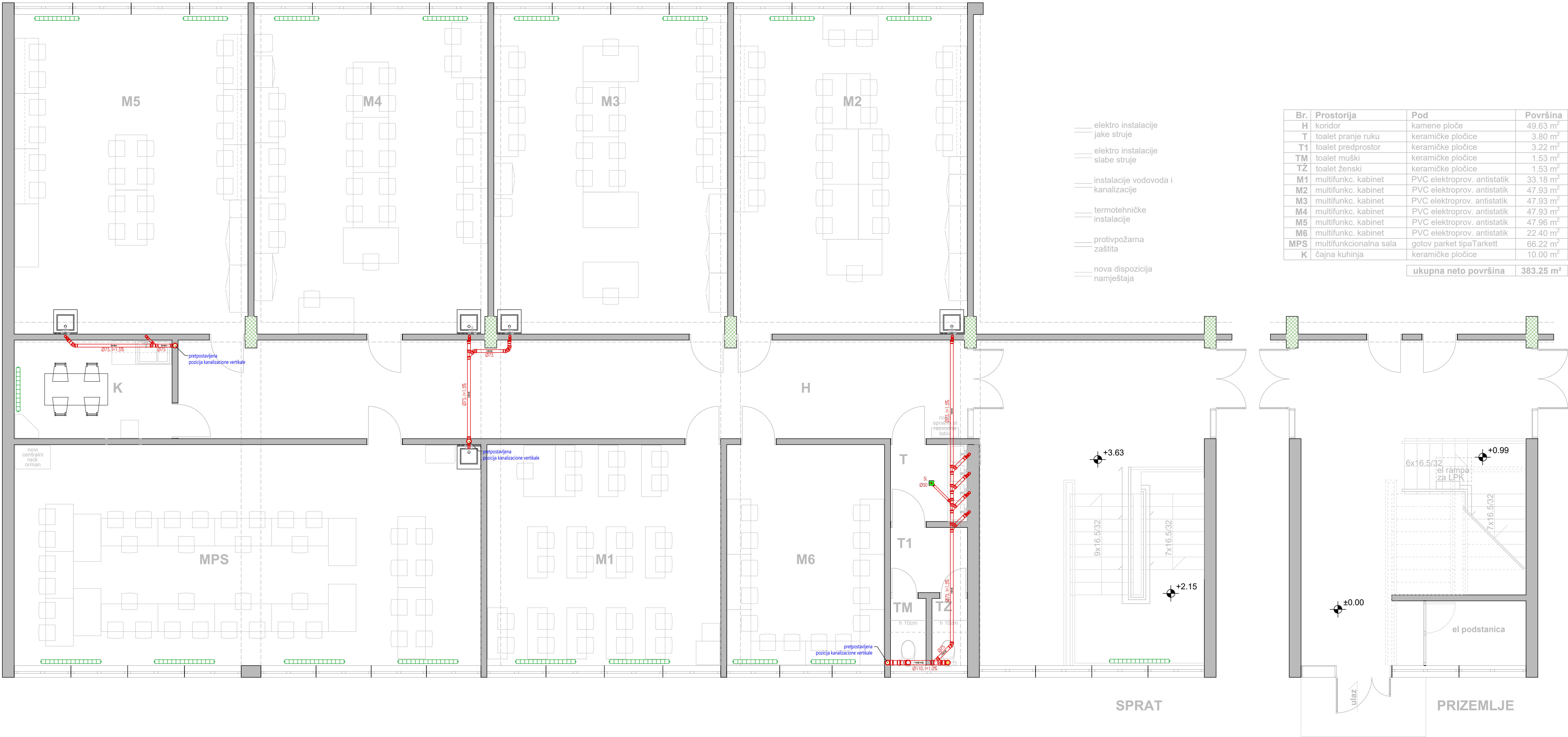


SPRAT

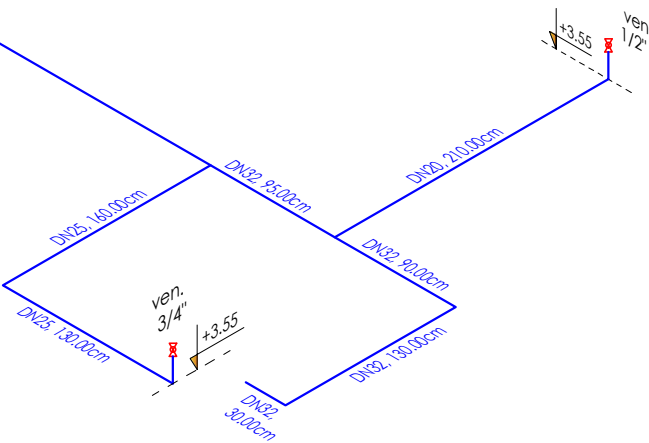
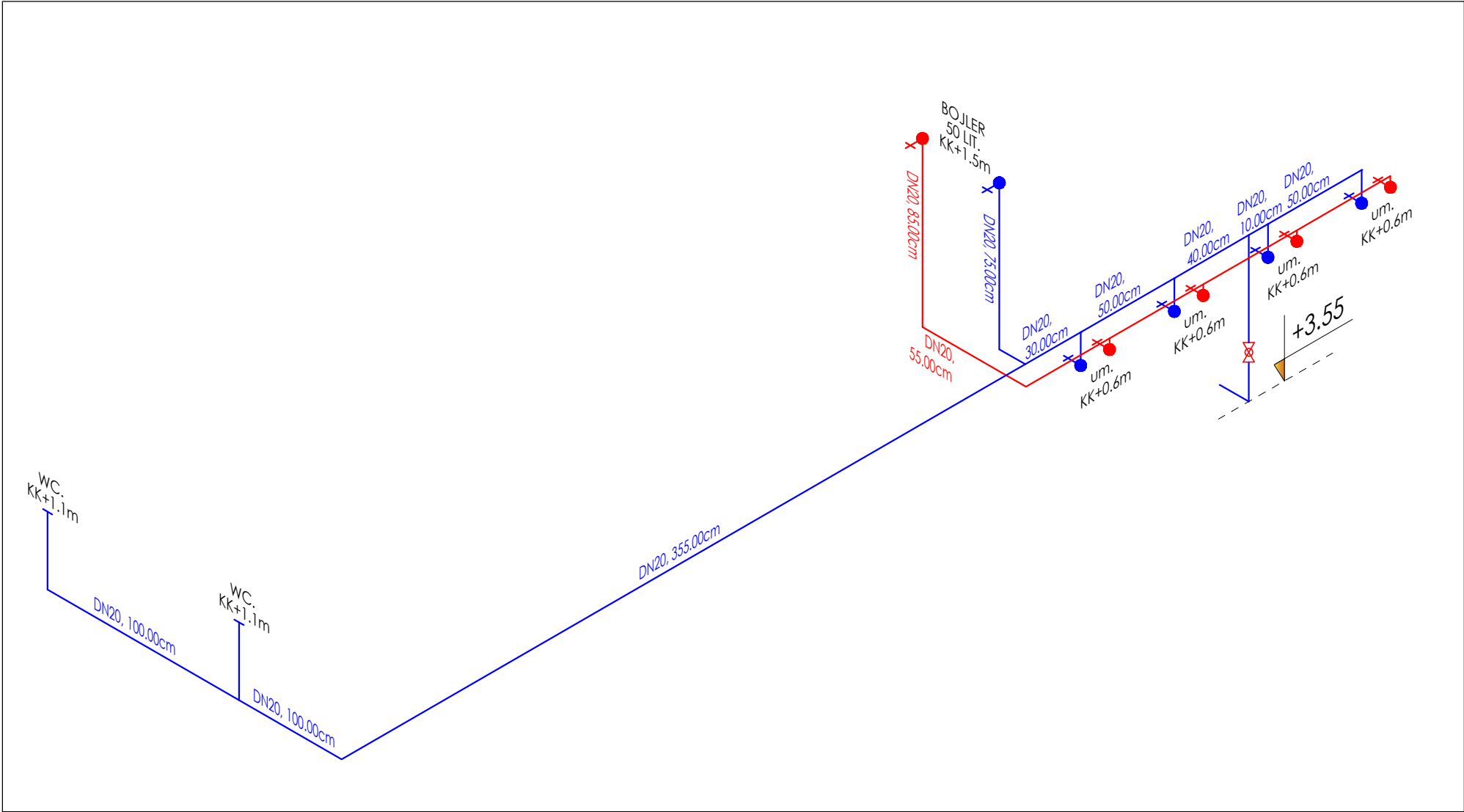
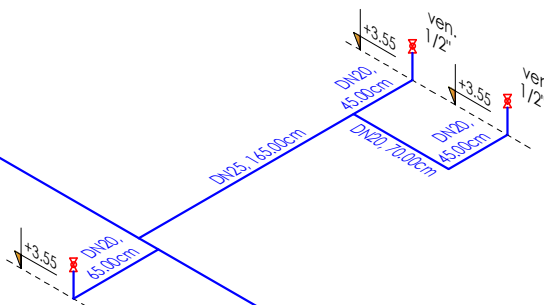
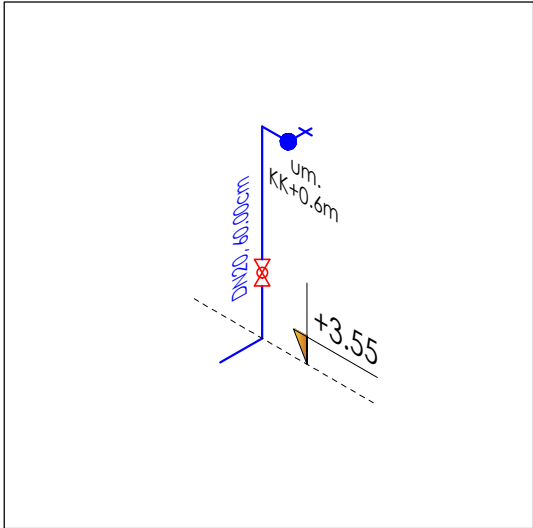
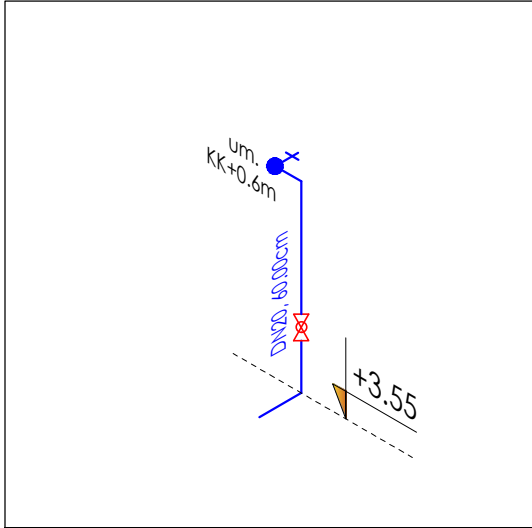
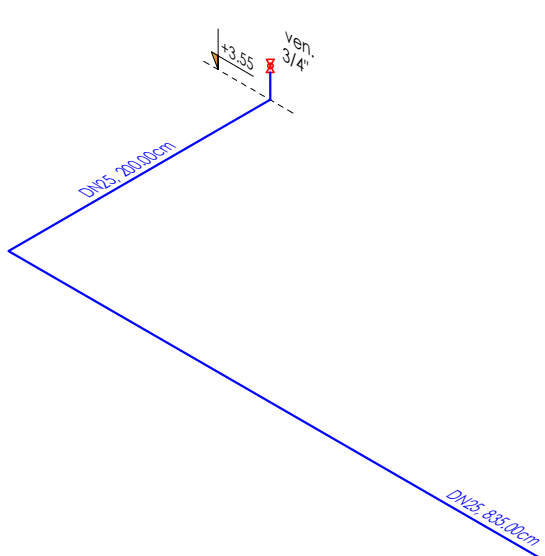
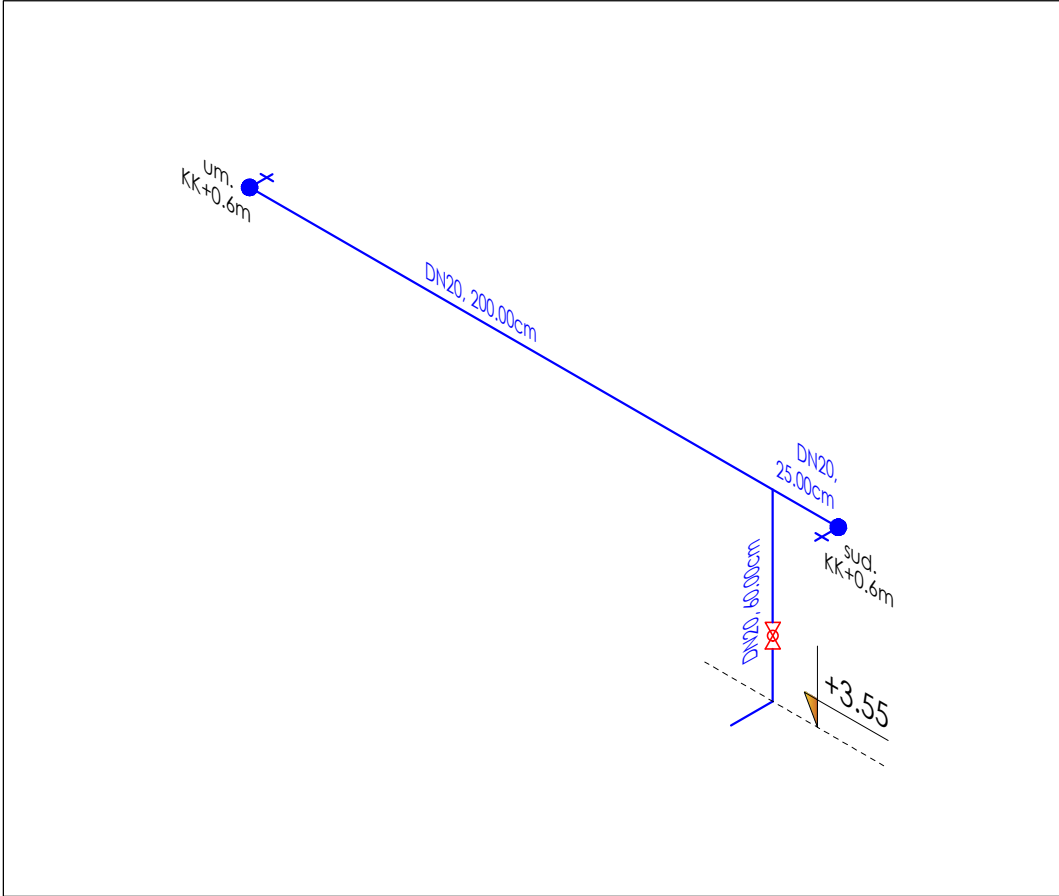


PRIZEMLJE

Projektant / Designer aqua engineering		Investitor / Investor: Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy	
Objekat / Object: JU SREDNJA ELEKTROTEHNIČKA ŠKOLA "VASO ALIGRUDIĆ" / SECONDARY SCHOOL OF ELECTRICAL ENGINEERING "VASO ALIGRUDIĆ"		Lokacija / Location: C.P. 1193, C.M. Podgorica I, Municipality of Podgorica	
Glavni inženjer / Head engineer:		Vrsta tehničke dokumentacije / Type of technical documentation: PROJEKAT ADAPTACIJE DIJELA OBJEKTA / ADAPTATION PROJECT OF PART OF THE BUILDING	
Odgovorni inženjer / Responsible engineer:		Br. priloга / Drawing no.: 1	
Saradnik/ci / Associate/s:		Datum revizije i M.P. / Revision date and M.P.	
Datum izrade i M.P. / Creation date and M.P.		Datum revizije i M.P. / Revision date and M.P.	
Januar / January 2024			



Projektant / Designer aqua engineering		Investitor / Investor: Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy	
Objekat / Object: JU SREDNJA ELEKTROTEHNIČKA ŠKOLA "VASO ALIGRUDIĆ" / SECONDARY SCHOOL OF ELECTRICAL ENGINEERING "VASO ALIGRUDIĆ"		Lokacija / Location: C.P. 1193, C.M. Podgorica I, Municipality of Podgorica	
Glavni inženjer / Head engineer:		Vrsta tehničke dokumentacije / Type of technical documentation: PROJEKAT ADAPTACIJE DIJELA OBJEKTA / ADAPTATION PROJECT OF PART OF THE BUILDING	
Odgovorni inženjer / Responsible engineer:		Do tehničke dokumentacije / Part of technical documentation: GRADNIVINSKI PROJEKAT INSTALACIJE VODOVODA I KANALIZACIJE / WATER AND SEWERAGE INSTALLATION PROJECT	
Saradnik/ci / Associate/s:		Prilog / Drawing: Osnova - novoprojektovano stanje (instalacije kanalizacije) / Layout - newly designed plan (sewer installations)	
Datum izrade i M.P. / Creation date and M.P.		Datum revizije i M.P. / Revision date and M.P.	
Januar / January 2024		Br. priloga / Br. strane / Drawing no.: Nos. 2.1	



Projektant / Designer aqua engineering		Investitor / Investor: Western Balkan Six Chamber Investment Forum Plazza della Borsa nr. 14 34121 Trieste, Italy	
Objekat / Object: JU SREDNJA ELEKTROTEHNIČKA ŠKOLA "VASO ALIGRUDIĆ" / SECONDARY SCHOOL OF ELECTRICAL ENGINEERING "VASO ALIGRUDIĆ"		Lokacija / Location: C.P. 1193, C.M. Podgorica I, Municipality of Podgorica	
Glavni inženjer / Head engineer:		Vrsta tehničke dokumentacije / Type of technical documentation: PROJEKAT ADAPTACIJE DIJELA OBJEKTA / ADAPTATION PROJECT OF PART OF THE BUILDING	
Odgovorni inženjer / Responsible engineer:		Dio tehničke dokumentacije / Part of technical documentation: GRAĐEVINSKI PROJEKAT INSTALACIJE VODOVODA I KANALIZACIJE / WATER AND SEWERAGE INSTALLATION PROJECT	Razmjera / Scale: R = 1 : 20/50
Saradnik/ci / Associate/s:		Prilog / Drawing: Aksonometrijska šema instalacija vode / Axonometric scheme of water installations	Br. priloga / Drawing no.: 3
Datum izrade i M.P. / Creation date and M.P. Januar / January 2024		Datum revizije i M.P. / Revision date and M.P.	