WORKS TENDER - LOT 2

Component 1: Reconstruction of Basic Court in Foča

T E C H N I C A L S P E C I F I C A T I O N S

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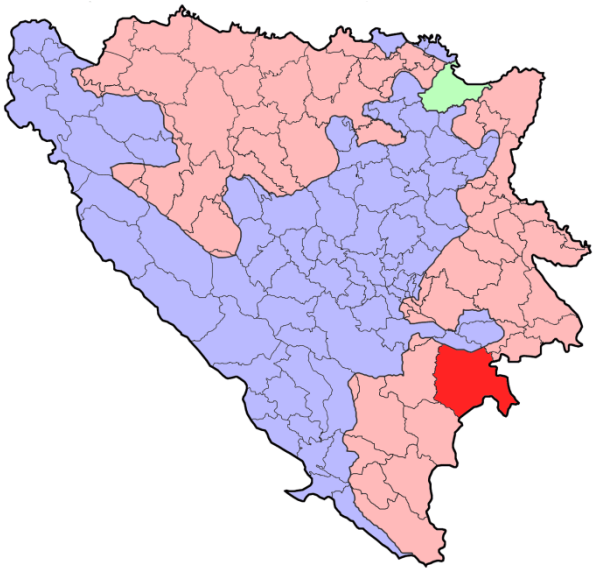
PART I: ARHITECTURE

1_Location of the Basic Court

The building of the Basic Court (ground floor + first floor) which was treated by the main project of rehabilitation and adaptation, is located in the urban area of Foca, on a plot designated as cp No 1481/2, within the cadastral municipality of Foca (Foca municipality). The subject parcel is surrounded by a school traffic, and the access to the building is primarily a pedestrian. The main entrance to the building is from the northeast side of the building, from the Njegos street, while the additional pedestrian and vehicular access is from the southwest side of the building. On this area there are installation of city water and sewage, telecommunications infrastructure, as well as the technical possibilities for connection (consumer) to the electricity grid. Restoration and renovation of the Basic Court are carried out within the existing plot, whose boundaries and shapes do not change the planned interventions.

Location of the Basic Court (Google Earth)



https://upload.wikimedia.org/wikipedia/commons/b/be/BH_municipality_location_Foca.png

The main pedestrian access to the building is currently being carried out by the single-staircase directly out onto the traffic-bearing street (Njegoš Street), and this is a possible threat to all participants in traffic, such as pedestrians, and persons who operate a motor vehicle.

Foca municipality is characterized by moderate - continental climate, partially amended by the altitude of the area. With increasing altitude, air may be a moderate continental climate, perymountain climate type, and it can also be the mountain type of climate at its highest regions. Such a climate is characterized by long winters and long summers and short periods of spring and autumn. Despite the relatively high mean annual air temperature, this area is characterized by a much smaller temperature range than most regions in Bosnia and Herzegovina. The coldest month is January, the warmest month is July. Absolute maximum value of the summer temperature do not exceed 39 ° C, while the absolute minimum temperature in the winter go below -20 ° C.

2_ Descripton of the building

The building of the Basic Court in Foca is a cultural monument and is located on the Provisional List of National Monuments of Bosnia and Herzegovina under number 218 adopted by the Commission / Commission to Preserve National Monuments, at its 15th meeting held on 14.06.2000. year.

Basic Court in Foča (northeast) – march 2016.g.

Basic Court in Foča (southeast) – march 2016

Basic Court in Foča (southwest) – march 2016

Basic Court in Foča (north) – march 2016

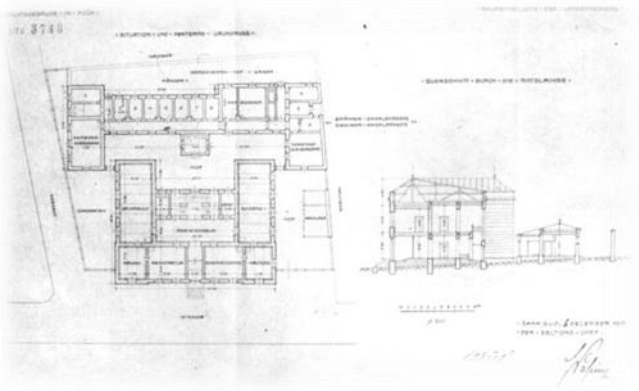
In early December 1905, the Czech architect Karlo Paržik signed a draft project for the court and the prison in Foca. The ground floor rooms are provided for the land registry, records, registry and Sharia judge, and upstairs rooms are itended for judges and other offices.

The building of the Basic Court in Foca has a neoclassical style characteristics. It is the disposition of the blocks, with two wings, with the number of floors P + 1. The main facade is articulated by shallow side projections with the shallow bay windows with a pronounced attic placed on it, as well as over the entrance. The windows are designed as vertical rectangles without a frame and parapets are slightly recessed relative to the surface of the walls that have been processed horizontal rustication.

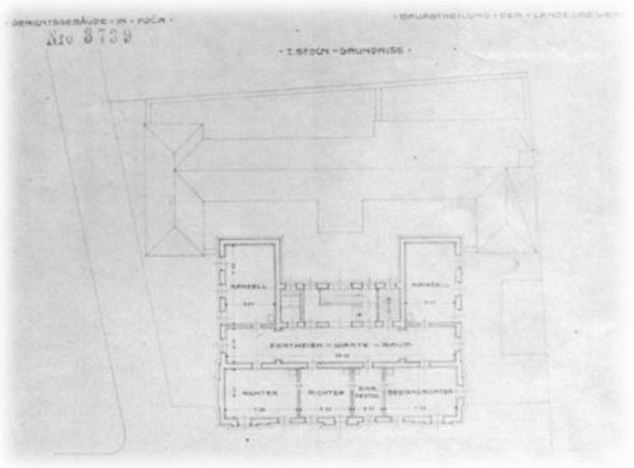
Basic Court in Foča –Year 1988
http://www.karloparzik.com/Images/41-SUD%20U%20FOCI/41d.JPG

Basic Court in Foča –Year 1988
http://www.karloparzik.com/Illustrations-41-55.html

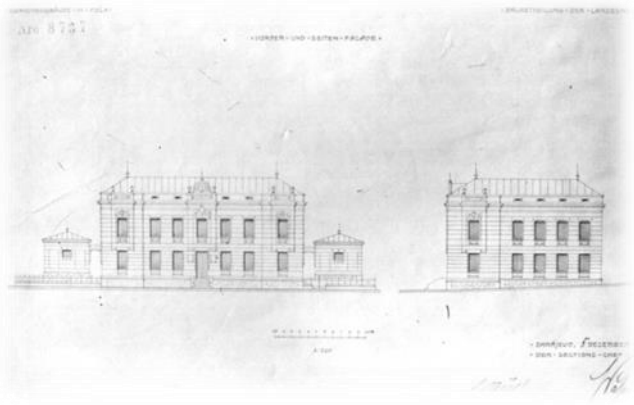
These design elements are known from previous projects Parzik (Garrison court house, Zadik Fincij's house) and are applied with small changes in the details and in the composition. Thereby, having a lower building, there was no division of any molded cornices, and the building still got a different look from previous similar examples - general impression of dynamic linearism deep joints prevails, through broken shallow, running, façade surfaces. The building was built during 1909, and construction was managed by engineer Domenico Karković. The performance is lacking secondary plastic that has been indicated in the project (the cartridge bay windows, vases), and the project has not presented any high roof cornice.



Ground floor plan and section, Year 1905 *(http://www.karloparzik.com/Images/41-SUD%20U%20FOCI/41a.JPG)*



First floor plan, Year 1905 *(http://www.karloparzik.com/Images/41-SUD%20U%20FOCI/41b.JPG)*



Elevations, Year 1905 *(http://www.karloparzik.com/Images/41-SUD%20U%20FOCI/41c.JPG)*

Karlo Paržik (in Czech Karel Pařík), Czech architect, was born in the village of Veliš near the town of Jicin, in the Kingdom of Bohemia, in the Austrian Empire, in 1857 and died in Sarajevo on 16 June 1942. He graduated from the Academy of Fine Arts and Architecture and Construction.

3_ The existing condition of the building of the Basic Court

There are noticeable damages on the building of the Basic Court in Foca, which occurred as a result of interaction of various factors, such as by the action of moisture, microorganisms, cracks and deterioration of the material.

Damage of the facade cornice - March 2016

Damage of the facade - March 2016

Damage of the facade - March 2016

Interior damage - March 2016

Under the influence of mechanical forces, in fact because of the weakening of the quality of construction, or by the influence of extreme values of temperature, there were defects in the form of surface cracks on the façade, separating layers of finishing walls and ceilings in some places, as well as deformation of floor joists under the room for trial (the ceiling between the ground and first floor).

The layers of the facade are threatened by the moisture which causes chemical and physical deterioration of the building, the finishing paint has lost its original color and quality, and there is a danger of further penetration of moisture into the very structure of the building. Atmospheric water is dangerous because it carries the mineral substances, and once they are located in the cracks they create new minerals, which increases the pressure in the material and creates more damage.

Microorganisms act biologically, associated with other agents; they damage the stone surface by keeping its minerals through a biochemical process and in such a way they vegetate.

Construction of the building is classic, with supporting walls (in both directions), made of brick blocks. The roof structure is constructed as a timber for a multipart roof, and it is a set of wooden rafters, purline rests and wooden poles. After the review of the roof structure, it has been established that the wooden roof structure is generally in good condition, with minor damage. Roofing and tin flashing are worn out, and it is necessary to replace new authentic appearance, as well as all the horizontal gutters and gutter verticals.

Roof construction – March 2016

Roof construction – March 2016

After removal of the existing roof, the wooden structures must be repaired and the damaged parts must be replaced. All wooden parts must be protected with fungicide and insecticide coatings. Material should be sturdy,

dry, healthy and good quality wood. Technical characteristics of the wooden structure must be such that during the construction and use, with proper construction and maintenance, construction must submit all impacts of normal use and environmental impacts, and must not cause the demolition of the building or part thereof, impermissible degree of deformation, damaging the overall structural system, or interior equipment for their own deformation. During transportation, processing, intermediate storage, installation and use, wood should be protected from leaching; direct contact with cold or hot water should be avoid by proper stacking and covering. The timber elements are to be arranged so that they are spaced apart and exposed to a constant ventilation.

Existing woodwork - windows and doors (except for the main entrance) - is in a very bad condition, especially in the stair areas where there is danger of collapsing. Planners recommend that the existing woodwork should be replaced with the new one, modeled after the old one. The windows on the premises of the District Prosecutor's Office are planned to be made by bulletproof glass. Internal doors are low compared to today's standards (approximately 190 cm), it is suggested that the doors should be lifted to the height of 210 cm.

4_The spatial organization of the Basic Court

The building of the Basic Court in Foca consists of two floors, the ground and first floor. Attic space is unused. The current spatial organization of the building cannot meet the modern needs of the institution located in it. Most of the space is not functional, the contents are mixed, utilization of the available space is not at a satisfactory level. The total gross floor area is 788 m2, the total usable area of the current state of 557.22 m2 and the total usable area after the adaptation would amount to 587,93 m2.

The existing ground level, the gross area of approximately 394 m2, consists of an entrance hall (10.77 m2), central hall (50.93 m2), prefabricated room for doorman (3.38 m2), detention cells (5.95 m2), the room for judicial police (17.15 m2 + 20.32 m2), the room for archives and cash register (23.23 m2 + 15.83 m2), toilet (5.60 m2), a District Prosecutor's Office (26,92 m2 + 20,32 m2), administrative office with a handy archive (28.03 m2 + 28.91 m2), and the staircase area (14.25 m2). The total usable floor area is 271.59 m2. Storey can be accessed via a staircase and the access is not allowed to persons with reduced physical abilities.

The first floor, gross area of approximately 394 m2, consists of a central hall (40.71 m2 + 8.58 m2), utility room with access to the attic (5.95 m2), rooms for accounting (8.23 m2), typing Bureau (15.41 m2), archives (17.79 m2), room for judges (19.76 m2 + 26.68 m2 + 20.32 m2), room for bailiff and executor of investigation (10.77 m2), room for trial (41.09 m2) with additional rooms (7.67 m2 + 2.62 m2 + hall 5.25 m2), toilet (5.60 m2) and stairs (22.28 m2). The total usable area floor is 285,63 m2.

In the framework of the ground floor, the main project is: entrance hall (10.77 m2), central hall (50.93 m2), prefabricated room for doorman (3.38 m2), rooms for the District Prosecution (12.19 m2 + 14 48 m2), room for bailiff and executor of investigation (20.32 m2), room for judicial police (17.15 m2 + 23.23 m2), a room for seized subjects (8.88 m2), detention cells (6, 45 m2), server room (5.95 m2), a room for judge / judges typists (26.92 m2), a room for archives / Shipping / Kurir (20,32 m2) Registry Office with archives (28.03 m2 + 28.91 m2), toilet (5.60 m2), and the staircase (14.25 m2). The total usable area of the amended ground floor is 297.77 m2. Access is enabled by the staircase and the access ramp for people with reduced physical abilities. The plan for the first floor is: the central hall (54.68 m2), rooms for judges (19.76 m2 + 26.68 m2 + 10.77 m2 + 20.32 m2), a court president's room (26,92 m2), a room for trial (43.14 m2) with entrance hall (6.59 m2) and room for an interpreter and AV recording (6.04 m2), a room for accounting (8.23 m2), a room for typist bureau (15.41 m2 + 5.95 m2) with the archive (17.79 m2), bathroom (5.60 m2), kitchen (4.18 m2), and the staircase (18.10 m2). Exit to the attic remains in the same position. The total usable area of the

5_ Proposal color of facade

RAL 1015

RAL 1015

RAL 8008

6_Materials

The ground floor is poured concrete base protected with waterproofing coating, followed by slab of waterproof reinforced concrete, in order to prevent possible moisture penetration, which would adversely affect the stability of the structure and stability of the load-bearing elements and finishing materials.

The floors in the offices is parquet (first class), thickness of 22 mm, which is placed over the concrete base cleansing. Close all joints on the floor. The floors in the sanitary facilities and the kitchen are ceramic tiles (I class). The floor in halls is terrazzo.

New walls are made of plaster boards (3x1,25 - Duplex) and sound insulation.

Insulation of floors is hard foam insulation made of extruded polystyrene (XPS), a thickness of 3 cm, except in the room where the court is provided insulation from mineral wool. Roof insulation is rock mineral wool, thickness of 12 cm, between the wooden beams.

7_ Conclusion

The main project of rehabilitation and adaptation of the Basic Court in Foca was prepared in accordance with the Law of the Spatial Planning and Construction ("Official Gazette of Republika Srpska", No: 01-696 / 13), with the Terms of Reference, available documentation and the applicable rules and regulations governing this area, and refers to a functional reorganization and grouping of similar content of the specified object, in order to meet the needs of modern institutions and better use of available space, and only within the existing vertical and horizontal footprint of the building.

Except to repurposing and relocation of certain rooms, it is proposed that the final coating floors should be amend, walls and ceilings in the interior; replacement of doors and windows should also be done, as well as the rehabilitation of the facade and roof cladding. Preliminary design is subject to adjustments, and after its adoption, the production of the main project will start, where the intervention subject to the building of the Basic Court in Foca will be elaborated in detail, the damage and the measures proposed rehabilitation and adaptation will be analyzed, with all the necessary textual, numerical and graphical documents.

While creating the main project, the following measures of protection and improvement of the building are fully complied, prescribed by the Institute for protection of natural and cultural - historical heritage of the Republic of Serbian:

During the preparation of project documentation, all the available archives, technical and photo - documentation of the authentic appearance of the building should be used;

- Maintain the existing horizontal and vertical dimensions of the object;

- Maintain an authentic structural system, the general functional disposition of the facility, and preserved elements of the original interior;

- Minimal intervention to adapt to the needs of the modern labor court can be made, as well as access to persons with reduced physical abilities and similarly;

- Check the condition of the roof structure: if some of the structural elements are worn out, replace them with the new ones modeled on authentic;

- Determine the type of roof cladding by the original documents;

- Restore the authentic joinery, and where this is not possible, or where the woodwork is not the original, create a new wooden windows completely modeled on authentic;

- Reconstruct the original facade plastics; paint the facade in two colors so to highlight the facade of plastic (determine the original color of the façade if possible, and if this is not possible, select the color in consultation with the ministry of protection);

- Appearance, details and materialization of the gutters should be modeled on authentic, based on the original design documents, and if it is not possible, use the analogy with examples of similar objects that represent the Austro-Hungarian period.

Note: Due to the poor quality of printing, there may be differences between specific paint of the façade in relation to the graphic illustration. The exact shades of color will be defined by the Master project, in RAL or other color system.

PART II: CONSTRUCTION

INTRODUCTION

According to the terms of reference submitted by the Investor, it is necessary to develop a design for the reconstruction of the existing building of the Basic Court in Foča. The building of the Basic Court was registered as a cultural property and listed on a temporary list of national monuments of Bosnia and Herzegovina, and is placed under the greatest degree of protection. The building was constructed in the early 20th Century. It was designed by Karel Pařík in 1905; and it was completed in 1909, with a block layout with two wings. The number of floors is G+1. Some elements of its authentic interior have been preserved. The roof is multi-pitched, roofed with roofing tiles.

DESCRIPTION OF THE EXISTING CONDITION OF THE STRUCTURE AND NEW STRUCTURAL SOLUTIONS

Structurally, the facility represents a classic massive masonry structure that has no vertical or horizontal round beams (characteristic structure for this period of construction). Roof structure of the existing facility is a classic wooden structure for multi-pitched roofs. Inter-floor structure in the existing facility is a wooden ceiling.

In line with the terms of reference, design company that is developing the design for the reconstruction of the Basic Court building appointed the team that visited the location and the building. The existing condition was surveyed on the spot, both dimension wise and with regard to possible damages to the facility.

The roof structure was constructed as a classic wooden structure for a multi-pitched roof. Roofing was done with roofing tiles. The inspection (as much as possible) of the roof structure established that the wooden roof structure is generally in good condition with noticeable minor damages. It is not necessary to disassemble the roof structure, but implement the reinforcements on the existing roof structure. After the removal of the existing roofing material, it will be possible to provide a detailed overview of the condition of roof structure during the reconstruction works. This design documentation includes certain quantity of timber with joining agents that will be applied to strengthen the existing facility's roof structure. Actual quantity and the need to reinforce the existing roof structure will be established on the site during the execution of works, and in agreement with the site supervisor. The assessment of the roof structure is provided because the designer at this moment is not able to inspect the existing roof structure's condition in more details due to inability to access the roof.

It is presumed that the structure between floors is made of wood. The inter-floor structure is generally in a good condition except for the part in the in-take office and the archive of the in-take office where significant deformations of the inter-floor structure are visible. The floor above the in-take office houses a courtroom, and deflection therein was probably caused by the overload with equipment in the courtroom as well as with other furniture necessary for the courtroom (presence of a large number of people). Designer's recommendation is to disassemble the existing wooden ceiling and construct a new ceiling in its place. This new ceiling in between floors can be constructed as a full reinforced concrete slab (which needs formwork and supporters) or semi-prefabricated ceiling (*FERT* ceiling or similar). Designer recommends this to be a prefabricated or semi-prefabricated ceiling in order to avoid the installation of formwork and a large number of supporters. Designer recommended in the design documentation a semi-prefabricated ceiling of "FERT" type. During the execution of works, the contractor together with the supervision can choose other type of pre-fabricated ceilings provided all static requirements given in this design documentation with regard to reinforcement quantity and required loads given in this design documentation are met.

The ceiling structure above the in-take office and archives (the part with the courtroom upstairs) should be a semi-prefabricated ceiling of *FERT* type, with a thickness 16+4cm=20cm. Hollow tiles should be 16cm high, and monolithic concrete layer 4cm. *FERT* beams to be placed at a distance of 40cm. *FERT* beams should include *Binor* lattice girder 2X8/8/4 and additional reinforcement depending on span. Beams must be doubled in line with the ceiling detail that makes integral part of this design documentation. Beams are placed at equal axis intervals of 40 cm.

Over the beams are placed infillings, with a minimal length of overlapping 5 cm.

During the execution of works, the ceiling is supported in intervals of 150 cm. The beams are positioned on load-bearing walls. Load-bearing walls serve as a base for constructing horizontal round beams that are monolithically connected with the inter-floor structure and they are concreted together.

The reinforcement bars of the pressed slab are anchored in horizontal round beams along the entire girth of the ceiling, at least 15 cm in length. A Q188 reinforcement mesh was designed as reinforcement for the pressed slab.

A rib for rigidity in dimensions 25x20 cm is constructed in a half of the bearing span; it is installed transversely on the beams (4Ø10 – bar reinforcement, Ø6/25 cm - stirrup).

The pressed slab is reinforced 1 cm below the top of the ceiling with reinforcement mesh in line with static calculation along the entire area of the ceiling.

Concrete at least MB 30 is used for the construction of monolith part.

For a span of up to 5 m the beam in the middle needs to be given super elevation L/300 and spans over 6 m super elevation L/200 (L=beam length).

Instructions of the ceiling producer must be followed in every case, as well as manuals and technical recommendations and instructions. When installing the beams, beams must be given super elevation of L/200= 510/200 = 2.55 cm.

STATIC CALCULATIONS AND DIMENSIONING

Calculation of the structure was done for permanent and changeable loads (usable loads), in line with valid technical regulations and standards.

Constant load

Permanent loadings are given according to the dimensions of structural elements and linings defined in the design of architectural phase. The weight of some materials was taken in line with JUS U.C7.123.

Live load

Architectural design defined the purpose of individual spaces, and live load on some structural elements was defined in line with their purpose; this was given in individual analyses of load in line with JUS U. C7.121 (1988)

Dominant impacts that were used during dimensioning and reinforcement of the new inter-floor structure above the in-take office and archives are bending momentum and transversal forces whereas normal forces were neglected. The calculation for the semi-prefabricated inter-floor structure was done according to the theory of limit load. The calculation was done as for full reinforced concrete slabs that bear in one direction, i.e. as a beam element with a 100 cm wide cross-section, and a width that is equal to the slab thickness of 20 cm. The calculated reinforcement is laid into beams.

Concrete type of all the main structural system bearing elements is MB 30. Reinforcement has the quality of RA 400/500 and MA 500/560.

GENERAL TECHNICAL CONDITIONS

FOR THE EXECUTION OF WORKS – CONSTRUCTION PHASE

CONCRETE AND REINFORCED CONCRETE WORKS

These technical conditions provide the criteria of quality and testing of the basic materials, technological conditions and controls over the execution of concrete and reinforced concrete works, as well as the preliminary control and the and control of fresh and hardened concrete, according to the "Rulebook on Technical Norms and Conditions for Concrete and Reinforced Concrete", SFRY Official Gazette, No. 11/87.

All concrete and reinforced concrete works must be executed by adequately trained manpower. Concrete must only be produced from previously tested materials in a concrete plant.
Materials to be used must also conform to technical requirements referred to in the aforementioned Rulebook, i.e. regulations on standards in Yugoslavia.

Concrete is to be made mechanically and transported exclusively in concrete truck mixers. Smaller quantities of concrete can be made at the construction site itself. During the entire operation, quality control must be strictly implemented in line with applicable regulations and rulebooks.
Concrete must be poured immediately upon mixing or at last until cement starts to bind. In case the cement started binding, such concrete must not be used.

Two different types of cement must not be used for concrete structures and parts.
During the works, tests must be performed on appropriate types of concrete before using it in every specific case, in order to establish the quality of concrete. For the materials that will be used for execution of works attestations must be acquired.
Preliminary concrete test cubes must be taken in line with regulations PBAB issued in 1987 (Article 41). Test costs are borne by the contractor, which must be included in the price of concrete.
Constructed formworks must be stable, resistant, rigid and sufficiently supported in order to prevent buckling in any direction. Internal surface of formwork must be flat so that visible areas remain smooth and with sharp edges once the formwork is removed.
Formwork for fair faced concrete must be smooth and dressed, constructed formwork with supports must be controlled prior to concrete casting by the site supervisor.
Prior to placing concrete, the formwork must be well wetted and concrete mixture poured soon after its mixing. A funnel must be used in order to avoid concrete segregation. Surface where the concreting continues must be carefully cleaned and wetted. Parts that are damaged must be removed and replaced with new ones.
Concrete mixing must be mechanical. Manual mixing can only be applied in extraordinary circumstances, when dealing with smaller quantities of concrete and upon approval by the site supervisor.
After the concreting, concrete must be protected against sun, frost etc. according to the regulations on concrete, for at least 10 days.
Prior to the concreting, all openings must be made according to the formwork plans. No additional chase cutting or cutting is allowed.

Hardened concrete must possess the following properties:

- comply with the requested mark
- meet the criteria for technically watertight concrete
- meet the criteria for frost resistance

Calculation must be done in accordance with actual executed quantities.
The price for 1 m3, i.e. 1 m2 or 1m of the concreting includes all material with waste, formwork, works, tools, transport, social contributions, taxes and all other expenses relating to these works in line with the regulations according to price structure. The price includes protection and wetting of concrete, and reinforcement is paid separately.
It is the duty of the contractor to acquire attestations and other evidence on the quality of materials that are installed for technical inspection.

* Scaffolding and formwork

During the construction, the following regulations must be complied with: "Rulebook on Technical Measures and Requirements for Concrete" SFRY Official Gazette, No. 11/87, "Rulebook on Protection at Work in Civil Engineering", SFRY Official Gazette, Nos. 42 and 45 issued in 1988, design and static calculation.
The quality of timber that is used for the construction of scaffolding and formworks must comply with standards, while the allowed stresses must be appropriate for the wood class used, taking into account the permanent exposure of the wood to moisture and elements and duration of the usage of formwork and scaffolding. Formwork should be constructed using planks, beams and lathing made of fir timber, i.e. hewn conifer timber should be used for the construction of formwork.

REINFORCEMENT WORKS

Reinforcement is to be done according to the valid technical regulations and rulebooks for the usage of concrete steel.

The contractor must supply steel for the construction of reinforcement according to the specification in drawings from producers whose products were attested by an authorised expert organisation that has attestations not older than 6 months.

The supervising engineer is to check whether the supplied reinforcement steel has prescribed markings (producer, type and quality of steel, dimensions etc.) and that they are delivered with prescribed certificates of quality for the delivered quantity of reinforcement steel.

Assembled reinforcement bars must be inspected by the site supervisor prior to the concreting; also, the building log book must state that it was properly installed and bound.

Reinforcement bars must be clean from dirt and rust, and position and distribution of individual bars should be secured with bar supports, paying attention not to disturb their distribution during the concreting. Special attention should be paid to the thickness of the protective layer on the reinforcement so that bars are not left uncovered.

The contractor is obliged to strictly comply with the provisions of the Rulebook on Measures and Norms of the Protection at Work.

Calculation of the assembly of reinforcement bars is to be done according to theoretical weights. Waste when cutting, bar supports and the rest are included in the price and not paid separately.

Unit price comprises the value of basic and auxiliary material, transport, manpower, tools, installation and relocation of movable scaffolds, and construction of temporary stiffening and other.

CARPENTRY WORKS

Carpentry works must be done precisely in line with the design and static calculation. In a case that some structure in the design documentation has no such calculation, the contractor is to make it himself or request the designer to provide it. Prior to the treatment of joints, timber cutting or making drawings on the floor, the contractor is to recheck all measures, survey on the building and check on drawings. The construction of floor for the sake of drawing and cutting wooden structures of the roof is included in unit price of the item and shall not be charged separately. Delivery, treatment, assembly, numbering, disassembly, transport to the installation location, assembly and strengthening the structure are included in unit price in the cost estimate. This also includes material waste, possibly necessary treatment of joints, drawing levels etc.

Timber and joining material for the construction of new roof structures must completely comply with the Rulebook on Technical Regulations for Wooden Structures. Timber used for the roof and parts of the roof must be dry, clear and logged in the winter. Sawn timber is made of fir logs, except for the parts that are exposed to weathering which must be made of pinewood.

Old, rotten timber or waste pieces must not be used. If beams and planks are not sufficiently air dried, they must be dried in the kiln.

Roof structure is to be made of adequate profiles of beams and types of wood in accordance with the design. The contractor must install all necessary hardware. Roof beam caps that lie on the walls must be impregnated and supported by oak staves.

Roof lathing as preparation for roofing with roof tiles must be done with adequate staves at adequate intervals. Adequate nails must be used for the joining of planks and staves.

FERT TYPE SEMI-PREFABRICATED CEILING

Beams are placed at equal axis intervals of 40 cm (or 50)

Beams are covered with infillings, if the beam vertically leans on the wall minimal length of overlapping is 5 cm.

During the execution of works, the ceiling is supported at each 150 cm. The beams are leaned on bearing walls or beams. Horizontal round beams that are monolithically connected to the floor structure and concreted together will be constructed on bearing walls.

The reinforcement bars of the pressed slab are anchored in horizontal round beams along the entire girth of the ceiling, at least 15 cm in length.

A rib for rigidity is installed when a ceiling span is larger than 4 m, and if a span is larger than 6 m two ribs are installed on one third of the span.

The pressed slab is reinforced vertically on beams 1 cm below the top of the ceiling with reinforcement mesh in line with static calculation along the entire area of the ceiling. Concrete of at least MB 30 is used for the construction of monolith part unless the design defines otherwise. Prior to concreting, the surface must be cleaned and well protected with water.
The concrete must be properly installed, pressed and cured.
Minimal thickness of the pressed slab is 4 cm
For a span of up to 5 m the beam in the middle needs to be given super elevation L/300 and for spans exceeding 6 m, super elevation L/200 (L=beam length).
Supports may be removed after 14-28 days.
All works must be done with due care and following the protection at work measures.

PART III: ELECTRICAL INSTALLATIONS

1. INTRODUCTION

The public structure, the building of the Basic Court in Foca is located in the 17 Njegoseva street and it is the subject of this project and has the ground floor and floor. The project of the electrical installations for this structure includes: the electricity supply, electrical installations within the structures (sockets, switches, gates), electrical installations for mechanical equipment supply, installations of the internal lighting which are compatible to the design and Preliminary design, installation for the potential levelling, grounding and lighting installations, installation of computer and telephone network. The project was harmonized with the architectural-construction project, with the mechanical project, the investor requirements, everything pursuant to the valid regulations and standards for the respective types of installations and devices. The project harmonization with the executed situation of the construction works to be checked on the spot.

Remark: Having visited the structure, inspecting and recording of the existing situation as well as talking to the staff that work in the court building in Foca, we concluded that it is the best to make completely new electrical installations, namely to make new electrical installations in the complete structure. The Investor does not have any project documents related to the electrical installations, so that we cannot determine what belongs to any circuits, namely which parts protect some fuses from the distribution boards. In order to determine this, and also the situation of the existing fuses in board, it is necessary to make testing and measuring of the existing installations from the companies which have the licenses for such works. A part of installations which is under mortar is old, namely installation cables as well as the sockets and switches are old and shabby. Another part of installations is additionally added and cables are placed in the conduits which are put on the wall, and also power outlet boxes with the transparent cover as well as the power outlet switches are used. Also, we were informed by the court premises' users that the installations were burnt beginning of May, which was firstly noticed by the accountant because the distribution board of the floor was in his office. After that, the electrician came to carry out some rehabilitation work. Having in mind that there will be reconstruction of the whole structure (walls, etc.) and considering the significance of the structure, we think that it is necessary to carry out the complete replacement of electrical installations and distribution boards.

2. TECHNICAL PART

2.1. Supply of the structure with electricity

Supply of the structure with electricity was foreseen pursuant to the town-zoning technical conditions based on the requirements of the responsible electric distribution company. The connection to the low voltage distribution network was foreseen through the cable connecting box (KPK) which is put on the external wall below MRO, using the cable PP00 4x50 mm2. Such connection is not the subject of the project. Total installed capacity of the structure is Pinst=118.643 kW, while the total peak capacity Pmax=71.1858 kW (with the simultaneously factor η=0,6). Simultaneous maximum current of the customer is Imax=108.284 A.

The capacity of the electrical cable is 141 A, while the fuses are NV 125 A.

Remark: According to the information verbally obtained from the representative of the responsible distribution company, the current supply of the structure goes from the sub-station to one of the buildings nearby, using the cable PP00 4x95mm2, and from that building to another building with the same cable, and from that particular building to the building of the court with the cable of PP00 4x25 mm2. Taking into account the importance of the building, we propose to foresee the structure to be supplied directly from some of the sub-stations nearby. In the vicinity of some 70 m from the court building, there is a Sub-station Centar of 3 630 kVA so we think that it would be good to provide supplying of the court building from that sub-station, if there is sufficient remaining capacity there.

2.2. Metering of electricity

At the structure facade, on the place marked in the drawing, there is a metering distribution box (hereinafter MRO) which is placed along the cable connecting box. The responsible distribution company will determine the exact position of the MRO. Position of the MRO and KPK was determined based on the position of the existing KPK which is located at the northwest facade. It was planned to install MRO in the wall, at the distance of 1,2 m from the standpoint, whereby the responsible distribution company will determine the conditions around MRO which may be the free-standing ones. The same was constructed from the twice pickled sheet, level of protection of IP 54, with door and lock (type of the lock and key determined by the responsible distribution company), with the glazed hole for reading of electricity. In the metering box, semi-direct metering of electricity was foreseen (voltage is directly metered, while the current is metering through the current transformer. If the maximum simultaneous capacity has the value exceeding the most allowed current of the counter, semi-indirect metering is used – TP13). Metering digital three-phase two-tariff meter with three metering elements is located with a possibility of metering active and reactive energy, the current metering transformers of the class of accuracy of 0,5 electric dial as well as the appropriate fuses NV and automatic fuses, everything pursuant to the appropriate single-line diagram.

2.3. Distribution of electricity

The main distribution box (GRO) is located in the central hall on the ground floor at the place where there is the existing GRO. GRO is consisted of the network and UPS part.

The main switch, located in GRO, is equipped with voltage trigger which disconnects supply of all customers in the structure in case of activating the fire alert central, except the safety system. It is necessary to install the GRO in the wall. The same was made from the pickled sheet, level of protection IP 44, with door, lock and key (type of the lock and key is determined by the responsible Distribution company). It is necessary to connect PE and N busbar in GRO. GRO is consisted of the network and UPS part. Apart from the compact switches and modular automatic switches in GRO, there is also surge arrester, signal lights as well as bypass switch which purpose is to switch from the network to the UPS supply.

UPS is located in the technical premise (server room). In the normal mode of operation, UPS behaves as the pass, as the closed breaker, delivers the network voltage, and with disappearance of the network supply, UPS takes over the obligation to the supply of certain customers by itself and they empty in such a way so that in any moment, the supply of the top priority customers is ensured. The supply of lighting of the server room and detention place was planned from UPS, the supply of server room, firefighting and anti-theft system, system of the video surveillance, floor modular box in the court room and KO and in the pre-entrance of the court room.

There are three more distribution boxes in the structure. On the ground floor, at the place marked in the drawing, there is RO-1 which is consisted of the network and UPS part and serves for supply of customers in the ground floor. At the floor, at the place marked in the drawing, there is RO-2 which is also consisted of the network and UPS part and serves for supply of customers on the floor. There are wall cupboards, installed with vertical division in the network and UPS part. On the floor, there is also a distribution box RO-M which serves for supply of the mechanical equipment (installations). The distribution boxes were made of the pickled sheet, level of protection of IP 44. It is necessary to install the current protective busbars with the voltage triggers, automatic switches, main fuses of the circuitries, zero and protective busbar. Distribution boxes should be equipped with the equipment according to the one-line diagram and specification in the estimate, door with the standard lock and key, nameplate, warning, one-line diagram and certificate of producer.

The electrical cable PP00 4x50 mm2 from MRO to GRO is laid on the floor through the court police premise to the hard PVC pipe. The electrical cable path was shown in the drawing number 17.

From GRO to UPS in the server room as well as from UPS to GRO, the cable PP00-Y 5 x6 mm2 is laid.

The energy distribution from GRO to the distribution boxes was foreseen with the cable with the cooper lines and sheet of PVC mass, type PP00-Y. GRO is connected with the distribution boxes of the ground floor (RO-1-M) and floor (RO-2-M) cable PP00-Y 5x25 mm2 and PP00-Y 5x4 mm2 for the network and UPS part. GRO is connected with RO-M cable PP00 – Y 5 x 16 mm2.

The cables are laid from GRO to the distribution boxes at the perforated cable rack 200/50 as presented in the drawings number 17 and 18.

Other cables are of the type PP-Y (sockets, modular boxes, leads, PP-Y 3x2,5 mm2 and PP-Y 5x2,5 mm2, lighting PP-Y 3x1,5 mm2). These cables are laid PODZBUKNO, under the ceiling and in the floor in the appropriate PVC pipes. The least distance between them should be equal to the diameter of the longest cable, in order to avoid reduction of the cable capacity. Dimensioning of all lines was made for the nominal current, accepting the factors of laying and other conditions of technical requirements.

The lowered ceiling and perforated cable shells are foreseen in the corridors and these cables are laid on that part of the path on them. The supply of most job positions is provided through the floor modular sockets pursuant to the layout of the furniture in them. While laying the cables in the floor, it is necessary to put them in hard PVC pipes.

Perforated cable shells are of dimensions of 200/50 and are laid below the lowered ceiling of the ground floor and floor as presented in the graphical part of the project. They are laid on the carriers which are fastened to the wall. Carriers are laid on every 80 cm and they are laid on the same carrier in the PNK of the low voltage current.

Parallel leading of lines with the smoke channels or heating pipes should be avoided. If it is not possible, the lines should be lay at about 5 cm of distance. While crossing the lines with the smoke channels and similar, the distances between the lines and channels should be at least 3 cm. The electrical lines should be protected against heating with the appropriate thermal insulation.

The cables' dividing should be exclusively done in the distribution boxes, and between two connection points, namely distribution boxes, the cable should be in one piece (it is not allowed to go on with the cables out of the distribution boxes).

For ventilation and air-conditioning of some premises of the structure, it was foreseen with the mechanical project, the system of ventilation and air conditioning with equipment, characteristics and layout pursuant to the technological bases of the mechanical phase. The electrical phase realized the supply of the mechanical equipment (heat pumps, fan coil devices and ventilators), everything in agreement with the mechanical phase designer.

2.4. Lighting

Installations of lighting were foreseen pursuant to the architectural interior requirements.

Types of the lights were agreed with the author of architecture, designer, investor as well as with the requirements prevailing in some premises (type of the ceiling, humidity, level of dust, etc).

Level of lighting complies with the IEC norms and Terms of reference in which the intensity of level of lighting for each premise was defined.

For the offices' lighting, the fluorescent overhead lamps type as 774 Comfort T8 4x18 W G13 EB, Disano or similar and 774 Comfort T8 2x36 W G13 EB. Disano or similar was foreseen.

For the corridors' lighting, fluorescent installed lamps, type as 874 Comfort T8 4 x18 W G13 EB, Disano or similar, and for the lighting of the passage to the external exit, fluorescent overhead lamps type as 774 Comfort T8 2 x 18 W G13 EB. For lighting of sanitary blocks, the appropriate water-tight lamps were foreseen. Above the sink in the sanitary block, fluorescent water-resistant lamps 1x18 W, with the installed breaker. Above the entrance door, the

wall reflectors IP65 were foreseen. For lighting of the detention premise, the ceiling lamp IP 44, 12 V, 12W supplied through the protective substation 230V/12V/2,08A-24V/1,04 A was foreseen.

Also, the emergency lamps were foreseen in the structure (ant panic lamps – with appropriate labels with or without pictogram with fluo pipes 1x8 W, 230 V, rectifying set and acu battery with three hours of autonomy).

At the appropriate draft, there is a minimum required capacity of the lighting bodies.

Normally, the lamps of any other producers may be installed provided that they have the stated technical characteristics and appropriate level of protection. Complete installation of the lighting was foreseen with the cables of the type PP-Y 3 x 1,5 mm2.

2.5. Installation heights

Installations of the connectors as well as their layout to be executed as presented in the appropriate drawing. All connectors to be installed at the height of 0,30 m, apart from one connector in the court room which is placed at the height of 2,2 m and serves for supplying of big LCD monitor as presented in the graphical part. The hand-drier should be placed at the height of 125 cm from the floor. The connector for the electrical cooking stove in the kitchen should be left at the height of 0,6 m. The boiler leads to be left at the height of 1,6 m.

Parapet conduits should be placed at the height of 15 cm from the floor in order to avoid their damaging with the chairs.

The lighting switches should be installed at the height of 1,4 m from the ready floor level. Connector, lighting switches and distribution boxes should be taken under the mortar with appropriate protective elements.

Installation of the connectors as well as their layout should be executed as presented in the appropriate drawing.

2.6. Protection against the power surge

For protection of people against the power surge, the system of TN-C-S was adopted, with the grounding unit placed about the structure foundation at the distance of 1 m, as presented in the drawing, as the basic and with measures of levelling potential in the structure, which represents the additional protection measure. The earthing should be tied (FeZn tape 25x4 mm) with the main, railway for the potential levelling GSPI which is located near KPK. With GSIP cable PP00-Y 1x16mm2, the pipes of the water supplying are connected with the sewage system, antennas, namely all metal masses and accordingly the same are included in the system of the main levelling of the potential. With GSIP cable PP00-Y 1 x 25 mm2, the connection is established with the busbar for the protection lines in GRO. The installation is dimensioned in such a way that the resistance of the loop till the most distant customer is such that the protection devices interrupt the circuitry in time, harmless for man and it is 0,4 sec for the customers in dry areas, namely 0,1 sec for the customers in humid premises in case of the one-line short circuit. This was proven by the enclosed estimate.

In the sanitary blocks, additional levelling of potential was foreseen. Namely, for the rails for the earthing in RO-1 and RO-2 with the conductor P/F-1x6 mm2, the busbar for levelling potential in the sanitary block was connected, and from this busbar with the conductor P/F – Y – 4 mm2 in more flexible PVC pipes of 11mm of diameter all metal masses in bathrooms, everything pursuant to the enclosed detail.

Also, from the rails for earthing in RO-2 with the conductor P/F – 1x16 mm2, the box for levelling potential in the pre-entrance to the court room is connected. From this box with the cable P/F-1x10 mm2, the communication box of the floor and rack box, which is located in the court room, are connected. The connection is realized by folding.

For the purposes of levelling of the potential in the server room, it was foreseen to lay the tapes FeZn 25x4 mm below the raised floor applying appropriate carriers of the tape, as presented in the drawing 24. The earthing of the server room is connected with the earthing which goes around the structure foundation. The communication boxes

are connected with the cable P/F-1x10 mm2 with the tape, through the contact element of the wire-tape and screw. The floor is anti-static and its connection was made with the tape FeZn 25x4 through the cable P/F-1x10 mm2 as presented in the drawing number 24.

Also, to make the galvanized bridging of the PNK cabinet with the cable P/F – 1 x10 mm2.

Upon completion of the works, the contractor is obliged to measure the resistance of the damage loop and prove the regularity of installations.

2.7. Lightning protection system

For protection of the structures from the atmosphere discharges, the installation of the classical lightning rod in a form of the Faraday cage. The accepting system is the steel galvanized tape FeZn 20x3 mm, which is connected with the structure roof. The tape is installed with the carrier for the roof line. The carriers are placed at the roof ridge at the distance of 0,8 m while on the other part of the roof, they are laid at the mutual distance of up to 1 m as presented in the graphical part. Lightning installations (8 in total) were made of the tape FeZn 20x3 mm, which are installed applying the support for the wall.

From the earthing system, the tape is led to the metering (testing) point. The metering joint is made by folding one tape with another in the length of up to 10 cm, fastened with two screws M8x30, all of it in the tin for the metering joint, made in the line with the facade element at the height of 1,8 m from the ground.

The earthing is foreseen as the joint for both grounding of the lighting rod and for protection. From this earthing, it is necessary to leave the leads (which are also of FeZn tape of 25 x 4 mm) and it is about the following:

- leads for the metering (testing) joint – 8 pcs
- lead for the connection with the rail for the main leveling of the GSIP potential which is located near KPK – 1 pcs
- lead for the connection with gutters – 4 pcs
- lead for the connection with the earthing in the server room – 1 pcs
  Maintenance of the lightning installation should comply with the standard JUS N B4.802. Control of the lightning installations can be done only by the authorized person for that kind of works everything pursuant to the standard JUS IEC 1024 – I point 4.2.1 and 4.2.2. Visual control is done once a year, while the full control is carried out every two years.

TECHNICAL DESCRIPTION – LOW CURRENT

1. INTRODUCTION

The public structure, the Basic Court building in Foca, is located in the 17, Njegoseva Street and it is the subject of this project and has the ground floor and floor. The low voltage current project was made based on the Terms of Reference of the Investor and pursuant to the Construction architectural design and of other installations. The following installations were foreseen in the structure:

- Computer and telephone installations of the structure
- Installations of the system for the fire detection
- Installations of the anti-theft system and access control system
- Installations of the video surveillance
- Installations of the audio-video system of the courtroom,

The project has been harmonized with the architectural-construction project, with the mechanical project, investor requirements, everything pursuant to the valid regulations and standards for the respective types of installations and devices. Harmonization of the project with the executed situation of the construction works to be checked on the spot.

2. TECHNICAL PART

3.1. Structured computer-telephone network

The system of the structured cabling was planned, in order to ensure the maximum functionality of the institution, pursuant to the technology of work of the judicial institutions. The principles of the structured cabling were defined by the standards ISO/IEC 11801, EN 50173, EIA/TIA 568B, whereby these standards take into account all necessary elements for realization of the multimedia and communication system of one structure with the following types of services: voice and file transfer and transfer of picture. The essential advantage of the structured cabling is utilization of the uniform cable system for all installations transferring any pieces of information in the bandpass of up to 600 MHz. It also includes the transfer of voice, picture and control signals as well as a very quick file transfer. The only interface to the beneficiary is the wall jack with RJ 45 connectors which either computer or telephone can be connected to, which further leads to the appropriate dividers and active device through the cable system. Constructing the system of the structured cabling reduces a possibility for mistakes at the most sensitive part of the network system, in the cable infrastructure. The network structure is such that after the installations, without any type of interventions at the cables themselves, the whole network can be re-configured in a completely different way, depending on the needs of beneficiaries. It is achieved at the dividers themselves, namely on the patch panels which are required to be constructed for easy and simple switching over and desirable network configuration. This option is particularly noticeable in those situations when physical layout of the job positions in the building is modified. The administrator in charge should only switch over at the appropriate dividers and the user at his new job position should connect both his telephone and network to the wall power socket and make it operating.

The same applies for his computer to be connected to the computer network, his telephone is at the same extension number as he/she used to be before. Apart from the great flexibility it offers, the structured cabling, thanks to its systematic approach, enables simple and efficient network administering, easy extension of installations and something that is perhaps the most important – it is completely independent from the type of active devices used for both, telephone and computer network. Even those devices that they do not comply with the standards of the structured cabling and do not have appropriate connectors may be connected to the system applying appropriate simple rectifiers.

The MDF communication box is located in the Server Room which is on the structure ground floor. In this premise, there is also a Server chamber, depth of 100 cm. Active network equipment (routers, switches, firewall devices, AAA controllers and similar) which is not the subject of procurement through this project, will be concentrated in the redundant configuration in KO-P. Core devices are connected in a way to enable the logical network segmenting (Wlan and etc.).

Passive and active equipment will be adapted to the current and future requirements of the investor.

For the computer-telephone installations, UTP Cat 6 cable is used and it takes towards the connecting points with RJ 34 socket of the category Cat 6 and at the both sides it ends with the connector Cat 6, armored. Passive equipment (patch panels, sockets, cables) will be at minimum of the category 6, pursuant to the Terms of Reference. For each job position, double RJ45 Cat 6 sockets have been foreseen as requested by the Terms of Reference. Two UTP Cat 6 cables, used for either computer or telephone network, are led towards each connecting point as indicated in the drawing. Connection of the telephone and computer socket is carried out in the mounting box for the parapet channel or in the floor modular box with the cover.

Cables are laid partly in the galvanized cabinets, partly in the parapet channels with the separation wall and partly in the floor. Cables are laid from RACK to each socket, without continuation and interruption. Additionally, it is necessary to take into account that the maximum length of UTP cat 6 cables between the main divider and socket must not exceed 90 m.

On the floor, in the hall before the court room, the communication cabinet of the floor KO-S (IDF) was planned being connected with the MDF cabinet, with the cable 4 x UTP cat 6.

Communication cabinets will be supplied through the separate fuses directly from cabinet of the EE network. All active network equipment should be in UPS.

The switching system shall be located in the Server room at the place marked in the drawing. It was not treated by this project. There is an existing switching system in the structure which might be used. If the Investor plans to use the existing switch system, convergence to IP telephony can be gradually made, using special devices of VoIP Gateway. This device in real time converts the voice and fax calls between the public telephone and IP network. VoIP Gateway make compression/decompression of voice, switching, call routing and control signalization. There is a position of the inlet telephone cabinet presented in the drawings which is located in the corridor. Currently, the structure has the telephone line through the telephone cabinet which is located in the southwest side, on the wall but in a very bad conditions, it does not even have the cover.

From the inlet cabinet of the switching system, laying of the cable J-Y (St) nx2x0,6 in the hard PVC pipe.

While executing these installations, it is necessary to take care of rules, which were specified by these or some other additional standards. It is about the radius of the cable bending and distance of the power lines.

The radius of the cable bending is defined in order to avoid cable physical damaging and its electrical performances. The bending radius is defined in ratio to the radium of the cable D or absolute value as presented in the Table.

Table 1: Bending radius

Cable	Bending radius
UTP horizontal	4D
UTP vertical	6D
UTP while withdrawing	8D
STP	75 mm
STP reinforced	150 mm
Optically unloaded	10D, min 30 mm
Optically loaded	202D, min 30 mm

The distance from the power cables is controlled in order to ensure non-cross talk of the signal of 50 Hz and early disturbances caused by the turning on/off of the customers. Minimum distances differ from the unarmored and armored energy cables, and the values are given in the Table 2.

Table 2: Minimum distance from the energy cables

ENERGY CABLE	<2kV	2-5kV	>5kV
Unarmored, near the open or plastic channels with the lines	127 mm	305 mm	610 mm
Unarmored, near the metal grounded channels with the lines	64 mm	152 mm	305 mm
In the metal grounded channel, near the metal grounded channels with lines	-	152 mm	305 mm

The distances are considerable for the lines placed in parallel. If it is about the channel crossing, small deviations may also be tolerated in the practice.

Cable CAT-6 (ISO Class E) is applied in the structured local networks of the class E for file transfer and transfer of voice of high speed, at the primary, secondary (vertical) and tertian (horizontal) level. It is standardized for application up to 250 MHz (in certain configuration, up to 500 MHz may be used).

The network types in which it is used:

- ISDN
- IEEE 802.3 10BASE – T Ethernet 10 Mb/s
- IEEE 802.3u 100BASE – T Fast Ethernet 100 Mb/s
- IEEE 802.3 ab 1000BASE – T Gigabit Ethernet 1000 Mb/s
- IEEE 802.5 Token ring 16 MB
- IEEE 802.12 100 VG AnyLAN
- TP-DDI
- ATM 155, ATM 622, ATM 1200
- Limited: 10 GBASE-T

Length of this cable in 1000BASE-T network is limited to maximum 100 m (usually to install the cable of maximum length of 90 m, with the connecting cables up to 5 m at each end). It can be used in 10 GBASE – T networks, but with maximum length up to 55 m.

The point of connection is determined by the responsible Telecom upon development of the project documents.

3.2. Installations of the system for the automatic fire alert

The project includes the system of the fire alert pursuant to the Terms of Reference. The addressable switching system, manual and automatic fire alarms, alarms of devices as well as other elements of the system for the fire alert have been foreseen.

The fire-alarm system was designed as the local safety network of mutually connected automatic and manual alarms with the central fire alarm. The switching system will be located in the premises of the Court police following the Terms of Reference, in which 24-hours' presence of the trained staff is provided. The main switching unit contains the power unit, control set and module with two zones (up to 64 elements). The system control is realized through the control keyboard at the front side of the switching system which contains LCD

display on which there is a menu for the system control. Along with the fire alarm system, there should be a book on maintenance of the fire alarm system in which all data are to be inserted (dates of all tests, noticed failures, method of removal of those failures, false alarms and possible causes of those false alarms and similar) and periodical reviews of the system. Near the switching system, the following documents on the system for the fire alarm should be stored: the book on maintenance, the alarming plan, plan of the system for the fire alert and guidelines for handling and maintenance. Before each checking, it is necessary to go through the book on maintenance in order to get possibly useful data from it for such a checking.

The periodical reviews of the system are needed. The periodical review should determine:

- Whether all automatic and manual detectors react in a proper way,
- Whether all functions of the central device are regular,
- Whether all other devices of the fire alert system function properly;

The system user is obliged to take care of regular realization of the periodical reviews and enable normal work of the persons who carry out the checking.

For the purposes of connecting the fire alert detectors, as well as internal and external sirens, halogen-free fire alert installation cable, of the improved properties in case of fire, with preserved electrical functionality up to 30 minutes of the type JEB-H (St) H E30 2x2x08, mm will be used. One pair is used for the detector supply and another for the loop closure. Incoming telephone line till the telephone combiner is also executed through incombustible fire alert cable JEB-H(St)H E30 2x2x0.8 mm. The cables are laid in the drop ceiling in PNK cabinets and in PVC pipes below the surface of mortar. Fire alert system will be supplied through the separate fuse (red color) of the distribution board of the ground floor – UPS part. While laying the cables for the fire protection, it is necessary to comply with the distance from the energy line as well as for the telephone installations. From PPC to GRO, the cable PP00-Y 3x1,5 mm2 is laid for disconnection of the main supply.

In this case, all detectors are connected to the addressable fire alert central.

The Terms of Reference requested detectors in all premises to concurrently react on smoke and fire outbreaks. Detectors of the optical-thermic detectors were selected except in the premises of kitchen (thermic) and in the detention premise (optical-thermic-chemical). There are manual detectors of the fire for the internal mounting at the main communication parts of the structure. Manual detectors are located at the ways planned for case of emergency (evacuation). Each manual detector should be accompanied by the nameplate clearly indicating the purpose and method of turning on. There are also 4 optical-thermic detectors with parallel indicators.

Parallel indicators are the devices which generate visual indication of the alarm and are used in cases of mounting of automatic fire detectors at the visually unreachable places (below the lowered ceiling, in the double floor, in GRO and similar). Parallel indicators are connected in a parallel way to the detectors which effects should be signalized. The position of the automatic detectors is harmonized with the position of the ventilating holes and channels and with the position of the lights in such a way that the least possible distance is 50 cm, and for the purposes of providing the equipment functioning.

The staff alarming is made with sirens for internal and external mounting which should be positioned at the places from which the structure is appropriately covered with the sound signaling, as well as the blinkers for the appropriate visual signalization. Sirens should be connected to the central with the halogen-free fire-alert installation cable, of the improved properties in case of fire, with the preserved electrical functionality up to 30 minutes. Sirens should be tied to the exits for the sirens of the fire alert central.

While detecting the fire in any part of the structure, there occur: the siren activating, disconnection of the main distribution cabinet and remote fire alert.

Remote fire alert, which is meant by the notification to the fire fighting service, as well as to other responsible persons, is performed through the voice dialer at the direct telephone line.

Short period of delay (cca 60 seconds) is the control of presence. It is a method of checking of the person on duty and his reaction to the alarm. If the person on duty did not react within 60 seconds, the general alarm automatically occurs.

When the person on duty in the switching office disconnects the acoustic alarm, another period of delay occurs - control of exploring. This delay is adjusted for a longer period, depending on the distance of the endangered area from the premise in which there is a central for the fire alerts, e.g. 5-7 minutes.

In this period the person on duty should inspect the fire, if possible to eextinguish it and bring the switching system to the initial position (to reset it). If the switching system is not brought to the initial position back within the given time, the alarm will be automatically transferred as the general alert.

Activating the manual detector of the fir, the general alert is automatically activated. The person on duty then acts following the prescribed procedures in a case of fire: he calls the firefighters, helps extinguishing it, helps in the evacuation process, etc.

It is not allowed to jointly lay in one pipe, cable, separate channel or vertical position the circuitries with the voltage of up to 50 V, with the circuitries of voltage that is more than 50 V. The insulation resistance between the lines and ground should be at least 500k. In order to measure the insulation resistance, it is not allowed to use the instrument with the voltage of more than 50 V, unless all parts of the stable insulation are separated from the line and cable.

3.3. The system of the anti-theft protection and system of the admission control

According to the Terms of Reference, the anti-theft system and system of the admission control have been foreseen in the structure. The anti-theft system includes the monitoring of movement in all admissible and communication parts of the structure. The anti-theft central is located in the premise of the Court police in the ground floor. All entrances to the structures and exits to the corridors for each floor of the structure are protected with IC addressable detectors of movement.

The anti-theft station is place at the height of 1,6 m from the ground. The anti-theft station will be supplied through the separate fuse of the distribution board of the ground floor – UPS part. It is modular with the main module in the metal housing, 8 zones, 2 partitions and it supports up to 2 keyboards of the memory of 254 events. The integrated communicator for alarming of the theft to the city police station and responsible security persons, the memory of 254 events.

The installation for detectors of the theft is carried out with the cables of the type of 6 AF 22 + 2x0,75 mm with the insulation which may persist the temperature of up to 80 degrees, and are laid in the lowered ceiling, and along the wall in plastic pipes. One pair is used for the detector supply, and another for the loop closure. PIR detectors are laid at the height of 2,3 m.

The access control systems are often planned as the independent concept or as a part of the comprehensive technical protection concept. The access control systems use for surveillance and physical protection of the buildings or their parts. The basic task of the system is to allow the admission – entrance or pass – exclusively to the authorized persons. The admission is enabled or prevented by the automatic action of the system, in most cases, with the electric locks which are inserted in the door framework. It was foreseen that the system of the admission control in the building of the basic court in Foca ensure the admission control of the visitors and servicers, as well as the control of entrance and exit of the staff in the structure. This system is a standard part of the equipment of most business and housing structures. The integral parts of the system for the admission control are:

- Card readers – electronic devices for identification of persons which are forwarded the data, read from the card to the controller which the data are processed on
- Controller – the main control unit which the card readers are connected to
- Electric locks
- Computers – with appropriate software for the system configuration, monitoring, control and reporting;

In this system of the admission control, modern devices for control of entrance-exit of the staff as well as for the evidence of the working hours of the staff are applied. Using the card for pass, the employee may see his/her statistics of working hours at the display of the device, reading the card.

Installation of the server for control of the admission with software for configuration of the system of the admission control is planned in the server room, with licenses for connection of 64 readers and 2 clients (maximum 16), capacity of up to 100000 cards in the system. The controllers for readers are located at the places of all entrances in the rooms and corridors according to the Terms of Reference. Also, they also cover the entrance in the server room, archives and premises planned for the stolen property. They are placed at the height of 1,5 m from the floor.

For correction of the controller at the local computer network, FTP cat 6 cables will be used. For correction of the reader with controller, AWG 22 cable is used, 10-vein. For supply of the electric receptor of the lock, LiYCY 2 x 1,5 mm is used.

3.4. Installation of the system of the video surveillance

The video surveillance becomes an obligatory segment of the technical providing and surveillance of the structures of all sizes. Due to application of the digital technology, the system of the video surveillance is an integral part of the interactive system of technical protection. External or internal, hidden or for special purposes, camera may be controlled manually or automatically, thanks to the detector of movement and its signal may be reviewed in real time at the monitors which show the pictures from 1 or more camera, or even kept a the hard disc of digital recorder. The picture from the video camera may be at the same time, in real time, shown also on the TV receiver, computer monitor, new generation of GSM telephone or at the website which you have an access to from any computer or GSM telephone which have the access to the internet.

The purpose of the planned video surveillance is to enable the monitoring of the structure and equipment and digital video recording of the obtained video material. The system is connected to the backup UPS supply and as such it is planned for the normal operation in all conditions. Video surveillance system of the buidling implies the installation of the central server in the redundant configuration, installation of cameras of high quality for internal and external mounting, IP recorder DSA-N2B20-06AT and color monitor of the high resolution for control.

There are 17 cameras installed in the structure, in total whereby there are 11 internal and 6 external cameras. The layout of cameras is shown in the drawings. All cameras which are mounted at the open area are located in the thermal stable housing with IP66 protection and thermostat, heater and ventilator. For the purposes of the server room, the video surveillance is also anticipated with the surveillance cameras covering the server room, access to the server room and external area in front of the server room. Monitor for surveillance is located in the court police premise. (Terms of Reference at first required one monitor more in the premise of the court secretary, but since such a premise does not exist and in discussion with the representatives of the Investor, it was decided to put only this monitor in the court police premise).

The camera supply is executed with the cable FTP cat 6.

Before laying the cables, it is necessary to consult the equipment deliverer.

3.5. Installation of the audio – video system of the court room

This project did not foresee the installation of the audio-video equipment but only to bring the installation (installation cables) to the place foreseen for installation of this equipment, everything pursuant to the Terms of Reference.

The installations are led from the typist desk, below which there will be mini rack cupboard the width of which is 19" height 10 U. All technical equipment, required for the audio signal recording on the computer of the typist, distribution of video signal to the monitors in the court room and the typist computer itself will be placed in this cupboard.

The installations for pan-tilt, IP camera of high resolution controlled by the operator are foreseen. They will be supplied through the FTP cable cat 6. Till the desks of the parties within the court room till LCD monitors which broadcast the picture of the trial course, video records as the evidence and pictures of witnesses during the trial course, the coaxial cable 75 is foreseen. All of these mentioned will be presented on the big LCD monitor which position was agreed with the architect.

The cable LiYCY 2x2,5 mm is foreseen to the passive loudspeakers. They are placed on the walls of the court room and the sound will be reproduced on them.

The audio system should have the rack with the installed microphone (at least 30 cm) with 2 audio outputs for the earphones. The microphone has on/off button and red indicator (when it is on) at each position. Professional microphone cables Proel have been foreseen for the microphones.

Separate independent system of the earphones with amplifiers for earphones has been foreseen. The cable LiYCY 2x0,22+S has been foreseen for them.

PART IV: MECHANICAL INSTALLATIONS

1_GENERAL

The Facility of the Basic Court in Foča consists of the ground floor that houses the offices for judges and court police, clerk's office, server room, archives and others. On the ground floor, an entrance hall with security was envisaged. On the second floor the offices of the same purpose as on the ground floor were envisaged, however, there is an office for stolen property and detention. In the attic, an area for HVAC equipment was envisaged.

Design documentation of HVAC installations was completely developed in line with: architectural-civil engineering design, town planning requirements, Law on construction of buildings in the Republic of Srpska, standards as well as valid regulations and recommendations for this type of installations.

Outdoor design parameters:

- summer t_{sp} = +32˚C, rv = 62%

Indoor design temperatures in air-conditioned premises:

- summer tun = 26 (+/-) 2^{o} C

In order to achieve the required thermal conditions in the facility, the following systems were envisaged:

- S-1 - office area cooling system;
- S-2 - cooling system for premises with electric equipment (server room);
- S-3 - archives room ventilation system

2_ DEVICES FOR OFFICES

On both floors, the “fan coil” devices of cabinet type for mounting on the wall were accepted. They are mounted on the wall in office; and according to producer's recommendation a distance from the upper edge, right and left side, and from the ceiling, namely from the wall is at least 100mm, whereas it is from the floor at least 2500mm. The regulation of fan coil is done from the water side via the three-armed valve. This regulator is integrated in the fan coil device and has the following functions:

- Turning the device on and off;
- Fan velocity selection (3 speeds);
- Choosing the temperature in a room via potentiometer.

Change in the regime of regulator's performance (summer/winter) is automatic via an installed thermostat that registers whether the fan coil receives cold (summer) or warm (winter) water.

In this case, the purpose is only for summer period. The device's position is precisely specified in graphic part of the design.

Designer's proposal for the cooling of interior space is producer SABIANA, type MISTRAL SI-IR 1,2,3 or 4 depending on the size of premises and required thermal losses. Their heating power ranges from 1.60 kW to 4.3 kW and sound power up to 40 dB. In any case, devices must have 3 different (speeds) powers and flow of air, possibility of full regulation through command unit either cable or infra-red, thermostatic regulation etc.

3_ PIPELINE NETWORK

The main pipe distribution for cooling water is made of black steel pipes that are welded together; and branches towards fan coil devices is through solid copper pipes. The conceived concept of pipeline network routing in the facility is as follows:

- Architecturally it was conceived that the suspended ceiling is constructed only in the corridor, whereas the remaining premises have no suspended ceiling so that the main routing of the pipeline network is limited to sub-ceiling part of the corridor.
- The main pipeline distribution is made of black seamless pipes that are welded together and run vertically from the corridor towards the attic where the heat pump is located. In the part where pipes on the first floor in the facility run through the floor, they are envisaged for masking once they are cleaned, coated with protective layers and insulated with foam insulation with vapour barrier. The purpose of their vertical position is the supply of distributors/collectors that are located in the hidden sub-ceiling part of the corridor.
- From the collectors and distributors a pipeline network through solid copper pipes to fan coil devices, meaning one connection to one device is envisaged, however the collector/distributor are installed with an extra connection so that some of the premises that are not covered by an air-conditioner can be redecorated into a room for people to stay in.
- Copper pipelines in premises must be as hidden as possible and parts of the network that cannot be hidden are masked in line with requirements of the investor or architect. In the dropped ceiling, inspection shafts for the collector/distributor must be left unless the design envisages differently.

Horizontal distribution, as it was said, is constructed in the dropped ceiling in the corridor whence it runs to fan coils in premises through horizontal lines along the walls. The pipeline network has an ascent to “fan coil” that vents the network or, the central venting can be built at a convenient place. Pipeline network is insulated with foam insulation with vapour barrier with the aim of preventing thermal losses and condensation in pipelines.

Condensate is removed through plastic pipes that run along the horizontal lines and then in the ground floor, horizontally to the closest or most convenient point where it is discharged into sewerage or gutter through siphon.

4_ COOLING GENERATOR - HEAT PUMP

To prepare cool water for the air-conditioning purposes, the cooling generators were foreseen, for internal mounting, in a version of a heat pump with air-cooled capacitors. One cooling generator is envisaged; it is located in the attic under the slanting roof of the facility.

The space where a heat pump (ventilated roof) is located serves for the intake of external air that enters through the ventilated part of the roof and through certain number of ventilated roof tiles. The air is ejected to the upper side of the heat pump with a possibility of mounting the canals for direction of air; it is turned towards the major part of the attic whence it streams out through ventilation openings on the roof and certain number of ventilation roof tiles.

For the purposes of the heat pump mounting, in the attic part between the walls that enclose the corridor, a reinforced concrete slab should be poured, on which the heat pump and other necessary equipment will be installed.

Cold water circulation envisages one circulating pump to supply fan coils from hot water storage tank. For water expansion, a membrane expansion tank was envisaged.

Apart from circulating pumps, technical area with heat pumps also accommodates other equipment of these systems.

Designer's proposal is a heat pump of producer CARRIER, type: AQUASNAP 30RY/RYH 040 depending on whether it will be used in the transition period. Power 39.4kW, weight 510 kg, height x width x length = 1372 x 2097 x 1128

5_ COLD WATER TANK

A tank with a volume of V=250 L for water in the system serves as a cold water storage in the summer period 7/12°C, as a hydraulic switch and as a converging point, where energy from the heat pump converges.

The tank is made of steel sheets, thermally insulated with flange connection for the heat pump on one side and consumers' network on the other. It must also have threaded connections 1x DN32 and 4x DN25 for thermometers and temperature sensors (G1/2“, internal).

6_ SERVER ROOM

Because of different work dynamics, compared to the remaining part of the facility, for the server room air-conditioning, one autonomous unit apart from “ fan coil” devices was envisaged. External unit is assembled on the facility's wall if allowed by the investor or architect; if not, then sufficient quantity of air must be provided under the facility's roof for its safe and undisturbed operation.

7_ KITCHENETTE

Natural airing through windows is envisaged for the kitchenette in the first floor.

8_ SANITARY BLOCKS

Natural airing through windows is envisaged for sanitary blocks in the first and second floor.

9_ SPACE FOR ARCHIVES AND STOLEN PROPERTY

The space for archives and stolen property envisages airing with independent systems through axial fans. Electric timers are envisaged to turn ventilators on four times in an hour in an interval of 5 min. Air ejectors are to be mounted on the façade, or ventilation canals should be built towards the roof.

Only air extraction is envisaged whereas inflow will be provided through crevices or windows. It is also necessary to install dehumidifiers in these premises. Example: Archives has a volume of 71.16 m³. If according to the rulebook fresh air inflow per unit of area for storages is 0.3 (m³/h·m²) air flow is 21,348 m³/h.

A fan with air flow of 250 m³/h or 4.16 m³/min meets the needs for fresh air in the archives in twenty minutes.

PART V: WATER SUPPLY, SEWERAGE AND HYDRANT NETWORK

GENERAL DATA

For the Basic Court building in Foča at the location marked as cadastral plot 1481/2 Foča cadastral municipality, Municipality of Foča, it is necessary to develop design documentation that should contain the installations of:

- cold water
- hot water
- faecal sewerage system
- hydrant installation

Horizontal and vertical distribution of installations resulted from the facility layout, i.e. distribution of sanitary blocks.

Architecture wise the facility consists of the ground floor and first floor.

In water supply - sewerage terms, the facility has one toilet on the ground floor and one toilet on the first floor. Also, apart from the toilet, a kitchen has been foreseen on the first floor.

Sanitary water is supplied from the town water supply pipeline that is located in the vicinity of the facility. In the immediate vicinity of the facility, one reinforced concrete water supply manhole has been foreseen that will house a water meter for sanitary and hydrant water.

The waste is discharged from the facility via a sewerage horizontal pipeline with a diameter of Fi110 mm, which collects faeces from the designed sewerage vertical pipeline with a diameter of Fi110 mm. Sewerage horizontal line is discharged outside the facility into a reinforced concrete sewerage manhole and into the town faecal sewerage on.

WATER SUPPLY INSTALLATIONS

The water supply of the respective facility has been foreseen from the existing town water supply network, which provides a sufficient quantity of water and meets the required pressure of min 0.5 bar above the highest outlet point in the water supply installation of the facility.

The connection of the facility to the water supply network is executed in the water supply manhole, which houses a water meter with a diameter of Ø 3/4“ (DN25 mm), lids and all necessary related equipment. The manhole is located directly along the facility, its base being 120x120cm, and depth 120 cm for the action of frost and freezing possibility. The manhole is equipped with step irons at a distance of 30 cm and cast iron lid, in dimensions 60 x 60 cm, weight 35.0 Kg.

For distribution from the water meter (manhole) to the facility, a water pipe with a diameter of DN32 mm has been foreseen. Within the facility, this pipe runs on into the distribution with a pipe diameter ofDN32 mm. For the distribution to outlet points, water pipes DN25 mm have been foreseen. Horizontal distribution of these pipes is carried out at a height of about 50 cm from the level of the floor. Hot water for the toilet and kitchen is envisaged for preparation in tankless water heaters that are assembled at low height.

Connection of pipes and fittings is done by welding, with a fall of 1% in order to facilitate the emptying of pipes in case of repairs. Adequate fittings and connective elements have also been foreseen.

On the branches towards outlet points, flat gate valves should be installed with a diameter of Ø 1/2“ and appropriate valves on the water tank with a diameter of Ø 3/8“.

Pipes are to be connected to the wall with adequate iron ties, if necessary.

On the washbasin outlet points, mounting of a chrome-plated faucet has been foreseen, with a movable spout, for hot and cold water. Chrome-plated rosettes are to be installed between the wall and faucets.

Before usage, water supply installation in the facility is to be tested for test pressure; a report is to be made, and washing and sterilisation must be done.

Calculation of maximum necessary quantity of sanitary water (l/s), and dimensions of the sanitary line

Dimensioning of the house water supply network was done according to sanitary needs.

Principal task in dimensioning of water supply installation is to achieve a required flow and pressure on all outlet points. Required pressure for the majority of sanitary outlet points should be 0.5 bar, except for WC with water tank, which is 1.2 bar.

When choosing adequate diameter of pipeline, connective and transitional elements, attention was paid to necessary flow, and total fall of the pressure in the installation.

- ***Quantity of water*** that is consumed in a house is determined based on the number of users, type and number of outlet points, purpose, usage and structure of the sanitary outlet point. Quantity of water that runs in a pipeline section is determined according to the number of ***loading units*** **JO.** One **JO** represents a quantity of water that runs out on an outlet point through a pipe with a diameter of Ø10 mm with full jet and flow pressure of 0.5 bar.

According to DIN1988-W308, **1 JO = 0.25 l/s**

Ratio between the flow quantity of water and loading unit:

q = 0.25 $\sqrt{JO}$ l/s = dm³/s. Loading units are not taken in full number, but as a square root of that number, and it contains a factor of simultaneity fi.

- Velocity of water in pipes significantly influences pressure fall, also too low velocity (below 0.5 m/s) accelerates precipitation and generation of a film that causes narrowing of pipes; too fast velocity (above 3 m/s) causes sounds, noise and battering in the pipeline network.

Table: Recommended velocities of water in water pipes for diverse type of lines

TYPE OF LINES	Water velocity (m/s)
Domestic connections	**1.0 – 2.5**
Diverse lines	**1.0 – 2.0**
Verticals	**1.0 – 2.0**
Legs and branches	**1.0 – 2.5**
Verticals and branches in hospitals, hotels etc.	0.5 – 0.7
Hot water - circulation lines	0.2 – 0.4

Velocity of water in pipes can be calculated from the expression: q = w $\frac{d^2\pi}{4}$, m³/s = (m/s) x m²

Velocity of water in a pipeline w ≤ 2 m/s (0.5 – 2.0 m/s), that no noise is present.

- ***Pressure loss***

A requirement that must be met – loss of pressure in any line must not be higher than the available. For this reason, pressure losses must be established.

Hu – minimal pressure in a street line at a connection location (data from the communal water supply network administration)

hg - height of the highest outlet point (height difference from the street pipeline to the highest sanitary outlet point)

hi - outlet pressure (pressure of flowing out – sanitary outlet 0.5 bar, Sprinkler snout 0.7 bar, fire hydrants 2.5 bar)

hv – pressure loss in a water meter (it must be lower than 0.5 bar, water meter is selected from a diagram based on maximal water consumption in l/s for the whole building)

Permissible pressure loss – ***ht***:

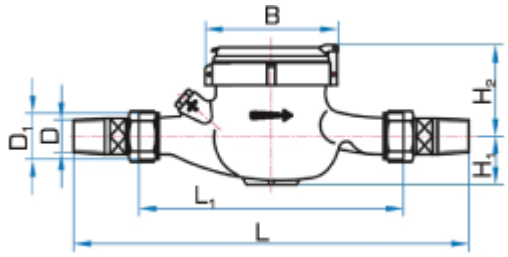
ht = Hu – hg – hi – hv

Polyethylene water pipes were adopted.

- Water meter selection

System and size of water meter are selected according to a diagram based on maximal water consumption in l/s for the entire facility, according to which the connective line of water supply line is dimensioned (whereby water meter diameter is not necessary to be equal to the connection diameter).

Pressure loss in the water meter must be lower than 0.5 bar, hence the size of water meter is selected accordingly.



Nominal diameter (DN mm)	15	15	20	20	25	32	40	50	50
Nominal flow (Qn m3/h)	1,5	1,5	1,5	2,5	3,5	6	10	15	15
Highest flow (Qmax)	3	3	3	5	7	12	20	30	30
Transition flow (Qt)	0,12	0,12	0,12	0,2	0,28	0,48	0,8	3	3
Lowest flow	0,03	0,03	0,03	0,05	0,07	0,12	0,10	0,45	0,45

Pressure loss in the highest flow	0,6	0,6	0,6	0,6	1	1	1	1	1
Length (L mm)	245	270	290	290	380	380	440	390	-
Length (L1 mm)	165	180	190	190	260	260	300	270	270
Screw fitting (D)	1/2"	1/2"	3/4"	3/4"	1 1/4"	1 1/4"	1 1/2"	2"	2"
Screw fitting (D1)	G3/ 4"B	G3/ 4"B	G1"B	G1"B	G11/ 4"B	G11/ 2"B	G2"B	G11/ 2"B	pri.
Space (H1 mm)	31	32	31	31	43	43	46	46	68
Space (H2 mm)	84	87	84	84	87	87	107	107	92
Mass (kg)	1,5	2	1,6	1,6	2,2	2,5	37	4,5	8,5
Sensitivity (l/h)	5-7	5-7	5-7	5-7	5-7	30	50	110	110

Water meter with a diameter of DN 25 mm was adopted.

HYDRANT INSTALLATIONS

Within this project, designing of internal hydrant network has been foreseen (it not necessary to design external hydrant network because there are three hydrants at a distance shorter than 80 m from subject facility, information received by the designer from the representative of PViK a.d. "Izvor" Foča. The design envisages two internal hydrants (one in the ground floor and one on the first floor of the facility).

According to the Fire Protection Act (Republika Srpska Official Gazette, No. 71/12), Rulebook of technical norms for hydrant network for fire extinguishing (Republika Srpska Official Gazette, No. 39/13), subject facility requires a quantity of 10.00 l/s of water for fire duration of 2 h.

- Internal hydrant network

This design envisages internal hydrant installations. It is necessary to install new internal hydrants and all necessary equipment along with them.

Internal hydrant network in the facility is separated from the internal water supply network. It is connected to the existing public water supply network. The existing public water supply network disposes of sufficient quantities of water and required pressures of min 2.5 bar. IN the existing manhole next to the facility was installed a water meter with a diameter of 5/4" for hydrant installations.

Internal hydrant network is made of galvanised water pipes with a diameter of DN 63mm (Ø2"). Pipes are installed so that they are protected from mechanical damages. If necessary pipes must be fixed with adequate ties in order to prevent possible vibrations in the hydrant network.

Total length of required galvanised hydrant pipes:

DN 63 mm (Ø2") is 14.00m'.

Position of internal hydrant has been determined in such a way so that the entire protected area is to be covered with water jet. Internal hydrants are located in the central hall.

Hydrant cabinets, with dimensions 50x50x15, are installed so that valves in the hydrant cabinet are at a height of H = 1.50 m measured from the floor. Hydrant cabinet houses fire hose with a diameter of 52 mm with a snout that has a diameter of 12 mm. Cabinet is marked with a hydrant mark (letter „**H**").

Before usage, hydrant installation must be tested for test pressure and a report must be made.

SEWERAGE INSTALLATIONS

Sewerage installation was envisaged to be connected to the town sewerage network. Next to the facility, a collective sewerage manhole has been designed to collect faeces from the facility, which is discharged into the town faecal sewerage therefrom. This manhole is also the inspection manhole

All sewerage network should be made of HDPE sewerage pipes and fittings. For respective network diameters of sewerage pipes as follow: DN 110 mm and DN 50 mm were adopted whereas distribution from the facility to the manhole and connection to the town sewerage network has also been designed to be of pipes with a diameter of DN 110mm.

Total lengths of pipes are:

For DN 50 mm L = 12.00 m',

For DN 110 mm – internal distribution L = 10.00 m',

For DN 110 mm – external distribution L = 5.00 m'.

Washbasin shall be fastened to the wall with adequate wall plugs and brass screws over rubber washers. The washbasin is to be connected with the drain via chrome-plated siphon with a diameter of 5/4" with a rosette, plug and chain. A shelf, soap and towel holders shall be installed next to the washbasin. The washbasin and equipment shall be ordered as per Investor's choice."

Toilet bowl shall be connected to the sewerage network with a toilet bowl gasket and adequate putty in order to have 100% sealing. The bowl shall be fastened with brass screws over rubber washers. Water tank is to be installed with a puller. It shall be connected to water supply network through a chrome-plated valve and quality tube, and the toilet bowl with a tube and rubber cuff. To install the toilet bowl lid.

In each bathroom and toilet one PVC floor drain with a grid has been foreseen.

When making a sewerage connection, the connection must be given due care and make it as short as possible, the fall must be equal in the entire length of the connection pipe, the lowest fall for a pipe DN150 mm is 2 % (recommendation).

Calculation of quantity of waste water and dimensions of connective line of the sewerage

In the calculation were considered:

- Type and number of sanitary objects
- average quantity of consumed water in l/s
- purpose of the building
- type of waste water
- water usage regime
- type and inclination of sewerage pipes
- roughness of pipes.

Collector diameter was determined based on the total quantity of waste water with the aid of tables, diagrams according to their position, namely according to the inclination, taking into account probable simultaneity of usage of sanitary objects.

Sanitary (faecal) waste water:

$$Qf = \frac{N \cdot P \cdot q}{100} \text{ l/s}$$

N – number of sanitary objects of the same type

P – percentage of simultaneous outflow from sanitary objects of the same type, (%)

q – quantity of outflow from individual sanitary objects, (l/s)

After the input of the total value of Qf into KÜTERA tables, the following diameters of HDPE sewerage pipes were adopted: DN 50 mm, DN 110 mm.

Before usage, sewerage installation in the facility must be tested.

All sanitary objects must comply with valid standards.

All details relating to water supply, hydrant and sewerage installations are given in graphic annexes.

PART VI: ANNEXES

ANNEX 1 - PROTECTION AT WORK

Contents:

1. Danger and hazards in the usage of the location
2. Danger and hazards in the usage of water supply and sewerage installations
3. Measures envisaged for removal of danger and hazards in the usage of water supply and sewerage
4. Conclusion

This report was made in line with valid Regulations and norms of safety at work and fire protection in designing activity.

1. Danger and hazards in the usage of the location

Description of the location

The facility's location is integral part of a settlement with developed street access and developed surrounding terrain as urban area.

Access to the location directly from the road was constructed in line with the regulations of the Traffic Safety Act and regulations relating to the construction of roads for vehicles in narrow urban area.

Location has a direct connection of water installations to urban water supply network with constructed (existing) manholes in compliance with the regulations of corresponding town administration and a connection to town sewerage network.

Hazards in the usage of the location

- Hazard of uncontrolled exploitation of water supply and sewerage at the location.
- Hazard of uncontrolled outlet of storm sewerage of the facility to the location

Protection measures in the usage of the location

- Protection from uncontrolled usage of manholes of water supply and sewerage anticipated the construction of the manhole in line with regulations and it can only be used by authorised personnel.
- Protection from uncontrolled outlet of storm sewerage at the location anticipated adequate collection of surface runoff and discharging it into surrounding terrain and onto the street

2. Danger and hazards in the usage of water supply and sewerage

In the water supply system

- Unhygienic conditions of water supply
- Unclean, broken and non-chlorinated installation
- Possibility of pollution due to passage through the sewerage manhole
- Untested network under required pressure

- Application of inadequate installation material

In the sewerage

- Insufficient inclinations
- Improper network management
- Insufficient number and distribution of ventilation verticals
- Improper selection of material
- Improper dimensioning of the sewerage network
- Improper selection and distribution of inspections and inspection manholes

3. Anticipated protection measures for removal of danger and hazards in the usage of water supply and sewerage

In the water supply system

- Water supply is anticipated from the town network
- Water quality is at a quality of potable water, it is to say hygienically and bacteriologically tested and suitable for usage
- Installation of the water supply system before the commissioning must be chlorinated and tested
- Installation of the water supply system is separate from the sewerage installation and any passage through sewerage manholes has been avoided
- Terms of reference envisaged the testing of water supply network under a required pressure before its commissioning
- Prescribed and already tested material was used for the water supply system installation in line with existing regulations and standards

In the sewerage

- Distribution of sewerage network was solved in line with the architectural design and regulations for this type of installations
- When resolving the sewerage, attention was paid to a sufficient number of ventilation verticals, which provided proper functioning of the installation
- Prescribed and already tested material was used for the sewerage installation in line with regulations and standards
- given the facility's purpose, there are no technological waste waters in the facility, namely waste water treatment devices
- When designing the sewerage, attention was paid to adequate dimensioning of the sewerage network in line with regulations and norms for this type of installations
- Revision and inspection chamber were envisaged at all critical spots, turns, joints of two and more canals, and at the bottom of every vertical, so that control and possible intervention are facilitated.

4. Conclusion

Design envisages all measures for removal of hazards and dangers with regard to safety at work and when using the installations and the facility.
Based on the annexes to the design, textual and graphic part of the design, the designer claims that the installations of water supply and sewerage will properly function and can be used in line with the Rulebook and general measures and norms of safety at work for buildings for operational and auxiliary premises.

ANNEX 2 - TECHNICAL CONDITIONS FOR WORKS EXECUTION

Execution of water supply and sewerage installations

Preliminary measures

1. Installation of water supply and sewerage comprised in this design must completely be executed according to the design
2. Prior to the works commencement the contractor is obliged to compare the designed connection with the real situation at the construction site and discuss possible disputes with the supervising body
3. Prior to any possible changes, the contractor is obliged to notify the supervising body of it timely and acquire consent from the designer.

Laying down the lines

4. The contractor is obliged to check all elevations in the facility and reconcile them with real elevation on the spot
5. In sewerage network, a connection to the street canal must be executed at first, then lower distribution of sewerage, and in the end vertical lines with branches
6. All horizontal lines are installed with a fall towards the lowest outlet point.
7. Only material complying with valid standards can be used; it must be checked on the construction site before it is used
8. Only completely new material and equipment can be used
9. Galvanised pipes must not be bent in hot or cold condition
10. Pipes are laid perpendicular to the wall surface through the wall. Pipes must not be laid aslant through the wall

Underground pipes

11. All underground pipes are laid in a layer of sand that encompasses the pipe from all sides in a min 5 cm thick layer
12. In the covered ground, a sufficiently thick layer of sand should be placed and well compacted on the trench bottom. Humus, construction material waste and rocks must be used for backfilling the trenches
13. Pipe laying in trenches can only begin after the supervising body established that the trench was properly excavated in line with the design
14. Trenches must not be backfilled before the supervising body inspects the network and before the sewerage is tested

Pipes in structures

15. Firm building in of pipes into the walls, concrete and other structures is not allowed
16. Openings for pipes through the structure must be large enough, and the space between the pipes and structures must be filled with plastic material in order to prevent damages to pipes

17. Water pipes that pass through structure walls must be protected with a protective pipe whose diameter is larger than the external diameter of water pipes by 40mm, and the space between them must be filled with oakum

18. Possible non-envisaged drilling in the walls and the inter-floor structure can only be done after the supervising body issues a permit

Pipe protection

19. Water pipes must not pass through chimney walls and ventilation shafts, through canal shafts, under the toilet or urinal floor and where they can be exposed to pollution

20. At places where they intersect with other pipelines, the pipes must be protected at crossing with canals. Water pipes must be higher and the space in between must be filled with clay in a layer that is at least 20 cm thick. If the space is smaller, the water pipe must be put into a protective pipe as in the case of installation inside the walls.

21. At places where they are exposed to freezing, the pipes must be thermally insulated. This insulation must be executed with due care, and the lines must not be backfilled before the relevant body has inspected them all

22. When disrupting the works, the pipes must conveniently be sealed in order to prevent water from pollution or filling with waste material

Joints

23. Joints between the pipes and reinforcement, namely, the connectors or fittings must be done with due care. Pipes are joined together by welding.

24. Pipes must not be joined in the wall, floor slab etc. Such joining must be avoided if possible

Pipes fastening

25. Pipes must be fastened to walls; namely to the structure with ties at distances of max 2 m. They must be leaned against the walls in their entire length

26. Pipes must be installed so that they can expand due to heat

Reinforcement

27. Water supply reinforcement bars must be inspected and are to be installed after their integrity is established

28. Installation of reinforcement bars must be done precisely taking care of a good and easy handling and aesthetics

29. All valves and exhaust valves must have the same diameter as the pipes

Sanitary devices

30. Sanitary devices must be installed precisely and in line with enclosed details.

Installation testing

31. Water supply installations

Test pressure to which the installations in a building must be tested must be higher by 1 bar than the double working pressure, meaning the one that was acquired in hydraulic calculation according to the following procedure:
All openings and ends of pipe network are closed with caps, and then the network is filled with water. Before that, a manometer is installed at a convenient point. Manual pump is used to compress the water until the manometer shows the defined test pressure. In case that the manometer hands falls, the entire network is checked for a malfunctioning point that leaks water, visually and manually, by touching; all joints must be checked for moist, dry them up and recheck. Malfunctioning points must be repaired and then the network should be rechecked. Network is to be filled and discharged with a hose cock. A report of testing the water supply installations for the required pressure must be made.

Sewerage installations

Testing the proper functioning of the sewerage networking buildings is done in three phases:

- *The first phase* comprises the testing of lower runoff network before it is backfilled while the inclination of canal according to the design is checked. In order to check the functioning of joints, the entire system must be filled with water after the canal is first sealed at the lowest end. In case that some of joints leak water, they must be repaired and then the network is rechecked. Only after this, the trench can be backfilled.

- *The second phase* is done after the entire vertical network with branches is constructed. Testing is done with water or air.

Water testing is partially done for some verticals after all ends of branches except the highest part are sealed, then water is filled in the network.
Testing is done under a pressure of the water column that is at least 3.0 m above the highest outlet point. If all joints hold for a period of 15 min, it is a sign that all joints are functioning
Air is used to test the vertical network, with compressors that have a manometer. The compressor is connected to one of the openings, and the remaining openings are well sealed. Test pressure is 0.35atm in duration of 15 min. Even the slightest pressure decreases mean that some joints leak and they must be repaired.

- *The third phase*

The testing is done after the installation of all sanitary structures. Test pressure is 2.5 cm of the water column (0,0025atm). If there are no changes in the entire network and all siphons hold water, it means that the installation functions properly. Until the testing is finished, neither grooves for pipes may be closed nor can the sub-floor be laid.

A report on installation testing must be made
Testing is done at the contractor's expense

32. Finished water supply installations must be washed and disinfected

Contractor's obligations

33. Established quantities and contracted unit price are relevant for the calculation of executed works

34. If the contractor establishes that the envisaged works can be implemented in an easier, simpler and more rational way in technical terms, or that some technical conditions or disposition of a drawing and other contracted deliverables are harmful to the durability, stability and quality of works, the contractor is obliged to enter their remarks and observations in the building log book and provide their specific proposals.

WORKS TENDER; LOT 2

T E C H N I C A L S P E C I F I C A T I O N S

Component 2: Reconstruction of District PO East Sarajevo