

B.1	Area characteristics	2
B.2	Overall building information	3
B.2.1	Building purpose and capacity	3
B.2.2	Overall urban and architectural solution.....	3
B.2.3	Overall solution of production facilities	3
B.2.4	Solution for disabled persons	3
B.2.5	Safety during building usage.....	3
B.2.6	Basic structural characteristics.....	4
B.2.7	Basic characteristics of technical facilities	4
B.2.8	Fire safety.....	4
B.2.9	Energy solution.....	7
B.2.10	Hygienic requirements	7
B.2.11	Protection against negative environmental effects	8
B.3	Technical infrastructure	9
B.4	Traffic solution.....	10
B.5	Vegetation and landscaping	10
B.6	Environmental influences and protection.....	10
B.7	Protection of inhabitants.....	11
B.8	Building works organization.....	11

Building name:	University Residential Centre Object "P", Library and Dormitory Brno, Czech Republic
Plot number:	456/20, cadastral district Ponava (611379), municipality Brno (582786)
Documentation level:	Architectonical study and realization documentation
Investor:	Vysoké učení technické v Brně
Land owner:	Statutární město Brno Dominikánské náměstí 196/1, Brno, CZ
Designer:	Bc. Petr Dvořák, Okružní 588, Kaplice, CZ
Building authority:	Stavební úřad Brno

B.1 AREA CHARACTERISTICS

This project documentation is concerned by a new building located in Brno. The building plot was built up by barracks. Now it is a brown field. Currently, the plot is a brown field, divided to smaller parts 456/1-10, 456/15-16, 456/18-19, 457/1-4 and 458 which are going to be consolidated before the realization. The final plot area is 30 160 m². The built-up area is 1785,82 m² by Object "P" and 500 m² by Object "W" (total percentage 50%). The area of pavements is 1000 m². There is Štefánikova Street going along the eastern border of the plot and on the opposite side there is Staňkova Street. There are two entries to the plot, one from each road (see the situation drawing). The plot is in a slight slope from west to east.

As a part of this documentation there is a geotechnical report. According to this (low bearing capacity of the subsoil) it was decided to use pile foundation. Hydrogeological survey – it is partially solved by the geotechnical report. It states that the level of ground water is tied to a rift system in a greater depth. More detailed survey will be done before the construction process.

The building is not located in a conservation area. Therefore, there was no need to carry out historical or archaeological surveys. Also, there is no threat of landslides or earthquakes in the building area. Moreover, it is not a flood area. No special precautions related to mining need to be taken in to account.

The building is located entirely within the building plot. During the built up the building company must follow obligatory rules concerning the protection of the environment and neighbouring properties. Owners of neighbouring properties have no special requirements.

The previous buildings have been removed already. First part of the building process will be to remove trees and bushes. These plants are self-seeded and there is no need of protection. Moreover, as a part of urban changes, new vegetation will be planted.

There are utility lines under neighbouring roads. The concerned authorities have permitted connections and they are solved in an attached situation drawing. The used utility lines are water supply, sewerage, electricity and municipal heat distribution.

The construction works will be carried out in a continuous term (including technological breaks). There are no known additional investments yet.

B.2 OVERALL BUILDING INFORMATION

B.2.1 BUILDING PURPOSE AND CAPACITY

The building is designed to be dormitory – comfortable apartments for students of nearby universities. There are 14 apartments in two floors, together 28 apartments. There are three types of rooms for three persons, for four persons and for disabled persons. The capacity is 76 inhabitants. The ground floor is composed of communication areas – library and two assembly halls, each for 56 persons.

B.2.2 OVERALL URBAN AND ARCHITECTURAL SOLUTION

As concerns the urban solution the building was designed to not exceed the height of the surrounding buildings. The neighbourhood is a residential area with shops. Public transport stops (ex. Šumavská) are nearby. The buildings will be surrounded by vegetation to provide a place of recreation for the students and also other visitors. There are no strict regulations for the building appearance.

The building has a form of an elongated block in L-shape with angle 50° and north-south oriented axis. Most of the windows are oriented east-west. The eastern facade is more dissected by balconies belonging to the student apartments. Also the ground floor has there a glass facade to bring light to the library. The western facade is simpler, only with windows.

The architectural solution is tied to the other object on the building plot – Object “W”. These two objects create together an enclosed space – a communication area, a kind of a square. Through this way inhabitants can meet and share facilities – library, canteen, fitness and assembly halls. And this is also possible for accommodated disabled persons.

B.2.3 OVERALL SOLUTION OF PRODUCTION FACILITIES

As concerns the Object “P”, there are no production facilities.

B.2.4 SOLUTION FOR DISABLED PERSONS

The utilization purpose of the building counts with disabled persons on wheelchairs. There is a parking lot with reserved space for them. Entrances are with ramps and there are elevators suitable for wheelchairs. Also the staircases will be equipped with platforms for wheelchairs. In the first floor there are nine apartments dedicated to the disabled persons. The equipment of the rooms and hygienic facilities comply with requirements given by standards and recommendations. The library and assembly halls are also prepared accessible for disabled persons. There are restrooms for them.

B.2.5 SAFETY DURING BUILDING USAGE

The utilization of the building must comply with general mandatory rules.

B.2.6 BASIC STRUCTURAL CHARACTERISTICS

The structural system is a monolithic reinforced concrete skeleton. The main vertical load bearing elements are concrete walls and columns. The building envelope is created by infill hollow block masonry with good acoustic properties – Heluz AKU 25. It holds ventilated facade – thermal insulation and fibre cement boards Cembrit Metro on aluminium load-bearing construction. The internal walls are of two types – hollow block masonry (the same as for the facade) and plasterboard partitions. In some spaces there is a suspended ceiling to cover pipes and ventilation ducts (in the ground floor).

The roof is flat, with vegetation and accessible for the inhabitants of the dormitory. A part of the roof can be utilized with solar panels. There are two entrances to the roof.

The building is founded on piles due to low load-bearing capacity of the subsoil. However, there are no problems with the ground water. The freezing depth is 1 200 mm.

The building is designed in such way, that the intended load acting during construction and usage will not cause: collapse of the building or of its part; higher degree of unacceptable deformation; damage of other parts of the building or of technical facilities or of installed equipment as a result of major deformation of the structure; damage in case, when its range is disproportionate to its original cause. Mechanical resistance and stability of the structures designed by this project documentation has to be assessed in detail in its part concerned by statics and constructions.

B.2.7 BASIC CHARACTERISTICS OF TECHNICAL FACILITIES

There are no production facilities in the object. Therefore, there is a one technical room for the whole object. The connections of water and municipal heating are ended there and the distribution within the building is done by an installation channel going along the centreline of the building under the floor of the ground floor. In the technical room there is a heat exchange unit, which provides heating water. Heating itself is solved by standard radiators. There are two ventilation units in the building, each in a separate room (due to disposition requirements). Their inlets and outlets are on the roof.

B.2.8 FIRE SAFETY

The fire safety of the building is described in detail in a special part of this project documentation – in the fire safety report.

Fire sectors – the building is divided into fire sectors according to requirements of the standard ČSN 73 0818. Technical facilities, such as technical room, have separate fire sector. Then, the library and its belongings are in a separate fire sector. Also so are the assembly halls. Each apartment is a separate fire sector.

Fire sectors					
Ground floor		First floor		Second floor	
Sector	Degree	Sector	Degree	Sector	Degree
N1.01/N3	II.	N1.01/N3	II.	N1.01/N3	II.
N1.02	I.	N2.01	III.	N3.01	III.
N1.09/N3	I.	N2.02	II.	N3.02	II.
N1.03	II.	N2.03	II.	N3.03	II.
N1.04	III.	N2.04	II.	N3.04	II.
N1.05/N3	II.	N2.05	II.	N3.05	II.
N1.06	IV.	N2.06	II.	N3.06	II.
N1.07	III.	N2.07	I.	N3.07	I.
N1.08/N3	II.	N1.05/N3	II.	N1.05/N3	II.
N1.10/N3	I.	N2.08	I.	N3.08	I.
		N2.09	II.	N3.09	II.
		N2.10	II.	N3.10	II.
		N2.11	II.	N3.11	II.
		N2.12	II.	N3.12	II.
		N2.13	II.	N3.13	II.
		N2.14	II.	N3.14	II.
		N2.15	II.	N3.15	II.
		N2.16	II.	N3.16	II.
		N2.17	II.	N3.17	II.
		N1.08/N3	II.	N1.08/N3	II.
		N1.09/N3	I.	N1.09/N3	I.
		N1.10/N3	I.	N1.10/N3	I.

Evaluation of constructions – The construction of the building is class DP1 – non flammable. This allows creation of three protected escape ways by the staircases. The dividing constructions are made from concrete, masonry and plasterboards, materials with high fire resistance.

Fire distances – they have been calculated according to ČSN 73 0802.

Ground floor								
Position	h_u [m]	l [m]	S_{po} [m²]	S_p [m²]	p_o [%]	Sector	p_v [kg/m²]	d_1 [m]
1	2,15	1,90	4,09	4,09	100	N1.07	57,00	4,91
	2,30	5,35	6,65	12,31	54	N1.06	69,13	3,48
2	1,50	3,00	3,00	4,50	67	N1.04	51,06	3,65
	2,20	21,50	19,80	47,30	42	N1.03	27,58	2,45
3	0	0	-	-	-	-	-	-
4	4,02	9,26	37,23	37,23	100	N1.03	27,58	6,04
5	4,02	54,34	172,74	218,45	79	N1.06	69,13	10,68
6	0	0	-	-	-	-	-	-

Water for extinguishing – due to ČSN 73 0873 internal hydrants are demanded for the object. The ground floor (which is solved by this report) contains four hydrants. The used type a fire hose system which consists of hose reel, inlet valve, 20 m long lay-flat hose with reach 30 m and a shut-off nozzle.

External sources of water for extinguishing are underground hydrants located in the Štefánikova Street. There are four of them which are closer than demanded 100 m specified in ČSN 73 0873, tab. 1 for building with larger area than 2 000 m² and they cover the whole building. The dimension DN150 fulfils the standards. Static pressure of the hydrant must be at least 200 kPa.

Access roads – According to standard ČSN 73 0802 all objects must have an access road to allow action of fire fighters. For the object as access roads can be used Štefánikova Street and the northern parking lot. From there the entrances are less than 20 m far and also paved areas can be used. In the case that the building is lower than 12 m there is no need to have a boarding area for the fire brigade.

Entrances and roads to the plot useable for arrival of fire fighting vehicles have at least 3,5 m of clear width to fulfil the requirements of the standard ČSN 73 0802.

Technical equipment – ventilation will be both natural and forced and there will be two operational units – one in room 1003 and the other in room 1022. The ventilation system has built-in recuperation unit. The inlets and outlets will be placed in vertical shafts leading to the roof. The shaft and the ventilation technical room are together separate fire sector. The ventilation ducts will be placed between reinforced concrete floor structure and suspended ceiling made from plasterboards. Where the ventilation duct crosses a border of a fire sector it will be equipped with fire damper according to standards to prevent smoke from spreading.

The standard ČSN 73 0802:2009 states the requirements for service pipes. If the clear area of the pipe is more than 40 000 mm² it (which is true for the ventilation ducts) it will be surrounded by materials with fire reaction class A1 (plastered masonry wall).

Safety devices – the building will be equipped with automatic fire detectors and fire alarm systems according to the Fire safety plan. This is done following the regulation No. 23/2008 Coll. It consists of heat and smoke detectors or it can be activated manually by fire alarm button. In the reception (room 1013) will be installed electronic fire signalling central. Also there will be accessible telephone for fire reporting. Manual fire alarm buttons will be located to be clearly visible and reachable without any obstacles. They will be marked according to regulation.

Acoustic fire signalling device will be in every room. Emergency speaker control will be located in the reception (room 1013) and from there evacuation can be controlled and conducted. It has to fulfil requirements of ČSN EN 60846 and ČSN EN 60849. Both devices will be equipped by accumulators to be fully operational in the case of fire for at least 15 minutes.

Escape ways must be marked according to ČSN ISO 3846 where the exit is not directly visible. These marks must ease the evacuation process. Therefore, changes of direction of escape (horizontally and vertically) and must be marked by signs and arrows. This is valid also for crossings of escape ways.

Emergency lighting must be working in the case of fire for 15 minutes in type A protected emergency ways. This is valid also for non-protected emergency ways (15 minutes). Every emergency light will be equipped by accumulator to meet the required 15 minutes of working time without power connection. Emergency lights will be placed in all rooms according to the Fire safety plan drawing.

B.2.9 ENERGY SOLUTION

The standards – the building is designed in accordance with act No. 406/2000 Coll., about energy management and ČSN 730450-2, thermal protection of buildings, with regard to year 2011 amendment. Compositions of constructions in contact with exterior are fulfilling required U-values (thermal loss coefficient) given by the standard.

There has been made an Energy label, which categorized the building as a class B ($U_{em} = 0,265 \text{ W/m}^2\text{K}$) – efficient building. The energy label is a part of this project documentation.

Constructions – ČSN 730450-2 has stated required and recommended U-values in $\text{W/m}^2\text{K}$ for different types of constructions. Also it is necessary to pay attention to construction details and their execution on the construction site. If there are instructions from a producer, they must be followed. Specified compositions are a part of this project documentation.

Construction	Real U-value [$\text{W/m}^2\text{K}$]	Required U-value [$\text{W/m}^2\text{K}$]	Recommended U-value [$\text{W/m}^2\text{K}$]
External wall	0,145	0,300	0,250
Green roof	0,163	0,240	0,160
Ground floor	0,230	0,450	0,300
Windows	0,783	1,500	1,200
Doors	1,200	1,500	1,200
Glass facade	0,983	1,182	1,004

Windows and doors – the windows are made by producer Slavona, the type is HA110, which has thermal average loss coefficient $U_W = 0,783 \text{ W/m}^2\text{K}$. It is made of wood with aluminium cover and it has insulating triple glazing. It can be tilted or turned to ensure suitable type of ventilation. Specifications and ironwork can be found in list of windows, which is a part of this project documentation.

The doors metal with aluminium finish. They are from producer Ador CZ and have thermal loss coefficient $U_W = 1,20 \text{ W/m}^2\text{K}$. They have PUR foam insulating infill. Specifications and tinsmith products can be found in list of doors, which is a part of this project documentation.

Glass facade – the producer is Schüco and the type is FW50+ SI. It comes with triple glazing. The U-value needed to be calculated and the protocol is attached. It has solved thermal bridges and to improve the thermal properties

Equipment – the heat is provided by the municipal heat distribution. The building is fully dependent on external power sources. However, part of the green roof can be utilized by solar panels producing electricity, which partially cover consumption of the building. The capacity will be specified later.

B.2.10 HYGIENIC REQUIREMENTS

The building satisfies requirements given by act No. 183/2006 Coll., Building Law and by public notice No. 268/2009 Coll., about technical requirements for buildings – especially part three. Further the building satisfies ČSN 73 4301 and other valid standards and regulations. The project documentation fulfils relevant rules both for interior of the building and exterior influences of the building.

Ventilation – in apartments it is designed as natural, using infiltration and ventilation by openings. The ground floor has forced ventilation with recuperation. There are two ventilation units and the inlet and outlet are on the roof. Vapour and fume produced in kitchen is cleaned by kitchen extractor hood and cycled in the room. Every kitchen has the possibility to ventilate by a window.

Air conditioning – cooling is not designed. The perimeter walls have good accumulation capacity and the roof has sufficient thermal insulation, therefore there is satisfactory temperature stability during year.

Heating – it is done by municipal hot water distribution. There is a heat exchanger in the technical room. The hot water is then distributed to radiators.

Daylighting – openings was designed provide sufficient light to all habitable rooms. Every window, including French windows, will have a possibility of shading by curtains or by window blinds.

B.2.11 PROTECTION AGAINST NEGATIVE ENVIRONMENTAL EFFECTS

During the construction works attention must be paid to existing vegetation. If it has to be preserved, it must be protected – for example by wooden planks. There are standards concerned with landscaping (ČSN 839001, 11, 21, 31, 41, 51, 61), which must be followed when working with vegetation. However, the plans and permissions do not show any important plants in the building area.

The contractor will proceed during the construction works in compliance with public notice No. 272/2011 Coll., about health protection against negative effects of noise and vibration. He will ensure the limits given by this public notice will not be exceeded. Also he will use tools and machinery in appropriate technical condition. Loud machines can be placed in cells or other suitable closed spaces if necessary.

Other precautions for minimizing negative effects:

- Usage of modern machinery and tools with minimal noise levels
- The construction works will have as short duration as possible
- The construction works will be done with respect to environment and used machinery will be modern with minimal emissions (regularly checked) and without leakage of dangerous petroleum products
- In the case of leakage, the supplier of the machinery will be equipped with means for liquidation of the leaked substances (detergents, absorbers...)
- Vehicles leaving the construction site must be cleaned, so that they do not pollute other areas or roads; any pollution must be immediately removed
- Brash and debris must be moistened before transportation
- It is necessary to accept precautions, which will protect ground water against pollution
- Negative effects, especially emissions, noise, heat, quakes, vibration, dust, odour, dazzles and shades and water contamination must not deteriorate environment on the construction site and in its surroundings over admissible limits

Noise protection – In accordance with the type of building, the massive masonry walls and the composition of the roof structure, there is a sufficient airborne sound insulation of the building.

As concerns spreading of sound within the building, constructions must be done according to rules and recommendations from the producers. All floor structures in or above habitable rooms must have a layer of acoustic (impact) insulation. Layers above this insulation must be separated from walls by a mineral wool strip, thickness 10 mm.

Piping has to be bedded flexibly in relation to constructions to interrupt sound spreading within the construction. It is forbidden to wall up the piping without foam insulation. Piping leading through a floor structure must be separated from both concrete screed and the load-bearing construction below – these two constructions must not touch in any case.

Fire protection – is solved by a separate fire safety report and the summary is included in the chapter B.2.8.

B.3 TECHNICAL INFRASTRUCTURE

Sewerage – the project documentation solves the whole area. Therefore there are three connections to the combined sewer main located under the Štefánikova Street (sewage and rainwater together). All of them are made from earthenware pipes. The piping outside the building must be placed at least in the freezing depth, which is 1 200 mm. The north connection is dewatering the north parking lot. The slope is constant 1% and the dimension is DN200. There is a revision shaft on the plot 2 m behind the fence. The inspection shaft is made from prefabricate concrete rings with diameter 1 200 mm. It is closed by a round cast iron cover with diameter 600 mm. The standards state the maximal distance of revision shafts to 18 m (40 m if the section is straight without bends). Therefore there are three other shafts along the whole length. They have the same dimensions.

The south connection is dewatering the south parking lot. There are 7 revision shafts with cleaning armature. The dimensions are DN200 and DN300, slope 2,4% and 8,7%. To this branch is connected the canteen in Object “W”. The canteen requires installation of oil retention tank which has to be periodically cleaned by a responsible company. The tank is made from plastic and has retention capacity 3 m³ (approximately 400 lunches, 4 l/s). It is located 2 m from the building.

The middle sewerage connection is the main for sewerage of the both buildings. It is also designed to take away rainwater from both roofs. The dimensions are DN250 and DN400, constant slope 2,4%. There are three revision shafts.

Water supply – water main is located under the Štefánikova Street. The service pipe leads to three water meter shafts placed on the plot. Each shaft is placed 2 m from each building. The water meter shaft is made by producer EKONA, the type is VŠ-K 15 and dimensions are 1 500x1 000 mm. It is made from plastic (polypropylene) and it has a round plastic cover with diameter 600 mm. Concrete is poured around the shaft. The material of the service pipe is HDPE 100 SDR 11 (ČSN 75 5410), the dimension is DN80. It is also supplying water for internal hydrants. Therefore it has to have pressure at highest hydrant at least $p_{\min,f} = 200$ kPa.

The owner is responsible for protection of water main by anti-pollution check valve. Outside the building, 300 mm above the piping, there will be a warning foil. The piping outside the building must be placed at least in the freezing depth. Also the pipe must be laid into a sand bed (thickness 100 mm) and covered by sand up to the height 300 mm above the pipe.

Power supply – low voltage distribution cable is located by under the Štefánikova Street. From there a standard connection cable will be lead to both buildings and the filtration station. Power junction boxes will be located on the walls of the buildings above the connections. It is a plastic box Elaplast PS1 100A HH, which is resistant to weather conditions and protects the wiring inside. It is also lockable, only authorized persons will have the key. The specification is 3 PEN ~50 Hz 400/230 V / TN-C.

Rain water – rain water is taken away together with sewage by combined sewerage. Water from the roof is taken inlets and by internal sewerage pipes. The requirements are the same as for the sewerage pipes.

Municipal heat distribution – the heat is distributed by a hot water piping. Currently it ends under the Štefánikova Street. Now it will be extended and led to the technical room. There will be a heat exchanger which designed by a specialist. There will be an inspection shaft near the border of the plot. The material of the inlet and outlet pipe will be steel with insulation. This will be specified by administrator of the municipal heat distribution. The dimensions are 2x DN100.

B.4 TRAFFIC SOLUTION

The area is connected to the two neighbouring streets – Štefánikova and Staňkova. They provide entrance to the communication area between the objects P and W and also entrances to the two parking lots according to the situation drawing. Also it shows paved areas. All paved areas with risk of standing water are sloped. The area is accessible for personal cars, trucks and by public transport from a nearby stop.

B.5 VEGETATION AND LANDSCAPING

Vegetation is going to be solved according to the situation drawing. There are no major landscaping changes, which can influence neighbouring buildings or geology of the area.

B.6 ENVIRONMENTAL INFLUENCES AND PROTECTION

According to §4, act No. 100/2001 Coll., about assessment of environmental impacts, it is not necessary to evaluate impacts of the dormitory to environment. Waste produced during the construction works and during the usage of the building is being treated in compliance to act No. 185/2001 Coll., Waste Act, and must be categorized according to public notice No. 381/2001 Coll., and handled according to public notice No. 383/2001 Coll.

The production of waste can be divided to:

- Waste produced during the construction works – this kind of construction does not presume production of dangerous waste, requiring special care during liquidation. However common waste will be produced, it will be liquidated according to act

No. 185/2001 Coll. by an authorized company. Glass and steel will be recycled, wood will be burned.

- Waste produced during the usage of the building – the purpose of the building does not deduce risk of production of dangerous waste. Waste production will be solved as is standard for a residential building. Storage of municipal waste will be placed according to the situation drawing.

B.7 PROTECTION OF INHABITANTS

The building fulfils all requirements given by standards for protection of inhabitants.

B.8 BUILDING WORKS ORGANIZATION

The building site and workplace will be taken over 22 May, 2014 between the investor and the contractor. There will be made up a site diary involving information about taking over the building site. All building works are supervised by site manager or mandated foreman. He is also checking volumes of earthworks in given places. It's necessary to keep demanded dimensions of excavations and compactions. Before the building works, the area has to be fenced.

The construction company has their own machinery and they will be responsible for their operation. Machinery is operated only by assigned and trained personnel. Before the beginning of construction works operating personnel will have checked technical status of all used machinery. All of the earthworks and construction works are executed at the area of the building site; hence there is no need to provide additional safety precautions.

There will be one entrance for machinery from the Štefánikova Street and one from the street Staňkova. All machinery has to be cleaned before leaving the construction site.

The dewatering will be done by drainage according to a plan which will be specified later. If possible all soil from earthworks will be used on the site; the rest will be taken to a specified place.

Common waste produced before and during the construction works:

Code	Name of waste	Origin
17 01	Concrete, bricks, ceramics	Building works
17 02	Wood, glass, plastics	Building works, Vegetation
17 03	Bitumen and tar	Building works
17 04	Metals	Building works
17 05	Soil and rocks	Earthworks
17 06	Insulation materials	Building works
17 08	Gypsum based materials	Building works
17 09	Other building materials	Building works
20 03	Other municipal waste	Site facilities

In the vicinity of the construction site there are no buildings which are used by disabled persons and this function will be influenced or impossible during the built up process.

There are no other special requirements for the construction works.

Brno, 8.1.2014

Created by: Bc. Petr Dvořák