VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ

BRNO UNIVERSITY OF TECHNOLOGY

FAKULTA STAVEBNÍ

FACULTY OF CIVIL ENGINEERING

ÚSTAV POZEMNÍHO STAVITELSTVÍ

INSTITUTE OF BUILDING STRUCTURES

BYTOVÝ DOM

RESIDENTIAL BUILDING

BAKALÁŘSKÁ PRÁCE

BACHELOR'S THESIS

AUTOR PRÁCE — B.Sc. MICHAL JAKOBEI

AUTHOR

VEDOUCÍ PRÁCE — Ing. FRANTIŠEK VAJKAY, Ph.D.

SUPERVISOR

BRNO 2020

VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ
FAKULTA STAVEBNÍ

Studijní program	B3607 Civil Engineering
Typ studijního programu	Bakalářský studijní program v anglickém jazyce a prezenční formou studia
Studijní obor	3608R001 Pozemní stavby
Pracoviště	Ústav pozemního stavitelství

ZADÁNÍ BAKALÁŘSKÉ PRÁCE

Student	Michal Jakobei
Název	Bytový dům
Vedoucí práce	Ing. František Vajkay, Ph.D.
Datum zadání	30. 11. 2019
Datum odevzdání	22. 5. 2020

V Brně dne 30. 11. 2019

prof. Ing. Miloslav Novotný, CSc.
Vedoucí ústavu

prof. Ing. Miroslav Bajer, CSc.
Děkan Fakulty stavební VUT

PODKLADY A LITERATURA

(1) Směrnice děkana č. 19/2011 s dodatky a přílohami; (2) Stavební zákon č. 183/2006 Sb. v platném a účinném znění; (3) Vyhláška č. 499/2006 Sb. v platném a účinném znění; (4) Vyhláška č. 268/2009 Sb. v platném a účinném znění; (5) Vyhláška č. 398/2009 Sb.; (6) Platné normy ČSN, EN; (7) Katalogy stavebních materiálů, konstrukčních systémů, stavebních výrobků; (8) Odborná literatura; (9) Vlastní dispoziční řešení budovy a (10) Architektonický návrh budovy.

ZÁSADY PRO VYPRACOVÁNÍ

Zadání: Zpracování určené části projektové dokumentace pro provádění stavby zadané budovy s téměř nulovou spotřebou energie. Cíle: Vyřešení dispozice budovy s návrhem vhodné konstrukční soustavy a nosného systému na základě zvolených materiálů a konstrukčních prvků, včetně vyřešení osazení objektu do terénu s respektováním okolní zástavby. Dokumentace bude v souladu s vyhláškou č. 499/2006 Sb. v platném a účinném znění a bude obsahovat část A, část B, část C a část D v rozsahu části D.1.1 a D.1.3. Dále bude obsahovat studie obsahující předběžné návrhy budovy, návrhy dispozičního řešení a přílohovou část obsahující předběžné návrhy základů a rozměrů nosných prvků a prostorovou vizualizaci budovy včetně modulového schéma budovy. Výkresová část bude obsahovat výkresy situací, základů, půdorysů podlaží, konstrukce zastřešení, svislých řezů, technických pohledů, min. 5 konstrukčních detailů, výkres(y) sestavy dílců, popř. výkres(y) tvaru stropní konstrukce vybraných podlaží. Součástí dokumentace budou i dokumenty podrobností dle D.1.1. bod c), stavebně fyzikální posouzení objektu a vybraných detailů, popř. další specializované části, budou-li zadány vedoucím práce. V rámci stavebně fyzikálního posouzení objektu budou uvedeny údaje o splnění požadavků stavebního řešení pro budovy s téměř nulovou spotřebou energie. Dokumentace bude dále obsahovat koncepci větrání, vytápění a ohřevu vody. Výstupy: VŠKP bude členěna v souladu se směrnicí děkana č. 19/2011 a jejím dodatkem a přílohami. Jednotlivé části dokumentace budou vloženy do složek s klopami formátu A4 opatřených popisovým polem a s uvedením obsahu na vnitřní straně každé složky. Všechny části dokumentace budou zpracovány s využitím PC v textovém a grafickém CAD editoru. Výkresy budou opatřeny popisovým polem. Textová část bude obsahovat i položky h) "Úvod", i) "Vlastní text práce" jejímž obsahem budou průvodní a souhrnná technická zpráva a technická zpráva pro provádění stavby podle vyhlášky č. 499/2006 Sb. v platném a účinném znění a j) "Závěr". V souhrnné technické zprávě a ve stavebně fyzikálním posouzení objektu budou uvedeny použité zásady návrhu budovy s téměř nulovou spotřebou energie. Součástí elektronické verze VŠKP bude i poster formátu B1 s údaji o objektu a jeho grafickou vizualizací.

STRUKTURA BAKALÁŘSKÉ PRÁCE

VŠKP vypracujte a rozčleňte podle dále uvedené struktury:

1. Textová část závěrečné práce zpracovaná podle platné Směrnice VUT "Úprava, odevzdávání a zveřejňování závěrečných prací" a platné Směrnice děkana "Úprava, odevzdávání a zveřejňování závěrečných prací na FAST VUT" (povinná součást závěrečné práce).
2. Přílohy textové části závěrečné práce zpracované podle platné Směrnice VUT "Úprava, odevzdávání, a zveřejňování závěrečných prací" a platné Směrnice děkana "Úprava, odevzdávání a zveřejňování závěrečných prací na FAST VUT" (nepovinná součást závěrečné práce v případě, že přílohy nejsou součástí textové části závěrečné práce, ale textovou část doplňují).

Ing. František Vajkay, Ph.D.
Vedoucí bakalářské práce

Abstrakt

Hlavným cieľom tejto bakalárskej práce je vypracovanie projektovej dokumentácie k realizácii stavby pre rezidenčný bytový dom. Bytový dom sa nachádza vo Zvolene, parcely projektu spadajú pod katastrálne územie Zvolen. Miesto stavby má rovinatý profil, celý objekt je podpivničený, samostatne stojaci so štyrmi nadzemnými podlažiami a prístavbou s dvomi podlažiami na východnej strane pozemku. Z funkčného hľadiska ide o bytový dom prepojený s polyfunkčnou jednotkou. Koncept dispozície je pre 1, 2 a 3-izbové byty rovnaký.

Navrhovaný objekt je na svoj charakter bez náročných tvarov, detailov a konštrukčných riešení. Navrhovaná stavebná činnosť preto vytvára predpoklad finančne výhodnej investície pri zachovaní stanoveného štandardu.

Objekt je založený na železobetónovej základovej doske hrúbky 650mm. Všetky nosné konštrukcie v návrhu počítajú s použitím poloprefabrikovaných filigránových panelov. Hlavný strešný plášť nad posledným podlažím tvorí plochá strecha s mechanickým priťažením, hydroizolácia bude mechanicky kotvená do nosnej železobetónovej stropnej dosky. Obvodové steny budú zateplené systémovo riešeným kontaktným zatepľovacím systémom z izolačných dosiek z minerálnej vlny.

Projektová dokumentácia bola vytvorená v počítačovom softvéri AutoCad.

Kľúčové slová

Bytový dom, suterén, plochá strecha, základová doska, filigránové panely, bezbariérový vstup, výťah

Abstract

The main aim of this bachelor thesis is to elaborate project documentation for construction realization of a residential building.

Residential house is located in Zvolen, building lots of the project fall under the cadastral area of Zvolen. Construction site has a relatively flat profile, there is a basement floor, detached with 4 above-ground floors and an extension with two floors on the east side of the plot. From the functional point of view, it is an apartment building connected with a retail multifunctional unit. The layout concept is the same for 1, 2 and 3-room apartments.

Due to its character, the proposed building is without demanding shapes, details and construction solutions. The proposed construction processes therefore create a precondition for a financially advantageous investment while maintaining the set standards.

The building is founded on a 650mm thick foundation slab. All load-bearing structures are designed as reinforced concrete filigree panels. The main roof above the last floor is flat with mechanical load, water-proofing layer is mechanically anchored into the load-bearing concrete structure. All external walls are thermally insulated using mineral wool walls. Project documentation was drawn in a computer software AutoCad.

Keywords

Residential building, basement, flat roof, foundation slab, reinforced concrete filigree panels, wheelchair access, elevator

Rozšírený abstrakt

Bytový dom je delený na dve časti A1 a A2. Vstup do objektu je riešený cez zádverie, cez ktoré sa prechádza na spoločnú chodbu, kde sa nachádza schodisko a výťah. Vstup do bytov je priamo zo spoločnej chodby. V bytovom dome sa nachádzajú 1, 2 a 3-izbové byty. Koncept dispozície je pre 1, 2 a 3-izbové byty rovnaký. Vstup do chodby alebo zádveria, na ktoré je napojené wc, kúpeľňa a kuchyňa s obývačkou. Izby s orientáciou na západnú stranu majú vstup na lodžiu. Byty na poslednom 4. poschodí majú vstup do bytu cez zádverie, kde sa ďalej pokračuje do kuchyne s jedálňou, ktorá je priamo spojená s obývačkou. Nočná zóna začína za chodbou, z ktorej sa vstupuje do šatníka, wc, kúpeľne a izieb. Vstup na terasu je z obývacej izby. Terasa je prestrešená markízou.

Podzemné podlažie predstavuje spoločnú podzemnú garáž pre obidva vstupy bytového domu. Funkčnosť 1.PP je dvojúčelová, v prípade ohrozenia bude slúžiť ako úkryt civilnej ochrany kategórie JÚBS – jednoduchý úkryt budovaný svojpomocne. Vjazd do garáže je riešený centrálnym vstupom – rampa z úrovne terénu. V priestore suterénu sa okrem priestorov pre parkovanie nachádza aj technické zázemie (kompaktná odovzdávacia stanica tepla, miestnosť elektrorozvodne, slaboprúdu a CBS, miestnosť upratovačky a skladové priestory – kobky určené pre budúcich vlastníkov bytov.

Celkovo je v rámci suterénnych priestorov umiestnených 36 parkovacích stojísk z toho sú 2 p.m. určené pre osoby s obmedzenou schopnosťou pohybu.

Užívateľmi jednotlivých priestorov budú budúci vlastníci jednotlivých bytov a nebytových priestorov.

Prevádzkovateľom distribučnej trafostanice TS 01., VN a NN rozvodov bude Stredoslovenská energetika, a.s, Žilina.

Prevádzkovateľom vybudovanej verejnej kanalizácie a verejného vodovodu bude spoločnosť Stredoslovenská vodárenská prevádzková spoločnosť a.s., Banská Bystrica.

Prevádzkovateľom navrhovaných komunikácii v riešenom území ako aj priľahlých chodníkov a parkovacích státí bude Mesto Zvolen.

Zemné práce

Zemné práce sú spojené s realizáciou základov predmetných objektov novostavby.

Výkopy je potrebné zhotoviť až po vrstvu uľahlých štrkov a jemnozrnné zeminy nahradiť drveným kamenivom. Vzhľadom na to, že časť objektu je nepodpivničená, podložie je nutné vytvoriť formou zhutneného násypu.

Zakladanie

Objekt je založený na železobetónovej základovej doske hrúbky 650 mm. V mieste stĺpov je navrhnuté lokálne zhrubnutie v hodnote 150mm, resp. 250mm.

Systém železobetónovej základovej dosky a obvodových stien hr. min 300mm funguje ako biela vaňa.

Zvislé a vodorovné nosné konštrukcie

Všetky nosné zvislé stenové konštrukcie sú navrhnuté ako železobetónové steny s hrúbkou 200 a 250mm. Návrh počíta s poloprefabrikovanou konštrukciou pomocou filigránových stien. Nosné steny hrúbky 250mm sú použité medzi dvoma bytmi alebo medzi bytom a chodbou. Ostatné nosné steny budú hrúbky 200mm vrátane výťahovej šachty.

Stropné dosky sú navrhnuté rovnako ako steny t.j. ako železobetónové poloprefabrikované konštrukcie - filigránové. Hrúbka stropnej dosky medzi bytmi je podľa statického výpočtu navrhnutá na 220mm. Doska nad podzemnými parkoviskom bude 300 mm. Doska pod predzáhradkami bude lokálne zhrubnutá na 600 resp. 850mm.

Deliace steny a priečky

Vnútorné deliace nenosné steny a priečky sú navrhované ako murované z vápenno-pieskových tvárnic SILKA S12-1400 hrúbky 100 mm, murovaných na SILKA lepiacu maltu S10. Preklady v priečkach budú typu Ytong - nenosný preklad šírky 100mm a dĺžky 1250mm.

Priečky sú oddelené od nosných stien a v hornej časti od stropnej dosky pružným stykom – vloženým pásom minerálnej vlny.

Zastrešenie

Hlavný strešný plášť nad posledným podlažím navrhovaného objektu tvorí plochá strecha s klasickým poradím strešných vrstiev s mechanickým priťažením. Spádovanie strešnej roviny je vytvorené spádovým polystyrénom. Odvodnenie strechy je cez vnútorné strešné vpuste, ktoré sa napájajú na dažďové potrubie vo vnútorných šachtách.

Tepelné izolácie

Zateplenie stien suterénu je navrhnuté zo soklového perimetru hrúbky 120mm, nad základom je identickej hrúbky ako zateplenie stien tj. v hrúbke 220mm. Obvodové steny budú zateplené systémovo riešeným kontaktným zatepľovacím systémom ETICS z izolačných dosiek z minerálnej vlny hrúbky 220, 180, 160 a 100 mm.

Izolácie proti vlhkosti

Hydroizoláciu spodnej stavby tvorí fóliová hydroizolácia na báze PVC-P vystužená polyesterovou mriežkou Fatrafol 803. Pás tvorí izoláciu spodnej stavby proti zemnej vlhkosti, gravitačnej a tlakovej vode a tiež tvorí protiradónovú ochranu.

Hydroizolačnú vrstvu strechy tvorí fóliová hydroizolácia na báze PVC-P vystužená polyesterovou mriežkou Fatrafol 810.

Povrchová úprava fasády

Povrchovú úpravy fasády bude tvoriť štruktúrovaná silikátová škriabaná fasádna omietka aplikovaná na kontaktný zatepľovací systém z izolantu z dosiek z minerálnej vlny.

Výplne otvorov v exteriéri

Výplne otvorov sú v prevažnej miere navrhované z plastových 5-komorových profilov so zasklením izolačným trojsklom. Tienenie bude zabezpečené exteriérovými tieniacimi prvkami.

Stavebná fyzika

Rezidenčný objekt bol posudený na základe stavebno fyzikálnych výpočtov zahrňujúcich vlastnosti tepelnej techniky, akustiky a presvietenia jednotlivých bytových priestorov. Vo všetkých smeroch dizajn rezidenčného domu splňuje normatívne požiadavky a svojou tepelnou obálkou budovy sa zaraďuje do kategórie budov s takemr nulovou spotrebou energie.

Požiarna ochrana

V budove sa nachádza 43 požiarnych úsekov, ktoré sú všetky priamo napojené na dve chránené únikové cesty typu A navrhnuté od podzmeného podlažia až po posledné štvrté podlažie. Budova spĺňa všetky normatívne požiadavky a nevytvára žiadne požiarne nebezpečné plochy v jej okolí.

Bibliografická citace VŠKP

Michal Jakobei *Bytový dom.* Brno, 2020. 82 s., 430 s príl. Bakalárska práca. Vysoké učení technické v Brně, Fakulta stavební, Ústav pozemního stavitelství. Vedúci práce Ing. František Vajkay, Ph.D.

DECLARATION OF THE ORIGIN OF THE FINAL WORK

I declare, that I worked on the bachelor's thesis independently and that I rightly stated all information sources used.

DECLARATION OF THE ORIGIN OF THE FINAL WORK

Prehlasujem, že som bakalársku prácu vypracoval samostatne a že som uviedol všetky použité informačné zdroje.

V Brne dňa 05.06.2020

……..

B.Sc. Michal Jakobei

autor práce

ACKNOWLEDGEMENTS

First of all I would like to thank my supervisor of the Bachelor Thesis Ing. František Vajkay Ph.D. for his valuable help, professional advice and consultation comments during the whole elaboration process of my thesis.

Special acknowledgements goes to my parents, siblings and my girlfriend for their continuous support and motivation.

POĎAKOVANIE

V prvom rade, by som chcel poďakovať vedúcemu mojej bakalárskej práce Ing. Františkovi Vajkayovi Ph.D., za odbornú pomoc, hodnotné rady a komenty počas celého obdobia spracovania bakalárskej práce.

Osobitné poďakovanie patrí mojim rodičom, súrodencom a priateľke za ich nepretržitú podporu a motiváciu počas štúdia.

CONTENT:

a. cover sheet,
b. assignment of the VŠKP,
c. abstract in Slovak and English,
d. key words in Slovak and English,
e. extended abstract in Slovak,
f. bibliographic citation of the VŠKP,
g. declaration of the origin of the final work,
h. acknowledgements,
i. content,
j. introduction,
k. original text part,
   - A – Accompanying report
   - B – Technical report
   - D.1.1 – Architectural building solution
   - D.1.2 – Structural building solution
   - D.1.3 – Fire safety building solution
l. conclusion,
m. list of used sources,
n. list of used abbreviations and symbols,
o. list of annexes.

INTRODUCTION

The main topic of this Bachelor Thesis is to design a residential building and elaborate main parts of the project documentation for successful realization.

Building represents a residential house with the height of 4 above-ground floors with a shared basement garage. Residential units are located from the first to the fourth floor, retail multifunctional space is designed in front of the main entrance into the A2 section. The apartment house has 1, 2 and 3-room apartments and is divided into two sections with individual entrance vestibules from outside.

The building is founded on a 650mm thick foundation slab. All load-bearing structures are designed as reinforced concrete filigree panels. Interior partition walls are brick-made, using lime-sand blocks SILKA laid on SILKA adhesive mortar. Lintels will be constructed by using YTONG.

The main roof above the last floor is flat with mechanical loading, water-proofing PVC-P layer Fatrafol 810 is mechanically anchored into the load-bearing concrete structure. Since the thermal insulation is designed with EPS (expanded polystyrene), it is necessary to separate it from the water-proofing layer using a layer of geotextile with a min. surface weight of 300g/m^2.

Floor insulation is designed as a combination of expanded polystyrene with different strengths EPS 100S and EPS 150S, the same material is used for insulation of roofs and terraces on the last floor. All external walls are thermally insulated using mineral wool walls. Substructure waterproofing layer consists of PVC-P based foil reinforced with a Fatrafol 803 polyester mesh. Exterior window and door fillings are predominantly designed from plastic 5-chamber profiles with triple-glazing and the total Uw max 1.0 W/m^2K.

Colour of these elements will be white from the interior side and anthracite from the exterior. Shading will be ensured by external shading elements.

This thesis is divided into following parts: the main text part, preparatory and study works, situation drawings, architectural-structural solution, building structural solution, fire safety and building physics.

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BYTOVÝ DOM

RESIDENTIAL BUILDING

A – ACCOMPANYING REPORT

BAKALÁŘSKÁ PRÁCE

BACHELOR'S THESIS

AUTOR PRÁCE — B.Sc. MICHAL JAKOBEI

AUTHOR

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SUPERVISOR

BRNO 2020

A. ACCOMPANYING REPORT

A.1. IDENTIFICATION DATA

A.1.1. BUILDING DATA

a. construction name:

KONTON Residential building

b. location:

c.a. Zvolen, parcel number 3883/45

c. the subject of the project documentation:

The main goal of this project is to design a new functional residential building, with all necessary drawings for the construction process included.

A.1.2. INFORMATION ABOUT THE INVESTOR

MICHAL JAKOBEI

Poľovnícka 609/8, Sliač, 962 31, Slovakia

michal.jakobei@gmail.com

A.1.3. CONSTRUCTION DESIGNER'S INFORMATION

a. Architectural-construction solution:

MICHAL JAKOBEI, Poľovnícka 609/8, Sliač, 962 31, Slovakia

b. Building construction solution:

MICHAL JAKOBEI, Poľovnícka 609/8, Sliač, 962 31, Slovakia

c. Fire-safety solution:

MICHAL JAKOBEI, Poľovnícka 609/8, Sliač, 962 31, Slovakia

A.2. DIVISION OF BUILDING STRUCTURES, TECHNICAL AND TECHNOLOGICAL EQUIPMENT

SO 01	Residential building
SO 03.1	LV connection for residential object and underground garage
SO 04.1	Public lightning
SO 06	Public water system, hydrants and water supply connections
SO 07	Public sewage system and sewer pipeline connections
SO 09	Telecommunication connection
SO 10.1	Traffic infrastructure

SO 10.2 Pavements and paved areas

SO 10.3. Sidewalks and paved area

A.3. INPUT DATA LIST

- Cadastral information – detailed information about the parcel and all the neighbouring parcels
- Landscape surveying – altitude, latitude, measuring of the terrain
- Radon index determination – detailed protocol
- Owner's demands and requirements
- Regulation plan of the city Zvolen
- Engineering-geological survey of the site – carried out in February 2007

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INSTITUTE OF BUILDING STRUCTURES

BYTOVÝ DOM

RESIDENTIAL BUILDING

B – OVERALL TECHNICAL REPORT

BAKALÁŘSKÁ PRÁCE

BACHELOR'S THESIS

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SUPERVISOR

BRNO 2020

B. TECHNICAL REPORT

B.1. DESCRIPTION OF THE CONSTRUCTION SITE

B.1.1. Location and construction site characteristics developed and non-developed area, compliance of the proposed building with the character of the developed area, existing use and built-up area.

The construction site is located on the northern periphery of the town Zvolen, in the area called "Čierne zeme– Rákoš". The building plot is situated between the "Kováčský potok", "Strážská cesta" and the premises of the company „DRU Zvolen ". The area on which the residential complex is designed is located on the outskirts of Zvolen in the UPN-Z part "Čierne zeme - Rákoš" on the plot. no. 3883/19, 3883/45, 3883/24, 3883/129, 3883/130, 3883/21 and 3883/96, cadastral territory Zvolen.

B.1.2. Data on compliance with an Urban Planning Territorial decision, Regulatory plan or a Public Law Territorial Decision.

The construction design is in accordance with the Planning Territorial decision. New residential house is designed in accordance with the Regulatory plan of city Zvolen. The building plot is located within the area intended for housing construction. All necessary maintenance networks and infrastructure is developed in near proximity of the construction site.

B.1.3. Data on compliance with the land-use planning documentation, in case of construction modifications influencing a change in use of the construction.

The construction project and its design are in accordance with the land-use planning documentation. The plan complies with all parts and requirements of use, spatial arrangement and architectural aesthetic conditions of the area.

B.1.4. Information on decisions taken to grant exemptions from general land use requirements

No granted exemptions were required for the construction process. All requirements and conditions of the area were taken into account.

B.1.5. Information on whether and in what parts of the project documentation the terms of the authorities concerned binding opinions are taken into account

Conditions were not set, it is not the subject of the bachelor thesis

B.1.6. Analysis of the construction site - conclusions of conducted surveys and analyses on site – geological survey, hydrogeological survey, historical building survey etc.

Engineering-geological survey was carried out at the construction site in February 2007 (Aurex trade, s.r.o., Banská Bystrica).

The final report evaluates the construction site with simple foundation conditions; the base soil will be predominantly (G3) with the addition of fine-grained soil (G-F), respectively. clayey gravel G5-GC. The entire surface of the construction site is covered with a layer of sandy clay, under which is located clay sand (F4-CS) thickness of 0.5-1.5 m.

No groundwater was found in any of the probes in the area, stabilized at a level of about 282.00 m.n.m. - it will not affect the foundation joint of the building.

Excavations should be digged up to a layer of gravel and replaced by fine-grained soil with crushed aggregate. Due to the fact that part of the building is with no basement, the subsoil must be created in the form of compact embankment.

Cartographic and land-surveying data

- Data from the cadastral map – cadastral territory Zvolen
- Information about the parcel
- Information about the neighbouring parcels
- Land-surveying of technical infrastructure
- Legislation and regulations

B.1.7. Protection of the territory subjected to other legislations

The construction site parcel together with the neighbouring parcels in the cadastral area Zvolen is not a part of any protected area, national park nor any territory reservation.

B.1.8. Construction site in accordance with flooded territory, undermined territory regulations.

The construction site and all the neighbouring parcels are not within the boundaries of a flood or mined area.

B.1.9. Construction – its effects on neighbouring buildings and land surrounding the area, maximal environment protection, drainage conditions within the site.

Contractor shall protect all foundation works from flooding caused by floods, heavy storms or other causes so as to avoid unnecessary damage and subsequent interruption of construction work on site. It shall also provide, install and maintain the pumps, hoses, troughs and other equipment necessary to remove accumulated water off the level of the temporary foundation floor for a period to be determined by the technical project supervisor.

The flood waters must be drained immediately outside the work area so as to prevent undercutting of already made excavations or other objects. In the event of undercutting or flooding with pumped water, the supplier must immediately take appropriate corrective action. When carrying out earthworks, the work must be done in such a way as to avoid unnecessary waterlogging of the construction site/appropriate workplace.

B.1.10. Requirements for demolition works, clearance of the site from trees, possible earth decontamination.

Construction site is free of any building, no demolition works are necessary.

There are no trees on the site and the decontamination of the earth is minimal, bearing no requirements within this issue.

B.1.11. Requirements for maximum temporary and permanent occupation of agricultural land resources or land intended for forestry.

There is no collision of land intended for the occupation of the agricultural land fund caused by the construction. The occupation of land intended for the forest function is not disrupted neither.

B.1.12. Technical conditions - especially the possibility of connections to the existing transport and technical infrastructure, possibility of barrier-free access to the building.

Newly designed traffic infrastructure will be directly connected to a main road "Strážska cesta" located south from the proposed building. Within the building plot, exterior parking spaces will be built. Utility connections will all be directly connected to the building, barrier-free access is available using the ramp from the car park.

B.1.13. Material and time constraints of construction, conditional, induced, related investments.

There will be no conditional, induced or related investments.

B.1.14. A list of building plots according to the cadastral map on which the construction is carried out.

The area is located on the northern periphery of the town Zvolen. The building plot is situated between the "Kováčský potok", "Strážská cesta" and the premises of the plant „DRU Zvolen". The area on which the residential building is designed is located on the outskirts of Zvolen on the plot. no. 3883/19, 3883/45, 3883/24, 3883/129, 3883/130, 3883/21 and 3883/96, cadastral territory Zvolen.

B.1.15. A list of building plots on which a protection or security zone is established.

New protection and safety zones are set within the field of engineering networks: water supply and sewerage system 1,5m, electricity 1m, gas 1m, low current 2,5m.

B.2. GENERAL BUILDING DESCRIPTION

B.2.1. Basic characteristics of the building and its use

a. New construction or modification of a completed construction; in case of a construction change, information about their current state, conclusions of the structural-technical or structural-historical survey and the results of static assessment of load-bearing structures

The main goal of this thesis is to design a detached residential building including paved areas and all necessary utility connections, plus a retail multifunctional space.

b. Purpose of the building use

Building for living.

c. Permanent or a temporary building

Permanent building.

d. Information on issued decisions granting exemptions from technical requirements for construction works and technical requirements ensuring barrier-free use of the structure

The building is designed in accordance with the Decree of the Ministry for Regional Development No. 398/2009 Coll. on general technical requirements ensuring barrier-free use of buildings.

e. Information on whether and in what parts of the project documentation the legal conditions of the binding opinions of the concerned authorities are taken into account

Requirements of all concerned authorities are taken into account and processed within the project documentation.

f. Protection of the construction according to other legal regulations

During construction, only machinery and equipment in proper technical condition must be used in such a way that no leakage of oil into the soil or groundwater. Waste can only be disposed in facilities that have a valid waste disposal license and the documents on handing over the waste to these plants must be kept by the contractor for possible inspection.

g. Designed parameters of the building, built-up area, enclosed space, number of residential and functional units and its areas etc.

Surface and spatial balance

Number of above-ground floors	4
Number of underground floors	1
Floor area 1.PP. /m^2/	1425,68
Floor area 1.NP. /m^2/	877,62
Floor area 2.NP. /m^2/	844,60

Floor area 3.NP. /m^2/	588,03
Floor area 4.NP. /m^2/	588,03
TOTAL floor area. /m^2/	4323,96
Built-up area. /m^2/	1591,75
Enclosed space /m^3/	20483,54

Number of flats and persons:

Number of 1-room apartments	**5**
Number of 2-room apartments	**10**
Number of 3-room apartments	**15**
Retail rent space /m^2/	**146,46**
Occupancy	**108**
Residential units	**100**
Retail space	**8**

h. Basic construction balance – needs and consumption of materials, rainwater management, total produced quantity and types of waste and emissions, energy performance class of buildings, etc.

h.1. Calculation of water demand (for hygienic and social purposes)

Specific water demand (day/person):

Residential units …. 100 persons …. 56 m3/year/person = 0,15 m3/day/person

Retail space …. 8 persons …. 22 m3/year/person = 0,06 m3/day/person

Average water demand in a day (for all occupants):

$$Qp = 100 \times 0{,}15\ m^3 + 8 \times 0{,}06\ m^3 = \frac{15{,}48\ m^3}{day} = 0{,}18\ l/s$$

Maximum water demand in a day (kd = 1,25)

$$Qm = Qp \times kd = 15{,}48\ m^3 \times 1{,}25 = 19{,}35\ m^3/day$$

Maximum water demand in an hour (kh = 2,0)

$$Qn = \frac{1}{24} \times Qp \times kd \times kh = \frac{1}{24} \times 15{,}48\ m^3 \times 1{,}25 \times 2{,}0 = 1612{,}5\ l\ per\ hour$$
$$= 1{,}6125\ m3/day$$

Water demand in a year

$$Qr = Qp \times 365 = 15{,}48\ m^3 \times 365 = 5650\ m^3/year$$

h.2. Calculation of fire water demand is part of the fire safety report.

h.3. Outflows of sewage - calculation of the sewage system

Calculation is based on the water demand values ($Qp = Qs$)

$Q_{s,average} =$ 0,18 l/s

$k_{h,max} = 3$ $(coefficient\ of\ maximum\ hourly\ unevenness)$

$Q_{s,max} = 0{,}18 \times 3 = 0{,}54\ l/s$

h.4. Outflows of rainwater - calculation of the rainwater system

Design rain intensity (for dimensioning of sewer and oil-water separators (ORL).

Intensity of 15 min. rain with a periodicity of 0,5 (2-year rain), measuring precipitation station Zvolen-Hájniky …. $i = 168\ l/s \times ha$

Drainage areas

- Roofs …. 920 m^2
- Green roofs …. 390 m^2
- Road network (outside of OWS). …. 380 m^2
- Road network (for ORL 1) …. 1080 m^2
- Road network (for ORL 2) …. 930 m^2
- Drainage coefficients

Ψ (for roofs) …. 1,0

Ψ (for green roofs) …. 0,3

Ψ (for roads) …. 0,9

Total outflow of rainwater (into the public sewage system)

$$Q_{total} = [(0{,}092 \times 1{,}0) + (0{,}039 \times 0{,}3) + (0{,}239 \times 0{,}9)] \times 168 =$$

$$0{,}319 \times 168 = 53{,}56\ l/s$$

Outflow of rainwater into OWS

$$Q_{OWS-1} = 0{,}108 \times 0{,}9 \times 168 = 16{,}3\ l/s$$

$$Q_{OWS-2} = 0{,}093 \times 0{,}9 \times 168 = 14{,}1\ l/s$$

i. Waste management

During construction. The resulting waste will be temporarily stored in containers intended for this purpose. Waste exports will be contracted with an authorized person with regular collection primarily for material recovery. In case of waste types that cannot be recovered, they will be handed over for disposal.

With the temporary deposit of topsoil, its using is assumed for landscaping within the construction site.

After the building is put into operation, separate collection of waste suitable for further processing (unpolluted packaging paper, cardboard packaging, glass, plastics, metals, etc.) shall be introduced. Material and organizational assurance of the collection will be realized with the customer company, which will ensure the delivery of suitable collection containers, waste collection and its further use.

Hazardous waste will be handed over to a contracted person for hazardous waste management.

More detailed information about waste management can be found in part B.6.b

j. Energy performance

Residential building is designed in accordance with the requirements for almost zero energy buildings and according to all valid standards. More detailed information about energy building performance can be found in "File 6 – Building Physics Assessment"

k. Basic construction assumptions – realization time schedule, division into individual construction stages

Construction starting date – 03/2020

Construction ending date – 05/2021

l. Prediction of total construction costs

The price of the project is estimated up to 3,5 million €.

B.2.2. Urbanistic and architectural solution of the building

a. Urbanism – layout solution, spatial regulations

Building SO-01 represents a sectional residential house with the height of 4 floors with a shared basement garage. From the functional point of view, it is an apartment building connected with a multifunctional unit.

Residential units are located from the 1st to the 4th floor. Retail space is located in front of the main entrance into the A2 section. The retail space is not spatially divided at this stage of the project. The layout will be based on the requirements of the future tenant.

The apartment building is divided into two parts A1 and A2. Entrance to the building is designed through a vestibule which leads to a common hallway, where there is a staircase and elevator. Entrance to the apartments is directly from the common hallway.

The apartment house has 1, 2 and 3-room apartments. The layout concept is the same for 1, 2 and 3-room apartments. Entrance to the hallway or vestibule, which is connected with toilet, bathroom and kitchen with living room. Rooms facing the courtyard have access to the loggia. Apartments on the last 6th floor have access to the apartment through the vestibule, where it continues to the kitchen with dining room, which is directly connected to the living room. The night zone starts behind the corridor from which you enter the wardrobe, toilet, bathroom and bedrooms. The entrance to the terrace is from the living room. The terrace is covered with an awning.

b. Architectural – designed shape, materials and colours

Shape of the main residential building is rectangular with the length of 53,44 m and the width of 12,34 m. The retail part is connected to the main building from the eastern side, right above the entrance into the A2 block. The dimensions of the extension are 8,16 m (length) and 25,00 m (width).

This building has a basement where parking spots, technical rooms and storage cells are located. It also has a flat roof above all structures.

The façade solution consists ETICS insulation system with different colour finishes including grey, white and yellow colours. All the opening frames will have the anthracite finish.

All paved areas will be constructed from concrete blocks and asphalt.

B.2.3 General operational solutions, technology productions

The apartment house has 1, 2 and 3-room apartments. The layout concept is the same for all apartments. Entrance to the hallway or vestibule, which is connected with toilet, bathroom and kitchen with living room. All apartments have access to a loggia or a balcony. Apartments on the last 4th floor have access to the apartment through the

vestibule, where it continues to the kitchen with dining room, which is directly connected to the living room. The night zone starts behind the corridor from which you enter the wardrobe, toilet, bathroom and bedrooms. The entrance to the terrace is from the living room. The terrace is covered with an awning.

Areas such as common hallways or entrance halls within the building are designed for easy access in case of moving furniture taking into account general dimensions 1600 x 600 x 1600 mm (length * width * height), according to ČSN 73 4301 – Residential buildings, Z4: 2000, part "Basic factors influencing operational and spatial relationships".

Parking situation is solved by underground parking garage and outdoor parking places for residents. The entrance to the underground parking is via a ramp, which is partially covered. The ramp is connected to the proposed class B2 access road. The entrance to the outdoor parking lot is connected from the access road B2 and C3.

B.2.4 Barrier-free use of the building - principles of accessibility and use of the building by persons with reduced mobility, including data on conditions for the work performance of persons with disabilities

The building is designed in accordance with the Decree of the Ministry for Regional Development No. 398/2009 Coll. on general technical requirements ensuring barrier-free use of buildings.

Design principles for traffic infrastructure, areas and building objects regarding of use and accessibility for physically and visually disabled persons are dealt with in full compliance with Decree 398/2009 Sb. Both building entrances are equipped with an elevator that leads to all floors, including the basement garage. Individual residential units are not designed for permanent use of disabled persons.

B.2.5 Safe use of the building

This project and its documentation are designed in accordance with the latest standards and valid regulations. After the construction is handed over to the investor, it allows safe use of all parts.

General building operation, its technology, structural solutions, all the equipment and activities will be designed and constructed with regards to occupational safety, in particular in accordance with Regulation no.48/1982 Sb. as

amended. All machinery, equipment and materials used within the residential building must meet the requirements for safe operation and use and must have the original certificates (declaration of conformity).

Flooring walkable surfaces must be ensured with a non-slippery finish. The specific requirements are set in standards divided according to a flooring type:

- ČSN EN 13 813 Screed materials and floor screed structures
- ČSN EN 13 164 Thermal insulation construction materials
- ČSN 74 4505 Floor structures - Common regulations
- ČSN 72 5191 Ceramic tiles elements - determination of anti-slip properties
- ČSN 74 4507 Testing methods for floor structures - Determination of anti-slip properties of individual floor surfaces.

All used materials must be certified for individual flooring types and the specific environment. All horizontal and vertical elements are designed in accordance with the requirements of ČSN 73 4130 Stairs and inclined ramps and are secured in accordance with ČSN 74 3305 Protective railings.

In order to ensure safe construction operation, the project investor must ensure a well-prepared elaboration of all warning alarm directives and all necessary operating rules, especially for technical equipment located within the building. The report must be listed with all necessary operational instructions, basic processes when carrying out regular inspections, tests and revisions. Operational staff must be over 18 years of age, fully competent and qualified for the specific equipment operation.

The building user manual from the operational and safety point of view must contain in particular: individual deadlines for regular inspections of electrical equipment (ČSN 33 2000-6-61).

According to the Regulation of the Ministry of the Interior of the Czech Republic No. 246/2001 Coll. "Fire prevention" project contractor must ensure a creation of well-defined Fire Alarm Guidelines, Evacuation schemes, the Evacuation Plan, detailed Fire Fighting Documentation and other required fire protection documentation in accordance with the requirements of the Fire Protection Act and regulations on fire prevention (e.g. fire book). Further as stated in the regulation, a preventive fire inspection must take place regularly in a time period of 6 months.

Also, once in six months, every spring and autumn, the technical condition of roofing and roof gutters will be checked.

Every residential building user will use the object according to the projected parameters and in accordance with the purpose of the building for which the building permit was issued. All residents will ensure necessary regular inspections, maintenance and prescribed inspection of all building systems.

The building is designed in accordance with valid standards and regulations, during normal operation, therefore, there will be no danger to the health of residents in connection with the shape and technical solution of the building.

B.2.6 Basic Characteristic of objects

a. Construction design

Detached residential building with two separate entrances designed in a rectangular shape with the main facades facing south and north. Dimensions of the main building together with the extension are specified in B.2.2.b – Architectural design. Structural solution of the building consists of two main parts, the substructure is monolithic (C 30/37) and the superstructure uses prefabricated filigree reinforced concrete panels for both vertical and horizontal load-bearing structures.

The building is constructed on a reinforced concrete foundation slab with 650 mm thickness. In column positions are designed local increases in thickness of 150 mm, resp. 250 mm. The foundation slab is designed as the base for creating the garage floor with a crack width limit of 0.3 mm. System of reinforced concrete foundation slab and perimeter walls th. min 300 mm works like a white tub.

b. Design and material construction solutions

Subsoil replacement

Conditions for effective subsoil replacement:

1. removal of fine-grained soil up to min. depth 400 mm below the upper level of the gravel layer,
2. sufficiency of the excavation depth must be verified by a geotechnician and a structural engineer,
3. removal of the last 200 mm immediately before replacing the subsoil,
4. protect the construction pit from long-term exposure to rainwater,

5. for embankment material use quarry stone (macadam - andesite) with a continuous curve with a grain size of 0.1 - 63 mm (excluding the dust fraction) with the deposition of coarser fractions from the lower level of the excavation,
6. confirm the suitability of the material by a responsible geotechnician
7. layers of the embankment constructed in height max. 300 mm and gradually compacted,
8. keep the resulting compactness $I_d > 0.7$
9. required modulus of elasticity $E_{def} > 80$ MPa,
10. demonstrate the degree of compaction by a field test ($E_{def2} / E_{def1} < 2.6$).

Vertical and horizontal load-bearing structures

All load-bearing vertical wall structures are designed as reinforced concrete walls with thicknesses of 200 and 250mm. The design uses a semi-prefabricated construction using filigree walls. The 250mm thick load-bearing walls are used between two flats or between an apartment and a corridor. Other load-bearing walls will be 200mm thick including elevator shafts.

The ceiling slabs are designed in the same way as the walls, i. as reinforced concrete semi-prefabricated filigree structures. According to the static calculation, the thickness of the ceiling slab between apartments is designed to be 220mm. The thickness of the slab above the underground car park will be 300 mm. The slab under the front yards will be locally strengthened to 600 resp. 850 mm.

The exact description of these structures is solved in the project documentation – Structural analysis (not part of this thesis).

Partition walls

The internal non-load-bearing partition walls are designed as brick made of lime-sand blocks SILKA S12-1400 - 100 mm thick, laid on SILKA adhesive mortar S10, resp. made of Ytong aerated concrete blocks of 100 mm thickness.

Lintels in the partition walls will be from Ytong - non-bearing lintel with the width of 100mm and the length of 1250mm.

Thermal insulation

The external walls will be insulated with a ETICS system made of mineral wool boards with the thickness of 220, 180, 160 and 100 mm.

Roof

The main roof above the last floor is flat with mechanical loading, water-proofing PVC-P layer Fatrafol 810 is mechanically anchored into the load-bearing concrete structure. Since the thermal insulation is designed with EPS (expanded polystyrene), it is necessary to separate it from the water-proofing layer using a layer of geotextile with a min. surface weight of 300g/m^2.

Staircase

Design includes a prefabricated TOP-STEPS system for all staircases within the project. The width of one staircase flight is 1,28m, 16,5cm/30cm, there are 6/7 steps in each flight and the thickness of the staircase slab is 18cm. Point placement with a console design (25x15x15 cm).

Elevator

Both building blocks are designed with an elevator shaft, the shaft goes through all five floors and is located directly in the common hallway after the entrance vestibule. The specific elevator type will be determined on tender documentation. Dimensions of the shaft are 1600mm x 1750mm.

c. **Mechanical durability**

Structural solution of the design is processed to withstand and respect basic requirements for mechanical resistance together with understanding effectiveness and importance of the financial aspect from the Investor's point of view.

Following aspects within the normal use of the building should be strictly avoided:

- Total destruction/collapse of the building
- Great deflections and deformations of individual structural parts – causing danger to technical equipment/other parts and eliminates safe use of the building

The structural (static) and material solutions is solved in detail in a separate part of the project documentation D.1.2. - Building structural design solutions

B.2.7 Basic characteristics of technical and technological equipment

a. **Technical solutions**

Water supply connection

Drinking and fire water will be supplied by a new water connection, which will be connected to the public water supply. The water connection will serve to provide sufficient amount of water for social purposes of residents. This water connection will

also serve as a source of fire water (supply to the external above ground hydrant HN DN150 and fire hose reels mounted in common hallways and in the garage.

Design of the water supply system will be constructed in accordance with ČSN 75 5401, 75 5411. Layout of the water supply system is specified in the situation drawing, vertical cross-section can be found in the longitudinal profiles (not part of this thesis). The water supply system complies with the existing engineering networks as well as the proposed connections and their protective zones in accordance with ČSN 73 6005 (Spatial adjustment of engineering networks).

Sewer system

The proposed sewerage system will be connected to the existing public sewerage system. Within the system, following areas will be drained – wastewater from sanitary facilities, rain-water treatment, roofs of apartment buildings, green areas around the residential building and all paved areas.

Pipelines placed in trenches will be on 15cm thick gravel layer, the backfill will be from sorted material up to 30 cm above the pipe. Backfilling of trenches will be done with compacted material, under the roads and paved areas compacted gravel layer should be used.

Fixed electrical installation

Design solves the connection of electricity meter switchboards to the LV distribution system from the existing transformer station. The low-voltage connection will be realized by a low-voltage cable 2x 1-CYKY 4x150 mm2 in the conduit.

Energy balance for one housing unit considers the degree of electrification "C" (lighting, conventional appliances up to 3.5kW, cooking, electric oven - appliances with an output of over 3.5kW and air conditioning up to 2kW).

„Pi“ for one residential unit		Number of offtake points	„Pi“ TOTAL	
4kW		34	136kW	
ß for no. of units	„Ps“ TOTAL for all units		„Ps“ common consumption	„Ps“ TOTAL
0,24	33kW		5kW	38kW

Table 1: Electrical installations

Central heating system

Residential building will be heated by the system with forced circulation of heating water. The heating circuit will be connected to a central heat supply (so-called district heating) via a hot water pipeline.

Lightning rods and building grounding

Lightning protection – EXTERIOR

The main aim of this documentation is to build a new lightning protection according to the set of standards of lightning protection ČSN 62305. The object was based on the standard ČSN EN 62305-2 and the rules of the risk assessment included in the level of pre-lightning protection (LPL) class III, which is further specified in Tab. 2 ČSN EN 62305-2.

The construction of external lightning protection must be controlled in accordance with the valid standards ČSN EN 62305-3 Protection of buildings and life-threatening situations.

There are 16 lightning rods proposed for the residential building, all are designed as hidden in the facade. When passing through the terraces, it is necessary to connect the rods to the proposed grid system, in accordance with the project documentation. The lightning rods should be placed at a maximum distance of 15m from each other, if possible on each edge of the building.

Lightning protection – INTERIOR

For equipotential bonding of internal LPS it is necessary to connect:

- Metal building parts
- Metal installations
- Internal systems
- External conductive parts and power grid line connected to the building

Internal sewerage system

Internal sewerage system will be divided into sewage and rain sewer. The internal sewage system will drain wastewater from sanitary facilities. Sewage will be drained by gravity and will be discharged into the area's unified sewerage system. Rainwater from the roof and green areas will be drained by gravity through internal and external rain sewer pipes and subsequently discharged into the area's unified sewerage system.

- **Sewerage system – sewage**

Wastewater from individual sanitary facilities in flats will be drained through connecting pipes to waste pipes.

Sewage water pipes will be brought under the ceiling in 1.PP, where it will be led to the peripheral wall by sewage pipes and subsequently will be discharged into the area uniform sewerage system constructed under the building.

Waste pipes and connecting pipes of sewage will be laid in installation shafts, in grooves in the walls or loosely with additional overlap. The connecting pipes will be laid at an inclination of at least 3%.

In order to connect a sink and a dishwasher, there will be a blinded connecting pipe element in the kitchen directly connected on the sewage system.

All sewerage system pipes will be attached to the building structures with elements with a rubber lining against noise transmission. When installing sewer outlets for fixtures, it is necessary to consult their exact floor plan with the designer or the architect and the supplier of technological equipment and adapt to the selected equipment.

The correct function of the gravity sewer will be ensured by a ventilation pipe led above the roof and terminated by a plastic ventilation head (HL810). Cleaning of waste pipes will be possible through cleaning fittings with a screwing closing lid,

which will be located 1.2 m (in kitchens 0.4 m) above the floor of 1.NP, or when changing the direction of the waste pipe. Cleaning of waste pipes in apartments will be possible through cleaning fittings installed on the 1.NP accessible through a small door opening under the sink and through a small opening installed above or next to the toilet.

Pipes from showers will be laid in the floor. The pipes in the floor will be laid with a minimum slope of 1% and will be made of pipes and fittings of high-density polyethylene (HDPE) for internal sewerage, connected by welding.

Pipe transitions through the base concrete from the ground to the interior must be insulated against groundwater.

When the installation of the internal gravity sewer is completed, tests will be performed according to ČSN73 6760.

A detailed calculation of the amount of discharged sewage is processed in a separate part „B.2.1“.

- **Sewerage system – rain sewer**

Rainwater from the roof of the building will be drained by internal gravity rain sewer within the installation cores and external rain sewer system along the facade constructed inside the thermal insulation. Internal rainwater drains will be led to 1.PP, where they will be led under the ceiling to the peripheral wall and then will drain into the unified sewer system under the building. Cleaning is accessible through the door on the 1.NP.

At the ground level, the external rainwater drains will open into the rain hoppers (HL 600 NHO) and subsequently into the area's unified sewerage system.

Each drained roof area must have at least 2 roof outlets and a safety overflow made in the attic of the roof, when water clogs the roof drainage outlet, water from the roof could directly flow through the opening in the attic. The composition of the roof outlets will be adapted to the composition of the roof cladding.

A detailed calculation of the amount of discharged rain sewer is processed in a separate part „B.2.1“.

Internal water supply

The building will be supplied with drinking water from the city water supply system by the proposed water connection. A DN80 will be connected to the building.

The internal water supply will be divided in the building into a drinking water supply and a fire water supply. The drinking water supply will supply the entire building of the residential complex. The fire water supply will supply the hose reels within in the building.

- **Internal drinking water supply**

Water supply for the building will be a common dimension DN80 and will be brought to the building inside the cleaning room on 1.PP.

From the cleaning room, the main distribution of cold water will be led to individual offtake installations of the building. The main horizontal distribution of cold water, hot water and hot water circulation is under the ceiling of 1.NP. There will be connection branches to the individual pipe risers on which there will be partial shut-off valves.

For a two-storey building, a horizontal distribution is made under the ceiling of the 2nd floor, from which distribution branches are constructed into individual apartments and one branch to the retail space on 1.NP, on which shut-off valves will be installed under the ceiling of the floor.

Internal water pipes will be laid above each other in the wall grooves, on the floor, or loose with additional cover.

The water supply connection pipes will be connected in the installation shafts to the proposed cold and hot water meter sets, which will be accessible through the inspection door. Water meters equipped with a module for radio remote data reading will be installed in water meter sets.

The internal water supply will be vented through the outlet fittings, drained through the lowest laid fittings. All pipes will be attached to the building structures with fastening elements with rubber fittings against noise transmission. All the fittings will be located so that they are freely accessible, controllable and replaceable.

After the installation of the drinking water supply, a pressure test of the water distribution is performed in accordance with ČSN 73 66 60. After a successful test, the piping system is flushed and disinfected.

A detailed calculation of the amount of discharged rain sewer is processed in a separate part „B.2.1“.

- **Internal fire water supply**

The internal fire water supply supplies the internal hose reels DN25/30 located in the building. The main hydrant distribution is under the ceiling of the 1.PP.

In the building, winding hose devices are designed with a shape-stable hose DN25, length 30 m, in accordance with the valid ČSN, with a flow rate of 1.1 l/s at a pressure of 0.2 MPa. Hose reels will be located in the building in accordance with the requirements of fire protection project documentation. Connections for hose reels must be DN 32. Before each hose reel, a DN32 shut-off valve will be fitted at a height of approx. 1.3 m above the floor.

The internal fire water supply will be drained through hydrants installed in the building or through the lowest outlet fittings. The water supply will be sloped into these places.

After installation, a pressure test of the water distribution is carried out. After a successful test, the pipe is flushed.

The entire fire water distribution system in the building is covered with insulation against condensation of water vapor.

b Technological equipment

The building is designed with two elevators by SCHINDLER, type of the elevator without the need for an engine room.

The elevator is designed with acage with dimensions of 1600 x 1750 mm and height of the cabin is 2200 mm. The elevator control system will be equipped with one-way collection. Design load capacity of the elevator is for 8 persons / 1150 kg, speed of movement is 1.6 m/s. Doors designed as two-panel sliding to the side with a clear width of 900 mm and a door height of 2220 mm.

The service panel will be mounted on the door frame on the top floor (exit station on 4.NP).

B.2.8 Main principles about fire safety design and solutions

This part and all the points written below are dealt with separately and can be found in the “File 5 – Fire Safety”.

- division of the residential building into specific fire sections,
- calculation of fire risk and determination of the degree of fire safety
- evaluation of proposed building structures and building materials, including requirements for increasing the fire resistance of building structures

- evaluation of evacuation of persons, including evaluation of escape routes
- evaluation of distances and definition of fire hazardous space
- provision of the required quantity of firewater or other extinguishing agent, including location of internal and external offtake points
- evaluation of the possibility of fire intervention (access roads, intervention routes)
- evaluation of technical and technological equipment of the construction (distribution pipes, air conditioning equipment)
- assessment of requirements for securing the building with fire safety equipment
- the extent and determination of places for warning and safety signs and plates

B.2.9 Energy saving design and thermal protection

a. Criteria for building thermal assessment

All building structures are designed in accordance with the requirements of ČSN 73 0540 - „Thermal protection of buildings“. One of the main design priorities is an efficient and effective energysaving building that meets all standards for the almost zero energy building category and these requirements are met, including all recommended values.

Calculations with conclusions, protocols and evaluation of building structures and the building envelope are part of this thesis and can be found in the „File 6 - Building Physics“.

The residentialn building is located in Zvolen, the outdoor temperature for this location is determined from te hydrometeorological tables as t_e = -15 °C, design temperature of living rooms is set for + 20°C, for underground floors and common areas of the apartment building the temperature of + 10°C is considered.

b. Energy building certificate

Energy certificate label of the building envelope regarding the almost zero energy building design was carried out and the residential building was classified in group B

An energy label of the building envelope was prepared for the construction, at the end of which the building was classified in group B: energy-saving building.

c. **Energy optimalization - assessment of the possible use of renewable energy sources**

Possibility of renewable energy sources has not been considered for the construction of the residential building yet, however, the area is suitable for a number of options and could be applied in the future.

B.2.10 Hygienic requirements for buildings, requirements for working and communal environment, principles of solution of building parameters - ventilation, heating, lighting, water supply, waste management, etc.

Layout of residential units is designed for everyday family use, all aspects are considered and the structure is free of dangers that could affect the health of the building users. A bathroom with a toilet is designed in all residential units of the apartment building or in case of larger apartments as a bathroom with a separate toilet.

The whole structure is free of hazardous materials, dangerous places within the strucutre – e.g. stairs will be equipped with railings.

No pollutants will be discharged from the building into the atmosphere. Sewage will be drained through newly designed connections to the area's unified public sewerage system.

Household waste will be regularly transported by the city's technical services.

a. **Ventilation**

Natural cross-ventilation may be sufficiently maintained in all living rooms, exhaust of the toilet and bathroom is secured by a fan mounted into the wall of individual rooms. Degraded air is blown out by a horizontal and vertical pipeline above the roof of the building. The vertical pipe is terminated above the roof of the building by a rain blind installed in the roof house. The method of ventilation within sanitary areas is secured by under-pressure and the recommended amount of extracted air for individual rooms is ensured.

The air supply is solved by infiltration from the surrounding rooms, as it is only an occasional ventilation. The fans are started by an individual switch in the room and have a built-in time deceleration. The minimum intake air dose is set as follows:

- bathroom 150 m^3/h

- toilet bowl 50 m^3/h
- washbasin 30 m^3/h

In the kitchen, extraction of steam and excess heat above the cooker will be solved by an extractor hood with an air output Q_v = max. 250 m^3/h.

a. **Lightning**

All living spaces will be naturally lit by windows combined with artificial lighting. Determination of the intensity and uniformity of lighting, as well as other lighting indicators will be in accordance with the ČSN EN 12464-1.

Residential units with their orientation to the cardinal points are designed so that each of the living rooms have enough direct sunlight, simultaneously, design priority was to ensure that majority of the residential units and their windows were not oriented facing the north side.

The whole lighting design of the underground floor is solved as artificial lighting, all lightning equipment on this floor will be equipped with standard way of operation - surface-mounted switch located on the wall near the door, the switch will have a light indication.

b. **Heating**

Residential building is connected on a central heat line, which will supply heat to the building through a 2-pipe hot water system from the existing gas boiler room in a neighbouring building.

The construction condition is the installation of a domestic pressure-independent compact heat transfer stations (KOST) in the building, which will be connected to the primary (proposed heat line) and connected to the secondary distribution of CH (central heating) and DHW (domestic hot water).

Secondary distribution is solved with a classic hot water two-pipe heating with forced circulation with a thermal gradient of 70/50 °C, connected to a heat source. Hot water for sanitary installations is prepared centrally at the heat source and this project documentation does not address this issue. The method of heating is designed according to the purpose of each room. The basic regulation is installed within the heat source.

The system for housing units is designed so that from the main risers, connecting distribution branches are constructed for individual apartments. The main

horizontal distribution is led under the 1.PP ceiling, while at each connection branch to the 1.NP, a ball valve is fitted together with drain taps as the main fitting with the possibility of draining the whole system.

All rooms are heated by radiators to temperatures according to ČSN EN 12831.

Designed heating devices:

- for residential units and the retail space, steel plate radiators KORADO RADIK type VKM8-U in color design - white, mounted on special fittings on the walls or anchored to the floor,
- for sanitary facilities, KORADO KORALUX LINEAR type CLASIC-M ladder radiators - straight version,
- for the underground floor, common areas are heated by direct heating electric convectors PROTHERM

c. Noise transmission

In accordance with the building physics assessment regarding the sound insulation of the building envelope, ceilings and load-bearing wall structures between residential units, a final conclusion can be stated that the assessed building complies with all valid standard requirements for airborne and impact soundproofing.

There is no technological equipment within the building that would cause an increased noise level during its operation and could negatively affect the surroundings of the building and the building itself.

d. Vibration

There are no significant vibration sources such as railways, highways in the close vicinity of the building. Therefore, the potential vibration pollution is minimal and is not taken into account.

There is no technological equipment installed within the building that would cause significant vibrations during its operation hours and could affect the surroundings and the building itself.

e. Dust

Taking into account the character of the residential building and its operation, as well as all traffic situated on paved roads, the building will cause minimal dust pollution.

The exception is a construction period, when dust emissions could affect the comfort of neighbouring building residents, therefore, during individual construction phases, sufficient measures such as sprinkling water must be done in order to eliminate excessive dust pollution.

f. Waste management

Waste from the residential building will be regularly transported by municipal services.

B.2.11 Principles of building protection against negative effects of external environment

a. **Protection against radon penetration from the subsoil**

Waterproofing layer of the substructure is made of PVC-P foil reinforced with a Fatrafol 803 polyester mesh. It provides insulation of the substructure against earth moisture, gravity and pressure water and also provides radon protection.

b. **Protection against stray currents**

No stress from stray currents is expected within the building structure.

c. **Protection against technical seismicity**

Building stress caused by technical seismicity is not expected in the given area.

d. **Noise protection**

Design noise protection measures are not necessary. There is no significant source of noise within the building plot or its close surroundings.

e. **Flood control measures**

The building plot is located outside of the designated flood zones of watercourse Hron. It is not necessary to implement special flood protection measures.

f. **Other effects – influence of methane, undermining**

The building plot is not located within a mining area, there are no design measures taken into account regarding the effects of undermining.

B.3 Technical infrastructure – connections

B.3.1 Connection points of technical infrastructure

The residential building will be connected directly to the public technical infrastructure network, located under the traffic infrastructure. All necessary connections will be set up, such as the electricity network connection, the low voltage

system, communication cables, the water connection and the public sewerage system. Network connections of technical equipment are designed to allow all the construction works, repairs, maintenance and renovations done easily.

B.3.2 Connection dimensions, capacities and their lengths

a. Water connection

Water connection is designed for the D160 water supply system that is directly connected to the DN 700 public water supply system, which is located on the north side from the solved residential building. The length of the connection pipeline between the public system and the water-meter shaft is 65,20m, from the shaft to the place where the water pipeline system enters the building it is 38,47m. Length from the water-meter shaftto the exterior hydrant is 23,15m. The public water supply is managed by StVPS, a.s. The water meter shaft (WS) in the place of the water connection will be built at a distance of approx. 8.0 m from the connection point (beginning of the WS). The design of the water supply system is made in accordance with the ČSN 75 5401, 75 5411.Proposed connections and their protection zones are in accordance with the ČSN 73 6005 (Spatial requirements of technical infrastructure).

Water pipeline system

The slope of the water system must be > 3 ‰. The pipeline is placed in the groove on the bed th. 10 cm backfill will be done from sorted material up to 30 cm above the pipeline. Backfill of grooves must be done with compacted material, under the roads the backfill will be from gravel. A CYKY search conductor rod with a cross-section of 2 x 4 mm^2 is installed and fixed above the pipeline, which must be conductively connected to the metal fittings. Cast iron parts of the pipeline must be laid on concrete blocks.

Water meter shaft

The water meter shaft will be built as a prefabricated reinforced concrete unit with floor plan dimensions of 3600 x 1500 mm, the clear height of the unit will be 1800 mm. The entrance to the shaft will be secured through a cast iron square cover 600x600 mm by means of risers with PE surface treatment. The shaft will be equipped with a water meter and the appropriate fittings.

b. Sewerage and rain-water connection

The proposed sewerage system will drain sewage and rainwater from the residential project. The proposed sewerage system will be connected to the current public sewerage system. The length of the connection pipeline Z1 which drains area on parking places on the eastern side of the building is 24,6m, it then connects on the branch S1 which measures 52,1m and connects directly into the public sewerage system. Sewerage north branch Z2 measures 61,9m and connects directly into the public sewerage system. The system will discharge sewage of municipal character from social and hygienic facilities, rainwater from the roofs of the apartment building, from green areas in front of the residential building and from all paved areas.

Uniform sewerage pipeline

Gravity uniform sewerage is built from the PP (polypropylene) sewerage pipe. The dimensions of sewers will be DN400, DN300, DN200, the dimensions of sewer connections will be DN125, DN150 and DN200.

The pipeline is placed in the groove on the bed th. 15 cm backfill will be done from sorted material up to 30 cm above the pipeline. Backfill of grooves must be done with compacted material, under the roads the backfill will be from gravel.

Inspection-shaft

Inspection shafts constructed with prefabricated bottoms will be built on the gravity sewers of the sewage system. The entrance into the shafts will be made from prefabricated concrete rings, the top of the shafts will be fitted with cast iron round hatches ø600. To allow access to the shafts, steel risers with a PE surface are installed on their walls.

Street drain inlets

Street drains will be installed in paved roads to drain rainwater from roads. The drains are built of concrete prefabricated circular units. The top of the drains at road level will be done with cast iron gratings.

Oil-water separators

Oil-water separators (WOS) will be installed on the sewers "Z1" and "Z2". It is proposed to use reinforced concrete WOS with a sludge tank and a coalescence filter. The separators will be manufactured in such a way that the quality of treated water at the outlet of the ORL does not exceed more than 5.0 mg/l at the input pollution up to 1000 mg/l.

The capacity flow of the proposed WOS No. 1 will be Q = 20 l / s (installed on the drain "Z1").

The capacity flow of the proposed WOS No. 2 will be Q = 15 l / s (installed on the drain "Z2").

c. Electricity - low voltage connection

The power supply of the newly designed LV ground line will be from the existing transformer station. The cable lines will be constructed as ground LV cable lines with cables 2x 1-CYKY 4x150mm^2. The cables will be connected to the newly designed distribution board in the building SO 01. The length of the connection cable is 250m.

Ground works

The design power supply cable will be laid under open terrain (green areas) resp. in sidewalks in the groove 40x80cm. The cable will be laid on a sand bed covered with plastic cover plates and a warning foil. The minimum layer of the sand bed under the cable is 80 mm, above the cable 80 mm. A plastic cover plate will be placed on the sand bed along the entire length of the cable axis. At a height of 250 mm above the cover plastic plate, a warning red foil type with a flash will be placed along the entire length of the cable.

At places where power supply cables cross with the other technical infrastructure, the cables will be pulled into the HDPE protective pads. Cables under the roads will also be pulled through the protective pads. The distance of the first (outer) cable from the building must be at least 600 mm. In routes along buildings that have a floor below ground level (sidewalk), the distance of the first cable up to 1,000 V may be less, but at least 300 mm (narrow sidewalk, narrowing of the route, etc.). Cables must not be laid in soils containing salts and acids, in soils with rotting substances and in some sandy or stony soils. In such cases, it is necessary to lay the cables in ducts, blocks, pipes or other suitable elements protecting them from mechanical and chemical action, or cables resistant to the effects of this environment must be used.

d. Telecommunication connection

Design solution of this part is the connection of the residential building to the public

telecommunications network. The telecommunication supply to the building is designed according to the requirements of the investor and provider: multipipe DB 12x12 / 8. Fiber optic transmissions guarantee high-quality Triple Play broadband services (TV + internet + voice services) without electromagnetic interference. The low-current distributions of the FTTH (fiber-to-the-home) platform will be laid in ground cable grooves.

At the intersections with roads, HDPE pipes and microtubes will be placed in corrugated PE protective pads 110/95 mm with min. cover of about 0.90 m from the level of the terrain. Within the sidewalks, the network pipeline will be laid in a 0.30 x 0.60 m cable groove. Above the entire distribution route, a warning orange foil will be placed at a distance of 0.25 m from the surface. The total length of the newly designed telecommunication cable is 72,4m.

e. Heating connection

Subject of this part is the design of a central heat line supply (CZT) for the proposed apartment building, which will supply heat to the building through a 2-pipe hot water system from the existing gas boiler room in a neighbouring building.

The construction condition is the installation of a domestic pressure-independent compact heat transfer stations (KOST) in the building, which will be connected to the primary (proposed heat line) and connected to the secondary distribution of CH (central heating) and DHW (domestic hot water). Length of the exterior part of the heating pipeline is 12,77m.

Design

The forced circulation of heating water will be ensured by the disposition pressure on the primary connection and the circulation pumps, which are part of the KOST, on the secondary side. The exterior heat line is designed as an underground pipeline. The proposed CZT distribution will be connected to the existing primary CZT distribution system in the neighbouring building. The heat line will be constructed using the channel-free heat conduction (BTV) technology. The pipeline will be laid in the groove with the sand bed, th.10cm.

The entrance to the building is solved with a piercing of the basement wall, together with water-proofing insulation, in which rubber sealing rings will be

installed. End cuffs are used to protect the BTV insulation at the connection point of the BTV to the classic pipelines.

After laying down the BTV, it is necessary to perform a pressure test according to ČSN EN 13480-5. After a successful pressure test, the groove will be backfilled with sand fr. 0.5-4 mm in min. 150 mm above the top of the pipe. The sand must be gradually compacted, initially by hand. Green warning foil must be laid on the sand in the pipe axis and backfilled with soil without larger and sharp-edged rocks, which will be compacted in layers.

Dimensions

The dimensions of the pipeline are designed with respect to the heat balance, resp. the anticipated heat demand of the residential building. Dimensions and length of the proposed external heat pipeline is - DN 40 / D 120 - 2 x 7 m.

Main technical parameters for CZT – heat line

Working substance	hot water
Testing substance	water
Design pressure/temperature	0,6 MPa, 90 °C
Maximum working overpressure	0,55 MPa
Testing overpressure	0,9 MPa
Temperature drop - winter	80/55 °C
Temperature drop - summer	60/50 °C

Main technical parameters of the heating system – CH and DHW

Working substance	hot water
Testing substance	water
Design pressure/temperature CH	0,6 MPa, 90 °C
Design pressure/temperature DHW	1,0 MPa, 70 °C
Maximum working overpressure CH	0,55 MPa
Maximum working overpressure DHW	0,8 MPa
Testing overpressure CH	0,9 MPa
Testing overpressure DHW	1,2 MPa
Drinking water pressure	600 kPa
Maximum working temperature CH	75 °C

Maximum working temperature DHW	60 °C
Temperature drop CH	70/50 °C
Temperature drop DHW	55/50 °C

B.4 Transport solutions

B.4.a Description of the transport solutions, including barrier-free measures for accessibility and use of the building by persons with reduced mobility

The construction project is designed with a residential function. The main source of transport is personal

motor transport of the residents. The building will be connected to the local road, which is located on the south side of the building, barrier-free access to the building and its two entrances will be secured by a pedestrian ramp directly from the parking lot on the east side of the building, access to the 1st floor of the building extension is barrier free. Both entrances of the building are equipped with elevators that serve all floors.

B.4.b Building infrastructure solutions – connection to the existing infrastructure

The building will be connected to the local road, which is located on the south side of the building, there will be a two-way road directly into the underground garage, the road will also lead behind the building where parking lots will be constructed.

Area for municipal waste will be located along the access road, from where the disposal itself will be carried out. This means that municipal waste collection vehicles will not enter parking areas next to the residential building.

B.4.c Transportation at rest

For the residential parking purposes, parking lots will be built in exterior on the terrain and in the underground garage.

The basis for the calculation of static transport are data on the capacity of the building.

Parking lots:

N	Object	Pcs.		Purpose	No. of lots per unit	Short-term [%]	Long-term [%]	Using period	Number of lots
1	1-room flat	5	Up to 60 m^2	flat	1	0	100	Mon.-Fri.0:00-24:00	5
2	2-room flat	10	Up to 60 m^2	flat	1	0	100	Mon.-Fri.0:00-24:00	10
3	2-room flat	1	Above 60 m^2	flat	1,5	0	100	Mon.-Fri.0:00-24:00	1,5
4	3-room flat	14	Up to 90 m^2	flat	1,5	0	100	Mon.-Fri.0:00-24:00	21
O_o - Total number of parking lots for the residential building									38
5	Retail space	146,5	m2	retail	1/25m2	100	0	Mon.-Fri.8:00-16:30	6
6	Retail space	8	workers	retail	1/4 wor	0	100	Mon.-Fri.8:00-16:30	2
P_o - Total number of parking lots for the retail space									8
N - The total number of parking lots in the designed area according to ČSN 73 6110									
O_o = 38	k_{mp} = urban position coefficient = 0,8								
P_o = 8	k_d = division coef. of transport. work = 1,4								

$$N = 1{,}1 \times O_o + 1{,}1 \times P_o \times k_{mp} \times k_d$$

Total number of parking lots N = 52 parking lots

The calculation of static transport implies the need for 52 p.l. A total of 52 p.l. of which 16 p.l. will be constructed on the terrain and the remaining 36 p.l. constructed within the underground garage. Portion of the stated number, min. 4%, i.e. 2 parking spaces is reserved for the disabled. The total number of designed parking lots fully covers the calculated needs.

Parking of vehicles will be mostly perpendicular. 5 p.l. on terrain will be with longitudinal parking. The basic dimension of the perpendicular parking lot on the terrain is 2.5x5.0 m. The dimensions of the edge parking lot next to the building will be 3.0x5.0 m due to better manoeuvrability when handling and leaving the parking lot. The size of the parking lot for the disabled on terrain is 3.0x5.0 m with the possibility of leaving the car on the adjacent 3.0 m wide sidewalk. The basic dimension of the longitudinal parking lot on the terrain is 2.5x6.5 m.

The basic dimension of the vertical parking lot in the garage is 2.5x5.5 m. The size of the parking space for the disabled in the garage is 3.5x5.5 m.

B.4.d Walking and cycling trails

Pedestrian trails

Pedestrians can move within the residential complex along the proposed sidewalks. The width of the sidewalks is min. 2.0 m. Along the access road of the residential complex, the sidewalk leads to the road III / 2460, where it passes to the other side of the road through a pedestrian crossing and further to the river Hron where it connects into a parallel public pedestrian route along the river. This connection provides access to other parts of the city and accessibility to many public transport stops.

Cycling trails

At present, no separate bicycle roads have been built in the area. Cyclists use common roads with motor transport.

B.5 Vegetation solutions – design, treatment and adjustments

B.5.1 Landscaping

As part of landscaping, new paved and green areas will be constructed. The layer of topsoil from the earth works will be stored on the site and will be additionally used for all the landscaping measures.

The terrain level will be adapted to the new level and flattened out, all green areas will be grassed over.

B.5.2 Vegetation elements

Vegetation elements such as small trees, decorative bushes and flower beds will be constructed all around the residential complex to balance out the amount of concrete used in the project.

B.5.3 Biotechnical measures

The use of biotechnical measures is not expected on the plot.

B.6 Environmental impact of the construction on environment and its protection

B.6.1 Environmental impact – air, noise, water, waste and soil

The construction will not have a negative impact on the environment. It has a non-productive character. It will not have negative effects, will not produce harmful exhalations, noise, heat, shocks, vibrations, dust, odour, glare and shading, nor will it deteriorate the environment on the construction site and its surroundings beyond the permissible level.

It is not necessary to establish temporary protective hygienic zones during construction and later operation. The elaborated project documentation respects Act No. 127/94 Coll. on environmental impact assessment. Given the location of the construction site equipment, we suggest building material for the construction site to be imported and stored palletized.

The overall technical solution, designed parameters are designed with the knowledge of minimizing the impact on the environment, taking into account all applicable legislation. The site contains all the necessary infrastructure for the proposed activity. The implementation of the activity will not exceed the environmental quality standards.

Potential adverse effects can be eliminated by preventive protective measures. From the point of view of potential risk, the potential impact on air quality, groundwater and surface water in case of unforeseen events (failure of technological equipment, leakage of dangerous substances into the unsecured environment, etc.) is considered as an adverse impact. Elimination, prevention and disposal of possible consequences of accidents will be the subject of solutions and measures in further stages of project preparation of the proposed activity, as well as emergency and operational plans.

During the construction process, the contractor has to respect:

- Act No. 24/2006 Coll. on environmental impact assessment and on amendments to certain acts,
- Act No. 364/2004 Coll. on Waters and Government Decree no. 269/2010 Z.z. laying down requirements for achieving good water status.

- Act No. 50/1976 Coll. on land-use planning and building code (Building Act),
- Government Order No. 269/2010 Coll. laying down requirements for good water status.
- Act no. 137/2010 Coll. on air.
- Decree of the Ministry of Health No. 549/2007 Z.z. laying down details of noise levels, infrasound and vibration and requirements for objectification of noise, infrasound and vibration in the environment
- Act No. 355/2007 Coll. on the Protection, Promotion and Development of Public Health, as amended
- Decree of the Ministry of Health No. 528/2007 Coll. from natural radiation.
- Act no. 79/2015 Coll. on Waste and on amendments to certain acts
- Decree of the Ministry of the Environment - Establishing the Waste Catalog
- Decree of the Ministry of the Environment - Implementing some of the provisions of the Waste Act

B.6.2 Impact on nature and landscape – protection of tree species, protection of memorial trees, protection of plants and animals, preservation of ecological functions and links in the landscape, etc.

Within the area of the construction site or its close proximity are no protected plants or trees. None of the vegetation elements will be somehow endangered by the process during construction and operation of the building.

B.6.3 Impact on the Natura 2000 network of protected areas

The construction process will not have any negative impact on the system of protected areas Natura 2000.

B.6.4 The manner of taking into account the conditions of the binding opinion of the environmental impact assessment of the project, if it is the basis;

The construction is not subjected to the investigation procedure or the EIA opinion, therefore, there are no conditions.

B.6.5 In the case of projects falling within the regime of the Act on Integrated Prevention, the basic parameters of the method of fulfilling the conclusions on best available techniques or the integrated permit, if issued;

The construction project does not fall within the intentions of the Act on integrated prevention.

B.6.6 The proposed protection and safety zones, the scope of the restrictions and the conditions of protection under other legislation.

Protection zones of the proposed technical network connection pipelines will be met with the standard regulation requirements.

B.7 Protection of population

The building is designed in accordance with the legislation, especially with the Building Act No. 183/2006 Coll. and relevant regulations No. 268/2009 Coll., on technical requirements for constructions and 398/2009 Coll. on general technical requirements ensuring barrier-free use of buildings.

Safety and protection regulations must be followed at all times ensuring occupation health. All employees will be properly trained in health and safety, the employer's work rules and the labor code are complied with.

The whole building is conceptually and pleasantly does not endanger the health and life of its occupants.

Common underground garage is designed for two purposes, in case of emergency it will serve as a shelter of civil protection of the JÚBS category. The entrance to the garage is solved by a central entrance - a ramp from the ground level. In the basement, there is also a technical background (compact heat transfer stations, electric control room, CBS room, cleaning room and storage room for future apartment owners).

B.8 Construction organization principles

B.8.1 Needs and consumption of critical media and materials, their provision

The construction site will be connected to water supply, sewerage system and electricity lines. The offtake points will be provided from newly built connections, which will be used for connection of the residential building. Electricity will be supplied from the construction distribution board.

B.8.2 Drainage of the construction site

Groundwater level does not reach the level of the foundation joint, therefore, design of the groundwater drainage is not necessary. In case of a large amount of rainfall, it is necessary to pump water out from the foundation joint using a submersible pump. From construction site roads the water will be drained by sloping outside of the foundation pit.

B.8.3 Connection of the construction site to the existing transport and technical infrastructure

The building plot is entirely located on the investor's land. The plot is directly connected with the main transport route, therefore, the building is easily accessible for all suppliers.

The only gate and entrance to the construction site will be from the Strážska road. After the building construction is completed, all conditions must be put back to their original state.

The internal-site traffic system will be constructed within the construction site, compacted road areas will ensure the movement of mechanisms around the construction site. Volume, specifications of roads and compositions will be coordinated with the general contractor and adjusted as needed. All mechanisms leaving the construction site will have to properly cleaned before entering the public

road, right before leaving the construction site there will be a specific washing place for all mechanisms to use.

The supplier's trucks must respect the condition of the roads (max. weight, speed, actual weather conditions).

Necessary traffic signs warning all drivers about a construction nearby will be installed - drawing attention to the ongoing construction, to the entrance and exit from the building site on public communications, speed limit and warning sign about not entering the construction site.

B.8.4 Effect of construction on surrounding buildings and land

In order to protect surroundings of the building site, special care with maximum extent will be taken into account. All negative effects on the environment should be excluded from the construction harmonogram and principles mentioned below should be followed at all times:

- If necessary, all demolitions within the site must be done with no explosives
- Waste bins should be placed outside of public spaces and should be used wisely
- Noisy works must be done within the pre-agreed time periods
- Ensure continuous operation with minimal excessive noise and dust pollution
- All construction mechanisms must be properly cleaned before leaving the construction site
- Eliminate ground pollution with wastewater from sanitary facilities and surface waters from contaminated places with oil products
- Ensure clean public roads in the close proximity of the site, if dirty, the contractor is obliged to clean it and put it back to its original state
- Specific locations of all existing engineering networks going through the construction site must be properly marked, as the input data may not be always 100% accurate, all necessary protection zones of individual networks must be followed in accordance with the ČSN 73 605 – „Spatial requirements of technical engineering networks“

- Construction site will be fenced around its full perimeter with a steel entrance gate located on the south side, entries of unauthorized persons will be eliminated
- Construction site will also be properly illuminated by site lightning system

B.8.5 Protection of the surroundings of the construction site and requirements for related, demolition, felling of trees or rehabilitation

There are no designed works within the site regarding felling of trees, demolition nor rehabilitation of the construction site

B.8.6 Maximum temporary and permanent occupations for construction sites;

Boundaries of the construction site will be used up its full extent within the parcels owned by the Investor. All necessary site facilities will be located within the boundary together with all storage and work facilities.

B.8.7 Requirements for barrier-free bypass routes,

There are no requirements regarding a construction of barrier-free bypass routes as the constrution is located outside of existing residential area and there is no continuous infrastructure that would have to be substituted.

B.8.8 Maximum amounts and types of waste and emissions generated during construction, their disposal.

Number of a group, subgroup and waste type	Name of the group, subgroup and waste type	Waste category	Amount in tons	Method of elimination
17	**CONSTRUCTION AND DEMOLITION WASTE**			
17 01	**CONCRETE, BRICKS, TILES**			
17 01 01	Concrete	O	1,00	R5
17 01 07	Mix of concrete, bricks, tiles	O	0,10	D1
17 02	**TIMBER, GLASS, PLASTIC**			
17 02 01	Timber	O	0,25	R1
17 02 02	Glass	O	0,05	R5
17 02 03	Plastic	O	0,50	R3
17 03	**BITUMEN MIX**			
17 03 02	Bitumen mix, other than 17 03 01	O	0,15	R3
17 04	**METALS**			
17 04 05	Steel	O	0,75	R4
17 04 11	Cables, other than in 17 04 10	O	0,01	R4
17 05	**SOIL, ROCKS**			
17 05 06	Excavation soil other than in 17 05 05	O	10000,00	D1
17 06	**INSULATION MATERIALS**			
17 06 04	Insulation materials other than in 17 06 03	O	0,10	D1
17 08	**GYPSUM-based MATERIAL**			
17 08 02	Gypsum-based material other than in 17 06 03	O	1,50	D1
17 09	**OTHER CONSTRUCTION WASTE**			
17 09 04	Mixed demolition and construction waste other than in 17 09 01 - 03	O	25,00	D1
20	**MUNICIPAL WASTES INCLUDING SORTED WASTE**			
20 03	**Other municipal waste**			
20 03 01	Mixed municipal waste	O	2,50	D1
TOTAL WASTE				
other		**O**	**10 031,91 t**	
dangerous		**N**	**0,00 t**	

Table 2: Overall construction waste production

All waste will be properly treated in accordance with the provisions of Act.185/2001 Coll., On waste, ann. No. 93/2016 Coll., Decree No. 383/2001 Coll. and regulations related.

Waste will be collected in waste containers, separated commodities (plastic, glass, metal, paper) will be collected separately and handed over regularly to an

approved waste collection company. Hazardous waste will be handed over to a contracted person for hazardous waste management.

Estimated waste production according to the Act (No. 185/2001 Coll.) on waste categorization - Waste catalog.

Number of a group, subgroup and waste type	Name of the group, subgroup and waste type	Waste category	Amount in tons	Method of elimination
15	**WASTE PACKAGING, ABSORBENTS, CLEANING AND FILTER MATERIALS**			
15 01	**PACKAGING (INCLUDING WASTE PACKAGING FROM SORTED COLLECTION OF COMMUNAL WASTE**			
15 01 01	PAPER packaging	O	2,50	D1
15 01 02	Plastic packaging	O	1,80	R5
15 01 06	Mixed packaging	O	7,00	R1/R5
15 01 07	Glass packaging	O	2,50	R5
15 01 09	Textilve packaging	O	0,30	R1/R5
16	**NON-SPECIFIED WASTE IN THIS CATALOG**			
16 02	**ELECTRICAL WASTE AND ELECTRONIC APPLIANCES**			
16 02 13	Discarded equipment containing dangerous parts other than those mentioned in 16 02 09 to 16 02 12	N	0,05	R4/R5
20	**COMMUNAL WASTE INCLUDING SORTED MATERIALS**			
20 01	**ELEMENTS OF COMMUNAL SORTED WASTE**			
20 01 01	Paper and cardboard	O	1,50	R3
20 01 08	Biodegradable waste	O	1,50	R3
20 01 21	Fluorescent and other waste containing mercury	O	0,02	R4/R5
20 01 25	Edible oils and fats	O	0,10	R13
20 01 39	Plastic waste	O	1,40	R5
20 03	**OTHER COMMUNAL WASTE**			
20 03 01	Mixed communal waste	O	4,50	D1/D10
20 03 03	Waste from street cleaning	O	0,50	D1
TOTAL WASTE				
other		**O**	**23,62 t**	
dangerous		**N**	**0,05 t**	

Table 3: Estimated waste production of the residential building

Waste management during construction. The resulting waste will be temporarily stored in containers intended for this purpose. Waste exports will be contracted with an authorized person with regular collection primarily for material recovery. In case of waste types that cannot be recovered, they will be handed over for disposal.

With the temporary deposit of topsoil, its using is assumed for landscaping within the construction site.

After the building is put into operation, separate collection of waste suitable for further processing (unpolluted packaging paper, cardboard packaging, glass, plastics, metals, etc.) shall be introduced. Material and organizational assurance of the collection will be realized with the customer company, which will ensure the delivery of suitable collection containers, waste collection and its further use.

Hazardous waste will be handed over to a contracted person for hazardous waste management.

B.8.9 Earthworks review, landfill requirements

Total earthworks volume is estimated with a storage of approximately 3000 m3, the soil storage will be on the site and the excavated soil will be used for future project stages

B.8.10 Environmental protection during construction

There is no negative impact considered that could significantly affect the environment. The general principles of protection are strictly followed for water resources and land devastation, preventive protection measures will also be in place.

B.8.11 Principles of safety and health at work on the construction site, assessment of the occupational safety and health coordinator according to others legislation

During construction works, all safety regulations must be properly followed. In particular, the principles of technical, organizational and other measures must be observed to ensure work safety according to Regulation No. 361/2007 Coll. All workers on site are obliged to use protective personal equipment (PPE).

B.8.12 Modifications of barrier-free use by the construction of neighbouring buildings

The construction does not impose to any requirements for the modification of the construction site and its surroundings for disabled persons with limited ability to move and see. The construction will not affect any buildings intended for barrier-free use.

B.8.13 Design principles regarding traffic enginneering measures

Supplier’s harmonogram for the construction site must respect public infrastructure, public transport operation and pedestrians at all times and should not

cause any interventions, the construction should not require any special traffic engineering measures.

B.8.14 Determination of special conditions for construction – construction during operation, measures against the effects of the external environment during construction, etc.

There is no need to set and apply any special conditions for the construction process.

B.8.15 Construction process, decisive partial dates

Specific deadline dates of project documentation, construction processes of individual stages and the final construction review will be determined between the Investor and the general contractor after reviewing the project. Construction may start after receiving a valid building permit and a successful selection of the construction contractor. A detailed time schedule of construction and assembly works will be prepared by the selected construction contractor.

During the construction process, a regular week construction meeting inspection should take place directly on the site with all parties involved, such as the Investor, the Contractor and the Construction Inspector.

- Estimated start of the construction 03/2021
- Estimated construction period of the HSV - approx. 6 months
- Estimated time period for the whole project – approx. 12 months
- Estimated end of the construction 03/2022

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INSTITUTE OF BUILDING STRUCTURES

BYTOVÝ DOM

RESIDENTIAL BUILDING

D – MAIN TECHNICAL REPORT

BAKALÁŘSKÁ PRÁCE

BACHELOR'S THESIS

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SUPERVISOR

BRNO 2020

D Documentation of objects, technical and technologi equipment

D.1 Documentation of a building or an engineering object

D.1.1 Architectural and construction solutions

a Object purpose, functionality and capacity of the building

Residential project with a height of 4 floors with a shared basement garage. From the functional point of view, it is an apartment building connected with a multifunctional unit. Residential apartment units are located from the 1st to 4th floor of the building. The multifunctional space is designed in front of the main entrance to the A2 section.

Number of flats and persons:

Number of 1-room apartments	**5**
Number of 2-room apartments	**10**
Number of 3-room apartments	**15**
Retail rent space /m^2/	**146,46**
Occupancy	**100**

b Architectural, art, material and layout solutions

- **Architectural and art solutions**

The apartment building is of a rectangular shape that is divided into two parts A1 and A2. Both entrances to the building are designed from the east side, through the vestibule, which leads to a common hallway, where there is a staircase and elevator. Entrance to the apartments is directly from the common hallway. The apartment house has 1, 2 and 3-room apartments.

- **Material solutions**

All load-bearing structures are designed as reinforced concrete filigree panels. Interior partition walls are brick-made, using lime-sand blocks SILKA laid on SILKA adhesive mortar. Lintels will be constructed by using YTONG.

The main roof above the last floor is flat with mechanical loading, water-proofing PVC-P layer Fatrafol 810 is mechanically anchored into the load-bearing concrete structure. Since the thermal insulation is designed with EPS (expanded

polystyrene), it is necessary to separate it from the water-proofing layer using a layer of geotextile with a min. surface weight of 300g/m^2.

Floor insulation is designed as a combination of expanded polystyrene with different strengths EPS 100S and EPS 150S, the same material is used for insulation of roofs and terraces on the last floor. All external walls are thermally insulated using mineral wool walls. Substructure waterproofing layer consists of PVC-P based foil reinforced with a Fatrafol 803 polyester mesh. Exterior window and door fillings are predominantly designed from plastic 5-chamber profiles with triple-glazing and the total Uw max 1.0 W/m^2K.

Colour of these elements will be white from the interior side and anthracite from the exterior. Shading will be ensured by external shading elements.

- **The layout concepts**

Concept is the same for 1, 2 and 3-room apartments. Entrance to the hallway or vestibule to which toilet is connected and then with direct access to a bathroom and a kitchen with a living room. Rooms facing the courtyard have access to the loggia. Apartments on the last 4th floor have access to the apartment through the vestibule, where it continues to the kitchen with a dining room, which is directly connected to the living room. The night zone starts behind the corridor from which you enter the wardrobe, toilet, bathroom and bedrooms. The entrance to the terrace is from the living room. The terrace is covered with an awning.

- **Barrier-free use of the building**

The project documentation is designed in accordance with the Regulation No. 398/2009 Coll. on general technical requirements ensuring barrier-free use of buildings.

All building entrances to the residential part are solved as barrier-free. Entrance doors to the residential part are min. 1000 mm wide. There are parking places in accordance with the barrier-free design located in the underground garage. However, individual apartment units are not designed as barrier-free.

The height of stairs is 165 mm, which is more than 160 mm. However, this is not a public building, therefore consideration of this requirement is not necessary. Handrails on the stairs are designed at a height of 1000 mm with an overlap of min. 150 mm at the first and last step of the staircase. The handle will allow

A firm grip, the first and the last step on the staircase will be of a different colour to contrast the others.

Sidewalks are designed with a maximum slope of 1:12 (7.20%).

- **Production technology**

During the construction of the residential building, common technological processes will be followed. Technological requirements and typical details of manufacturers will be used for construction.

D.1.2 Structural design solutions

a Preparation of the building site

Area of the building site will be completely cleaned from grass and shrubs, fence will be constructed all around the plot perimeter with the entrance gate on the south side.

b Dilatation joints

Polyfunctional building SO-01 is dilated from the underground floor in the ceiling level above 1.PP and walls in 1.PP. Ceilings above 1.NP and 2.NP are dilated from the adjacent 2-storey building. The width of the dilative joints is 30 mm. The dilative joints do not go through the building foundations. Access ramp is also dilated from the main building with a dilative joint of 30 mm and is partially covered with roofing.

c Earthworks

Earthworks are connected with the realization of the building foundations, the laying of engineering networks and landscaping of the land. Soil from excavations for laying of networks will be used for future backfill. We propose to transport the excess soil that cannot be used for construction to a landfill location, which will be specified by the selected supplier or it will be disposed of in accordance with the requirements of the project investor.

Import of soil to the construction site is assumed only in connection with the implementation of final landscaping of the building site.

No excavated soil may be temporarily stored in a public place, on sidewalks or site communications.

The selected contractor must protect all excavations from flooding caused by floods, storms or other causes so as not to cause unnecessary damage and consequent

interruption of work. It must also provide, install and maintain the pumps, hoses, gutters and other equipment necessary to drain the accumulated water from the bottom level of the temporary excavation. Flood waters must be drained immediately outside the area of work so as to protect the excavation or other objects that have already been made.

In all inspection probes within the subjected area, no groundwater was encountered, stabilized at the level of approx. 282.00 m.n.m. - does not affect the foundation joint.

Excavations must be constructed up to a gravel layer and fine-grained soils must be replaced with crushed aggregate. Due to the fact that part of the building is without a basement, the subsoil must be created in the form of a compacted embankment.

d Foundations

The building is founded on a 650mm thick foundation slab. In places with columns, the slab thickness is increased by 150mm, resp. 250mm.

The adjacent 2-storey building is founded on the foundation strips 800x1200mm, respectively. 900x1200mm with sloped upper edge and base concrete layer th. 200mm that inter-connects foundation strips. The foundation slab of the access ramp is designed as th. 300mm and is dilated from the foundation slab of the main building SO.01.

e Vertical load-bearing structure

The vertical load-bearing elements in SO.01 are walls and columns. The columns in the 1.PP are designed with dimensions of 250x1000mm, the peripheral walls of the 1.PP are designed with the thickness of 300 mm, the inner walls of the thickness of 200 and 250 mm. Walls in above-ground floors are th. 200 and 250mm.

Walls and columns in underground garage must be resistant to de-icing salts, so it is necessary to apply a protective coating layer to vertical surfaces up to 1200 mm. The walls on the above-ground floors have a thickness of 200 and 250 mm.

The vertical load-bearing elements in the adjacent 2-storey building are walls with the thickness of 200 and 250mm. On the 1st floor columns with dimensions 300x500mm and 300x350mm are designed.

Access ramp walls are designed as 300mm thick.

f Horizontal load-bearing structure

Ceiling slabs will be designed mostly as filigree slabs, reinforced with concrete steel B500-B.

Thicknesses of ceiling slabs:

- • filigree slab above 1.PP - 220mm
- • reinforced concrete slab above 1.PP - 600mm, 850mm
- • filigree slab above flats - 220mm
- • filigree loggia slab - 200mm
- • filigree balcony slab - 220mm
- • filigree slab above retail space in the side. building - 300mm
- • ceiling slab above the ramp (green roof) - 220mm

Staircase flights and half-landings will be prefabricated from concrete class C25 / 30. The main landings will be part of the ceiling slabs. The staircase flights and half-landings will be separated from the walls of the living space by means of acoustic-insulating elements - Schoeck Tronsole. The staircase flight thickness is designed as d = 160mm, th. of the half-landing will be d = 230mm.

List of load-bearing elements - Minimal strength classes of concrete							
	CONCRETE	STRENGTH CONCRETE CLASS	DEGREE OF ENVIRONMENTAL IMPACT	MAX. AMOUNT OF CHLORIDE IONS	MAX. AGGREGATE GRAIN	CONSISTENCY DEGREE - CONE TEST	NOTE
FOUNDATION SLAB	Reinforced concrete	C 25/30	XC2 (SK)	Cl 0,4	Dmax 22	S3	max. seepage depth is 50 mm according to the ČSN EN 12390-8
RAMP FOUNDATION SLAB	Reinforced concrete	C 30/37	XC2, XD1, XF4 (SK)	Cl 0,4	Dmax 22	S3	
FOUNDATION STRIPS AND PRIMER CONCRETE	Reinforced concrete	C 25/30	XC2 (SK)	Cl 0,4	Dmax 22	S3	
1.PP							
MONOLITHIC COLUMNS	Reinforced concrete	C 30/37	XC2, XD1 (SK)	Cl 0,4	Dmax 16	S4	
INTERIOR FILIGREE WALLS	Reinforced concrete	C 25/30	XC1 (SK)	Cl 0,4	Dmax 16	S4	
PERIPHERAL FILIGREE WALLS	Reinforced concrete	C 25/30	XC2 (SK)	Cl 0,4	Dmax 16	S4	max. seepage depth is 50 mm according to the ČSN EN 12390-8
FILIGREE CEILING SLAB ABOVE 1.PP	Reinforced concrete	C 25/30	XC1 (SK)	Cl 0,4	Dmax 22	S3	
MONOLITHIC CEILING SLAB ABOVE 1.PP	Reinforced concrete	C 30/37	XC2 (SK)	Cl 0,4	Dmax 22	S3	
MONOLITHIC BEAMS	Reinforced concrete	C 30/37	XC2 (SK)	Cl 0,4	Dmax 22	S3	
FILIGREE WALLS OF THE RAMP	Reinforced concrete	C 25/30	XC2, XF2 (SK)	Cl 0,4	Dmax 16	S4	
FILIGREE CEILING SLAB ABOVE THE RAMP	Reinforced concrete	C 25/30	XC2 (SK)	Cl 0,4	Dmax 22	S3	
1.NP - 6.NP							
FILIGREE WALLS	Reinforced concrete	C 25/30	XC1 (SK)	Cl 0,4	Dmax 16	S4	
MONOLITHIC COLUMNS	Reinforced concrete	C 25/30	XC1 (SK)	Cl 0,4	Dmax 16	S4	
FILIGREE CEILING SLAB ABOVE FLATS	Reinforced concrete	C 25/30	XC1 (SK)	Cl 0,4	Dmax 22	S3	
FILIGREE BALCONY SLAB	Reinforced concrete	C 25/30	XC2, XF1 (SK)	Cl 0,4	Dmax 22	S3	
FILIGREE ATTIC WALLS	Reinforced concrete	C 25/30	XC1 (SK)	Cl 0,4	Dmax 16	S4	
FOUNDATIONS FOR TRAFFIC INFRASTRUCTURE	Reinforced concrete	C 25/30	XC2 (SK)	Cl 0,4	Dmax 22	S3	
CONCRETE BASE LAYER	Plain concrete	C 12/15	X0 (SK)	Cl 1,0	Dmax 22	S3	
CONCRETE STEEL	B500 - B						

Table 4: Minimal strength classes of concrete

g Non-load-bearing structure

The internal non-load-bearing masonry partition walls are constructed of lime-sand blocks SILKA S12-1400 with the thickness of 100 mm, laid on SILKA adhesive mortar S10, resp. made of Ytong aerated concrete blocks of 100 mm thickness. Lintels in the partition walls will be Ytong type - non-bearing lintel width 100 mm and length 1250 mm.

The partitions are separated from the load-bearing walls and in the upper part from the ceiling slab by elastic contact - inserted strip of mineral wool. Alternatively, the gap can also be filled with low expansion foam. The gap between the last row of masonry blocks and the ceiling construction is min. 20mm but may be larger depending on the deflection of the ceiling construction. Deflection is specified in the structural analysis part of the ceiling. The upper row of blocks is fixed to the ceiling construction by a stainless brickwork connection, in every second vertical contact of the blocks, after approx. 1200mm.

h Structures connecting floor levels

There is one central staircase designed within each entrance in the apartment building, prefabricated staircase arms with precast reinforced concrete half-landings on which the arms are mounted. The main landing is at each floor level and is constructed by a ceiling slab.

The required anti-slip surface treatment of the staircase arms will be ensured by 2-component epoxy sealing screed Sikafloor-264. Stainless steel railings and handrails will be used for the construction. Material characteristics and reinforcement design will be delivered by the supplier of prefabricated elements.

The staircase is designed according to ČSN 73 4130 + Z1: 2018.

Both building blocks are designed with an elevator shaft, the shaft goes through all five floors and is located directly in the common hallway after the entrance vestibule. The specific elevator type will be determined on tender documentation. Dimensions of the shaft are 1600mm x 1750mm.

i Roof structure

The main roof above the last floor of the building is a flat roof with a classic composition of roof layers with mechanical loading, the waterproofing layer will be mechanically anchored into the supporting filigree reinforced concrete ceiling slab. Thermal insulation is designed according to the thermal calculation from EPS boards with a minimum thickness of 300mm. The slope of the roof plane is formed by the sloping polystyrene. Drainage of the roof is through the inner roof outlets, which are connected into the rain pipe in the inner shafts. The composition of the terraces will be identical to the structure of the roof above the last floor, the walkable layer will be made of concrete tiles placed on supporting adjustable pads.

The roof above the building extension and the entrance to the underground car park will have a green extensive roof solution. The vegetation layer of different species will be placed on the substrate of hydro-accumulative mineral wool. The drainage system will be made of hardened PE foil with surface protrusions. The two layers must be separated by a layer of geotextile. Under the drainage layer there will be a root membrane made of LD polyerylene. Furthermore, the classic composition of a flat roof. Waterproofing-layer is mPVC Fatrafol 810 based on the geotextile layer. Thermal insulation from EPS boards with a minimum thickness of 300mm. The slope of the roof plane is formed by the sloping polystyrene. Drainage of the roof is through the inner roof outlets, which are connected to the rain pipe in the inner shafts.

The waterproofing layer consists of PVC-P based foil reinforced with a Fatrafol 810 polyester mesh. Since the thermal insulation is designed from expanded polystyrene, it is necessary to separate the contact of these materials with a separating layer of geotextile with a surface weight of at least 300g/m2. Laying and joining of the waterproofing layer can be done at temperatures above -5 ° C.

j Surface finishes

All interior walls and ceilings will be done with gypsum plaster. In rooms with increased humidity (bathrooms, toilets) an interior lime-cement plaster will be applied. The surfaces of the filigree walls in the areas of the common hallways will be painted.

In sanitary areas, ceramic tile cladding will be used as a surface treatment of walls in the range according to the graphic part of this PD.

For exact specification of individual surface finishes, see composition of structures.

k Flooring

The finishing layer varies depending on the type and purpose of the room. In common areas, in the hallways, a carpet with a pile height of up to 5mm will be used, glued to a concrete screed reinforced at the bottom edge with a mesh Ø6,0 100x100.

In the rental polyfunctional area the floor will be finished with a reinforced concrete slab. Other layers are not specified within this PD.

In flats there will be a laminate floor layer resp. ceramic tiles depending on the type of room and the choice of the future owner of the apartment. The base will be of a concrete screed reinforced at the bottom edge with a mesh Ø6,0 100x100.

In the exterior on the first floor of the residential building, pavements and terraces will be made of concrete blocks.

l Thermal insulation

Thermal insulation is designed differently depending on a place of application. Insulation of basement walls is designed from the base perimeter of thickness 120mm. Plinth insulation - plinth perimeter above the foundation is of the same thickness as the wall insulation, i.e. 220mm thick. Plinth insulation applied at least 300mm above ground level. External walls will be insulated with a contact thermal insulation system made of mineral wool boards of thickness 220, 180, 160 and 100 mm.

Floor insulation on the ground is designed as a combination of floor EPS of different strength EPS 100S and 150S. The same material is used for insulation of the flat roof of the building as well as terraces on the last floor.

For the exact specification of individual types of thermal insulation and the way of their application within the proposed compositions see the graphic part of the PD.

m Moisture insulation

Waterproofing layer of the substructure is made of PVC-P foil reinforced with a Fatrafol 803 polyester mesh. It provides insulation of the substructure against earth moisture, gravity and pressure water and also provides radon protection.

Waterproofing should be applied min. 300 mm above the terrain level or on the door frame or glazed wall.

The vertical parts of the foundations are to be covered with a dimple membrane around the perimeter of the building. Dimple membrane must always be applied to the terrain level. Waterproofing layer of the roof consists of PVC-P-based foil reinforced with Fatrafol 810 polyester mesh.

n Façade finish

The facade finish consists of a structured facade plaster applied to the contact thermal insulation system made of mineral wool boards. It will be made as a scraped thin-layer silicate plaster with grain size K2 in a combination of white and grey colour. The exterior surface treatment will be carried out according to ETICS.

o Opening fillings

- **Opening fillings – EXTERIOR**

Opening fillings are predominantly designed from plastic 5-chamber profiles with triple glazing, total U_w max 1.0 W / m^2K. The colour of these elements will be white from the interior side, from the exterior they will be in anthracite. Shading will be provided by external shading blinds.

All façade elements must meet the requirements for sound insulation of cladding set by ČSN 73 0532.

- **Opening fillings – INTERIOR**

Individual apartments have design of security fire-resistant entrance doors with 9-point anchorage in the security class RC2 to the steel security door frame. Within the apartment wooden doors in CPL laminate surface to the doorframe of the same material are designed.

Doors to technical rooms are designed as wooden fire-resistant in accordance with the project of fire protection. The door in the vestibule will be made of 5-chamber plastic profiles without any thermal requirements.

Individual doors must meet the requirements for sound insulation of building dividing structures according to ČSN 73 0532.

- **Glazed walls – RETAIL**

Exterior openings of the retail space are made of aluminium windows and aluminium system constructions. The exterior glazed walls of the ground floor are designed as an aluminium facade column-cross beam system with load-bearing elements with an interrupted thermal bridge and triple glazing with U_w max = 1.0 W / m^2K. The glazed walls include hinged windows and an aluminium hinged door. Door within the glazed wall shall meet the safety requirements for RC-2 construction openings. The colour of these elements will be anthracite.

p Tinsmith elements

All tinsmith elements must be constructed according to valid ČSN. All elements are specified individually in part D.1.1.

q Locksmith elements

All locksmith elements must be constructed according to valid ČSN. All elements are specified individually in part D.1.1.

r Technical building equipment

Technical equipment of the building includes electric wiring, heating system, ventilation and sanitary installations. Individual parts are solved within separate PD.

s Additional elements

All elements are specified individually in part D.1.1.

D.1.3 Fire safety building solution

This part is dealt with separately in the file no.5 – Fire safety solution of the building

D.1.4 Building physics assessment

a Thermal building assessment

All constructions are designed with regard to the requirements of ČSN 73 0540 -

Thermal protection of buildings and meet these requirements. In all compositions of structures forming the envelope of the building, especially at

perimeter structures, building roofing, structures in contact with the ground and fillings holes, the minimum achievement of the recommended values of U and other quantities is monitored according to ČSN 73 0540-2 (2011).

Specific heat transfer coefficients are evident from the thermal engineering assessment of the object, which is part of this documentation in the documentary part (File no.6).

b Insolation, sun exposure assessment

The layout of the building is designed so that all the rooms are well lit with natural sunlight. The building meets the requirements for daylight and sunlight. The living rooms of the apartments are oriented to the south, east and west.

The distance of the proposed building from the surrounding existing buildings is sufficient, due to the location of the building, there will be minimum shading from the surrounding buildings.

The assessment of living rooms is a separate appendix to the project documentation.

c Building acoustics assessment

All constructions respect the standard requirements for sound values of soundproofing.

Solution of object acoustics - impact and airborne soundproofing and urban acoustics and its evaluation is part of a separate appendix to this project documentation.

Conclusion

The aim of the thesis was a design and elaboration of project documentation of a contemporary residential building on the outskirts of city Zvolen. The building plot is located on undeveloped existing building plots.

With its architectural design, facades elements, the residential building fits perfectly with the existing neighbouring buildings and significantly improves modern development in this location.

The elaboration of the realization project documentation was carried out in accordance with all applicable laws, regulations and standards. All building parts and materials comply with the mentioned requirements and must be documented with the declaration of conformity, differences from the architectural studies are mostly connected with the addition of a 2-storey building on the eastern side.

During the elaboration of this thesis, I have gathered a lot of valuable information regarding individual construction processes and design of larger residential buildings.

List of used sources

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List of used abbreviations and symbols

- FC - fire compartment
- th. - thickness
- Coll. - collocation
- no. - number
- min. - minimal
- max. - maximal
- km – kilometer
- m – meter
- cm – centimeter
- mm – millimeter
- RF – reinforced concrete
- Act. – article
- °C – celsius degree
- ČSN – Česká státní norma (Czech national standard)
- DHW – domestic hot water
- m.a.s.l. – meters above sea level
- m^2 – square meter
- m^3 – cubic meter
- MW – mineral wool
- MPa – megapascal
- ÚPmZ – Územný plán města Zvolen (Zvolen city zoning pla)
- EPS – expanded polystyrene
- EPS – electric fire signalization
- EW – radiation reduction
- HVAC – heating ventilation air conditionary
- LV – low voltage
- WOS – water oil separator
- PVC – polyvinyl chloride

List of annexes

FILE NO. 1 – PREPARATORY AND STUDY WORKS

Drawing no.	Name	Scale
S.01	1.NP – Floor plan	1:200
S.02	1.NP – Architectural plan	1:200
S.03	2.NP – Floor plan	1:200
S.04	2.NP – Architectural plan	1:200
S.05	3.NP – Floor plan	1:200
S.06	3.NP – Architectural plan	1:200
S.07	4.NP – Floor plan	1:200
S.08	4.NP – Architectural plan	1:200

FILE NO. 2 – SITUATION DRAWINGS

Drawing no.	Name	Scale
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FILE NO. 3 – D.1.1 – ARCHITECTURAL STRUCTURAL SOLUTION

Drawing no.	Name	Scale
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D.1.1.4	2.NP Floor plan	1:50
D.1.1.5	3.NP Floor plan	1:50
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D.1.1.19	Locksmith elements	-
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Drawing no.	Name	Scale
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D.1.3.8	Legend of markings	-
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FILE NO. 6 – BUILDING PHYSICS

Drawing no.	Name	Scale
01	Building physics report	-
Annex 1	Thermal report DEKSOFT	-
Annex 2	Calculation of heat transfer coefficients	-
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FILE NO. 7 – ADDITIONAL CALCULATIONS

Drawing no.	Name	Scale
01	Building physics report	-

DECLARATION OF CONFORMITY OF PAPER AND ELECTRONIC FORM OF THE FINAL WORK

I declare that the electronic form of the submitted bachelor thesis called KONTON Residence Building is identical to the submitted paper form.

PREHLÁSENIE O ZHODE PAPIEROVEJ A ELEKTRONICKEJ FORMY ZÁVEREČNEJ PRÁCE

Prehlasujem, že elektronická forma odovzdanej bakalárskej práce s názvom *KONTON Residence Building* je zhodná s odovzdanou papierovou formou.

V Brne dňa 05.06.2020

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autor práce