BRNO UNIVERSITY OF TECHNOLOGY
VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ

FACULTY OF CIVIL ENGINEERING
FAKULTA STAVEBNÍ

INSTITUTE OF BUILDING STRUCTURES
ÚSTAV POZEMNÍHO STAVITELSTVÍ

HOUSE WITH TATTOO STUDIO
RODINNÝ DOM S TETOVACÍM ŠTÚDIOM

BACHELOR'S THESIS
BAKALÁRSKA PRÁCA

AUTHOR **Adela Matušovová**
AUTOR

SUPERVISOR **prof. Ing. Jitka Mohelníková, PhD.**
VEDÚCI PRÁCE

BRNO 2025

FAKULTA STAVEBNÍ ústav pozemního stavitelství

Assignment Master's Thesis

Department:	Institute of Building Structures
Student:	Adela Matušovová
Supervisor:	prof. Ing. Jitka Mohelníková, PhD.
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Study programme:	BPC-SI Civil Engineering – Building Construction

Děkan Fakulty Vám v souladu se zákonem č.111/1998 o vysokých školách a se Studijním a zkušebním
řádem VUT v Brně určuje následující téma bakalářské práce:

FAMILY HOUSE WITH TATTOO STUDIO:

Charakteristika problematiky úkolu:

Vytvoření části projektové dokumentace pro provádění stavby zadané budovy s téměř nulovou spotřebou energie částečně nebo plně podsklepené. 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.

Cíle, kterých má být dosaženo:

Návrh 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 vytvořena v souladu s vyhláškou č. 131/2024 Sb. v platném a účinném znění a bude obsahovat část A, B, C a vybranou část D. Upřesněný rozsah části D.1, D.3 a D.4 bude definován vedoucím závěrečné vysokoškolské práce (VŠKP). Výkresová část bude obsahovat výkresy situací, základů, výkopů, půdorysů všech podlaží, konstrukce zastřešení, svislých řezů, technických pohledů, min. 5 konstrukčních detailů, výkres(y) sestavy dílců, popř. výkres(y) tvaru stropní konstrukce všech podlaží. Součástí dokumentace budou i dokumenty podrobností dle D.1.3. bod i), stavebně fyzikální posouzení objektu a vybraných detailů, popř. další specializované části, budou-li zadány vedoucím práce. Součástí bude také stavebně fyzikální posouzení objektu. Dokumentace bude dále obsahovat koncepci větrání, vytápění a ohřevu vody. Dále bude dokumentace obsahovat studie obsahující předběžné návrhy budovy, návrhy dispozičního řešení a přílohovou část obsahující předběžné návrhy základů a rozměrů nosných prvků a prostorovou vizualizaci budovy obsahující i modulové schéma budovy. Výstupem návrhu bude soubor ve formátu IFC (Industry Foundation Classes), který zavádí mezinárodní standardy importu a exportu stavebních objektů a jejich vlastností. Závěrečná práce bude členěna v souladu se směrnicí děkana č. 1/2023 a jejím dodatkem a přílohami. Jednotlivé části tištěné verze dokumentace budou vloženy do složek 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 podle výběru zpracovatele VŠKP. Výkresy budou opatřeny popisovým polem. Textová část bude obsahovat i položky "Úvod", "Vlastní text práce" jejímž obsahem bude A Průvodní list a B Souhrnná technická zpráva a textové části D.1.1. a D.1.2 podle vyhlášky č. 131/2024 Sb. v platném a účinném znění a "Závěr". V souhrnné technické zprávě a ve stavebně fyzikálním posouzení objektu budou uvedeny použité zásady návrhu. Součástí elektronické verze VŠKP bude i poster ve formátu B1 s údaji o objektu, konstrukčním a materiálovém řešení a jeho grafickou vizualizací. Poster může být vhodně doplněn o řešené konstrukční detaily. Všechny zdroje použité při zpracování VŠKP musí být řádně citovány podle ČSN ISO 690:2022 (např. pomocí nástroje www.citace.com). Do VŠKP nelze vkládat údaje o vlastnících pozemků nebo staveb, které byly získané z Katastru nemovitostí, pokud s nimi vlastníci nevysloví souhlas.

Základní literární prameny:

(1) Směrnice děkana č. 1/2023 s dodatky a přílohami; (2) Stavební zákon a jeho prováděcí vyhlášky v platném a účinném znění; (3) Platné normy ČSN, EN; (4) Katalogy stavebních materiálů, konstrukčních systémů, stavebních výrobků; (5) Odborná literatura; (6) Vlastní dispoziční a architektonické řešení budovy; (7) Vlastní architektonický návrh budovy a (8) ČSN ISO 690:2022.

Termín odevzdání bakalářské práce je stanoven časovým plánem akademického roku.

V Brne, dňa 30.5.2025

prof. Ing. Miloslav Novotný, CSc.
vedoucí ústavu

prof. Ing. Jitka Mohelníková, Ph.D.
vedoucí práce

prof. Ing. Rostislav Drochytka, CSc., MBA, dr. h. c.
děkan

ABSTRACT

The main objective of this bachelor's thesis is the development of project documentation for a newly designed nearly zero-energy detached family house. The house is intended for a family of four and includes a tattoo studio for one of the family members. It is designed as two functionally independent units connected by a shared wall, allowing for internal access while maintaining privacy between the residential and work areas.
The building is situated in the modern municipality of Krokočín, in the Vysočina region of the Czech Republic. It is oriented to the south. The structure features a partial basement, two above-ground floors with a double garage, covered with flat green roofs insulated using ISOVER EPS polystyrene.
The vertical load-bearing system consists of masonry walls made from Porotherm ceramic blocks, insulated with EPS GREYWALL. Horizontal load-bearing elements are reinforced concrete ceiling beams with blocks.. The house is founded on concrete strip footings.
The project drawings were created using Revit software. The complete project documentation includes a fire safety report, foundation and structural load calculations, as well as technical assessments covering thermal performance, heat loss, acoustics, and daylighting.

KEYWORDS

Detached family house, partial basement, flat green roof, masonry
Porotherm, reinforced concrete ceiling, foundation strips

ABSTRAKT

Hlavným cieľom tejto bakalárskej práce je vypracovanie projektovej dokumentácie pre novonavrhnutý samostatne stojaci rodinný dom s takmer nulovou spotrebou energie. Dom je určený pre štvorčlennú rodinu a zahŕňa tetovacie štúdio pre jedného z členov rodiny. Navrhnutý je ako dva funkčne nezávislé celky prepojené spoločnou stenou, ktorá umožňuje vnútorný prechod, pričom zároveň zabezpečuje súkromie medzi obytnou a pracovnou časťou.
Stavba sa nachádza v modernej obci Krokočín v kraji Vysočina v Českej republike. Orientovaná je na juh. Objekt má čiastočné podzemné podlažie, dve nadzemné podlažia a dvojgaráž. Strechy sú ploché a vegetačné, zateplené polystyrénom ISOVER EPS.
Zvislý nosný systém tvorí murovaná konštrukcia z keramických blokov Porotherm, zateplená polystyrénom EPS GREYWALL. Vodorovné nosné konštrukcie sú zo železobetónových stropných nosníkov s vložkami. Objekt je založený na betónových pásových základoch.
Projektová výkresová dokumentácia bola vyhotovená v softvéri Revit. Súčasťou kompletnej dokumentácie je správa o požiarnobezpečnostnom riešení, výpočty základov a zaťaženia, ako aj technické posúdenia z hľadiska tepelnej techniky, tepelných strát, akustiky a denného osvetlenia.

KĽÚČOVÉ SLOVÁ

Samostatne stojaci rodinný dom, čiastočné suterénne podlažie, plochá vegetačná strecha, murivo Porotherm, železobetónový strop, pásové základy

BIBLIOGRAPHIC CITATION

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DECLARATION OF AUTHORSHIP OF THE FINAL THESIS

I, Adela Matušovová, declare that this Bachelor's Thesis titled *Family house with tattoo studio* is my own work and the result of my own original research. I have clearly indicated the presence of quoted or paraphrased materials and provided references for all sources.

Brno, 30.5.2025

Adela Matušovová
author

ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere gratitude to my supervisor, prof. Ing. Jitka Mohelníková, Ph.D., for her excellent guidance, professional approach, and for the valuable advice, explanations, and insights she provided throughout the course of my bachelor's thesis. Her support was truly appreciated.
I would also like to thank my closest family and friends, who have been a great source of support throughout this journey.

CONTENT

INTRODUCTION

The main objective of this bachelor's thesis is the development of project documentation for a newly designed nearly zero-energy detached family house. The house is intended for a family of four and includes a tattoo studio for one of the family members.
The house is located in modern municipality Krokočín, in the Vysočina region of the Czech Republic.

This part of the municipality is built-up area with family houses and tattoo studio. The building is situated on sloped terrain and is mainly oriented towards the south. Its placement on the site was carefully chosen to minimize excavation work and to allow effective backfilling where necessary. It is located on two land parcels with a total area of 2,094 m², while the family house with the tattoo studio occupies 186 m². The plot is bordered on three sides by residential gardens and on the fourth side by a road. Due to the elongated and narrow shape of the plot, proper spatial arrangement and setback distances were essential in the design process.

The house is detached and includes a partial basement, two above-ground floors, and a garage for two cars. All roof surfaces are flat green roofs. The tattoo studio is a separate unit that shares one wall with the residential part of the house. It has its own entrance and dedicated parking for clients. The tattoo artist—who is also the homeowner—can access the studio directly from the house, ensuring both convenience and privacy for the family. The studio is designed with barrier-free access and complies with applicable standards for premises providing personal care services.

The building features flat green roofs with integrated rainwater drainage and is insulated with ISOVER EPS polystyrene. The vertical load-bearing structure consists of masonry walls made from Porotherm ceramic blocks with EPS GREYWALL thermal insulation. The horizontal load-bearing structure is composed of reinforced concrete ceiling beams with infill blocks. The house is founded on concrete strip footings.

The drawing documentation required for project execution was created using Revit and ArchiCAD software, with additional support from Microsoft Word and Excel. The project documentation is organized into nine sections: main text, preparatory and conceptual work, site plans, architectural design, structural design, fire safety design, building physics, technical calculations, and supplementary documents.

All relevant Czech standards, laws, regulations, and decrees were observed during the design of this family house.

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A ACCOMPANYING REPORT

BACHELOR'S THESIS
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BRNO 2025

A . ACCOMPANYING REPORT

A.1 Identification Data

A.1.1 Information about the Building

a) Name of the building :	FAMILY HOUSE WITH TATTOO STUDIO
b) Location of the building :	c.a. Krokočín [674826], p.n. 730/2 and 728/4
c) Subject of the documentation:	new construction

A.1.2 Information about the Documentation Processor

a) Name :	Adela Matušovová Hontianske Nemce 525, Slovakia
b) Name and surname of the lead designer:	-

A.2 List of Input Documents

- data from the Land Register
- documents from existing utility network operators
- binding regulations

A.3 TEA – Technical and Economic Attributes of the Building

a) Built-up area:	256,85 m^2
b) Floor area :	313,48 m^2
c) Number of underground floors:	1
d) Number of above-ground floors:	2
e) Method of use:	Residential building with a business unit
f) Type of structure:	masonry
g) Heating method:	HVAC
h) Water supply connection:	yes
i) Sewer connection:	no
j) Gas connection:	no
k) Elevator:	no

A.4 Building Attributes Relevant for Determining Conditions of Connection and Activities in Protective and Safety Zones of Transport and Technical Infrastructure

a) Building depth:	-4,120 m
b) Building height:	+7,520 m
c) Estimated occupancy (number of people) in the building:	4
d) Planned start and completion dates of the construction:	-

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A SUMMARY TECHNICAL REPORT

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B. SUMMARY TECHNICAL REPORT

B.1 General Description of the Area and the Building

a) Basic description of the building; in the case of a modification to an existing building, information about its current condition, conclusions of the structural-technical and, if applicable, historical building survey, and the results of the structural assessment of the load-bearing structures.
The property is situated in the village of Krokočín, located in the Vysočina Region of the Czech Republic. Krokočín lies approximately 26 km east of Třebíč, 50 km east of Jihlava, and 161 km southeast of Prague.
The proposed building is located on the edge of the municipality, in an area predominantly developed with modern family houses. The land is flat and well-suited for construction.

b) Characteristics of the area and building plot, previous land use and development, location in relation to flood zones, undermined areas, etc.
The building plot is owned by the investor. The parcel intended for the construction of the family house with tattoo stusio is located in the municipality of Krokočín. The investor's land is undeveloped and situated in a residential area. The plot is identified as parcel number 730/2 and 728/4 in the cadastral territory of Krokočín (code 674826). The current land use is classified as a garden.
The proposed building is in accordance with the character of the surrounding area. The design respects the existing development and, with its massing, does not visually dominate the surroundings. The project documentation assumes that the house will not be located in a seismically active zone, undermined area, or floodplain.

c) Information on the compliance of the building with spatial planning documentation and territorial measures, or with the goals and objectives of spatial planning, as well as with the requirements for the protection of cultural, historical, architectural, archaeological, and urban values in the area.
The building complies with the conditions set out in the Spatial Plan of Krokočín. The plot is located within the area designated as SO – Mixed Residential Zone, where the following construction conditions apply:
- Characteristics: Building height regulation – a maximum of 2 above-ground floors including the attic … FULLFILLED (the house has 2 above-ground floors
  - Land use intensity – building coverage ratio, i.e. the ratio of the area built with buildings to the land area owned by one owner in this area, will be a maximum of 0.3 … FULLFILLED (the ratio of the area built with buildings to the land area is 3,4% = 0,034
  - Greenery coefficient, i.e. the ratio of unbuilt and unpaved area to the land area owned by one owner in this area, will be at least 0.5 … FULLFILLED (the ratio of unbuilt and unpaved area to the land area is 87,7% = 0,87
  - At least 40% of the area must be reserved for stormwater retention … FULLFILLED (for stormwater retention is 87,7% = 0,87)

The building complies with the regulatory conditions for the given locality.

d) List and conclusions of surveys
No surveys were carried out

e) Information on the necessity of granting an exemption from construction requirements
No exemptions have been issued for the construction. The project complies with the general requirements for land use.
f) Existing protection of the area and the building under other legal regulations, including the scope of restrictions and protection conditions
The land parcel is not located within a heritage conservation area, heritage zone, specially protected area, or within a Natura 2000 site.
All applicable protective and safety zones will be respected in the placement and setting out of the building on the construction site parcel.
g) Impact of the building on surrounding structures and land, environmental protection, impact on local drainage conditions, requirements for remediation, demolition, and tree removal
The construction will have no negative impact on surrounding buildings or land, nor on local drainage conditions. No remediation, demolition, or removal of mature vegetation posing a threat to the surroundings is anticipated on the plot.
h) Requirements for maximum temporary and permanent occupation of agricultural land or land designated for forest functions
All built-up and paved areas will be permanently excluded from the Agricultural Land Fund.
i) Proposed and resulting protective and safety zones, scope of restrictions and protection conditions under other legal regulations, including a list of land parcels according to the Land Register where the protective or safety zone will arise, and the safety distance of a munitions storage facility with fragmentation risk as determined by other legal regulations
The main affected parcel is the investor's land, located in the cadastral territory of Krokočín, parcel no. 730/2 and 728/4.
In addition, the following land is affected:
Parcel no. 771/2, owned by: Strašák Jan Ing., č. p. 3, 67571 Krokočín, which is impacted by paved surfaces with a total area of 7,81 m² and by water supply connection 0,9 m.
Parcel no. 5513, owned by: Příhoda Michal, č. p. 7, 67571 Hluboké, which is impacted by water supply connection 0,9 m.
j) Proposed building parameters – for example, built-up area, enclosed volume, floor area by function (residential, services, administration, etc.), type of proposed technology, expected operational and production capacities

Roof pitch:	flat roof
Total usable floor area:	313,48 m²
Built-up area:	256,85 m²
Number of residential units in the house:	1 unit
Expected occupancy:	4–5 persons

k) Limiting balances of the building – utility and material needs and consumption, rainwater management, total quantity, types and categories of waste and emissions, etc.
All rainwater from the building will be directed to a rainwater tank (an accumulation tank intended for garden irrigation) – *Nautilus 5 Extreme Line* with a capacity of 4.7

m³, manufactured by Sineko Engineering s.r.o. The tank will be equipped with a safety overflow leading to an infiltration system, which consists of drainage leading to an infiltration trench located on the investor's property.
Rainwater infiltration on residential building plots is considered compliant if the ratio of the area capable of absorbing rainwater to the total plot area is at least 0.4 for a detached family house.

Area capable of rainwater infiltration: 1836,15 m²
Total plot area: 2093 m²
1836,15 / 2093= 0,877 > 0,4 – **FULLFILLED**

Water demand:
Estimated water consumption: 99 l/person/day
Number of persons: 5 persons
Total daily water demand: 495 l/day
According to ČSN 73 08 73 – Fire Water Supply, the required fire water demand is 4 l/s (for v = 0.8 m/s).

l) Requirements for the capacities of public communication networks and electronic communication equipment of the public communication network
The project documentation does not address connection to communication lines or electronic communication equipment of the public communication network.
m) Basic construction assumptions – timeline of project implementation, phasing, factual and temporal dependencies, conditional, induced, and related investments
At present, the project designers are not aware of any factual or temporal dependencies, conditional, induced, or related investments that would prevent the building permit process or the execution of the construction.
Construction phases:

- Site preparation – topsoil stripping
- Family house
- Fencing
- Driveways and paved surfaces
- Landscaping (greenery)

Start and expected completion date, including construction method:
Construction will begin after the issuance of the relevant decision by the Building Authority (SÚ) and is expected to be completed within 2 years from the start of construction works. The construction method will be specified by the investor.
n) Basic requirements for early use and trial operation of the building, including their duration in relation to completion and use of the building
Early use of the building is not anticipated.
o) List of results of geodetic activities under other legal regulations, if the project requires such results in connection with the building permit
For the preparation of the project documentation, no results of geodetic activities under other legal regulations were required.

B.2 Urban and Basic Architectural Design

Urban Design – Spatial Composition and Basic Architectural Concept
The goal is to create a building that respects the surrounding development and, through its massing, does not visually dominate the area. Access to the investor's property will be provided from the street located on the northern side.
Basic Architectural Design
The house has 2 above floor and partially with basement. The building is covered with a green flat roof.

B.3 Basic Structural and Technological Design

Heating for the family house will be provided by a HVAC system.

B.3.1 General Concept of the Structural and Technological Design

Heat Source: The primary heat source is an *Acond PRO-N air-to-water inverter heat pump* with an internal hydrobox.
Heating System: Underfloor hot water heating system.
Domestic Hot Water (DHW): Hot water will be provided by an indirect storage water heater with a capacity of 186 liters, which is part of the internal hydrobox unit of the heat pump. The hot water heating system also includes a central heat recovery unit for warm (grey) water.

B.3.2 Overall Accessibility Conditions

The building itself is not subject to §29 of Decree No. 146/2024 Coll., which stipulates requirements for accessibility for persons with reduced mobility and orientation. Publicly accessible areas comply with this regulation.

B.3.3 Safety Principles for Building Use

The family house is designed to meet the safety requirements outlined in Decree No. 146/2024 Coll., Part 3 on construction requirements, as amended. Given the building's intended use, there is no need for risk reduction measures, safety zones, or designated escape routes. Evacuation to open space is ensured through unprotected escape routes in accordance with the applicable ČSN standards.

B.3.4 Basic Technical Description of the Building

a) Description of the existing condition – this is a new construction.
b) Description of the proposed structural and technical solution
The family house will be constructed using traditional building technologies with the use of thermally insulating and environmentally friendly materials.

Foundations:
The strip foundations will be made of plain concrete *CEMEX Compacton C16/20*, with a width of 800 mm. On top of the strip foundations, the upper part of the foundation will consist of rows of *BEST permanent formwork blocks*- for the

foundation strips under 1NP. The sub-base slab beneath the house will be a 150 mm thick concrete slab with embedded *reinforcement mesh 150/150/6 mm*.

External and Internal Walls:

The load-bearing walls of the entire structure are designed using *POROTHERM ceramic blocks*. The peripheral walls will be constructed from *POROTHERM 30*, strength class P12 and P15, thickness 300 mm, laid using *POROTHERM PROFI thin-bed mortar*. The internal load-bearing walls will be built with *POROTHERM 24 PROFI* blocks, strength class P10 and P15, thickness 240 mm. Partition walls will be made of *POROTHERM 11,5* blocks, strength class P8, thickness 115 mm, also with POROTHERM thin-bed mortar.

Ceilings:

The ceiling are from *reinforced concrete beams and blocks.*

Roofing:

The roof is flat green with with a 3% slope towards the drain.

Openings:

Windows, terrace doors, balcony doors, and entrance doors will be made of plastic with triple glazing. During installation, joints between the window frame and wall opening will be sealed with special interior and exterior sealing foils.

Windows in habitable rooms will be fitted with *external motorized aluminum blinds* by *SERVIS CLIMAX a.s.*.

Interior doors will be provided by *POL-SKONE CZ s.r.o.*,

Tiling, Fixtures:

The interior finishes will use standard products chosen by the investor. Standard ceramic tiling in the kitchen area may be replaced with *Grafosklo glass panels* by *JAP spol. s r.o. Přerov*. Design and specifications will be tailored to the investor's request.

External Surfaces:

The construction of the family house will be complemented by secondary structures such as fencing, paved surfaces, landscaping, and utility connections. Paved areas for terraces and walkways will be made using paving from *BEST, a.s.*.

The slope of paved surfaces (including drainage paths with *BEST tiles 60×40 cm*) and utility routes away from the building will be a minimum of 1%.

Fencing and Minor Landscape Architecture Elements

The fencing and small garden architecture elements will also be supplied by *BEST, a.s.* The front fence will consist of a masonry base with wooden infill panels, with a height of 1,6 m. The rear fence will be made of wire mesh, also 1,6 m in height.

Thermal Insulation

The project includes thermal insulation materials by *ISOVER*.

B.3.5 Technological Solution – Basic Description of Technical and Technological Systems

a) Description of the existing condition – this is a new construction.

b) Description of the proposed solution – the building will not contain any specific technological equipment. The technical solution includes heating of the family house by a low-temperature hot water system with forced water circulation.

Heat source:
The primary heat source is an *Acond PRO-N inverter air-to-water heat pump* with an internal hydrobox unit.

Heating system:
Underfloor hot water heating.

Domestic Hot Water (DHW):
Hot water will be prepared using an *indirect storage water heater* with a capacity of 186 liters, which is integrated into the hydrobox unit of the heat pump. The hot water system also includes a *central heat recovery unit for warm (grey) water*.
c) Energy calculations:
Water demand:

- Estimated water consumption: 99 l/person/day
- Number of persons: 5 persons
- Total daily water demand: 495 l/day

According to ČSN 73 08 73 – Fire Water Supply, the required fire water supply is 4 l/s (at a flow velocity of 0.8 m/s).

B.3.6 Fire Safety Principles

a) Characteristics and criteria for determining the building category according to the requirements of other legal regulations – building height, built-up area, number of floors, number of persons for which the building is designed, or other building parameters, such as clear floor height or tunnel length, etc.

Built-up area: 256,86 m²
Anticipated number of occupants: 4 persons
b) Criteria – usage class, presence of hazardous substances or other risk factors, declaration of the building as a cultural monument.
The family house is classified in Usage Class III. The presence of hazardous substances or other risk factors is not considered. The building is not declared a cultural monument.

B.3.7 Energy Saving and Thermal Protection of the Building

The proposed family house meets the requirements for energy saving and thermal protection in accordance with §16 of Decree No. 268/2009 Coll. on general technical requirements for construction, and Act No. 406/2000 Coll. on energy management, as amended, including the energy performance of the building.

B.3.8 Hygienic Requirements for the Building, Working and Municipal Environment

The orientation of the house toward cardinal directions is appropriately designed. Natural daylighting and sunlight exposure comply with the requirements of ČSN 73 4301 and ČSN 73 0580-1. The size of the windows ensures sufficient visual comfort.

Rooms with limited or no natural daylight are supplemented by artificial lighting. Artificial lighting is addressed in the section *Strong-current Electrical Installations*. The selection of luminaires for interior rooms follows the technical requirements of ČSN EN 12464-1 – illuminance values *Epk* in lux, according to lighting categories. Ventilation in most rooms is provided naturally through openable or tiltable windows. The kitchen is equipped with forced ventilation. Cooking vapors are extracted via a kitchen hood. The hood's exhaust is designed with carbon hood. The pantry is ventilated using openings of 750×750 mm.
The building does not include any technical equipment generating noise or vibrations. Partition walls between individual habitable rooms meet the requirements of Table 1 of ČSN 73 0532 – Acoustics – Protection against noise in buildings and assessment of acoustic performance of construction products – Requirements.
POROTHERM 11,5 partition walls, provide an airborne sound insulation of Rw = 45 dB > 40 dB – the normative requirement is fulfilled.
POROTHERM 23 PROFI load-bearing walls, thickness 240 mm (including plaster layers of at least 10 mm), provide an airborne sound insulation of Rw = 49 dB > 40 dB – the normative requirement is fulfilled.

B.3.9 Principles of Protecting the Building Against Adverse External Environmental Effects

Flood protection measures, protection against radon ingress from the subsoil, stray currents, technical and natural seismicity, aggressive and pressurized groundwater, noise, and other effects – undermining, methane occurrence, etc.
Based on the determined volumetric activity of radon in soil air and the permeability category of the subsoil, the site is assessed as an area with a low radon index.
Stray current protection is not considered in the project.
Protection against technical seismicity is not considered in the project.
The house is located in an area where the sound pressure level in front of the façade does not exceed 50 dB during the day and 40 dB at night. If higher noise levels occur, the building envelope must be evaluated and adjusted individually. No technical equipment generating excessive noise is proposed within the building.
There is no significant stationary source of noise in the vicinity of the building.
The hygienic limits for A-weighted equivalent sound pressure level, defined in § 12 paragraphs 1 and 3, and Annex No. 3, Part A of Government Regulation No. 272/2011 Coll. on the protection of health from the adverse effects of noise and vibration, will not be exceeded in the protected outdoor areas of the family house.
Flood protection measures are not included in the project.

B.3 Connection to Technical Infrastructure

Water Supply:
The water distribution system will be connected to the public water mains.
A newly constructed service connection will be brought onto the investor's plot and terminated in a newly built water meter chamber near the fence, with a total length of 8,95 m.

The pipeline between the house and the water meter chamber will be installed using plastic PE pipe SDR 11 Ø32x3 mm, with a length of 17,91 m.
The pipeline will be laid in a trench at a minimum depth of 1,2 m below ground level. The trench width must allow for a minimum clearance of 15 cm between the outer surface of the pipe and the trench wall to ensure proper bedding.
The pipe will be placed on a sand bedding layer (grain size up to 20 mm) with a thickness of 0.10 m, and a minimum slope of 0.3%.
The pipe will be backfilled up to its crown. Compaction is sufficient only to ensure complete bedding support.
The pipeline will be backfilled with excavated sand (grain size up to 20 mm) to a height of 0.3 m above the pipe, without compaction.
A warning tape will be placed above this backfill layer.
Water metering (water meter assembly) will be located in the water meter chamber.
The pipeline installation will also include:

- Pressure test at operating pressure, up to 1.0 MPa if needed,
- Flushing of the pipeline,
- Water sampling from the installed section and subsequent laboratory analysis,
- Closing and opening of the water supply, and installation of the house shut-off valve and water meter by the public water supply operator. The pressure test must be performed in the presence of the operator.

The operator has the right to inspect the pipeline installation along its entire length immediately prior to backfilling.

Hot Water Heat Recovery System
The domestic hot water system will include a passive heat recovery exchanger – AKIRETHERM, installed underground outside the building. Cold potable water from the internal domestic supply will be routed into the exchanger, and preheated water will be led back into the building through plastic PE pipe SDR 11 Ø32x3 mm, with a total length of 5,13 m.
The supply line will include a branch with a shut-off valve and a check valve. This branch may be installed inside the building (after the main shut-off valve) or outside the building in a plastic utility chamber.
The connection will include a branch line with a shut-off valve and a check valve. This branch can be installed inside the building (after the main shut-off valve) or outside the building in a plastic chamber.

Wastewater Sewer System :
Wastewater from the family house will be discharged into a septic tank.
The pipeline from the house to the inspection chamber at the greywater heat recovery unit will be made from PVC socketed pipes DN 150, with a length of 5,13 m.
The pipeline will be laid in a trench on a 0.10 m sand bedding, at a depth of approximately 0,8 m below ground level, with a minimum slope of 2%.
The trench will have a minimum width of 0,3 m. The sand used for bedding (grain size up to 20 mm) must be placed evenly across the trench width and properly compacted using suitable mechanical equipment.
The backfill material will be spread evenly on both sides of the pipe and compacted carefully in layers of 0.10 – 0.15 m.
A warning tape will be placed above the backfill layer.

The pipe sockets will be sealed using rubber rings.
A pressure test will be performed according to ČSN 75 5911 before final trench backfilling.
Wastewater pipelines will be separated into:

- Greywater (from washbasins, showers, bathtubs, and washing machines), and
- Blackwater (from toilets, kitchen sinks, and possibly utility sinks),

due to the installation of an external greywater heat recovery exchanger. Only greywater will be directed into the heat exchanger. After the heat exchanger, the greywater and blackwater lines will be combined and led into the unified sanitary sewer system.
Refer to the plumbing section and coordinated site plans in the project documentation.
The pipeline from the house to the heat exchanger, and from the heat exchanger to the external sewer line connection, will be made of PVC socketed pipes DN 110, with a total length of 3,0 m.

Rain Water System:
All rainwater from the building will be collected in a rainwater tank (accumulation tank) – *Nautilus 5 Extreme Line*, volume 4,7 m³, manufactured by *Sineko Engineering s.r.o.*
The tank will include a safety overflow connected to an infiltration system, consisting of drainage into an infiltration, inspection, and control chamber – Doublekon, also by *Sineko Engineering s.r.o.*
The infiltration system is located on the investor's property.
The stormwater drainage pipe will be made of PVC socketed pipes DN 125, with a total length of 17,98 m, laid in a trench on a 0,10 m sand bedding, at a depth of approximately 0,8 m below ground level.
Pipe joints will be sealed with rubber rings.
Rainwater infiltration on residential plots is considered compliant when the ratio of infiltration-capable area to total plot area is at least 0,4 for detached houses.

Area capable of rainwater infiltration:	1836,15 m²
Total plot area:	2093 m²

1836,15 / 2093= 0,877 > 0,4 – **FULLFILLED**

Electrical Installation:
The house will be connected to the electrical grid via a new service connection leading to a metering pillar located at the property boundary.
The cable will be laid in a trench 35 cm wide and 80 cm deep, placed on a screened sand bed, backfilled with 25 cm of soil, with a warning tape placed above before completing the backfill.
A CYKY 4Bx16 mm² cable, with a length of 18,14 m, and HDO impulse control will connect the pillar to the house through the landscaped part of the property.
During construction, all requirements and approvals of the grid operator ČEZ must be observed.

B.4 Traffic and Transport Solution

a) Description of the transport solution, including barrier-free access measures for persons with reduced mobility and orientation:
The plot is accessible via a paved local access road, which will provide entry for private vehicles and a pedestrian access path.

The building itself is not subject to Decree No. 398/2009 Coll., which establishes general technical requirements for the use of buildings by persons with reduced mobility and orientation.
Publicly accessible areas comply with the provisions of this decree.
b) Connection of the site to the existing transport infrastructure:
The plot is connected via a paved local access road, which will provide access for both vehicle entry and a pedestrian walkway.
c) Static traffic (on-site parking):
Parking is provided by two on-site parking spaces for passenger vehicles, located in front of the building on the investor's property. For tatto studio is reserved one spot for parking in front of studio.

B.5 Landscaping and Related Earthworks

a) Earthworks:
Topsoil will be stored on-site in a designated stockpile during construction and will be reused after project completion for leveling and greening the site.
b) Vegetation elements used:
The adjacent land will be grassed and planted with low-maintenance vegetation.
c) Biotechnical measures:
No biotechnical measures are planned on the site.

B.6 Description of Environmental Impacts and Protection

a) Impact of the building on the environment – air, noise, water, waste, and soil:
The construction is not subject to environmental impact assessment under Acts No. 17/1992 Coll. and No. 100/2001 Coll., as amended.
The use and operation of the building will not negatively affect the environment. The building will not produce any hazardous waste during its operation.
During construction, typical construction waste will be generated, including:

- Excess excavation soil,
- Construction debris,
- Leftover building materials,
- Packaging materials (paper, cardboard, plastic foils),
- Waste timber from construction and packaging,
- Small amounts of leftover insulation materials (damp-proof, thermal, and acoustic),
- Remnants of cables, pipe penetrations, adhesive tapes, and cuttings from plastic or metal piping during electrical, water, and sewer installations,
- Containers (metal and plastic) with residual content and soiled textiles from painting, flooring adhesives, and general cleaning activities.

Waste will be sorted directly on the construction site.

- Waste suitable for reuse will be handed over to an authorized entity for recycling or recovery.
- Waste that cannot be reused will be handed over to an authorized entity for ecological disposal.

Uncontaminated excavated soil will be reused for landscaping and leveling the terrain of the existing plot.
Construction waste classification is based on the Catalogue of Waste (according to Decree No. 8/2021 Coll.).

Waste Catalogue Number	Waste Description	Estimated Quantity	Waste Handling Method
17 01 07	Mixtures or fractions of concrete, bricks, tiles and ceramics not included under 17 01 06	0,4t	controlled landfill
17 02 01	wood	0,02t	controlled landfill
17 02 02	glass	0,02t	recycling
17 02 03	plastic	0,1t	recycling
17 03 02	Bituminous mixtures not containing coal tar	0,1t	controlled landfill
17 04 01	Copper, bronze, brass	0,02t	recycling
17 04 05	Iron and steel	0,2t	recycling
17 06 04	Insulation materials other than those mentioned in 17 06 01 and 17 06 03	0,1t	controlled landfill
17 09 04	Mixed construction and demolition waste	0,2t	controlled landfill
15 01 01	Paper and cardboard packaging	0,1t	recycling
15 01 02	Plastic packaging	0,1t	recycling
08 01 11	Waste paint and varnish containing organic solvents or other dangerous substances	0,05t	controlled landfill

Municipal Waste Management:
Household municipal waste generated during regular operation will be stored in wheeled waste containers and collected by a specialized waste management company for disposal at a municipal solid waste landfill (MSW landfill).
Sanitary wastewater will be discharged into the sanitary sewer system or treated by a domestic wastewater treatment plant (WWTP).
b) Impact of the building on nature and the landscape (tree protection, heritage tree protection, protection of plants and animals, etc.), preservation of ecological functions and relationships in the landscape:

The building will not have a negative impact on the natural environment. The protection of heritage trees, plants, and wildlife in the area will be ensured. Ecological functions and connections within the landscape will be preserved.
c) Impact of the building on the Natura 2000 protected area network:
The building has no impact on the Natura 2000 protected area network.
d) Incorporation of the binding opinion from the Environmental Impact Assessment (EIA), if applicable:
Given the character, scale, and location of the project, no EIA study was required or conducted.
e) Proposed protective and safety zones, scope of restrictions, and protection conditions under other legal regulations:
The land parcel is not located within the protective zone of an overhead high-voltage power line and within the protective zone of a communication cable.

B.7 Civil Protection

According to Decree No. 380/2002 Coll., §22 paragraph 1:
a) Permanent shelters:
Not considered due to the nature, scale, and location of the construction.
b) Protective systems of underground transport structures:
Not considered due to the nature, scale, and location of the construction.
c) Buildings funded from the state budget, educational facilities, dormitories, and facilities providing healthcare or social services, in terms of their usability as improvised shelters:
Not considered due to the nature, scale, and location of the construction.
d) Buildings for industrial production and storage:
Not considered due to the nature, scale, and location of the construction.

B.8 Construction Site Organization Principles

a) The construction site will be connected to water supply and electricity. Electrical power will be drawn from a site distribution board fitted with a 25 A circuit breaker. The estimated electricity consumption is 250 kWh per month. Water for the site facilities will be taken from the public water supply system, with an estimated consumption of 15–20 m³ for the house construction. All construction materials will be delivered and stored exclusively on the investor's plot.
b) Site drainage – Groundwater does not reach the level of the foundation structures, and therefore no groundwater pumping system is planned. In the case of excessive rainwater or groundwater appearing in the foundation trench, the issue will be resolved using a submersible pump to remove the water.
c) Connection to existing transport and utility infrastructure:
The plot is accessible via a local access road, which will provide entry for passenger vehicles and a pedestrian path. The construction site boundary will be defined by the wire fence on the investor’s property, preventing access by unauthorized persons. Entry to the site will be prohibited for unauthorized persons. The site area will be confined to the investor’s land.

In terms of public interest protection, the following must be ensured: prevention of pollution of roads, protection of air from exhaust gases and dust, compliance with hygienic regulations and standards within construction site facilities.
There are existing utility networks in the area, addressed in the land use proceedings, to which the building must be connected.
The site is ready for the start of construction work. Electricity will be drawn from a PRIS cabinet and water from the public water supply. As part of site preparation, external low-voltage cables will be insulated for protection.
d) The site will occupy only the investor's land. Measures must be taken to protect public roads, air quality (dust and emissions), and ensure compliance with hygiene regulations at all times.
e) Site protection and requirements for remediation, demolition, or tree removal:
No remediation, demolition, or felling of mature vegetation affecting the surroundings is expected.
f) Maximum land use for construction (temporary/permanent):
No temporary or permanent land use outside the investor’s parcel is planned.
g) The building itself is not subject to Decree No. 398/2009 Coll. (technical requirements ensuring access for persons with reduced mobility and orientation). However, publicly accessible areas comply with this decree.
h) Estimated maximum waste and emissions during construction:
It is anticipated that the project will generate approximately 500 kg of waste, which will be disposed of exclusively by an authorized entity, and about 5 m³ of soil, which will be deposited at an appropriate landfill.
i) Earthworks balance, requirements for soil import or storage:
Excavated soil will be stored on-site and used for landscaping and backfilling, or transported to a suitable landfill if not usable.
j) Environmental protection during construction:
Construction activities must be organized to minimize disruption to traffic in nearby streets and to avoid negative impacts on neighboring residential areas. Special attention must be paid to:
- protection against noise and vibrations,
- protection against air pollution from exhaust gases and dust.
- Prevention of road pollution
- Prevention of contamination of groundwater and surface water
- Compliance with hygiene regulations and requirements within the construction site facilities
Construction activities will generate construction waste, for which maximum recyclability is required. All waste will be managed in compliance with the contractor’s waste management plan.
k) Health and safety regulations during construction:
To ensure worker safety and health protection during construction, all applicable legal regulations and technical standards must be followed, especially Act No. 309/2006 Coll. and Government Decree No. 591/2006 Coll., which stipulate minimum safety and health requirements on construction sites.
Construction must be carried out in accordance with technical data sheets for each product, and basic occupational hygiene standards must be maintained.
All specialized work must be carried out by qualified personnel with appropriate certification.

l) Adjustments for barrier-free use of buildings affected by the construction:
The building itself is not subject to Decree No. 398/2009 Coll., which stipulates general technical requirements to ensure the use of buildings by persons with limited mobility and orientation.
Publicly accessible areas comply with the decree.
The construction will not negatively impact surrounding structures, and no modifications for barrier-free access are necessary.
m) Principles for traffic engineering measures:
Given the nature, scope, and location of the project, no traffic engineering measures are required.
n) Minimizing environmental impact and disruption during construction:
Construction activities must be planned in a way that minimizes disruption to traffic in adjacent streets and especially that avoids any negative impact on neighboring housing caused by: noise and vibrations, air pollution from exhaust gases and dust, road contamination, groundwater and surface water pollution.
All local regulations and ordinances must be respected, and safety regulations must be observed at all times.
o) Construction phases and timeline:
Due to the character and scope of the construction, complex staging is not necessary. The construction will proceed in the following phases:
- Site preparation – topsoil stripping
- Family house construction
- Fencing
- Driveways and paved surfaces
- Landscaping (greenery)

The start date of construction for individual components will follow the issuance of the relevant decision by the Building Authority (SÚ). Completion is expected within 2 years of commencement.
The construction schedule has been proposed by the project designer in agreement with the investor, based on prior experience, construction costs, implementation conditions, and project complexity.

B.9 Overall Water Management Solution

The current conditions on the construction site, as well as the realization of the building and related earthworks, must not worsen runoff conditions on the property or cause flooding of neighboring plots with rainwater.
All rainwater from the building will be directed into a rainwater tank (accumulation tank) – *Nautilus 5 Extreme Line*, with a volume of 4.7 m³, manufactured by *Sineko Engineering s.r.o.*
The tank will be equipped with a safety overflow leading to an infiltration system, consisting of a drainage trenchconnected to a soakaway, inspection, and control chamber – Doublekon, also by *Sineko Engineering s.r.o.* The infiltration system is located on the investor’s property.

Rainwater infiltration on residential plots is considered compliant when the ratio of the Infiltration-capable area to the total plot area is at least 0.4 for a detached family house.

Area capable of rainwater infiltration: 1836,15 m²
Total plot area: 2093 m²
1836,15 / 2093= 0,877 > 0,4 – **FULLFILLED**

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ÚSTAV POZEMNÍHO STAVITELSTVÍ

HOUSE WITH TATTOO STUDIO
RODINNÝ DOM S TETOVACÍM ŠTÚDIOM

C SITUATION DRAWINGS

BACHELOR'S THESIS
BAKALÁRSKA PRÁCA

AUTHOR — **Adela Matušovová**
AUTOR

SUPERVISOR — **prof. Ing. Jitka Mohelníková, PhD.**
VEDÚCI PRÁCE

BRNO 2025

C. Situation drawings

C.1 Block plan

a) Scale 1:500

b) Building connections to the transport and technical infrastructure

c) Present and proposed protection and safety zones

d) Proposed borders of the concerned plot

C.2 Cadastral plan

a) Scale 1:500

b) Plan of the designed building

C.3 Coordination situation drawing

a) Scale 1: 200

b) Present buildings, transport, and technical networks

c) Territory boundaries, parcel numbers

d) The boundaries of the concerned plot

e) Present altitude and geometric measurements

f) Identification of designed and removed buildings and technical infrastructure

g) Determination of the above-ground level for buildings (± 0,00) and the height of the terrain in the plot; maximum height of the building

h) Designed roads and paved areas, connection to transport network

i) Vegetation control

j) Plan of new utility networks, connection of the structure to technical network

k) Present and designed protection and security zones, conservation areas, etc.

l) Maximum long-term and short-term occupations

m) Designation of geotechnical probes

n) Geodetical data, identification of the setting grid coordinates

o) Equipment on the construction site

p) Partitioning distances, including areas of fire hazard, access roads etc.

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HOUSE WITH TATTOO STUDIO
RODINNÝ DOM S TETOVACÍM ŠTÚDIOM

D DOCUMENTATION OF OBJECTS AND TECHNICAL AND TECHNOLOGICAL EQUIPMENTS

BACHELOR'S THESIS
BAKALÁRSKA PRÁCA

AUTHOR **Adela Matušovová**
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VEDÚCI PRÁCE

BRNO 2025

D. Project Documentation of the Structures

Project Title:	**FAMILY HOUSE WITH TATTOO STUDIO**
Location:	c.a. Krokočín [674826], p.n. 730/2 and 728/4
Responsible Designer:	Adela Matušovová
Contact Address:	Hontianske Nemce 525
Date:	05/2025

D.1.1 Architectural and Structural Design

a) Technical Report

The intention is to build a new standard residential family house on their own land, including associated auxiliary structures such as fencing, paved areas and driveways, utility service connections, etc.
The building serves a purely residential function, with tattoo studio.
This is a new construction of a two above ground floor with basemnet, designed as a detached building. The layout is tailored to meet the housing needs of a 4–5-member family. The building is covered with a flat green roof.
The main entrance is located on the front side of the building, with additional access from a terrace at the side. The internal layout separates the daytime living area and the quiet nighttime area as well as the business area through wall.
Entry is through a vestibule, leading into a hallway that serves as the central communication space of the house facing stair which goes to basement. And through this hall is possible to walk to stusio. From the hallway, one can access the toilet, and a combined kitchen and living room area, which includes a pantry adjacent to the kitchen.
From living room which is open- without ceilling, goes 2nd stair to nighttime zone.
The nighttime zone on the second floor, corridor leads to two bedrooms, guestroom, and a bathroom. Each habitable room is equipped with its own built-in closet. The main room has ist own walk-in closet and bathroom.
The attic space is accessible via a foldable staircase on second floor.
The building is not subject to Decree No. 398/2009 Coll., which sets general technical requirements for the use of buildings by persons with reduced mobility and orientation.
At this stage, the project documentation does not include technical designs of terraces, paved surfaces, earthworks, or elements of minor architecture.

Roof pitch:	flat roof
Total usable floor area:	313,48 m²
Built-up area:	256,85 m²
Number of residential units in the house:	1 unit
Expected occupancy:	4–5 persons

The orientation of the house has been designed to ensure that living spaces receive sufficient sunlight while avoiding excessive overheating.
Daylight access and solar exposure in the rooms comply with the requirements of ČSN 73 4301 and ČSN 73 0580-1.

Rooms with limited or no access to natural light are illuminated using artificial lighting. Artificial lighting is addressed in the section Power Electrical Systems.
The selection of lighting fixtures in the rooms follows the technical requirements of ČSN EN 12464-1, specifically the illuminance tables (Epk in lux) for various categories of lighting.

TECHNICAL AND STRUCTURAL DESIGN OF THE BUILDING

The strip foundations will be made of plain concrete *CEMEX Compacton C16/20*, with a width of 800 mm. On top of the strip foundations, the upper part of the foundation will consist of rows of *BEST permanent formwork blocks*- for the foundation strips under 1NP. The sub-base slab beneath the house will be a 150 mm thick concrete slab with embedded *reinforcement mesh 150/150/6 mm*.
The load-bearing walls of the entire structure are designed using *POROTHERM ceramic blocks*. The peripheral walls will be constructed from *POROTHERM 30*, strength class P12 and P15, thickness 300 mm, laid using *POROTHERM PROFI thin-bed mortar*. The internal load-bearing walls will be built with *POROTHERM 24 PROFI* blocks, strength class P10 and P15, thickness 240 mm. Partition walls will be made of *POROTHERM 11,5* blocks, strength class P8, thickness 115 mm, also with POROTHERM thin-bed mortar.
The ceiling are from *reinforced concrete beams and blocks.*
The roof is flat green with with a 3% slope towards the drain.
Windows, terrace doors, balcony doors, and entrance doors will be made of plastic with triple glazing. During installation, joints between the window frame and wall opening will be sealed with special interior and exterior sealing foils.
Windows in habitable rooms will be fitted with *external motorized aluminum blinds* by *SERVIS CLIMAX a.s.*.
Interior doors will be provided by *POL-SKONE CZ s.r.o.*,
The interior finishes will use standard products chosen by the investor. Standard ceramic tiling in the kitchen area may be replaced with *Grafosklo glass panels* by *JAP spol. s r.o. Přerov*. Design and specifications will be tailored to the investor's request.
The construction of the family house will be complemented by secondary structures such as fencing, paved surfaces, landscaping, and utility connections. Paved areas for terraces and walkways will be made using paving from *BEST, a.s.*.
The slope of paved surfaces (including drainage paths with *BEST tiles 60×40 cm*) and utility routes away from the building will be a minimum of 1%.
The fencing and small garden architecture elements will also be supplied by *BEST, a.s.* The front fence will consist of a masonry base with wooden infill panels, with a height of 1,6 m. The rear fence will be made of wire mesh, also 1,6 m in height.
The project includes thermal insulation materials by *ISOVER*.
The structural design and selected materials have been proposed to ensure the appropriate durability and longevity of the building.

Building Safety

In accordance with Decree No. 591/2006 Coll. and Decree No. 362/2005 Coll. on occupational safety and the use of technical equipment during construction, the project will fully comply with all relevant regulations. The construction will ensure safe operation and use upon completion, and the structure will meet all applicable standards, codes, and legal requirements.

Building Physics
Relevant calculations are included in Folder No. 6 – Building Physics. This section contains assessments of lighting conditions, vibration and dust levels, thermal insulation, and heat loss performance.

b) Drawing part
It's provided in the folder No.3 - Architectural building solution and in the folder No.4 - Building structural solution.

D.1.2 Structural solution

a) Technical report

EARTHWORKS
Before starting earthworks, the position of the family house will be staked out using profile boards. A clearly visible elevation reference point will be established, from which all relevant heights will be measured.
Excavations will be measured and executed according to the foundation construction drawings.
The earthworks will begin with topsoil removal to a minimum depth of 30 cm. The topsoil will be stored in a designated area on the construction site for later use.
Excavation for the foundations will be carried out mechanically. Just before concrete placement, the foundation basewill be manually cleaned.
The foundation base must not be left exposed during the winter. Soil intended for backfilling will be stored on-site, while excess soil will be transported to an approved landfill.
Upon exposing the foundation base, a structural engineer must be consulted to evaluate soil bearing conditions.
If unexpected soil conditions are encountered (e.g., low bearing capacity, variable subsoil, high groundwater level, or presence of fill material), the foundation method must be reassessed based on actual geological conditions and recommendations by the geologist or structural engineer.
Excavation pits will be shored as needed.
Backfill under structural elements must be compacted to a bearing capacity of 0.2 MPa.
The minimum depth of the foundation base is 1.2 meters. The actual depth must be specified with regard to site location, climatic zone, and type of foundation soil.

FOUNDATIONS AND SUBSTRUCTURE WATERPROOFING AND INSULATION
Foundations will be measured and executed according to the foundation construction drawings.
The foundation structure is designed as strip footings made of plain concrete CEMEX Compacton C16/20, with a width of 800 mm.
The lower part of the strip footings must be poured immediately after excavation is completed.
The upper part of the strip footing is composed of two courses of BEST formwork blocks (lost formwork), 400 mm wide, filled with C12/15 concrete, and insulated with ISOVER XPS thermal insulation.

After compaction, a 150 mm thick sub-base concrete slab of CEMEX Compacton C16/20, reinforced with a steel mesh (150/150/6 mm), will be placed.
On top of the sub-base concrete, coated with bitumen primer (e.g., DEKPRIMER), a waterproofing membrane made of GLASTEK 40 SPECIAL MINERAL modified bitumen sheet will be installed. This membrane also serves as a radon barrier.
This waterproofing design applies to a flat plot with a drained surface and groundwater level more than 4 metersbelow the lowest point of the building.
If conditions differ, the waterproofing solution must be reassessed and specified in Section 2.
Should groundwater appear during excavation, the foundation and waterproofing system must be re-evaluated and adapted accordingly.Ň

VERTICAL STRUCTURES
All vertical load-bearing structures are designed using POROTHERM ceramic blocks.
The load-bearing walls of the entire building are constructed from POROTHERM ceramic masonry units.
The external walls of the house are made of POROTHERM 30 blocks, with dimensions 250 × 300 × 238 mm, laid with POROTHERM thin-bed mortar.
The interior load-bearing walls are made of POROTHERM 240 blocks, with dimensions 372 × 240 × 2499 mm, also laid with POROTHERM thin-bed mortar.
Partition walls are made of POROTHERM 11.5 blocks, with dimensions 500 × 115 × 238 mm, laid using the same thin-bed mortar.
Lintels above windows and doors are prefabricated elements made of POROTHERM lintel units.

STAIRCASE
Access to the green roof is provided by a staircase manufactured by JAP spol. s r.o., Přerov.

CEILINGS
The ceiling structure is designed using the BEST system.
During installation, it is essential to follow the manufacturer's prescribed assembly procedure.

SURFACE FINISHES
Interior Plastering
For interior plaster, a plaster mix by WEBER will be used. All surfaces must be moistened and cleaned of dust prior to plastering.
A single-layer gypsum plaster (*Weber.dur štuk UNI*) will be applied to the interior walls.
Partition walls will be finished with 15 mm thick acoustic interior plaster Ytong on both sides.
As an alternative, thin-layer plaster Rigips – Rimat 100 DLP may be used.
Plastered surfaces over joints between different materials will be reinforced with wire mesh (rabitz), with a minimum overlap of 300 mm.
Tiling
Sanitary areas will be tiled with ceramic tiles fixed using flexible adhesive Weber.for flex and grouted with Weber.color comfort, up to door frame height (typically 2000 mm).
In the kitchen, the wall behind the kitchen unit will be tiled up to the bottom edge of the upper cabinets (typically between 800–1400 mm).

As an alternative to ceramic tiles, glass paneling (Grafosklo) with custom graphics, 6 mm thick, may be used behind the kitchen unit. This option is available from J.A.P. spol. s r.o., Přerov.

Exterior Plastering

Exterior plaster will also use WEBER materials, in the following composition:

- Base coat – lightweight render *Weber.dur 140 SLK MVC140*
- Throwing coat – *Weber.dur štuk EX*
- Primer coat – *Weber UNI primer*
- Final finish – colored plaster *Weber.pas ExtraClean*

The color specification will be selected by the investor.

Alternatively, the external walls may be finished with a Weber therm klasik external thermal insulation system.

Timber Finishes

Exterior wooden components will be treated with a transparent glaze coating.

Interior Paint

Interior surfaces will be painted using Weber.deco mal.

FLOOR WATERPROOFING

In wet areas (bathroom, WC), a liquid waterproofing membrane Akryzol will be applied. The membrane must be extended 150 mm up the walls, and in the shower area to a minimum height of 1500 mm—i.e., applied fully underneath both ceramic wall tiles and floor tiles. Joint reinforcement (e.g., between floor and wall, and in corners) will be done using weber.BE 14 elastic sealing tape.

ROOF WATERPROOFING

As an auxiliary waterproofing layer, DEKTEN MULTI-PRO II membrane is proposed. It will be installed on continuous boarding over rafters, fixed using counter-battens 60/40 mm. All overlaps must be sealed with system adhesive tape.

Drip edges will be installed at the eaves and at ventilation inlets to the roof cavity.

As a vapour barrier, the bituminous membrane GLASTEK 40 SPECIAL MINERAL will be used, laid directly over the ceiling structure.

SHEET METAL WORKS

Window sill flashings, eaves flashings, and verge trims are made of LINDAB FOP-EL galvanized steel sheet, 0.6 mm thick, with a colored ELITE surface finish.

Eaves gutters, downpipes, and associated accessories are part of the LINDAB Rainline system, manufactured from Lindab ELITE galvanized steel sheet, also 0.6 mm thick.

CENTRAL HEATING

The project documentation specifies the heating of the family house using a low-temperature hot water system with forced circulation.

ELECTRICAL INSTALLATION

The electrical installation project addresses lighting and socket circuits in the family house using a comprehensive system by HAGER.

b) Drawing part

Drawings are in the folder No.3 - Architectural building solution and in the folder No.4 - Building structural solution.

c) Static assessment
Calculations of loads, foundation strips and staircases are in the folder No.7 – calculations.

D.1.3. Fire safety solutions

The fire safety assessment of the building is in the folder No.5 - Fire safety.

D.1.4. Building Engineering networks

It is not part of the thesis assignment. Only the concept of technical building services (TZB) has been developed, see folder S.01 Preparatory and Study Work.

CONCLUSION

The primary aim of this bachelor's thesis is to develop project documentation for a new nearly zero-energy family house, designed for a family of four, including a tattoo studio for one of the family members. The building is situated in the modern municipality of Krokočín, in the Vysočina Region, Czech Republic. It has been designed to comply with all relevant standards, codes, regulations, laws, decrees, and manufacturer specifications.

The design respects cardinal orientation, plot geometry, terrain slope, and distances from adjacent structures. Care was taken to ensure excellent thermal performance, acoustic comfort, and natural daylighting. Thermal bridges have been eliminated and the building is designed to avoid shading issues. Structural integrity under all applied loads is ensured, fulfilling both Ultimate Limit State (ULS) and Serviceability Limit State (SLS) criteria.

The project was developed using several software tools including Revit, AutoCAD, Velux Daylight Visualizer 3, Microsoft Word, and Excel. The documentation was prepared under the guidance of my thesis supervisor. The final design differs slightly from the initial study and preparatory phase; these adjustments were necessary to enhance overall design efficiency.

In conclusion, this thesis has provided valuable insight into the complexity and multi-step nature of project documentation. It has shown that the final solution often evolves during the design process and, most importantly, that compliance with norms and regulations is the cornerstone of any successful building project.

List of used sources

a) **LITERATURE**

KLIMEŠOVÁ, Jarmila, Ing. *Nauka o pozemních stavbách: Modul M01*. Brno: Akademické nakladatelství CERM, 2007. ISBN 978-80-7204-530-3.

BENEŠ, Petr, Markéta SEDLÁKOVÁ, Marie RUSINOVÁ, Romana BENEŠOVÁ a Táňa ŠVECOVÁ. *Požární bezpečnost staveb*: Modul M01. Brno: Akademické nakladatelství CERM, 2016. ISBN 978-80-7204-943-1.

REMEŠ, Josef, Ing. a kolektiv. *Stavební príručka: To nejdůležizejší z norem, vyhlášek a zákonů*. 2., aktualizované vydání. Praha: Grada Publishing, 2014. ISBN 978-80-247-5142-9.

b) WEBSIDES

https://allimpex.sk/
https://alu-design.sk/
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https://wienerberger.sk/

c) Legal Regulations

Act No. 183/2006 Coll., on Spatial Planning and Building Code (Building Act), as amended.
Act No. 406/2000 Coll., on Energy Management, as amended.
Act No. 133/1985 Coll., on Fire Protection, as amended.
Decree No. 499/2006 Coll., on Building Documentation, as amended.
Decree No. 268/2009 Coll., on Technical Requirements for Buildings, as amended.
Decree No. 264/2020 Coll., on Energy Performance of Buildings.
Decree No. 23/2008 Coll., as amended by Decree No. 268/2011 Coll., on Technical Conditions of Fire Safety for Buildings, as amended.
Decree No. 246/2001 Coll., on Determining the Conditions of Fire Safety and the Performance of State Fire Supervision (Fire Prevention Decree), as amended.

Decree No. 398/2009 Coll., on General Technical Requirements Ensuring Barrier-Free Use of Buildings, as amended.
Decree No. 92/2012 Coll., on Requirements for Minimum Technical and Material Equipment of Medical Facilities and Home Care Contact Centers.
Government Regulation No. 272/2011 Coll., on the Protection of Health from Adverse Effects of Noise and Vibration, as amended.
Government Regulation No. 361/2007 Coll., setting the Conditions for Health Protection at Work, as amended.

d) Standards Used

ČSN 01 3420 – Building Drawings – Drafting of Construction Drawings
ČSN 73 5305 – Office Buildings and Spaces
ČSN 73 4130 – Stairs and Inclined Ramps
ČSN 73 6056 – Parking and Standing Areas
ČSN 73 6110 – Design of Local Roads
ČSN 73 0810 – Fire Safety of Buildings – General Provisions
ČSN 73 0802 – Fire Safety of Buildings – Non-Industrial Structures
ČSN 73 0818 – Fire Safety of Buildings – Occupancy of Buildings by People
ČSN 73 0833 – Fire Safety of Buildings – Buildings for Healthcare and Social Care
ČSN 73 0872 – Fire Safety of Buildings – Protection Against Fire Spread via HVAC Systems
ČSN 73 0873 – Fire Safety of Buildings – Fire Water Supply
ČSN 73 0821, ed. 1 – Fire Resistance of Building Structures
ČSN 01 3495 – Construction Drawings – Fire Safety Drawings for Buildings
ČSN 73 0540-1:2005 – Thermal Protection of Buildings – Part 1: Terminology
ČSN 73 0540-2:2011 + Z1:2012 – Thermal Protection of Buildings – Part 2: Requirements
ČSN 73 0540-3:2005 – Thermal Protection of Buildings – Part 3: Design Values of Variables
ČSN 73 0540-4:2005 – Thermal Protection of Buildings – Part 4: Calculation Methods
ČSN 73 0532:2020 – Acoustics – Protection Against Noise in Buildings and Assessment of Acoustic Properties of Building Products – Requirements
ČSN 73 0580-1:2007 + Z1:2011 + Z2:2017 + Z3:2019 – Daylight in Buildings – Part 1: Basic Requirements
ČSN 73 0580-2:2007 + O1:2014 + Z1:2019 – Daylight in Buildings – Part 2: Daylight in Residential Buildings

ČSN EN 17169 – Tattooing - Safe and hygienic practice

List of symbols and abbreviations

FGL Formation ground level

IGL Initial ground level

m.a.s.l. Meter above sea level

FC Fire compartment

RC Reinforced concrete

XPS Extruded polystyrene

EPS Expanded polystyrene

TH Thickness

RT Retention tank

WMS Water meter shaft

SBS Styrene Butadiene Styrene

PVC Polyvinylchloride

WWS Wastewater shaft

RWS Rainwater shaft

DN Diameter

ČSN Czechoslovak standards

Coll. Collineation

PHP Práškový hasiaci prístroj

R Thermal resistance of the structure

HT Specific heat loss by heat penetration

U Heat transfer coefficient

Uem Average heat transfer coefficient

λ Coefficient of thermal conductivity

H Height

W Width

L Length

No. Number

Etc. Et cetera

μ Diffusion factor

m meter

mm	millimeter
km	kilometer
kg	kilogram
l	liter
dm	decimeter
cm	centimeter
s	second
h	hour
min	minute
max	maximum
min	minimum

List of attachments

Folder No.1- PREPARATION AND STUDY WORKS

S01 STUDY OF UNDERGROUND FLOOR PLAN	1:100
S02 STUDY OF FIRST FLOOR PLAN	1:100
S03 STUDY OF SECOND FLOOR PLAN	1:100
S04 STUDY OF SECTION A-A´ & B-B´	1:100
S05 STUDY OF NORTHEAST & SOUTHWEST VIEW	1:100
S06 STUDY OF SOUTHEAST & NORTHWEST VIEW	1:100
S07 STUDY OF WATER SYSTEM 1.PP	1:100
S08 STUDY OF WATER SYSTEM 1.NP	1:100
S09 STUDY OF WATER SYSTEM 2.NP	1:100
S13 CALCULATIONS	

Folder No.2 – C SITE PLANS

C.01 BLOCK PLAN	1:500
C.02 CADASTRAL PLAN	1:500
C.03 COORDINATION SITUATION	1:200

Folder No.3 – D.1.1 ARCHITECTURAL BUILDING SOLUTIONS

D.1.1-01 UNDERGROUND FLOOR PLAN	1:50
D.1.1-02 FIRST GROUND FLOOR PLAN	1:50
D.1.1-03 SECOND GROUND FLOOR PLAN	1:50
D.1.1-04 SECTION A-A´	1:50
D.1.1-05 SECTION B-B´	1:50
D.1.1-06 NORTHEAST & SOUTHWEST VIEW	1:50
D.1.1-07 SOUTHEAST & NORTHWEST VIEW	1:50
D.1.1-08 FLAT ROOF PLAN	1:50
D.1.1-09 DETAIL A –ROOF OUTLET	1:5
D.1.1-10 DETAIL B –PLINTH	1:5
D.1.1.11 DETAIL C – WINDOW SILL	1:5

D.1.1.12 DETAIL D – PARAPET WALL	1:5
D.1.1.13 DETAIL E – XXX	1:5
D.1.1.14 COMPOSITIONS	
D.1.1.15 LIST OF ELEMENTS	

Folder No.4 – D.1.2 BUILDING STRUCTURAL SOLUTION

D.1.2-01 – EXCAVATIONS	1:50
D.1.2-02 – FOUNDATIONS	1:50
D.1.2-03 – CEILING ABOVE 1.S	1:50
D.1.2-04 – CEILING ABOVE 1.NP	1:50
D.1.2-05 – CEILING ABOVE 2.NP	1:50

Folder No.5 – D.1.3 FIRE SAFETY

D.1.3-01 TECHNICAL REPORT	
D.1.3-02 COORDINATION SITUATION	1:200
D.1.3-03 UNDERGROUND FLOOR PLAN	1:100
D.1.3-04 FIRST GROUND FLOOR PLAN	1:100
D.1.3-05 SECOND GROUND FLOOR PLAN	1:100
D.1.3-06 CALCULATIONS	

Folder No.6 – BUILDING PHYSICS

01. THERMAL CALCULATIONS – DEKSOFT
02. DAYLIGHT FACTOR ASSESSMENT
03. ACOUSTICS ASSESSMENT - DEKSOFT
04. ENERGY LABEL - DEKSOFT

POSTER