VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ
BRNO UNIVERSITY OF TECHNOLOGY

FAKULTA STAVEBNÍ
ÚSTAV POZEMNÍHO STAVITELSTVÍ

FACULTY OF CIVIL ENGINEERING
INSTITUTE OF BUILDING STRUCTURES

DETACHED FAMILY HOUSE WITH PREMISE

DETACHED FAMILY HOUSE WITH PREMISE

BAKALÁŘSKÁ PRÁCE
BACHELOR'S THESIS

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VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ
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ZADÁNÍ BAKALÁŘSKÉ PRÁCE

Student	Vít Janíček
Název	Detached family house with premise
Vedoucí bakalářské práce	Ing. František Vajkay
Datum zadání bakalářské práce	30. 11. 2011
Datum odevzdání bakalářské práce	25. 5. 2012

V Brně dne 30. 11. 2011

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doc. Ing. Miloslav Novotný, CSc. Vedoucí ústavu	prof. Ing. Rostislav Drochytka, CSc. Děkan Fakulty stavební VUT

Podklady a literatura

- směrnice děkana č. 12/2009 a přílohy, interní pokyn vedoucího ÚPST č.2/2007
- stavební program definovaný textovým popisem,
- studie dispozičního řešení stavby
- katalogy a odborná literatura
- Stavební zákon č. 183/2006 Sb., Vyhláška č.499/2006 Sb., Vyhláška 268/2009 Sb., ČSN

Zásady pro vypracování

- výkresy budou zpracovány na bílém papíře s využitím výpočetní techniky
- výkresy budou opatřeny jednotným popisovým polem (razítkem) a k obhajobě budou předloženy složené do příslušných desek; (velikost výkresů vyplyne z rozsahu zadání)
- textové a výpočtové přílohy budou napsány technickým písmem, strojopisem, případně výpočetní technikou
- úprava hlavních složek formátu A4 viz. příloha, desky budou z tvrdého papíru potažené černým plátnem se zlatým písmem
- členění BP bude do tří složek – A, B, C
- dílčí složky formátu A4 budou opatřeny popis.polem s uvedením obsahu na str. 2

Předepsané přílohy

.....

Ing. František Vajkay
Vedoucí bakalářské práce

Prohlášení:

Prohlašuji, že jsem bakalářskou práci zpracoval/a samostatně a že jsem uvedl všechny použité informační zdroje.

V Brně dne ……..

…….

Podpis

Abstrakt

Bakalářská práce Detached family house with premise, je zaměřena na řešení dvojpodlažního rodinného domu 4+1 s nevýrobní provozovnou (kanceláří) pro zajištění podnikatelských aktivit potenciálního vlastníka. V práci je řešena zděná stavba s pultovou střechou, založená na základových pasech. Celá stavba je navržena ze systémových prvků Ytong v nízkoenergetickém standardu, v souladu s ČSN 73 0540 – 2. Objekt je situován na parcely 73/24 a 73/25 v obci Biskoupky, katastrální území Biskoupky, Jihomoravský kraj. Obsahem bakalářské práce je technická dokumentace pro provádění stavby, podle vyhlášky č. 499/2006 Sb., o dokumentaci staveb, konkrétně podle příloh č. 1 a 2.

Klíčová slova

Rodinný dům, samostatně stojící, provozovna, nevýrobní provozovna, kancelář, pórobeton, Ytong, Multipor, pultová střecha, Biskoupky, nízkoenergetický standard,

Abstract

Bachelor’s thesis Detached family house with premise is aimed for the solution of the two storey family house 4+1 with the premise (office) for the ensuring of the business activities of the potential owner. In the thesis is solved masonry building with the mono-pitched roof, founded on the foundation strips. He whole building is designed from the system members Ytong in low-energy standard in accordance with the ČSN 73 0540 – 2. Object is situated on the parcels 73/24 and 73/25 in the village Biskoupky, cadastral area Biskoupky, South Moravian district. Content of the bachelor’s thesis is technical documentation for the building realization according to the public notice no. 499/2006 Coll., about building documentation, especially according to the appendixes no. 1 and 2.

Keywords

Family house, detached, premise, office, aerated concrete, Ytong, Multipor, mono-pitched roof, Biskoupky, low-energy standard,

Bibliografická citace VŠKP

JANÍČEK, Vít. *Detached family house with premise.* Brno, 2012. 20 s., 161 s. příl. Bakalářská práce. Vysoké učení technické v Brně, Fakulta stavební, Ústav pozemního stavitelství. Vedoucí práce Ing. František Vajkay.

Prohlášení o shodě listinné a elektronické formy VŠKP:

Prohlašuji, že elektronická forma odevzdané Bakalářské práce je shodná s odevzdanou listinnou formou.

V Brně dne 24.5.2012

.....

titul jméno a příjmení studenta

Obsah (Content)

Úvod

Bakalářská práce Detached family house with premise, je zaměřena na řešení dvojpodlažního rodinného domu 4+1 s nevýrobní provozovnou (kanceláří) pro zajištění podnikatelských aktivit potenciálního vlastníka. V práci je řešena zděná stavba s pultovou střechou, založená na základových pasech. Celá stavba je navržena ze systémových prvků Ytong v nízkoenergetickém standardu, v souladu s ČSN 73 0540 – 2. Objekt je situován na parcely 73/24 a 73/25 v obci Biskoupky, katastrální území Biskoupky, Jihomoravský kraj. Obsahem bakalářské práce je technická dokumentace pro provádění stavby, podle vyhlášky č. 499/2006 Sb., o dokumentaci staveb, konkrétně podle příloh č. 1 a 2.

Introduction

Bachelor's thesis Detached family house with premise is aimed for the solution of the two storey family house 4+1 with the premise (office) for the ensuring of the business activities of the potential owner. In the thesis is solved masonry building with the mono-pitched roof, founded on the foundation strips. He whole building is designed from the system members Ytong in low-energy standard in accordance with the ČSN 73 0540 – 2. Object is situated on the parcels 73/24 and 73/25 in the village Biskoupky, cadastral area Biskoupky, South Moravian district. Content of the bachelor's thesis is technical documentation for the building realization according to the public notice no. 499/2006 Coll., about building documentation, especially according to the appendixes no. 1 and 2.

A. Accompanying report

1. Identification data

Identification of the building:	Detached family house with the premise
Place:	Biskoupky, parcels no. 73/24 and 73/25
Cadastral area:	Biskoupky
District:	South Moravian
Purpose:	Solution of housing with business aims
Type:	New building
Degree of PD:	Project documentation for the planning permission

2. Characteristic of the location and the construction site

a) The parcels are situated in the village region in the area prepared for the building up in Biskoupky. Purpose of the parcels is building of the detached family house. At present time the parcels are a free place prepared for the building up. The whole area is in the ownership of the submitter.

b) The site will be checked by the probes with the aim to know the radon emissions of the soil and the depth of the underground water level. The connection onto the technical and traffic infrastructure will be provided by a short approach from pre-cast concrete tile segments connected to the present road construction. For the purpose of the building up the parcels are geodetically measured by the designer. On the border of the parcels will be made new connections of the water, electricity, communication cables and the building will be connected to the public sewerage system by the core drill after the construction. Parking of the personal vehicles is solved by the parking place on the approach.

c) During the investigation of the relations to the properties of the other custodians have not been inquired any violation against their interests. The planned building will be outside all protection zones of the water main, electric lines and the road.

d) Planned building is in accordance with the common building development.

e) Intention of the family house is in the built-up location. Building is in accordance with the Territorial planning documentation (ÚPD).

f) Building of the family house have no time or material connections to the nearby areas.

g) Expected start of the building: 10/2012

h) Expected expenses on building*:

Whole expenses:	1 980 000,-
Whole project expenses:	217 800,-
Executive project:	59 400,-
Permission project:	39 600,-
Performance of the authorial and building supervision:	35 640,-

*According to the valid fee system of the ČKAIT as the base for the contract price between employer and contractor. All prices are in CZK.

Built up area of the family house:	110,00 m^2
New usable area of the family house:	154,22 m^2
Habitable area:	136,70 m^2
Area of the premise:	17,52 m^2

No. of the dwellings:	1
No. of the premises:	1

B. Summary technical report

1. Urban, architectonic and technological solution

a) Building site is situated in Biskoupky, in the part of the village prepared to the building up. The whole site is arranged to the plane and prepared for the construction. Connections to the electricity, water, communication cables and sewerage are premade for the purposes of construction and connection of the new building.

b) From the urban and architectonic point of view will not be made essential changes in the character of the build-up area. The current street line will be respected and will not be changed. The ridge of the building will be approximately 7,39 m above the terrain. Building will be made with the mono pitched-roof with slope 6,4 % perpendicularly to the street line. Terrain will be arranged to the plane according to the drawing of situation.

c) The technical solution consists of excavation of the soil for the arranging of the site to the plane and construction of foundations from reinforced concrete; load bearing walls will be constructed from the aerated concrete blocks Ytong; floors will be made as the system of reinforced aerated concrete panels with steel exchanges of system Ytong; partitions will be made from Ytong aerated concrete partition blocks; construction of the roof will be done as the mono-pitched rafter roof according to the project drawings. Construction system of the roof will correspond with the system of the cold flat roof. New connections of the networks will be done before the construction itself. Object will have open area of the garden type which will be bordering to the same areas of the nearby objects. The whole building will be placed on the parcels and will be faced to the street as other objects in the street.

d) The connection to the traffic and technical infrastructure will be provided by the approach from concrete tiles to the public road.

e) The building will not be situated on the undermined or sloped area with the steep descend.

f) From the point of view of environment and its protection will not be caused any aggravation in the town because of the noise, air and water pollutions or rubbish, by construction nor by the usage of building.

g) New building solves demands on the barrier-free usage only in the part of the premise. Entrance to the premise will be made as the barrier-free. Doors without doorsills will be used and the steps to the premise have to be provided with the steel ramp for the wheelchair access.

h) By the investigation were not detected any engineering networks that are restraining the building. The radon index in this area is on degree 2 – intermediate level. To this radon index will be designed horizontal insulation under the basement. According to the demands of the legislature for the producers every water-insulation foil can be used to this purpose. Underground water level was detected firstly in the depth of 5m from the intended grade level of the ground. According to this investigation will be done around the building drainage only for the purpose of the rain water drainage from the foundation strip.

i) The building site is localized and lay out in accordance to the situational plan in drawing documentation. For the levelling will be used measuring system BVP (Baltic after adjustment).

j) The building will be made as one building unit that is divided onto two functional units. First unit consists of the dwelling areas and the second unit consists of one room of the premise with the individual sanitary facility.

k) The building site will be placed on the area owned by the submitter. On other areas (public or private) will not be made any temporary soil or material deposits. After construction the whole site will be cleaned perfectly such that there will not remain any residual debris from the construction.

l) Health and safety precautions will be provided according to the law 309/2006 Coll. About further demands on health and safety precautions during the working process and according to the Regulation 361/2007 Coll. About health and safety precautions determination with changes 68/2010 Coll. and 93/2012 Coll.; it is mainly aimed to the work in the excavations, in heights, in the protective zones of the heavy machinery; work with the rotating and electric-driven tools and especially on the usage of the protective gear.

2. Mechanical stability and durability

a) Building is designed in construction systems appropriate for this type of building. All parts are designed such that failure, of the building or its part, will not occur. Object is stiffed by the reinforced concrete ring beams around each floor. Construction of the roof is designed as the rafter construction with the rafters perpendicular to the street. Rafters are supported by the wall beams which are anchored by screw rods into the ring beam from reinforced concrete. Every members of the roof construction will be provided with the coating against wood-rotting insects and fungi. Transversal bracing will be provided by the wooden decking. Construction system safely transfers the permanent and variable loading. Deformations greater then allowed strain according ČSN EN will not occur.
b) Construction system is not allowing occurrence of the excessive strain.
c) No part of the object and or any technical equipment will be subjected by the excessive deformation of the construction that can cause damage or destruction.

d) There is not allowed any damage of the construction that is inappropriate to its reason and constructions are not designed in way that this can happen.

3. Fire safety

a) The whole object consists of one fire sector. All used materials are fulfilling the fire safety precautions about durability of the structure in fire, for the given type of building. All precautions of the ČSN 73 0802 and other regulations for the given type of building are fulfilled. Further information can be found in part F 1.3. - Fire safety report. The whole object will be provided by the device of the independent fire detection and signalization in accordance with the notice 23/2008 Sb. Furthermore is recommended to equip the building with one fire extinguisher with the quenching ability at least 34A. Individually will be provided same fire protection for the premise.

b) Around the object is situated the road approach that can provide the fire patrol intervention. According to the Fire safety report, hydrants for the supply of water for fire fight actions is placed in sufficient distance from the building.

4. Hygiene, protection of the health and environment

The building is fulfilling all the precautions and regulations about the hygiene, protection of the health and environment. Functioning of the premise will not produce any pollutions and will not be harming the health or environment.

5. Safety during the usage

According to the design, there are no places of the unusual risk, connected with the usage of this type of the building or premise.

6. Protection against noise

Object is not situated in the industrial area and all the materials will have sufficient sound–– insulating properties, such that the maximal allowed values of the noise from the exterior inside the object will not be exceeded in any way.

7. Saving of energy and heat

By the used materials the sufficient thermal insulation of the object will be provided in accordance with the valid normative CSN 73 0540 - Thermal protection of buildings. See the certificate of the energetic demandingness of the building.

Thermal losses by the envelope of the building and by the natural vent will be about 6,87 kW.

8. Solution of usage for the persons with the restricted possibilities of the movement and orientation

The premise will be provided by the doors without doorsills and the level of the first floor will be nearly the same as the grade level (0,29 m difference).

9. Protection against the harmful influences of the outer environment

The site is not located in the undermined area, there are no protective or safety zones, there is not aggressive underground water, and the site is not in the seismic area. The radon index of the site is 2 – intermediate.

10. Protection of the inhabitants

There are no special demands on the protection of the inhabitants for civil protection in case of war state or in case of natural disaster.

11. Engineering buildings (objects)

a) Waste water and rain water will be drained to the combined public sewerage network.
b) Supply of water will be provided from the present water-supply network by the new connection.
c) Supply of electricity will be provided by the connection of the building to the new electric connection. Supply of the nature gas is not demanded.
d) Parking will be provided on the approach from the concrete tiles.
e) Area around the building site will stay in the present state, building process will not intervene to the surrounding areas. Ground level of the site will be adjusted to the plane according to the situation drawing.
f) Electronic communication cables will be connected to the house through the premise by the connection from the main communication cable that leads on the border of the parcels according to the situation drawing.

12. Production and non-production technological facilities (if exists)

a) There are no intended production technological facilities in the object of the family house. Premise will serve as non-production facility
b) Premise will be used as the design office of the submitter. There will be no heavy production machinery.
c) The premise is intended for one person usage (clients of the design office are not calculated in).
d) Energy consumption of the premise will be connected to the consumption of family house and there is not assumed any perceptibly enlargement of the energy consumption.
e) No raw materials are used in premise and the production of the waste will not be perceptibly enlarged. Wastes from the premise will be treated in same way as from the dwelling unit.
f) No special demands on water usage are required.
g) No special demands on technological transport are required.
h) No special demands on protection of nature and working environment are required.

Závěr

Projekt řešený v této bakalářské práci je zamýšlen jako co nejjednodušší a nejoptimálnější stavba, především z pohledu tepelně technického posouzení a dispozice. Návrh klade důraz na jednoduchost, ale současně také na funkčnost užívání a jisté architektonické ozvláštnění. Při návrhu bylo téměř výhradně použito prvků stavebního programu Xella Ytong a to jak pro svislé, tak pro vodorovné konstrukce. V projektu není řešen složitější systém vytápění, které je v současném návrhu zamýšleno jako vytápění elektrickým kotlem. Projekt je navržen v nízkoenergetickém standartu, podle ČSN 73 0540-2, ale po zvýšení světlých výšek místností a zabudování vzduchotechniky do zavěšených podhledů, spolu s návrhem solárních kolektorů, který je součástí studie ve složce B, je možné dosáhnout standartu pasivního bez nutnosti zvětšování mocnosti izolací a pod.

Conclusion

Project solved in this bachelor's thesis is intended as simplest and as most optimal building as possible, especially from the point of view of the thermal design and disposition. Design emphasis on the simplicity but together with it also on the functionality of the usage and certain architectural tangents. For the design were used almost exclusively the members of the building programme Xella Ytong for the vertical as well as horizontal constructions. In the project is not solved complex system of heating, which is solved in present design as the heating by the electric boiler. The whole project is designed in the low-energy standard, according to the ČSN 73 0540-2, but after the enlargement of the clear heights of the rooms and assembly of the air-conditioning into the suspended ceilings there is possibility to reach the passive standard without any necessity of enlargement of the insulations etc.

Seznam zdrojů (List of sources):

Zákon č. 183/2006 Sb., o územním plánování a stavebním řádu (stavební zákon);

Vyhláška č. 499/2006 Sb., o dokumentaci staveb;

Vyhláška č. 268/2009 Sb., o technických požadavcích na stavby;

Vyhláška č. 501/2006 Sb., o obecných požadavcích na využívání území;

Nařízení vlády č. 361/2007 Sb., kterým se stanoví podmínky ochrany zdraví při práci;

Zákon č. 309/2006 Sb., o zajištění dalších podmínek bezpečnosti a ochrany zdraví při práci;

ČSN 73 4301 Obytné budovy;

ČSN 01 3420 Výkresy pozemních staveb – Kreslení výkresů stavební části;

ČSN EN ISO 128-23 Typy čar a jejich použití;

ČSN 01 3130 – Technické výkresy – Kótování – Základní ustanovení;

ČSN 73 0540 Tepelná ochrana budov;

ČSN 73 0532 Akustika – Ochrana proti hluku v budovách a posuzování akustických vlastností stavebních výrobků – Požadavky;

Appendix F 1.3 – A Fire safety report a appendix F.13 – B Drawing of the fire distances

www.ytong.cz – Oficiální webové stránky produktu Ytong

nahlizenidokn.cuzk.cz – Nahlížení do katastru nemovitostí

Seznam použitých zkratek a symbolů (List of the used abbreviations and symbols)

ÚPD – územně plánovací dokumentace;
Sb., Coll. – odkaz na sbírku zákonů ČR;
OF – over-ground floor – nadzemní podlaží (ekvivalent zkratky NP);
ČKAIT – Česká komora autorizovaných inženýrů a techniků činných ve výstavbě;
CZK – Czech crown – Česká koruna;
$R'_{w,min}$ – weighted sound reduction index – vážený součinitel zvukového útlumu;
U – overall heat losses coefficient – součinitel prostupu tepla vícevrstvou konstrukcí;
m, m^2, m^3, kN, kPa, kW – jednotky SI (SI units)

List of attachments

B. Study
    a. Documents of the designing process
C. Technical documentation
    a) Accompanying report
    b) Summary technical report
    c) Situation
    d) Evidence part
    e) Organization principles of the construction
    f) Documentation of the building (object/s)
        1. Architectonical and construction technical solution
        2. Building constructional part
        3. Fire safety report
    g) Appendixes:
        1. F. 13 – A – Technical report
        2. F. 13 – B – Drawing of the fire distances
        3. D. B – Thermal design and energy label of the building
        4. Technical drawings

Přílohy (Appendixes)

See the next parts of the bachelor’s thesis.