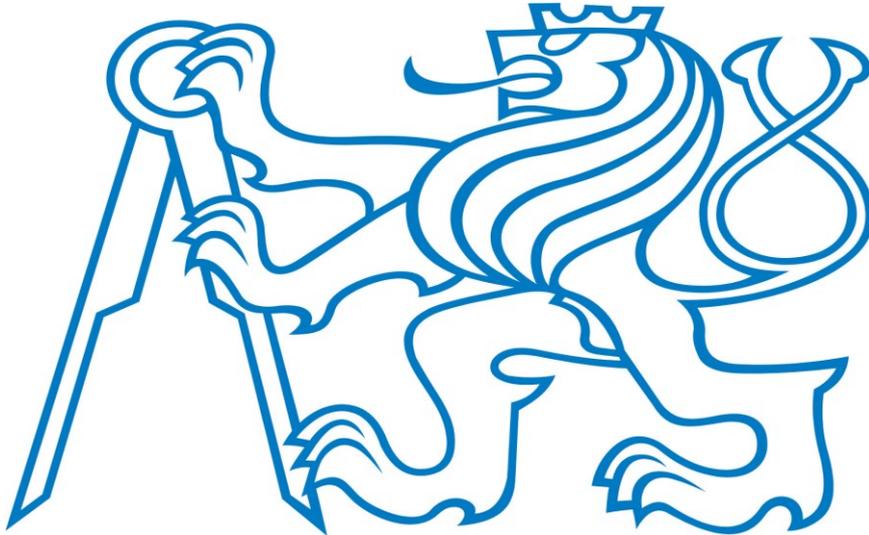


**Czech Technical University in Prague
FACULTY OF CIVIL ENGINEERING**



**TECHNICAL REPORT
BUILDING STRUCTURES**

podle STAVEBNÍHO ZÁKONA 183/2006, VYHLÁŠKA Č. 499/2006 Sb.

Thesis

**RESIDENTIAL APARTMENT BUILDING
BYTOVÝ DŮM**

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Date: December : 20.05.2016

signature:

Student: Hikmatullah Salarziy , 4th year, building structures , civil engineering Czech technical university in Prague
Subject: bachelor thesis 20.05.2016
Object: Residential apartment building
Bytový dům

Project name: Residential aptment building

place of construction: prauge IV - plot no. 1022 and 1023,

Investor:

List of enclosures:

BUILDING PART :

A 1	Technical report
1	Situation
2	Foundation
3	Basment 2pp
4	Basment 1PP
5	Ground floor plan
6	Typical floor plan
7	Section A-A
8	ROOF
9	view from the north
10	veiw from the east
11	view from the wet
12	view from the south

DETAILS:

D1	Detail connection logiea
D2	Detail connection roof and attic
D3	Detail connection parphet and parking roof
D4	Detail connection parking floor and ground
D5	Detail penetration through the basement wall
D6	Detail connection stairs

Date: May 2016

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1. Identification data:

Project name: Residential apartment building

Location: Prague IV - streets plot no. 1022 and 1023,

Function of the building: apartment building

Stage : Building permits

Investor :

supplier: will be selected by tender

1.1 Architectural and engineering design of the building:

a) the purpose of the object

this building will function as a residential apartment building.

b) the architectural, functional, layout and graphic solutions

Apartment building located in urban area Dejvicka Prague Czech Republic total building size 990m² Whole building is consist of nine floors

2 relatively large underground Parking compare to above ground structure this largest parts of underground structure is joint together by Expansion joint due to preventing the transmission of the effect of one structural member to another not to harm the desired functions.

Seven above ground stories consist of one roof five typical floor and on ground floor

Each typical floor is consist of seven complete flat for living.

Roof is not accessible to public except repair and maintain reason ground floor is consist of 4 typical flat on relatively large covered area for commercial reason the roof of underground level can be used as open terrace for the ground floor special composition of the roof and high live load had been considered in calculation the structure consist of mainly reinforced concrete column, walls and pillars.

Breakdown facade reflects the functional use the individual floors.

2PP - 30x car parking place , 2x staircase places , hallway, elevator and 40xcellar

1pp - 30x car parking place , 2x staircase places , hallway, elevator, 17xcellar , mechanical room , technical room , boiler room

Ground floor - hall , elevator , stair , corridor , 5apartments

Typical floor - hall, stairs , elevator , 7apartments

apartments:

apartment typ1.

Hall, kitchen , room , bathroom

Apartment typ2.

Hall, room + kitchen , room , bathroom

Apartment typ3.

Hall + kitchen , room , bathroom , loggia , loggia

Apartment typ4.

Hall+kitchen , room , bathroom , loggia

Apartment typ5.

Hall , room+kitchen, room , winter garden, room , changing room, bathroom, WC, laundry room , loggia , loggia , loggia

Surrounding the building will be after the rough landscaping grassed and planted with low and medium greenery.

C) as mention above the building is actually consist of two parts we can name them BUD1 and BUD2 the the basment two floors are consiting the BUD1 and BUD2 , but above 0 level only the Bud1 will be build and the roof of bud 1 will function as a terrace for bud2

floor area bud1	540.9 m²
floor area of bud2	498.4 m³

orientation, and insolation

The building is situated with its longitudinal axis from north to south and we can say that perpendicular to access road. All living rooms are naturally lit and sunlight.

d) design and technical solution of building

residential building is based on the slab foundation due to random location of column , the structrue is skeleton system consist of 300mm thick reinforced concrete wall , rectungular column , perameter pillar , laterl RC wall for the stiffness of building , flate plate slab , the stairs will be constructed from Reinforced concrete the filling material for the skelton to close the envelope will be ceramic brick porotherm 30 T profi , as a partation will be used internal masonry portherm 11.5 Aku , Protherm 30 P+D ,porotherm 14 P+D , porotherm 8 P+D

the roof for parking which will function as a terrace for the the BUD2 the slope is 1% and the slope is solved by the thermall insulation the roof finshes is cermic tile frost reistance its a walkable roof

this is a permanent structure, and this fact is subordinate to the selection of construction materials , ceramic , concrete walls , reinforced concrete.column , and flat slabe ensure long life and good properties (thermall resistance of exterior wall , building sound insulation , strength , weather reistance , healthy indoor climate)

e) thermal properties of building structures and fillings

Building construction the building are designed accordance with CSN 73 0540-2 Thermal protection of buildings, the desired values of thermal resistance (heat transfer coefficient) structures are in Project exceeded.

Perimeter infill walls are constructed of POROTHERM bricks Profi portherm 30 t , th. 300 mm insulated with 100mm foamglass thermall insulation . thermal resistance of this compositoin is $R = 3.49 \text{ m}^2\text{K} / \text{W}$, heat transfer coefficient $U = 0, 232 \text{ W} / \text{m}^2\text{K}$ - standard requires $U = 0, 30 \text{ W} / \text{m}^2\text{K}$.

Perimeter thick concrete walls. 300 mm, insulated cladding system Foam glass. 100 mm, the thermal resistance of the structure is $R = 4.06 \text{ m}^2\text{K} / \text{W}$, heat transfer coefficient $U = 0, 24 \text{ W} / \text{m}^2\text{K}$ - standard requires $U = 0.38 \text{ W} / \text{m}^2\text{K}$

Perimeter basement concrete walls thick. 300 mm insulated cladding BASF Styrodur plate thickness. 50 mm thermal resistance of the structure is $R = 2.81 \text{ m}^2\text{K} / \text{W}$, heat transfer coefficient $U = 0.34 \text{ W} / \text{m}^2\text{K}$ - standard requires $U = 0.38 \text{ W} / \text{m}^2\text{K}$

Car parking roof , thermall insulation foam glass 150mm , the thermall reistance of the structure is is $R = 4.06 \text{ m}^2\text{K} / \text{W}$, heat transfer coefficient $U = 0, 24 \text{ W} / \text{m}^2\text{K}$ - standard requires $U = 0.38 \text{ W} / \text{m}^2\text{K}$

Bud2 roof , thermall insulation 100mm foam glass and 100mm of XPS , thermal resistance is $R = 4.06 \text{ m}^2\text{K} / \text{W}$, heat transfer coefficient $U = 0, 24 \text{ W} / \text{m}^2\text{K}$ - standard requires $U = 0.38 \text{ W} / \text{m}^2\text{K}$

The floor on the ground is fitted with thermal insulation Rigips EPS 150 S th. 60 mm, thermal resistance $R = 1.86 \text{ m}^2\text{K} / \text{W}$, heat transfer coefficient $U = 0, 48 \text{ W} / \text{m}^2\text{K}$ - standard requires $0.85 \text{ W} / \text{m}^2\text{K}$.

Floor 1st floor between heated, temperature-controlled space is equipped with thermal insulation Rigips EPS 150 S button. 60mm thermal resistance $R = 1,85\text{m}^2\text{K} / \text{W}$, heat transfer coefficient $U = 0,49\text{W} / \text{m}^2\text{K}$ - standard requires $0,75 \text{ W} / \text{m}^2\text{K}$.

Openings - facade - aluminum multi-chambered windows, glazed with thermally insulating double a spacer stainless steel or plastic, heat transfer coefficient $U_o \text{ max} = 1.1 \text{ W} / \text{m}^2\text{K}$.

f) Foundation of the building

foundation are design as a flat plate due to the random location load bearing wall and column after consultation with geotechnical department we have decided to use the flat plate slab 500mm thickness where flat plate is recommended for the area with poor subsoil but our building is placed on s3+G(G3) sandy gravel have better bearing resistance but we will use flat plate which will help us with the random places of column landing and we don't have to design the settlement and bearing capacity calculation due to the large contact area of soil and slab this slab area is approximately 1139.3 m² which means that we have huge bearing resistance the calculation of settlement and detail calculation of bearing resistance has been omitted material used for construction is concrete C30/37 we don't need any thermal insulation on the slab on grade due to the fact that the basement level is designed for the car parking purpose

g) the impact of the object and its use on the environment and to address any negative effects

there are no permanent negative effects on the environment

Domestic wastewater will be disposed of by connection into the public sewer system in Street and rainwater will be also directly linked to the public sewer system .

Garbage disposal related to the operation of the building after acceptance (household waste) provide the user with the facility contract authorized organization liquidate this waste.

h) transport solutions

Transport- transport of this object is connected to the main city roads , each flat will have his own car parking and cellar at the two basement level

i) protection of the object from harmful environmental effects, radon measures

Aggressive groundwater was not encountered during the hydrogeological survey, the object is not designed in seismically active area, and neither undermined nor is placed in a protective or safety zone.

Measuring radon concentrations at the site was found to medium permeability foundation soils and low categories of radon index of building land. According to these findings may not carry out any radon insulation of buildings.

j) compliance with the general requirements for construction

The building is designed in accordance with general technical requirements for construction. They respected the requirements of Decree no. 137/1998 Coll., No. 502/2006 Coll., Act no. 186/2006 Coll. and other related standards and regulations.

1.2 Construction component:

a) description of the proposed structural system

residential building is based on the slab foundation due to random location of column , the structure is skeleton system consist of 300mm thick reinforced concrete wall , rectangular column , perimeter pillar , laterl RC wall for the stiffness of building , flat plate slab , the stairs will be constructed from Reinforced concrete the filling material for the skeleton to close the envelope will be ceramic brick porotherm 30 T profi , as a partition will be used internal masonry portherm 11.5 Aku , Protherm 30 P+D ,porotherm 14 P+D , porotherm 8 P+D

RC column 450x450 mm , the column of the upper building will land on the perimeter Reinforced wall the will be like a pillar 600x300 mm

Perimeter reinforced concrete wall 300 mm , Internal Reinforced concrete wall 200mm

Flat slab with thickness of 240mm

Balconies will consist of a static point of view ISO beam Schock Isokorb type K and walkable layer of ceramic tile frost resistance.

b) designed products, materials and major components

Any proposed building products and materials - plain concrete, reinforced concrete, clay bricks, spruce wood, insulation They are satisfactory in all respects - a solid, durability and safety.

Among the main structural elements of the building include, foundation construction, structure skeleton

Ground work - before any excavation work for the foundation structures it is necessary to remove the layer of topsoil tl. 200 mm. Hidden topsoil will be deposited on land and used to humus covering buildings and surroundings

Foundations - foundation are design as a flat plate due to the random location load bearing wall and column after consultation with geotechnical department we have decided to use the flate plate slab 500mm thickness

where flat plate is recomanded for the area with poor subsoil but our building is place on s3+G(G3) sandy gravel have better bearing reistance but we will used flat plate which will help us with the random places of column landing and we dont have to design the settlement and bearing capcity calculation

due to the large contact area of soil and slab this slab area is approximatly 1139.3 m2 which mean that we have huge bearing reistance

the calculation of settlement and deatil calculation of bearing resistance has been omitted

material used for constructoin is concrete C30/37

we dont need any thermall insulation on the slab on grade due to the fact that the basment level is designed for the car parking purpose

External walls and internal load bearing walls 1pp – 2pp - consist of reinforced concrete C30/37

External walls ground floor – 7NP – the system is skeleton so the load bearing part is reinforced concrete wall ,

And the filling material is ceramic brick porotherm 30 T profi $R_w=45\text{db}$ reaction to fire A1-incombustible fire resistance is REI 90 DP1

internal partitioning wall 1 to 7 NP – wall are made of ceramic brick portherm 11.5 Aku $R_w= 47 \text{ dB}$ reaction to fire A1 incombustible , Protherm 30 P+D $R_w=52 \text{ dB}$ fire dividing wall with double sided plaster reaction to fire A1 incombustible fire resistance: REI 180 DP1 ,porotherm 14 P+D, $R_w=44\text{dB}$, porotherm 8 P+D $R_w=39 \text{ dB}$ reaction to fire A1 incombustible

Lintels - lintlesl will be from ceramic lintlels Porotherm 7 and 11.5.

Slab structure – freinforced concrete flat plate slab landing directly on column with out beams and girders tl. 240mm

The only problem with the punching for detail undrestanding of punching please refer to the preliminary desing in the static part

The roof –

As mention above the roof is two part Bud 1 and Bud 2 the bud1 is the carparking roof wich will function as a terrace for the bud2 building is desinged as a flat roof with minimum slope the roof finshes is cermic tiles and the drainge is provided by scupper which will goo through the parapet wall

And the roof of bud2 is also design at the flat roof with minimum slope

Main staircase –

The staircase construction is from reinforced concrete – U shape staircase with two flight and landing on each. Due to the fact that the height of the basement floors, ground floor, and typical floor is different I have assumed three different geometry solutions of the staircase but the structure solution is all the same. Each flight will be supported by special elements to prevent transfer of impact sound to the rest of the building. We will use ISI Units between the flight and landing. The landing will be supported by the Trapez boxes and the staircase is perimeter joint insulation. The thickness of flight slab is 160 mm and landing also has the height of 180 mm.

Heat insulation

- Other openings in façade - XPS extruded polystyrene thick. 50 mm
- car parking roof Flat foam glass, styrodur cs 4000 . 200mm
- between parking and typical floor - POLYSTYREN floor thickness. 60 mm
- Reinforced concrete. lintels, slabs, beams and columns – foamglass tl 100mm
- lintles POROTHERM 7 - POLYSTYREN thickness. 80 mm
- Insulation of perimeter walls above the ground – foam glass . 100 mm
- Insulation of perimeter walls below ground - STYRODUR thickness. 50 mm

Soundproofing

- Sound insulation POLYFORM thick. 100 mm
- Acoustic insulation stair arms

floors - wear layer of floor structures are designed and described in the legend drawings rooms.

ventilation - the building is naturally ventilated through the windows and the internal doors are equipped with ventilation grill, in the underground cellar block wall height is 300mm less than normal height due to circulation of air.

- each apartment has sanitary facilities (toilet, bathroom, kitchen) which will be exhausted by the means of mechanically exhaust fan which will be placed on vertical pipe in shaft, this vertical pipe will be lead out of the roof top
- Small ventilation during the opening into the vertical pipes will be fitted with non-return valve, which will prevent the recurrence of opposite drafts.

plasters – internal - lime plaster 10mm

exterior - fine-grained silicone colored plaster (grain 3, 0 mm)

Windows and glass – oknotherm plastic windows, perimeter fittings, micro, thermally insulating double glazing (with glass walls door glazing is made of safety laminated glass) filled with gas (argon, krypton) spacer stainless steel or plastic frame SWISSPACER, heat transfer coefficient of the window $V_0 = 1.1 \text{ W / m}^2\text{K}$.

doors – typical wood type for their internal partition walls with the steel frame which will behave as a lintel rebated to the wooden doorframes, full or partially glazed - depending on the specific situation

Input external doors - to the building will be from in terms of increased mechanical stress aluminum or steel profiles thermal break - frame material group 1, fully glazed, glazed with insulation double glass from laminated safety glass. Door leaves fire resistance are indicated in project documentation.

Metalwork - (Railings, grids, etc.) Will be carried out steel, all St. and rice and sharp edges are ground down and smooth. Outdoor elements will be on weather protection galvanized internal components will be fitted with 1x and 2x basic topcoat. Railings have their performance satisfy CSN 74 3305 - Protective railings.

coatings - all structures and elements without surface treatment will be provided with suitable base and topcoats. All wooden elements exposed to outside influences weather will be equipped with 3x paint LUXOL, HERBOL, Xyladecor ...

External improvements - sidewalks, paved areas are equipped with concrete pavement thickness 60mm. Areas mobile passenger cars (the area in front of the entrance and garages) will be paved with concrete pavement thickness. 80 mm. Eaves sidewalk - strip width of 600 mm spilled float aggregate fractions 16-32. Other open areas in surroundings are complemented by grass and bark, shrubs and medium and high vegetation.

c) the value of utility, climatic and other loads considered in the design of the supporting structure

Value payload in B D - $q_k = 2 \text{ kN / m}^2$; $\gamma_q = 1.5$; $q_d = 3 \text{ kN / m}^2$

the value of the payload on the stairs - $Q_k = 4 \text{ kN / m}^2$; $\gamma_q = 1.5$; $q_d = 6 \text{ kN / m}^2$

Payload value in garages - $q_k = 2.5 \text{ kN / m}^2$; $\gamma_q = 1.5$; $q_d = 3.75 \text{ kN / m}^2$

Value climate load - snow - snow area I - 0.7 kN / m^2

Value climatic loads - wind - wind Area I - $V_{REF} = 25 \text{ m / s}$

Computational bearing capacity of the soil foundation base - $R_{Dt} = 739; 769; 637; 818; \text{ kPa}$

d) unusual constructions, construction details, processes

The structure includes common structural details and standard technological processes. But i have chosen 6 most difficult detail and ther are part of drawing.

e) technological progress conditions that could affect the stability of our own design, or adjacent buildings

Auxiliary structures built inside the building will not bother building material, if not this purpose.

Building materials must be object stored in such an amount so as not to Overload floors or ceilings.

f) principles for the conduct demolition work strengthening structures and penetrations

Demolition work in This project not occur

g) requirements for inspecting structures conceals

Among the structures that checks before covering technical supervision, investor or designer, the entry in the construction diary include:

- All connections and underground supporting structure before burying
- Basic seam, which should take geologist
- Reinforcement of reinforced concrete elements, you need to check before casting and take
- Waterproofing against ground moisture - type, check integrity, joint design and details
- Thermal insulation of exterior walls and roofs - the kind of checking haul
- Vapor barrier in the roof - kind of checking integrity, joint design and details
- Thermal insulation of floors - kind, check
- Sound insulation of floors - kind, check
- Chemical treatment truss - type, version control
- Checking for HVAC penetrations

h) a list of documents, CSN, technical regulations, literature, software

Geological and hydrogeological report

CSN 73 1101 Design of masonry structures

CSN 73 1201 Design of Concrete Structures

CSN 73 0035 Loading of structures

EN 1991-1-3 Snow loads

CSN 73 1001 Foundation engineering - foundation soil beneath shallow foundations

CSN 73 1701 Design of Timber Structures

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CSN 73 1901 Design roofs
CSN 73 0540-2 Thermal protection of buildings
CSN 73 0532 Acoustics
CSN 73 0532 Protection of buildings against radon from subsoil
CSN 73 4301 Residential buildings
CSN 73 4130 Stairs and inclined ramps
CSN 73 3305 Protective railings
CSN 73 4201 Chimneys and flues
Technical Guide TP 51 Static table for building practice SNTL Praha 1978
Decree no. 137/1998 Coll., On general technical requirements for construction
Decree no. 502/2006 Coll., Which mnění Decree no. 137/1998 Coll.
Act no. 183/2006 Coll., On Territorial Planning and Building Code (Building Act)
Act no. 186/2006 Coll., Amending certain laws related to adoption of the Building Act
Act no. 185/2001 Coll., On waste and amending certain other laws
Decree no. 381/2001 Coll., Laying down the Catalogue of Wastes, List of Hazardous Wastes ...
Decree no. 499/2006 Coll., On construction documentation
Basis for proposing - www.wienerberger.cz
Static program FEAT 200
Drafting AutoCAD 2009
Act no. 309/2006 Coll., Stipulating further requirements for health and safety in the work or services provided outside labor relations
Government Regulation no. 362/2005 Coll., On detailed requirements for occupational safety and health on the construction site with danger of falling from height or depth
Government Regulation no. 101/2005 Coll., On detailed requirements on workplace and work environment
Government Regulation no. 591/2006 Coll., On detailed minimum requirements for occupational safety and health on construction sites
Government Regulation no. 378/2001 Coll., Which tented detailed requirements for safe operation and use of machines, technical equipment, instruments and tools
Decree no. 48/1982 Coll., as amended, which sets out the basic requirements for ensuring work safety and technical equipment
Decree no. 18-21 / 1979 Coll., On selected technical equipment
Decree no. 50/1978 Coll., On professional competence of persons at work electrical equipment

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