CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF CIVIL ENGINEERING

DEPARTMENT OF BUILDING STRUCTURES

TECHNICAL REPORT – CIVIL ENGINEERING PART

RESIDENTIAL BUILDING

Created by

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Name of project	Residential building in Prague
Investor:	CTU
Created by :	Ahmed Alkhateeb
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Content

1. General information

Residential building outside of Prague is designed. The building is located on the corner of Bovarikova and Novakova Streets. Investor is CTU. The residential building is design economically and utilizing modern ways of design and construction. The project emphasize in good quality. The project utilized orthogonal architecture to blend in with the surrounding of nice and efficient buildings. Czech and euro codes were used during design.

2. Basic information

The residential building has 1 underground floor and 5 upper ground floors. The Length is 28.58 m. Width is 19.6 m. Height above the ground is 16.48 m. Height under the ground is 3m. Total height is 19.48 m. The underground floor is equipped with a technical room and ten parking spaces. 13 more parking spaces are located outside the building. Drive in to the building is from Bovarikova Street. Drive in is than separated into a way to outside parking spaces and to the way to the underground floor. Entrance to the underground floor is via ramp with slope of 17%. There are areas of storage rooms assigned to the apartments in ground floor. There are 6 apartment units in the ground floor, 1 of 3+kk disposition, 4 of 1+kk disposition, 1 of 4+kk disposition. There are 8 apartment units in the other floors (2^{nd} level to 5^{th} level), 1 of 3+kk disposition, 6 of 1+kk disposition, 1 of 4+kk disposition. The building consists of 38 apartment units in total. All the apartments are properly lighted.

2.1. Software

- AutoCAD 2015
- MS Office
- Teplo

3. Structural system

The structural system of underground floor is a one-way slab with girders in one direction. Girders are supported by reinforced concrete columns. Column dimension is 300x550mm.Underground perimeter reinforced concrete wall is 300 mm thick. Floor structure is created by a one way slab by thickness of 180 mm. Communication areas around stairs well and elevator is created by reinforced concrete wall of thickness 300 mm. There are light shafts located in the underground walls. The shafts are thermally separated with use of isobeams.

Structural system of the upper floors is one way reinforced concrete slab sitting on load bearing masonry walls. Perimeter load bearing masonry wall is 440 mm thick, inner load bearing masonry wall is 300 mm thick. Load bearing walls around communication area are from reinforced concrete and are 300 mm thick. Elevator shaft walls is created by reinforced concrete walls of thickness of 200 mm and are separated from the load bearing structure of the building due to acoustic reasons.

4. Materials

Concrete :

Reinforced concrete columns underground level

C35/45 - XC2, XD1 - dmax=22mm - Cl<2% - S4

Reinforced concrete perimeter walls underground level

C30/37 - XC3, XD2, XA1 - dmax=22mm - Cl<2% - S4

Reinforced concrete walls (communication areas) underground level

C30/37 - XC2, XD1 - dmax=22mm - Cl<2% - S4

Reinforced concrete walls (communication areas) upper levels

C30/37 – XC1 - dmax=22mm - Cl<2% - S4

Reinforced concrete slabs

C30/37 – XC1 - dmax=22mm - Cl<2% - S4

Reinforced concrete foundations

C25/30 - XC3, XD2, XA1 - dmax=22mm - Cl<2% - S4

Reinforced concrete of the elevator shaft

C25/30 – XC1 - dmax=22mm - Cl<2% - S4

Reinforced concrete of precast staircase elements

C30/37 – XC1 - dmax=22mm - Cl<2% - S4

Reinforced concrete ramp

C25/30 - XC3, XD2, XA1 - dmax=22mm - Cl<2% - S4

Steel :

Reinforcing bars B500B

Masonry :

HELUZ GRINDED BRICK 440mm

HELUZ GRINDED BRICK 300mm

HELUZ GRINDED BRICK 250mm

HELUZ GRINDED BRICK 115mm

5. Loads

The load generated from one way slab underground – General floor composition is 13.045 KN/m2

The load generated from one way slab general floor composition is 12.690 KN/m2

The load generated from one way slab roof composition is 8.982 KN/m2

Live load for floor for residential building is 2.0 KN/m2

Live load for roof for residential buildings (maintenance) is 0.75 KN/m2

Snow load =0.7 KN/m2

6. Excavation

The excavation is made made for underground construction and for window shafts for ventilation and natural lighting in the undeground level. The excavation area is = 2m2 composed of two drainage systems DN100 and backfill soil and gravel 60/32. Volume of excavated soil = 1643 m3. , To the possible extent, most of the excavated soil will be used as a backfill, the rest will be take off the site and properly stored. The top 200 mm of the ground will be carefuly put out and used as agriculture soil elsewhere.

7. Acoustic

Elevator shaft (reinforced concrete walls) is seperated by acoustic rubber (Schock – type L) from load bearing structure of the building.

Due to accoustic reasons, every slab composition is equipped with acoustic insulation. The wall composition also satisfy acoustic requirements.

8. Foundation

8.1. Characteristic of soil

Sand S4 –angle of internal friction = 32deg

Gamma is = 18KN/m3

Tabled load bearing capacity = 275kpa

8.2. Foundation pad

The building foundation is created by foundation pad below every column and foundation strip below load bearing walls (perimeter wall, walls of communication area). Elevator shaft is placed to the level below other foundation, therefore creates a recess.

Foundation pad footing: 2.1x2.1x1.3m

Foundation strip footing: 1x1x0.85m

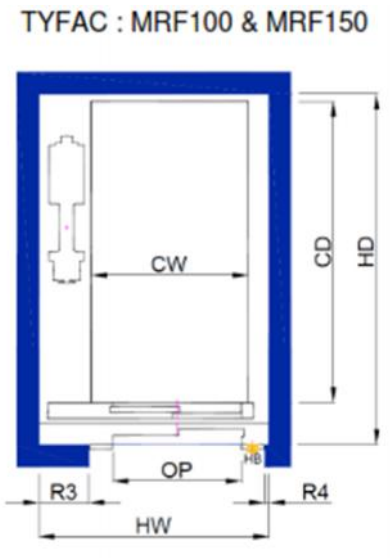
8.3. Waterproofing

Waterproofing of the structure below ground is done by asphalt sheets. System is known as grey bath, where all the underground structure is covered by asphalt sheets. For asphalt sheets to be placed, it is sometimes necessary to build additional structure (wall), the asphalt sheets are put on to, and before the load bearing structure is build. This is the case for example for elevator reinforced concrete recess.

9. Elevator

Building is equipped with one elevator placed in the communication area right behind entrance door.

Otis tayfac MRF100



Nosnost výtahu	Vnitřní rozměry kabiny		Dveře		Typ zárubně dveří TYFAC	Rozměry šachty		
Nosnost a počet osob	Šířka kabiny CW (mm)	Hloubka kabiny CD (mm)	Typ dveří	Světlá šířka dveří OP (mm)		Světlá šířka šachty HW (mm)	Světlá hloubka šachty HD pro 1# (mm)	Světlá hloubka šachty HD pro 2# (mm)
4 osoby 320 kg pro 1 & 2#	800	1100	TLD	700	SF &NF & MRF	1360	1430	1610

10. **Staircase**

Staircase is designed as precast reinforced concrete. Staircase is located in the communication area right behind the entrance door. It is 3 flight staircases. 2 main reinforced concrete precast flight elements are bedded in the main landing via hook (see detail…) and to the reinforced concrete wall via Schöck Tronsole® type Z. The third flight element is placed on the main flight elements by the hook. Starcase is accusticaly seperated from the load bearing structure of the building and also form elevator shaft. The composition of the staircase is therefore only precast element, plaster and ceramic flooring on glue.

Used Staircase precast elements

Used acoustic elements

Schöck Tronsole® type Z

Schöck Tronsole® typ Z

Schöck Tronsole® type F

Schöck Tronsole® typ F

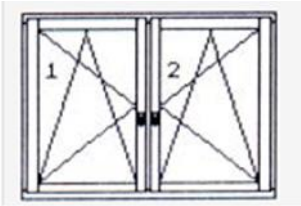
Schöck Tronsole® type B

Schöck Tronsole® typ B

Schöck Tronsole® type L

11. **Windows**

- Windows with dimensions 1500(1500/1030) and 2500(1500/1030) and 1250(1500/1030)
- Windows is made from aluminum and double glassed layers



11.1. Advanteges of wodden-aluminum windows

Wood-aluminum windows are a numerous possibility for a perfect insulation, sound and sun protection, high safety and comfort due of low energy consumption windows and with thermal insulation it will stop the thermal bridges between materials. Also because the wooden part of the window gives an outstanding natural beauty to the building.

11.2. Material composition

These special wood-aluminum windows are factory-made from a high-quality mixture of oak tree, pine tree, larch, alder and meranti. Glass is brought in double or triple seals with a full aluminum frame, equipped with latest electronic-controlled fittings. Additional benefit is integrated shades in the sealed space to avoiding wrong manipulation

11.3. Surface treatment

For the European windows, surface treatment is absolutely important, not only for looks, but for of durability and insulation.

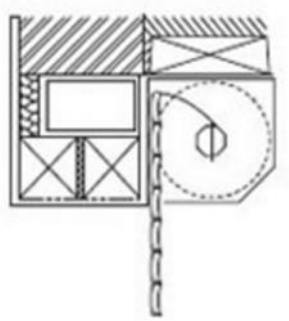
11.4. TTk comfort

Up-to-date design with exceptional thermally insulating properties high wind and rainwater resistance

12. **Doors**

- The doors in the underground with dimensions 800/1970
- Doors in the ground floor with dimensions 800/1970
- The doors is from aluminum + glass material and plastic frame

13. **Garage door**



14. **Lintels**

WL1: ROLLER HEAD PIECE HELUZ 440 X 238 X 1500

WL2: ROLLER HEAD PIECE HELUZ 440 X 238 X 1750

WL3: ROLLER HEAD PIECE HELUZ 440 X 238 X 2750

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1. List of composition
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