CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF CIVIL ENGINEERING

BACHELOR THESIS OF ADMINISTRATIVE BUILDING

CZECH TECHNICAL UNIVERSITY IN PRAGUE
Faculty of Civil Engineering
Thákurova 7, 166 29 Prague 6, Czech Republic

BACHELOR´S THESIS ASSIGNMENT FORM

I. PERSONAL AND STUDY DATA

Surname: Alachkar Name: Bashar Personal number: 470443

Assigning Department: K124 - Building Structures

Study programme: Civil Engineering

Branch of study: Building Structures

II. BACHELOR THESIS DATA

Bachelor Thesis (BT) title: Administraion Building

Bachelor Thesis title in English: Administration Building

Instructions for writing the thesis:

The proposal and target of this new administration building is to design and make structural solution with comprehensive solution and the envelop with fire safety solution of the building in accordance with applicable Czech standards norms.

List of recommended literature:

1. Hollis M.: Surveying Buildings, RICS Boks 2007
2. Assessment of Traditional Housing, BRE Watford, 2001
3. Whitlow R.: Materials and Structures, Longman 1992
4. Barry R.: The Construction of Buildings, BSP 1989
5. Foster J.S.: Structures and Fabric, Parts I - III, Longman 1994
6. Schodek, D.: Structures- Pearson. New Yersay. 2004
7. Hanaor, A. : Principles of structures. Blackwell Science. 1998

Name of Bachelor Thesis Supervisor: Ing. Malila Noori, Ph.D.

BT assignment date: 24.02.2020 BT submission date: 17.05.2020

[redacted] [redacted]

BT Supervisor's signature Head of Department's signature

III. ASSIGNMENT RECEIPT

I declare that I am obliged to write the Bachelor Thesis on my own, without anyone's assistance, except for provided consultations. The list of references, other sources and consultants' names must be stated in the Bachelor Thesis and in referencing I must abide by the CTU methodological manual "How to Write University Final Theses" and the CTU methodological instruction "On the Observation of Ethical Principles in the Preparation of University Final Theses".

[redacted]

Assignment receipt date Student's name

CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF CIVIL ENGINEERING

TECHNICAL REPORT OF ADMINISTRATIVE BUILDING

PART 1. BUILDING STRUCTURES

ABSTRACT

THIS BACHELOR THESIS IS ADMINISTRATIVE BUILDING AND MOSTLY IS ABOUT BUILDING STRUCTURES SOLUTION. THE PROJECT DIVIDED TO FIVE PARTS. THE 1ST PART IS BUILDING STRUCTURES, TECHNICAL AND DESIGN SOLUTION, WHICH ARE INCLUDE PLAN VIEWS, ROOF, SECTIONS, FACADE VIEWS AND 5 DETAILS OF ALL PARTS OF THE BUILDING. THE 2ND PART IS ABOUT CALCULATION AND SOLUTION IS FROM THE POINT OF VIEW OF CONCRETE. THE 3RD PART IS DESIGN OF FOUNDATION OF THE ADMINISTARIVE BUILDING, WHICH CONSISTS OF PLAN, SECTIONS AND CALCULATION. THE 4TH PART IS ABOUT PLAN OF THE GENERALLY SOLUTION OF BUILDING SERVICES SYSTEM. THE 5TH PART IS ABOUT BASIC SOLUTION OF FIRE SAFETY, INCLUDING PLANS OF FIRE SAFETY.

THANK YOU

I WOULD LIKE TO EXPRESS MY SPECIAL APPRECIATION AND THANKS TO MY SUPERVISOR ING.MALILA NOORI, PHD. YOU HAVE BEEN A TREMENDOUS MENTOR FOR ME. I WOULD LIKE TO THANK YOU FOR ENCOURAGING MY THESIS TO BE READY AND ABLE FOR DEFENCE OF MY BACHELOR THESIS. YOUR ADVICE ON DURING MY WORK WITH THESIS STUDY AS WELL AS ON MY CAREER HAVE BEEN INVALUABLE.

I WOULD ALSO LIKE TO THANK FOR CONSULTANTATION, DOC.ING IVA BROUKALOVA, ING. JAN SALAK, CSC, AND ING. PAVLA DVORAKOVA, PHD.

I WOULD ESPECIALLY LIKE TO THANK THE CZECH TECHNICAL UNIVERSITY IN PRAGUE ,CZECH REPUBLIC FOR THE PRECIOUS FOUR YEARS OF STUDY AND THE HONOR OF BEING ONE OF THE STUDENTS IN THIS GREAT EDUCATIONAL INSTITUTE.

CONTENT

GENERAL INFORMATION

PROJECT NAME: ADMINISTRATIVE BUILDING.
LOCATION: VYNOHRADY,BRNO,CZECHIA
FUNCTION OF THE BUILDING: OFFICE BUILDNIG.
STAGE : BUILDING PERMITS.

1. LOCATION

THIS OFFICE BUILDING IS LOCATED IN AN URBAN AREA OF BRNO CZECH REPUBLIC THE TOTAL AREA WHERE THE BUILDING IS DESIGNED ON LAND IS 2720 M^2 AND AREA OF BUILDING 940M^2 THIS BUILDING IS CONSISTS OF FOUR FLOORS INCLUDING OF THE BASEMENT,GENERALLY SURROUNDING THE BUILDING WITH DIMENSION OF 1,5M THERE IS STONE PAVEMENTS AND THE OTHER AREA OF THE LAND WILL BE AFTER THE ROUGH LANDSCAPING GRASSED AND PLANTED WITH LOW AND MEDIUM GREENERY THERE IS ALSO.

2. FOUNDATION

GENERALLY THIS PAD FOUNDATION IS A CONTINOUS REINFORCED COCNRETE ON WHICH THE LOAD BEARING COLUMNS WITH THE THICKNESS OF 400X400MM ARE BUILT CENTRALLY.
SO DUE TO THE FACT THAT THE USE OF CONCRETE AS IT IS EASY TO PLACE, SPREAD AND LEVEL IN THE FOUNDATION TRENCH. DUE TO ITS ABILITY TO HARDEN CONCRETE CREATES A BASIS FOR COLUMNS AND DEVELOPS PROPER COMPRESSIVE STRENGTH TO SUPPORT THE FOUNDATIONS LOAD, THEREFORE THE BASIC PURPOSE OF THIS FOUNDATION IS TO SPREAD THE LOAD OVER A LARGER AREA SO THAT THE SOIL HAS CAPABILITY TO WITHSTAND THE STRESS, AND SAFE BEARING PRESSURE IS NOT EXCEEDED.
XC1 - FOR INTERNAL SLABS AND FOUNDATIONS C37/30 STEEL GRADE B500B
XC2 - FOR REINFORCED WALLS.
XC1 - DRY OR PERMANENTLY WET CONCRETE INSIDE THE BUILDING WITH LOW AIR HUMIDITY .
XC2 - WET RARELY DRY CONCRETE SUFFER SUBJECTED TO THE LONG TERM WATER LIKE MANY FOUNDATIONS.
POSITION WHERE THERE THE FOUNDATION HAS TO BE DESIGNED IS 5.00M.

PADS

THE ADMINISTRATIVE BUILDING WILL BE BASED DEEP ON LARGE DIAMETER PADS. PADS WITH DIAMETER OF 2100MM AND 2700MM WILL BE USED FOR COLUMNS WITH DIMENSIONS OF 400X400MM REINFORCED CONCRETE COLUMNS .DESIGNED LENGTH OF THE PADS IS 1.2 M. CALCULATION OF THE PADS ARE PROVIDED VIA FILE (FOUNDATION PART 3).

3. STRUCTURAL SYSTEM

THE BUILDING IS BASED ON THE REINFORCED FOOTING PADS, THE STRUCTURAL SYSTEM IS A COLUMN SYSTEM.
VERTICAL LOAD BEARING STRUCTURES CONSISTS OF 400X400 MM THICKNES REINFORCED CONCRETE COLUMNS , THE STAIRS WILL BE CONSTRUCTED FROM PREFABRICATED REINFORCED CONCRETE STAIRS.WALL IN BASEMENT WILL BE PROVIDED WITH REINFORCED CONCRETE. AND IN THE OTHER FLOORS WILL BE PROVIDED BY THE CERAMIC BRICK POROTHERM 30 T AS A NON-LOAD BEARING WALLS OF 450 MM THICKNESS IT CAN ALSO BE USED FOR THE INNER AND OUTER SUPPORTING PART OF THE BUILDING FOR BRICKWORK, SPECIAL MORTAR FOR THIN JOINTS (DRY FIX) IS USED FOR THE ALL PARTITIONS WALLS IN THE BUILDING WILL BE USED INTERNAL MASONRY.

EXTERNAL WALLS

WILL BE PROVIDED BY THE CERAMIC BRICKS POROTHERM 30 PROFI AS A NON-LOAD BEARING WALLS OF 300 MM THICKNESS WITH DRY FIX.

PARTITION WALLS

1. POROTHERM 8 PROFI DRYFIX BINCLUDE OF BOTH SIDES PLASTER THE THICKNESS WILL BE 100MM. (STORES , BATHROOM)
2. POROTHERM 14 PROFI DRYFIX BINCLUDE OF BOTH SIDES PLASTER THE THICKNESS WILL BE 150MM FOR OFFICES.
3. LUXFER GLASS WALLS ARE CONSTRUCTED IN KITCHEN.

4. PLASTERS: INTERNAL PLASTER ARE WEBER MUR PLASTER FOR POROUS EDGING INTERIOR WALLS AND CEILINGS WITH T =10 [MM] AND EXTERNAL IS SAME APPLICATION ALSO T= 10MM.

SLAB STRUCTURE

THE FINAL DEPTH OF THE REINFORCED CONCRETE SLAB IN BASEMENT AND GROUND FLOOR IS 230 [MM] TO 5TH FLOORS IS SAME.

FLOORS

GENERALLY WHERE ALL LAYERS OF FLOOR STRUCTURES ARE DESIGNED AND DESCRIBED IN DRAWINGS.

STAIRS

5. REINFORCED CONCRETE PREFABRICATED STAIRCASE IS DESIGNED AS A TWO FLIGHT PRECAST, MADE OF CONCRETE C30/37, SITUATED NEXT TO ELEVATOR SHAFT WITH REINFORCED CONCRETE LANDING. IN EACH LEVEL THERE IS ONE COMMUNICATION CORE WITH A STAIRCASE AND AN ELEVATOR, WHICH IS CONNECTING ALL FLOORS.
6. THE BASIC GEOMETRY OF THE STEPS OF THESE STAIRCASES IS 160/310 MM AT INCLINATION OF 27˚WITH A WIDTH OF STEP 1200MM AND LENGTH OF FLIGHT 3100MM.
7. FLIGHT TO THE LANDING CONNECTION IS DONED BY HALFEN HTT IMPACT SOUND INSULATION UNIT WITH THE LENGHT WITH ITS FIRE GRADING F90/F120 – IMPACT SOUND PRESSURE LEVEL ∆L = 12 DB.
8. THE CONNECTION BETWEEN LANDING AND MAIN BEARING STRUCTURE WHICH SUPPORT THE LANDING IS IMPLEMENTED BY HTT HALFEN SOUND INSULATION SYSTEM.

ELEVATOR

THE ELEVATOR SHAFTS ARE DESIGNED FROM REINFORCED CONCRETE WITH THICKNESS OF 200 MM. THE ACOUSTIC SOLUTION OF THE NOISE FROM

THE ELEVATOR IS CARRIED OUT BY SOUND PROVE CONCRETE WALLS AROUND THE ELEVATOR.
CHOSEN TYPE OF ELEVATOR IS SCHINDLER 5500 WITH A LOAD CAPACITY OF 630 KG / 8 PERSONS.

LINTELS

POROTHERM 7 BRICK TRANSLATIONS ARE USED AS FULLY SUPPORTING ELEMENTS OVER WINDOW AND DOOR OPENINGS IN BRICK WALL STRUCTURES, THERE ARE USED FOR DIFFERENT OPENING SIZE.

ROOF

THE DESIGN IS A FLAT ROOF WITH MINIMUM SLOPE THE ROOF FINSHES IS WASHED RIVER GRAVEL
AND THE DRAINGE IS PROVIDED BY SCUPPER WHICH WILL GO VERTICALLY DOWN.

4. INSULATION:

OBVIOUSLY THE BUILDING IS DESIGNED ACCORDING TO CSN 73 0540-2 THERMAL PROTECTION OF BUILDINGS, THE DESIRED VALUES OF THERMAL RESISTANCE (HEAT TRANSFER COEFFICIENT) STRUCTURES ARE IN PROJECT EXCEEDED BASICALLY THE PROCESS IS IMPLEMENTED IN 3 STEPS.

THERMAL INSULATION

XPS EXTRUDED POLYSTYRENE T = 75 MM VERIFIED IN BASEMENT WALLS.
EPS FOAM POLYSTYRENE IS USED FOR EXTERNAL WALLS T =150 MM.
IN THE EDGE OF CONCRETE SLAB IS DONE WITH SAME APPLICATION.
LINTLES POROTHERM 7 - POLYSTYREN THICKNESS. 80 MM.
IN POSITION BETWEEN PAVEMENT IS XPS EXTRUDED POLYSTYRENE T = 75 MM.

A: PERMETER WALLS

IN BASEMENT PLAN ARE CONSTRUCTED OF REINFORCED CONCRETE WITH T = 240 MM ARE INSULATED WITH XPS EXTRUDED POLYSTYRENE T = 75 MM, THERMAL RESISTANCE OF THE STRUCTURE IS R = ? HEAT TRANSFER COEFFICIENT STANDARD REQUIRES U = 0.45 W / M2K

B: EXTERNAL WALLS

ABOVE THE BASEMENT PLAN WALLS ARE CONSTRUCTED OF POROTHERM PROFI 30 T T = 300 MM INSULATED WITH EPS FOAM POLYSTYRENE T = 150 MM.

THERMAL RESISTANCE OF THIS COMPOSITOIN IS R = ? HEAT TRANSFER COEFFICIENT STANDARD REQUIRES UN = 0.25 [W/(M2·K)].

C: ROOF

BASICALLY ROOF IS CONSTRUTED OF REINFORCED CONCRETE SLAB WITH T = 230 MM ARE INSULATED WITH XPS EXTRUDED POLYSTYRENE 2 X T = 100 MM, THERMAL RESISTANCE OF THE STRUCTURE IS R = ? HEAT TRANSFER COEFFICIENT STANDARD REQUIRES UN = 0.16 [W/(M2·K)].

5. WINDOWS AND DOORS

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 ALUMINUM FRAME SWISSPACER, HEAT TRANSFER COEFFICIENT OF THE WINDOW VO = 1.1 W / M2K.

DOORS

TYPCIAL WOOD TYPE FOR THER INTERNAL PARTATION 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.

GLASS SLIDING DOORS

THE BUILDING WILL BE PROVIDED WITH AUTOMATIC FIRE-PROOF GLASS DOORS IN COSTUME SIZE.THE FILLING CAN BE MADE FROM FIRE-PROOF GLASS, INSULATED FIRE-PROOF GLASS.ALUMINUM LANING FIRE-PROOF PANEL.

6. AIR AND VENTILATION OF THE BUILDING

AS I MENTIONED IN PREVIOUSLY THAT THIS BUILDING IS IN AN NEW URBAN AREA WHICH FAR AWAY FROM INFELUENCE OF THE ENVIRONMENT(TRAFFIC NOISE,POLLUTIONS,ETC) THEREFORE THE BIULDING IS A HYBRID VENTILATION SYSTEM WHICH COUNTS ONNATURAL VENTILATRION THROUGH THE WINDOWS AND MECHANICAL SYSTEM..

THE MECHANICAL VENTILATION IS PROVIDED WITH HVAC SYSTEM THAT IS RESPONSIBLE OF VENTILATING,HEATING AND COOLING THE BUILDING. FOR EACH FLOOR EXHAUST AIR FROM (TOILET , BATHROOM, KITCHEN ROOM AND GARAGE) IS LED OUT THROUGH THE ROOF TOP BY VERTICAL PIPES WHICH IS POSITIONED IN THE INSTALLATION SHAFTS.

7. LIST OF DOCUMENTS, CSN, TECHNICAL REGULATIONS, LITERATURE AND SOFTWARE

GEOLOGICAL AND HYDROGEOLOGICAL REPORT

CSN 735305 DESIGN OF ADMINISTRATIVE BUILDINGS

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 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 FLU

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8. LIST OF ATTACHEMENTS

DESCRIPTION OF THE WINDOWS,DOORS,ELEVATOR AND LUXFER WALLS.

TEPLO CALCULATION OF THE U – VALUE.

9. LIST DRAWINGS:

1.SITUATION, SCALE 1:250

2.PLAN VIEW OF UNDERGRAOUND FLOOR, SCALE 1:50

3.PLAN VIEW OF GROUND FLOOR, SCALE 1:50

5.PLAN VIEW OF TYPICAL FLOOR, SCALE 1:50

6.PLAN VIEW OF ROOF 5TH FLOOR, SCALE 1:50

7.PLAN VIEW OF ROOF DRAINAGE 1:50

8.SECTION A-A’, SCALE 1:50

9.SECTION B-B’, SCALE 1:50

10.NORTH VIEW, SCALE 1:50

11.SOUTH VIEW, SCALE 1:50

12.EAST VIEW, SCALE 1:50

13.WEST VIEW, SCALE 1:50

14.DETAIL A, SCALE 1:10

15.DETAIL B, SCALE 1:10

16.DETAIL C, SCALE 1:10

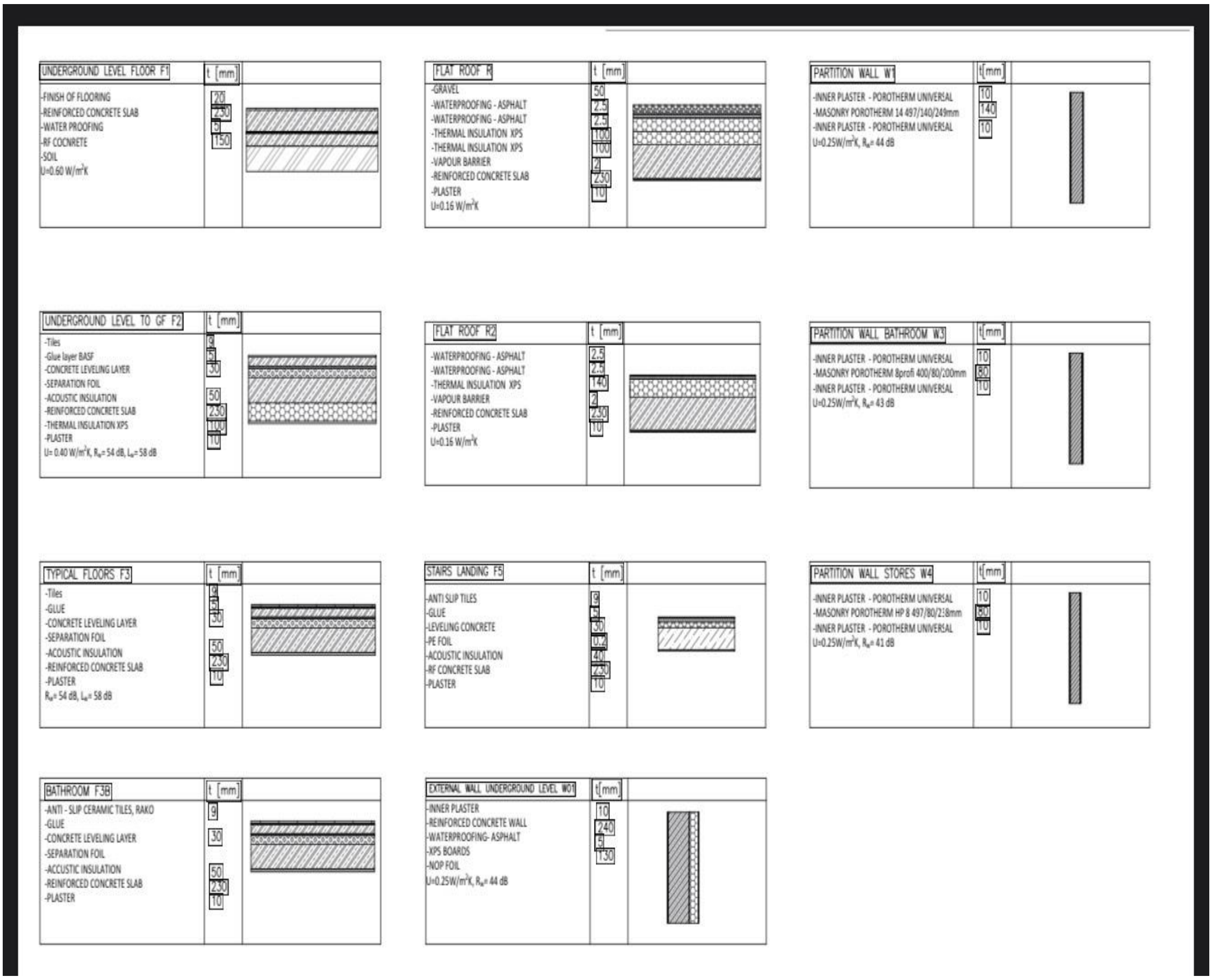
17.DETAIL D, SCALE 1:10

18.DETAIL E, SCALE 1:10

10. SOFTWARES

1. AUTOCAD 2020
2. MS OFFICE
3. TEPLO 2017

COMPOSTION OF FLOORS



13.TEPLO REPORT

SHRNUTÍ VLASTNOSTÍ HODNOCENÝCH KONSTRUKCÍ

Teplo 2017 EDU tepelná ochrana budov (CSN 730540, EN ISO 6946, EN ISO 13788)

Název kce	Typ	R [m2K/W]	U [W/m2K]	Ma,max[kg/m2]	Odparení	DeltaT10 [C]
Flat Roof...	strecha	45.876	0.16	0.0000	ano	---
Ground Floor...	podlaha	45.153	0.40	nedochází ke kondenzaci v.p.		---
External Wall...	stena	4.179	0.25	0.0534	ano	---

Vysvetlivky:

R tepelný odpor konstrukce
U soucinitel prostupu tepla konstrukce
Ma,max maximální množství zkond. vodní páry v konstrukci za rok
DeltaT10 pokles dotykové teploty podlahové konstrukce.

KOMPLEXNÍ POSOUZENÍ SKLADBY STAVEBNÍ KONSTRUKCE Z HLEDISKA ŠÍRENÍ TEPLA A VODNÍ PÁRY

podle EN ISO 13788, EN ISO 6946, CSN 730540 a STN 730540

Teplo 2017 EDU

Název úlohy : **Flat Roof**
Zpracovatel : TT 2017
Zakázka :
Datum : 27/04/2020

ZADANÁ SKLADBA A OKRAJOVÉ PODMÍNKY :

Typ hodnocené konstrukce : Strecha jednoplášťová
Korekce soucinitele prostupu dU : 0.000 W/m2K

Skladba konstrukce (od interiéru) :

Císlo	Název	D [m]	Lambda [W/(m.K)]	c [J/(kg.K)]	Ro [kg/m3]	Mi [-]	Ma [kg/m2]
1	Sádrokarton	0.1000	0.2200	1060.0	750.0	9.0	0.0000
2	Železobeton 1	2.3000	1.4300	1020.0	2300.0	23.0	0.0000
3	Al folie 2	0.0002	204.0000	870.0	2700.0	700000.0	0.0000
4	Austrotherm 20	2.0000	0.0300	2060.0	28.0	130.0	0.0000
5	Asfaltový nátě	0.0000	0.2100	1470.0	1400.0	280.0	0.0000
6	Asfaltový nátě	0.0000	0.2100	1470.0	1400.0	280.0	0.0000
7	Sterkopisek	0.0500	2.0000	1010.0	2000.0	50.0	0.0000

Poznámka: D je tlouštka vrstvy, Lambda je návrhová hodnota tepelné vodivosti vrstvy, C je merná tepelná kapacita vrstvy, Ro je objemová hmotnost vrstvy, Mi je faktor difúzního odporu vrstvy a Ma je pocátecní zabudovaná vlhkost ve vrstve.

Císlo	Kompletní název vrstvy	Interní výpocet tep. vodivosti
1	Sádrokarton	---
2	Železobeton 1	---
3	Al folie 2	---
4	Austrotherm 20 XPS-G/030	---
5	Asfaltový nátěr 2x	---
6	Asfaltový nátěr 2x	---
7	Sterkopisek	---

Okrajové podmínky výpoctu :

Tepelný odpor pri prestupu tepla v interiéru Rsi : 0.10 m2K/W
dtto pro výpocet vnitrní povrchové teploty Rsi : 0.25 m2K/W
Tepelný odpor pri prestupu tepla v exteriéru Rse : 0.04 m2K/W
dtto pro výpocet vnitrní povrchové teploty Rse : 0.04 m2K/W

Návrhová venkovní teplota Te : -20.0 C
Návrhová teplota vnitrního vzduchu Tai : 21.0 C
Návrhová relativní vlhkost venkovního vzduchu RHe : 85.0 %
Návrhová relativní vlhkost vnitrního vzduchu RHi : 65.0 %

VÝSLEDKY VÝPOCTU HODNOCENÉ KONSTRUKCE :

Tepelný odpor a soucinitel prostupu tepla podle EN ISO 6946:

Tepelný odpor konstrukce R : 45.876 m2K/W
Soucinitel prostupu tepla konstrukce U : **0.16 W/m2K**

Soucinitel prostupu zabudované kce U,kc : 0.04 / 0.07 / 0.12 / 0.22 W/m2K
Uvedené orientacní hodnoty platí pro ruznou kvalitu rešení tep. mostu vyjádrenou približnou prirážkou podle poznámek k cl. B.9.2 v CSN 730540-4.

Difúzní odpor a tepelne akumulacní vlastnosti:

Difuzní odpor konstrukce ZpT : 1.9E+0012 m/s

Teplotní útlum konstrukce Ny* podle EN ISO 13786 : 11449851904.0
Fázový posun teplotního kmitu Psi* podle EN ISO 13786 : 19.6 h

Teplota vnitrního povrchu a teplotní faktor podle CSN 730540 a EN ISO 13788:

Vnitrní povrchová teplota v návrhových podmínkách Tsi,p : 20.78 C
Teplotní faktor v návrhových podmínkách f,Rsi,p : **0.995**

Obe hodnoty platí pro odpor pri prestupu tepla na vnitrní strane Rsi=0,25 m2K/W.

Difúze vodní páry v návrh. podmínkách a bilance vodní páry podle CSN 730540:

(bez vlivu zabudované vlhkosti a slunecní radiace)

Prubeh teplot a cástecných tlaku vodní páry v návrhových okrajových podmínkách:

rozhraní:	i	1-2	2-3	3-4	4-5	5-6	6-7	e
theta [C]:	20.9	20.1	18.7	18.7	-19.9	-19.9	-19.9	-20.0
p [Pa]:	1616	1608	1387	803	98	98	98	87
p,sat [Pa]:	2472	2352	2151	2151	103	103	103	103

Poznámka: theta je teplota na rozhraní vrstev, p je predpokládaný cástecný tlak vodní páry na rozhraní vrstev a p,sat je cástecný tlak nasycené vodní páry na rozhraní vrstev.

Pri venkovní návrhové teplote dochází v konstrukci ke kondenzaci vodní páry.

Kond.zóna císlo	Hranice kondenzační zóny levá [m]	pravá	Kondenzující množství vodní páry [kg/(m2s)]
1	3.5629	3.6553	2.140E-0010

Rocní bilance zkondenzované a vyparené vodní páry:

Množství zkondenzované vodní páry za rok Mc,a: **0.0000 kg/(m2.rok)**
Množství vyparitelné vodní páry za rok Mev,a: **0.0812 kg/(m2.rok)**
Ke kondenzaci dochází pri venkovní teplote nižší než -15.0 C.

Poznámka: Hodnocení difúze vodní páry bylo provedeno pro predpoklad 1D šírení vodní páry prevažující skladbou konstrukce. Pro konstrukce s výraznými systematickými tepelnými mosty je výsledek výpoctu jen orientacní. Presnejší výsledky lze získat s pomocí 2D analýzy.

KOMPLEXNÍ POSOUZENÍ SKLADBY STAVEBNÍ KONSTRUKCE Z HLEDISKA ŠÍRENÍ TEPLA A VODNÍ PÁRY

podle EN ISO 13788, EN ISO 6946, CSN 730540 a STN 730540

Teplo 2017 EDU

Název úlohy : **Ground Floor**
Zpracovatel : TT 2017
Zakázka :
Datum : 27/04/2020

ZADANÁ SKLADBA A OKRAJOVÉ PODMÍNKY :

Typ hodnocené konstrukce : Podlaha nad nevytápeným ci méne vytáp. vnitrním prostorem
Korekce soucinitele prostupu dU : 0.000 W/m2K

Skladba konstrukce (od interiéru) :

Císlo	Název	D [m]	Lambda [W/(m.K)]	c [J/(kg.K)]	Ro [kg/m3]	Mi [-]	Ma [kg/m2]
1	Beton hutný 1	0.3000	1.2300	1020.0	2100.0	17.0	0.0000
2	Folie PVC	0.0005	0.1600	960.0	1400.0	16700.0	0.0000
3	Minerální vlák	0.5000	0.0410	880.0	50.0	1.2	0.0000
4	Železobeton 1	2.3000	1.4300	1020.0	2300.0	23.0	0.0000
5	Austrotherm 20	1.0000	0.0300	2060.0	28.0	130.0	0.0000
6	Sadrokarton	0.0100	0.2200	1060.0	750.0	9.0	0.0000

Poznámka: D je tlouštka vrstvy, Lambda je návrhová hodnota tepelné vodivosti vrstvy, C je merná tepelná kapacita vrstvy, Ro je objemová hmotnost vrstvy, Mi je faktor difúzního odporu vrstvy a Ma je pocátecní zabudovaná vlhkost ve vrstve.

Císlo	Kompletní název vrstvy	Interní výpocet tep. vodivosti
1	Beton hutný 1	---
2	Folie PVC	---
3	Minerální vlákna 1 (po roce 2003)	---
4	Železobeton 1	---
5	Austrotherm 20 XPS-G/030	---
6	Sadrokarton	---

Okrajové podmínky výpoctu :

Tepelný odpor pri prestupu tepla v interiéru Rsi : 0.17 m2K/W
dtto pro výpocet vnitrní povrchové teploty Rsi : 0.25 m2K/W
Tepelný odpor pri prestupu tepla v exteriéru Rse : 0.17 m2K/W
dtto pro výpocet vnitrní povrchové teploty Rse : 0.17 m2K/W

Návrhová venkovní teplota Te : 18.0 C
Návrhová teplota vnitrního vzduchu Tai : 21.0 C
Návrhová relativní vlhkost venkovního vzduchu RHe : 55.0 %
Návrhová relativní vlhkost vnitrního vzduchu RHi : 65.0 %

VÝSLEDKY VÝPOCTU HODNOCENÉ KONSTRUKCE :

Tepelný odpor a soucinitel prostupu tepla podle EN ISO 6946:

Tepelný odpor konstrukce R : 45.153 m2K/W
Soucinitel prostupu tepla konstrukce U : **0.40 W/m2K**

Soucinitel prostupu zabudované kce U,kc : 0.04 / 0.07 / 0.12 / 0.22 W/m2K
Uvedené orientacní hodnoty platí pro ruznou kvalitu rešení tep. mostu vyjádrenou približnou prirážkou podle poznámek k cl. B.9.2 v CSN 730540-4.

Difúzní odpor a tepelne akumulacní vlastnosti:

Difuzní odpor konstrukce ZpT : 1.0E+0012 m/s

Teplotní útlum konstrukce Ny* podle EN ISO 13786 : 13838239744.0
Fázový posun teplotního kmitu Psi* podle EN ISO 13786 : 7.9 h

Teplota vnitrního povrchu a teplotní faktor podle CSN 730540 a EN ISO 13788:

Vnitrní povrchová teplota v návrhových podmínkách Tsi,p : 20.98 C
Teplotní faktor v návrhových podmínkách f,Rsi,p : **0.995**

Obe hodnoty platí pro odpor pri prestupu tepla na vnitrní strane Rsi=0,25 m2K/W.

Difúze vodní páry v návrh. podmínkách a bilance vodní páry podle CSN 730540:

(bez vlivu zabudované vlhkosti a slunecní radiace)

Prubeh teplot a cástecných tlaku vodní páry v návrhových okrajových podmínkách:

rozhraní:	i	1-2	2-3	3-4	4-5	5-6	e
theta [C]:	21.0	21.0	21.0	20.3	20.2	18.0	18.0
p [Pa]:	1616	1595	1575	1574	1447	1135	1135
p,sat [Pa]:	2484	2480	2480	2383	2368	2065	2064

Poznámka: theta je teplota na rozhraní vrstev, p je predpokládaný cástecný tlak vodní páry na rozhraní vrstev a p,sat je cástecný tlak nasycené vodní páry na rozhraní vrstev.

Pri venkovní návrhové teplote nedochází v konstrukci ke kondenzaci vodní páry.

Množství difundující vodní páry Gd : 4.803E-0010 kg/(m2.s)

Poznámka: Hodnocení difúze vodní páry bylo provedeno pro predpoklad 1D šírení vodní páry prevažující skladbou konstrukce. Pro konstrukce s výraznými systematickými tepelnými mosty je výsledek výpoctu jen orientacní. Presnejší výsledky lze získat s pomocí 2D analýzy.

Teplo 2017 EDU, (c) 2017 Svoboda Software

KOMPLEXNÍ POSOUZENÍ SKLADBY STAVEBNÍ KONSTRUKCE Z HLEDISKA ŠÍRENÍ TEPLA A VODNÍ PÁRY

podle EN ISO 13788, EN ISO 6946, CSN 730540 a STN 730540

Teplo 2017 EDU

Název úlohy : **External Wall**
Zpracovatel : TT 2017
Zakázka :
Datum : 27/04/2020

ZADANÁ SKLADBA A OKRAJOVÉ PODMÍNKY :

Typ hodnocené konstrukce : Stena vnejší jednoplášťová
Korekce soucinitele prostupu dU : 0.000 W/m2K

Skladba konstrukce (od interiéru) :

Císlo	Název	D [m]	Lambda [W/(m.K)]	c [J/(kg.K)]	Ro [kg/m3]	Mi [-]	Ma [kg/m2]
1	Baumit hlazena	0.1500	0.6000	1000.0	1110.0	10.0	0.0000
2	Porotherm 30 T	0.3000	0.0750	1000.0	650.0	10.0	0.0000
3	Porotherm Univ	0.0100	0.8000	800.0	1450.0	14.0	0.0000

Poznámka: D je tlouška vrstvy, Lambda je návrhová hodnota tepelné vodivosti vrstvy, C je merná tepelná kapacita vrstvy, Ro je objemová hmotnost vrstvy, Mi je faktor difúzního odporu vrstvy a Ma je pocátecní zabudovaná vlhkost ve vrstve.

Císlo	Kompletní název vrstvy	Interní výpocet tep. vodivosti
1	Baumit hlazena	---
2	Porotherm 30 T	---
3	Porotherm Univ	---

Okrajové podmínky výpoctu :

Tepelný odpor pri prestupu tepla v interiéru Rsi : 0.13 m2K/W
dtto pro výpocet vnitrní povrchové teploty Rsi : 0.25 m2K/W
Tepelný odpor pri prestupu tepla v exteriéru Rse : 0.04 m2K/W
dtto pro výpocet vnitrní povrchové teploty Rse : 0.04 m2K/W

Návrhová venkovní teplota Te : -20.0 C

Návrhová teplota vnitrního vzduchu Tai : 21.0 C
Návrhová relativní vlhkost venkovního vzduchu RHe : 85.0 %
Návrhová relativní vlhkost vnitrního vzduchu RHi : 70.0 %

VÝSLEDKY VÝPOCTU HODNOCENÉ KONSTRUKCE :

Tepelný odpor a soucinitel prostupu tepla podle EN ISO 6946:

Tepelný odpor konstrukce R : 4.179 m2K/W
Soucinitel prostupu tepla konstrukce U : **0.250 W/m2K**

Soucinitel prostupu zabudované kce U,kc : 0.25 / 0.28 / 0.33 / 0.43 W/m2K
Uvedené orientacní hodnoty platí pro ruznou kvalitu rešení tep. mostu vyjádrenou približnou prirážkou podle poznámek k cl. B.9.2 v CSN 730540-4.

Difúzní odpor a tepelne akumulacní vlastnosti:

Difuzní odpor konstrukce ZpT : 2.2E+0010 m/s

Teplotní útlum konstrukce Ny* podle EN ISO 13786 : 1094.7
Fázový posun teplotního kmitu Psi* podle EN ISO 13786 : 22.3 h

Teplota vnitrního povrchu a teplotní faktor podle CSN 730540 a EN ISO 13788:

Vnitrní povrchová teplota v návrhových podmínkách Tsi,p : 18.71 C
Teplotní faktor v návrhových podmínkách f,Rsi,p : **0.944**

Obe hodnoty platí pro odpor pri prestupu tepla na vnitrní strane Rsi=0,25 m2K/W.

Difúze vodní páry v návrh. podmínkách a bilance vodní páry podle CSN 730540:
(bez vlivu zabudované vlhkosti a slunecní radiace)

Prubeh teplot a cástecných tlaku vodní páry v návrhových okrajových podmínkách:

rozhraní:	i	1-2	2-3	e
theta [C]:	19.8	18.2	-19.5	-19.6
p [Pa]:	1740	1341	143	87
p,sat [Pa]:	2305	2089	108	107

Poznámka: theta je teplota na rozhraní vrstev, p je predpokládaný cástecný tlak vodní páry na rozhraní vrstev a p,sat je cástecný tlak nasycené vodní páry na rozhraní vrstev.

Pri venkovní návrhové teplote dochází v konstrukci ke kondenzaci vodní páry.

Kond.zóna císlo	Hranice kondenzacní zóny levá [m]	pravá	Kondenzující množství vodní páry [kg/(m2s)]
1	0.2771	0.3903	6.574E-0008

Rocní bilance zkondenzované a vyparené vodní páry:

Množství zkondenzované vodní páry za rok Mc,a: **0.0534 kg/(m2.rok)**
Množství vyparitelné vodní páry za rok Mev,a: **3.0451 kg/(m2.rok)**
Ke kondenzaci dochází pri venkovní teplote nižší než -5.0 C.

Poznámka: Hodnocení difúze vodní páry bylo provedeno pro predpoklad 1D šírení vodní páry prevažující skladbou konstrukce. Pro konstrukce s výraznými systematickými tepelnými mosty je výsledek výpoctu jen orientacní. Presnejší výsledky lze získat s pomocí 2D analýzy.

CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF CIVIL ENGINEERING

TECHNICAL REPORT OF ADMINISTRATIVE BUILDING
PART 2 :STRUCTURAL SYSTEM

BASHAR ALACHKAR 2020

Content:

GENERAL DESCRIPTION OF THE BUILDING:

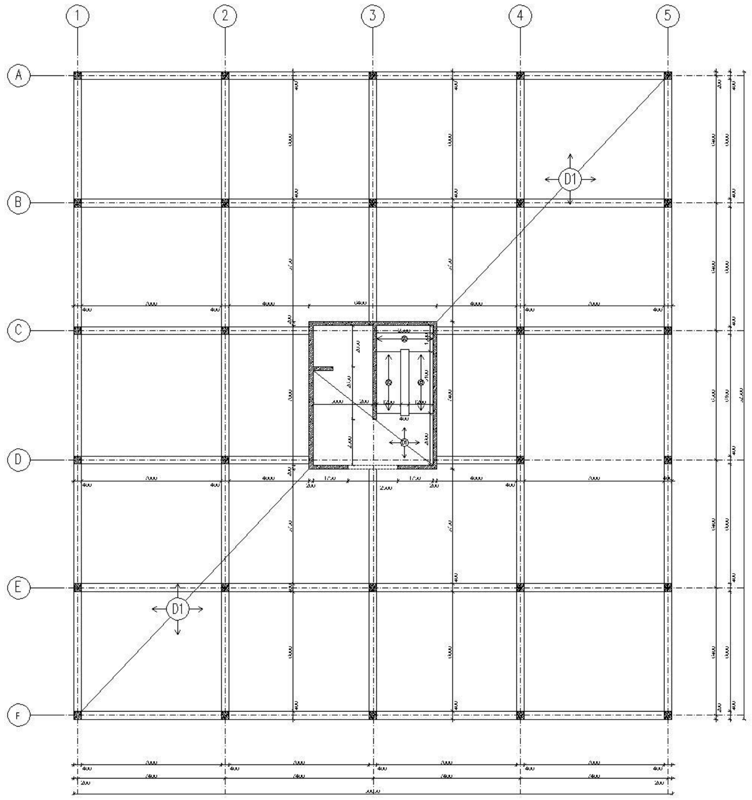
PROJECT NAME: ADMINISTRATIVE BUILDING.
LOCATION: VYNOHRADY,BRNO,CZECHIA
FUNCTION OF THE BUILDING: OFFICE BUILDNIG.
STAGE : BUILDING PERMITS.

DRAWING DOCUMENTATION:

1. EVALUATION OF STRUCTURAL SOLUTION IN BASEMENT:
2. EVALUATION OF STRUCTURAL SOLUTION IN GROUND FLOOR:
3. EVALUATION OF STRUCTURAL SOLUTION IN GROUND FLOOR:

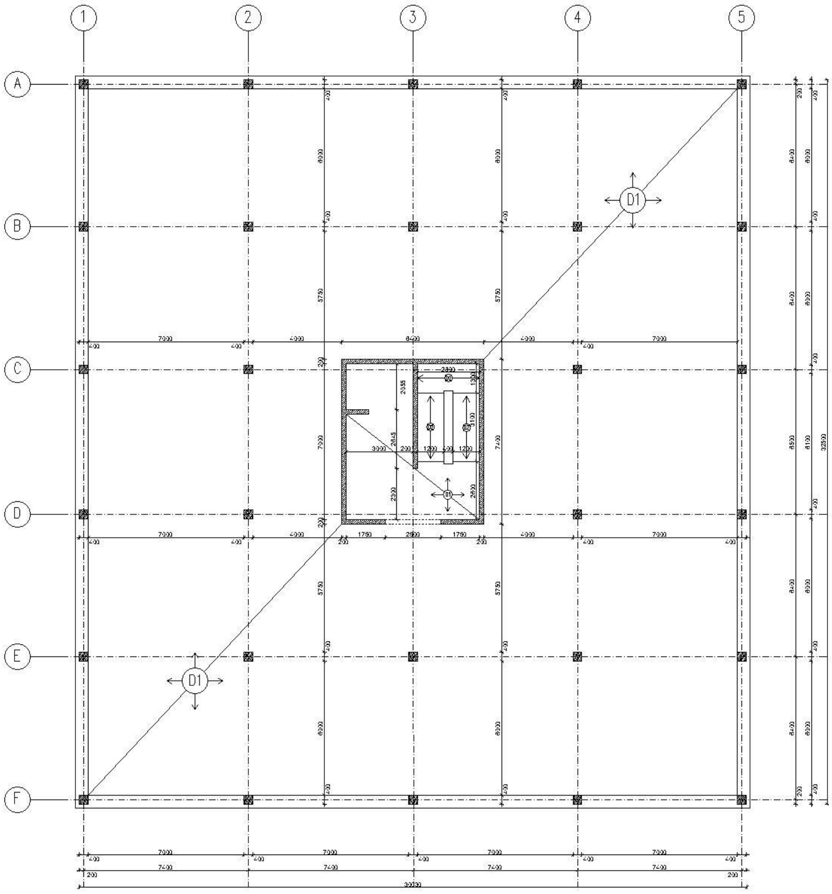
STRUCTURAL SOLUTION IN BASEMENT:

IN THE BASEMENT SOLVING THE STRUCTURAL SOLUTION IS A TWO-WAY CONCRETE FLAT SLAB WITH DEPTH H = 230 MM SUPPORTED BY (400 X 400) MM. ALSO SLAB OF THE STAIRCASE IS CONSTRUCTED AS A ONE-WAY SLAB WHICH IS SUPPORTED IN CONCRETE WALLS.THIS SOLUTION CAN REDUCE BOTH DEPTH AND REINFORCEMENT OF THE SLAB,



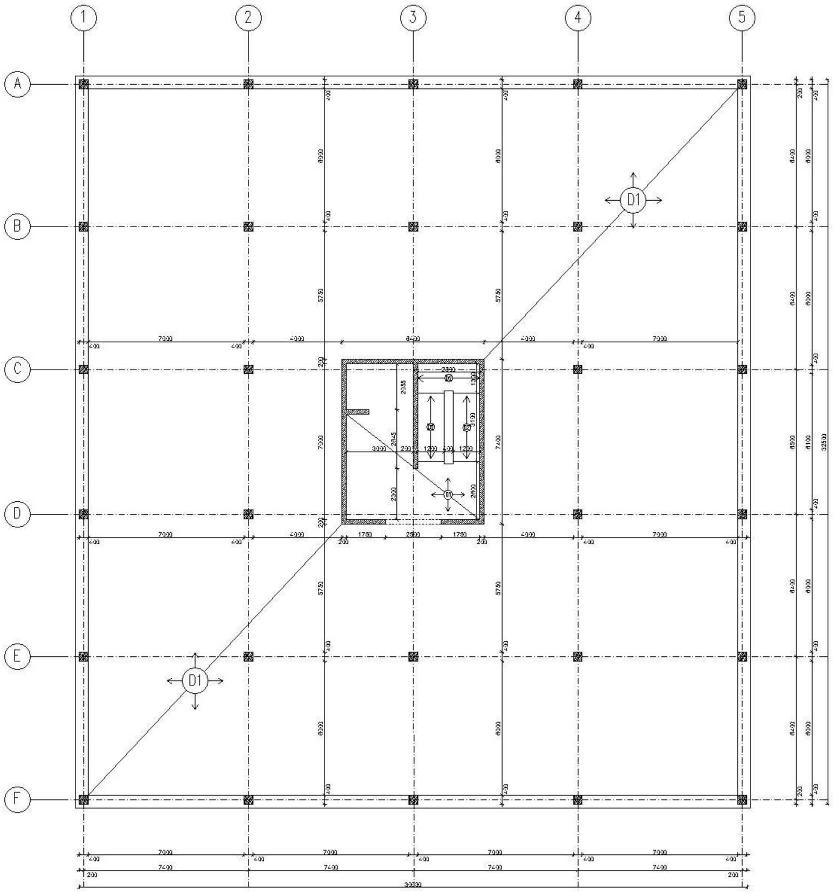
STRUCTURAL SOLUTION IN GROUND FLOOR:

IN THE GROUND FLOOR THE STRUCTURAL SOLUTION IS THAT THE TWO-WAY CONCRETE FLAT SLAB WITH DEPTH H = 230 MM SUPPORTED BY (400X400) MM COLUMNS .300 MM POROTHERM BRICKS IN ALL EXTERNAL PARTS OF THE BUILDING IN THE BOTH DIRECTIONS. ALSO SLAB OF THE STAIRCASE IS ASSUMED AS A ONE-WAY SLAB WHICH IS SUPPORTED IN CONCRETE WALLS.



STRUCTURAL SOLUTION IN GROUND FLOOR:

IN THE 2ND , 3TH , 4TH FLOORS ,THE STRUCTURE IS THAT THE TWO-WAY CONCRETE FLAT SLAB WITH DEPTH H = 230 MM SUPPORTED BY (400X400) MM COLUMNS WHILE 300MM POROTHERM BRICKS IN ALL EXTERNAL PARTS OF THE BUILDING IN THE BOTH DIRECTIONS. ALSO SLAB OF THE STAIRCASE IS ASSUMED AS A ONE-WAY SLAB WHICH IS SUPPORTED IN CONCRETE WALLS.



PRELIMINARY DESIGN (DESIGN DIMENSIONS OF ALL ELEMENTS)
ADMINISTRATIVE BUILDING

1. DEPTH OF THE SLAB: H_S

ONE-WAY SLAB

1.1- EMPIRICAL ESTIMATION:

$D_S \geq \left(\frac{l}{Kc1.kc2.kc3.\gamma d,tab}\right)$

CONCRETE CLASS: C30/37

$D_S \geq \left(\frac{7000}{1.1.1,2.30,8}\right)$

STEEL: B500B

$D_S \approx 190mm$

H_S = DS+C=190+25= 215MM
H_S = 230MM **220 WILL NOT MATCH SPAN DEPTH RATIO**

1.2- EFFECTIVE DEPTH: $D = H_S - C - \frac{\emptyset}{2}$

1.2.1- COVER DEPTH: C → $C = C_{MIN} + \Delta C_{DEV}$ → 100 YEARS WORK LIFE, STRUCTURAL CLASS X0

$C_{MIN}=MAX(C_{MIN,B}:C_{MIN,DUR}:10)MM$ → $C_{MIN}=MAX(10:10:10)MM$ → C_{MIN}= 10 MM

$C = C_{MIN} + \Delta C_{DEV}$ → C = 20 → C = 25 MM.

$D = H_S - C - \frac{\emptyset}{2}$ →

STEEL BAR: Ø 10 MM

$D = 230 – 25 - \frac{10}{2}$ → D = 195 MM.

D = 195 MM.

1.3- SPAN/DEPTH RATIO (DEFLECTION CONTROL):

$\Lambda = \frac{L}{D} \leq \Lambda_{LIM} = K_{C_1}K_{C_2}K_{C_3}\Lambda_{D,TAB}$

$\Lambda = \frac{7000\ MM}{195\ MM} \leq \Lambda_{LIM}$ = 1*1*1.2*30.8 ?

K_{C_1}- EFFECT OF SHAPE =1.0

K_{C_2}- EFFECT OF SPAN = 1.0

K_{C_3}- EFFECT OF REINFORCEMENT = 1.2

$\Lambda_{D,TAB}$ FOR SLAB CONSIDER THE VALUE FOR 0.5% REINFORCEMENT RATIO, C30/37 = 30.8 → Λ = 35.89 < Λ_{LIM} = 36.96 OKAY

2. DIMENSION OF THE COLUMN:

$N_{RD} \geq N_{ED}$?

3.1- CALCULATION OF THE LOAD:

SLAB LOAD					
			CHARACTERISTIC	Γ_F	DESIGN
			[KN/M²]		[KN/M²]
PERMANENT					
	SELF-WEIGHT	$0.23m \times 25 \frac{kN}{m^3}$	5.74	1.35	7.76
	OTHER		1.56	1.35	2.033
	∑		7.3	1.35	9.855
VARIABLE					
	CATEGORY B		2.5	1.5	3.75
∑			9.8		≈14
ROOF LOAD					
			CHARACTERISTIC	Γ_F	DESIGN
			[KN/M²]		[KN/M²]
PERMANENT					
	SELF-WEIGHT	$0.2m \times 25 \frac{kN}{m^3}$	5.75		
	OTHER		2		
	∑		7.75	1.35	10.46
VARIABLE					
	SNOW		0.56	1.5	0.84
∑			8.31		≈12

3.2- CALCULATION OF VARIABLE LOAD:

SNOW LOAD S_K: $s_k = \mu_i C_e C_t s$ S_K = 0.8*1*1*0.7 S_K = 0.56

3.3- CALCULATION OF N_{ED}:

3.3.1- TRIBUTING AREA TRIBUTARY

A = 7*6 = 42 M^2

3.3.2- LOAD FROM THE SLAB:

5 * TYPICAL FLOOR = 5 * 42 M^2 * 12 $\frac{kN}{m^2}$ = 2520 KN

1 * ROOF = 1 * 42 M^2 * 12 $\frac{kN}{m^2}$ = 504 KN

∑ = 3024 KN

3.3.4- ESTIMATION SELF-WEIGHT OF THE COLUMN ≈25 KN

N_{ED} = 3024 KN + 25 KN
N_{ED} = 3050KN.
3.3.5- $N_{RD} \geq N_{ED}$
$N_{RD} \geq N_{ED} \rightarrow N_{RD} = 0.8\ A_C\ F_{CD} + A_S\ \sigma_s$ $A_S = 0.02\ A_C$
3024 KN = 0.8 A_C * 20000 + 0.02 A_C * 400000 σ_s= 400MPA
MIN $A_C = 0.126\ M^2$

RECTANGULAR COLUMN: 400 X 400 MM

$A_C = 0.16$
$N_{RD} = 0.8\ A_C\ F_{CD} + A_S\ \sigma_s \geq N_{ED}$ = 260.5 KN ?
$N_{RD} = 0.8 * 0.16M^2 * 20000\ \frac{kN}{m^2} + 0.02 * 0.16\ M^2 * 400000\ \frac{kN}{m^2}$
N_{RD} = 3840 KN > N_{ED} = 3024 KN. OKAY.

DESIGN OF THE STAIRCASE:

1. **DESIGN OF THE GEOMETRY OF THE STAIRCASE:**
   1.1- DIMENSION OF THE STRUCTURE:
   HEIGHT OF THE FLOOR H_K =3200 MM
   DEPTH OF THE MAIN SLAB H_S = 200 MM
   DEPTH OF FLOOR STRUCTURE H_F = 200 MM
   THICKNESS OF CLADDING OF THE STAIRS H_C = 30 MM

1. 2- DIMENSIONS OF THE STAIRCASE
IDEAL HEIGHT OF ONE STEP IN THE ADMINISTRATION BUILDING IS 160 MM
$\frac{3200}{160} = 20 \rightarrow$ 2 STEPS (2 FLIGHTS WITH 10 STEPS EACH)
HEIGHT OF ONE STEP $H = \frac{3200}{20}$ = 160 MM
WIDTH OF ONE STEP $B = 630 – 2H$ = 310 MM

STAIRCASE WITH 160/310 MM STEPS, 2 FLIGHTS WITH 10 STEPS EACH

1.3- OTHER DIMENSIONS:
WIDTH OF THE FLIGHT = 1200 MM
WIDTH OF THE LANDING = 1200 MM
SLOPE OF THE STAIRCASE IS □□= ARCTAN $\frac{160}{310}$ = 27.3°.

FUNDAMENTAL REQUIREMENTS:

USED DOCUMENTS, STANDARDS

ČSN EN 1990 EUROCODE: BASIS OF STRUCTURAL DESIGN

ČSN EN 1991-1-1 EUROCODE 1: ACTIONS ON STRUCTURES: GENERAL ACTIONS - DENSITIES, SELF-WEIGHT AND IMPOSED LOADS.

ČSN EN 1991-1-3 EUROCODE 1: ACTIONS ON STRUCTURES: GENERAL ACTIONS - SNOW LOADS

ČSN EN 1991-1-4 EUROCODE 1: ACTIONS ON STRUCTURES: GENERAL ACTIONS - WIND

ČSN EN 1992-1-1 EUROCODE 2: DESIGN OF CONCRETE STRUCTURES: GENERAL RULES AND RULES FOR BUILDINGS

ČSN EN 1993-1-1 EUROCODE 3: DESIGN OF STEEL STRUCTURES: GENERAL RULES AND RULES FOR BUILDINGS

ČSN EN 1996-1-1 EUROCODE 6: DESIGN OF MASONRY STRUCTURES: GENERAL RULES FOR REINFORCED AND UNREINFORCED MASONRY STRUCTURES.

SOURCE: HTTP://EUROCODES.JRC.EC.EUROPA.EU/SHOWPAGE.PHP?ID=13

CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF CIVIL ENGINEERING

TECHNICAL REPORT OF ADMINISTRATIVE BUILDING
PART 3 :FOUNDATION

BASHAR ALACHKAR 2020

CONTENT

GENERAL DESCRIPTION OF THE BUILDING:

PROJECT NAME: ADMINISTRATIVE BUILDING.
LOCATION: VYNOHRADY,BRNO,CZECHIA
FUNCTION OF THE BUILDING: OFFICE BUILDNIG.
STAGE : BUILDING PERMITS.

MATERIALS:

XC1- FOR INTERNAL SLABS AND FOUNDATIONS C37/30 STEEL GRADE B500B

XC2 - FOR REINFORCED CONCRETE COLUMNS.
XC1 - DRY OR PERMANENTLY WET CONCRETE INSIDE THE BUILDING WITH LOW AIR HUMIDITY .
XC2- WET RARELY DRY CONCRETE SUFFER SUBJECTED TO THE LONG TERM WATER LIKE MANY FOUNDATIONS.

GEOTECHNIC VALUES OF SOILS OF COVERING FORMATIONS:

GT2: 2.30 – 4.50M	SANDY LOAM AND LOAMY SAND

THE SITUATION OF PADS IS PLACED IN GT2 SANDY LOAM AND LOAMY SAND

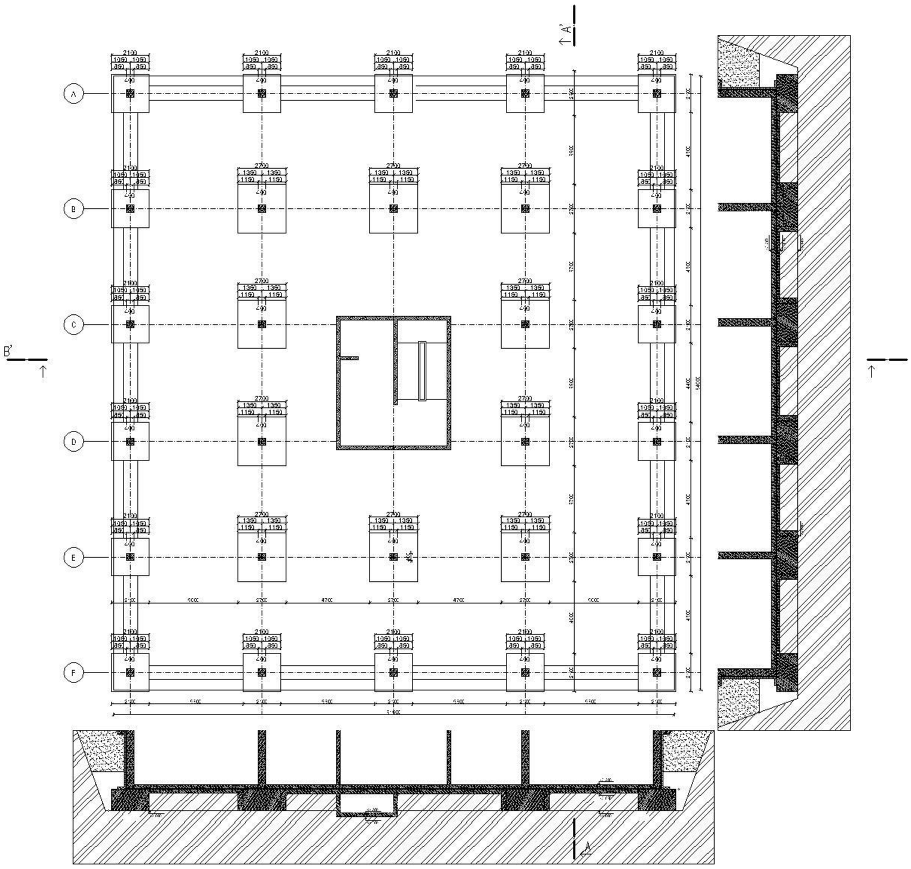
MATERIALS:

FOR THE LOAD BEARING CONCRETE COLUMNS AND SLAB WAS USED CONCRETE C37/30 – XC2, C=30MM. FOR THE REINFORCEMENT WAS USED B500B.

LOADS:

LIFE LOAD FOR ADMINISTRATIVE BUILDINGS IS 3.24 KN/M^2
LIFE LOAD FOR THE PARTITIONS IS 0.8 KN/M^2
SNOW LOAD IS 0.56 KN/M^2

FOUNDATION:



CHARACTERISTIC OF SOIL
SANDY SILT/ GT2,– ANGLE OF INTERNAL FRICTION = 30°
LOAD BEARING CAPACITY FROM TABLE = 275 KPA
C’ = 0 KPA
GAMMA IS 18 KN/M^3

FOUNDATION PADS
PAD DIMENSIONS – 2.1X2.1X1.2M
PAD DIMENSIONS – 2.7X2.7X1.2M
DESIGNED BY RULES OF 1 GEOTECHNICAL CATEGORY.

PRELIMINARY DESIGN OF FOUNDATION PAD

A 11.00 M2 A=VDN/RDT

SIDE OF FOUNDATION PAD 3.32 M

COEFFICIENT CALCULATION

foundation pad dimensions	
b	2.7
l	2.7
h	1
d	1.2

load bearing coefficient		
Nc	20.46	φd>0
Nq	10.45	
Ngamma	6.55	
shape of foundation pad coefficient		
sq	1.419452082	
sc	1.46	
sgamma	0.7	
depth of foundation coefficient		
dc	1.07	
dq	1.06	
dgamma	1	
coefficient of slope of force		
ic	1	
iq	1	
igamma	1	

R/A 450.38 KPA LOAD BEARING CAPACITY OF SOIL

STRESS BELOW FOUNDATION PAD

ΣD 415 KPA

ΣD<R/A 415 < 450 **OK**

PRELIMINARY DESIGN OF FOUNDATION PAD

A 6.60 M2 A=VDN/RDT
SIDE OF FOUNDATION PAD 2.57 M

Coefficient calculation

foundation pad dimensions	
b	2.1
l	2.1
h	1
d	1.2

load bearing coefficient		
Nc	20.46	φd>0
Nq	10.45	
Ngamma	6.55	
shape of foundation pad coefficient		
sq	1.419452082	
sc	1.46	
sgamma	0.7	
depth of foundation coefficient		
dc	1.08	
dq	1.07	
dgamma	1	
coefficient of slope of force		
ic	1	
iq	1	
igamma	1	

R/A 428.13 kPa load bearing capacity of soil

stress below foundation pad
σd 411 kPa

σd<R/A 411 < 428 **ok**

Eurocodes:
EN 1990 – Basis of structural design
EN 1991 – Action of structures
EN 1992 – Design of concrete structures
EN 1996 – Design of masonry structures
EN 1997 – Geotechnical design

Softwares:

- AutoCAD 2017
- MS Office
- Excel

Attachments:

a) Calculation of foundation
b) Drawings: 1. Foundation – plan

CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF CIVIL ENGINEERING

TECHNICAL REPORT OF ADMINISTRATIVE BUILDING
PART 4 :BUILDING SERVICE

BASHAR ALACHKAR 2020

CONTENTS:

GENERAL DESCRIPTION OF THE BUILDING:

PROJECT NAME: ADMINISTRATIVE BUILDING.
LOCATION: VYNOHRADY,BRNO,CZECHIA
FUNCTION OF THE BUILDING: OFFICE BUILDNIG.
STAGE : BUILDING PERMITS.

DRAWING DOCUMENTATION:

TYPICAL, GROUND FLOORS AND BASEMENT DRAINAGE SYSTEMS.

RAIN DRAINAGE AND INTERNAL DRAINAGE SUPPLY.

TYPICAL AND GROUND FLOORS AND BASEMENT WATER SUPPLY SYSTEMS.

TYPICAL AND GROUND FLOORS AND BASEMENT DRAINAGE SYSTEMS.

BASEMENT VENTILATION SYSTEMS.

ROOF DRAINAGE SYSTEM

DRAINAGE SYSTEMS:

BUILDING DRAIN CONNECTION:

DETAILS AND SOLUTION OF THE SYSTEM IS INSERTED IN ATTACHMENT WHICH IS CONSISTS OF DRAINAGE AND RAINWATER WHILE EACH OF THEM IS SEPARATED.

THE CONNECTION OF THE DRAINAGE PIPE IS PVC DN 125 AND RAINWATER IS PVC DN 125 AND MUST BE CONNECTED TO AN EXISTING SEWERAGE NETWORK ADMINISTRATOR.

THE SLOPE OF BUILDING DRAIN CONNECTION IS CONSIDERED AS 5% (FOR DN 200).

THE MAN HOLE WILL BE IN FROST-FREE DEPTH AND WILL BE CONCRETED AND FITTED WALK-ON COVER.

SHAFTS DIMENSIONS

S01 SHAFT 700X150MM

S02 SHAFT

S03 AND S04 SHAFTS 200X400MM

THE DRAIN CONNECTION WILL BE MADE FROM PLASTIC PIPES.

THERE ARE TWO PIPES RAINWATER AND WASTE WATER WHICH ARE CROSSING FROM THE SAME SHAFT WITHOUT INTERSECTION.

BUILDING DRAIN

GENERALLY, THE SLOPE OF BUILDING DRAIN IS 5% IN THIS CASE IT WILL BE USED PLASTIC PIPES. THE DIAMETERS CHANGES FROM 50MM UP TO 150MM WITH THE KNEE PIPE WITH ANGLE OF 45◦.

WASTE WATER INTERNAL DISTRIBUTION:

ALL OF THE WASTE WATER PIPES ARE MADE UP OF PVC PIPES, WITH DIAMETERS DN 125-125 -200 MM

THE PIPES WITH DIAMETERS DN 125,150 AND 200 MM , IT IS CONDUCTED IN PRE-PREPARED DITCH.

ALSO AS A RESULT WE NEED TO HAVE FIXED ALL OF THE PIPES FOR SAFETY AT A DISTANCE OF MOUNTING BRACKETS FOR A GOOD FUNCTIONALITY. DRAIN PIPES ON THE ROOF SHALL BE EQUIPPED WITH THE VENTILATION HEAD.

THE DRAINAGE PIPES IS DIRECTED TO THE BASEMENT WITH THE DIAMETER OF (DN150MM) AFTER THAT THE DRAIN PIPES IS DIRECTED THROUGH TO THE BASEMENT WITH A WIDER PIPE OG (DN200MM) WALL AND ALSO IN THE BASEMENT WALL THERE ARE SEVERAL OPENING WHICH ARE PROVIDED FOR PASSAGES OF THE SWERAGE PIPES.

THERE ARE 2 RAINWATER PIPES WITH THE DN125 WHICH DRAINS THE RAINWATER FROM THE ROOF TO THE BASEMENT.

BASIC MATERIAL:

ALL PVC PIPES WHICH ARE USED IN THE BUILDING VARIES BETWEEN 100MM AND 200MM.

PIPES ARE PREVENTED FROM FREEZING BECAUSE THEY ARE ALL PLACED INSIDE THE BUILDING.

DRAINS CLEANING:

THE PROCESS OF CLEANING THE DRAINS WILL BE IMPLEMENTED BY VERTICAL DRAINS FROM THE ROOF TOP THROUGH TO THE VENTILATION CORNERS AND OPENNINGS.

HORIZONTAL FIXTURE BRANCH:

DUE TO THE FACT SLOPE OF 5% IS APPLIED. USED MATERIAL WOULD BE PLASTIC PIPES WITH DN 150. THE PIPES ARE LOCATED IN THE UNDERGROUND FLOOR.

RAINWATER

VERTICAL RAIN PIPES AND THIS RAINWATER DRAINAGE IS MADE BY PVC PIPES.THE DIAMETER OF THESE PIPES WHICH ARE RESPONSIBLE OF THE DRAINAGE OF RAINWATER ARE PROVIDED WITH A DIAMETER OF DN125MM.

WATER SUPPLY SYSTEMS:

SOURCE OF DRINKING WATER:

THE SOURCE OF DRINKING FRSH WATER IS CENTRAL CONNECTION OF FRESH WATER FROM THE MAIN PROVIDING PIPES FROM THE STREET INFRONGT OF THE BUILDING.

BUILDING WATER SUPPLY CONNECTION:

WATER SUPPLY CONNECTION WILL BE MADE FROM PIPES, DIAMETER 25MM.

FRESH WATER SUPPLY CONNECTION IS ATTACHED IN SITUATION.

WATER CONNECTION WILL BE DN25 POLYPROPYLENE AND WILL BE CONNECTED TO THE EXISTING WATER SYSTEM NETWORK UNDER PRESSURE.

WATER METER ASSEMBLY:

THE ASSEMBLY OF WATERMETER WILL BE PLACED IN THE UNDERGROUND LEVEL .

HORIZONTAL PIPING:

HORIZONTAL PIPES HAS DECLINATION OF 0.5%. WHILE HORIZONTAL PIPES ARE MADE FROM COPPER. THE PIPES ARE PLACED MAINLY IN THE WALLSAROUND THE BATHROOM AND KITCHEN ROOM.

VERTICAL PIPING:

ALL VERTICAL PIPES ARE MADE FROM COPPER. IT IS PLACED IN THE VERTICAL SHAFTS. THE HYDRANT WATER SUPPLY PIPE IS PLACED IN THE BEARING WALL.

.

OUTLET VALVE: THESE VALVES ARE ANGLE VALVES WHICH ARE MADE FROM CHROME.

FUNCTIONALITY AND INSTALLATIONS:

BOILER ROOM IS LOCATED IN THE BASEMENT OF THE BUILDING.

2 X HEATER TYPE VITOCELL 100-V - VIESMANN 200 L.

MORE INFORMATION,

THE COLD WATER IS CONNECTED TO THE HEATER AND IS TAKEN OUT HOT WATER AND CIRCULATION PIPE WITH IS PLOTTED WITH CIRCULATION PUMP.

FIXTURES AND FITTINGS:

OBVIOUSELY IN THE BASEMENT PLANE THERE **O**CCURS 0 OUTLET FITTINGS.

FUNCTIONALITY IN THE GROUND FLOORS.9X SINK, 15X CORNER VALVE (TOILET), 1X KITCHEN SINK,.

IN THE TYPICAL FLOOR.9X SINK, 1X KITCHEN SINK, 15X CORNER VALVE (TOILET)..

WATER CONSUMPTION MEASUREMENTS:

THE FUNCTION OF WATER CONSUMPTION IS ORIGINALLY MEASURED IN METER SHAFT, BY USING OF HYDROMETRIC REPORTS WHICH IS SUPPLIED BY THE NETWORK ADMINISTRATOR, WHO WILL INTERVALS TO READ THE STATUS OF THE METER. LONGER SECONDARY WATER METERS WILL BE INSTALLED IN EACH RESIDENTIAL UNITS.

CONCLUSION:

GENERALLY WATER SUPPLY CONNECTION AND ACCOMPLISHMENT OF WORK IS ACCORDING TO THE STANDARDS CZECH REPUBLIC AND THE EUROPEAN UNION.

CSN 73 66 60 - INDOOR WATER.

CSN 73 66 55 - CALCULATION OF INTERNAL WATER.

EN 806-3 - INTERNAL DISTRIBUTION OF WATER FOR HUMAN CONSUMPTION

H 132 98 - HEATER WATER.

CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF CIVIL ENGINEERING

.

TECHNICAL REPORT OF ADMINISTRATIVE BUILDING
PART 5 :FIRE SAFETY

BASHAR ALACHKAR 2020

Content

1.GENERAL INFORMATION AND LOCATION:
IDENTIFICATION DATA:

PROJECT NAME:	ADMINISTRATIVE BUILDING.
LOCATION:	VYNOHRADY,BRNO,CZECHIA
FUNCTION OF THE BUILDING:	OFFICE BUILDNIG.
STAGE :	BUILDING PERMITS.

DRAWING DOCUMENTATION:

- UNDERGROUND FIRE SAFETY SOLUTION.
- GROUND FLOOR FIRE SAFETY SOLUTION.
- TYPICAL FLOOR FIRE SAFETY SOLUTION.

FIRE COMPARTMENT:

THIS IS MENTIONABLE THAT IN EACH FLOORS THERE ARE ONLY ONE FIRE COMPARTMENTS (FC) IS DESIGNED BUT NOT FOR BASEMENT FLOOR BECAUSE THERE ARE THREE (FC).
FIRE LOAD IS CALCULATED ACCORDING THE FOLLOWING FORMULA:
BUILDING P_V = 45 KG/M^2, III. FRG
PEW P_V = 30KG/M^2, II. FRG

THIRD FIRE COMPARTMENT IS USED FOR THE WHOLE BUILDING EXCEPT THE PROTECTIVE EXCAPE WAY WHICH HAS SECOND FIRE COMPARTMENT.

FIRE RESISTANCE:

1. PERIMETER WALL, UNDERGROUND LEVEL REW 45 DP1
2. EXTERNAL WALL GROUND FLOOR EI 60 DP1
3. EXTERNAL WALL TYPICAL FLOORS EI 60 DP1

FIRE CEILINGS:

REINFORCED CONCRETE SLAB WITH A THICKNESS OF 230MM IS CONSTRUCTED IN THE CEILINGS BETWEEN UNDERGROUND FLOOR , GROUND FLOOR AND THE ROOF STRUCTURE.
IN THIS CASE AND DEPENDING ON THIRD FIRE COMPARTMENT LEVEL AND CALCULATION.

1. CEILING BETWEEN UNDERGROUND LEVEL AND GROUND LEVEL REI 45 DP1
2. CEILING BETWEEN TYPICAL FLOORS LEVEL REI 45 DP1
3. CEILING BETWEEN LAST FLOOR AND ROOF REI 45 DP1

ESCAPE ROUTES:

ESCAPE WAYS (EW) ARE DIVIDED TO TWO TYPES: NON-PROTECTIVE ESCAPE WAY(NPEW) AND PROTECTIVE ESCAPE WAY (PEW)
ACCORDING TO ČSN 73 0818 – FIRE SAFETY OF BUILDINGS – OCCUPATION OF BUILDINGS:

PEW:

IN THE CENTER OF THE BUILDING EXISTS THE PROTECTIVE ESCAPE WAY WITH AN AREA OF 42M^2.THE MAIN STAIRCASE SYSTEM IS LOCATED IN THE PEW AND IT IS ALSO EQUIPED WITH THE ELEVATOR WHICH IS USED AS A EVACUATION ELEVATOR ALSO.
PEW HAS THE SECOND FIRE COMPARTMENT LEVEL
P_V = 30KG/M^2, II. FRG
THERE IS A PROTECTIVE ESCAPE WAY (PEW) A-P01.01/N04-II CONNECTION ALL STORIES. THE PEW IS COMBINED VENTILATED FOR FORCED INLET AND NATURAL OUTLET AT HIGHEST POINT.
OPENINGS TO PEW ARE GLASS SLIDING DOORS WHICH HAVE LIMIT "EI-C-S". THESE DOORS OPENS AUTOMATICALLY IN CASE OF FIRE AND ARE SMOKE PROVE DOORS .ULTIMATE LENGTH OF PEW = 42,3 M

NPEW:

EACH FLOOR HAS ONE LARGE CORRIDOR WITH A WIDTH OF 1.65M THAT ALLOWS THE MOVEMENT BETWEEN ALL ROOMS REACHING THE PEW.
THESE CORRIDORS ARE PROVIDED WITH FIRE DETECTORS,EMERGENCY LIGHTS AND FIRE EQUIPMENTS.
LENGTH OF EACH NPEW IN THE BUILDING DOES NOT EXCEED THE LIMIT OF 35M.

NUMBER OF EVACUATION PERSON:

	ADMINISTRATIVE BUILDING	
	AREA [M^2]	N0. OF EVACUATED PEOPLE
UL	18(PARKING) X0.5	9
GF	940	68
1	940	72
2	940	72
3	940	72
Σ E	**293 PERSONS**	

STAIRCASE:

IN THE CENTER OF THE BUILDING EXISTS THE PROTECTIVE ESCAPE WAY WITH AN AREA OF 42M^2.THE MAIN STAIRCASE SYSTEM IS LOCATED IN THE PEW.THE STAIRCASE HAS A WIDTH OF STEP 1200MM AND LENGTH OF FLIGHT 3100MM.
1200 > 1100MM (MINIMUM WIDTH).
FIRE EMERGENCY LIGHTNINGS AND DETECTORS ARE PROVIDED ALSO THE STAIRCASE.

FIRE EQUIPMENTS:

EACH FLOOR IS PROVIDED WITH FIRE EQUIPMENTS WHICH RESPECTS THE TYPE AND USAGE OF THE FLOOR.

1. PARKING IS EQUIPPED WITH HYDRANT 20M + 10M STREAM AND FIRE ESTINGUISHER 183B BECAUSE OF CAR EXISTANCE.
2. ALL THE REMAIN FLOORS ARE ALSO EQUIPPED WITH HYDRANT 20M + 10M STREAM AND FIRE ESTINGUISHER 21A.
3. AS MENTIONED BEFORE ALL THE BUILDING SPACES SUCH AS STAIRS, CORRDIDORS, PARKING AND STORES ARE EQUIPPED WITH FIRE DETECTORS AND EMERGENCY LIGHTNINGS.

SUPLLY OF WATER:

THERE IS A WATER PIPELINE DN 150 CONNECTED TO THE HYDRANTS IN EACH FLOOR. THERE IS OUTER ACCESS AREA FOR FIRE-FIGHTING CARS WITH A DIMENSION OF 4X10M^2 AND HYDRANT LOCATED NEXT TO THE MAIN ROAD.

LIST OF DOCUMENTS, CSN:

ČSN 730804 FIRE SAFETY CONSTRUCTION: PRODUCTION OBJECTS - ANNEX I, GARAGES

ČSN 730818 FIRE SAFETY OF BUILDINGS: OBJECT OCCUPATION BY PERSONS

ČSN 730821 FIRE SAFETY OF BUILDINGS: FIRE RESISTANCE OF BUILDING STRUCTURES

ČSN 730833 FIRE SAFETY OF BUILDINGS: HOUSING AND ACCOMMODATION BUILDINGS

ČSN 730872 FIRE SAFETY OF BUILDINGS: PROTECTION OF FIRE EXTINGUISHING STRUCTURES