

CZECH TECHNICAL UNIVERSITY IN PRAGUE
FACULTY OF CIVIL ENGINEERING
DEPARTMENT OF BUILDING STRUCTURES



TECHNICAL REPORT
FIRE SAFETY PART

Created by

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Name of project	Residential building in Prague
Investor:	CTU
Created by :	Ahmed Alkhateeb
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1. Description of the building

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.

1.1. Basic information

The residential building has 1 underground floor and 4 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 14%. Fire height is 12.2m.

1.2. Software

- AutoCAD 2015
- MS Office

2. Fire compartment & fire resistance grade

floor discription	fire compartment	No. of fc	Pv [kg/m2]	fire resistance grade
under ground	parking	1	15	II
	technical room	2	30	III
	PEW	3	-	II
	7x shaft	4-10	-	II
ground floor	storage areas	11	240	VI
	apartment 1	12	70	IV
	apartment 2	13	76	IV
	apartment 3	14	76	IV
	apartment 4	15	83	IV
	apartment 5	16	80	IV
	apartment 6	17	75	IV
	corridor	18	21	III
Last floor	apartment 1	40	80	IV
	apartment 2	41	70	IV
	apartment 3	42	76	IV
	apartment 4	43	76	IV
	apartment 5	44	83	IV
	apartment 6	45	80	IV
	apartment 7	46	75	IV
	corridor	47	21	III

3. Evacuation

Total no. of people = 116 persons

Occupation of persons				
type	name of room	rooms area [m2]	number of persons	
C1	storage areas	80		
C2	apartment 1	37.8	2	
C3	apartment 2	54.2	4	
C4	apartment 3	81.6	4	
C5	apartment 4	34	2	
C6	apartment 5	44.4	4	
C7	apartment 6	72.9	4	
C8	corridor	31.8		
total	-	-	20	
total of persons in the building			116	
EW desgin				
type	name of room	rooms area [m2]	min opening area needed [m2]	opening area [m2]
ew1	stairs	23	2.3	4.16
type of PEW				
fire height =12.2m	hight in underground = 3m			

limit length of NPEW			
type	name of room	one escape way length limit [m]	real length [m]
FC1	storage areas	20	9.4
FC2	apartment 1	20	4.6
FC3	apartment 2	20	8.4
FC4	apartment 3	20	8.4
FC5	apartment 4	20	4.6
FC6	apartment 5	20	5.5
FC7	apartment 6	20	9.1
desgin of strips			
NPEW			
coef. of K			
one escape way	on plane	on down stairs	on staris up
	40		
coef. of E			
	20		
coef. of s			
	1		
u			
	0.500		

PEW		
coef. of K		
on plane	on down stairs	on staris up
160	120	100
coef. of E		
20	20	20
coef. of s		
1	1	1
u		
0.125	0.167	0.2

Residential building fire safety part

occupation of persons				
type	name of room	rooms area [m2]	number of persons	
FC1	apartment 1	80	4	
FC2	apartment 2	37.8	2	
FC3	apartment 3	54.2	4	
FC4	apartment 4	81.6	4	
FC5	apartment 5	34	2	
FC6	apartment 6	44.4	4	
FC7	apartment 7	72.9	4	
FC8	corridor	31.8		
total	-	-	24	
PEW desgin				
type	name of room	rooms area [m2]	min opening area needed [m2]	opening area [m2]
pew1	stairs	23	2.3	5.21
type of PEW				
fire height =12.2m	hight in underground = 3m			
one escape way	grade type : A			

limit length of NPEW				
type	name of room	one escape way length limit [m]	real length [m]	
FC1	apartment 1	20	9.4	
FC2	apartment 2	20	4.6	
FC3	apartment 3	20	8.4	
FC4	apartment 4	20	8.4	
FC5	apartment 5	20	4.6	
FC6	apartment 6	20	5.5	
FC7	apartment 7	20	9.1	
	corridor			
desgin of strips				
NPEW				
coef. of K				
one escape way	on plane	on down stairs	on staris up	
	40			
coef. of E				
	20			
coef. of s				
	1			
u				
	0.500			
PEW				
coef. of K				
	on plane	on down stairs	on staris up	
	160	120	100	
E				
	20	20	20	
s				
	1	1	1	
u				
	0.125	0.167	0.2	

Residential building fire safety part

evacuation time		
K		
on plane	on down stairs	on stairs up
160	120	100
E		
100	100	100
s		
1	1	1
u		
0.625	0.833	1
Vu		
30	25	20
Ku		
40	30	25
tu [min]		
4.14	4.17	4.21
te =	$1.25 \cdot \sqrt{(hs)/a}$	10.8

4. Fire space & separation space

4.1. Underground

FDA (technical room)				
h [m]	L [m]	opening area [m ²]		
3	4.5	2.25		
P _o	17 ‰	<	40 ‰	
P _o =	40			
d=	1.9 m			
FDA (parking)				
north				
h [m]	L [m]	opening area [m ²]		
3	26	6.6		
P _o	8 ‰	<	40 ‰	
P _o =	40			
d=	1.9 m			
East				
h [m]	L [m]	opening area [m ²]		
3	19	4.5		
P _o	8 ‰	<	40 ‰	
P _o =	40			
d=	1.9 m			
South				
h [m]	L [m]	opening area [m ²]		
3	26	6.75		
P _o	9 ‰	<	40 ‰	
P _o =	40			
d=	1.9 m			
West				
h [m]	L [m]	opening area [m ²]		
3	19	18		
P _o	32 ‰	<	40 ‰	
P _o =	40			
d=	1.9 m			

4.2. Ground floor

FDA [storage rooms]				
h [m]	L [m]	opening area [m2]		
3	9	3.75		
P _o	14 %	< 40 %		
P _o =	40			
d=	1.9 m			
FDA [apartment 1]				
h [m]	L [m]	opening area [m2]		
3	4.5	3.75		
P _o	28 %	< 40 %		
P _o =	40			
d=	3 m			
FDA [apartment 2]				
north part				
h [m]	L [m]	opening area [m2]		
3	8	6		
P _o	25 %	< 40 %		
P _o =	40			
d=	3 m			
east part				
h [m]	L [m]	opening area [m2]		
3	4.8	2		
P _o	16 %	< 40 %		
P _o =	40			
d=	3 m			

Residential building fire safety part

FDA [apartment 3]				
east part				
h [m]	L [m]	opening area [m2]		
3	10.6	11		
Po	33 %	<	40 %	
Po=	40			
d=	3 m			
south part				
h [m]	L [m]	opening area [m2]		
3	8	5		
Po	19 %	<	40 %	
Po=	40			
d=	3 m			
FDA [apartment 4]				
h [m]	L [m]	opening area [m2]		
3	4.5	4		
Po	28 %	<	40 %	
Po=	40			
d=	3 m			
FDA [apartment 5]				
h [m]	L [m]	opening area [m2]		
3	5.5	4		
Po	23 %	<	40 %	
Po=	40			
d=	3 m			
FDA [apartment 6]				
south part				
h [m]	L [m]	opening area [m2]		
3	9.1	6		
Po	22 %	<	40 %	
Po=	40			
d=	3 m			
west part				
h [m]	L [m]	opening area [m2]		
3	8	5		
Po	19 %	<	40 %	
Po=	40			
d=	3 m			
FDA [corridor]				
h [m]	L [m]	opening area [m2]		
3	1.5	2		
Po	50 %	>	40 %	
d=	2.3 m			

4.3. Typical floor

FDA [apartment 1]				
h [m]	L [m]	opening area [m2]		
3	9	3.75		
P _o	14 %	<	40 %	
P _o =	40			
d=	1.9 m			
FDA [apartment 2]				
h [m]	L [m]	opening area [m2]		
3	4.5	3.75		
P _o	28 %	<	40 %	
P _o =	40			
d=	3 m			
FDA [apartment 3]				
north part				
h [m]	L [m]	opening area [m2]		
3	8	6		
P _o	25 %	<	40 %	
P _o =	40			
d=	3 m			
east part				
h [m]	L [m]	opening area [m2]		
3	4.8	2		
P _o	16 %	<	40 %	
P _o =	40			
d=	3 m			

Residential building fire safety part

FDA [apartment 4]				
east part				
h [m]	L [m]	opening area [m2]		
3	10.6	11		
P _o	33 %	<	40 %	
P _o =	40			
d=	3 m			
south part				
h [m]	L [m]	opening area [m2]		
3	8	5		
P _o	19 %	<	40 %	
P _o =	40			
d=	3 m			
FDA [apartment 5]				
h [m]	L [m]	opening area [m2]		
3	4.5	4		
P _o	28 %	<	40 %	
P _o =	40			
d=	3 m			
FDA [apartment 6]				
h [m]	L [m]	opening area [m2]		
3	5.5	4		
P _o	23 %	<	40 %	
P _o =	40			
d=	3 m			
FDA [apartment 7]				
south part				
h [m]	L [m]	opening area [m2]		
3	9.1	6		
P _o	22 %	<	40 %	
P _o =	40			
d=	3 m			
west part				
h [m]	L [m]	opening area [m2]		
3	8	5		
P _o	19 %	<	40 %	
P _o =	40			
d=	3 m			
FDA [corridor]				
h [m]	L [m]	opening area [m2]		
3	1.5	2		
P _o	50 %	>	40 %	
d=	2.3 m			

5. Fire fighter intervention & fire extinguishers

- Fire fighter entrance from the north outside parking entrance 60*6m
- There are external ladders for fire fighters
- 1 hydrant 25m in length
- Transferable extinguishers according to table

fire fighters route will be from the north side of the building

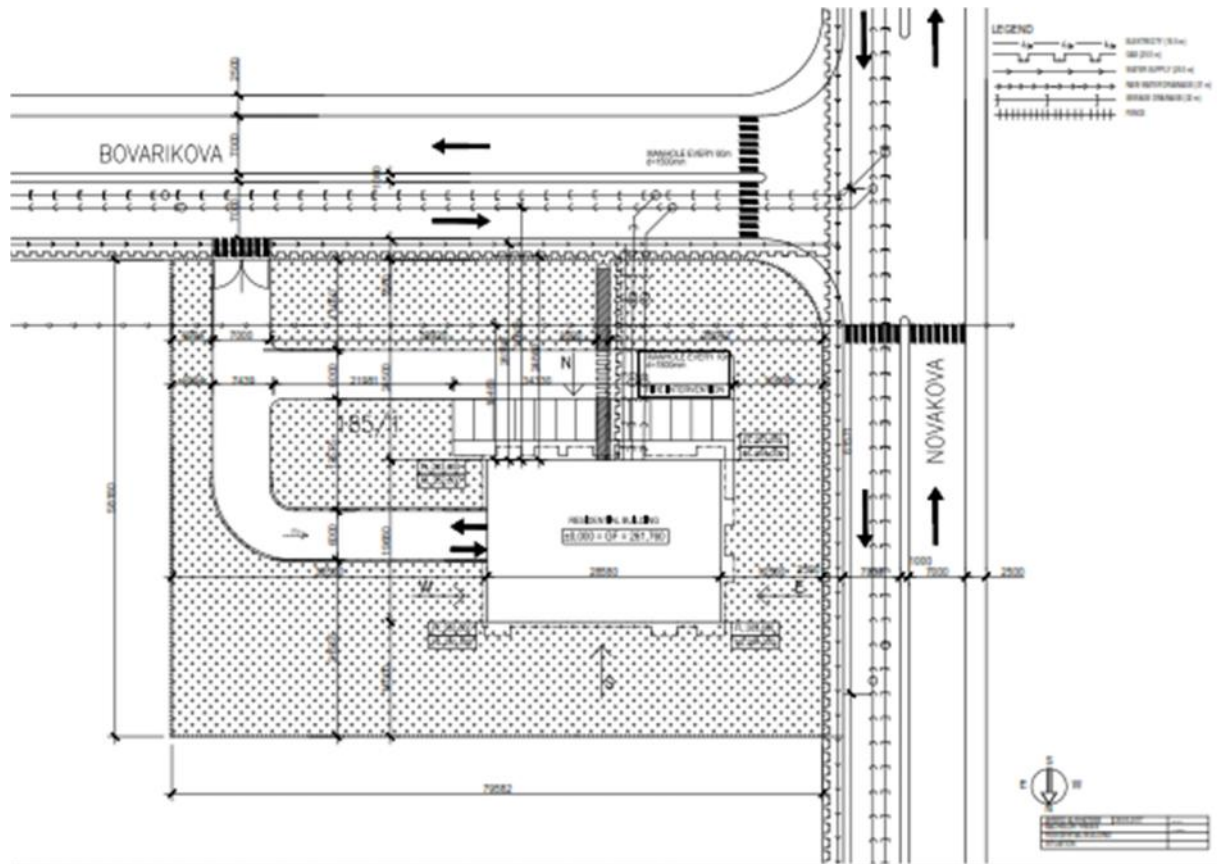
design of extinguishers

1 hydrant in each floor

number of extinguishers

$n_r = 0.15 \cdot \sqrt{S \cdot a \cdot c}$

underground floor								
type	name of room	rooms area [m2]	a	c	n_r	n_{HJ}	n_{PHF}	HJ
FC1	technical room	17		1	1	1	6	1 21B
FC2	parking	508		1	1	3	20	3 70B
[ground floor]								
type	name of room	rooms area [m2]	a	c	n_r	n_{HJ}	n_{PHF}	HJ
FC1	storage areas	80		1	1	1	8	1 8A
Fc2	apartment 1	38		1	1	1	6	1 5A
FC3	apartment 2	54		1	1	1	7	1 5A
FC4	apartment 3	82		1	1	1	8	1 8A
FC5	apartment 4	34		1	1	1	5	1 5A
FC6	apartment 5	44		1	1	1	6	1 5A
FC7	apartment 6	73		1	1	1	8	1 8A
FC8	corridor	32		1	1	1	5	1 5A
[typical floor]								
type	name of room	rooms area [m2]	a	c	n_r	n_{HJ}	n_{PHF}	HJ
FC1	apartment 1	80		1	1	1	8	1 8A
Fc2	apartment 2	38		1	1	1	6	1 5A
FC3	apartment 3	54		1	1	1	7	1 5A
FC4	apartment 4	82		1	1	1	8	1 8A
FC5	apartment 5	34		1	1	1	5	1 5A
FC6	apartment 6	44		1	1	1	6	1 5A
FC7	apartment 7	73		1	1	1	8	1 5A
FC8	corridor	32		1	1	1	5	1 5A



6. List of drawings

1. Plan View of the underground floor
2. Plan View of the ground floor
3. Plan View of the general floor