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SPECIAL MOBILITY STRAND

URBAN AND ARCHITECTURAL MEASURES FOR THE PROTECTION OF THE FIRE /CASE STUDY BANJA LUKA/

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*Prevention of fire protection is ensured by **planning and implementing preventive measures and actions** to prevent the outbreak of fire in the most efficient way.*

In the event of a fire, the risk to human life and health, the endangering of material goods, as well as environmental damage, shall be reduced to a minimum and limited fire at the place of outbreak.



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Categorization by fire threat

*In order to determine the appropriate organization and undertaking the measures necessary for the successful functioning and implementation of fire protection, the Ministry carries out the **categorization of facilities, activities and land** according to the threat of fire, depending on;*

- the technological process that takes place in them;*
- types and quantities of materials produced, processed or stored;*
- types of materials used to build the building;*
- the importance and size of the building;*
- the type of plant cover.*



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Objects, activities and land are classified into the following categories:

- 1) with a high risk of fire outbreaks - the first category of vulnerability to fire;*
- 2) with an increased risk of fire outbreaks – the second category of vulnerability to fire;*
- 3) with a certain risk of outbreaks - third category of fire hazard.*





MEASURES FOR FIRE PROTECTION IN URBANISM

*Fire protection in a spatial and urban plan:
Spatial and urban plan, in addition to the conditions
prescribed by a special law, contain:*

- 1) **sources of water supply and capacity of the city water supply network** that provide sufficient quantities of water for extinguishing the fire;*
- 2) **access roads and passages** to facilities for fire-fighting vehicles;*
- 3) **safety belts between buildings** that prevent the spread of fire;*
- 4) **the distance between the zones** envisaged for housing and facilities for public purposes and the zones envisaged for industrial objects and special purpose objects.*



Water supply sources and the capacity of the city water supply network that provide enough water for fire extinguishing

For powering the hydrant network, any source whose capacity can provide the required amount of fire extinguishing water for a period of 2 hours can be used.

(groundwater from excavated or drilled wells, temporary water supply of surface waters, buried tanks, semi-tanks or above the ground)

- ***External hydrant network*** - *underground and overhead hydrants (it is made in the form of a ring pipeline system, the distance between the two hydrants is not more than 80 m, in the populated areas with predominantly residential buildings - the distance between the external hydrants can be up to a maximum of 150 m, the distance of the hydrants from The wall of the building must be at least 5 m and at most 80m)*



- **Inner hydrant network**
- **Dry hydrant network**
- **Pressure boosting devices**

Technical control of the hydrant network

(Hydrant network with all devices and armature is controlled at least once a year)

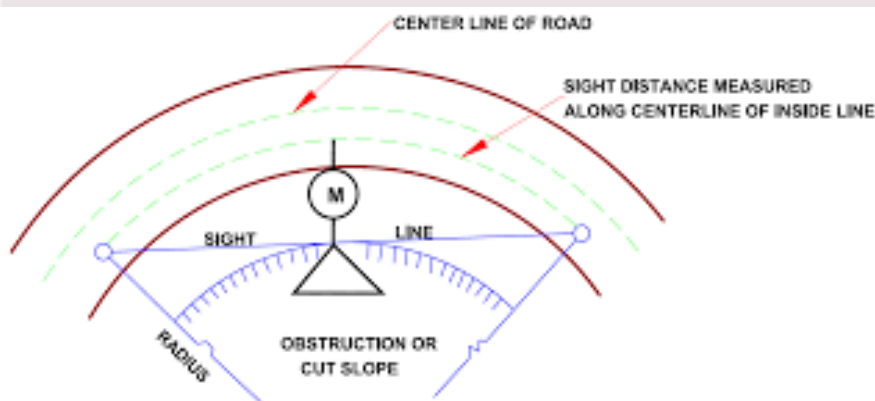
During control, the pressure of water in the hydrant network is measured while simultaneously operating all external and internal hydrants that provide the necessary flow of fire extinguishing water in a particular object. Hydrants are equipped with nozzles with a mouthpiece of 16 mm in diameter, and on the inner hydrants, nozzles with a mouthpiece of 12 mm in diameter are placed. The pressure is measured at the control nozzle on the highest floor or on the hydrant that is farthest it from the connector.



Access roads and passes for fire trucks to objects

The access road for fire trucks has the following characteristics:

- *Minimum width of the carriageway (one-way vehicle movement is 3.5 m, and two-way vehicle movement 6 m);*
- *The inner radius of the curve leaving the vehicle's wheels is 7 m, and the outer radius of the curve is 10.5 m;*
- *The rise (ramp) must be less than 12%, if freezing is then less than 6%;*



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- Access and stopping other vehicles is not allowed on the access road for fire vehicles, especially on the side of the building where the increased risk of fire
- **Preventing access** by other vehicles to an access road for fire-fighting vehicles is carried out: barrier obstacles in the form of disassembling "pyramids", gardens weighing more than 60 kg and less than 100 kg and a wired or similar fence that can be easily cut with a tool that use firefighters;
- Turntables for fire trucks can be: circular, "O" or "P" - where the vehicle is moving only in advance and the "T" shape where the maneuvering of the vehicle is allowed.



Safety belts between objects

The free space between the two buildings if it is wide enough represents the safest fire barrier. The minimum allowed distance between the buildings depends on the type and purpose of the buildings, the fire load, the size of the individual openings, and others.

$$**L_{min} = h1 / 2 + h2 / 2 + a**$$

*where **h1** and **h2** is the height of the adjacent objects and the **constant a** represents the width of the free-of-ruin road and is 4 m.*

FIRE SECTORS - PURPOSE AND OBJECTIVE

The fire department is a space in a building that is separated from other parts by a firewall or an indefinite ceiling.

We look at the fire department as part of a building that will be completely destroyed by the possible fire. In order to minimize the damage, it is trying to minimize the fire sector.



HORIZONTAL FIRE FACILITIES

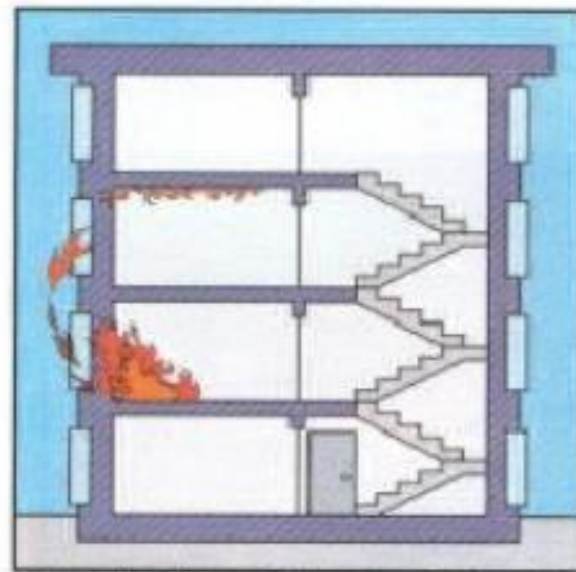
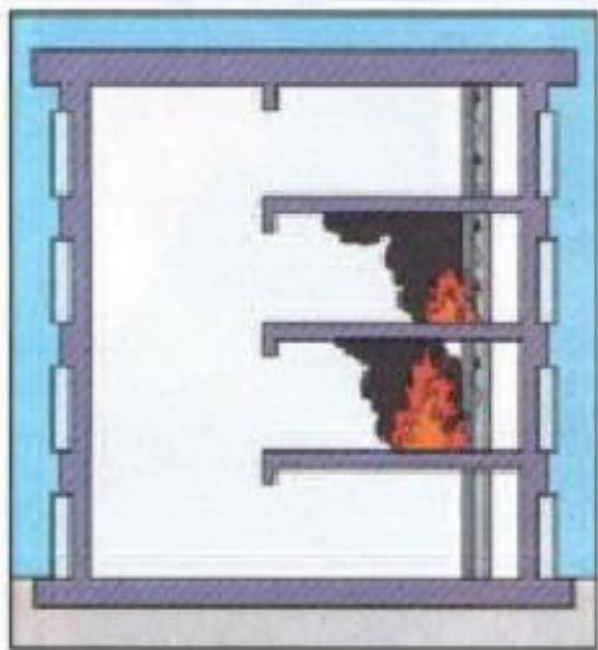
Horizontal barriers - interconnected structures of non-combustible materials with higher fire resistance (1h - 4h) are installed to prevent the spread of fire in the vertical direction.

As a rule, fire barriers should not have any openings on a section, but at the present level of the construction industry it is not possible, because there are a number of openings for installations in the landings. Such sites are very dangerous in terms of fire propagation and must be effectively protected.

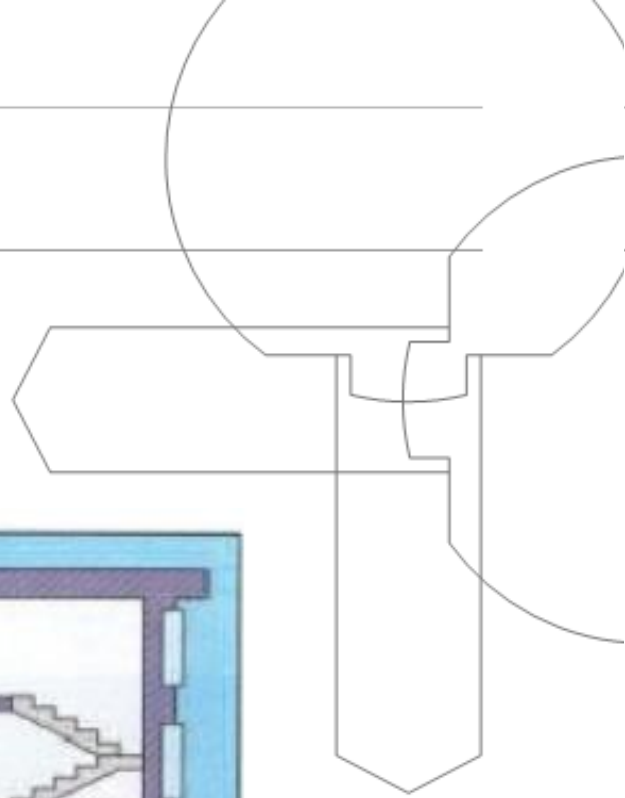


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Spreading from window-to-window, fire propagates vertically.



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FIRE / SAFETY / STAIRS

Exterior staircases - non-combustible material, stairs are not allowed to be located at a distance less than 1.5 m from the facade opening, the height of the guard rail must not be less than 1.2 m, the staircase must not be spiral, the width of the stair arm must be at least than 1,25 m

Interior stairs - enclosed by a wall of fire resistant material of 1.5 hours of fire resistance, must have built-in materials A class which are non-combustible, the staircase must be provided from the fire and smoke



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LIFTS / ELEVATOR/

*Since we can not put any horizontal barriers in the elevators, then the basic protection measure remains a **good insulation of the elevator from the rest of the building** with fireproof constructions.*

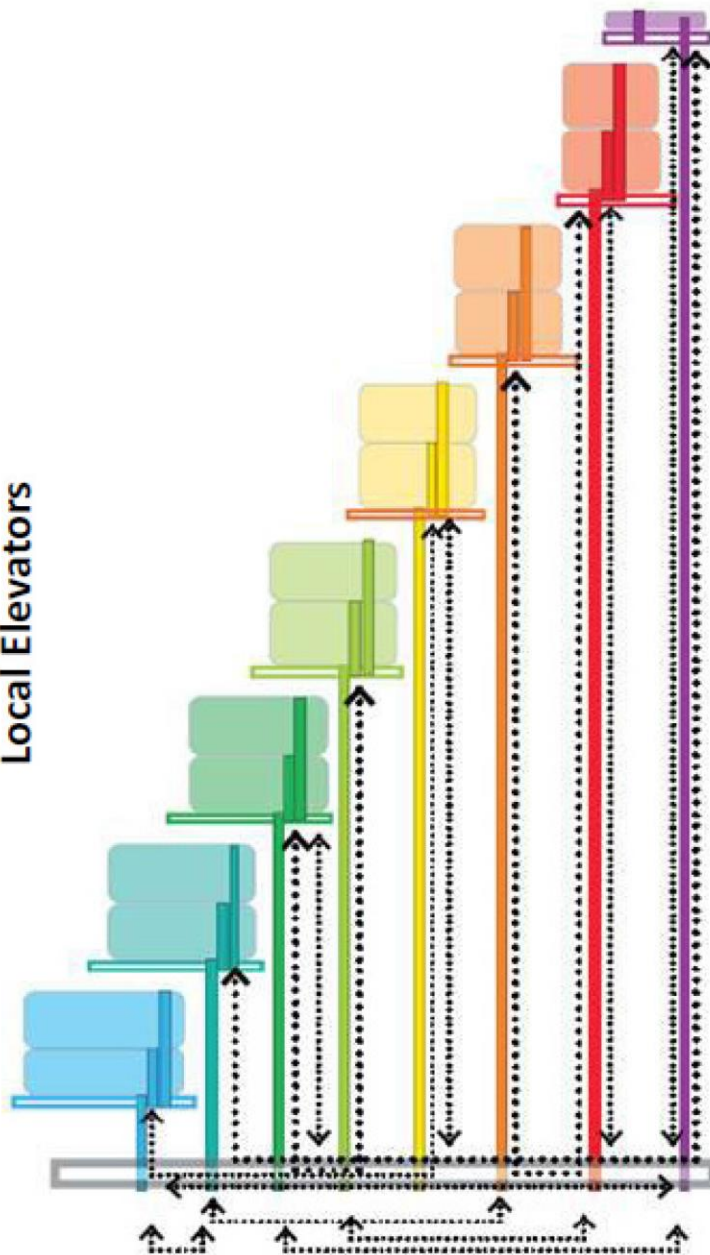
Elevator wall / 2h /, elevator doors / 1 / 2h /, lift installations in the highest part of the lift window in a separate room, in case of danger the elevator cab in the upper part must have an escape hatch.



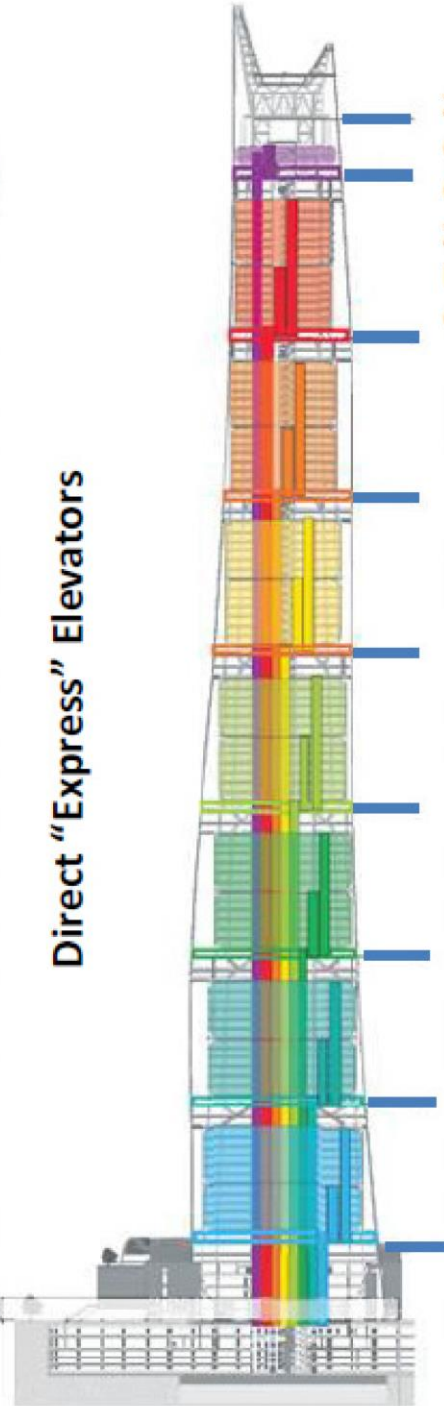
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Local Elevators



Direct "Express" Elevators



- Zone 9
Observation/
Cultural Facilities
- Zone 8
Hotel/Boutique
Office
- Zone 7
Hotel
- Zone 6
Office
- Zone 5
Office
- Zone 4
Office
- Zone 3
Office
- Zone 2
Office
- Zone 1
Retail



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The chimneys

The chimneys are best kept vertically from the basement to the roof above. The maximum deviation in relation to the vertical can be 30 °. The same chimney should not be placed 2 connectors at the same height. Their spacing must be at least 30 cm so as not to disturb the air burst.

When passing through a roof or a ceiling, it must be ensured that there is no flammable substance nearby. Particular care must be taken that the wooden parts of the structure do not pass at a distance less than 8 cm from the outer edge of the chimney.



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case study 1

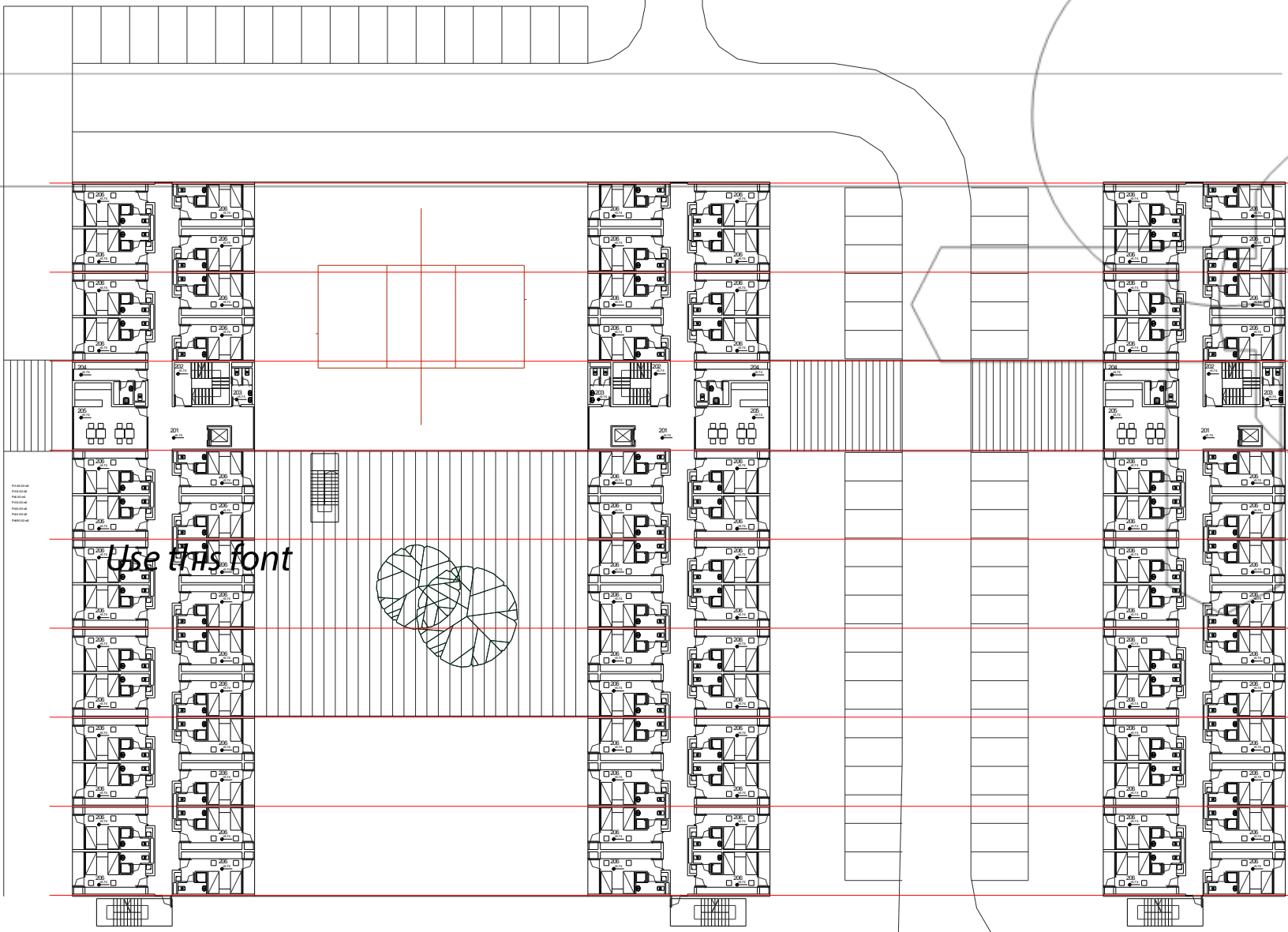
Student dorms
Nikola Tesla *Pavilion 4*
Banja Luka



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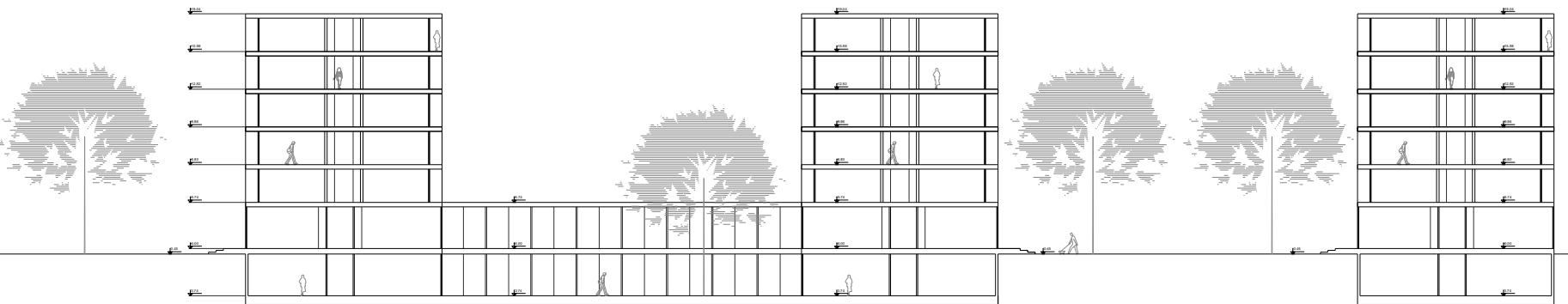
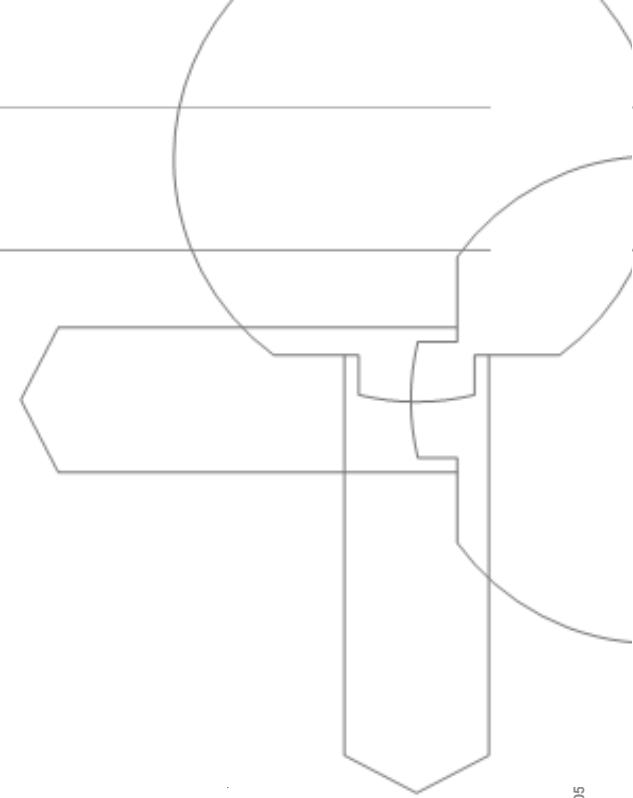
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*Logo of the
institution*

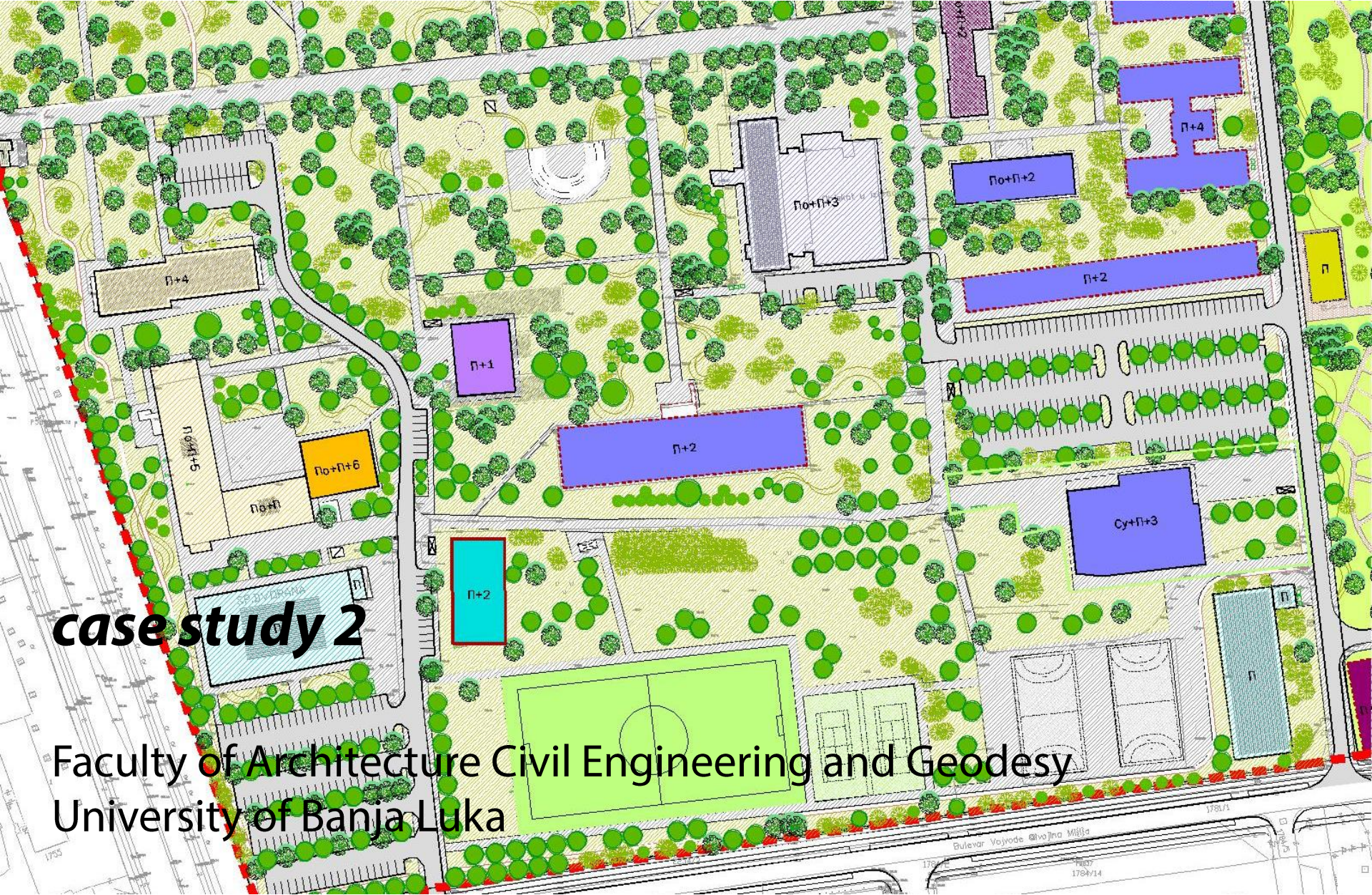
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case study 2

Faculty of Architecture Civil Engineering and Geodesy
University of Banja Luka



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IDEJNO ARHITEKTONSKO RJEŠENJE DOGRADNJE I ADAPTACIJE POSTOJEĆEG OBJEKTA U PROSTORIJE ARHITEKTONSKO-GRAĐEVINSKOG FAKULTETA
LOKACIJA: UNIVERZITETSKI KAMPUS-BULEVAR SRPSKE VOJVOJINE

POSTOJEĆE STANJE



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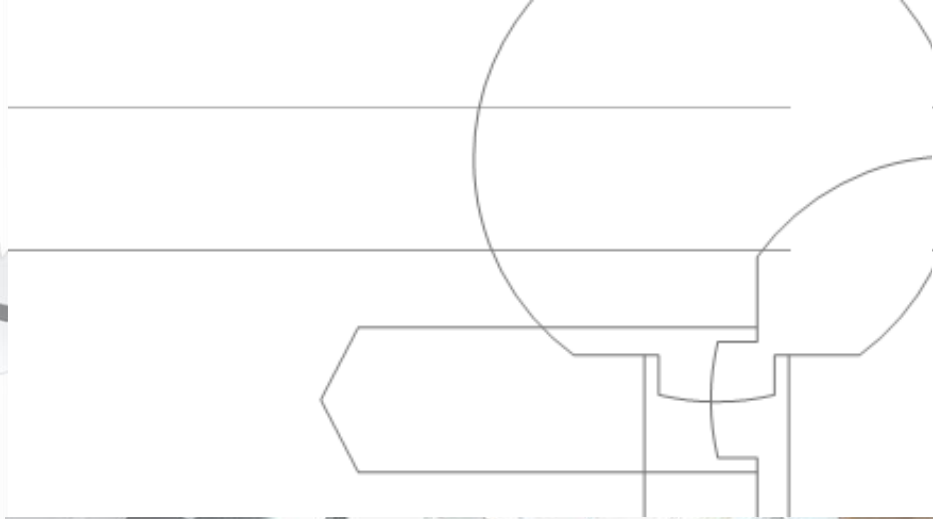


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- **Orientation of the building is in the direction of the dominant air flow for the purpose of good ventilation**
- **The central street is an upright vertical, which allows for a good squeeze and push the air /smoke/ out**
- **The building is divided into two fire departmental areas that are separated by a central street**
- **External fire stair risers**
- **Staircase verticals installed in a way that meets the statutory standards**
- **Internal and external hydrant network**







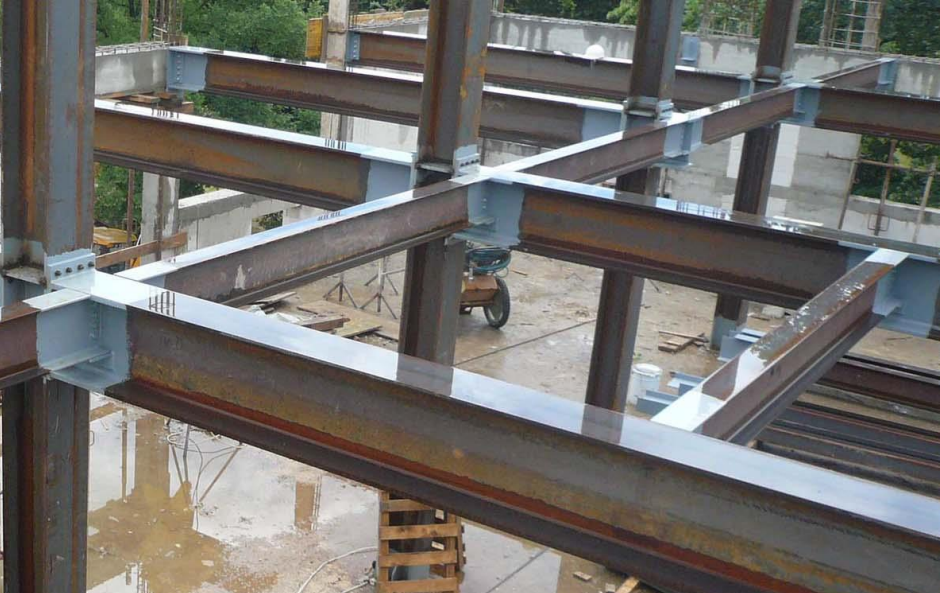
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ПОШТА





She knew the game
Called play
Oh She hit me low

She knew the game
Called play
Oh She hit me low

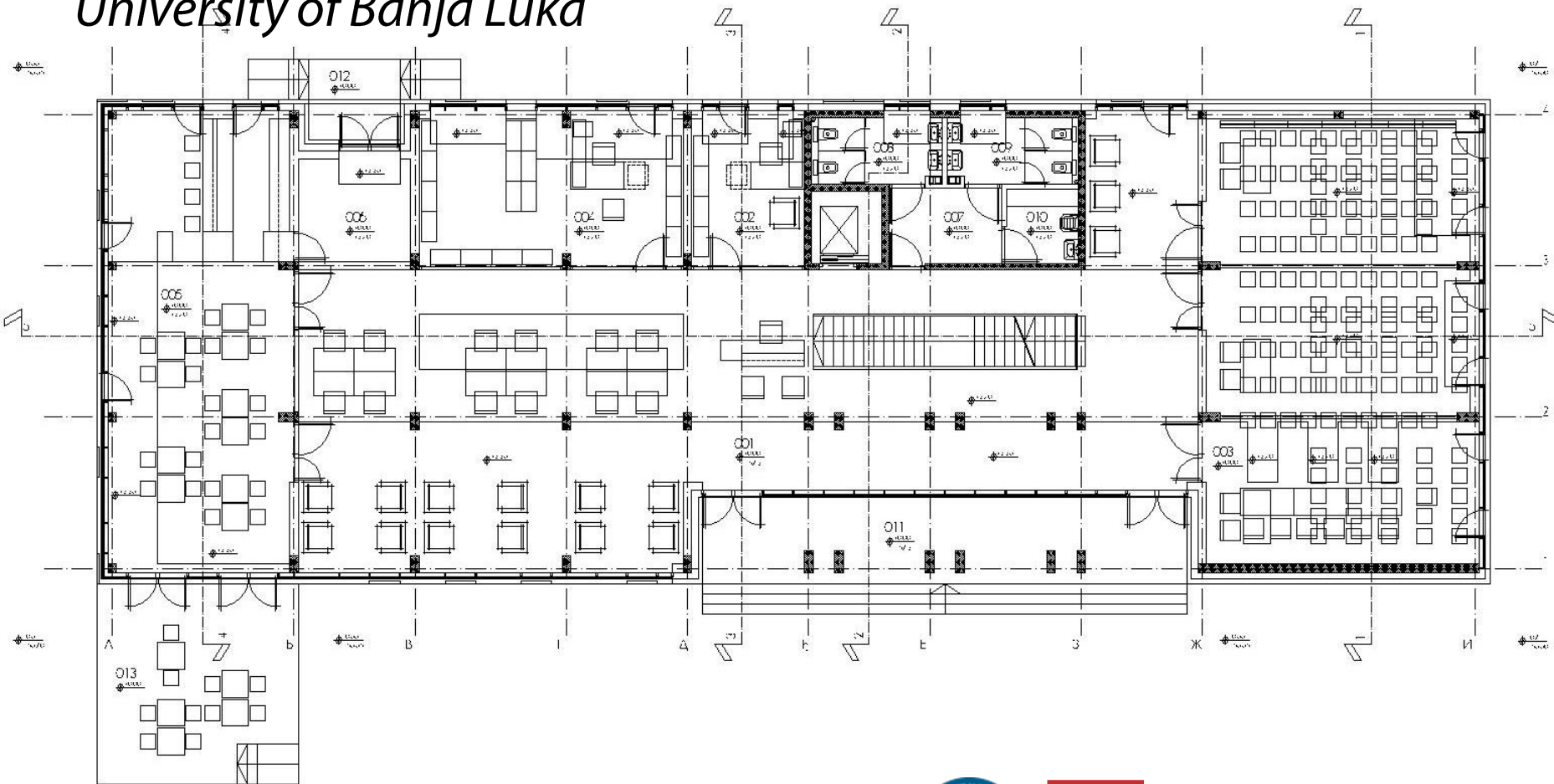






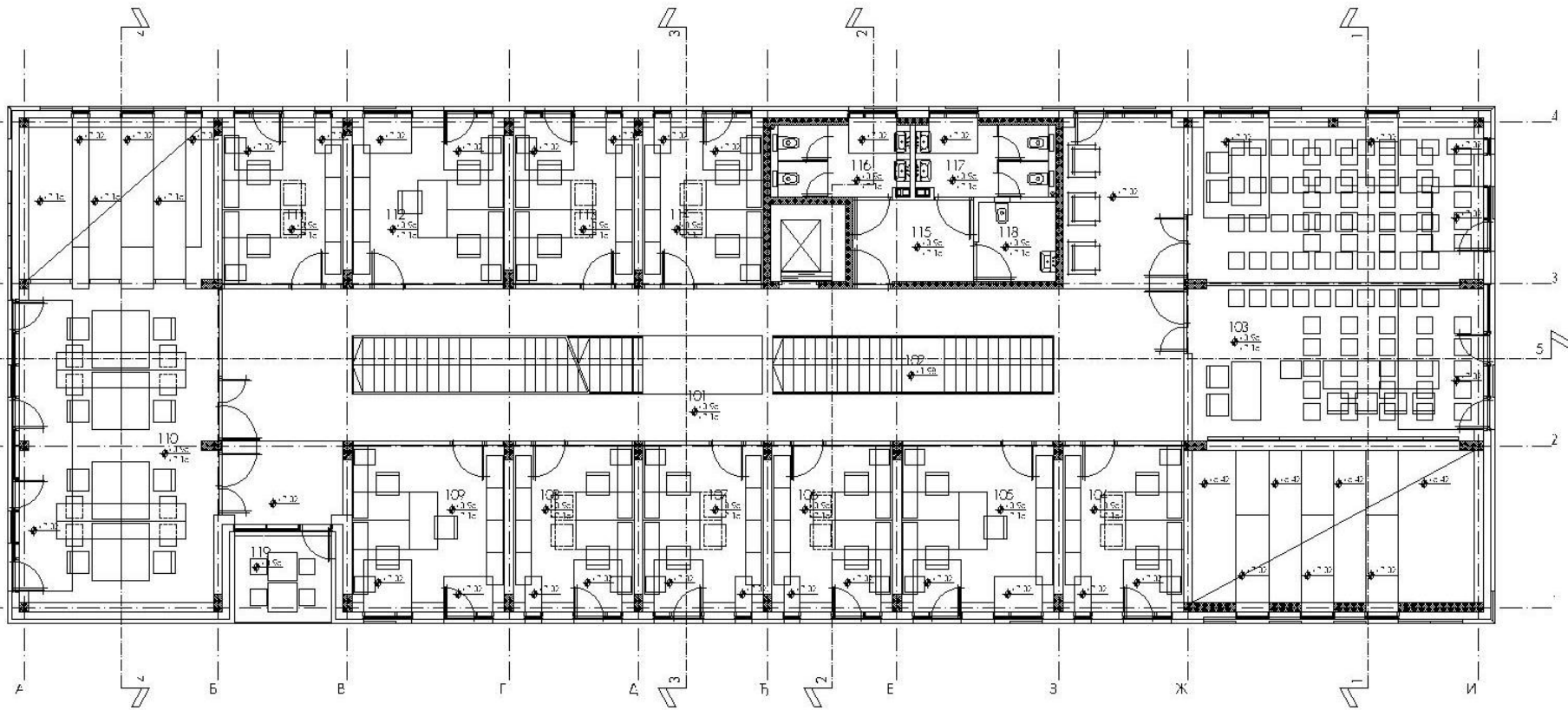
case study 3

University Development Center University of Banja Luka



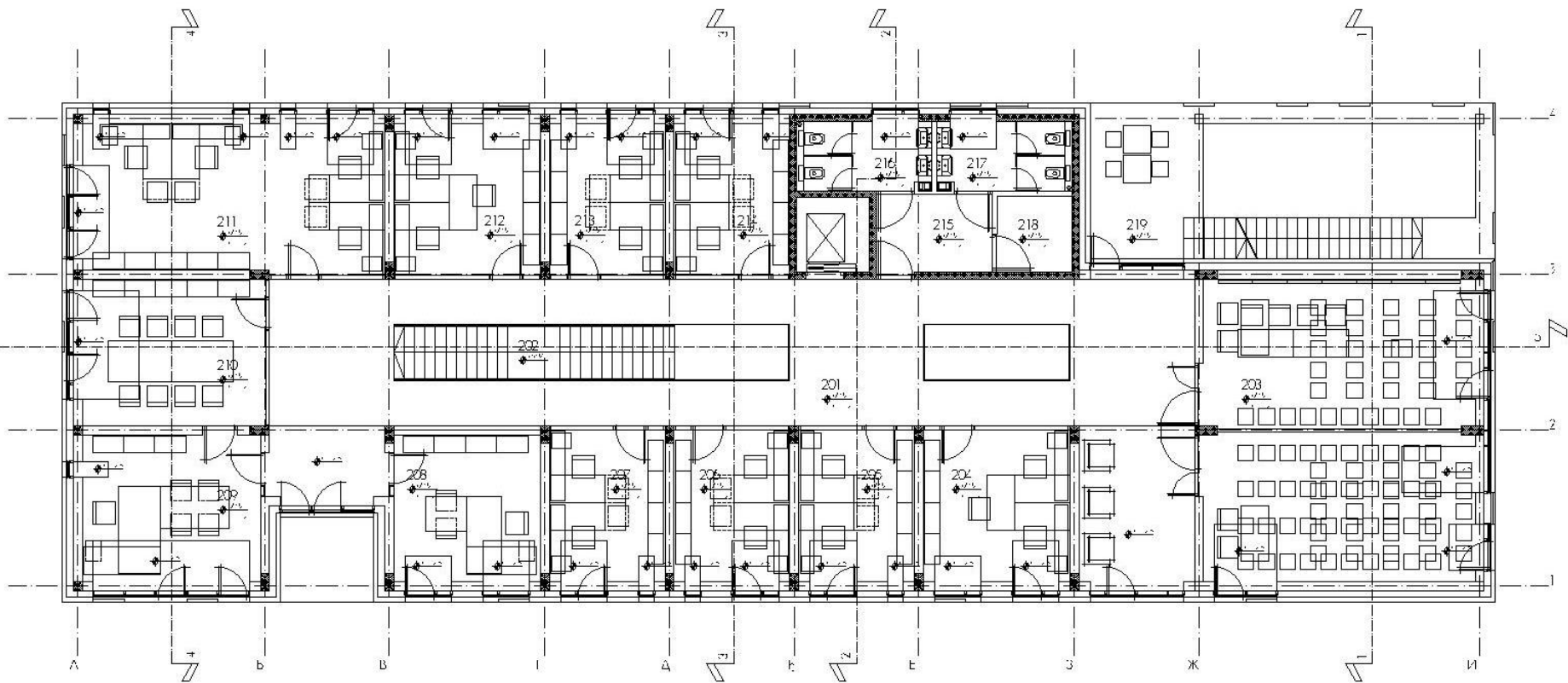
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- ***The whole building is one sector***
- ***Internal and external hydrant network***
- ***The inner central stairs are open. The total height of the building is adjusted to the maximum allowed height of objects of this type.***



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