

B Contest task

Title of the contest:

Public, anonymous, two-stage project urban and architectural contest for

# Faculty of Pharmacy and Faculty of Mechanical Engineering

1

Contracting authority:

University of Ljubljana  
Kongresni trg 12  
1000 Ljubljana

Client:

University of Ljubljana  
Kongresni trg 12  
1000 Ljubljana

in cooperation with

Chamber of architecture and spatial planning of Slovenia  
Vegova 8  
1000 Ljubljana

Producer of contest task:

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## Table of contents

I.	Address of the deans.....	5
a.	Address by the Dean of the Faculty of Pharmacy .....	5
b.	Address by Dean of the Faculty of Mechanical Engineering .....	6
II.	Purpose and subject of the contest.....	8
III.	Presentation of the contest area with spatial organizers data .....	10
c.	Area features .....	10
I.	Description of the location of the site .....	10
II.	Photographic view of the area .....	11
d.	Inclusion of the area in the green space system.....	16
I.	Summary of the strategic part of the municipal spatial plan .....	16
II.	General guidelines for regulating green pins .....	19
e.	Transport infrastructure .....	19
I.	Summary of the strategic part of the municipal spatial plan .....	19
II.	Actual space state.....	20
III.	Conditions, guidelines and opinions of spatial planning actors .....	24
I.	OPN MOL ID provisions .....	25
a.	Concept and placement of space activities.....	25
I.	Summary of the strategic part of the municipal spatial plan .....	25
II.	Space state description.....	26
III.	Dedicated use of space.....	27
IV.	An extract from OPN MOL ID and a summary of general terms .....	28
V.	Noise protection .....	32
b.	Infrastructure .....	34
I.	Actual space state.....	34
II.	Conditions, guidelines and opinions of spatial planning actors .....	35
c.	Natural and cultural heritage.....	36
I.	Actual space state.....	36
I.	Conditions, guidelines and opinions of spatial planning actors .....	38
d.	Environment protection.....	39
I.	Actual space state.....	39
II.	Conditions, guidelines and opinions of spatial planning actors .....	43
e.	Protection and rescue.....	44
I.	Conditions, guidelines and opinions of spatial planning actors .....	44
IV.	Project task for the urban landscape arrangement of the area.....	45
a.	Definition of the urban placement on the planned contest area .....	45

I.	General .....	45
II.	Traffic access .....	46
III.	Outer surfaces traffic arrangement.....	46
IV.	Urban and landscape arrangements .....	47
V.	Size of buildings .....	47
VI.	Height of buildings.....	47
VII.	Relation to the surrounding built and natural structures .....	48
VIII.	Additional requirements relating to the protection of natural and cultural heritage and the environment.....	48
V.	Terms of reference of the Faculty of Pharmacy (FFA).....	49
I.	Short historical development .....	49
II.	Description of existing buildings and premises of FFA .....	49
b.	Organisation chart for FFA .....	50
c.	Description of development vision FFA .....	52
I.	Mission FFA.....	52
II.	Vision FFA .....	54
d.	Summary of the investment project identification document .....	57
e.	Programme requirements.....	58
I.	Basic distribution of groups of programmes .....	58
II.	Tabular display of programme requirements FFA.....	60
III.	A more detailed description of individual groups of programmes.....	62
f.	Content requirements.....	64
I.	Long-term flexibility and design modularity.....	64
g.	Technical requirements .....	64
I.	Definition of the expected building materials of the new building.....	64
II.	Energy efficiency.....	65
III.	Construction design.....	65
h.	Electrical installations and equipment.....	66
i.	Mechanical installation design.....	66
j.	Economic requirements .....	67
I.	Level of investment .....	67
II.	Effective building management.....	67
III.	Long-term economic effects of construction (LCCA).....	68
VI.	Terms of reference for the Faculty of Mechanical Engineering .....	69
I.	Short historical development .....	69
II.	Description of existing buildings and premises of FS .....	69

a.	Organisation chart for FS .....	70
b.	Description of development vision FS.....	72
I.	Mission FS.....	72
II.	Vision FS.....	72
c.	Summary of the investment project identification document .....	73
d.	Programme requirements.....	73
I.	Basic distribution of groups of programmes .....	73
II.	Tabular display of programme requirements FS .....	75
III.	A more detailed description of individual groups of programmes.....	77
e.	Content requirements.....	79
I.	Long-term flexibility and design modularity.....	79
f.	Technical requirements .....	80
I.	General Requirements.....	80
II.	Definition of the expected building materials of the new building.....	80
III.	Energy efficiency.....	81
IV.	Construction design.....	82
g.	Electrical installations and equipment.....	83
h.	Mechanical installations .....	83
I.	The heating.....	83
II.	Cooling.....	84
III.	Ventilation .....	86
i.	Economic requirements .....	87
IV.	Level of investment .....	87
V.	Effective building management.....	88
VI.	Long-term economic effects of construction (LCCA).....	88
VII.	Contest basis and appendices.....	89



## I. Address of the deans

### a. Address by the Dean of the Faculty of Pharmacy

Dear Sir/Madam,

The Faculty of Pharmacy of the University of Ljubljana (UL FFA) approaches to the project of new construction with a clear vision of development into a modern internationally established educational and research institution that, with its involvement in the social space, will make an invaluable contribution to health, higher education and economic performance.

UL FFA operates as a separate faculty since 1995, prior to which UL's pharmacy studies have been carried out since 1960 within the unit of pharmacy within the University and later the Faculty of Natural Sciences and Technology. The premises in which the faculty operates does not allow adequate development, nor the long-term preservation of the leading position in the profession. We are part of a very competitive field, and our development plans must be ambitious. Improved conditions for research and education will be an excellent basis for the development of human resources, best experts, creators of ideas and developers of progress, which will ensure the further prosperity of the pharmaceutical profession and the further development of pharmaceutical companies that already contribute 5% of Slovenian GDP.

Faculty of Pharmacy in the so-called "knowledge triangle" connects the developmental, innovative and educational aspect: as a socially responsible higher education institution, it takes care of the development of critically-minded graduates capable of facing the challenges of the future, and for the transfer and use of new scientific recognition and knowledge. In doing so, it is very well aware of all levels of technological development of a product or service. In the long term, the company provides its contribution in cooperation with participants from the public sector, the economy, regulatory bodies and designers and implementers of development policies. In doing so, it follows its mission of education, training and educating experts and leaders for work in a globally competitive environment in pharmacy, laboratory medicine and cosmetology, with a combination of scientific approaches and innovative teaching tools in creating and disseminating knowledge for the well-being of Slovenian society.

I wish that in joint efforts and in an interdisciplinary approach, we find excellent solutions for the development and the establishment of a modern Faculty of Pharmacy of the University of Ljubljana.

prof. dr. Irena Mlinarič-Raščan

Dean

## b. Address by Dean of the Faculty of Mechanical Engineering

The Faculty of Mechanical Engineering of the University of Ljubljana is the leading Slovenian and internationally recognized institute in the field of mechanical engineering, and as one of the founding members in the field of engineering, in 2019 will celebrate its 100th anniversary at the University of Ljubljana. The strategy of the faculty is following a balanced research, professional development and pedagogical activity, with which can best fulfil its mission in the academic environment, the economy and the wider society.

The basis for fulfilling all of these goals is a quality and top-notch scientific and research work, where we often interact with the highest prizes and awards in Slovenia, and more and more often in the international arena. But mechanical engineering today is extremely interdisciplinary and naturally acts as an integrator of various fields of engineering, materials and classical science in many industrial systems and far beyond the frameworks of the traditional understanding of mechanical engineering decades ago or more. This includes our research from the most fundamental nanotechnological and physicochemical surface problems, microfluidics and micro-technologies, ie basic nano and micro physicochemical studies, to laser, robotics, control and electronic-mechanic systems, and modeling and simulations with individual or high-performance computer compositions, that is, advanced mechatronics and information and computer research, and ultimately to large-scale production transformers, energy systems, motors, dynamic exciters and hydraulic machines in real size, ie studies at the level of industrial applications. The provision of globally comparable scientific and research laboratory facilities in such a wide range of technical fields and conditions is our goal and at the same time the need for the long-term development of Slovenian mechanical engineering and Slovenian industry.

The Faculty of Mechanical Engineering is clearly strengthening cooperation with industry and other economies, as there is no industrial entity, which would not be decisively dependent on mechanical solutions, which in the time of perfect globalization should achieve the world level for long-term survival on the market. More than half of all revenues at the Faculty of Mechanical Engineering are recorded in the field of project and industrial cooperation, which is our key ambition and direction. We have already proved that, based on scientific work, we can successfully transfer knowledge into practice, thus helping Slovenian industry contributing more than 35% of GDP in Slovenia, thus creating a holistic approach to all segments of academic work. Given the current scope and importance of cooperation with the economy, we assure that this transfer of knowledge can be further upgraded and thus directly affect the growth of the economy and society. Of course, on condition that we can further develop our potential within industrial project tasks, while the scope and complexity of research activities already exceed the capabilities of our spatial conditions, so the potential for further development is very limited, as the economy is publicly pointing out, which is crucial because of adequate research spaces lack.

At the same time, one of the key challenges of the faculty and the entire Slovenian society is also the education and development of engineers, masters and doctors of mechanical engineering in the framework of a high-quality and modern pedagogical program at three levels of study. Part of the program is directed to project-applicative, and the other to development-research contents, which already basically indicate the different needs and conditions of work. Technique and mechanical engineering are intensively and rapidly changing, so pedagogical content and methods must follow and be adapted to the current state of affairs in industry and science and inter-sectoral needs. The stated breadth and interdisciplinarity of studies, changing demands and content in the industry, the ability to self-study, e-learning, information technology, providing practical engineering knowledge and mastering soft skills require a variety of study conditions, which must be satisfied by suitable premises. Many examples of various team or individual, adaptable, stimulating and program-oriented pedagogical and study spaces in modern universities give us examples of how and why teachers and students can easily follow the challenges of modern pedagogical work and faster learning content. It is the time that Slovenian higher education in the field of mechanical engineering

acquires such conditions of work, which only can in the long term guarantee the development and existence of the profession, the Slovenian industry and thus the whole society.

The current central location of the Faculty of Mechanical Engineering at Aškerčeva in Ljubljana, with spaces and laboratories in three multi-storey buildings from the 30s, 50s and 70s of the last century, the largest lecture rooms are in the highest, 7th floor, worn electrical and other infrastructure, inadequate load capacity and vibration-protected construction, insufficient and insufficient premises, no spaces for events and meetings, without common spaces for socializing employees and students' studies, has been silenced for some time and is hampering our development. At the moment, the activity of the faculty is carried out at eight locations in Ljubljana, while the fragmentation and disconnection of individual departments and laboratories only further complicate the work.

With a new building, with more and more useful space, the faculty would really breathe – pedagogues, students and laboratories. The building, which should be strongly focused on the functionality of the three key academic activities as well as professional services and efficient and very economical management and maintenance, should contribute to easier communication, cooperation, connecting, and especially the adaptability and technical requirements of different laboratory units with very different activities and thus the development of the basic activities and functions of the faculty. At the same time, it must provide a pleasant and interconnecting stay for all users over a longer daily period. In the long term, we will provide better engineers, masters and doctors of mechanical engineering, as well as better conditions for scientific and professional research, thus making domestic companies globally more competitive. This is the only thing that keeps the Slovenian economy upright – only domestic knowledge, development and a healthy economy can guarantee long-term and sustainable development and the state's existence. Engineering engineers are also indispensable for this.

prof. dr. Mitjan Kalin

Dean

7

## II. Purpose and subject of the contest

The purpose of the contest is to obtain:

- the most optimal urban solution for the location of the Faculty of Mechanical Engineering and the Faculty of Pharmacy building in the EUP RD 358 area (1st URBAN PHASE),
- the most suitable architectural solution for the new building of the Faculty of Mechanical Engineering (2nd ARCHITECTURAL PHASE, UL FS SET)
- the most suitable architectural solution for the new building of the Faculty of Pharmacy (2nd ARCHITECTURAL PHASE, UL FFA SET)
- the urban planning office to prepare the urban documentation of the Municipal Detailed Spatial Plan (1st URBAN PHASE) and
- the project designer to prepare the project documentation (2nd ARCHITECTURAL PHASE, SET UL FS UL and UL FFA).

The subject of the contest AS A TOTAL is the urban design of the placement and the architectural design of the buildings of the Faculty of Mechanical Engineering and the Faculty of Pharmacy in the area marked EUP RD 358, within the framework of the University Center Brdo (OPPN 65). The area under consideration is located in the western part of the city of Ljubljana, at the northern foot of Rožnik hill, on the west side of the Trail of Remembrance and Comradeship (PST).

University of Ljubljana, Faculty of Mechanical Engineering (FS) and Faculty of Pharmacy (FFA) intend to complete the construction in the area of the new university center Brdo, where are already the Biotechnical Faculty (BF), Faculty of Chemistry and Chemical Technology (FKKT) Faculty of Computer and Information Science (FRI).

The new buildings of the two faculties, including the organization of outer surfaces, should provide teachers and students with quality working conditions for study and research, cutting-edge, modern and technically faultless laboratory and other related facilities, and in general a stimulating university environment.

The area of the contest comprises areas on the west of the border between the Routes of Remembrance and Comradeship, in the north to the Glinščica brook, in the south to the agricultural land adjacent to the drainage ditch and the east to the existing faculties (FKKT and FRI). According to the municipal spatial plan MOL, the contest is prescribed for three units of spatial planning, namely RD-358 with the dedicated use of central education activities, RD-486, which is intended for the organization of park surfaces along the Trail of Remembrance and Comradeship and RD-555, representing the Glinščica waterside belt. Selected contest solution 1. URBANISTIC PHASES will be the basis for the preparation of the municipal detailed spatial plan OPPN 65 of the Faculty of Biology. The contest area is around 4.30 ha, of which EUP RD-358 is around 3.67 ha.



Photo 1, orthophoto of the contest area – wider display (source: IPN MOL)



### III. Presentation of the contest area with spatial organizers data

#### c. Area features

##### I. Description of the location of the site

The area under consideration is located in the western part of the city of Ljubljana, at the southern foot of Rožnik hill. The area lies on pristine areas south of Glinščica brook, between the Trail of Remembrance and Comradeship and the area of faculties.

To the south of the contest area is the area of low residential construction, which represents the transition from the build area in nature. In the east of the site, it is bordering to the faculty at the biotechnology center, which consists of larger educational and research facilities. The Strategic part of the OPN in this area, taking into account and respecting natural values, envisages the expansion of educational activities, which should relate to the biotechnical center.

Access to the area is provided from the road to the north.

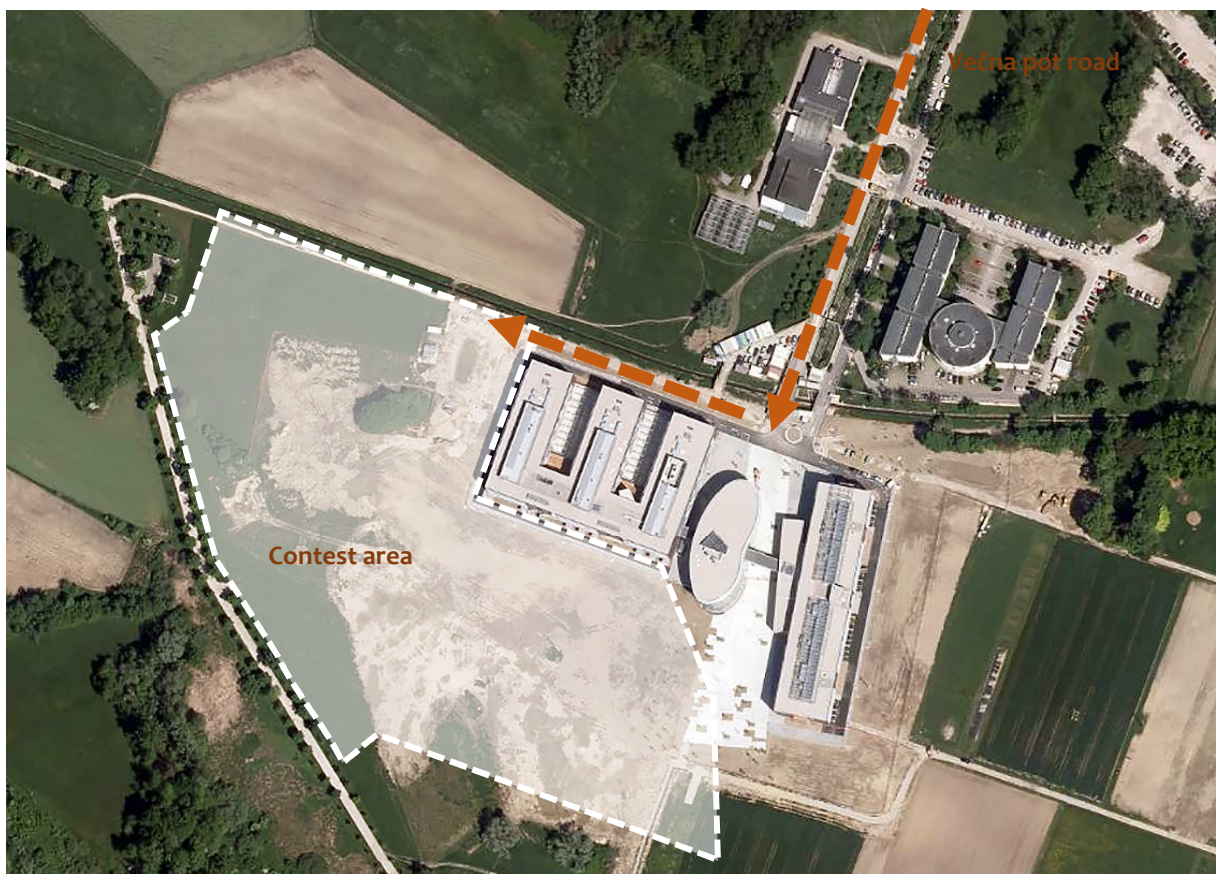


Photo 2, display of access to the contest area (source: google earth)



## II. Photographic view of the area



Photo 1 (source: natečajna podloga D\_4\_fotodokumentacija ((contest basis D\_4\_fotodokumentation))

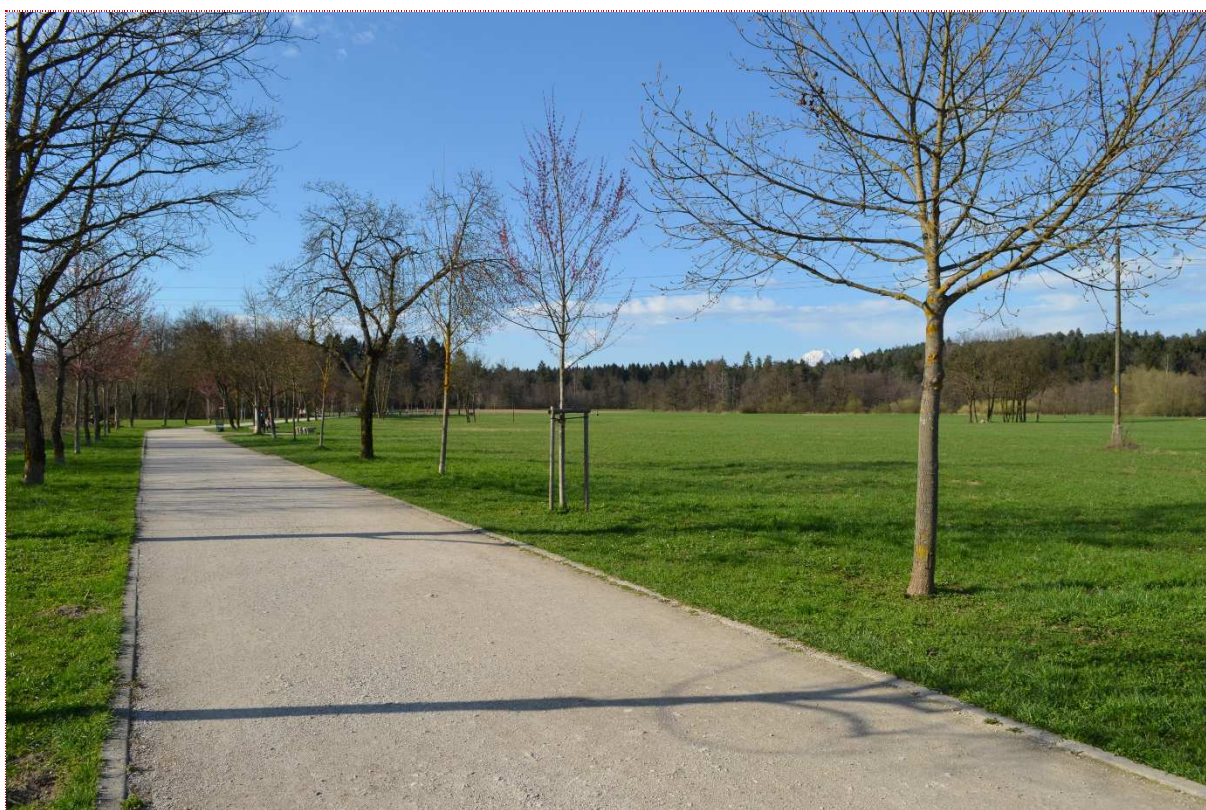


Photo 2 (source: natečajna podloga D\_4\_fotodokumentacija (contest basis D\_4\_fotodokumentation))





Photo 3 (source: natečajna podloga D\_4\_fotodokumentacija (contest basis D\_4\_fotodokumentation))



Photo 4 (source: natečajna podloga D\_4\_fotodokumentacija (contest basis D\_4\_fotodokumentation))





Photo 5 (source: natečajna podloga D\_4\_fotodokumentacija (contest basis D\_4\_fotodokumentation))



Photo 6 (source: natečajna podloga D\_4\_fotodokumentacija (contest basis D\_4\_fotodokumentation))





Photo 7 (source: natečajna podloga D\_4\_fotodokumentacija (contest basis D\_4\_fotodokumentation))



Photo 8 (source: natečajna podloga D\_4\_fotodokumentacija (contest basis D\_4\_fotodokumentation))



## Ownership display

The contest area coincides with the limit set by the OPPN 65. Land marked with parcel numbers (1706, 1707/3, 1707/4, 1708/2, 1816/2, 1816/3, 1816/4, 1817/3, 1817/4, 1817/5, 1817/6, 1820/5, 1820/6) are owned by the University of Ljubljana. The construction of buildings is therefore permitted only in the area of EUP RD 358, which is owned by the University of Ljubljana. The boundaries of these surfaces are more precisely defined in the contest basis C\_1\_geodetski-nacrt (C\_1\_geodetic-plan). The intervention also envisages the arrangement of external surfaces through which the new faculties will be connected with existing ones. Interventions in the part of the contest area that are not in a proprietary manner are not permitted. At the PST, a 25m wide green belt is planned. Connection to the gas, sewage, water and electricity grid is foreseen for both buildings.

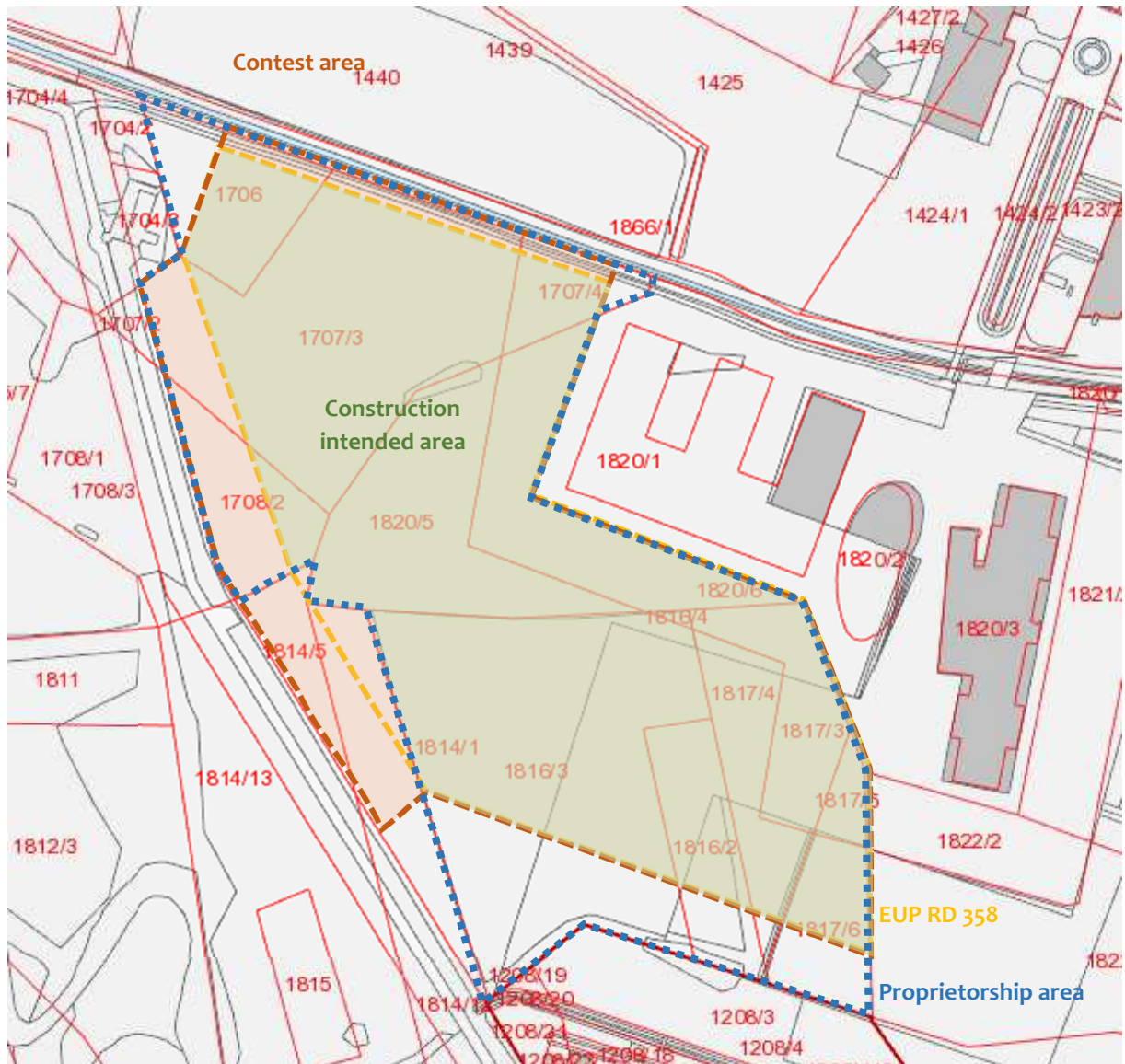


Figure 3, cadastral register display (source: IPN MOL)

## d. Inclusion of the area in the green space system

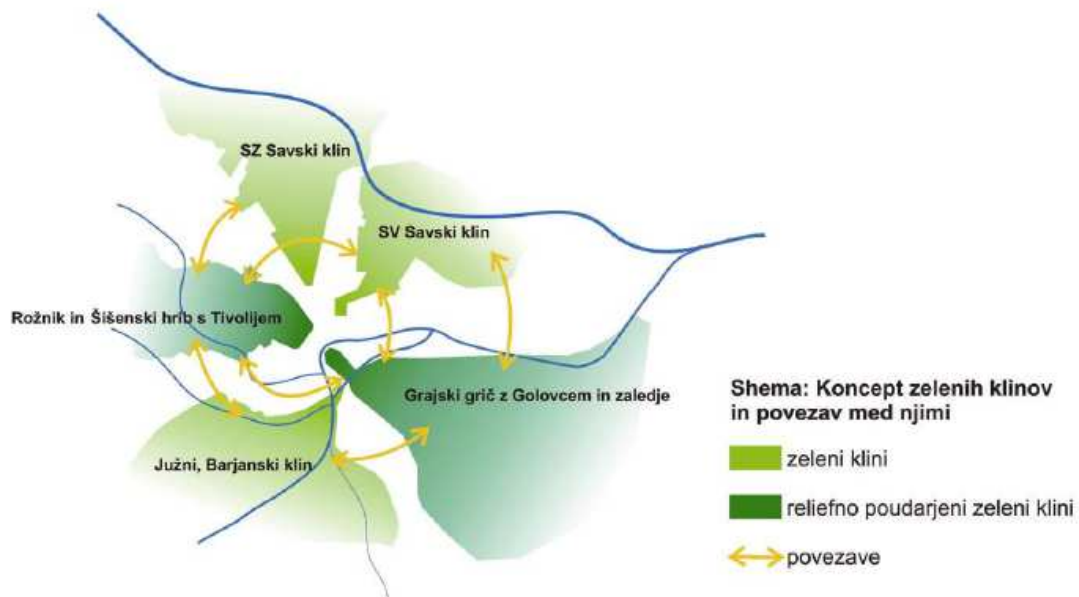
### I. Summary of the strategic part of the municipal spatial plan

The design of the green spaces of the city of Ljubljana focuses primarily on the following objectives:

- to maintain, settle or reconstruct all five potential green pegs of the city that connect the center of Ljubljana with the hinterland and represent the key macro spatial layout elements of the urban space and the important climate corridors of the city,
- link individual arrangements, areas and programmings with network of green spaces within the city and in its hinterland, and other important areas with the character of green spaces into a comprehensive green space system,
- ensure good accessibility and even distribution of green spaces, equivalent to all inhabitants,
- to set up and arrange waterside lines as a special element of the green area system,
- to integrate and link the PST as an important linking and programmatic move into the green space system,
- ensure the development of recreational and tourist potentials in the area of MOL and establish a system of good public access to these areas,
- define and protect important ecological corridors and connections to a wider regional area and ensure the minimum ecological conditions for plant and animal species,
- ensure adequate climate, living and ecological quality in the urban environment,
- restore the green areas where they have been degraded by sealing,
- to limit the sealing of the edges of larger green areas and to define a specific regime for existing objects within them.

The basis of the concept of the green spaces of the city of Ljubljana is the preservation or renewal of the five green pegs that penetrate from the hinterland into the city center. They are connected with circular and transverse green connections and a network of parks. As a special element of the design of green areas, the features of green surfaces and connections are defined: water surfaces, watercourses and waterside regulation.

Green pegs penetrate deep into the center of the city and relate to the landscape hinterland of the city. They have a special significance for the city, both from functional and segmentation as well as ecological, and especially from climatic aspects. They create appropriate micro and mesoclimatic conditions and allow the city to be ventilated and also the creation of natural corridors to the hinterland. They are also very important as the spatial possibilities of functional "green" connections for pedestrians and cyclists in the recreational hinterland of the city. Each of the pegs has its indispensable significance in the space of the city, and therefore, among the basic strategic orientations, the preservation and development of the potentials of all five green wedges, which are appropriately regulated in the long term, are appropriate for their character and importance. In these areas it is necessary to limit the construction and to lay down a special regime for the existing structures within them. To restore the green areas where they have been degraded by sealing.



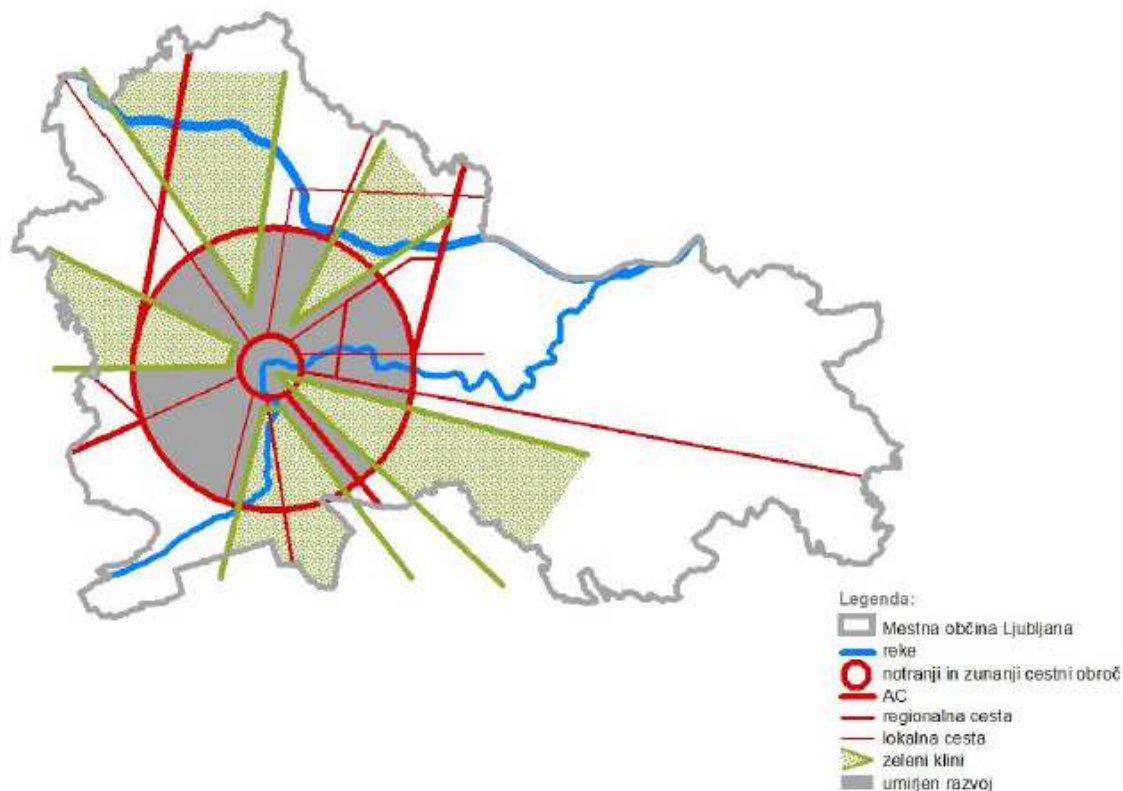
SV Sava peg  
 SV Sava peg  
 Rožnik hill and Šišenski hrib hill with Tivoli  
 South Barje peg  
 Grajski grič (Castle Hill) with Golovec and hinterland

Legend: Concept of green pegs and links between them  
 Green pegs  
 Relief emphasized green pegs  
 Links

Figure 4, Concept of green pegs and connections between them (source: SPN MOL)

The contest area is located on the southern edge of the western wedge Rožnik hill and Šišenski hrib with Tivoli, as part of the green system. Urbanization of the city of Ljubljana is based on the principle of densification of the city within the motorway ring by preserving the green pegs, thus preserving the characteristic morphology of the city, that is, the combination of a radiocentric and strands model in a compact place, especially within the motorway ring road (source: SPN MOL).

Rožnik hill and Šišenski hrib with Tivoli: The area was proclaimed Tivoli Landscape Park, Rožnik hill and Šišenski hrib. This peg goes deep into the center of the city with Tivoli Park. The connection is emphasized with Promenada and view on Ljubljana Castle. The recreational and natural hinterland of the peg is represented by the Polhov Gradec Dolomites, which due to their natural and landscape qualities are widely recognized as a landscape park.



Legend:  
 Municipality of Ljubljana  
 Rivers  
 Internal and external ring road  
 Motorways  
 Provincial road  
 Local road  
 Green pegs  
 Calm development

Figure 5, The principle of densification the city inside the motorway ring by keeping the green wedges (source: SPN MOL)

Construction in green pegs is subject to special regimes of preserving existing vegetation and more densely and intensively planting between and by objects. The placement of the buildings of both faculties in this area has both good and potentially bad effects on the development and preservation of urban green spaces.

Good effects are mainly in the synergy of the educational and recreational program. The immediate proximity of recreational areas makes an essential contribution to the quality of the study process, the work and living comfort of students, pedagogues and other employees, and to the integration of the student population into the general urban social structure. From the viewpoint of regulating open outer surfaces in green wedges, it is also important, that they remain in the public domain and accessible to all people on the same terms. Therefore the construction of public and open institutions, such as the two subject faculties, are not contrary to the fundamental principles of the development of green wedges.

Potentially bad effects can occur due to the poor design of functional and public external surfaces of faculties, which can result in the loss of the feeling of the expected placement of freestanding objects in continuous greenery.



## II. General guidelines for regulating green pins

General guidelines for regulating green pins are:

- Due to the importance for the sustainable development of the city, it is necessary to ensure permanent and active conservation and, at the same time, reconstruct all five green pins, which each have their own specific character. Each green wedge must maintain or even improve the proportion of green areas in the area, irrespective of the intended use.
- Integrated planning and regulation and improvement of hinterland connections must be established - a comprehensive concept of open space management (OPPN expert base) should be prepared for each green peg, which includes all areas of open space and green spaces in the peg (regardless of primary use and ownership) as well as a wider area of connection to the hinterland and the city center.
- Inside and through the peg, attractive and safe public connections for pedestrians and cyclists to public open space and green areas and to the hinterland, as well as to the public urban program and residential areas, must be established. In the framework of the regulation of green pegs, it is important to ensure favourable ecological conditions for the city as a whole, such as: preserving or restoring climate corridors, buffer zones for protection against noise and other pollution, green belts between economic zones and settlements.
- In the area of green pegs, areas not identified as green areas should be protected and regulated by green system regimes, which are of two types:
  - 1. Regimes with the guidelines of the green system for the protection of landscape features of the area and recreational sharing, used in areas with characteristics of green areas - in areas in forestry and agriculture primary use,
  - 2. regimes with the orientations of the green system for regulation and reconstruction or renovation of the character of the open space, which are used in built-up areas of various uses (residential, industrial).

The contest area is located on the southern edge of the green peg Rožnik hill and Šišenski hrib with Tivoli, where the 1st regime of protection is in force. Part of the green system is also the riverbed of Glinščica brook, which runs north of the contest area, where the 2nd protection regime applies.

In the immediate vicinity of the area, there is a central Ljubljana recreational trail - Trail of Remembrance and Comradeship, which continuously surrounds Ljubljana and creates a 32.5 km long recreational walking trail. It is routed along the barbed wire route, which during the Second World War (between February 23, 1942 and May 26, 1945 restricted the city ([www.wikipedia.org](http://www.wikipedia.org))).

### e. Transport infrastructure

#### I. Summary of the strategic part of the municipal spatial plan

The contest area is indirectly included in the road network through the functional premises of the Faculty of Chemistry and Chemical Technology and the Faculty of Computer and Information Science. When designing traffic areas, the following facts must be taken into account:

- that the student population per day is coming on foot (the student campus Rožna dolina), with the help of JPP and bicycle,
- pedagogues and employees use their own motor vehicles in accordance with their own mobility principles and the availability of parking spaces in the area of the study center,
- both faculties needs the delivery of materials and equipment with specialized delivery vehicles (combined vehicles, smaller trucks up to 3.5t) for their day-to-day operation, for which it is also necessary to ensure uninterrupted shipments of material, turning and short-term parking,

- access by motor vehicles is regulated by a ramp and intercom.

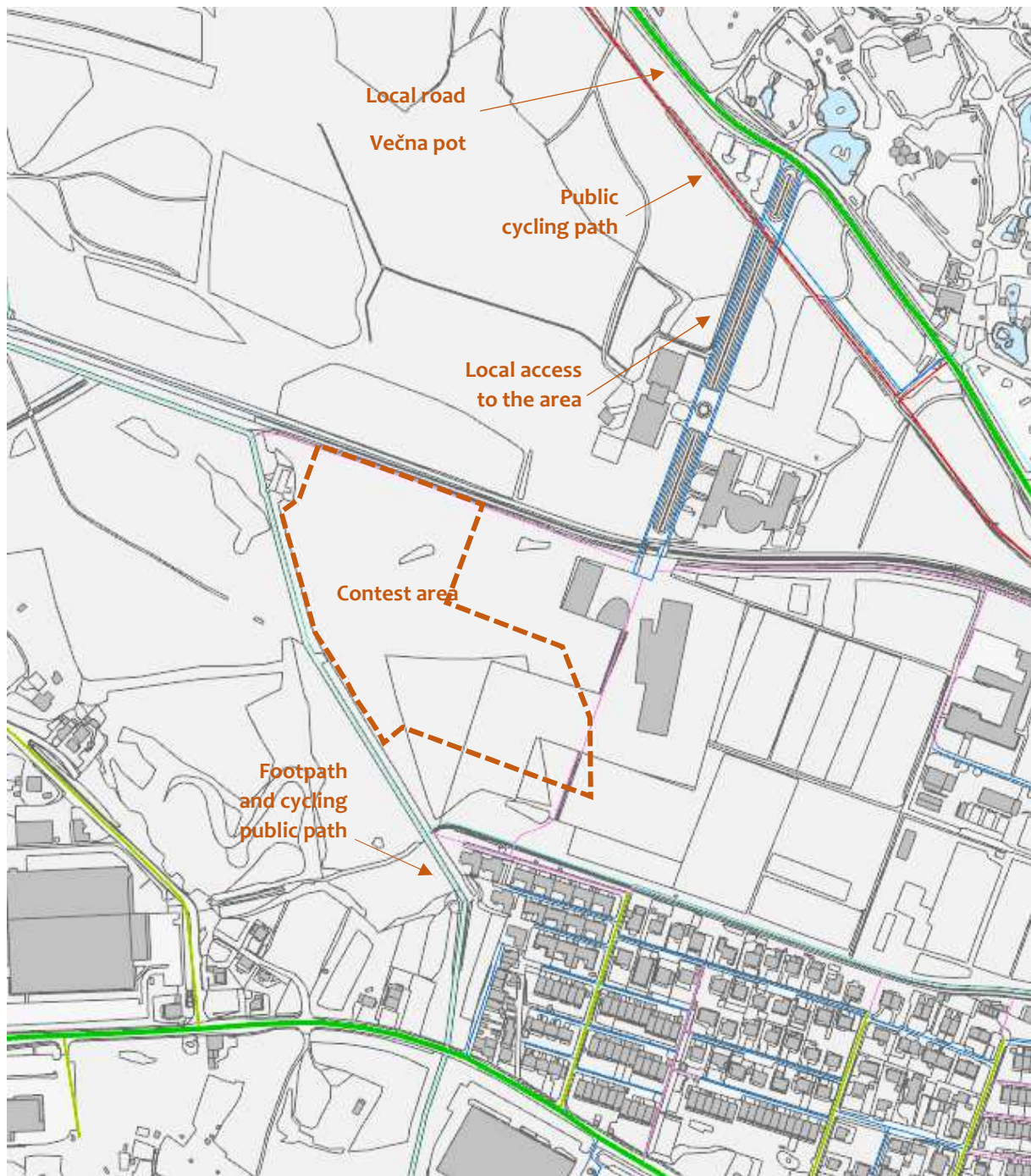
The traffic, pedestrian and cycling routes must be clearly separated and properly dimensioned according to the priority and number of users. Under the arrangement of stationary traffic, parking spaces must be arranged in the underground part of both buildings, within the outer surfaces, only parking spaces for disabled persons and short-term parking for vans can be installed.

Public spaces are not envisaged within the EUP RD-358 area, but will be publicly available. Intervention areas must be provided, which can also be part of the internal road.

## II. Actual space state

To the north of the contest area is the local evening road Eternal Path, from which the local public road for all vehicles is cut off in the south-west direction. There is a public footpath by Glinščica brook. South-west of the area is a public walking and cycling trail, the PST trail. Along the Večna pot road the central bicycle connection between Šiška and the city center is taking place along the old railway line.





21

Figure 6, road and bicycle network (source: OPN MOL ID)

LOKALNE CESTE IN JAVNE POTI	
	Lokalna glavna cesta
	Lokalna glavna cesta v predoru
	Lokalna zbirna cesta
	Lokalna zbirna cesta v predoru
	Lokalna krajevna cesta
	Lokalna cesta med naselji
	Javna pot za vsa vozila
	Javna pot za pešce in kolesarje
	Javna pot za kolesarje
	Javna pot za pešce

#### LOCAL ROADS AND PUBLIC PATHS

	Local main road
	Local main road in the tunnel
	Local collection road
	Local collection road in the tunnel
	Local road
	Local road between settlements
	A public road for all vehicles
	A public path for pedestrians and cyclists
	A public path for cyclists
	A public path for pedestrians



Figure 7, public transport (source: OPN MOL ID)

- Javni promet - avtobusni ali tramvaj - na ločenem vozišču
- Krožna linija mestnega avtobusnega prometa
- Priključna linija mestnega avtobusnega prometa

Public transport - bus or tram - on a separate carriageway  
A circular line of city bus traffic  
City bus connection line



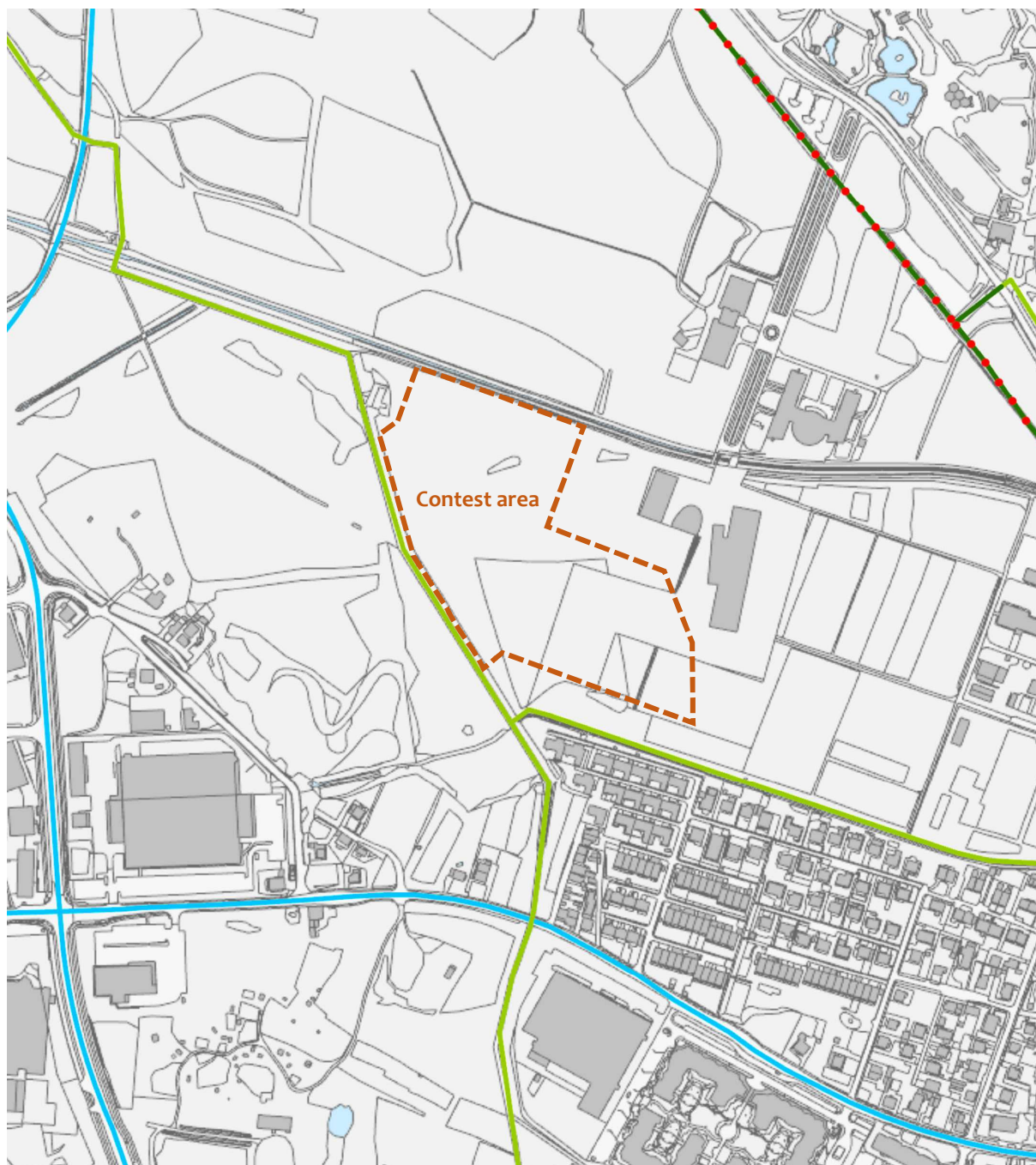


Figure 8, public transport (source: OPN MOL ID)

- Javna pot za kolesarje
- Javna pot za kolesarje in pešce
- Cesta s kolesarskimi stezami
- Kolesarska povezava znotraj notranjega kolesarskega obroča
- Pomembnejša kolesarska smer na vozišču za ves promet

- A public route for cyclists
- Public route for cyclists and pedestrians
- Road with bicycle tracks
- Bicycle connection inside the inner bike ring
- Important cycling route on the carriageway for all traffic

Legend 3, bicycle traffic

### III. Conditions, guidelines and opinions of spatial planning actors

#### *Area arrangement*

MOL OGD in previous guidance no. 3505-44 / 2012-27 PS of 30 March 2017 states that the contest area is supplied via the existing access road between the Večna pot road and Glinščica brook and the newly built road connection near Glinščica brook, which represents a functional extension of the aforementioned access road. The arrangement of the access road itself, which was built for the needs of significantly lower traffic loads and which does not satisfactorily solve the traffic of pedestrians and cyclists, is not included in the processing area of the OPPN 65, but should be covered. Today's situation with a poorly defined connection to the Večna pot road, with unstaged bus stops, without a left bend and without a sidewalk on the south side of the Večna pot road (at least to the bus station) is inadequate and unable to satisfactorily service the traffic requirements created by the construction of new faculties area. The main aim is to provide the OPPN with motor traffic through the Večna pot road (with the appropriate arrangement of the crossroads on the Večna pot road and with the appropriate regulation of the access road), while walking and biking traffic is supplied via the aforementioned access road, also by foot and cycling routes along Glinščica brook and other suitable routes. For employees and delivery, parking is arranged within the area, in the planned basement floors. Regardless of the practice so far in the case of the Biotechnical Center, there is no need to provide for students the full number of parking lots – the decision is left to the investor.

It is necessary to provide direct or indirect accessibility by public transport. It is desirable that foot communication between the farthest building and the nearest bus stop does not exceed 400 - 500 m, which is about 5-7 minutes of walking.

#### *Internal road network*

The internal road network is made up of one internal connecting road connecting the FFA and FS between the Glinščica brook and the Večna pot road, and by which all motor traffic to the garage and other traffic and intervention areas is carried out inside and near the FFA and FS. The road is arranged in such a way that it is able to take cycling and pedestrian traffic in a technologically appropriate and safe way.

#### *Stationary traffic*

Inside the area, it is necessary to arrange sufficient areas for stationary traffic. Priority is given to parking facilities for employees of pedagogical-andragogical workers and other top experts. The provision of parking facilities for students is permissible, but subject to the arrangement a sufficient, safe access way, including the redesign of the crossing on the Večna pot road. Parking facilities are primarily provided in underground floors. Due to different users, parking needs must be assured within a individual facility. The assuring of the parking needs of a particular faculty in the building of another faculty is undesirable, or it is only permissible to a lesser degree.

#### *Public works vehicles traffic*

Within the OPPN area, the smooth traffic of public works vehicles must be ensured. Waste disposal sites should be installed in such a way that they are easily accessible by public works vehicles and that their use does not require unnecessary manipulation.

#### *Intervention surfaces*

Intervention areas must be provided within the OPPN area. An internal road can also be used as an intervention surface.

#### *Wider traffic management strategy in the Brdo Higher education center area*

For the whole area of Brdo Higher education center, which besides faculties also includes the planned new building of the Natural history museum of the Republic of Slovenia and the National institute of biology, a mobility plan will be developed, which will determine the strategy of using public transport, personal transport and stationary traffic. In the framework of the preparation of the mobility plan, traffic technical measures verification of the trail access road from the Večna pot road towards faculty will also be

prescribed. Therefore, regardless of MOL OGD's position, the access road is not the subject of the contest.

Within the scope of the wider traffic regulation of the area, the construction of a parking facility with capacity of 320 to 480 PL (depending on the number of floors and expected needs) is planned along the Večna pot road, near the Ljubljana Zoo. The parking house will cover the needs of all nearby public institutions according to the overlapping principle. On weekends, most of the parking facilities will be dedicated to the zoo, and over a week to higher education establishments and institutes.

A small part of the parking needs of both new faculties (approx. 100 - 150 PL) can also be provided within the planned new parking house.

## I. OPN MOL ID provisions

Motorway access is provided from the north side from Večna pot road along the existing access road across Glinščica brook. A traffic study with proposals for the reconstruction of roads, driveways, access to public urban passenger traffic, walking and cycling routes and the arrangement of stationary traffic - a mobility plan is in preparation for improving transport infrastructure.

According to the norms from OPN MOL ID it is necessary to provide:

purpose:	no. PL for motor traffic	no. PL for bicycle traffic
12630 Educational and scientific-research work buildings (high school)	1 PL / 30.00 m <sup>2</sup> BTP facility, of which at least 20% for visitors	1 PL / 5 students + 1 PL / 5 employees

For education buildings and scientific research work (high schools), BTPs for the calculation of PL numbers are determined by the sum of the BTP of all premises intended for employees (offices, cabinets, research laboratories, libraries, archives, meeting rooms, etc.) and the associated common spaces necessary for the normal operation of these premises (corridors and stairways to cabinets, toilet facilities for employees, etc.). In addition, the BTP of other premises will not be included for the purpose of studying and exercising of students (classrooms, lecture rooms, halls, laboratories, gymnasiums, joint corridors to lecture rooms, reading rooms, commercial facilities for the breeding and care of animals, etc.).

Waste disposal sites should be installed in such a way that they are easily accessible with public works vehicles and that their use does not require unnecessary manipulation. According to the previous calculations of the required number of parking spaces of the two new faculties, according to OPN MOL, they exceed the actual needs. In accordance with the mutual agreement between MOL and UL, the contest shall take into account the necessary number of parking spaces specified in the terms of reference, irrespective of the actual calculation according to the OPN MOL provisions. The required number of PLs will be included in the Mobility Plan and will be part of the expert bases for the preparation of the OPPN.

## a. Concept and placement of space activities

### I. Summary of the strategic part of the municipal spatial plan

The construction of new buildings of the Faculty of Mechanical Engineering and the Faculty of Pharmacy is part of the planned and deliberate placement of central activities in the area of the City of Ljubljana. The goals that such in a location followed by the municipality are:

1. at the national and regional level:
  - to promote the urban centrality of national and regional importance,

- to build up a network of cultural institutions of European, national and regional importance;
- 2. at the city level:
  - to create centres of different levels by upgrading the network of central activities at the quarterly and local level,
  - to improve supply in inappropriately or inadequately equipped centres in the light of the envisaged level of care,
  - to displace core activities to areas that are accessible with current or planned passenger traffic,
  - to more evenly distribute cultural activities and to renew and to expand a network of cultural institutions of local importance,
  - encourage the mixing of coherent activities to ensure daily frequency (jobs), afternoon occupancy (entertainment, leisure time) and permanent presence of residents (dwellings).

## II. Space state description

The contest area belongs to the Higher Education Centre of the University of Ljubljana Brdo, which was created with the expansion of the biotechnology center. The biotechnology centre area is widespread, especially for science and technology faculties (Faculty of Chemistry and Chemical Engineering, Chemical Institute, Faculty of Computer and Information Science and Faculty of Mechanical Engineering, Faculty of Pharmacy, Biotechnical Faculty, National Institute of Biology, planned Museum of Natural History ...), the construction of accompanying programs (student residence) and a new botanical garden. An intensive connection with the technology park programs located in the immediate vicinity of the area is foreseen.

By building two new faculties, the total number of student population that daily visits the center of 5680 students will increase to 9050 (source UL website, [www.uni-lj.si](http://www.uni-lj.si)), which changes the migration image of Ljubljana and the study centre becomes comparable with a city centre where there are more numerous faculties. The quality and inclusive design of external public green and paved surfaces and traffic around the buildings of all faculties in a way that will enable socializing, relaxation and efficient logistics is crucial for the efficiency and functioning of the entire Brdo study centre.



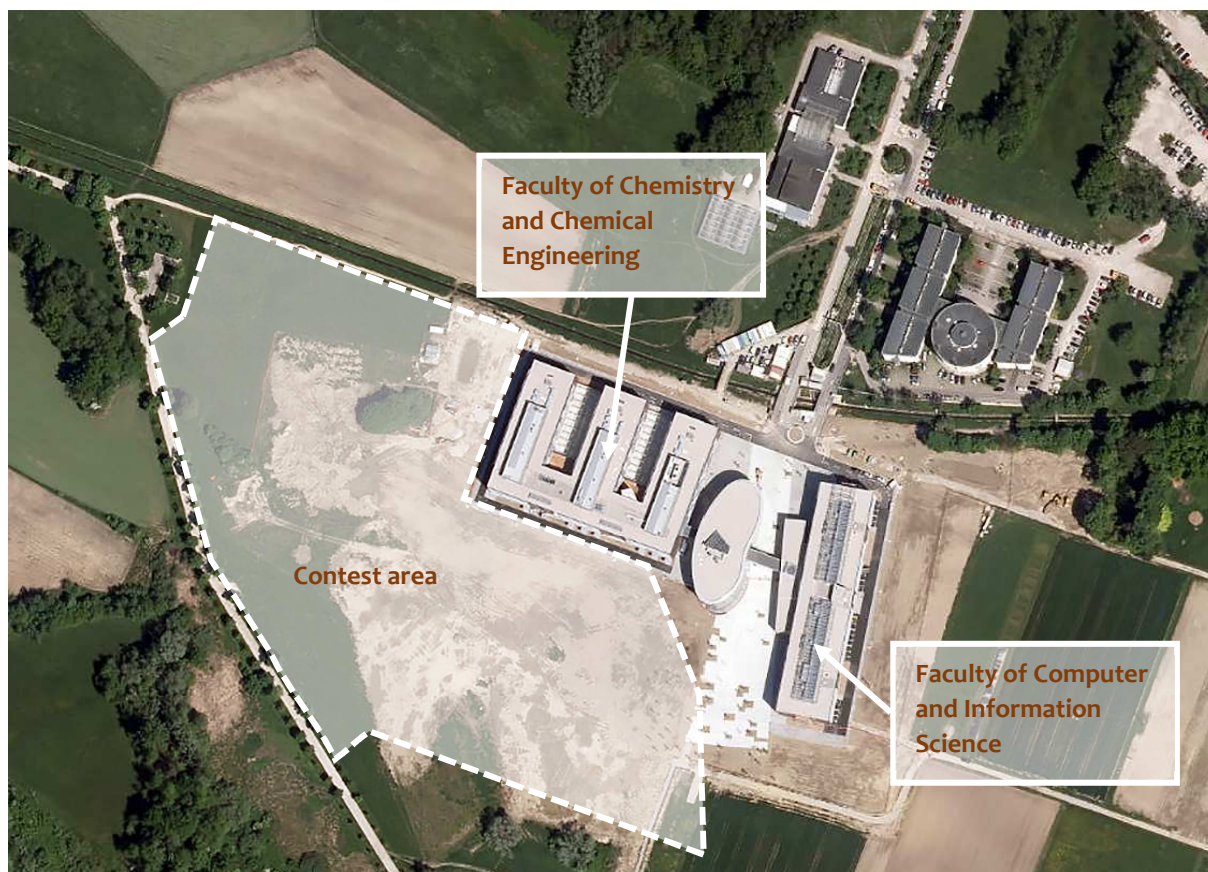


Figure 9, (source: google earth)

### III. Dedicated use of space

In the municipal spatial plan of the Municipality of Ljubljana - the implementation part (OPN MOL-ID), the RD-358, RD-486 and RD-555 spatial planning units (EUP) are envisaged to produce a detailed municipal spatial plan for the OPPN 65 Faculty at the Biotechnical Center, which solution must be obtained through the implementation of an urban contest.

In addition to the general provisions of OPN MOL, the guidelines for OPPN 65 are as follows:

#### OPPN 65: FACULTIES IN BIOTECHNICAL CENTER

Guidelines for the entire OPPN area

EUP MARKINGS IN OPPN

UNTIL PUTTING IN FORCE OPPN STANDS

OBLIGATION TO IMPLEMENT URBANISTIC CONTEST

OBLIGATION TO PROVIDE VARIANT SOLUTIONS

Guidelines for individual EUPs in the OPPN

RD-358, RD-486, RD-555

Article 95 of the OPN MOL ID act

YES

NO

EUP: RD-358

USAGE

CDi

TYPOLOGY

C

LEVEL OF EXPLOITATION OF THE PARCEL, INTENDED FOR BUILDING

FI - FACTOR OF EXPLORATION (maximum)

/

FI - FACTOR OF CONSTRUCTION (maximum %)

50

FBP - FACTOR OF OPEN LIVING SPACE (at least %)

Ø

FBP - FACTOR OF OPEN GREEN SURFACES (at least %)

25.

HEIGHT OF BUILDINGS

up to P+2+T

GUIDANCE FOR EUP

URBANIST CONDITIONS

Spatial arrangements and construction of facilities for the needs of the University of Ljubljana are allowed. The implementation of the spatial arrangement is permissible after

*Public, anonymous, two-stage project urban and architectural contest for the new building of the Faculty of Pharmacy and Faculty of Mechanical Engineering*

## TRANSPORT INFRASTRUCTURE

the implementation of the flood protection measures planned with the Ordinance on the municipal detailed spatial plan for the area of the Brdnikova flood retention basin (Official Gazette of the Republic of Slovenia, No. 63/12).  
The access must be arranged from the north side by the existing driveway to the faculty from the Večna pot.

EUP: RD-486

USAGE

ZPp

LEVEL OF EXPLOITATION OF THE PARCEL, INTENDED FOR BUILDING

FI - FACTOR OF EXPLORATION (maximum)

/

FI - FACTOR OF CONSTRUCTION (maximum %)

/

FBP - FACTOR OF OPEN LIVING SPACE (at least %)

/

FBP - FACTOR OF OPEN GREEN SURFACES (at least %)

70.

HEIGHT OF BUILDINGS

up to 5.00 m/h

EUP: RD-555

USAGE

ZDo

It follows that the construction of faculties is permissible only in the EUP RD-358 area. EUP RD-486 is intended for park regulation, which at the same time represents the landscape arrangement along the Trail of Remembrance and Comradeship. EUP RD-555 represents a waterside belt along the Glinščica brook, where a dyke with a planned public walking and recreational trail is planned as a flood protection measure (planned with the OPPN for the area of the Brdnikova flood retention basin area).

#### IV. An extract from OPN MOL ID and a summary of general terms

##### *Purpose:*

RD-358: CDi - areas of central education activities

Besides the activities for education and scientific research work and libraries, in the area, it is permissible to install conditionally: restaurants for student food, business, administrative and service activities, sports activities, children's and other playgrounds, public gardens, parks, markets, ambulances, garages, bicycling and covered car parks.

These activities are permissible if they complement the basic purpose of the site.

RD-486: ZPp – parks

Children's and other public playgrounds, public gardens, parks, markets that are not part of the public road, greenery and other landscaped green areas are permissible.

RD-555: ZDo – green waterside belt

The OPPN provisions apply to the area of the Brdnik flood retention basin, a dyke is planned with a well organized public walking and recreational trail.

##### *Typology*

For the RD-358 there is defined typology C - characteristic building:

A building with a unique outer and building design (for example) buildings for education, scientific research work that can not be placed among other types of buildings due to its unique design).

In the area RD-486 and RD-555, the construction of objects is not allowed, therefore typology is not defined.

##### *FI - Factor of construction*

FZ: maximum 50 %

Factor of construction (FZ) is the ratio between the layout projection of the most exposed parts of the building over the terrain and the area of the plot intended for construction. Balconies and projecting roofs



are not taken into account in the layout projection of the external dimensions of the most exposed parts of the building above the terrain. However, account is taken of the surface layout projections of the largest external dimensions of all simple and undemanding facilities above the terrain and the surface of the approach into and from the basement.

The FZ takes into account the area of the entire EUP RD-358 (divided into two faculties).

### *FBP - Factor of open green surfaces*

FZP: at least 25%

The Green surfaces (FZP) is the ratio between green areas on a cleared site and the entire plot area intended for the construction of non-residential buildings.

The FZP takes into account the area of the entire EUP RD-358

### *The area of the green peg (see map 3.2)*

In the RD-358 area with a dedicated CDi, at least 20 trees / ha must be planted, which increases by 20% or at least one tree in the area of the green peg in areas where the number of trees is prescribed per hectare. Depending on the size of the contest area (area within the RD-358), at least 88 trees should be planted within the framework. The required number of trees should be planted on the cleared site of the plot intended for construction.

In the area of the green wedge, at all buildings with a flat roof, more than 400,00 m<sup>2</sup> of net surface (no translucent roof kits, engine rooms and other roofing facilities), it is necessary to arrange a green roof. The exception is the roofs which, due to the technological process, are designed so that the arrangement of the green roof is not possible.

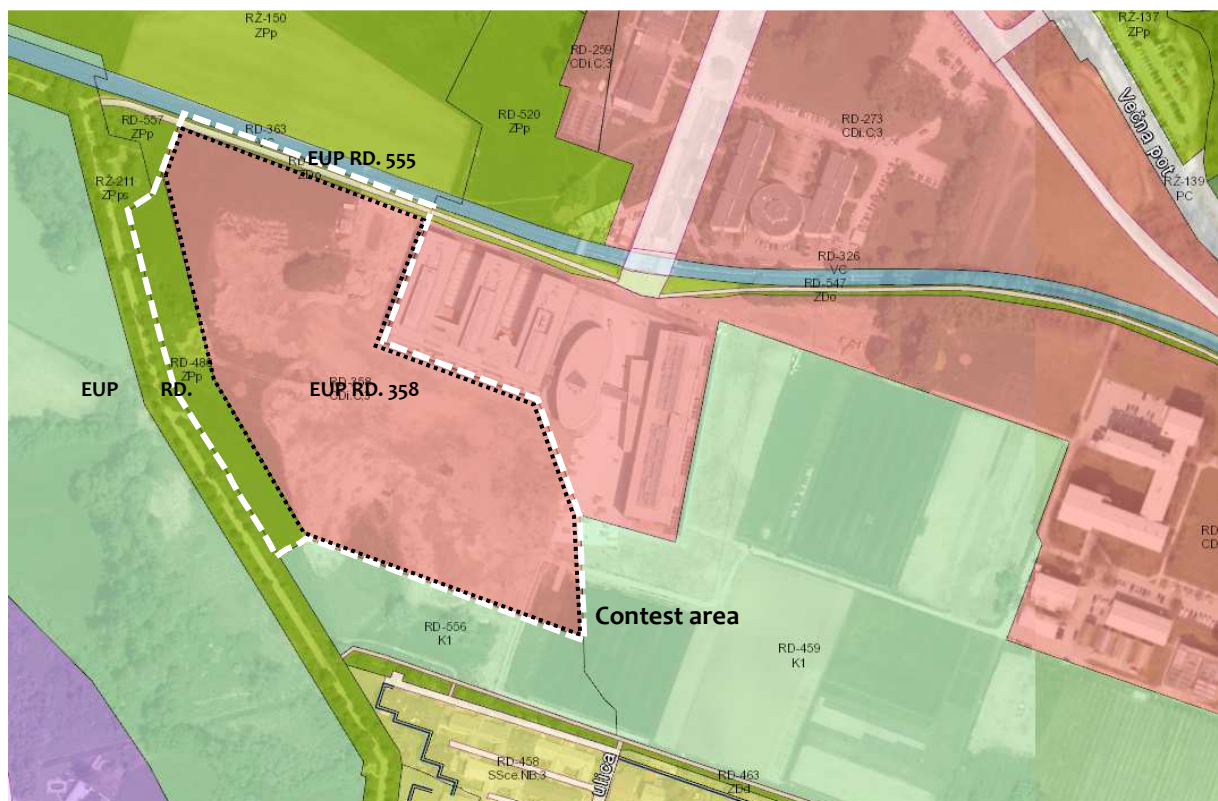


Figure 10, demonstration of dedicated land use (source: IPN MOL)

Območja centralnih dejavnosti	
CU	Osrednja območja centralnih dejavnosti
CDd	Območja centralnih dejavnosti brez stanovanj
CDI	Območja centralnih dejavnosti za izobraževanje
CDp	Območja centralnih dejavnosti za vzgojo in primarno izobraževanje
CDz	Območja centralnih dejavnosti za zdravstvo
CDk	Območja centralnih dejavnosti za kulturo
CDj	Območja centralnih dejavnosti za javno upravo
CDc	Območja centralnih dejavnosti za opravljanje verskih obredov
Območja zelenih površin	
ZS	Površine za oddih, rekreacijo in šport
ZPp	Parki
ZPps	Pot spominov in tovarištva
ZDd	Druge zelene površine
ZDo	Zeleni obvodni pas
ZK	Pokopališča
ZV	Površine za vrtičkarstvo
OBMOČJA KMETIJSKIH ZEMLJIŠČ	
K1	Najboljša kmetijska zemljišča
K2	Druge kmetijska zemljišča
OBMOČJA GOZDNIH ZEMLJIŠČ	
Gozdna zemljišča	
Go	Območja gozdov
OBMOČJA VODNIH ZEMLJIŠČ	
Območja površinskih voda	
VC	Celinske vode
VI	Območja vodne infrastrukture

## Areas of central activities

Core areas of central activities

Areas of central activities without housing

Areas of central activities for education

Areas of central activities for pre-primary and primary education

Areas of central activities for health care

Areas of central activities for culture

Areas of central activities for public administration

Areas of central activities to practise religious rites

## Green areas

Areas for rest, recreation and sport

Parks

Trail of Remembrance and Comradeship

Other green areas

Green waterside belt

Burials grounds

Areas for allotment gardening

## AREAS OF AGRUCULTURAL LAND

**Best agrucultural land**

**Other agrucultural land**

## AREAS OF FOREST LAND

**Forest land**

Areas of forest

## AQUATIC AREA

**Areas of surface waters**

Inland waters

Areas of water infrastructure

Legend 4, dedicated land use

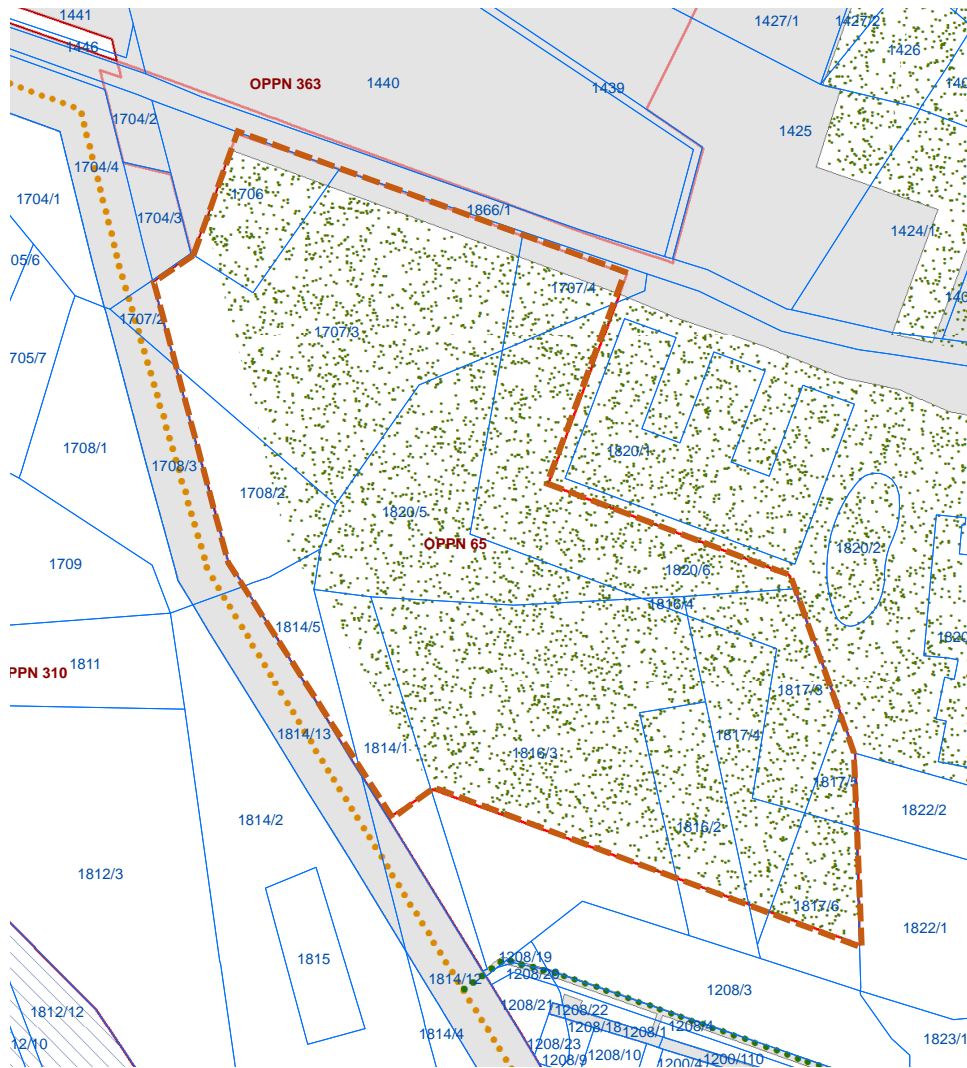


Figure 11, Display of areas of spatial units and spatial implementation conditions - control elements, public surfaces and advertising

## HEIGHT OF BUILDINGS

$H = \text{up to } P+2+T$

The height of the building is the distance between the terrain at the entrance to the ground floor of the building and the highest point of the cornice of the building with an oblique roof (single or multiple chamber) or a crown of a building with a flat roof or in the case of a terraced floor of a cornice of a terraced floor. The permissible height of the building may exceed: chimney, installation devices, solar collector or solar cells, access to the roof, fence, facility and electronic communication infrastructure device. The maximum height of new faculties must not exceed the height of existing faculties. To build basement floors is permissible.

The terraced floor (T) is part of the building, the rooms of which are located above the building's cornice and directly below the flat or oblique roof with a slope of up to 7 degrees. The BTP of the last floor shall not exceed 70% of the BTP of the last floor under the building's cornice.

Cornice of the building is a structural element on the outer perimeter of the building in the plane of the ceiling of the whole last floor, directly below the attic, mansard or terrace.

## Distances

The clearance of above the ground buildings must be at least 4.00 m from the boundary of adjacent plots, if these buildings are up to 14.00 m high or 5.00 m if they are higher than 14.00 m.

Exceptionally, with the consent of the adjacent landowner is permissible:

- 1.50 m from parcel boundaries for buildings lower than 14.00 m, and
- 3.00 m from parcel boundaries for buildings higher than 14.00 m.

When bordering on EUP with the dedicated use of K1, (in this case, this is on the southern and partly eastern border of the EUP RD-358), the same distance as above should be ensured.

On map 3.2. "Display of the units of spatial units and spatial implementation conditions – regulatory elements, public areas and advertising", public spaces are displayed, of which the buildings must be located at least 5.00 m or 3.00 (above the terrain and below it) from a public road or a lower category road. If the distances are smaller, the city authority of the City Administration of the City of Ljubljana in charge of transport must have the authority, while for state roads the operator of the state road (this applies to the part of the area near Glinščica brook, where the public road is marked marked gray).

The clearance of underground floors from the boundary of adjacent plots must be at least 3,00 m; the clearance may also be smaller if the owners of the adjacent plots agree in writing. When an underground floor is built under a number of plots intended for construction, the clearances between them need not be taken into account, but the distance from adjacent plots must be taken into account.

The intervals between facades of buildings and parts of buildings of type C of more than 14,00 m, on which areas are not oriented, and are intended for residence (including blind facades), are at least equal to or greater than half the height of the higher building, measured to its cornice or (if the inclination of its roof is greater than 45 °) to its ridge.

In the case of blind facades and facades with openings to illuminate the building's communications, it is also permissible to define with the OPPN minor distances between the facades of the buildings as defined in this Article.

The distance of the building from the parcel boundary is the shortest distance between the boundary of the adjacent land and this closest of the nearest outer point of the most exposed part of the building (for example, an overhang, a console structure, a balcony and the like).

## V. Noise protection

The contest area is located in area of III. level of noise protection in accordance with the Regulation on limit values of noise indicators in the environment (Official Gazette of the Republic of Slovenia, No. 105/2005) and means that the limits of noise indicators in night time can reach  $L = 50$  (dBA) and in the daytime  $L = 60$  (dBA).



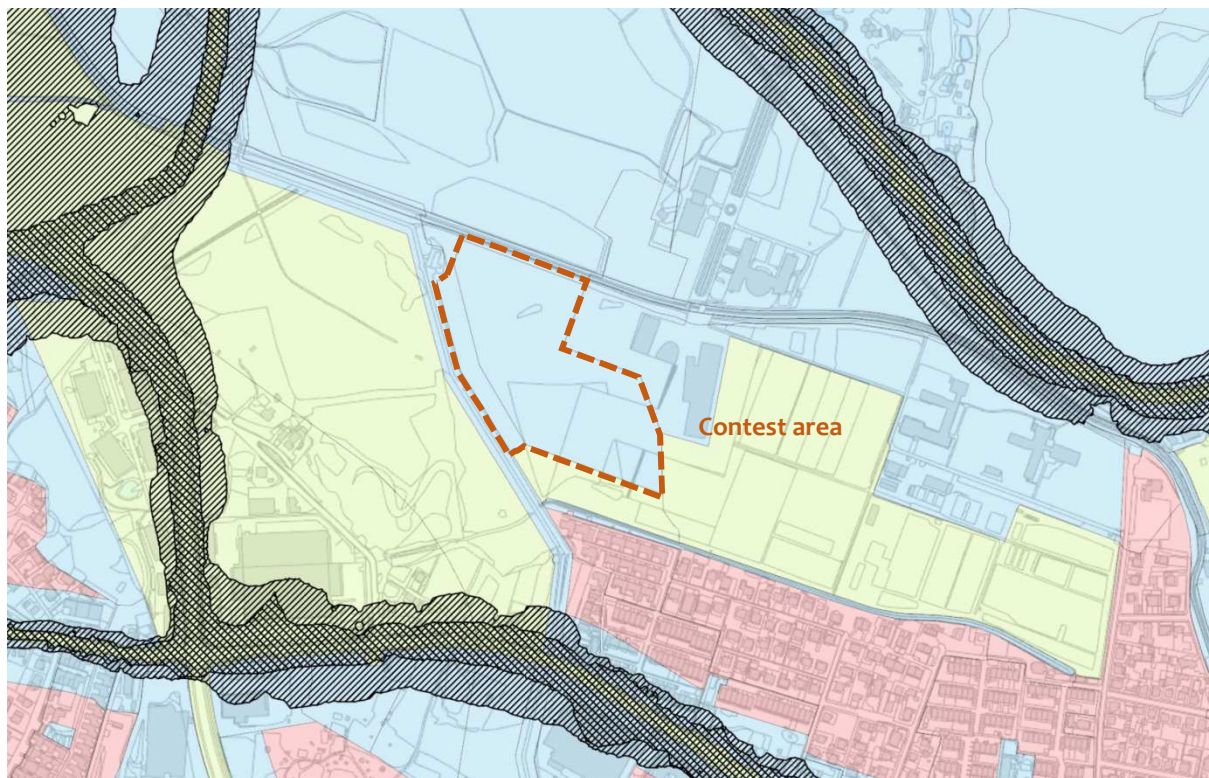
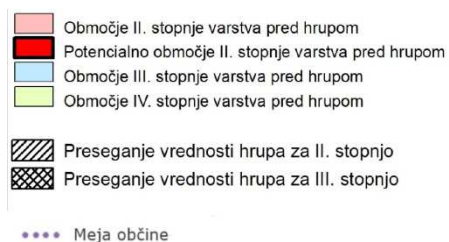


Figure 12, noise protection areas, (source: IPN MOL)



Legend 5, noise protection areas

Area of II. level of noise protection  
 Potential area of II. level of noise protection  
 Area of III. level of noise protection  
 Area of IV. level of noise protection  
 Exceeding the noise value for II. level  
 Exceeding the noise value for III. Level  
 The boundary of the municipality

## b. Infrastructure

### I. Actual space state

#### *Energetics, electricity and gas*

An overhead 10kV line route pass through the area and a 10 / 20kV cable is laid out in the underground electro cable ducts.

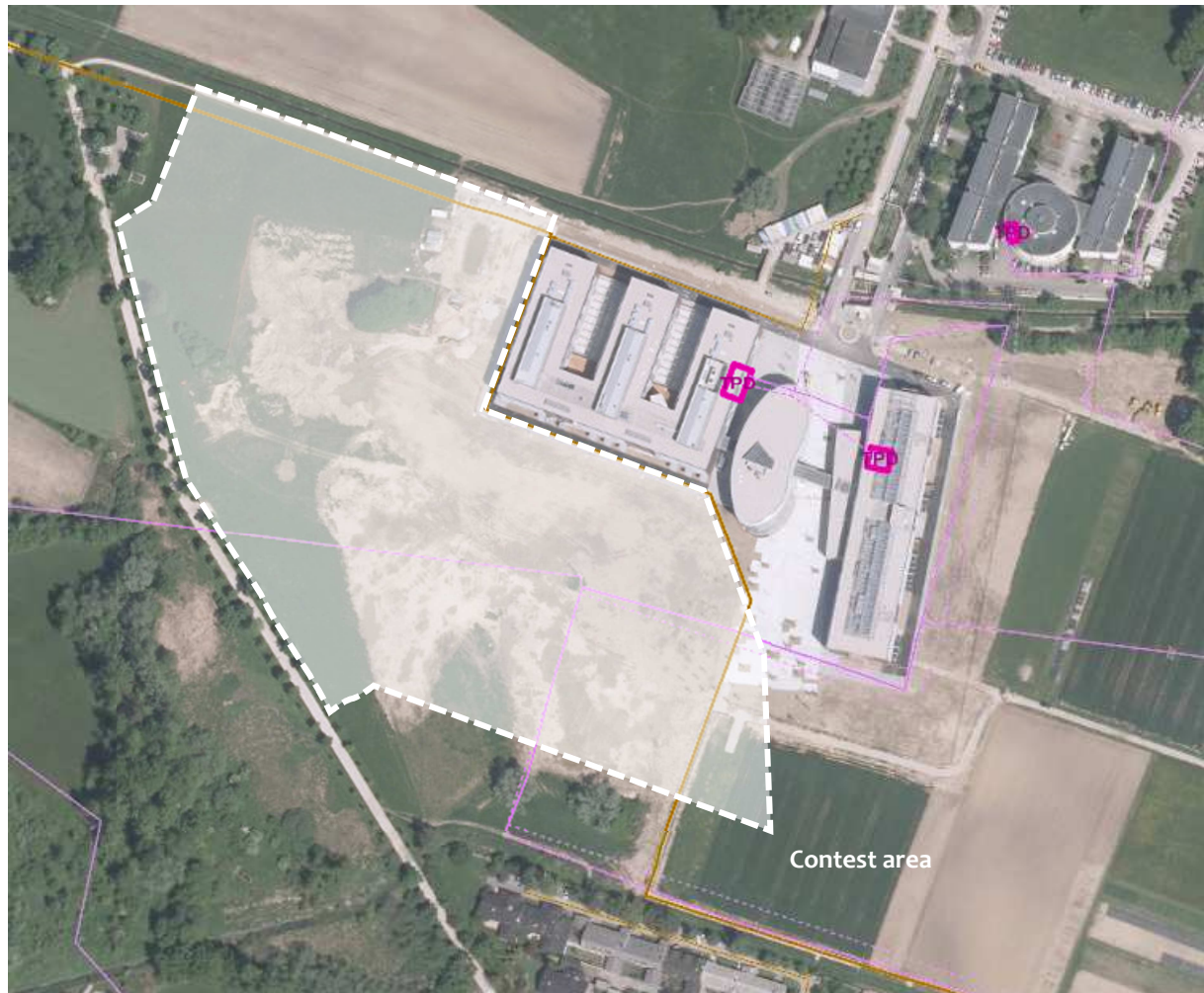


Figure 13, display of infrastructure, electricity and gas (source IPN MOL)

#### *Sewage and water supply*

On the northern side of the contest area, the public sewage DN 300 is intended for faecal sewage. The rain from the existing buildings is discharged into the Glinščica brook.





Figure 14, display of water supply and sewerage (source IPN MOL)

## II. Conditions, guidelines and opinions of spatial planning actors

### *Energetics, electricity and gas*

An overhead 10kV line route pass through the area and a 10 / 20kV cable is laid out in the underground electro cable ducts. The planned construction of FFA and FS concerns the existing line that will need to be moved and rearranged. For each facility is expected to build its own transformer station.

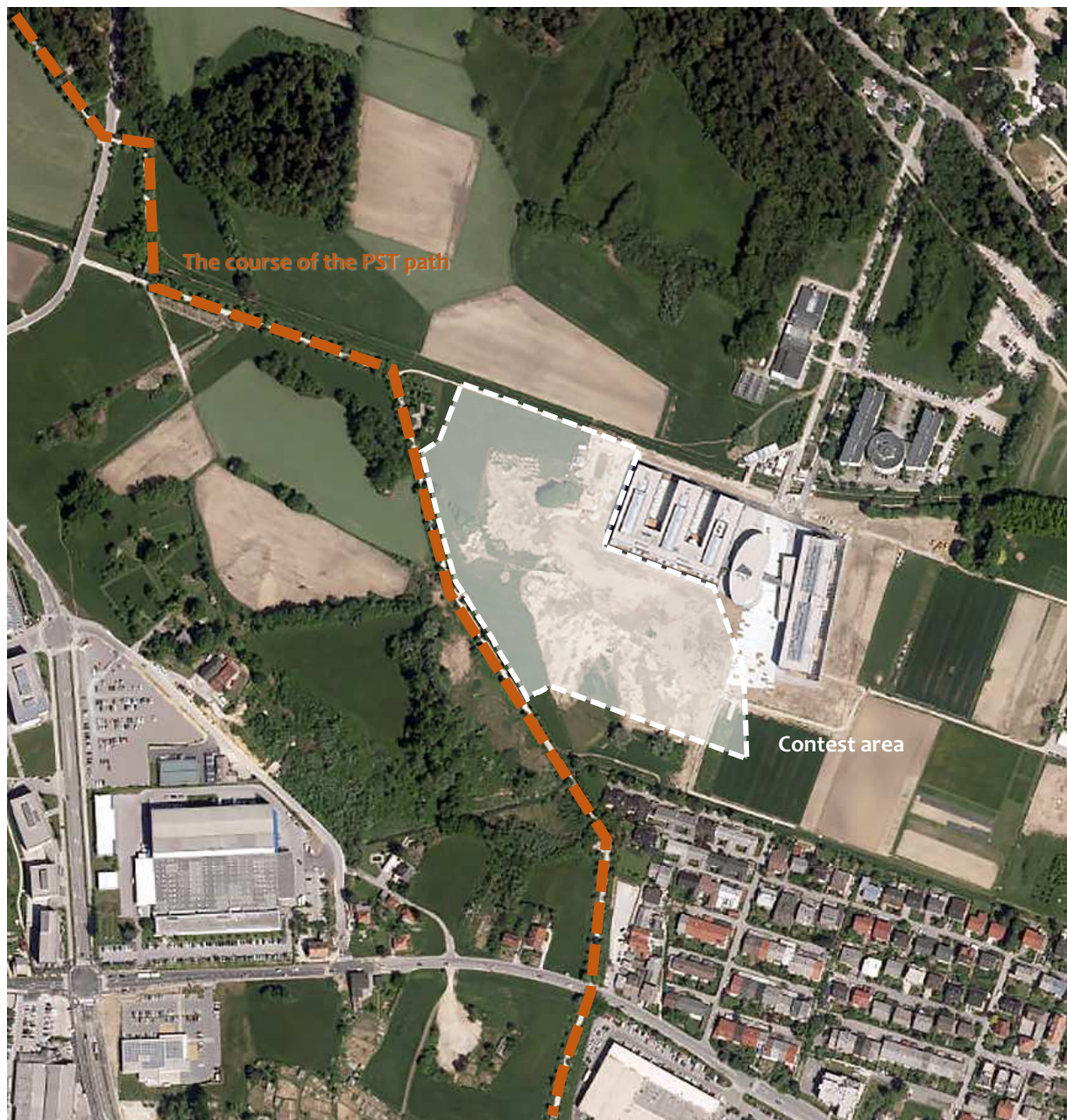
In accordance with the Local Energy Concept MOL and OPN MOL, the supply of planned buildings with natural gas are planned. The main distribution medium pressure gas pipeline JE 250 with a working pressure of 1 bar is located along the northern and eastern edge of the treated area. The route of the main gas pipeline can be moved if necessary.

### *Sewage and water supply*

In order to connect municipal wastewater from both planned facilities, the existing public channel DN 300 needs to be upgraded or extended. Due to the flood risk of the area, special attention should be paid to the retention of rainfall. Prior to the construction of buildings, mitigation measures need to be carried out, ie the construction of a flood water retention basin on Brdnikova ulica (the dam has already been built, the construction of locks in the selection stage of the contractor). In the event of the formation of technological wastewater, they must be cleaned before being connected to the public sewage system.

New buildings will be able to connect to the existing public water supply network. At the design stage, it is necessary to ensure adequate clearance of the facilities from the planned and existing water supply systems.

### c. Natural and cultural heritage



36

Figure 15, a demonstration of the PST recreational path

#### I. Actual space state

##### *Protection the natural heritage*

The contest area is located right next to two protected areas of nature. At the northern edge, it is in contact with the protected area - 1742 Landscape park Tivoli, Rožnik and Šišenski hrib and natural value - 317 Rožnik - Šišenski hrib - Koseški boršt. On the eastern side, the area borders on the monument of shaped nature - 4033 Trail of memories and comradeship.



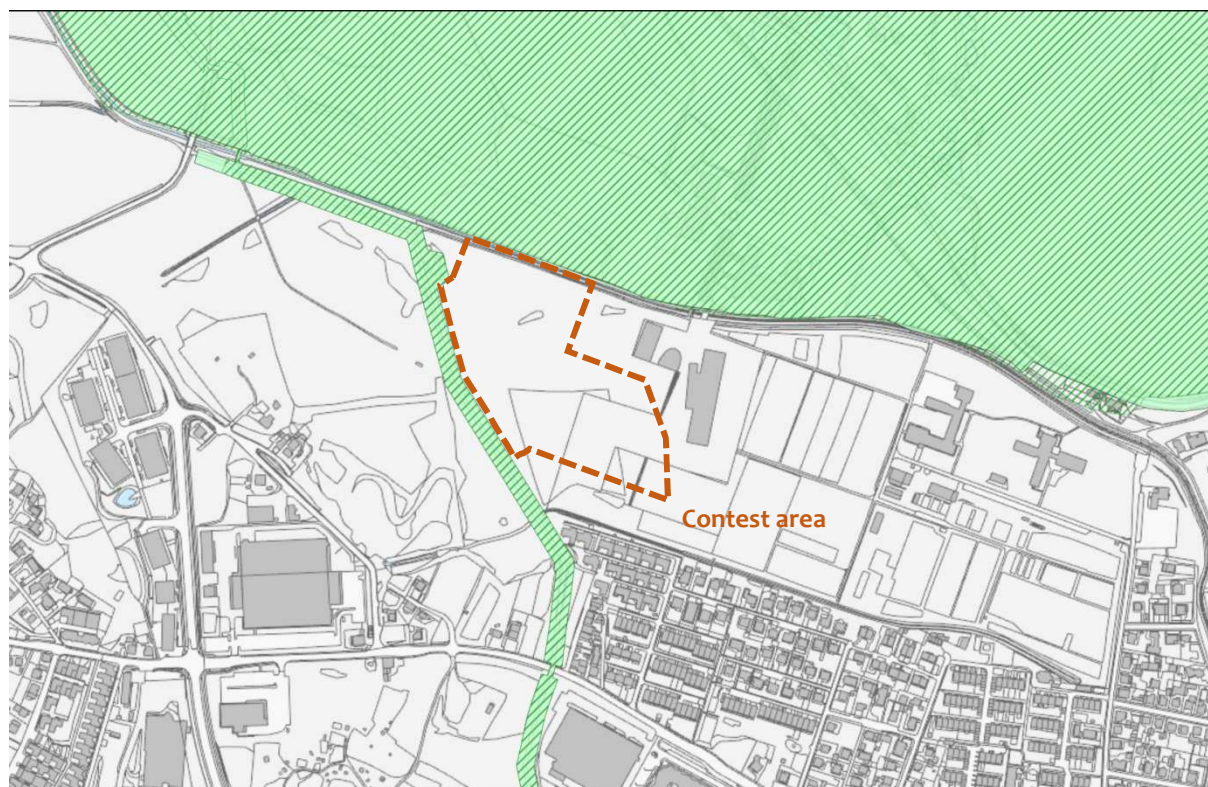


Figure 16, noise protection areas, (source: IPN MOL)

● Zavarovano območje	Protected area
● Naravna vrednota	Natural value
● Naravna vrednota - jama	Natural value - cave
▨ Naravne vrednote	Natural values
▨ Posebna varstvena območja Natura 2000	Special protection areas
▨ Potencialna posebna ohranitvena območja Natura 2000	Natura 2000
▨ Ekološko pomembna območja	Potential special areas of conservation
▨ Zavarovana območja	Natura 2000 Ecologically important areas
●●●●● Meja občine	Protected areas
	The boundary of the municipality

Legend 6, protected areas of nature

Both areas are vital for preserving the natural values of the city of Ljubljana. Urban, external and landscape arrangements must recognize the qualities of natural values, preserve them and, at the same time, be included in the area under consideration.

### Protection of cultural heritage

The contest area is also located in the immediate vicinity of protected areas as a cultural heritage. On the north side is the area of Rožnik, protected as a cultural landscape - 22736 Ljubljana - The cultural landscape of Rožnik and Šišenski hrib, to the east of the Trail of Remembrance and Communion, the larger area of the archaeological site begins - 22732 Ljubljana - archaeological site Brdo-Vrhovci. A cultural monument runs along the southwestern edge of the contest area: Ljubljana – trail POT, EŠD 1118.

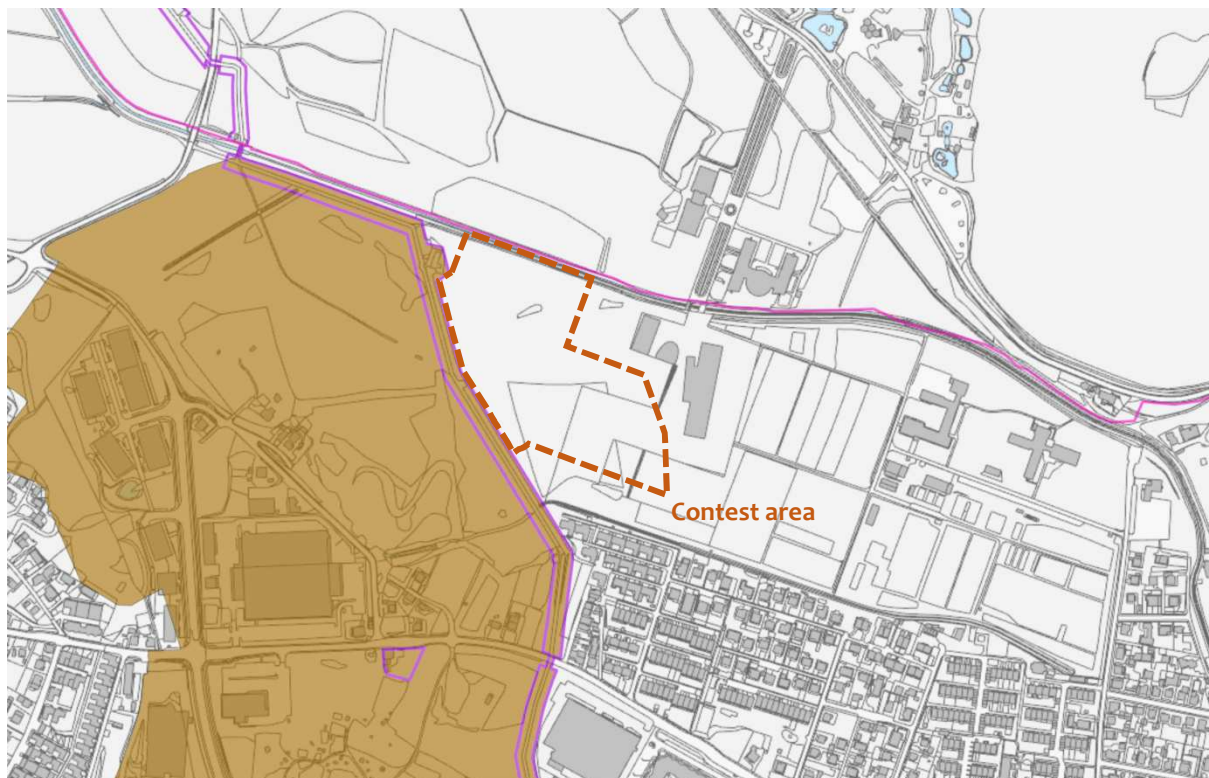








Figure 17, cadastral register display (source: IPN MOL)

	Arheološko najdišče	Archaeological site
	Spomenik	Monument
	Dediščina	Heritage
	Vplivno območje spomenika	Influential area of the monument
	Vplivno območje	Influential area
	Meja občine	The boundary of the municipality

Legend 7, cultural heritage

## I. Conditions, guidelines and opinions of spatial planning actors

### *Protection the natural heritage*

The Institute of Nature Protection of the Republic of Slovenia states that the contest area does not encroach on areas of natural heritage, it warns that on the western side the area is bounded by a natural value and protected area of Trail of memories and comradeship. By the POT, a 25-meter-wide green strip free of facilities and non-purpose arrangements is planned.

The area under consideration is located directly next to the protected area in the protected area Tivoli Landscape Park, Rožnik and Šišenski hrib and the natural value 317V Rožnik – Šišenski hrib – Koseški boršt, but there is no intervention.

### *Protection of cultural heritage*

There is no cultural heritage unit in the area under consideration. In the immediate vicinity there is a cultural monument: Ljubljana – trail POT, EŠD 1118. It is necessary to ensure that there will not be any degradation impacts on the route of POT with promenade. It is necessary to provide as much distance as possible from the POT route so that the POT route will still be the dominant spatial element that will be clearly perceived

in the space. The green spaces should be connected to the POT route as much as possible, which would create a connection with the green areas in the hinterland (Rožnik).

Routes and angles of POT with memorial marks can not be changed. It is also not permissible to fill the terrain near the promenade.

## d. Environment protection

### I. Actual space state

#### *Water resources*

The entire area of the contest belongs to III. water protection area, Vodarna Brest. The construction of facilities for upbringing and education in III. water protection area is permitted without special conditions.

#### *The segment from the hydrological report*

Characteristics of the groundwater level fluctuation: the essential observation is that the level in the upstream piezometer P-3 was significantly lower than the level in the piezometer P-2 by 27 November 2012; after 15 December 2012, the level was roughly equal, after 5. 2. 2013, the level of the upstream piezometer is constantly higher by approximately 0.4 m (Chart 5). Therefore, we could conclude that until December 15, 2012, there was an external influence on the water level in P-3.

Groundwater temperature; In the P-2 piezometer, the temperature of the water is very variable and the measurements show that it rises up to 20 °C (Chart 10). There are also strong temperature deviations that indicate dependence on precipitation events. Such fluctuations are not typical of the usual seasonal fluctuations in groundwater temperature.

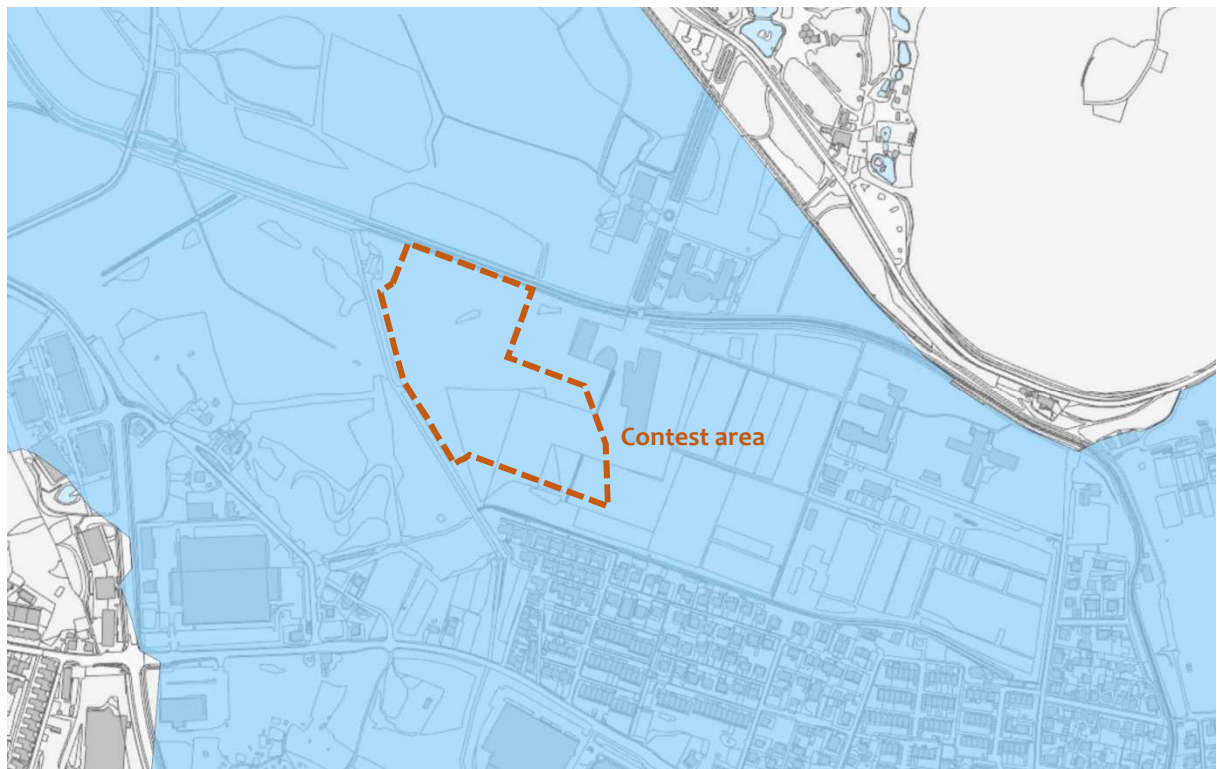












Figure 18, cadastral register display (source: IPN MOL)




 The area of the aquifer of the Ljubljansko barje and its hydro-geographical hinterland endangered by plant protection products and volatile chlorinated hydrocarbons

The area of the aquifer of the Ljubljansko barje and its hydro-geographical hinterland endangered by plant protection products and volatile chlorinated hydrocarbons

**Vodovarstvena območja**

-  0, Območje zajetja
-  I, Najožje vodovarstveno območje
-  1, Najožje vodovarstveno območje
-  II, Ožje vodovarstveno območje
-  2A, Podobmočje s strogim vodovarstvenim režimom
-  2B, Podobmočje z manj strogim vodovarstvenim režimom
-  III, Širše vodovarstveno območje
-  3A, Podobmočje z milejšim vodovarstvenim režimom
-  3B, Podobmočje z milim vodovarstvenim režimom

 Meja občine

#### Water protection zones

- 0, Area of basins
- 1, The narrowest water protection zone
- I, The narrowest water protection zone
- II, Narrow water protection zone
- 2A, Sub-area with strict water protection regime
- 2B, Sub-area with less strict water protection regime
- III, Wider water protection zone 3
- A, Sub-area with a milder water protection regime
- 3B, Sub-area mild water protection regime

The boundary of the municipality

*Legend 8, water sources*

#### Flood risk areas

The area under consideration lies predominantly in the area of low flood hazard class (Pm), while the part near Glinščica lies in the area of the medium flood hazard class (Ps) and the smaller part along the Trail of memories and comradeship lies in the area of the residual flood hazard class (Pp).

In order to reduce the flood hazard, flood prevention measures are planned with the Ordinance on the municipal detailed spatial plan for the Brdnikova area (Official Gazette of the Republic of Slovenia, No. 63/12), which envisages the construction of a dry flood retention basin between Brdnikova and the western highway, and waterside belt regulation structures with dykes and flood protection arrangements along Glinščica.

Construction in the contest area will be allowed after the implementation of the flood protection measures.

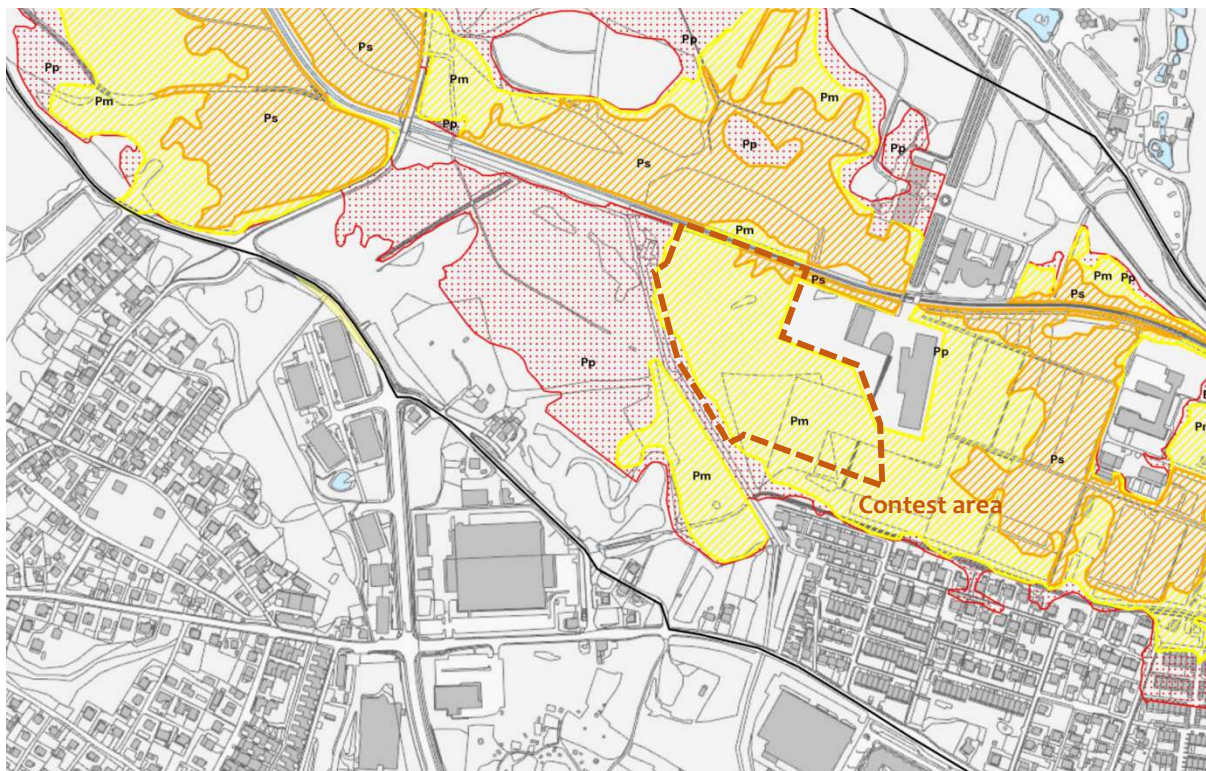
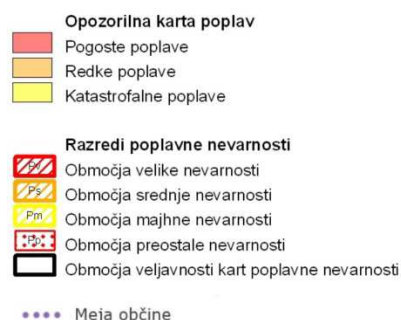


Figure 19, cadastral register display (source: IPN MOL)



#### Flood warning map

Frequent floods  
Rare floods  
Catastrophic floods

#### Classes of flood hazard

Areas of great danger  
Areas of medium danger  
Areas of low risk  
Areas of residual danger  
Areas of validity of flood hazard maps  
The boundary of the municipality

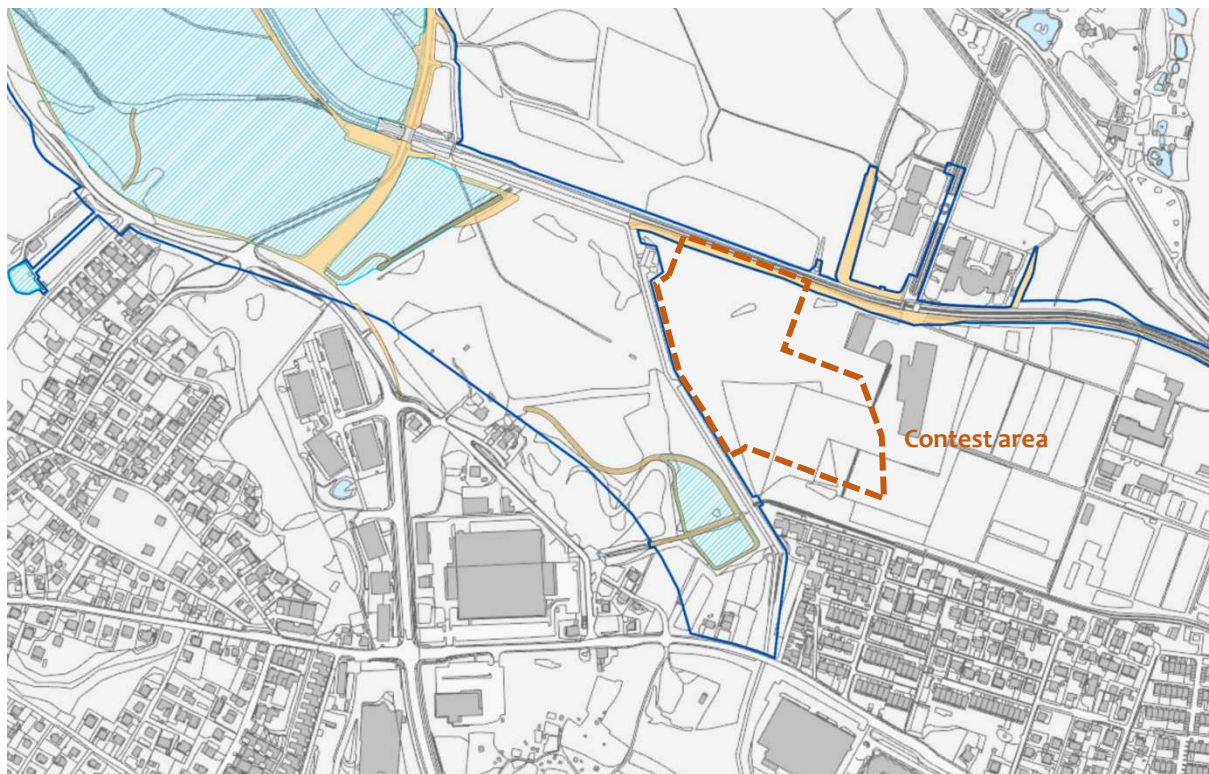
41

#### Legend 9, flood risk

As a planned mitigating measure, the construction of a retention facility along Brdnikova ulica, the construction of a dyke next to the Glinščica brook and several dry water flood retention basins in the surrounding area are planned. The measures are more precisely defined by the decree on the municipal detailed spatial plan for the area of the flood retention basin Brdnikova (Official Gazette of the Republic of Slovenia, No. 63/12).

Despite the fact that at the time of the announcement of the contest, the construction of the flood retention basin along Brdnikova ulica has not yet been completely completed, all the planned mitigation measures are deemed to be fulfilled and that the construction in the flood area is therefore permissible for the purpose of drafting the contest proposal.





Slika 20, map of mitigation measures (source: IPN MOL)

<b>Omilitveni ukrepi</b> — Objekt (vtočni, iztočni, zapornični, prag, zid) — Promet — Vkop, nasip - - - Odvodni kanal <b>Omilitveni ukrepi</b> ■ Objekt (zid, zapornica, vtok, iztok, pregrada, premostitev...) ■ Nasip ■ Vkop ■ Nadvišanje (poti, terena, brvi...) ■ Odstranitev objekta <b>Območja omilitvenih ukrepov</b> ■ Območje vodnega zadrževalnika ■ Območje suhega vodnega zadrževalnika ■ Območje razbremenilnika ■ Območje izravnalnega ukrepa <b>Območja veljavnosti omilitvenih ukrepov</b> ■ Območje veljavnega omilitvenega ukrepa ■ Območje omilitvenega ukrepa v pripravi <p>♦♦♦♦♦ Meja občine</p>	<b>Mitigating measures</b> Structure (in-flow, out-flow, barrier, threshold, wall) Traffic Ditch, dyke Drainage channel <b>Mitigating measures</b> Structure (wall, gate, in-flow, out-flow, barrier, bridging...) Dyke Ditch height increase (path, terrain, gangway...) Structure removal <b>Areas of mitigating measures</b> The area of the water retention The area of dry water retention The area of relief Area of the compensatory measure <b>Areas of validity of mitigation measures</b> Area of validity of mitigation measure Area of the mitigation measure under preparation  The boundary of the municipality
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42

Legend 10, mitigation measures for flood risk

### Seismically dangerous areas

In accordance with the Rules on mechanical resistance and stability of buildings, the contest area is located in the area with projected acceleration of the ground with a return period of 475 years = 0.635 g.



### *The segment from a geological report*

In the considered area the terrain is flat. The terrain is barely noticeably lower in the direction from north to south. On the northern edge, the Glinščica brook is regulated.

Beneath the 0.5 to 1.5 m thick surface lid of humus and heavily milled brown clay with pebbles, the depth of 8 and 11 m of fine fine middle-sandy sand were found in the entire investigated area. From depths of 8 m or 11 m, there is a 1.7 to 3.8 m thick layer of flooding containment sediments, which are tiny sand, fine sands and light milled gray clay. Under the flood containment sediments, at first there is a thin layer of medium fine sand with a gravel – the deposit of Gradaščica. From a depth of 13 m or 15,8 m further, the layer of clay with gravel. In these gravel, lenses and layers of heavy brown clay with gravel are often beneath the gravel-stone of Gradaščica. The deeper the groove is more cleansing and becomes very fine sand.

The first level of underground water was found 1.1 m to 1.8 m below the surface of the terrain. The next level of groundwater was found at the depth in the lower brown clay with gravel from river Sava.

The planned construction at the explored location will be quite demanding for the following reasons:

- The basement of buildings will need to be protected from high groundwater. The same applies to excavation (sealing of the perimeter of the construction pit to the flood sediments)
- The computational subsidence are already of such size that all facilities will need to be deeply built on the foundation piles. This is also shown by comparable experiences – Biological center.
- the non-homogeneity of the carrier base for foundation pillars is expected. Individual foundation piles will need to be deepened.
- in the case of simpler design of buildings – objects of smaller ground plan dimensions with dilatable connections, there is a possibility of shallow foundation. This is verified by more detailed geological and mechanics calculations.
- Geological technician should be involved in the further design of the foundations.

43

## II. Conditions, guidelines and opinions of spatial planning actors

### *Water resources*

This treatment is located within the water protection area marked VVO III, which requires strict compliance with all the conditions in the Regulation on water protection area for the water body of aquifers of the Ljubljansko barje and the surroundings of Ljubljana (OJ RS, No. 115/2007, 9/2008, 93/2013 ). The Regulation stipulates that construction of CCSI 1263 buildings for education and scientific research work is permissible in VVO III, without additional conditions and the construction of CCSI 1242 garage building, provided that, when a water consent is issued for the construction of buildings and the implementation of construction works, the impacts on water regime and state of the body of water are verified.

The lower height of the underground facility must be above the mean groundwater level, the average of the last 10 years. Exceptionally, construction is allowed if the transmissibility of the aquifer at the site of construction is not reduced by more than 10 per cent. If it is necessary to drain or extract groundwater during construction or operation, it is therefore necessary to obtain water consent.

The admissibility of building an underground part of the building of the two faculties for parking will have to be proven by a hydrological hydraulic study.

Separation of precipitation communal water must be planned and carried out in accordance with the provisions of the spatial planning institution, described in more detail in the previous DRSV guidelines of 28.2.2017, no. 35020-31 / 2017-3.

Plots for the planned arrangement lie along the Glinščica brook. Construction on aquatic and coastal land that extends on waters of the 2nd order of 5 m from the boundary of aquatic land is prohibited. As the

boundary of aquatic land, the upper edge of the watercourse or the outer planar gauge of the closed profile of the arranged watercourse is considered.

### *Flood risk areas*

The treated plots are entirely or partially in the class of small (PM) and the remaining (Pp) flood hazard. For floodplains regulated at the site, guidelines are given for the planning of spatial arrangements or the implementation of interventions in the area by the Ordinance on the municipal detailed spatial plan for the area of the flood retention basin zone Brdnikova (Official Gazette of the Republic of Slovenia, No. 63/12). More detailed instructions are in the previous DRSV guidelines of 28.2.2017, no. 35020-31 / 2017-3.

Filling of flood areas is not allowed except for the land under the facility within the envisaged mitigation measures.

In the contest solution, it is necessary:

- take into account the mitigation measures envisaged (determined by the OPPN for the area of the Brdnik flood retention basin area),
- underground garages are conditionally allowed, a hydrological hydraulic study is needed,
- 5m from the boundary of the water land Glinščica brook construction is not allowed,
- Filling of flood areas is not allowed except for the land under the facility within the envisaged mitigation measures,
- drainage of precipitation waters: anticipate the sinking or, possibly, the retention of precipitation waters from the outflow to the sewage or surface arrester (sealing, grass plates, possible dry flood retention basin ...).

## e. Protection and rescue

### I. Conditions, guidelines and opinions of spatial planning actors

In the contest solution, it is necessary:

- in the regulatory areas of cities and other settlements with more than 10,000 inhabitants, shelters of basic protection are being built in buildings designated by regulations (Article 3 of the Decree on the Construction and Maintenance of Shelters: Investors must build shelters for basic protection in facilities intended for regular education by more than 200 participants of the educational program)
- the ceiling structure above the cellar must be built so that it can withstand the demolition of objects on it (reinforcement of the first slab),
- in relation to fire safety, it is necessary to ensure the necessary distances from the boundaries of parcels and between facilities,
- provide an adequate hydrant network,
- secure unobstructed and safe driveways and work surfaces for emergency vehicles.

#### IV. Project task for the urban landscape arrangement of the area

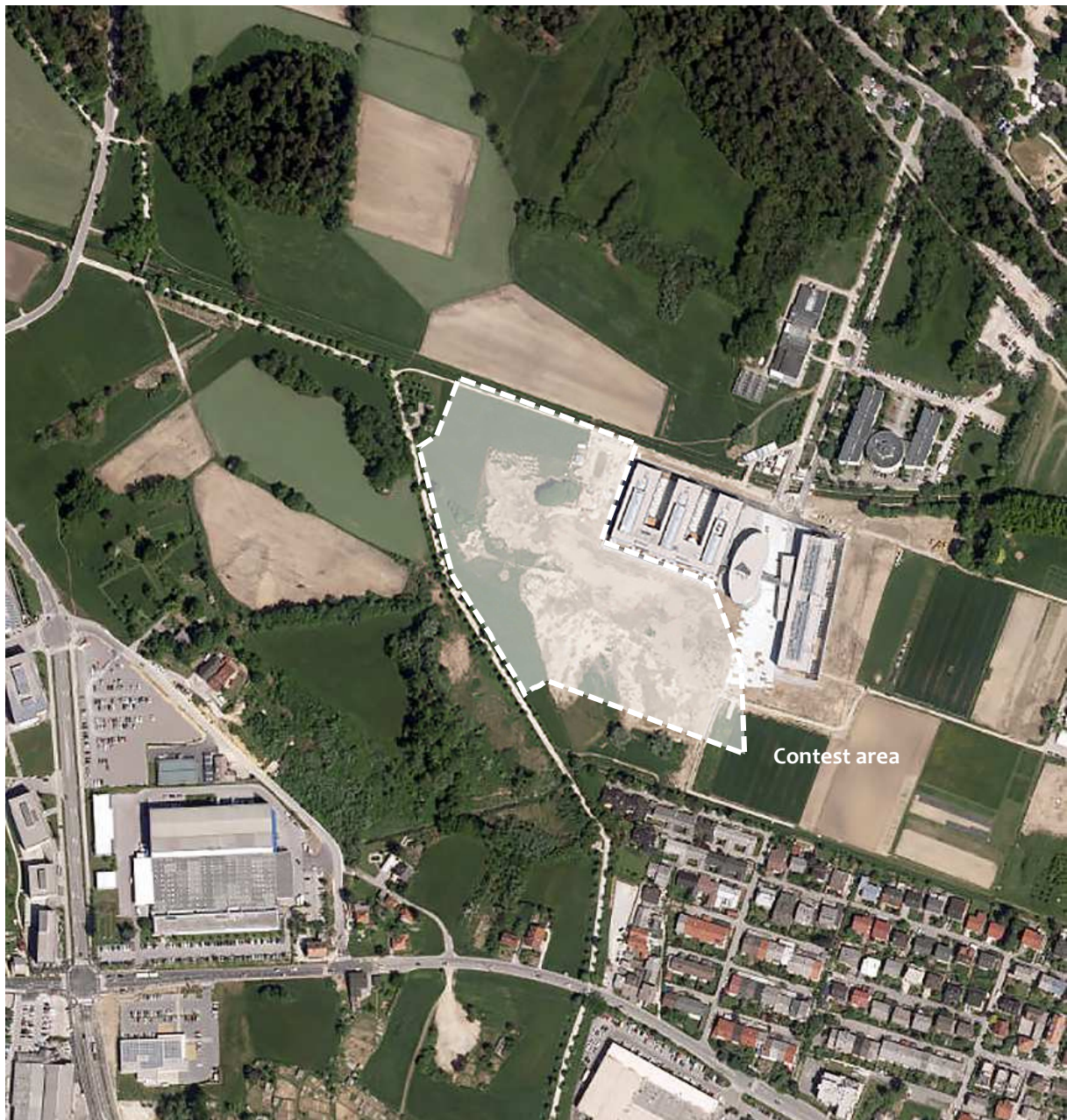


Figure 21, the orthophoto of the contest area (source: google earth)

##### a. Definition of the urban placement on the planned contest area

###### I. General

The contest area (43,044 m<sup>2</sup>) is located next to the already existing Faculty of Informatics and Computer Science (FRI) and Faculty of Chemistry and Chemical Engineering (FKKT). The new building of the Faculty of Pharmacy (FFA) and the Faculty of Mechanical Engineering (FS) should be placed in a space from the urban point of view in such a way that together with the existing ones they form a reasonable whole. Facilities of

*Public, anonymous, two-stage project urban and architectural contest for the new building of the Faculty of Pharmacy and Faculty of Mechanical Engineering*



the faculty should act as separate entities that are not connected to each other, and with their placement they establish external park and recreational areas (sports playground) in shared usage. The appearance of new faculties must not degrade the spatial qualities that the Trail of memories and comradeship with the promenades establishes in the western part of the location, so a 25m wide green belt is foreseen from the route POT. The design of open spaces should respect the natural qualities at and near the site (Landscape park Tivoli, Rožnik and Šišenski hrib) and connect to a cultural monument; The Trail of memories and comradeship.

## II. Traffic access

The main traffic access to the area considered is from the north side, from the Večna pot. Access to the newly planned faculties is shared with the Faculty of Computer and Information Science and the Faculty of Chemistry and Chemical Engineering. Even if existing traffic access does not stand the expected increase in the number of users (cars, cyclists, pedestrians) from the transport technical point of view, it will be regulated in the framework of a broader traffic regulation and mobility plan for the whole area of the Brdo Higher Education Center and is not the subject of the contest.

The traffic arrangement of the whole area should also provide access to pedestrians and cyclists from the south, in such a way that it provides quality foot and bicycle connection to the Cesto na Brdo and to the Tehnološki park.

## III. Outer surfaces traffic arrangement

Outside surfaces, in addition to park and sports, also include parking spaces and access roads that should not be perceived as dominant in the space. It is necessary to take into account the traffic connection to the road network (the urban concept of the MOL), delivery of transport vehicles, the access / drive away of personal vehicles and access for foot traffic and cycling. The installation of parking spaces should be foreseen in basement floors of buildings, which, however, should be properly designed due to flood risks. When determining the number of PLs, the norms prescribed by the OPN MOL ID (described in the section Transport infrastructure) for buildings intended for education and scientific research work (college) are prescribed only for information and are not binding on the participants. In accordance with the expected results of the Mobility Plan and the expectations of users, a minimum of 400 PL is foreseen for the needs of the FS, and for the needs of the FFA a minimum of 250 PL will be provided for parking vehicles for employees and visitors. A small part of the parking needs of the two new faculties (approx. 100 - 150 PL) can also be provided within the envisaged new parking house, which will be built along the Večna pot and is not the subject of this contest. The definition of the proportion of which parking needs can be solved within the dislocated parking house is left to the participants. With the contest proposal, it is necessary to strive for, within the framework of, the immediate proximity of both buildings to the maximum parking space, but at the same time not at the expense of the quality design of outdoor open spaces.

30% of the covered car parks should be equipped with a connection for electrically charging propulsion batteries.

In the area it is also necessary to provide 720 parking lots for bicycles, namely 450 PL for bicycles near FS and 270 PL near the FFA. 25% of parking lots for bicycles should be covered with a roof or under the overhang of the faculty building and equipped with a connection for electric charging of the drive batteries.

Intervention access must be enabled around the entire perimeter of both faculty buildings. The intervention path can be arranged as a hardened sand or grass surface, in accordance with the norms for planning interventions and surfaces.

#### IV. Urban and landscape arrangements

From an urban point of view, both buildings, regardless of their shape and position within the contest area, must be designed as constructive and functionally autonomous. The design must allow time and space independent execution and functioning. It is permissible to touch the building, whereby both the underground and the above-ground part must provide technical, operational and phase independent construction.

The design and position of the buildings in which the required FS and FFA programs are to be put in place should, in addition to adequate internal functionality, also ensure high quality external urban and landscape space as far as possible. Given the fact that the new faculties on three sides are surrounded by a cultural and natural heritage, they touch the green pegs of Ljubljana and establish an important contact point between the urban and the landscape areas, it is necessary to pay special attention to the arrangements on the south-west border and to the Glinščica brook. By proper planning, it is necessary to ensure that the POT area is maintained as an autonomous landscape move, and that the entire arrangement of the green areas should be retained, of a park character, without unnecessary aesthetization.

Within the green outer surfaces, it is necessary to plan the areas for rest and relaxation of students and pedagogues (clusters of benches in the shade of trees, larger grasslands, etc.) and additional open sports surfaces without fences at the discretion of the participants. Sports surfaces are designed for informal forms of sport and recreation. Organization of matches or professional training is not envisaged, therefore they can be dimensional and organizational deviation from sports norms.

Hardened outer surfaces should be designed to provide high-quality views of the surrounding landscape. They must provide formal and informal surfaces for socializing and group work of small groups outdoors (in the shade in the summer and in the sun in the spring and autumn). The design of urban equipment should be restraint.

The materials of the hardened surfaces should be chosen economically and in accordance with the purpose and frequency of use. It is desirable to combine wooden seating surfaces (use of wood suitable for outdoor use), concrete paving stones or cast concrete on frequency surfaces and sand in those areas of the outer arrangement that are not intended for regular winter cleaning of snow (secondary routes and surfaces). Asphalt should only be used on those surfaces that are primarily intended for motor traffic.

The external arrangement should reflect the importance of an open, advanced, and with the surrounding nature connected university campus.

#### V. Size of buildings

The construction on the basis of OPPN 65 is permitted in the contest area: Faculties in Biotechnical center. This defines the maximum occupancy factor (FZ) to a maximum of 50% and a green area factor (FZP) to at least 25%. The factor of exploration (FI) is not defined.

The area of the designated area is 36,315 m<sup>2</sup>. The total built-up area of both buildings should therefore not exceed 18,157 m<sup>2</sup>. There must be at least 9,078 m<sup>2</sup> open green areas.

#### VI. Height of buildings

The permitted height of the new buildings on site is defined by the OPN MOL with B+G+2+T. The maximum height of new buildings must not exceed the height of existing faculties. Building the building volume in this way will be in accordance with other built structures in the immediate vicinity - FKKT-19,9 m and FRI-20 m (source: <http://prostor3.gov.si>

[/javni/javniVpogled.jsp](#)). In the event that the participants propose higher objects, the urban design must be adequately reasoned and demonstrated through spatial displays that buildings are reasonably integrated

into the surroundings. For more precise determination of the height of o buildings in the University of Ljubljana, some featured PID designs of the FKKT and FRI buildings (D\_3\_4\_Izsek iz dokumentacije za izgradnjo FKKT in D\_3\_5\_Izsek iz dokumentacije za izgradnjo FRI) (D\_3\_4\_Extract from the documentation for the construction of FKKT and D\_3\_5\_Extract from the documentation for the construction of the FRI) are added to the contest annexes).

## VII. Relation to the surrounding built and natural structures

According to the OPN provisions, the design of the height of new buildings requires the use of existing buildings. Within the university center Brdo, the buildings FKKT, FRI and the intermediate entry building are located in the immediate vicinity of the planned faculty buildings. The layout of the existing surrounding buildings is P+3+T, where the terraced floor is designed as a uniformly designed technical upgrade and covers approx. 50% of the building's surface. The pronounced horizontal separation of existing buildings into the basic building body and the moderate upgrading of the centre is the fact that the design of new building masses needs to be taken into account. It is desirable that a planned building through a cornice of the top floor of the 2nd floor with existing buildings is set up a design and harmonized dialogue. The design of the terraced floors of new buildings should also follow the technical and distinctly formally reserved character of the FRI and FKKT terraces.

To the south of the contest area there is a settlement of individual residential buildings. Therefore, with proper urban design it is necessary to establish a clear relationship between the different purpose of the areas.

The urban design should work as subtle as possible in the space and, in terms of appearance, gives priority to the natural and cultural values that surround the location.

## VIII. Additional requirements relating to the protection of natural and cultural heritage and the environment

In the contest solution, all requirements set out in the chapter must be observedIII Presentation of the contest area with spatial organizers data . In addition, additional protection measures must be taken into account in order to ensure the functionality of the facilities in the contest solution.

When designing underground parts of the building, the principle of possible watering must be taken into account. In the underground part of the buildings, there must be no installation hubs and spaces, warehouses of substances and equipment, and other premises where, due to watering, water can result in permanent damage to the building, failure of installation systems or damage to material and equipment or the emission of toxic substances into the environment.



## V. Terms of reference of the Faculty of Pharmacy (FFA)

### I. Short historical development

The basic tasks of each university, and therefore of its faculties, are the creation, transfer and preservation of knowledge. Therefore, in terms of innovation and research, effective teaching as well as the preservation of historical memory, bound to the profession. The Faculty of Pharmacy formally formed in 1995, but not from scratch. The university pharmacy study has been fully implemented in Ljubljana since 1960, the first form of university study of the basis of pharmacy in Slovenia dates back to 1946 to 1949, while various forms of education of pharmacists in Slovenia are significantly older. The education of pharmacists and the introduction of the doctrine of good work in the pharmaceutical profession has been developed in the territory of Slovenia already in the 17th and 18th centuries, since the Pharmacy Order for the Duke of Kranjska was established in 1710. In the nineteenth century, pharmacists working in the area of present-day Slovenia were educated primarily at universities in Vienna, Graz and Padua, and later at the faculty in Zagreb. A comprehensive study of pharmacy was developed at the Department of Pharmacy of the Faculty of Natural Sciences and Technology, from which a new Faculty of Pharmacy was created. And all this history is embedded in today's Faculty of Pharmacy. Not with some nostalgia in the past, but as an awareness of the deep roots from which a high tree with a strongly branched crown can grow. The latter means diversity in the research work, where each sheet is counted, each individual, and at the same time involvement in pedagogical work through internal connections, such as the treetop associated with the small branches and branches, and the flowing juices from the roots to the last leaf.

The Faculty of Pharmacy has opted for a scientific and research oriented pedagogical institution. This is not a formal orientation, it is our daily life, this is the way of work. The number of publications in scientific journals, the number of quotations, the number of projects with the economy places us in the very top of the University of Ljubljana. And this way of working and thinking is also included in study programs. The central pharmacy program receives permanent renewal and upgrades, as well as some major changes: from the 4th year to the 4.5th year, to the harmonized 5th year study with added practical training instead of traineeships and then the Bologna 5 year study. So we came to the length of the study, which was proposed already in 1946 – but then without a half-year practical training. The study continues in the doctoral degree of Biomedicine, which is carried out within the Doctoral School of the University of several faculties and associated institutes. Doctoral degree can be achieved through study programs by all students of the Faculty - first and second degree laboratory biomedicine, cosmetology and industrial pharmacy, but they are also employable for each of the completed programs. The scientific approach in the course of studies also develops criticality and flexibility, which means that graduates find themselves even more easily in the atypical environments of their profession. This is, in today's tough economic climate, on the one hand, and the demands for constant adaptation and innovation on the other hand of paramount importance. The basic goal of the Faculty of Pharmacy is a well-educated, professional and scientifically qualified graduate, familiar with ethical principles that independently performs difficult tasks in pharmacies, pharmaceutical industry in all four basic segments (research and development, production, analytics, marketing and sales), hospital pharmacy, clinical-biochemical and other medical laboratories, control-analytical laboratories, research institutions, educational organizations, state and regulatory bodies and everywhere where the work and presence of an expert from the wider field of pharmacy, laboratory medicine, safety of medical and cosmetic products is essential for safety and health care.

### II. Description of existing buildings and premises of FFA

The Faculty has its own activities at four locations (in addition, classes are taking place at the locations of 4 participating faculties, while practical training of students is still on almost 100 locations in Slovenia). In addition to the main building on the Aškerčeva cesta, it is also rented out on the Tržaška cesta, the building at Aškerčeva cesta 9 and the lecture hall in the yard. In spite of this, the premises are not sufficient

(according to the findings of the spatial assessment of the faculty, there are 9,000 sq. m. missing) and are also not suitable for implementation on one side of the pedagogical work (lack of lecture rooms, inadequate lecture rooms, inadequate laboratory infrastructure) and above all research work. For modern research in the field of pharmacy, the so-called clean laboratories, which the faculty does not have and can not even provide in existing facilities, would be necessary. Therefore, in 2014, the procedure for the construction of a new building at the site of the UL University in Brdo, which began with the production of the DIIP and the conceptual design and the placement of the facility in the urban plan of Ljubljana, in 2016 it established the starting points of the internal organization of the work and the purpose of the premises, and started the procedures for the urban placement of the building and for the production of projects.

Building on Aškerčeva c. 9, which was given to the Faculty in the past year after FKKT moved to a new location, the FFA partially reorganized in 2016, and for the rest, it initiated the process of expert judgment regarding fit for use and plans for adaptation. In the high ground floor of the building, it has thus arranged the new premises of the Student's Room and the premises of the Infrastructure Translational Centre. Planning the usability and arrangement of the rooms on the first and basement floor is still ongoing, because the technical characteristics of the building are limiting optimal solutions.

In 2016, the faculty also partially rearranged the Lecture Room yard (Pd), mainly ventilation and heating, thus ensuring the conditions for work for large groups of students. The lecture room is the largest in the faculty with approximately 150 seats.

Preparation of plans for the organization of cellular laboratories with the processing of P2 and the former premises of Student's room on the first floor of Old Technology is under way, which is also connected with the arrangement of the replacement lecture rooms in the Aškerčeva 9 building.

There were problems with ventilation in the premises of Ilirija in the Tržaška cesta, which are used by the FFA, which will need to be regulated. Even at this location, it is known that in the old building, despite the renovation, it is difficult to achieve the conditions that are necessary for normal pedagogical work in demanding laboratory conditions.

The remaining issue was the issue of the arrangement of faculty premises at Trg MDB 2 in Ljubljana, where a study pharmacy is planned in cooperation with Lekarna Ljubljana. On the initiative of the Faculty, the building manager initiated the procedure under the ZVETL Act to regulate the issue of floor property, which is one of the necessary conditions for continuing the renovation process. However, the Faculty and the Pharmacy Ljubljana agreed to implement the renovation of only the pharmacy premises as soon as possible, as part of which the study part will also be. This renovation will take place in 2017 under the existing conditions and dimensions, which does not require the acquisition of a building permit and the consent of the other co-owners in the building.

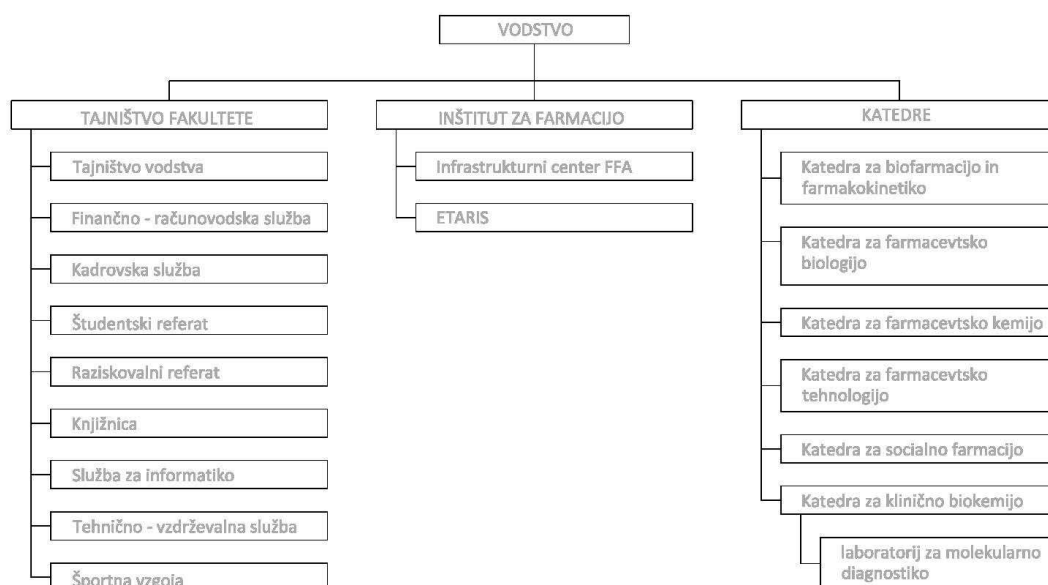
## b. Organisation chart for FFA

The Faculty of Pharmacy has the following organizational units: the faculty's management, the secretariat of the faculty, the chairs and the Institute for Pharmacy.

The management of the Faculty of Pharmacy consists of the dean, vice-dean for the field of study, vice-dean for the science and development department and vice-dean for the international field. The secretariat of the faculty is an organizational unit that takes care of solving organizational, financial accounting and legal matters and prepares professional bases for the decisions of the faculty's management. The secretariat is run by the secretary of the faculty. The Faculty of Pharmacy has six chambers representing the basic organizational units of the teaching and scientific research work and the Institute for Pharmacy that performs basic and development projects for the current needs of the pharmaceutical profession. The library of the Faculty of Pharmacy, which organisationally belongs to the secretariat of the faculty, provides library, information and documentation activities in pharmacy and clinical biochemistry.

The bodies of the faculty are the dean, the senate, the academic assembly, the administrative board and the student council.

Dean is a professional leader and management body that manages and represents the faculty. The senate is the highest professional body of the faculty in the field of education and scientific research. The academic assembly elects the members of the faculty senate and proposes candidates for the dean to the senate. The administrative board shall decide on matters of a financial nature. The student council is a body of students of the faculty.



51

#### MANAGEMENT

##### THE SECRETARIAT OF THE FACULTY

The secretariat of the management

Financial and accounting service

Personnel department

Student's desk

Research desk

Library

IT department

Technical and maintenance service

Physical Education

##### INSTITUTE FOR PHARMACY

Infrastructure Centre FFA

ETARIS

##### CHAIRS

Department of Biopharmaceuticals and Pharmacokinetics

Chair of Pharmaceutical Biology

Chair of Pharmaceutical Chemistry

Chair of Pharmaceutical Technology

Chair of Social Pharmacy

Department of Clinical Biochemistry

Laboratory for molecular diagnostics

Figure 22 - Organization chart for FFA



## c. Description of development vision FFA

### I. Mission FFA

Development, planning and implementation of higher education at all three levels, education of future professional staff to carry out the most demanding scientific, development and professional works in the field of pharmacy and laboratory medicine.

Planning and conducting scientific and research work in a broader set of pharmacy, clinical biochemistry and border science fields.

Concern for professional activities in the field of health and health services in the frame of pharmacy and laboratory activities, the provision of professional and developmental works for the needs of the pharmaceutical industry and government institutions, and promotion of the pharmaceutical profession within the borders of the Republic of Slovenia and abroad. "

The basic mission of the Faculty of Pharmacy is to offer educational programs based on scientific basics at the undergraduate and postgraduate levels. Moreover, the concern for lifelong learning is becoming increasingly important.

UL FFA make 1,500 students and 150 employees, and close to 4,000 UL FFA alumni, graduates, masters and doctors of Science (Table 1, Figure 20). Every year, around 100 students from partner faculties are educated in international agreements at the faculty, and a similar number of our students accumulates life experiences and education at partner universities, mostly European universities.

Table 1: Staffing

Staffing 2017	143
Full professors	18
Associate professors	12
Assistant professors	7
Assistants	34
Technical assistants	15
Researchers	20
Young researchers	18
Associates and adm. co-workers	15
Technical support	4
+ employees of other UL faculties	

EM FAR

S1 KOZ

S1 LBM

S2 INF

S1 LBM

S3 Biomedicine

Spec. study

Figure 23: Number of students in all study programs FFA 2016/2017

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### **At the FFA, we have five study programs:**

A five-year pharmacy study educates a regulated profession of pharmacists in accordance with the European Directive 2006/36 / EC and allows obtaining the title of university degree pharmacist recognized in all EU Member States. With this title, excellent job opportunities are offered as well as continuing education in doctoral level or specializations.

A student of laboratory biomedicine obtains after the first stage of study (3 years) the title of a graduated graduate in engineering of laboratory biomedicine, and after the second degree (2 years), he is a master of laboratory biomedicine. After both levels there is the possibility of working in various medical laboratories and industry, and after second degree there is also the possibility of continuation of studies at the doctoral level or in the specialization in medical biochemistry.

The university study program cosmetology lasts for 3 years and gives a professional title of a graduate cosmetologist (UN).

The master's study in industrial pharmacy (2 years) enables the acquisition of knowledge and skills for working in a pharmaceutical industrial environment, but not within the regular profession of pharmacists. The professional title obtained by the graduate is a master of industrial pharmacy.

At the doctoral level of biomedicine, the Faculty of Pharmacy offers programs pharmacy, clinical biochemistry and laboratory biomedicine and toxicology, which allow obtaining the title Doctor / doctor of science.

The feature of UL FFA studies is the high interdisciplinarity of knowledge and the inclusion of students in research work at all levels of study, which is reflected in the high quality and motivation of graduates.

Faculty of Pharmacy is a leading research and higher education institution in the field of pharmacy, clinical biochemistry, toxicology and cosmetology in Slovenia and successfully integrated into European research and educational space.

The research work of the faculty takes place under the auspices of four program groups and within a number of projects. The funding of program groups and projects is carried out within the national Slovenian Research Agency program. In 2016, research work was funded in the range of 40 FTE of full-time research.

### **UL FFA research programs**

1. Pharmaceutical technology: from the delivery systems of active substances to the therapeutic outcomes of medicines in children and the elderly, under the direction of prof. dr. Albina Kristel joins the researchers of the Department of Biopharmaceuticals and Pharmacokinetics, Chair of Pharmaceutical Technology and Chair of Social Pharmacy.

2. Pharmaceutical chemistry: design, synthesis and evaluation of active substances, under the guidance of prof. dr. Danijela Kikelj unites the researchers of the Department of Pharmaceutical Chemistry, Chair of Clinical Biochemistry and Chair of Pharmaceutical Biology.

3. Pharmaceutical biotechnology: science for health under the direction of prof. dr. Janko Kos brings together researchers from the Chair of Pharmaceutical Biology, Chair of Clinical Biochemistry and Biotechnology Department of the Jožef Stefan Institute.

4. Clinical biochemistry: genes, hormonal and personality changes in metabolic disorders, led by prof. dr. Andrej Janež, works at UKC Ljubljana and UL FFA, Chair of Clinical Biochemistry, coordinator is prof. dr. Janja Marc.

5. Participation in other programs.

*Researchers of the faculty also participate in research programs carried out at other institutions, namely*

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*Experimental Biophysics of Complex Systems and Painting in Biomedicine*, the leader is prof. dr. Janez Štrancar at the Jožef Stefan Institute, *Systemic autoimmune diseases*, the leader is doc. dr. Snežna Šemrl Sodin at UKC Ljubljana and *Cell Physiology*, the leader is prof. dr. Robert Zorec at UKC Ljubljana.

## II. Vision FFA

The vision of the Faculty of Pharmacy is to contribute to the shaping of the future, to remain an open, responsive and responsible academic educational and research institution in the world, to work for the benefit of Slovenian citizens, by developing and disseminating scientific knowledge, in order to consolidate national identity.

In its work, the Faculty is based on intensive national and international cooperation with partner organizations from the academic, public and economic spheres. By strengthening cooperation and developing common strategies, we want to achieve a better and faster flow and exchange of knowledge, new findings and transfer / translation from basic research laboratories to the industrial environment or health institutions. Partnership on the lifecycle cycle of the product integrates basic and clinical researchers, professionals in production and legislation, and healthcare professionals in pharmaceutical and medical care.

### Key competences of UL FFA to achieve goals

- planning, synthesis and biological evaluation of new potential substances, and the development of new molecular tools for the study of interactions with biological macromolecules and macromolecular structures
- the design of active ingredients into therapeutically effective and high-quality drugs or pharmaceutical forms,
- studying the processes that take place in the human body after drug administration and drug interactions
- studying the influence of medicines on modern humans and society and the control of medicines upon their arrival on the market, into the patient's hands
- pharmacognosy, pharmaceutical biotechnology, cell biology, plant biochemistry and instrumental analysis, and
- clinical-biochemical laboratory diagnostics in health care
- development, validation and verification of analytical methods, analytics of active substances and metabolites in biological systems, and analysts of plant drugs and their preparations.
- Establishment of an infrastructure center for translational research in the field of research and development of medicines (EATRIS.SI),

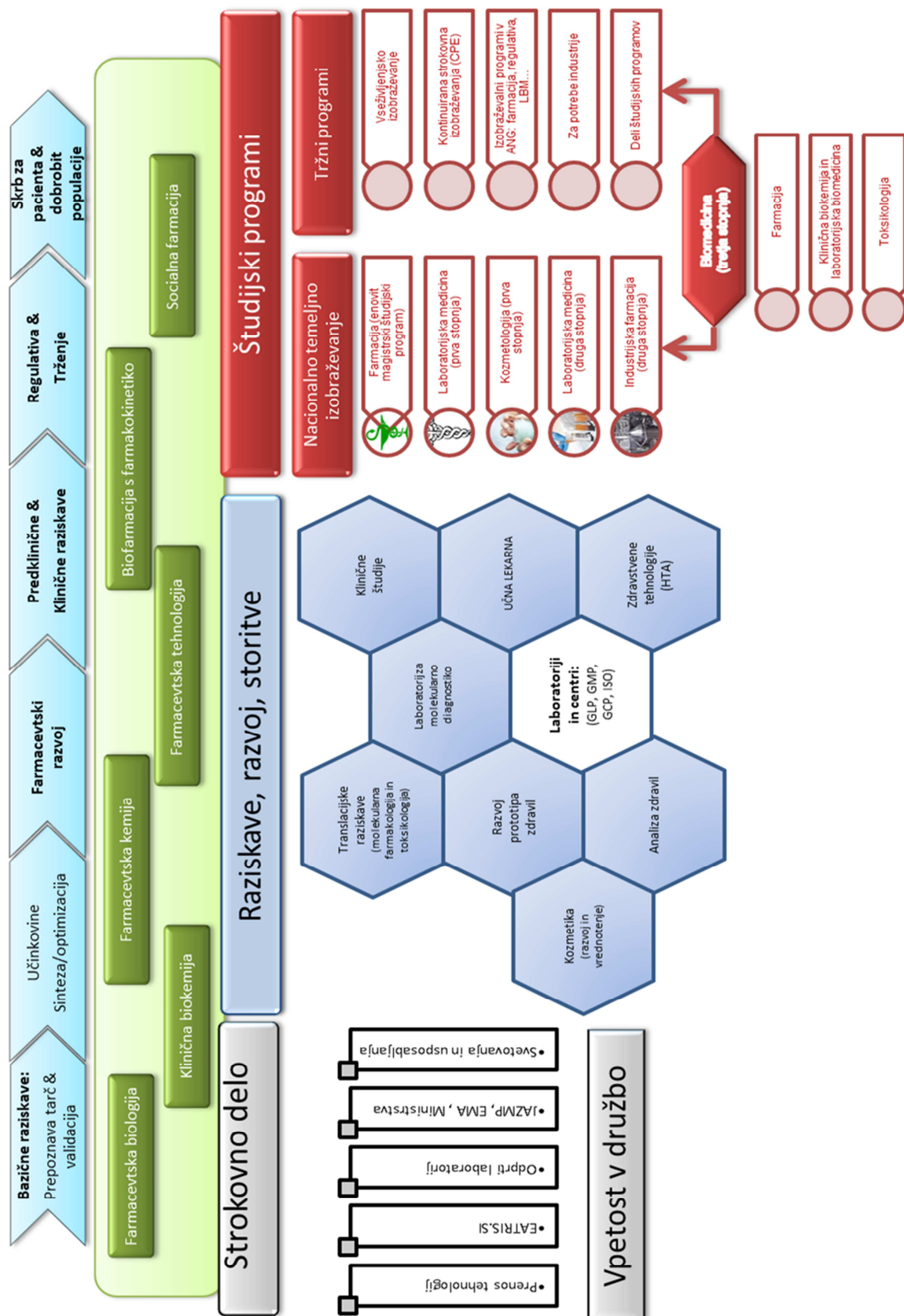
At the FFA we want to create an environment that will allow faster transfer of knowledge to the economy and commercial exploitation, we set priorities for strengthening infrastructure platforms that will enable activities in the innovative segment and will support top-level basic research and integration between researchers and research organizations, facilitate access to large international research centres and infrastructures, and acquired new knowledge will be directly applicable to the design, manufacture, marketing and use of new products and services.

The concept of UL FFA (Figure 21) activity is designed with the strategic goal of establishing an infrastructure that will enable faster and more efficient transfer of knowledge from basic research laboratories to clinical applicability, and the transfer of complicated clinical and developmental problems to basic research laboratories.

The concept is therefore multicentric and covers all stages of research and development from pathogenesis studies, making diagnostic bioreactors, through the synthesis of new molecules to the 1st phase of clinical testing, or new active substances or diagnostic markers and prototypes of medicines and the development of pharmaceutical care to ensure long-term safety, efficiency and quality of life of patients and society. It is



indispensable to link the research organization, educational learning bases, clinics and in the case of the development of prototypes of medicines for the industrial environment.



#### Basic research:

Target recognition & validation  
Agents

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Synthesis / optimization  
**Pharmaceutical development**  
**Preclinical & Clinical Research**  
**Regulatory & Marketing**  
**Care for the patient and the welfare of the population**  
 Pharmaceutical biology  
 Pharmaceutical chemistry  
 Biopharmacy with pharmacokinetics  
 Clinical biochemistry  
 Pharmaceutical technology  
 Social pharmacy  
 Professional work  
 Research, development, services  
 Study programs  
 Integration into society  
 Cosmetics (development and evaluation)  
 Translational research (molecular pharmacology and toxicology)  
 Drugs prototype development  
 Drug analysis  
 Laboratory for molecular diagnostics  
 Clinical studies  
 Laboratories and centres: (GLP, GMP, GCP, ISO)  
 STUDY PHARMACY  
 Health Technologies (HTA)

#### **National basic education**

Pharmacy (Unified Master's Study Program)  
 Laboratory medicine (first level)  
 Cosmetology (first level)  
 Laboratory medicine (second level)  
 Industrial Pharmacy (second level)

#### **Marketing programs**

Lifelong learning  
 Continuing Professional Education (CPE)  
 Education programs in the ENG: pharmacy, regulation, LBM  
 For industry needs  
 Parts of study programs

#### **Biomedicine (third level)**

Pharmacy  
 Clinical biochemistry and laboratory biomedicine  
 Toxicology
 

- Technologies transfer
- EATRIS.SI
- Open laboratory
- JAZMP, EMA , Ministries
- Consulting and training

*Figure 23, the concept of UL FFA*

## **d. Summary of the investment project identification document**

The contest was announced on the basis of the adopted investment operation "New Building of the University of Ljubljana, Faculty of Pharmacy", which was created in July 2013. With the implemented project

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it was found that the development and research possibilities are limited by modest spatial possibilities (insufficient number, insufficient surface and poor functionality of laboratories). Already, the Faculty for the mitigation of spatial hardship rent more than 900 m<sup>2</sup> of different premises for carrying out its activities in the Ilirija area near the Tržaška cesta.

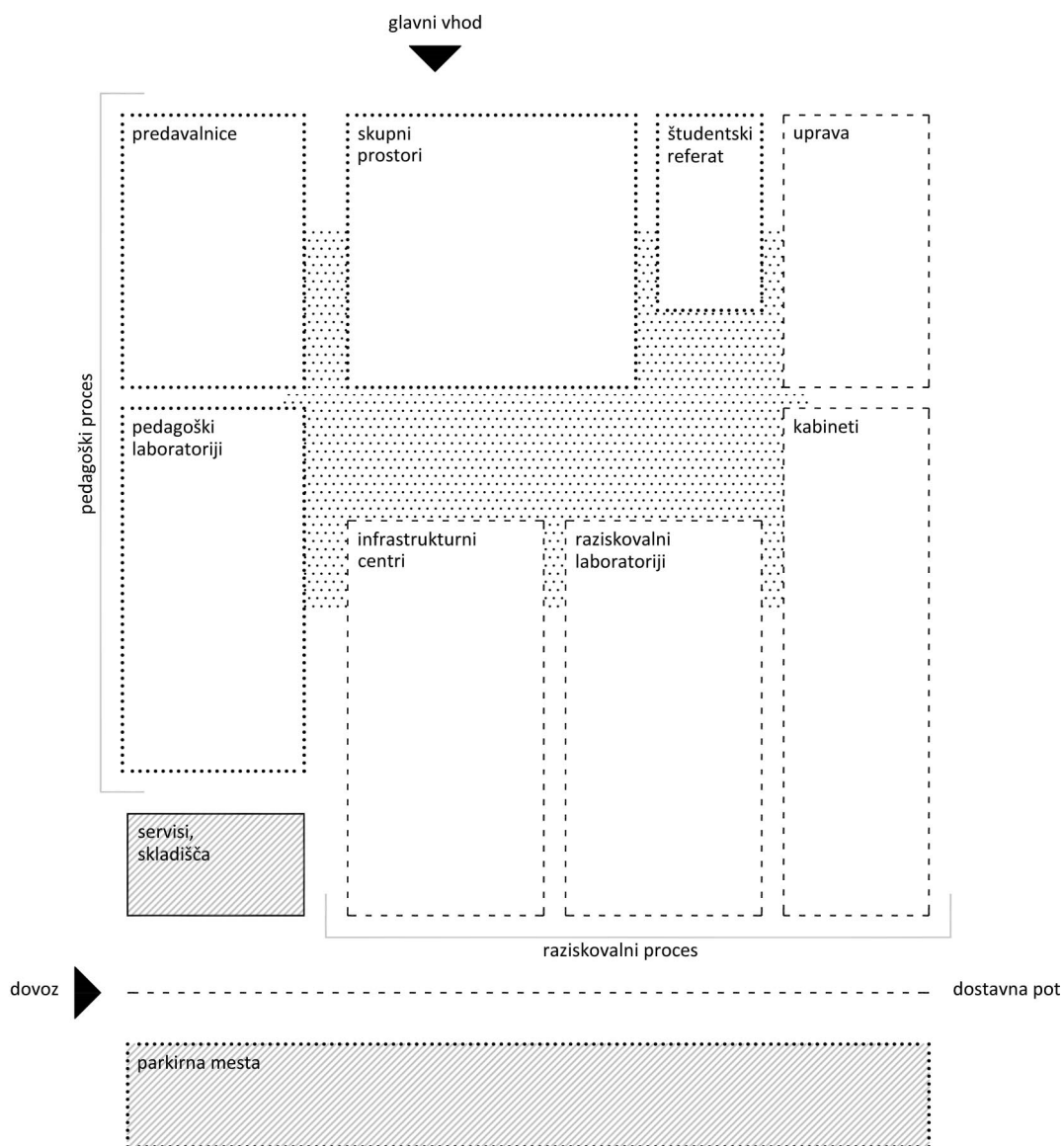
The initiative to relocate the Faculty of Pharmacy to a new location outside the centre of Ljubljana is based on the fact that the study of pharmacy is connected to the research work in laboratories in the closest possible way, while the spatial conditions at the current location do not allow the further development of pharmacy studies in the number of students since the laboratory facilities in current measurements do not allow quality study and research work.

The relocation of the FFA to the location of the Brdo university campus would allow maintenance of a functioning, synergic, and extremely important spatial connection between the FFA and FKKT. At the same time, the University of Ljubljana would achieve a meaningful rounding up of natural science faculties in the Brdo campus by moving FFA to Brdo.

## e. Programme requirements

### I. Basic distribution of groups of programmes

Individual spaces and chairs should be combined as much as possible into the foreseeable program groups, and they should be organized according to the following scheme:

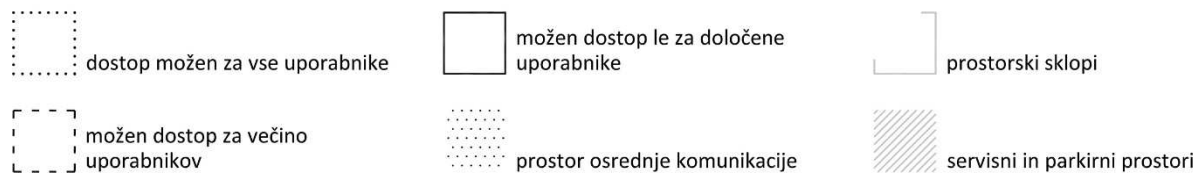


59

Main entrance  
Lecture room  
Pedagogical laboratories  
Common spaces  
Infrastructure centers  
Student's desk  
Research laboratories  
Administration  
Cabinets  
Services, warehouses  
Research process  
Driveway  
Delivery route  
Parking lots  
Pedagogical process

Figure 24, FFA spatial organization

## legenda:



*access is possible for all users*  
*access is possible for most users*  
*access is possible only for certain users*  
*central communication space*  
*spatial assemblies*  
*service and parking spaces*

Legend 11, FFA spatial organization

Chairs are grouped together in groups according to the degree of specialization of laboratory premises and the relatedness and connection of the research field. In laboratories, teachers and researchers spend most of their working hours, and some work, and especially pedagogical obligations (exams, speaking hours, preparation for lectures and exercises, independent research work) are also carried out in cabinets. The cabinets must not be located directly in the spatial frames of the laboratories, but it is advisable to be in the immediate vicinity. The number of employees who today work in individual laboratories and departments will adapt in the future to the development of pharmaceutical sciences, the needs of the economy and other factors. It is therefore senseless and impossible to prescribe the precise number of cabinets belonging to the individual chairs.

The contest solution should take into account the fact that the spatial relationship between the chairs and the cabinets is variable. At the same time, it is important that the cabinets are distributed evenly throughout the building, where the laboratories of individual chairs are located (either on the ground plan or on the cross-section). By doing this, the proper separation of cabinets between employees will allow the distance between the individual premises will not be too long.

The basic arrangement of the program sets must be shown as a separate scheme in the same graph as shown in the diagram (see Figure 24).

## II. Tabular display of programme requirements FFA

The FFA program requirements are grouped and detailed in the architectural and urban charting table, which is attached as the digital basis for the contest task (C\_3\_1\_preglednica površin FFA\_2. ARH faza in C\_3\_2\_preglednica-povrsin\_FFA\_1. URB faza) (C\_3\_1\_table of surfaces FFA\_2. ARH phase and C\_3\_2\_table of surfaces\_FFA\_1. URB phase). The program contents are divided into five sets: *Cabinets*, *laboratories*, *pedagogical spaces*, *common spaces*, *administration*, *technical facilities and services*. The indicative total net area of the entire program (with included communications) is 17,812 m<sup>2</sup>.

**In urban phase of the contest to be completed only C\_3\_2\_preglednica-povrsin\_FFA\_1. URB faza). Only the gross surfaces of individual groups or larger spaces with included construction are filled.**



sklopi	podskupina prostorov	izhodiščne površine		natečajna zasnova		
		površina sklopa	površine podsklopa	površina skupine	površina podskupine	
<b>Kabineti</b>		<b>1.943,0 m<sup>2</sup></b>		<b>0,0 m<sup>2</sup></b>		0%
	Kabineti		1.943,0 m <sup>2</sup>		0,0 m <sup>2</sup>	
<b>Laboratoriji</b>		<b>7.804,0 m<sup>2</sup></b>		<b>0,0 m<sup>2</sup></b>		0%
	Laboratorij		7.804,0 m <sup>2</sup>		0,0 m <sup>2</sup>	
<b>Pedagoški prostori</b>		<b>2.024,0 m<sup>2</sup></b>		<b>0,0 m<sup>2</sup></b>		0%
	Predavalnice in učilnice		2.024,0 m <sup>2</sup>		0,0 m <sup>2</sup>	
<b>Skupni prostori</b>		<b>1.113,0 m<sup>2</sup></b>		<b>0,0 m<sup>2</sup></b>		0%
	Skupni prostori		1.113,0 m <sup>2</sup>		0,0 m <sup>2</sup>	
<b>Uprava</b>		<b>554,5 m<sup>2</sup></b>		<b>0,0 m<sup>2</sup></b>		0%
	Uprava		554,5 m <sup>2</sup>		0,0 m <sup>2</sup>	
<b>Tehnične službe in servisi</b>		<b>4.374,0 m<sup>2</sup></b>		<b>0,0 m<sup>2</sup></b>		0%
	Tehnični prostori in servisi		874,0 m <sup>2</sup>		0,0 m <sup>2</sup>	
	Komunikacije*		3.500,0 m <sup>2</sup>		0,0 m <sup>2</sup>	
	Parkirna mesta z vozno potjo		0,0 m <sup>2</sup>		0,0 m <sup>2</sup>	
<b>skupaj</b>		<b>17.812,5 m<sup>2</sup></b>		<b>0,0 m<sup>2</sup></b>		
	skupaj brez parkirnih mest	17.812,5 m <sup>2</sup>		0,0 m <sup>2</sup>		

Assemblies	Subgroup of spaces	Starting surface		Contest design	
		Assembly surface	Sub-assembly surfaces	Area of the group	Area of the subgroup
<b>Cabinets</b>		<b>1,943.0 m<sup>2</sup></b>		<b>0.0 m<sup>2</sup></b>	0%
	Cabinets		1,943.0 m <sup>2</sup>		0.0 m <sup>2</sup>
<b>Laboratories</b>		<b>7,804.0 m<sup>2</sup></b>		<b>0.0 m<sup>2</sup></b>	0%
	Laboratories		7,804.0 m <sup>2</sup>		0.0 m <sup>2</sup>
<b>Pedagogical spaces</b>		<b>2,024.0 m<sup>2</sup></b>		<b>0.0 m<sup>2</sup></b>	0%
	Lecture rooms and classrooms		2,024.0 m <sup>2</sup>		0.0 m <sup>2</sup>
<b>Common spaces</b>		<b>1,113.0 m<sup>2</sup></b>		<b>0.0 m<sup>2</sup></b>	0%
	Common spaces		1,113.0 m <sup>2</sup>		0.0 m <sup>2</sup>
<b>Administration</b>		<b>554.5 m<sup>2</sup></b>		<b>0.0 m<sup>2</sup></b>	0%
	Administration		554.5 m <sup>2</sup>		0.0 m <sup>2</sup>
<b>Technical facilities and services</b>		<b>4,374.0 m<sup>2</sup></b>		<b>0.0 m<sup>2</sup></b>	0%
	Technical facilities and services		874.0 m <sup>2</sup>		0.0 m <sup>2</sup>
	Communications*		3,500.0 m <sup>2</sup>		0.0 m <sup>2</sup>
	Parking lots with a driving route		0.0 m <sup>2</sup>		0.0 m <sup>2</sup>
<b>Total</b>		<b>17,812.5 m<sup>2</sup></b>		<b>0.0 m<sup>2</sup></b>	
	Total without parking lots	17,812.5 m <sup>2</sup>		0.0 m <sup>2</sup>	

Figure 25, Table of surfaces FAA (source: contest appendix, C\_3\_1\_pregledanica površin FFA\_2. ARH faza).

Surfaces must be considered in the contest proposal. Any major upward or downward deviation needs to be specifically argued and in the event of a reduction in surfaces indicated how the programme can be properly implemented despite the smaller available surface. In the case of upward deviation, however, the reasons for the increase should be justified and it shall be defined the extent to which the increase in the area shall rise the initial investment.

The contest documents also contain a graphical catalogue of the premises (B\_1\_1\_grafični katalog prostorov FAA)(B\_2\_1\_graphical catalogue of the FS premises) which specifies the technical requirements of the individual spaces and contains a schematic overview of the rooms with drawn equipment. The scheme of the premises is intended to facilitate the understanding of the specific requirements of individual premises, including the desired interconnections of the premises or, microlocation. The ratios of the sides in the drawings are schematic and not binding, but in the contest solution, the required space should be installed all the required equipment, provide the intended natural lighting, and enable appropriate accesses and connections with other spaces. The participant can adjust the proportions of the spaces according to the design that he proposes. The size of the space should remain within the frames provided, but in any case not smaller, as specified in the table of quadratures.

In the form of the appendix (D\_1\_1\_tabele specifikacij prostorov FDA)(D\_2\_1\_specification tables of the FAA premises) the basic material is also attached, which served as the basis for the preparation of the aforementioned graphical catalogue of the premises (B\_1\_1\_grafični katalog prostorov FAA)(B\_2\_1\_graphical catalog of the FAA premises). This material should serve as additional information for easier understanding of the program under consideration and as terms of reference for more detailed planning in the subsequent phases of the project. Additional materials dealing with laboratory facilities are particularly useful for designing capacities and design, the deployment of machine installations and the tactical distribution of laboratories in terms of the functionality of machine installations. In the event that due to the fact that the data on individual premises are located in three different documents: a. the table of surfaces, b. graphical catalogue of premises and c. the specification table of the premises, in the tender documentation there are possible discrepancies, the hierarchical order of is valid from a., b. to c. This means that in case of data mismatch between a. and b. the content listed in a. is correct.

In cases where graphically presented space arrangement - the laboratory is particularly sensible and desirable (from a technical and organizational point of view), this is particularly exposed in the annex of additional materials in the final part of the table of each laboratory. The ratio of the pages, the proportions of the laboratory can be adjusted according to the contest solutions.

### III. A more detailed description of individual groups of programmes

#### *Laboratories*

They are the main part of the Faculty of Pharmacy and are distributed between six chairs and six infrastructure centres. Each department has its own research and pedagogical laboratories, preparatory offices, warehouses, offices, and a common seminar room, which serves as a cloakrooms, a space for casual work, space for socializing. At the same time, all chairs use joint laboratories of infrastructure centers. Individual departments should be organized as closed units within a strand, providing a clear link with the set of common laboratories. It is also acceptable that a set of research and a set of pedagogical laboratories of the department is organized as a dislocated unit. The common cloakrooms can be organized as several rooms or a single unit. At the same time, all chairs use joint laboratories of infrastructure centers. Exceptions are the Infrastructure Analysis Center of Medicines and Translational Research, which due to the nature of work and the establishment of a quality standard, a separate completed unit is accessible only to authorized and suitably qualified employees. Centre Analysis of medicines communicates with public work only through the common entrance, sample delivery room and the head office of the Centre. The technical requirements of individual premises are specified in the appendices. The gross floor height of the research and pedagogical laboratories should be 5m, the the gross floor height service rooms should be 3,5m or where the height is not defined, it should be adjusted accordingly to the adjacent spaces.

More detailed programme, technical and spatial characteristics of individual laboratories are given in the basis C\_3\_1\_preglednica površin FFA\_2 ARH faza (C\_3\_1\_table of surfaces FFA\_2. ARH phase). The total estimated area of the laboratories is approximately 7,804 m<sup>2</sup>.

#### *Cabinets*

The cabinets should form a single unit, which can be separated from a set of laboratories, however, they should ensure a clear and fast connection between them. It is desirable that cabinets appear as close as possible to research laboratories. The exception is the Chair of social pharmacy (SF), where due to the nature of the work, the cabinets must be in the immediate vicinity of research laboratories.

Support rooms such as meeting rooms, kitchenettes, and copying and printing rooms, which should be evenly distributed within a set, are also provided. The academic club is a common space of employees, which should be linked to a collective terrace for employees.

More detailed programme, technical and spatial characteristics of individual cabinets are given in the basis C\_3\_1\_preglednica povrsin FFA\_2 ARH faza (C\_3\_1\_table of surfaces FFA\_2. ARH phase). The total estimated area of the cabinets is approximately 1,943 m<sup>2</sup>.

### *Common spaces*

They are intended for all faculty users, so they should be designed in such a way that they create a high-quality feature of the public space in the building. The social spaces should be distributed in a reasonable and even way within the faculty, they can also be used as a link between the contents. The total area for sports is covered by the Faculty of Mechanical Engineering programme.

More detailed programme, technical and spatial characteristics of common spaces are given in the basis C\_3\_1\_preglednica povrsin FFA\_2 ARH faza (C\_3\_1\_table of surfaces FFA\_2. ARH phase). The total estimated area is approximately 1,113 m<sup>2</sup>. The surface is approximate and it can be - with the reasonable inclusion of additional space for socializing, group work of students and the like - also increased.

### *Pedagogical spaces*

In addition to common spaces they form the public part of the faculty, which is as much as possible intended for students. They shall design a single unit that allows easy transition to a set of laboratories. The lecture theatres and lecture rooms should be placed in the more streamlined areas of the building in close proximity to the central communications. Classrooms can form a characteristic unit that is somewhat distant from the rest of the programme groups. The technical requirements of individual premises are specified in the appendices.

More detailed programme, technical and spatial characteristics of individual pedagogical spaces are given in the basis C\_3\_1\_preglednica povrsin FFA\_2 ARH faza (C\_3\_1\_table of surfaces FFA\_2. ARH phase). The total estimated area of the pedagogical spaces is approximately 2,024 m<sup>2</sup>.

### *Administration*

The administration should be organized as an independent set that ensures optimal functioning of the premises within the unit. It is necessary to ensure adequate placing of ŠR unit (student desk) as a separate unit, which will be more closely connected with the student premises. The technical requirements of individual premises are specified in the appendices.

More detailed programme, technical and spatial characteristics of individual administration spaces are given in the basis C\_3\_1\_preglednica povrsin FFA\_2 ARH faza (C\_3\_1\_table of surfaces FFA\_2. ARH phase). The total estimated area of the administration spaces is approximately 554 m<sup>2</sup>.

### *Technical facilities and services*

Technical services are responsible for the cleaning and maintenance of FFA buildings, delivery of materials, waste management and other courier services. They should form a separate functional unit that is not easily accessible to most users. Lavatories, spaces for storing cleaners and cloakrooms should be reasonably distributed throughout the whole building.

More detailed programme, technical and spatial characteristics of individual laboratories are given in the basis C\_3\_1\_preglednica povrsin FFA\_2. ARH faza (C\_3\_1\_table of surfaces FFA\_2. ARH phase). The total planned area of technical facilities and service spaces, with no communication and parking spaces, is approximately 874 m<sup>2</sup>. Surfaces for mechanical installations are given indicative (spaces marked To50101, To50102, To50103) to be adjusted by the participant in accordance with his proposed solution. The surface of the rooms intended for communication is given indicative and is not binding on the participants.

## f. Content requirements

### I. Long-term flexibility and design modularity

The basic requirement of the contest is to ensure the long-term flexibility and modularity of the design with the architectural design. It is expected that the buildings are designed in such a way that with small interventions in the barriers and separations between spaces, it is possible to adjust and change the areas intended for individual chairs and laboratories. Education and research is a living and changing process, which is constantly adapted to the needs of society and international guidelines. The entire system of communications, installations and other service elements of a building must be designed as independently and general as possible, so that the substantive part of the building can be relatively freely renovated and adapted to the changes in substance. Technically more demanding spaces and laboratories, which due to demanding installations, accesses or other program requirements, need to be more technically equipped, should not constitute obstacles in the process of potential restructuring. All installations in the laboratory area should be designed in the so-called technical walk-on dropped ceilings with clear height min.

150 cm. Independent access and maintenance of installations must be enabled without interfering with the laboratory area. The contact between the installation sublevel and the laboratory must be completely tight.

In spite of the expected flexibility, the designed barrier systems and separation of individual spaces must provide adequate sound and visual protection. It is expected that the changes in the structure of the building will be carried out in cycles of 15-20 years, therefore short-term (and financially demanding) flexibility at the level of the basic organization of programs is not required.

The principles of long-term flexibility and modular design should be presented graphically in the form of schemes in a textual report and on posters.

## g. Technical requirements

### I. Definition of the expected building materials of the new building

In its design, the new FFA building will include key building materials that are available on the local construction services and materials market. In addition, due to the degree of fire hazard (chemicals, chemical experiments, technological processes), the contracting authority prefers the installation of materials which have low flame spread characteristics. The advantage should have materials from renewable sources, with low costs and environmental impacts due to their production and degradation.

All building materials used on the exterior and directly rain water exposed building site (e.g. vertical surfaces with no overhangs, horizontal surfaces without coverings) must be designed from durable materials with an expected life-span of 50 years without the need for their on-going maintenance or the need for maintaining basic mechanical resistance (e.g. painting, varnishing). On partially protected external surfaces under overhangs (facades, ceilings, flooring) that are not directly exposed to rain water effects, the range of materials used can be expanded with materials that may eventual need to be replaced or maintained - but easy accessibility and interchangeability of individual parts must be provided (such as simply changing the linings). Construction materials must meet the conditions for permanent mechanical stability of the building.

Other materials used, especially those intended for daily exposed surfaces (flooring, walls and wall coverings) should be selected so that they allow easy daily maintenance and cleaning (basic cleaning techniques), annual or multi-annual material renovation (floor grinding, surface sandblasting, painting works) and partial replacement due to damage or wear.



## II. Energy efficiency

The contest proposals should be designed in such a way that in the next stages of planning (basic design PGD, executive design PZI) the legal conditions for efficient use of energy are fulfilled without intervention to the floor plan design, façade and construction. Attention should be paid to the following elements, which can be defined and displayed in the conceptual design (or contest detailed report):

- architectural design, which allows the use of low-temperature systems,
- effective shading and control of heat gains, which at the same time allows the exploitation of natural lighting and potential heat gains during the heating season,
- control over construction passing through a heat envelope - a minimum range of passages, a minimum amount of elements to be insulated "outside" of the contour of the heat envelope (e.g. balcony brackets attached to the basic warm part of the construction), minimal use of specialized building elements that increase the investment (e.g. Schöck elements),
- exploitation of direct heat and cooling sources by means of an appropriate architectural design (e.g. night cooling during cooling of the building, heating of the building with solar energy in the heating cycle, accumulation of heat and cooling and their corresponding distribution in building).

The appropriate energy efficient design should be shown on the basis of floor planes, cross sections and façades, and the proposed systems for dealing with direct heat and cooling sources (the last indent) should be defined in the textual explanation.

## III. Construction design

In selecting the construction system and construction materials, the participants should consider the contracting authority's expectation that the construction is designed rational and long-term flexible.

The rational construction design in principle ensures the optimal ratio between the required structural ranges, the used construction material and the complexity of the execution. It is also necessary to design appropriate earthquake protection of the building at the level of the conceptual design, that is, to ensure the basic horizontal stability of the building. Any deviation from conventional (more or less rational) construction solutions must be argued and stated in what way a different (unusual) solution contributes to improving the design and operation of the building within other expected properties and qualities.

With long-term flexibility it is necessary to ensure that the building has a clear separation between the primary structure that ensures its global stability and secondary structural and barrier elements that can be removed or replaced without interfering with the primary construction system. In this way it is possible to adapt the building in the long term to other programs that will not be known at the time of construction.

There is no need to specify or display the electrical installation design in the contest proposal. The starting point for the further planning of the building is the expectation of the contracting authority that electrical installations, in addition to its other tasks, will adequately cover the following segments of operation and building management :

- variable lighting that adapts to the occupancy of the room and the available daylight. Particular care must be taken in the appropriate design of artificial lighting so that it can be combined with natural illumination effectively and smooth. The colour, sharpness and quality of light must be as comparable and non-conflict as possible to one another.
- information support for building management in terms of informing, energy consumption, space use and security,
- adaptive technical support of the building and its mechanical parts (mechanical installations and other devices) with the ability to learn and gradually increase efficiency according to the variable conditions of use.

## h. Electrical installations and equipment

There is no need to specify or display the electrical installation design in the contest proposal. The starting point for the further planning of the building is the expectation of the contracting authority that electrical installations, in addition to its other tasks, will adequately cover the following segments of operation and building management:

- variable lighting that adapts to the occupancy of the room and the available daylight. Particular care must be taken in the appropriate design of artificial lighting so that it can be combined with natural illumination effectively and smoothly. The colour, sharpness and quality of light must be as comparable and non-conflict as possible to one another.
- information support for building management in terms of informing, energy consumption, space use and security,
- adaptive technical support of the building and its mechanical parts (mechanical installations and other devices) with the ability to learn and gradually increase efficiency according to the variable conditions of use,
- connection power of a large number of users. It should be taken into account that all laboratories operate simultaneously, but not all devices at the same time.

## i. Mechanical installation design

The conceptual design (in 2nd ARH phase) determines, displays and argues the appropriate design of mechanical installations in the building, with the help of the appendix D\_1\_1\_tabele specifikacij prostorov FFA from the point of view of the types and complexity of the mechanical installations, and from the point of view of the organization of the space, the possibilities of integration of installations and the design requirements with the help of the appendix D\_1\_2\_vključitev strojnih instalacij FFA (D\_1\_2\_integration of FFA mechanical installations) and B\_1\_1\_grafični katalog prostorov FFA (B\_1\_1\_graphical catalogue of the FFA premises).

Buildings with laboratory facilities are unique in comparison to other types of buildings due to the pronounced requirements for maintaining a healthy, comfortable, safe and productive environment for users, in this case professors, researchers and students. Therefore, the successful design, construction and operation and maintenance (O&M) of the laboratory building is achieved only when the appropriate conceptual design has been previously carried out.

When organizing indoor lab spaces, the architect and mechanical engineer must work together and coordinate different concepts for the effective integration of architecture and engineering systems. The purpose of their coordination is to develop systems that complement one another, while ensuring a safe and healthy environment at reasonable initial and operating costs. The main areas that require the joint work of an architect and mechanical engineer are:

### *Design of the building*

Issues related to the design of the building include the basic positioning of laboratory spaces, which affects subsequent design and the choice of technical systems. These include the choice of air intake sites for the purpose of preventing pollution, selection of individual or common input and extract air systems and compliance with operational and maintenance requirements (O&M).

### *Distribution of installations*

Installations of all types, these are ducts of inflow air, outflow air and discarded air, various pipelines (heating, cooling, water supply, gas), technology equipment, fire protection and power lines must be spread throughout the building in different laboratories, offices and other premises. During planning, the architect and the mechanical engineer must coordinate the distribution of installations so that they fit into the available space, however their maintenance shall be enabled. There are several approaches to

distribution of installations, these include service corridors, several internal service shafts, several external service shafts, distribution of installations in a technical walk-on dropped ceiling.

### *Laboratory arrangements*

The architect and mechanical engineer must develop a plan for the internal organization of laboratory and accompanying premises. Possible approaches to the arrangement of laboratory spaces include a modular design, workstations and a special-purpose setting up based on the user's fully defined purpose.

### *Specific issues in the laboratory arrangements*

Once the design of the building, the method of distribution of installations, and the arrangement of laboratories are determined, it is necessary to provide solutions for t. i. specific issues relating to the laboratory work. These include the separation of laboratory and non-laboratory parts, fire compartmentation, entry and exit, volume of laboratory spaces, primary and secondary barriers, directed air flow and workstation layout.

### *Budget*

The design of laboratories should take into account the following: the percentage of the budget allocated to equipment and ventilation and air conditioning systems (HVAC), the impact of the complexity of the HVAC system, the impact of the necessary excess (redundancy) of hardware and electrical equipment, and the difference between short-term costs (capital) and long-term costs (in the lifetime of the building).

## j. Economic requirements

### I. Level of investment

The level of investment for engineering, design, supervision, execution and equipment of the FFA building is defined by the investment project identification document (DIIP) in amount of 48,269,300.00 € including VAT.

The new building must be designed in the way that making of the investment in the expected frames is not compromised. Its expected gross size and quality of construction, equipment and technique must be taken into account. The level of investment is determined on the basis of the gross volume of the entire building and the class of the construction and technological complexity GOI. The class of complexity is defined by the participants.

In defining the class of complexity GOI, the following elements of the building are considered in the following order: façade (amount of glazing, shading systems, layers of façade, materials and dimensions of elements - glass, materials of opaque linings), the need for parallel systems (dropped ceilings, raised flooring, etc. ), proposed finishing of interior surfaces (materials), structural complexity (ranges, technology), and other obvious signs of complexity.

In addition, it is encouraging that the building of the academy, as a comprehensive and representative example of a modern public building, can also compete in other calls for investment in public real estate. It is important that the building as a whole is potentially recognizable as an innovative, economically efficient and, from the point of view of the working environment, a stimulating building. Potential sources of additional financing are calls from the European Investment Bank and the Spirit Slovenia fund.

### II. Effective building management

Building management includes three basic levels of costs and inflows: operating costs, maintenance costs and inflows from market activities (leases, hosting outside events in the premises of the building). Within operating costs, we estimate the expected costs for ventilation, heating and cooling, lighting and cleaning. In terms of maintenance costs, we estimate the level of expected costs according to the extent and

complexity of maintaining built-in materials, furniture equipment and mechanical devices and technologies. In the case of inflows of market activities, we assess whether the building enables the uninterrupted rent of part of its premises, which are not used for teaching purposes during the lease period, for the purposes of a market lease.

### III. Long-term economic effects of construction (LCCA)

The design should include materials, technologies and systems that follow the life cycle cost analysis, which means that their cost of installation, maintenance and decommissioning is taken into account for their suitability.



## VI. Terms of reference for the Faculty of Mechanical Engineering

### I. Short historical development

The very beginning of higher education in Ljubljana go back far, more precisely in the year 1619. Technical branches can later be traced under the auspices of the Faculty of Arts until 1785, when technical studies were suspended. We find it again in 1813, during the Illyrian Provinces and then again not all since 1919.

Officially, the university teaching of mechanical engineering in Ljubljana started in 1919, when the University of Ljubljana was founded. The Faculty gradually developed from a fully pedagogical institution into a modern university institution, which simultaneously conducts scientific and development research projects and educates experts in the field of mechanical engineering. An important work of the Faculty of Mechanical Engineering is also the education of young researchers and scientists involved in the scientific and research work of laboratories. Initially, mechanical engineering within the programs of the University was more weakly represented. At the Faculty of Mechanical Engineering, the students were able to study only in the first four semesters; and studies had to be completed in Zagreb or elsewhere abroad.

In 1945, Ljubljana received comprehensive mechanical engineering studies, the first full professor was prof.dr. Milan Vidmar. The turning point in the development of mechanical engineering studies means prof. Feliks Lobe in 1929. With his perseverance he achieved the construction of the building of the Faculty of Mechanical Engineering in 1940. Thirty years later also a new building was built, which is why the Faculty of Mechanical Engineering today has around 14,000 square meters of lecture rooms and laboratories. An important milestone in the history of the Faculty is also 1960, when the Department of Mechanical Engineering at the Faculty of Technology developed into an independent Faculty of Mechanical Engineering within the University of Ljubljana.

Today, the Faculty of Mechanical Engineering educates students at the professional higher and university study programme. The beginning of the postgraduate studies dates back to 1971. In the years between 1945 and 1970 the research work was carried out at the Institute of Mechanical Engineering. After 1970, the research work at the Faculty of Mechanical Engineering took place in the chairs which became basic pedagogical and research units. They are distributed to laboratories; today there are fourteen laboratories in the faculty. Researchers, however, are also grouped into program groups where necessary.

### II. Description of existing buildings and premises of FS

The existing FS has a favorable location in the centre of the city along the Aškerčeva road, in a centre of gravity regarding the spatial distribution of UL (University of Ljubljana) facilities in the immediate vicinity of the old and planned NUK (National and University Library), close to the UL rectorship and important cultural institutions (Cankarjev dom, Drama , Opera, Slovenska filharmonija), in the intersection of urban public transport lines and the like. Because of this, the location is very suitable for the needs of faculties and academies, or other UL programs that do not yet have their own premises and need direct contact with central cultural and university programs.

The possibilities are offered primarily for the needs of the Academy of theatre, radio, film and television AGRFT, which has been waiting for the promised construction of a new building for many years and for the second time is guest in the rented facility. AGRFT would need 9,024 m<sup>2</sup> for its optimal operation. With moving into a new FS building it would gain about 8,800 m<sup>2</sup> gross area, which according to its involvement in the program-rich environment of the direct city centre would be sufficient for its common substantive needs.

The old facility FS near Aškerčeva cesta is very suitable for the relocation of the Central Technological Library at the University of Ljubljana CTK, which is today also in the rented premises. In the old FS building there is 4,341 m<sup>2</sup> gross area available, as CTK approximately needs for its operation. The building has a monumental marble staircase, similar to NUK, and will give the CTK an important symbolic feature.

A smaller building in the FS yard with gross area of 780 m<sup>2</sup> is suitable for relocating a part of the program of the Faculty of Arts, which is in rented premises.

With the relocation of AGRFT, part of FF and CTK to the location near Aškerčeva cesta, we would create a new important spatial concentration of attractive university programs, which are opened to the general public. With the envisaged and strategically planned construction of a large Aula magna in the yard of the Faculty of Arts and with the construction of NUK II, in the wider area near Aškerčeva cesta an important student forum in Ljubljana would be provided, which would under accompanying cultural, social and catering programs enable spontaneous socializing among students, pedagogues and different target groups.

The aforementioned AGRFT, CTK and FF programs are hosted today in rented premises not owned by the UL. For this purpose they pay high rents. Even more than the level of the rent, the important fact is that these institutions are in a precarious situation with regard to the duration of the rental period. Therefore, they are not prepared to invest funds in the installation of expensive, but necessary technological equipment, or invest in rented premises in any other way. This in any case bring down the standard that institutions can offer to students. By acquiring our own premises we could invest in the renovation and equipment of buildings for the long term.

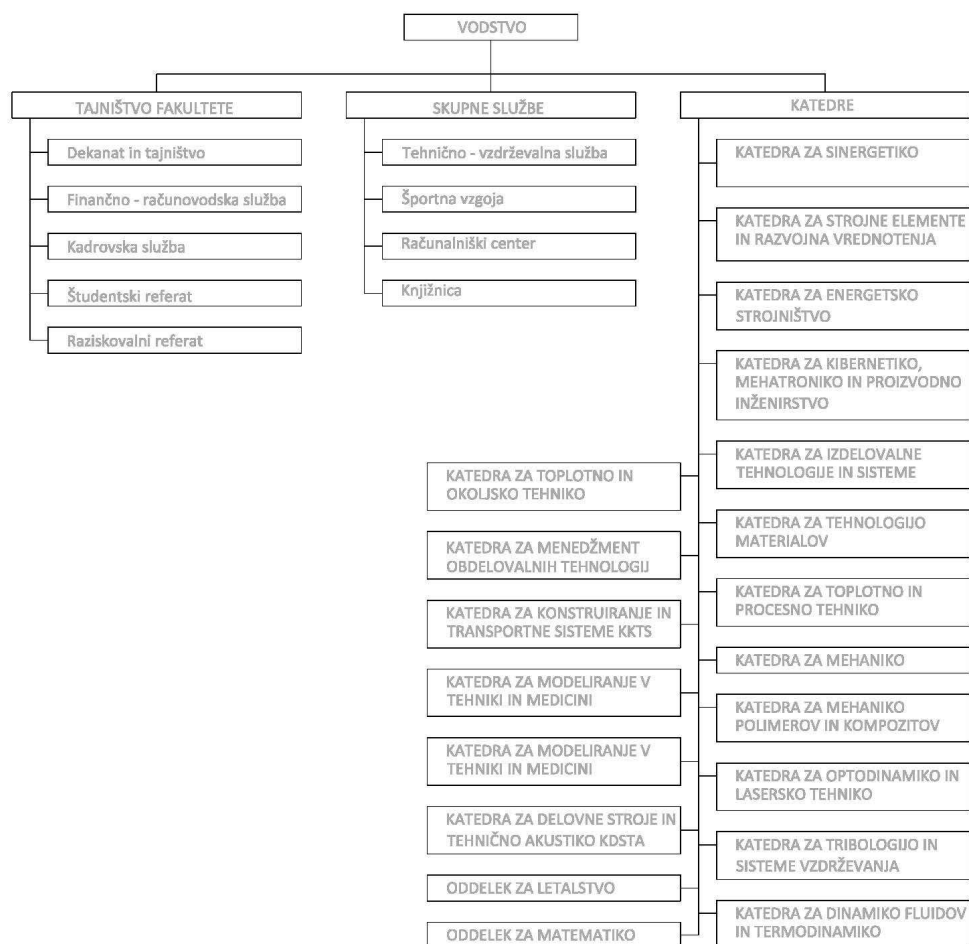
## a. Organisation chart for FS

The Faculty of Mechanical Engineering has the following organizational units: the faculty's management, the secretariat of the faculty, the chairs and the common service.

The management of the Faculty of Mechanical Engineering consists of the dean, the vice-dean for the 1st grade pedagogical activities, the vice-dean for 2nd and 3rd grade pedagogical activities and the vice-dean for scientific research and international cooperation. The secretariat of the faculty is an organizational unit that takes care of solving organizational, financial accounting and legal matters and prepares professional bases for the decisions of the faculty's management. The secretariat is run by the secretary of the faculty. The Faculty of Mechanical Engineering has nineteen chairs, representing the basic organizational units of teaching and scientific research at the faculty. Common services act as technical support for the smooth functioning of the chairs and other services.

The bodies of the faculty are the dean, the senate, the academic assembly, the administrative board and the student council.

Dean is a professional leader and management body that manages and represents the faculty. The senate is the highest professional body of the faculty in the field of education and scientific research. The academic assembly elects the members of the faculty senate and proposes candidates for the dean to the senate. The administrative board shall decide on matters of a financial nature. The student council is a body of students of the faculty.



#### MANAGEMENT

##### THE SECRETARIAT OF THE FACULTY

Dean and Secretariat  
Financial and accounting service  
Personnel department  
Student's desk  
Research desk

#### JOINT SERVICES

Technical and maintenance service  
Physical Education  
Computer Center  
Library

#### CHAIRS

CHAIR FOR SYNERGETICS  
CATEGORY FOR MECHANICAL ELEMENTS AND DEVELOPMENT EVALUATIONS  
CHAIR FOR ENERGY MACHINERY  
CHAIR FOR CYBERNETICS, MECHATRONICS AND PRODUCTION ENGINEERING  
CHAIR FOR MANUFACTURING TECHNOLOGIES AND SYSTEMS  
CHAIR FOR MATERIALS TECHNOLOGY  
CHAIR FOR HEAT AND PROCESS TECHNIQUE  
CHAIR FOR MECHANICS  
CHAIR FOR POLYMER AND COMPOSITE MECHANICS  
CHAIR FOR OPTODYNAMICS AND LASER TECHNIQUE

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CHAIR FOR TRIBOLOGY AND MAINTENANCE SYSTEMS  
CHAIR FOR DYNAMICS OF FLUIDS AND TERMODINAMICS

CHAIR FOR HEAT AND ENVIRONMENTAL TECHNIQUE  
CHAIR FOR MANAGEMENT OF TREATMENT TECHNOLOGIES  
CHAIR FOR CONSTRUCTION AND TRANSPORT SYSTEMS KKTS  
CHAIR FOR MODELING IN TECHNIQUE AND MEDICINE  
CHAIR FOR MODELING IN TECHNIQUE AND MEDICINE  
CHAIR FOR WORKING MACHINES AND TECHNICAL ACOUSTICS LDSTA  
AVIATION SECTION  
MATHEMATICAL DEPARTMENT

*Figure 26 - Organization chart for FS*

## b. Description of development vision FS

### I. Mission FS

At the Faculty of Mechanical Engineering we create and transfer knowledge that enables our students and partners in the research field the competitive integration in the international environment.

Quality in all fields of activities carried out by UL FS is one of the fundamental commitments and guidelines in its operation. This ensures that the faculty performs internationally comparable education of mechanical engineering graduates in all three stages and that its employees are trained to meet international criteria as demonstrated by top scientific research and development achievements that directly contribute to raising the competitiveness of the national economy and are highly respected at home as well as abroad.

The strategic guidelines of UL FS are: comparability at the international level, improvement of the quality of pedagogical work, increasing the share of foreign students, and maintaining a high share of research and market activity.

The key values that it takes into account are:

- innovation,
- international orientation and comparability,
- academic excellence or the provision of the highest scientific and pedagogical quality,
- customer orientation - for economic operators at home and abroad,
- employee satisfaction,
- ethics,
- social and environmental responsibility.

Within the framework of possible business strategies, FS will follow the differentiation strategy, which means that in view of the quality of human and material resources it will perform its services more efficiently and better than its competitors. In the field of education, it will focus on the acquisition of higher-quality students, taking into account the necessary economies of scale and on R&D activities on projects with a high share of knowledge and added value. The implementation of the strategy requires quality material resources (building and equipment), high quality of human resources (above average criteria in the election of titles), high flexibility and responsiveness in providing customer needs and a positive image in the target public, which can only be carried out by motivated and satisfied employees.

### II. Vision FS

To become the most important educational and research faculty with the highest international educational and research standards in the field of mechanical engineering in Slovenia, central and south-eastern Europe, which will make our graduates and research work attractive for both the Slovenian and international



economies and research and development institutions. With a building which allows long-term flexibility and thus adapts to the needs of the market it also encourages cooperation and knowledge sharing.

When designing an architectural form, the contracting authority expects an original and at the same time

rational solution that will enable the most appropriate channels of communication between (and among) individual program strands (in line with the suggestions for the allocation of programmable functional groups of users).

### c. Summary of the investment project identification document

The contest was launched on the basis of the adopted investment operation "New Building of the University of Ljubljana Faculty of Mechanical Engineering", which was created in February 2016. The stated documentation solves the spatial needs and eliminates the weaknesses of the existing situation, which represents an obstacle not only for the further development of UL Faculty of Mechanical Engineering, but also for the implementation of its existing programs. The faculty in existing buildings along the Aškerceva cesta has 13,254 m<sup>2</sup>, while in other locations it is forced to rent 1,368 m<sup>2</sup> of premises without taking into account parking areas. The greatest disadvantage of the current situation is the lack of space for the implementation of the existing study and research program and the functional inadequacy of laboratories.

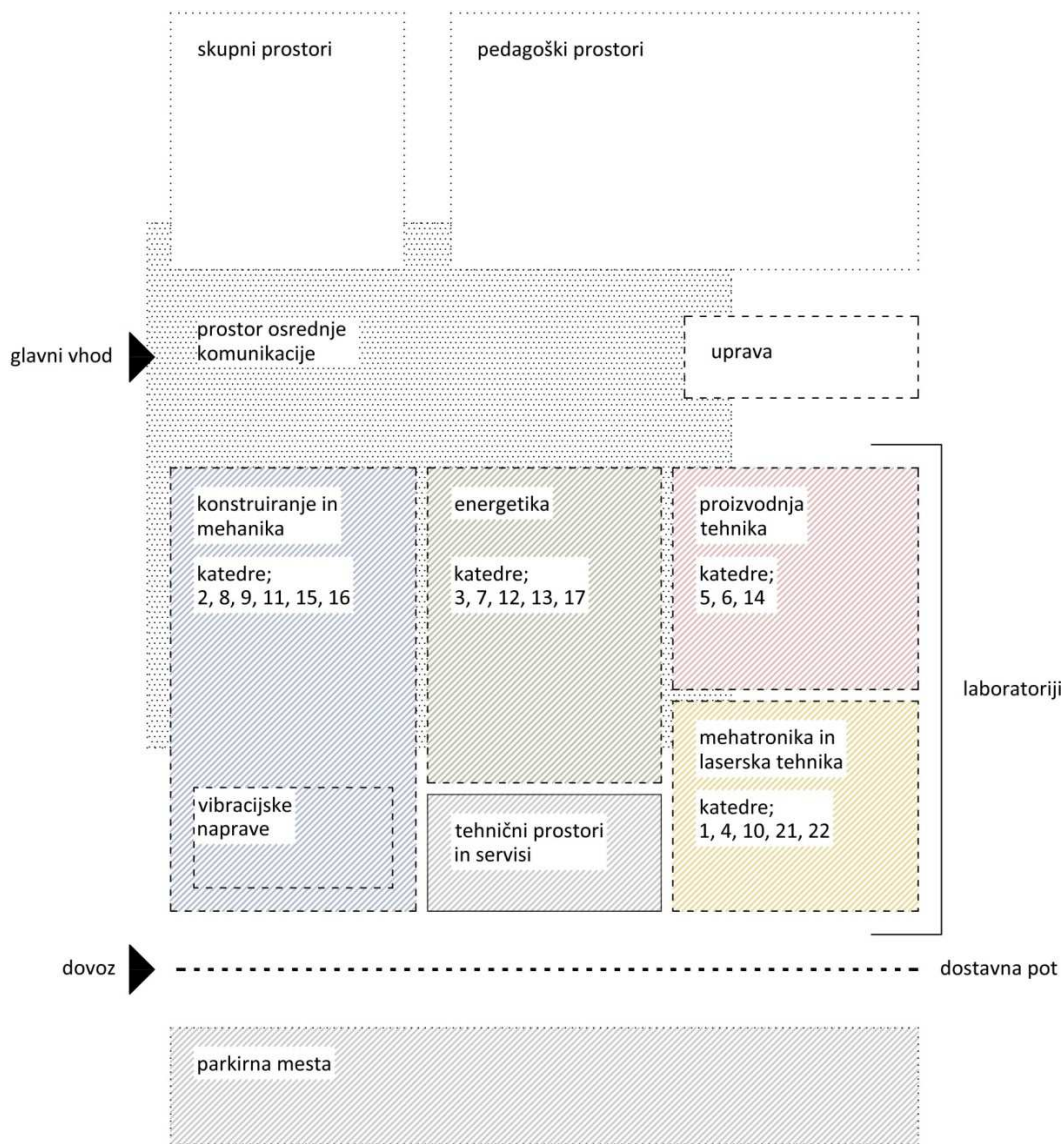
The use of external laboratories across Slovenia makes it difficult for professional and development work, and in particular, in-depth scientific research work. The same is true for pedagogical work, because the mechanical engineering studies have changed from lecturing to developmental and intensive research work in laboratories. Due to the need for interdisciplinary cooperation required by the trends of modern technological development, more appropriately developed areas are needed in a concentrated location, possibly in the vicinity of other faculties of science and technology, which will be achieved with the new construction at Brdo.

With the construction of the new building of UL Faculty of Mechanical Engineering and with the relocation of the faculty to the new location, the existing facilities of UL FS will be emptied. These are transferred to the members of the University of Ljubljana, the Academy of theater, radio, film and television (AGRFT) and the Faculty of Arts (FF) and the Central Technological Library at the University of Ljubljana (CTK), which is a associate member of the University.

### d. Programme requirements

#### I. Basic distribution of groups of programmes

The following is the planned or desirable spatial arrangement of individual functional units within the premises of the Faculty of Mechanical Engineering:



74

#### legenda:

	dostop možen za vse uporabnike		prostor osrednje komunikacije		laboratorijski sklop, energetika
	nadzorovan dostop		tehnični in servisni prostori		laboratorijski sklop, proizvodnja tehnika
	dostop možen le za določene uporabnike		laboratorijski sklop, konstruiranje in mehanika		laboratorijski sklop, mehatronika in laserska tehnika

Common spaces  
Pedagogical spaces  
Main entrance  
Central communication space  
Administration  
Construction and mechanics  
Chairs;  
2, 8, 9, 11, 15, 16  
Vibration devices

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Energetics  
Chairs;  
2, 3, 7, 12, 13, 17  
Technical facilities and services

Production  
Technique  
Chairs; 5, 6, 14  
Mechatronics and laser technology  
Chairs;  
1, 4, 10, 21, 22  
Laboratories  
Driveway  
Delivery route  
Parking lots

Legend:  
Access is possible for all users  
Controlled access  
Access is possible only for certain users  
Central communication space  
Technical facilities and services  
Laboratory assembly, construction and mechanics  
Laboratory assembly, energetics  
Laboratory assembly, production techniques  
Laboratory assembly, mechatronics and laser techniques

Figure 27 - Spatial organization FS (source: contest appendix, I\_katalog prostorov FS)

Areas of four directions which represent functional groups of units and include experimental and other laboratory facilities (offices, common rooms and meeting rooms of laboratories and chairs, etc.) should be together, insofar as this allows functional execution. Otherwise, minor deviations and connection of parts of these directions are possible in units of other directions. Solutions that enable common junctions of all directions are desirable, especially in non-professional activities, e.g. rooms for socializing, reading rooms, tea room services, etc., but not necessarily. It is desirable to have a sufficiently flexible structure of adapting the rooms at least within the chair, preferably even between the chairs, which is not necessary.

Part of the rooms that are sensitive to vibration and noise, either producing them or being isolated from them, can be considered separately depending on the technical possibilities of the implementation (foundations, isolation, etc.). It is possible to locate them at completely different parts of the building for the most effective vibration and noisy barrier. Part of the vibration laboratories is particularly sensitive and requires great attention in technical solutions.

Activities on the sports field may interfere with pedagogical and research work.

## II. Tabular display of programme requirements FS

The new building is intended for the implementation of the institute, research and pedagogical work of the **Faculty of Mechanical Engineering Ljubljana** for the following groups:

- Laboratory
- Pedagogical spaces
- Common spaces
- Administration
- Technical facilities and services

Programme requirements FS are grouped and detailed in the table, which is the digital basis of the contest task (C\_3\_3\_preglednica površin FS\_2. ARH faza in C\_3\_4\_preglednica-površin\_FS\_1. URB faza) (C\_3\_3\_table of surfaces FS\_2.

ARH phase and C\_3\_4\_table of surfaces\_FS\_1.

URB phase). The program contents are divided into five sets: laboratories, pedagogical spaces, common spaces, administration, technical facilities and services. The indicative total net area of the entire program (with included communications) is 25,913 m<sup>2</sup>. The last group *external surfaces* is common to both faculties. No parking spaces with a drive way are included in the sum of the surfaces.

**In urban phase of the contest to be completed only C\_3\_4\_preglednica-površin\_FS\_1. URB faza (C\_3\_4\_table of surfaces\_FS\_1.**

**URB phase). Only the gross surfaces of individual groups or larger spaces with included construction are filled.**

sklopi	podskupina prostorov	izhodiščne površine		natečajna zasnova	
		površina sklopa	površine podsklopa	površina skupine	površina podskupine
Laboratoriji		12.077,0 m²		0,0 m²	
	Kabineti		3.356,5 m²		0,0 m²
	Laboratorij		6.940,5 m²		0,0 m²
	Administracija		1.780,0 m²		0,0 m²
Pedagoški prostori		3.980,0 m²		0,0 m²	
	Predavalnice in učilnice		3.980,0 m²		0,0 m²
Skupni prostori		2.862,0 m²		0,0 m²	
	Skupni prostori		2.862,0 m²		0,0 m²
Uprava		881,0 m²		0,0 m²	
	Uprava		881,0 m²		0,0 m²
Tehnične službe in servisi		6.113,0 m²		0,0 m²	
	Tehnični prostori in servisi		1.113,0 m²		0,0 m²
	Komunikacije*		5.000,0 m²		0,0 m²
	Parkirna mesta z vozno potjo		0,0 m²		0,0 m²
Zunanje površine		1.196,0 m²		0,0 m²	
	Športno igrišče		1.196,0 m²		0,0 m²
skupaj		27.109,0 m²		0,0 m²	
skupaj brez parkirnih mest in zunanjih površin		25.913,0 m²		0,0 m²	

Assemblies	Subgroup of spaces	Starting surface		Contest design	
		Assembly surface	Sub-assembly surfaces	Area of the group	Area of the subgroup
Laboratories		12,077.0 m <sup>2</sup>		0.0 m <sup>2</sup>	0%
	Cabinets		3,356.5 m <sup>2</sup>		0.0 m <sup>2</sup>
	Laboratories		6,940.5 m <sup>2</sup>		0.0 m <sup>2</sup>
	Administration		1,780.0 m <sup>2</sup>		0.0 m <sup>2</sup>
Pedagogical spaces		3,980.0 m <sup>2</sup>		0.0 m <sup>2</sup>	0%
	Lecture rooms and classrooms		3,980.0 m <sup>2</sup>		0.0 m <sup>2</sup>
Common spaces		2,862.0 m <sup>2</sup>		0.0 m <sup>2</sup>	0%
	Common spaces		2,862.0 m <sup>2</sup>		0.0 m <sup>2</sup>
Administration		881.0 m <sup>2</sup>		0.0 m <sup>2</sup>	0%
	Administration		881.0 m <sup>2</sup>		0.0 m <sup>2</sup>
Technical facilities and services		6,113.0 m <sup>2</sup>		0.0 m <sup>2</sup>	0%
	Technical facilities and services		1,113.0 m <sup>2</sup>		0.0 m <sup>2</sup>
	Communications*		5,000.0 m <sup>2</sup>		0.0 m <sup>2</sup>
	Parking lots with a driving route		0.0 m <sup>2</sup>		0.0 m <sup>2</sup>
External surfaces		1,196.0 m <sup>2</sup>		0.0 m <sup>2</sup>	0%



Sport field	1,196.0 m <sup>2</sup>	0.0 m <sup>2</sup>
<b>Total</b>	<b>27,109.0 m<sup>2</sup></b>	<b>0.0 m<sup>2</sup></b>
Total without parking lots and external surfaces	25,913.0 m <sup>2</sup>	0.0 m <sup>2</sup>

Figure 28, Table of surfaces FS (source: contest appendix, C\_3\_3\_pregledanica površin FS\_2. ARH faza) (C\_3\_3\_table of surfaces FS\_2 ARH phase)).

The display of the starting areas does not include the necessary areas for parking spaces and driveways, as the surface depends on the share of parking spaces, which will be included in the underground part of the building and the design efficiency. The surface intended for parking spaces and driveways achieved by the contest design shall be filled in the table.

Surfaces must be considered in the contest proposal. Any major upward or downward deviation needs to be specifically argued and in the event of a reduction in surfaces indicated how the programme can be properly implemented despite the smaller available surface. In the case of upward deviation, however, the reasons for the increase should be justified and it shall be defined the extent to which the increase in the area shall rise the initial investment. The contest documents also contain a graphical catalogue of the premises (B\_2\_1\_grafični katalog prostorov FS)(B\_2\_1\_graphical catalogue of the FS premises), which specifies the technical requirements of the individual spaces and contains a schematic overview of the rooms with drawn equipment. These schemes are designed to facilitate the understanding of the specific requirements of individual spaces. The proportions of the sides in the drawings are schematic and are not ultimately binding. The participant can adjust the proportions of the spaces according to the design that he proposes. However, the dimensions of the equipment shown, the corresponding deviations, the transport routes and the work and service surfaces of the individual envisaged installation in these spaces must be taken into account. The square footage should not change.

In the form of the appendix (D\_2\_1\_tabele specifikacij prostorov FS)(D\_2\_1\_specification tables of the FS premises) the basic material is also attached, which served as the basis for the preparation of the aforementioned graphical catalogue of the premises (B\_2\_1\_grafični katalog prostorov FS)(B\_2\_1\_graphical catalogue of the FS premises). Note, however, that the requirements listed in these appendices (D\_2\_1\_tabele specifikacij prostorov FS)(D\_2\_1\_specification tables of the FS premises) are not part of the contest! This material should only serve as possible additional information to facilitate the understanding of the program in question.

In the event that due to the fact that the data on individual premises are located in three different documents: a. the table of surfaces, b. graphical catalogue of premises and c. the specification table of the premises, in the tender documentation there are possible discrepancies, the hierarchical order of is valid from a., b. to c. This means that in case of data mismatch between a. and b. the content listed in a. is correct.

### III. A more detailed description of individual groups of programmes

#### *Chairs and laboratories*

Laboratories are the main part of the Faculty of Mechanical Engineering and represent the smallest independent working units that are focused on a precise specified field of research. Laboratories that explore different specific subsections in the same field are connected to the chair. Connecting to the chair is primarily substantive. Spatial integration of individual laboratories into chairs - spatial units is desirable but not necessarily. More important is that laboratories are connected to spatial units with related technological and functional requirements in terms of height, access, emissions, etc. At the faculty, there are 36 laboratories and 18 chairs, which can be connected in 4 wider parts or. directions; PT (production technologies), KM (construction and mechanics), EPS (energy and process engineering) and ML

(mechatronics and laser technology). This division should be basic to the participant when organizing the group of programmes.

Each department acts as an independent pedagogical and research unit and consists of one or more (2-4) work units, i.e. laboratories, consisting of the head, the leader of the laboratories, professors, assistants, technical assistants, researchers and professional workers. Chairs have laboratories, measurement rooms, large and small meeting rooms, kitchenettes, and warehouses. Often these spaces can be shared or separated by laboratories, depending on the size of the chair and laboratories. Typically, larger rooms and kitchenettes are connected to the chair, while smaller meeting rooms are connected to the laboratory. In the chairs are conducted researches, measurements or industrial applications. Laboratories or chairs may also have part of the premises only for individual pedagogical purposes, which means that they work with students, especially in theoretical or calculation tasks in small groups at computers, for 8-20 students. The cabinets are of different sizes and represent the workplace of an employee. Chairs usually also have a joint administration, which includes an office, a meeting room and a kitchenette. The gross floor height (BEV) of the ceiling of all rooms in the group should be:  $BEV = 3.5m$ , except for technically more demanding laboratories, where  $BEV = 6m$ . A communication centre - a technical space - is created in each floor (or for each group of laboratories) - in which the connection and protection of all energy, communication and protection lines are passing through (with the necessary reserve).

More detailed software, technical and spatial characteristics of individual laboratories are given in the basis C\_3\_3\_preglednica povrsin FS\_2. ARH faza (C\_3\_3\_table of surfaces FS\_2.

ARH phase). The total estimated area of laboratories, together with cabinets and administration, is approximately 12,077 m<sup>2</sup>.

### *Common spaces*

They are intended for all faculty users, so they should be designed in such a way that they create a high-quality feature of the public space in the building and can also be used as a link between individual contents. The central communication space must be designed to allow events, receptions, exhibitions and the like to be performed. It must be easily accessible to outside visitors.

In addition to a library, canteens, shops, buffets, and spaces for social gatherings, sports facilities are included. The latter should be placed in such a way as to provide easy access for external users (for example FFA students) and through them access to an outdoor playground.

There must be many places in the building for socializing students of smaller groups (1-6) of different configurations, which allow for discussions, solving tasks, talking, discussing, calculating, etc. They can be in the form of different tables with chairs, benches with seats, etc. in the open space, separated spaces with or without monitors for joint work on the computer, smaller corners with sound barriers and even smaller rooms if space allows it.

More detailed programme and spatial characteristics of individual common spaces are given in the basis C\_3\_3\_preglednica povrsin FS\_2. ARH faza (C\_3\_3\_table of surfaces FS\_2.

ARH phase). The total estimated area is approximately 2,860 m<sup>2</sup>.

### *Pedagogical spaces*

In addition to common spaces they form the public part of the faculty, which is as much as possible intended for students. They shall design single unit. The lecture theatres and lecture rooms should be placed in the more streamlined areas of the building in close proximity to the central communications. It should also be possible to provide multipurpose lecture rooms, which can also be used for external users at free time. Classrooms can form a characteristic unit that is somewhat distant from the rest of the programme groups. The technical requirements of individual premises are specified in the appendices.

More detailed programme and spatial characteristics of individual pedagogical spaces are given in the basis C\_3\_3\_preglednica povrsin FS\_2. ARH faza (C\_3\_3\_table of surfaces FS\_2.

ARH phase). The total estimated area of pedagogical spaces is approximately 3,980 m<sup>2</sup>.

### *Administration*

The administration should be organized as an independent unit that ensures optimal functioning of the premises within the management board. It is required that each floor of the administration should have at least one meeting room. The ŠR unit (student's desk) equally cooperates with other parts of the administration, and it is available to students at certain hours, therefore it should have easier access to a larger number of students on the one hand, and at the same time act as part of the administration with other professional services in the administration. It is necessary to ensure their adequate placing - either within the administration, or as a separate unit more closely connected with the student premises. The technical requirements of individual premises are specified in the appendices.

More detailed programme and spatial characteristics of individual administration spaces are given in the basis C\_3\_3\_preglednica povrsin FS\_2. ARH faza (C\_3\_3\_table of surfaces FS\_2.

ARH phase). The total estimated area of administration spaces is approximately 881 m<sup>2</sup>.

### *Technical facilities and services*

Technical services are responsible for cleaning and maintenance, material delivery, waste management and other courier services. They should form a separate functional unit that is not easily accessible to most users. Lavatories, spaces for storing cleaners and cloakrooms should be reasonably distributed throughout the whole building. It is possible to arrange cloakrooms as a single unit.

More detailed programme, technical and spatial characteristics of individual laboratories are given in the basis C\_3\_3\_preglednica povrsin FS\_2. ARH faza (C\_3\_3\_table of surfaces FS\_2.

ARH phase). The total planned area of technical facilities and service spaces, with no communication and parking spaces, is approximately 1,113 m<sup>2</sup>. Surfaces for mechanical installations are given indicative (spaces marked T030101, T030102, T030103, T030104, T030105) to be adjusted by the participant in accordance with his proposed solution. The surface of the rooms intended for communication is given indicative and is not binding on the participants.

## **e. Content requirements**

### **I. Long-term flexibility and design modularity**

The basic requirement of the contest is to ensure the long-term flexibility and modularity of the design with the architectural design. It is expected that the building is designed in such a way that with small interventions in the barriers and separations between spaces, it is possible to adjust and change the areas intended for individual chairs and laboratories. Education and research is a living and changing process, which is constantly adapted to the needs of society and international guidelines. The entire system of communications, installations and other service elements of a building must be designed as independently and general as possible, so that the substantive part of the building can be relatively freely renovated and adapted to the changes in substance. Technically more demanding spaces and laboratories, which due to demanding installations, accesses or other program requirements, need to be more technically equipped, should not constitute obstacles in the process of potential restructuring of the building on system level. This means that it is desirable to combine technically more complex and consequently less flexible spaces into completed units.

In spite of the expected flexibility, the designed barrier systems and separation of individual spaces must provide adequate sound and visual protection. It is expected that the changes in the structure of the building will be carried out in cycles of 15-20 years, therefore short-term (and financially demanding) flexibility at the level of the basic organization of programs is not required.

The principles of long-term flexibility and modular design should be presented graphically in the form of schemes in a textual report and on posters.

## f. Technical requirements

### I. General Requirements

The general technical features of the new faculty building must follow the guidelines:

- nZEB class B1 or better (nearly zero-energy buildings, see Energy Performance of Buildings Directive, European Commission, <https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings/nearly-zero-energy-buildings>) or an action plan for almost zero-energy buildings for the period by 2020 (AP nZEB), Ministry of Infrastructure
- Rules on the effective use of energy in buildings (2010 and Technical guideline TSG-01-004)
- DGNB building certification system (see. [www.dgnb-system.de/en/system/certification\\_system/](http://www.dgnb-system.de/en/system/certification_system/))

The building must be designed so that the quality of the thermal comfort, air quality in the indoor environment, lighting and noise protection will suit at least the quality of class B.

The project is produced in BIM (Building Information Modeling) support, one of the established certification methods (e.g. DGNB, LEED, BREEAM level(s), etc.) is used to assess the sustainability of a building.

When designing the building and its embedded systems, the designer must ensure low primary energy consumption with simple constructional construction measures. When designing, the guidance is long life of built-in elements with emphasis on low operating and maintenance values. Designed systems must be simple and provide complete connectivity at the level of control over all parameters necessary for regulation and control of energy consumption. In the phase when the designer is selected, the final version of the project task must be agreed between the FS and the designer.

### II. Definition of the expected building materials of the new building

In its design, the new FS building will include key building materials that are available on the local construction services and materials market. The design contractor recommends the implementation of the RC support structure (wall carriers, columns) in combination with RC ceiling panels. Partition walls - due to the required and expected flexibility - are drywall (gypsum boards), taking into account adequate sound protection.

At the same time, the contracting authority emphasizes the importance of wood as a universal building material with which making simple constructions, final linings, builders' joinery and equipment is possible - but when using wooden construction in a city centre and buildings in a public function it is necessary to be adequately critical and circumspect. The advantage should have materials from renewable sources, with low costs and environmental impacts due to their production and degradation.

All building materials used on the exterior and directly rain water exposed building site (e.g. vertical surfaces with no overhangs, horizontal surfaces without coverings) must be designed from durable materials with an expected life-span of 50 years without the need for their on-going maintenance or the need for maintaining basic mechanical resistance (e.g. painting, varnishing). On partially protected external



surfaces under overhangs (facades, ceilings, flooring) that are not directly exposed to rain water effects, the range of materials used can be expanded with materials that may eventual need to be replaced or maintained. But easy accessibility and interchangeability of individual parts must be provided (such as simply changing the wooden linings).

Construction materials must meet the conditions for permanent mechanical stability of the building. In the event that wood is used as a construction material on places where because of uncontrolled installation (inadequate dryness of wood) the subsequent deformation may occur, the object must be designed in such a way that the structural elements are visible, relatively accessible and interchangeable without disproportionately high costs.

Other materials used, especially those intended for daily exposed surfaces (flooring, walls and wall coverings) should be selected so that they allow easy daily maintenance and cleaning (basic cleaning techniques), annual or multi-annual material renovation (floor grinding, surface sandblasting, painting works) and partial replacement due to damage or wear. The flooring must meet different requirements in laboratories, common areas with high frequency of people and in offices and cabinets where the frequency is low. Different laboratories may have different requirements for flooring, e.g. because of chemicals, etc.

Laboratories should be lit but adequately light and sound insulated.

### III. Energy efficiency

The contest proposals should be designed in accordance with general technical requirements and in such a way that in the next stages of planning (basic design PGD, executive design PZI) the legal conditions for efficient use of energy are fulfilled without intervention to the floor plan design, façade and construction. Attention should be paid to the following elements, which can be defined and displayed in the conceptual design (or contest detailed report):

- architectural design that enables the use of low temperature heating systems and high temperature cooling systems in combination with active and passive systems for the exploitation of renewable energy sources (RES) and accumulation,
- effective but passive shading and control of heat gains, which at the same time allows the exploitation of natural lighting and potential heat gains during the heating season,
- building envelope must not exceed 2/5 glazed surfaces in order to reduce overheating.
- the architectural design must ensure a minimum range of heat passages, a minimum amount of elements to be insulated "outside" of the contour of the heat envelope (e.g. balcony brackets attached to the basic warm part of the construction), minimal use of specialized building elements that increase the investment (e.g. Schöck elements),
- ventilation of the spaces should be completely separate for locations (laboratories) where toxic emissions are present, which will make that the air flows in the environment will not influence to each other. The level of emissions must be lower than the legally permissible level.
- exploitation of direct heat and cooling sources by means of an appropriate architectural design (e.g. night cooling during cooling of the building, heating of the building with solar energy in the heating cycle, accumulation of heat and cooling and their corresponding distribution in building).

Adequate energy efficiency is demonstrated by the nZEB indicators defined in the national action plan. Priorities must have solutions with indicators that go beyond the requirements of nZEB for such buildings.

To achieve 50% RES at the level of primary energy, the following technologies are also used: solar thermal receivers STR, which enable in the period of 15.4. to 15.9. full coverage of the needs of domestic hot water heating. STR must be connected to a heat pump system. The primary source for heating, cooling or air conditioning of the building should be the system of electrically driven heat pumps (preferably water-water), which must achieve the top 10% of the highest energy efficiency compared to the others on the market available heat pumps.

The facility must have a secondary power source as support in case of power failure (DEA diesel electrical aggregates + gas boiler - domestic hot water outside the summer).

The appropriate energy efficient design should be shown on the basis of floor planes, cross sections and façades, and the proposed systems for dealing with direct heat and cooling sources (the last indent) should be defined in the textual explanation which also applies to general technical requirements.

#### IV. Construction design

In selecting the construction system and construction materials, the participants should consider the contracting authority's expectation that the construction is designed rational and long-term flexible.

The rational construction design in principle ensures the optimal ratio between the required structural ranges, the used construction material and the complexity of the execution. It is also necessary to design appropriate earthquake protection of the building at the level of the conceptual design, that is, to ensure the basic horizontal stability of the building. Any deviation from conventional (more or less rational) construction solutions must be argued and stated in what way a different (unusual) solution contributes to improving the design and operation of the building within other expected properties and qualities.

With long-term flexibility it is necessary to ensure that the building has a clear separation between the primary structure that ensures its global stability and secondary structural and barrier elements that can be removed or replaced without interfering with the primary construction system. In this way it is possible to adapt the building in the long term to other programs that will not be known at the time of construction.

The allocation of premises should be designed so that spaces where vibrations can adversely affect their applicability (laboratories) are positioned in less sensitive locations, bearing in mind that a certain degree of protection will be required for certain rooms. We suggest that these rooms are on the ground floor of the building or the first basement floor, if it is not the lower one.

Two groups of laboratories (chairs) with special requirements for vibrations are identified, which are defined in the list of premises. The first group includes machines that produce vibrations (punching machines, motors, hydraulics, dynamic exciters, ...) and unacceptably disturb adjacent spaces without proper measures. There is also a noise problem in this group, which needs to be limited. The second group uses measuring equipment that requires the prevention of vibrations on micro (optodynamics and lasers, measurement rooms, for example) or nano scale (tribology). For both groups of laboratories, the relevant standards or recommendations should be taken into account, in the second group of criteria also for micro and nanotechnology. Class of vibration levels according to appropriate recommendations standards must be finally harmonized with the contracting authority at the design stage. It is required to include an expert who has references to the construction of objects of nano centres or objects that have specified the requirements for the measuring devices on the nano scale.

Since groups of laboratories and chairs are grouped primarily by substantive units at the faculty (energy, construction, production, ...), as described in the space description, it is acceptable in design that the abovementioned laboratories or chairs are merged or located differently, according to the specific construction and foundation requirements for vibration and noise.

The underground part of the structure must provide high reliability from the ingress of ground water and moisture. We recommend a reinforced concrete performance of the basement structure with classical waterproofing on the outer envelope in combination with a waterproof implementation of RC construction (white bath system). The cellar part of the structure should also be properly dilated to avoid rheological and technological damage with simple dilatation units. Nevertheless, it is recommended that places where water and moisture can cause significant damage are not located below the level of the terrain.

## g. Electrical installations and equipment

There is no need to specify or display the electrical installation design in the contest proposal. The starting point for the further planning of the building is the expectation of the contracting authority that electrical installations, in addition to its other tasks, will adequately cover the following segments of operation and building management:

- variable lighting that adapts to the occupancy of the room and the available daylight. Particular care must be taken in the appropriate design of artificial lighting so that it can be combined with natural illumination effectively and smoothly. The colour, sharpness and quality of light must be as comparable and non-conflict as possible to one another.
- information support for building management in terms of informing, energy consumption, space use and security,
- adaptive technical support of the building and its mechanical parts (mechanical installations and other devices) with the ability to learn and gradually increase efficiency according to the variable conditions of use,
- connection power of a large number of users. It should be taken into account that all laboratories operate simultaneously, but not all devices at the same time.

## h. Mechanical installations

Faculty of Mechanical Engineering Ljubljana wishes to prepare an architectural contest in order to obtain the most suitable solution for the new facility and to this end prepares terms of reference for individual dossier plans that will be included in the tender specifications of the envisaged contest.

Depending on the meaning and content of the building and the time of its creation, the mechanical installations are designed in a modern way, taking into account the achievements of the technique, at an appropriate level, energy-saving and ecologically friendly. The use of alternative and renewable energy sources should be included as far as possible. Complete installations are designed to serve the needs of the Faculty of Mechanical Engineering.

### I. The heating

Priority of heat sources:

1. heat pump water / water
2. gas boiler
3. condensers of cooling devices
4. solar panels

#### *Heat pump*

It shall be applied a cooling unit in a reversible version. Water is used as an energy source.

#### *Gas boiler room*

As a tertiary source of heat, the construction of a gas boiler room is planned. In accordance with the local energy concept MOL and OPN municipal spatial plan Municipality of Ljubljana MOL, the supply of planned buildings with natural gas are planned. The main distribution medium pressure gas pipeline JE 250 with a working pressure of 1 bar is located along the northern and eastern edge of the treated area.

### *Heat of condensation*

The cooling aggregate or integrated cooling aggregates in air conditioners must be equipped with an water condenser so that it is possible to return heat or to utilize heat of condensation.

### *Solar panels*

For the needs of the building and the learning process, the roof of the building should provide for an adequate number of modules of solar panels, which must be connected to the energy preparation system. The installation of panels is for the winter and transitional (spring and autumn) operating regime.

### *Heating substations*

It is necessary to predict the heating station. In the heating station a calorimeter is used to measure the amount of energy consumed. The temperature control on the primary side is controlled depending on the outdoor temperature. The heating system is filled with softened water.

On all major branches, except for the branch of the air supply, current rate of flow gauges for flow indication and the possibility of setting the desired flow are predicted.

In the heating station a thermal energy storage is provided on the hot water side, which allows the accumulation of heat energy. The thermal energy storage should be in the function of a common energy point, where energy is supplied from all sources (gas boiler, heat pump, additional water condensers, panels). From the thermal energy storage the heating medium should be supplied to the dividers with individual regulated or unregulated branches supplying the energy consumers.

### *Underfloor, wall and ceiling heating and cooling*

In order to maintain the desired temperature in individual rooms (lecture rooms, laboratories, cabinets ...), the activation of the concrete core is planned depending on the possibilities and the required comfort in the room.

The heating / cooling water supply runs from a heating station or cooling unit in double ceilings to individual consumers. All visible distributions must be thermally insulated with high quality thermal insulation with high resistance to steam transition, thickness in accordance with applicable legislation (Rules on efficient energy use in buildings and Technical Guideline TSG-1-004: 2010 Efficient Use of Energy).

### *Ventilation converters (local cooling)*

Converters are positioned as a cooling source exceptionally and allow local temperature regulation only in areas where workflows result in a higher heat output, which can not be properly discharge (nullify) by the low temperature ceiling cooling system.

Converters should be in a very low-performance version - tangential fans. They are dimensioned to maximize natural convection in the winter mode, and the converter fan subsequently and less turns on. The same applies to the annual regime, although in the summer there is no effect of natural convection.

The cooling water supply runs from a heating station or cooling unit in double ceilings to individual consumers.

## **II. Cooling**

The cooling loads should be calculated according to VDI 2078.

For the needs of cooling with ceiling radiant surfaces, a compact cooling unit is planned in the engine room, which in the winter regime is reversible as a heat pump.

The cooling energy distributor station is located in the immediate vicinity of the cooling unit if the spatial distribution allows it.



In the cooling station chill water storage is provided on the cold water side, which allows the accumulation of cool energy. From the chill water storage the cooling medium should be supplied to the dividers with individual regulated or unregulated branches that supply consumers.

#### *Cooling unit - heat pump*

The cooling unit is a compact design with an air-cooled condenser and a closed evaporative cooling tower. The cooling unit, due to the special evaporative and mechanical cooling, achieves high cooling rates. The required amount of air for draining condensing heat is very small compared to conventional systems, so it is possible to install the device without restrictions in the basement, which is not necessary or required. The inlet and outlet of the cooling air of the condenser is with the fan in the cooling unit itself. The cooling unit should have the possibility of condensing heat transfer (water condenser) for heating purposes. For operation in the winter mode as a heat pump, an additional evaporator is installed.

The cooling unit should have integrated complete regulation. The device controllers should be freely programmable and physically identical to all other digital control systems, which ensures absolute flexibility of the systems, compatibility between operation and connection control of all systems in the facility without interfaces.

As an alternative way of preparing a cooling water, check the possibility of using an absorption cooling unit.

### III. Ventilation

For ventilation and air conditioning, air conditioners with high efficiency regenerative and / recuperative energy return. Ventilation systems are foreseen in the specified areas of the facility and are divided on the basis of functionality, heat loads and operating time:

- System N1: lecture rooms
- System N2: Lobby, laboratories
- System N3: Cabinets, management, representation
- System N2: Experimental laboratory
- System N5: Cafe, kitchen, storage
- System N6: Toilet facilities

The systems of N1, N2, N5 and N6 devices are combined in machinery spaces, the device of N3 system in the engine room on the floor (and the device of N4 system under the ceiling of the laboratory. The heating substation is foreseen in the engine room. The height of the engine rooms should be approximately 4 m.

#### *Description of ventilation systems*

*Systems N1 (lecture rooms), N2 (lobby, laboratories), N3 (cabinets, management, representation):*

Devices should ventilate rooms and condition air inlet. They should be designed in such a way that, in the ventilation, they allow the transfer of heat and moisture from the outlet to the inlet air. The transfer of moisture from the outlet to the inlet air is predicted by the enthalpy exchanger. The appliances should have the possibility of free cooling with the outside air (night cooling).

The device should have a complete DDC control for fully automated operation. The device controllers should be freely programmable and physically identical to all other digital control systems (lighting, heat station, etc.), which ensures absolute flexibility of the systems, compatibility between operation and connection control of all systems in the facility without interfaces.

The duct system N1 for the lecture room should be designed in such a way that any individual lecture room can be switched off and the air conditioner automatically reduces the amount of air by means of frequency control regulation.

The N2 and N3 systems should ventilate all spaces at the same time, so that the amount of air can be adjusted with the frequency regulation of motors based on air quality measurement. At the same time it is necessary to foresee the regulation of the ventilation intensity based on the actual measurement of the amount of CO<sub>2</sub> in the air in individual lecture rooms.

The quantity and distribution of air are defined per person according to the Rules on ventilation and air conditioning of buildings (Official Gazette of RS 42/02) and also in accordance with DIN 1946. The system must always operate with 100% fresh air to prevent the occurrence of infections such as "Sick house syndrome".

#### *System N2 (experimental laboratory):*

A ventilation device with integrated recuperator and conditioning of the inlet air should be provided for basic ventilation of this area with inlet and outlet air. Depending on the purpose of individual laboratories, the number of individual devices is determined in the final harmonized project term of order.

Air and distribution volumes are defined per person or necessary exchange (according to emissions and heat loads in laboratories) in accordance with the Rules on ventilation and air conditioning of buildings (Official Gazette of RS 42/02) and also in accordance with DIN 1946.

#### *System N5 (caffe, kitchen, storage):*

A ventilation device with integrated recuperator and conditioning of the inlet air should be provided for basic ventilation of this area with inlet and outlet air.

Air and distribution volumes are defined per person or necessary exchange (according to emissions and heat loads in laboratories) in accordance with the Rules on ventilation and air conditioning of buildings (Official Gazette of RS 42/02) and also in accordance with DIN 1946.

The amount of ventilation air for the kitchen is calculated according to the recommendations of VDI 2052.

The cooking hood should be designed so that it also has an air supply.

#### *System N6 (toilet facilities):*

A ventilation device with an integrated multi-stage recuperator should be provided for ventilation of the toilets with inlet and outlet air.

#### *Ducts:*

Ducts for air distribution should be made of galvanized steel sheet thicknesses according to DIN 1946 and DIN 24190.

In all elbows it **is mandatory** to install the leading - steering blades. In the channels with a ratio of sides greater than 2.5, due to an unfavorable hydraulic cross-section, the guide plate should also be installed (so that the cross-sectional sections have a side ratio of not more than 2.5). Regulating elements must be installed on the branches of the main channel ducts.

#### *Thermal insulation*

Channels for air distribution into rooms are thermally insulated with closed-cell insulation, such as Armaflex AC in plates or equivalent quality, namely:

- outdoor air 19 mm thick
- inlet air 19 mm thick
- drain air (see note) 13 mm thick
- discarded air 9 mm thick

It is also necessary to isolate the connection boxes of the inlet elements as well as the flanges of the channels.

Ducts running outside the building are additionally insulated with mineral wool in Al foil of 50 mm thickness, in Al shield, and the joints of the shield must be completely waterproof.

Note: Drainage channels are isolated only in areas where the temperature in the duct and outside the duct varies by more than 3 K (outside, installation verticals).

## **i. Economic requirements**

### **IV. Level of investment**

The amount of investment for engineering, design, control, construction and equipment of the FS building is defined by the identification of an investment project document DIIP and amounts to € 46,906,255 with VAT included.

The new building must be designed in the way that making of the investment in the expected frames is not compromised. Its expected gross size and quality of construction, equipment and technique must be taken into account. The level of investment is determined on the basis of the gross volume of the entire building

and the class of the construction and technological complexity GOI. The class of complexity is defined by the participants.

In defining the class of complexity GOI, the following elements of the building are considered in the following order: façade (amount of glazing, shading systems, layers of façade, materials and dimensions of elements - glass, materials of opaque linings), the need for parallel systems (dropped ceilings, raised flooring, etc. ), proposed finishing of interior surfaces (materials), structural complexity (ranges, technology), and other obvious signs of complexity.

In addition, it is encouraging that the building of the academy, as a comprehensive and representative example of a modern public building, can also compete in other calls for investment in public real estate. It is important that the building as a whole is potentially recognizable as an innovative, economically efficient and, from the point of view of the working environment, a stimulating building. Potential sources of additional financing are calls from the European Investment Bank and the Spirit Slovenia fund.

## V. Effective building management

Building management includes three basic levels of costs and inflows: operating costs, maintenance costs and inflows from market activities (leases, hosting outside events in the premises of the building). Within operating costs, we estimate the expected costs for ventilation, heating and cooling, lighting and cleaning. In terms of maintenance costs, we estimate the level of expected costs according to the extent and complexity of maintaining built-in materials, furniture equipment and mechanical devices and technologies. In the case of inflows of market activities, we assess whether the building enables the uninterrupted rent of part of its premises, which are not used for teaching purposes during the lease period, for the purposes of a market lease.

## VI. Long-term economic effects of construction (LCCA)

The design should include materials, technologies and systems that follow the life cycle cost analysis, which means that their cost of installation, maintenance and decommissioning is taken into account for their suitability.



## VII. Contest basis and appendices

Contest basis:

- C\_1\_geodetski-nacrt (C\_1\_geodetic-plan)
- C\_2\_DOF
- C\_3\_preglednica-povrsin (C\_3\_table of surfaces)
  - C\_3\_1\_preglednica-povrsin\_FFA\_2. ARH faza (C\_3\_3\_table of surfaces FS\_2. ARH phase)).
  - C\_3\_2\_preglednica-povrsin\_FFA\_1. URB faza (C\_3\_2\_table of surfaces\_FFA\_1. URB phase).
  - C\_3\_3\_preglednica-povrsin\_FS\_2. ARH faza (C\_3\_3\_table of surfaces FS\_2. ARH phase)).
  - C\_3\_4\_preglednica-povrsin\_FS\_1. URB faza (C\_3\_4\_table of surfaces\_FS\_1. URB phase).
  - C\_3\_5\_preglednica\_urbanistični kazalci\_URB faza (C\_3\_5\_table of urban indicators\_URB phase)
- C\_4\_shematski-prikaz-plakati (C\_4\_schematic-overview-posters)
- C\_5\_maketa (C\_5\_model)

89

Contest appendices:

- D\_1\_1\_tabele specifikacij prostorov FFA (D\_1\_1\_specification tables of the FFA premises)
- D\_1\_2\_vključitev strojnih instalacij FFA (D\_1\_2\_integration of mechanical installations FFA)
- D\_2\_1\_tabele specifikacij prostorov FS (D\_2\_1\_specification tables of the FS premises)
- D\_3\_1\_Predhodne smernice soglasodajalcev (D\_3\_1\_Preliminary guidelines for consent givers)
- D\_3\_2\_Geološko poročilo (D\_3\_2\_geological report)
- D\_3\_3\_Hidrogeološko poročilo (D\_3\_3\_hydrogeological report)
- D\_3\_4\_Izsek iz dokumentacije za izgradnjo FKKT (D\_3\_4\_Extract from the documentation for the construction of the FKKT)
- D\_3\_5\_Izsek iz dokumentacije za izgradnjo FRI (D\_3\_5\_Extract from the documentation for the construction of the FRI)
- D\_4\_fotodokumentacija (D\_4\_fotodokumentation)