Invitation for Competition Submissions

ISOVER Multi-Comfort House Students Contest Edition 2016

Community development in Brest, Belarus

International, two-stage, open competition

2. Details of the task

2.1. General information Brest

Brest city (coordinates: 52°08°N 23°40°E) is located in Belarus border with Poland opposite the Polish city of Terespol, where the Bug River and Mukhavets rivers meet. It is the capital city of the Brest County and has a population of 330,800 (in 2015).
Founded in 1019, the city of Brest is a historic site of many cultures. Since XI century we find here Berestye - an ancient Russian trading centre and fortress on the boundary with the Polish and Lithuanian possessions. Between XIV-XVI centuries Berestye,is one of the largest cities in the Grand Duchy of Lithuania. In 1390 Berestye is the first Belarusian cities that received the right to self-government, known as Magdeburg rights.
In 1553 Mayor Nikolai Radziwill, founded the first printing house in Belarus that published the unique Brest Bible in 1563. In 1830, Nicholas I of Russia approved the final version of the construction of a fortress on the site of the ancient city. Brest itself is transferred 2 km east. Five years after the construction of the fortress the old town ceased to exist.
During World War II the city was first taken by the Soviets and in 1941 by the Nazis. After the war, with the new boundaries of the Soviet Union with Poland, the city became part of the Soviet BSSR until the breakup of the country in 1991, placing the city in the custody of Belarus, where it remains today.
The Brest City-Fortress was found by the Soviet Union as the Hero Fortress of the Second World War, unique award. More information about Brest you can find at:
http://translate.google.ru/translate?hl=ru&sl=ru&tl=en&u=http://city.brest.by/&sandbox=0&usg=ALkJrhgg7AuGfb4BRWAe5pOR6wij6oM1PQ

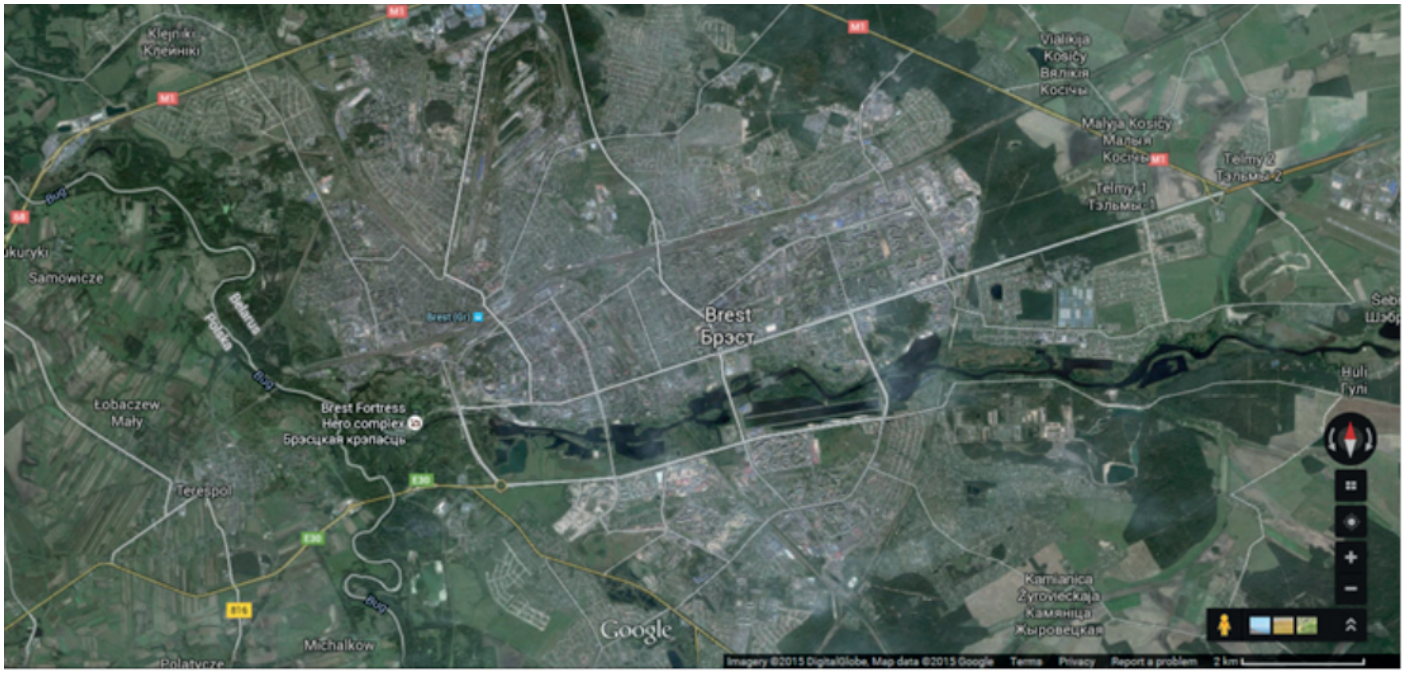


Figure XX –Brest City

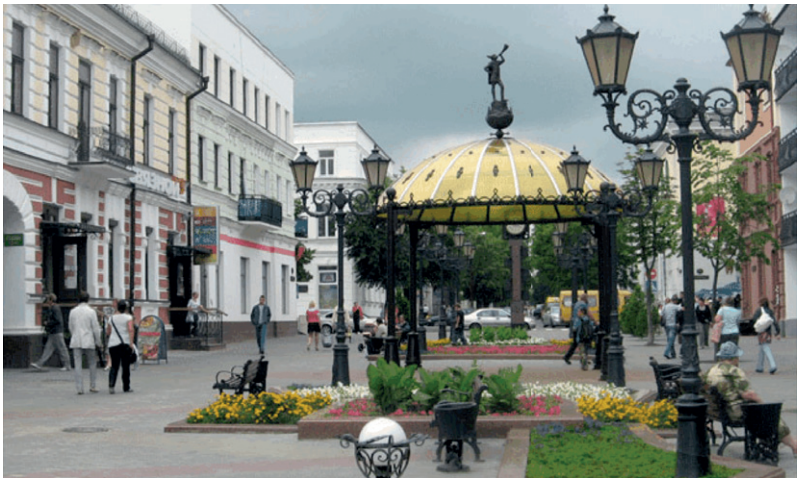
Belarusian Architecture.

During the 20th century predominate architecture is the Soviet Period one. In the beginning of the century, there is a period of industrialization. The architectural style acquired the features of laconism; simplicity and functionality (see Government Building in Minsk). The unusual volume of construction required new methods. In 1936 a so called Typical Project construction began. The Typical Projects of the buildings were developed in architectural institutes and then they were built in multiple copies all over the country.

Church in Brest City, Source: Gabriel Golumbeanu

Belarusian cities (Minsk, Brest) were demolished during WWII. After the liberation of Belarus in 1944 an all-union campaign for restoration of Belarusian cities begun. During1946 -1949 the general plans were developed and adopted for most of the Belarusian cities. During this period an important many monuments of Belarusian architecture lost, being demolished to make space for the new developments.

Starting mid-50th the constructions were realized using a new industrial method. The main attention was given to economics of the construction, the usage of reinforced concrete assemblage parts, standardization and unification. Architecture was considered a science rather than art. 60% of industrial, 90-95% of residential and 90% of social-cultural buildings were made as typical projects in multiple copies. The main direction of city growth was in formation of residential „Massive" on the perimeter. This concept was further developed into idea of micro-region - a self-sufficient residential area with multi-store apartment buildings that has its own infrastructure of communications, transportation, central heating and power supplies, commercial centres, schools, day care centres etc. These cities within city are very common in Belarus nowadays. In the last years an ecological aspect was given more attention resulting in somewhat more natural blending of the micro-regions with surrounding landscapes - lakes, rivers and parks.



City centre, Source: http://en.bstu.by/

A more detailed documentation about the history of Brest city and images of different architectural objectives can be found at www.isover-students.com at Documentation for submission 2016.

More images with Brest construction you can find at: http://globus.tut.by/brest/index.htm

2.2. Brest geographic position and climate

Brest (altitude 146m) lies astride the Mukhavets River. The river flows west through the city, dividing it into north and south, and meets the Bug River in the Brest Fortress. The river flows slowly and gently. Today the river looks quite broad in Brest. The terrain is fairly flat around Brest. The river has an extremely broad floodplain that is about 2 to 3 kilometres (1 to 2 miles) across. Brest was subject to flooding in the past.

A part of the floodplain was reclaimed by method of hydraulic mining. In the 1980s big cutter-suction dredgers were mining sand and clay from the riverbed, to build up the banks. After the dredging the river became deeper and the riverbanks higher. Today the river does not overflow its banks.

In the 2000s, two new residential areas are being developed in the southwest of Brest.

To the east of Brest the Dnieper-Bug Canal was built in the mid-nineteenth century to join the river to the Pina, a tributary of the Pripyat River which in turn drains into the Dnieper River. Thus Brest has a shipping route all the way to the Black Sea.

Brest climate

Brest has a transitional climate between the oceanic and humid continental regimes, but slightly leans towards the marine variety due to the irregular winters that mostly hovers around the freezing point. Summers are warm and influenced by its inland position compared to areas nearer the Baltic Sea.

- Absolute minimum temperature: −35.5°C
- Absolute maximum temperature: +36.6°C

Climate data for Brest [hide]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high, °C (°F)	11.6 (52.9)	17.2 (63)	22.6 (72.7)	30.7 (87.3)	32.1 (89.8)	33.0 (91.4)	36.6 (97.9)	35.6 (96.1)	31.5 (88.7)	26.4 (79.5)	19.0 (66.2)	14.5 (58.1)	36.6 (97.9)
Average high, °C (°F)	−0.1 (31.8)	1.2 (34.2)	6.3 (43.3)	14.0 (57.2)	20.1 (68.2)	22.6 (72.7)	24.9 (76.8)	24.2 (75.6)	18.4 (65.1)	12.5 (54.5)	5.4 (41.7)	0.9 (33.6)	12.5 (54.5)
Daily mean, °C (°F)	−2.6 (27.3)	−1.9 (28.6)	2.2 (36)	8.7 (47.7)	14.5 (58.1)	17.1 (62.8)	19.3 (66.7)	18.5 (65.3)	13.3 (55.9)	8.3 (46.9)	2.7 (36.9)	−1.3 (29.7)	8.2 (46.8)
Average low, °C (°F)	−4.9 (23.2)	−4.5 (23.9)	−1.2 (29.8)	3.8 (38.8)	9.0 (48.2)	12.0 (53.6)	14.2 (57.6)	13.3 (55.9)	9.1 (48.4)	4.8 (40.6)	0.4 (32.7)	−3.5 (25.7)	4.4 (39.9)
Record low, °C (°F)	−35.5 (−31.9)	−28.1 (−18.6)	−22.6 (−8.7)	−6.2 (20.8)	−4.2 (24.4)	2.1 (35.8)	5.8 (42.4)	1.3 (34.3)	−2.8 (27)	−9.9 (14.2)	−19.2 (−2.6)	−25.1 (−13.2)	−35.5 (−31.9)
Average precipitation, mm (inches)	34 (1.34)	33 (1.3)	33 (1.3)	37 (1.46)	63 (2.48)	68 (2.68)	76 (2.99)	72 (2.83)	55 (2.17)	37 (1.46)	42 (1.65)	41 (1.61)	591 (23.27)
Average rainy days	11	9	12	12	16	16	16	12	15	14	14	13	160
Average snowy days	16	16	10	3	0.1	0	0	0	0	1	7	14	67
Average relative humidity, %	85	82	75	66	66	69	70	71	78	81	86	87	76
Mean monthly sunshine hours	50	70	133	176	238	248	259	242	170	114	46	32	1,778
Source #1: Pogoda.ru.net[12]													
Source #2: NOAA (sun, 1961–1990)[13]													

Climate data Brest, Source: https://en.wikipedia.org/wiki/Brest,_Belarus

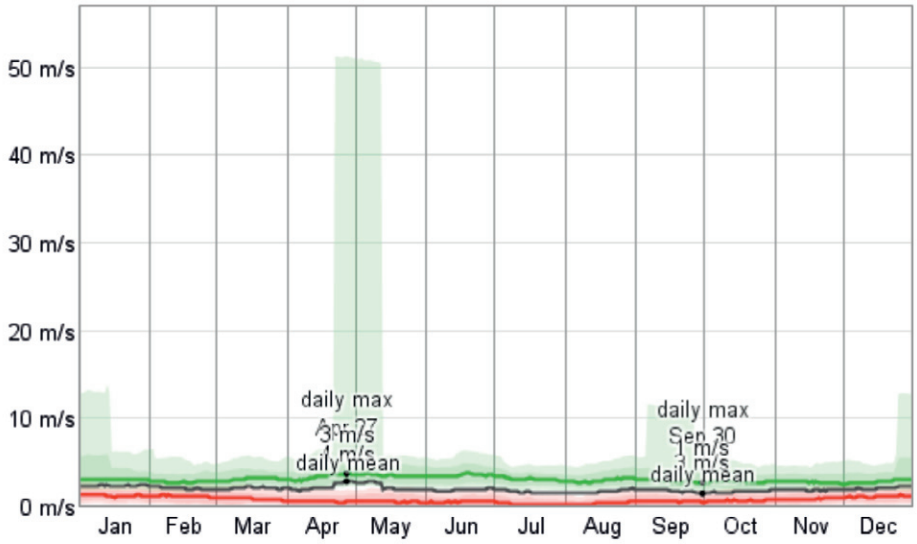
Brest wind

Over the course of the year typical wind speeds vary from 0 m/s to 4 m/s (calm to gentle breeze), rarely exceeding 51 m/s (hurricane).

The highest average wind speed of 3 m/s (light breeze) occurs around April 27, at which time the average daily maximum wind speed is 4 m/s (gentle breeze).

The lowest average wind speed of 1 m/s (light air) occurs around September 30, at which time the average daily maximum wind speed is 3 m/s (light breeze).

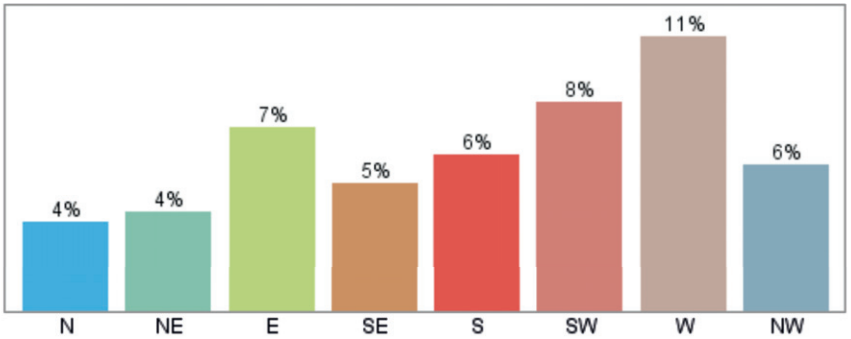
Wind Speed



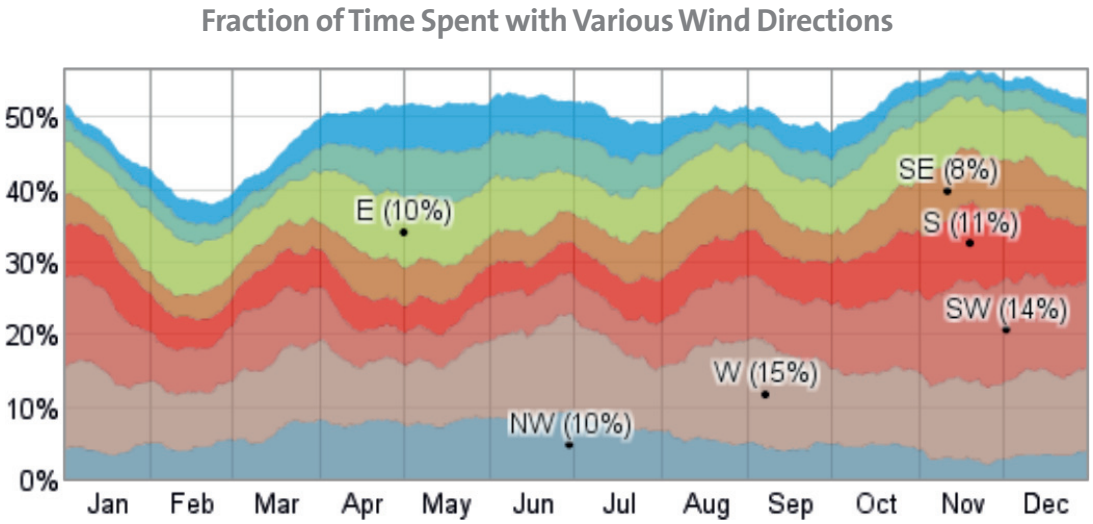
The average daily minimum (red), maximum (green), and average (black) wind speed with percentile bands (inner band from 25th to 75th percentile, outer band from 10th to 90th percentile). Source https://weatherspark.com/averages/33826/Brest-Brest-Province-Belarus

The wind is most often out of the west (11% of the time). The wind is least often out of the north (4% of the time) and north east (4% of the time).

Wind Directions over the Entire Year



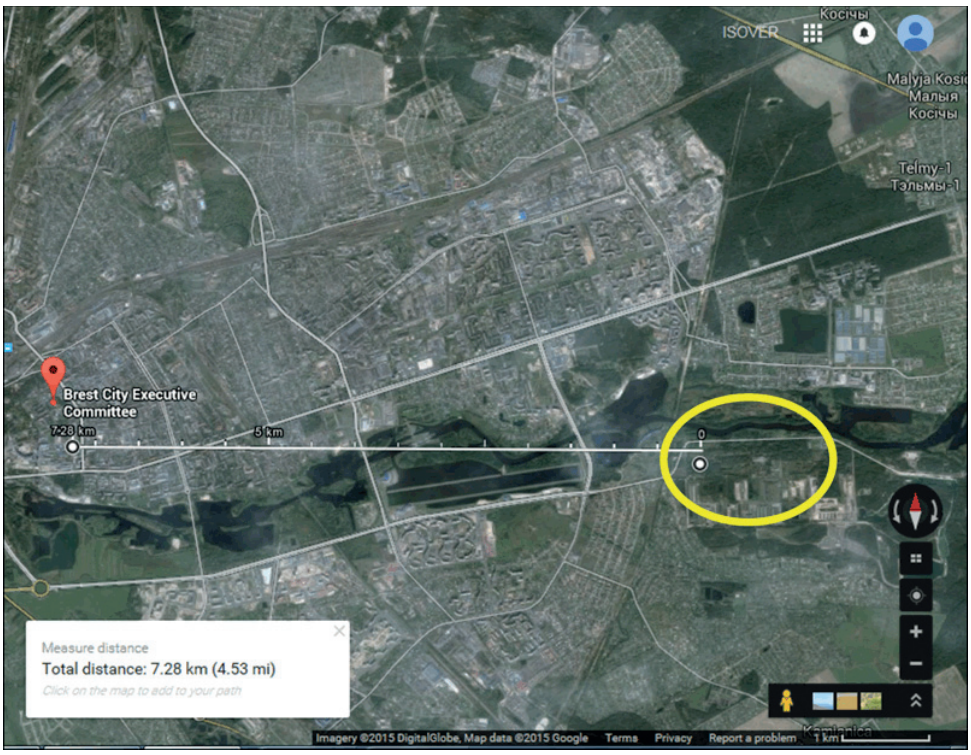
The fraction of time spent with the wind blowing from the various directions over the entire year. Values do not sum to 100% because the wind direction is undefined when the wind speed is zero. Source https://weatherspark.com/averages/33826/Brest-Brest-Province-Belarus



The fraction of time spent with the wind blowing from the various directions on a daily basis. Stacked values do not always sum to 100% because the wind direction is undefined when the wind speed is zero.
Source https://weatherspark.com/averages/33826/Brest-Brest-Province-Belarus

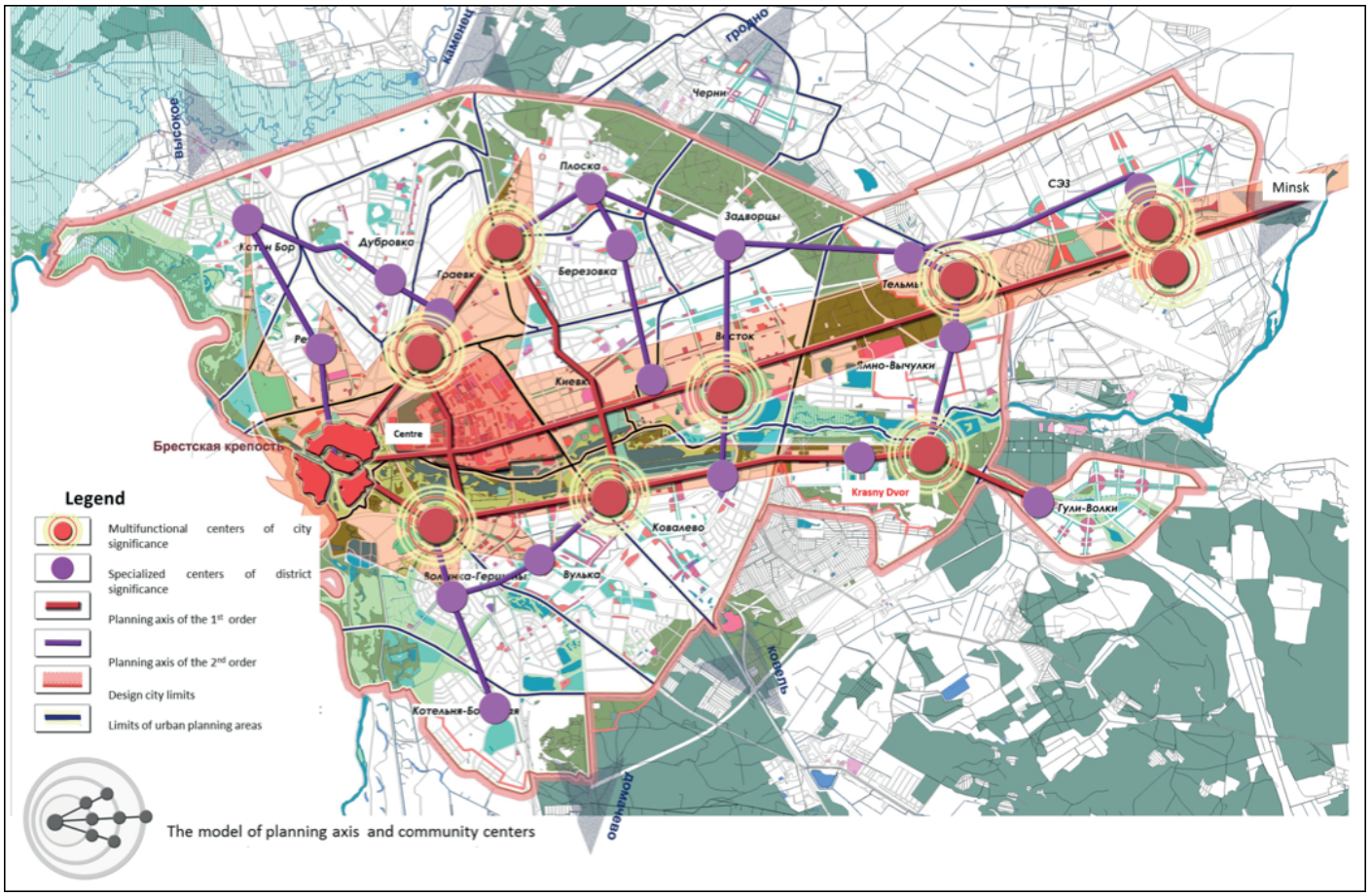
2.3. General information about the location of the site

The Krasny Dvor district is located in SE region of Brest city, roughly about 7km for the city center.
The site lies on the south shores of the Mukhavets River in a very calm environment.



Site Location
Source: Google Maps

The site is located on one of the major future development axes of the city in close proximity of a multifunctional center of city importance and of a specialized center of district significance.



Brest planning axis and community centres model
Source: Brest Executive comity

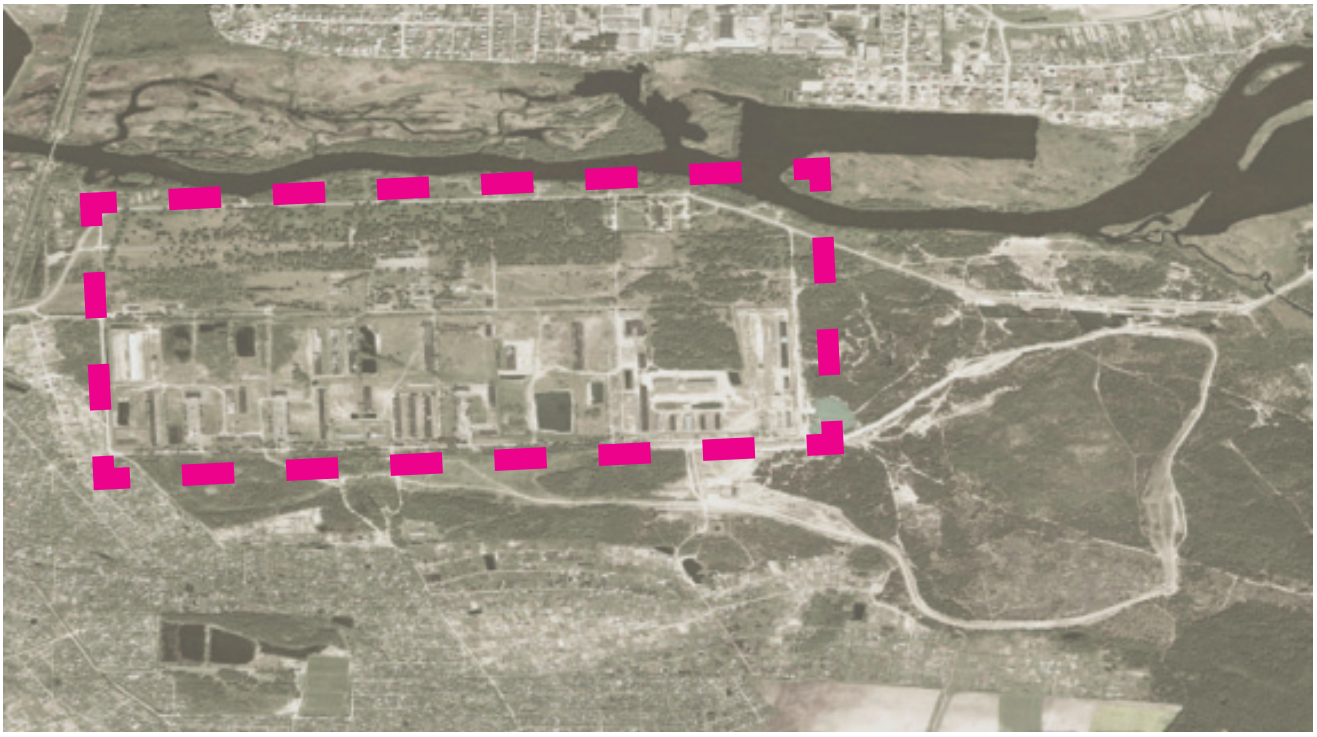
Mukhavets River, South bank facing East_1

Source: Gabriel Golumbeanu

Mukhavets River, South bank facing West_2
Source: Gabriel Golumbeanu

Part of the land is occupied by a former military unit that has been abandoned by Belarussian army in 2012. In the process of the new development the military buildings will be demolished.

Former Check Point
Source: Brest Executive Comity

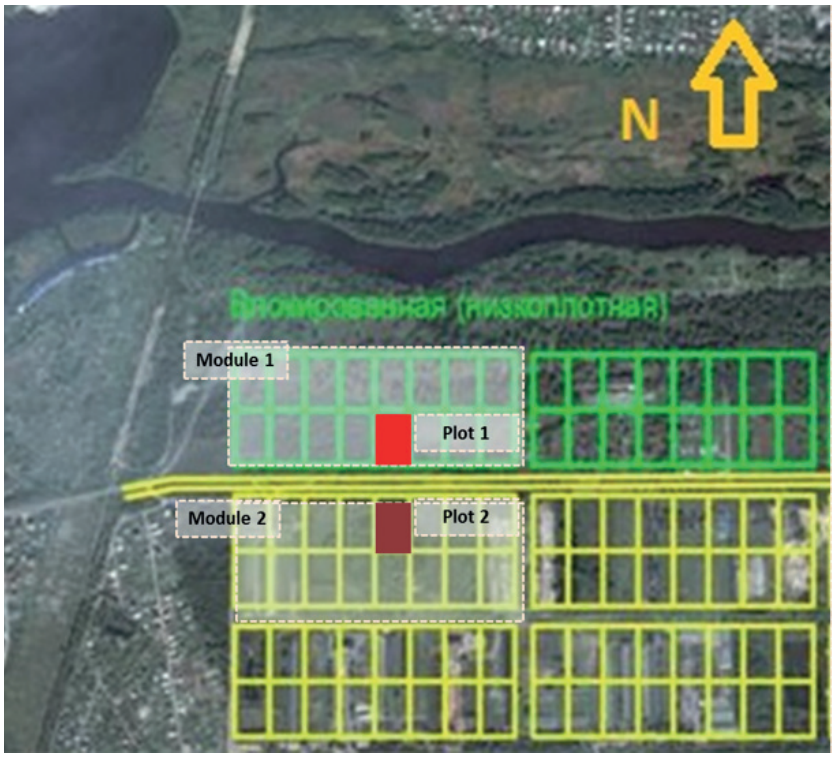


Aerial view of the plot
Source: Brest Executive Comity

More images and informations are available on www.isover-students.com at Documents for Submission 2016.

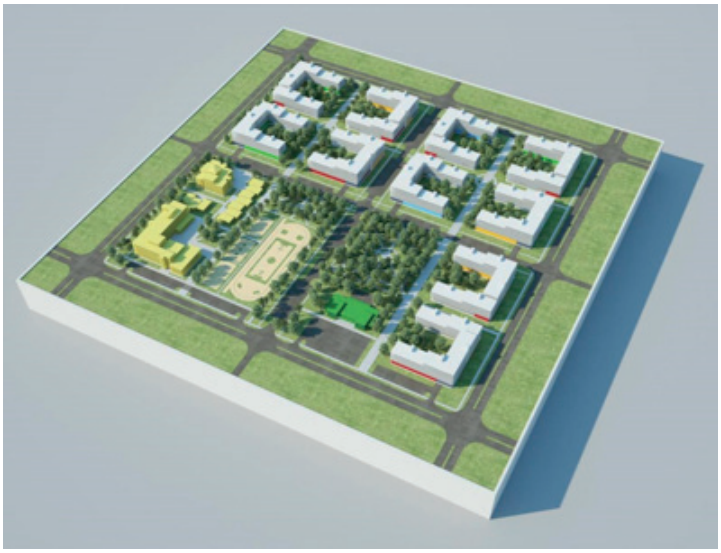
2.4 General information about the task

The students are required to develop a vision for a community development located in the perimeter of the Krasny Dvor district. The territory is conceptually proposed to be developed on the principle of quarters modules. Area of interest can be seen below. It is formed from 2 modules.



Module approach - theoretical

The module is a structural and planning element with the area of 15-20 ha, the territory of which is confined over the perimeter by main district arteries and broken down inside by district streets. The module is a relative autonomous element of the urban structure, within which the apartment blocks, institutions and social amenities, educational and upbringing institutions as well as production facilities. The blocks of apartments are provided with parking places (at the underground level); the guest parking lots are located outside the yards of residential houses within the module boundaries. The first story (ground floor) is used predominantly for public functions.



The main characteristics of a module are:

- Reduction of the number of building levels.
- Increase of the density and intensity.
- Using the first stories for social and cultural-domestic services as well as performing the educational functions.
- Using the underground space or first floor (ground floor) for parking places.
- Organizing the environment-friendly manufactures and workplaces within walking distance.
    - Multi-functionality and diversity (availability of residential, production, cultural, entertainment, public, administrative, business, landscape, recreational, sports, educational, medical, shopping and cultic functions).
    - Green space: at least 30%

One module consists of 16 quarters, mostly identical constructions and surfaces of 125*75 m (1 hectare) for 1 quarter. For the analyzed residential area there are two types of quarters:

- Plot 1: Townhouses (row houses) with a low density
- Plot 2: Multifamily houses with a medium density

Type of construction unit		Total constructed area
Plot 1	Townhouses (row houses) – low density • Between 1 to 3 floors, 20-40 houses in the quarter • 1 parking place per family • First floor can be used for retail and office space • 70-150 persons\ha (for one quarter) • Green space: at least 30%	1500 m^2/ha (minimum)
Plot 2	Multifamily houses – medium density • 3-5 floors, "high-rise accents" allowed – till 8 floors • 1 parking place per family • First floor facing the street - shopping facilities, offices, parking. • Rest of the floor: residential • 150-200 persons\ha (for one quarter) • Green space: at least 30%	Between 2500-3500 m^2/ha

Site and zoning requirements

The proposed area is formed from 2 plots each approximately 75m x 125m.

Plot 1 will contain residential construction - townhouses (row houses) - with 1 to 3 floors (G up to G+2). Number of constructions: 20-40/plot.

It is possible to use the ground floor to develop non-residential spaces such us office, shop, pastry shop to comply with the overall data of the module.

Plot 2 will contain residential construction (multifamily houses) with 3 to 5 floors (G+2 up to G+4).

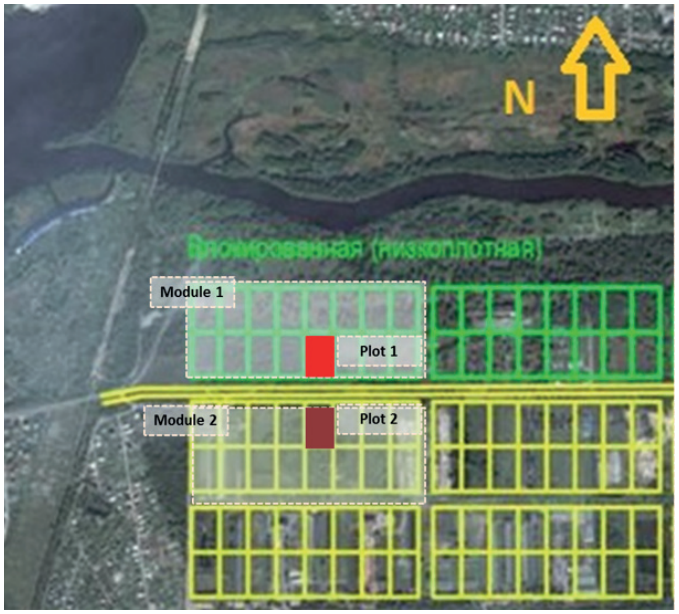


Figure 10 – Task site

As for Plot 1 the ground level can be used for nonresidential spaces and/or parking.

Within the scope of the project some high rise accents can be developed.
The allocation of the residential spaces as well as of the nonresidential will be done in such a way to achieve the requirements of the module (taking in to consideration all the plots forming that module)

Flats requirements

Bedrooms in the residential units should be large enough to accommodate two persons each and a living room must be adequately sized to accommodate families, based on the ratio of the total floor space of the living space more than 18 m2 per person.

Floor-to-floor dimensions will be 3.0 meters for residential floors.

Outdoor amenities can include:

- Play area suitable for children
- Neighborhood plaza. The open space requirement can either be in the form of a yard, a courtyard, or
- integrated into the building, or some combination of those strategies
- Garden-natural area of the neighborhood scale integrating both natural landscape and hard surfaces.
- Bicycle parking with bike sharing station integration
- Guest parking lots on grade
- Special features: waste collection points
- Yards -free from transport and yards (quarters) are connected by green corridors

Other functionalities,

In order to develop their own vision of the area the participants can propose any other residential amenities as they see fit.

IMPORTANT NOTICE

The participants are requested to study only 2 plots for which to fulfil the requested documentation.

The plots should by typical and repeatable for the master plan concept. The 2 plots should coexist and complete each other and share functions towards the main street.

All buildings from this area should achieve the building physics performance of a Multi-Comfort House as they are presented in the page 15.

Details and calculation are requested only for one building with residential function situated in Plot 1 area.

The overall scope of the task is to answer to the question: What should be the sustainable housing approach based on an "Energy Efficient Residential Module" in Brest taking in to account the social and climate factors?

2.5 Type of construction, technical parameters

The high-performance thermal, acoustic, fire protection and daylight requirements have to be considered in order to achieve the Multi-Comfort criteria. A presentation of the Multi-Comfort concept is available for download at www.isover-students.com. In the course of the competition, lectures on this subject will be held at the faculties as well as online trainings.
The Multi-Comfort criteria for the residential function are presented below.

HEATING ENERGY DEMAND (kWh/m²a)			**< 15 kWh/m²a**	
COOLING ENERGY DEMAND (kWh/m²a)			**< 15 kWh/m²a**	
AIR-TIGHTNESS n50 (V/h)			**0.6V/h**	
DAYLIGHTING (Daylight autonomy % during functioning hours)			**60 %**	
			Min.	**Targeted**
SUMMER COMFORT (Overheating % of functioning period)			**10 %**	**5 %**
ACOUSTICS	Between classrooms	**Airborne** – $D_{nT,w}$ + C(dB)	**≥ 58 dB**	
		Impact – $L_{nT,w}$ + CI(dB)	**≤ 45 dB**	
	Between music laboratory and classrooms	**Airborne** – $D_{nT,w}$ + C(dB)	**≥ 63 dB**	
		Impact – $L_{nT,w}$ + CI(dB)	**≤ 40 dB**	
	Exterior noise	Level of noise coming from outside sources	**≤ 25 dB**	
SUSTAINABILITY			**EPD for all SG products**	

Saint Gobain Multi-Comfort Criteria

Participants are expected to present in their design the main strategies they have used in order to achieve Saint-Gobain Multi-Comfort Criteria.

2.5.1. Construction

The construction method (load-bearing, wood, steel construction, etc.) can be chosen freely by the participants, but the integration of ISOVER, CertainTeed and/or Izocam products as parts of the construction build-up is mandatory.

ISOVER shall provide free planning assistance in the form of:

- Construction CAD details online data base: www.isover-construction.com
    - First data base in the world containing more than 150 joint construction details, thermal bridge free for 4 different construction systems.
    - All these details have been certified by the Passive House Institute and using it assures thermal bridge free construction.
    - The access is free and the application provides: CAD drawings with different download options, components and products, key figures, isotherms, model and materials, air tightness concept.
- Air tightness website: www.isover-airtightness.com
    - All relevant information about the achieving air tightness: methods, products and solutions, concept importance.

ISOVER Construction details
Source: www.isover-construction.com

- ISOVER Designer Calculation Tool and Brochures containing literature about Multi-Comfort concept for new construction and renovation can be found at www.isover-construction.com

Further Information about the local ISOVER, CertainTeed and Izocam organization can be found on the official contest website www.isover-students.com/content/view/137/161

2.5.2. Thermal comfort

2.5.2.1 Technical parameters for energy efficiency

The following thermal criteria will be targeted:

- An annual heat demand <15kWh/m2.
- An annual cooling demand <15kWh/m2.

In order to achieve these values we recommended the following U values for the envelope components:

- All opaque external constructions U ≤ 0.15 W/m2K for compact building shape
- All opaque external constructions U ≤ 0.10 W/m2K for non-compact building shape
- Windows and doors UW total ≤ 0.8 W/m2K. The 'g' value should be chosen based on the solar heat gain evaluations taking in to account both cold and warm season.

The above mentioned values do not guarantee the achievement of the criteria. The participants have to run the MCH Designer for their projects to have a clear image of the results.

2.5.2.2 Technical parameters for protection against overheating

In order to provide a good environment the proposed target for the summer comfort is that the overheating (temperatures above 25°C) measured as % from the total period is below 10%.

In order to achieve these values students can design both passive measures (ex: sun louvers, usage of light colour for the exterior surfaces) and active measures (ventilation system with heat recovery bypass for the summer, active cooling measures).

2.5.3. Acoustic comfort - Technical parameters

Noise is extremely damaging to human health. Providing a good environment from acoustic point of view is crucial for the human wellbeing. Sleep deprivation, as a result of high levels of noise, has adverse effects on human.

The sound sources that bother annoy or disturb the most in residential functions are: road traffic and neighbours.

The participants are advices to analyse also the level of noise generated by the technical equipment (such as HVAC) and if necessary to propose solutions to reduce it (sound insulated HVAC ducts, sound absorbers installed on the ducts).

2.5.4. Indoor Air Quality

In order to provide the best conditions for the inhabitant's low levels of CO2 concentrations (maximum 1000ppm) inside the apartments should be achieved. To reach this concentration of CO2 the participants should provide a level of the ventilation rate of 30mc per hour per person.

2.5.5. Fire safety

All bearing internal and external walls have to achieve at least REI 60 according to EN standards,

The roof and ceilings have to achieve at least REI 60 according to EN standards,

All non-bearing internal walls between different functions (depending on the function) have to achieve at least EI 60 according to EN standards.

2.5.6 Natural daylight

A good level of natural light is mandatory for a good quality of life. There for in the rooms were different activities are taking place during the day (ex: kitchen) a natural daylight autonomy of 60% should be achieved. In order to achieve these levels for Brest location under standard conditions it is recommended to use a window to floor ratio of 17-19 %.

2.6. Competition requirements

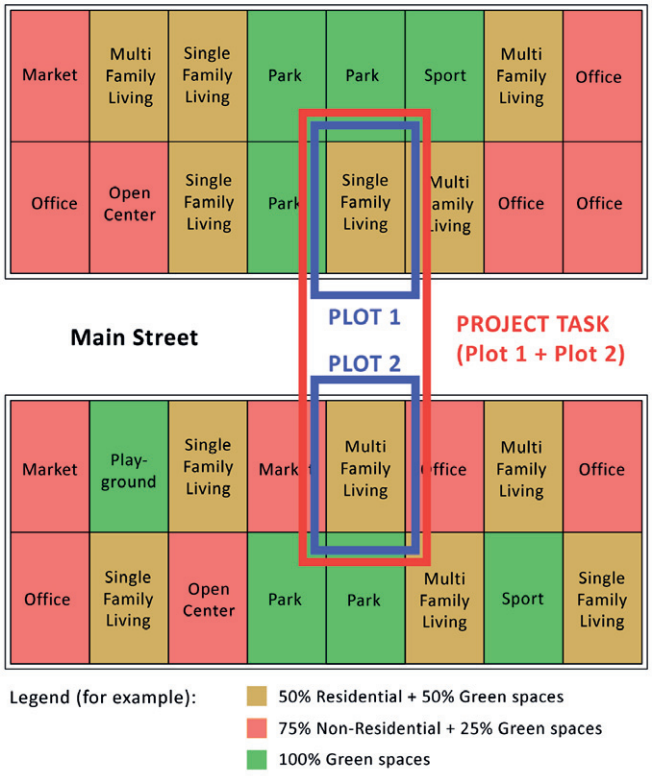
2.6.1. Minimum requirements (mandatory)

The following minimum requirements for descriptions and plans must be considered. Participants are advised to choose appropriate scales for all drawings based on the poster sizes outlined in section 3.1 and 3.2 and the participant's individual design ideas and directions to allow appropriate detail and clarity to be reviewed by the judges.

A. Master plan

- Basic (draft) schematic presentation of the general organization scheme for the two modules for the major functions. The scope of this scheme is to provide overall idea of the allocation of the main functions and their distribution. The participants can present this in the best way they see fit.

- Visualisation of the experience of living in the analysed areas: Plot 1 and Plot 2.
  - Views, perspectives and/or photographs of physical models as seen fit by the participants to better explain their project



Example: possible way to present the organization scheme

Example: possible way to present experience of living

B. Residential function - will be provided only for one building with residential function situated in Plot 1 area.

- Floor plans (suggested scale 1:100)
- Sections
  - Longitudinal section (suggested scale 1:100-1:200)
  - Cross section (suggested scale 1:50)
- Construction details:
  - Roof, external wall, partition walls, windows, ground and intermediary floors details (suggested scale 1:20 / 1:50)
  - Attention should be accorded to thermal/acoustic bridges as well as to airtightness and moisture protection
  - Other details as see fit by the participants

C. Calculations

- Will be **performed** for only one building with residential function situated in Plot1 area. The same building for which the details have been presented
- **Annual heat demand**
  - Calculation will be done using MCH Designer
  - Participants will insert a calculation overview in the project

Falling to provide the requested information above will lead to the disqualification of the project from the competition.

MCH Designer overview

D. Description of the Design Concept

Beside the minimum requirements the participants are expected to provide sufficient information to allow the jury members to analyse:

- **Design concept and functional solution**
- **Strategy to achieve thermal comfort**
  - Example: construction U values, airtightness concept, HVAC system, passive/active shading measures, cooling, etc.
- **Strategy to achieve acoustic comfort**
  - Example: Constructions Rw and Ln,w values, main measures for sound protection, etc.
- **Strategy to achieve indoor air quality**
  - Example: Proposed type of ventilation (mechanical and/or manual), ventilation blueprint, proposed solutions, etc.
- **Fire safety strategy**
  - Example: Evacuation path, separation, material fire reaction, etc.
- **Natural daylight strategy**
- **Energy supply and overall sustainable concept**

In order to explain the requirements mentioned above the participants can present: text, diagrams, calculations, drawings or information as they seem feat.

3. Formalities for submission

The following formalities have to be fulfilled for the participation in the national stage and international stage of the ISOVER Multi-Comfort House Students Contest 2016.

3.1. Formalities for submission - National Stages

The participants can register online at: www.isover-students.com. All participants registered will receive the official communications via the official online newsletter. Any participating team that fails to register or provides incomplete or false information will be disqualified from competition

The exact way in which the projects will be submitted to the national stage as well as the final local stage schedule will be decided by the respective local organizations. The recommendation is to allow a maximum number of 3 posters in 84 x120 cm format.

The contact details for the local ISOVER and Izocam organization can be found at www.isover-students.com/content/view/91/133/

3.2. Formalities for submission - Online Entry Stage

The participants can register online at: www.isover-students.com, latest by 31st December 2016, 17.00 CET. All participants registered will receive the official communications via the official online newsletter. Any participating team that fails to register or provides incomplete or false information will be disqualified from competition.

Each team participating to Online Entry Stage will submit to the organizer the following:

- A pdf document of maximum 30 pages containing the description of the Design Concept in English as better seeing fit by the authors, taking in to account the requirements from point 2.6
- The pdf export of MCH Designer calculation of their project

The documents will be uploaded on the dedicated section of www.isover-students.com. Closing date for submission of the projects is 15th January 2016, 17.00 CET. All project submitted after this date will be ignored.

3.3. Formalities for submission - International Stage

The formalities for the international stage shall be finalized by latest 9th of May 2016. Each of the participant teams shall submit to ISOVER contact person in their country the following information:

1. **Project in electronic format with the following characteristics:**

- PDF file version 9 or lower
- Resolution 300 dpi
- Dimensions of the poster 200cm x 80cm (height 200cm, width 80 cm).
- Suggested layout for the project presentation: two possible ways to present the project can be found in file: Suggested roll-up layout variants.pdf which can be found at www.isover-students.com – section Documents for submission.

Maximum number of posters that can be submitted for each team is 1 (one). The poster of each project will contain the following data:

- Team country (e.g. Austria)
- University (e.g. University of Ljubljana)
- Name of the drafter (or all names in the case of a team submission)
- National stage prize (e.g. 1st Prize)

This data will be used by the local ISOVER organization to print and prepare a roll-up display for each team for exhibition of projects during the international stage.

2. An electronic presentation of the project. The file will have the following characteristics:

- A single file - Power Point Presentation
  - Extension PPT or (PPTX). Other file types will not be accepted.
- The file name should be: Country X_Y Prize, Name1_Name2_Name 3.
  - Example: Serbia, 2nd Prize, Ilian Dragutinovici_Igor Pancic
- Maximum dimension of the file, not archived, has to be less than 20 MB.
  - All presentations bigger will be cut to required dimension.

This file will be used during the international stage for the official presentation of the project in front of the jury.

3. Individual pictures of each member of the team in tiff format, scheme CMYK, resolution 300 dpi.

4. Three tiff files containing pictures or details of the project in 300 dpi resolution:

- First picture: buildings preview (usually 3D model)
- Second picture: architectural plans (graphics, sections, drawings, models others.)
- Third picture: insulations (ideas, drawings etc.)

This data will be used for the edition of the book "ISOVER Multi-Comfort House Students Competition - Best of the Projects 2016".