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ABSTRACT

Keywords: Swimming pool, location, ice-skating, sport, object

The problem described in the diploma is a response to the needs of the people of Gdansk in terms of a sports facility. The project presents a combination of two sports, as the first facility of its kind in the Tricity metropolitan area. Extensive analyses show what need has existed for many years and where this type of facility would be appropriate. The analyses show that the dense urban tissue is not an easy solution of the problem. The project is a kind of alternative to current projects. The chosen location is only a proposal and does not contradict the location of this sports facility elsewhere. The project is one of the first buildings that combine a swimming pool and ice rink in one volume. The building, with an area of over 12,000 m², would be the answer to the lack of a year-round sports venue, primarily on ice, but would also satisfy insufficient number of swimming pools in growing city. Looking to the future, the project meets all the requirements to become the next world arena for ice hockey, curling and figure skating matches, but also for swimming competitions at international level. The creation of such a facility would certainly allow the Polish national team to achieve better sport results.

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I PART

ANALYSIS

1. Location problem for planned sport object in dense urban structure

One of the problems of the chosen topic of creating ice skating for the inhabitants of Gdansk is its location. The map below visualizing the structure of Gdansk shows a very dense urban tissue. The characteristic linear arrangement of the Tri-City created over the years has been defined, among others, by the topography; the Baltic Sea on one side and the environmentally protected Tri-City Landscape Park on the other.

In the case of locating a facility volume intended for a full-size ice rink, which is not only a place for recreation but also a sports hall, several factors should be taken into account. This type of facility should be located close to the transport infrastructure, which gives an easy access for residents and that it does not generate and require driving a car. Locating a sports object close to a transportation would not increase car traffic to a significant degree for the city. Nevertheless, the facility should have a designated parking space.

Another factor is the size of the plot, which should be at least twice the size of a full-size ice rink. In addition to the ice surface itself, the facility should include restrooms, locker rooms and a rest area or café. Studying the urban tissue, there are not a lot of squares prepared for such a large object or the shape of the plot does not correspond to the needs of the object. Therefore, one of the solutions is to locate the facility outside the city centre. However, with the possibility of good access from the centre, so that every resident will be able to get to the place. The problem of location is still open.

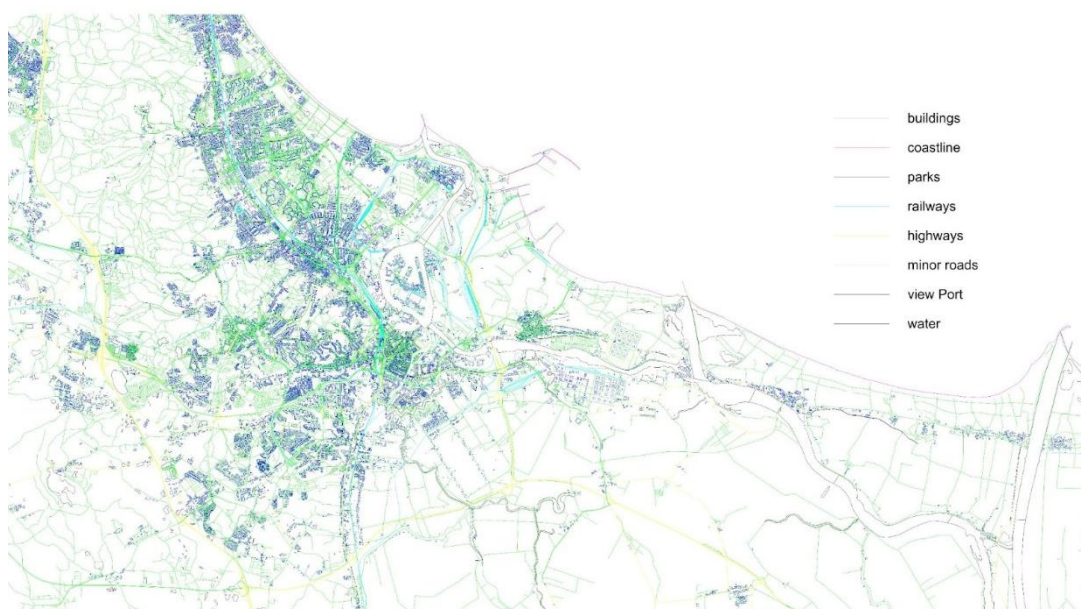


Fig. 1. The map of Gdańsk

The table below shows that Gdańsk is one of the largest and most populated cities in Poland. This brings a lot of opportunities as well as challenges and difficulties. What is also interesting and worth mentioning

is that Gdańsk in years from 2007- 2020 has the second highest population growth percentage (2,66%), after the capital Warsaw (4.92%).

Looking at the data, after the Second World War the population of Gdańsk is constantly growing. The instant city's population growth face with a variety of problems. Starting with the problems of location for living. The last years in Gdańsk have been registering the growth of interest of private investors for the big housing developments. The most interesting area is the south of Gdańsk. After the housing problem, there is another one such as transportation as well as in the private sector and public one. The higher population causes the problem of traffic on the streets and crowded public transport. According to the new housing developments have to be attached new facilities and services. In those services one of the important role fulfill sport objects. The need for this purpose from the last few years is well observed. One of the challenges for this type of facility is its location. Due to the large dimensions and volume of the building, the location must be particularly selected, not only due to the surface but also the accessibility. Meeting both conditions in such a dense urban structure is difficult to achieve, particularly when it comes to accessibility to the city centre.









Name	Voivodeship	Pop. 1 January 2021	Pop. 30 June 2020	Pop. Dec. 2007	Pop. 1999	Pop. 1970	Pop. 1960	Pop. 1950	Pop. 1900	Change 2020 - 2007
Warsaw	 Masovian	1,794,166	1,793,579	1,706,624	1,618,468	1,315,648	1,139,189	822,036	756,400	4.92%
Kraków	 Lesser Poland	779,966	780,981	766,583	740,666	583,444	481,296	343,638	120,300	1.63%
Łódź	 Łódź	672,185	677,286	753,192	806,728	762,699	709,698	620,273	351,600	-9.82%
Wrocław	 Lower Silesian	641,928	643,782	632,930	643,877	526,000	430,522	308,925	422,700	1.60%
Poznań	 Greater Poland	532,048	533,830	567,932	578,235	471,900	408,132	320,670	126,000	-5.83%
Gdańsk (part of Tricity metropolitan area)	 Pomeranian	470,805	471,525	458,717	458,988	365,600	286,940	194,633	140,600	2.66%
Szczecin	 West Pomeranian	398,255	400,990	410,811	416,988	338,000	269,318	178,907	210,700	-2.17%
Bydgoszcz	 Kuyavian-Pomeranian	344,091	346,739	361,222	386,855	282,200	232,007	162,524	52,200	-3.61%

Fig. 2. List of cities and towns in Poland

2. Analysis of ice skatings with the polish background

According to the earlier analysis of population in Poland, Gdańsk is the second city with the highest growth of population in the country. The list above shows the proportions between the cities. For instance; the observation of Toruń shows that the city has more ice skatings than Gdańsk, even though Toruń has a lower population. The Capital Warsaw with the highest population and percentage of growth has the highest number of ice skating. Comparing the number of ice skatings (4) in the metropoly with 933.000-1.500.000 inhabitants to Warsaw with 1.794.000 inhabitants and number of ice skatings 18, the observation shows that there is a disproportion between the cities. This is one of the reasons why Gdańsk needs a sport object like ice skating. From the whole range of ice skating in Gdańsk, one is the temporary tent in the "Plac Zebrań Ludowych". The ice skating is used by the citizens only half of the year. There is a lack of the facilities such as toilets, proper cloakroom and possible cafe or place for rest.

Another problem is the size of the ice-skating, which can not be expanded because of the dimensions of the tent. The second ice-skating is located in Oliwia Hall, this sport object is intended for the sport competitions as well as for the inhabitants. This gives a limited time of use for the citizens and tourists. The sport object also has problems with time of use associated with the season. The Oliwia's Hall gives a possibility of use only between October and March. Even in this period during the working days there is not a chance to use the ice skatings for inhabitants, because of school purposes and regular training. This gives another reason why there is a need for ice skating in Gdańsk destined for the users.

The list of ice skatings in the cities below

City	amount	amount of habitants (x1000)
Gdańsk	2	470
Gdynia	1	245
Trójmiasto (metropoly)	4	933 do 1500
Toruń	5	198
Bydgoszcz	2	344
Wejherowo	1	50
Warszawa	18	1794

Fig. 3. Table showing the amount of ice skating and habitants in chosen cities in Poland

3. Analysis of Ice skatings in Pomeranian Voivodship



According to the map of the Pomeranian area, it can be realised that for this bigger region four ice skatings might not be enough. Comparing with another polish regions (listed above), that are even less inhabited, such a fact can be observed. Blue dots represent ice skatings in temporary halls, which are rather removed for summer season. The only one-year around ice-skating (orange dot) is Oliwia's Hall, for such a big region the only one sport object does meet expectations of inhabitants. Green dots represent propositions for ice skatings that may appear in future. The one in Gdynia has been already designed-investment in Gdynia-shipyard and Investment in south of Gdansk-Ujescisko which are described below.

Fig. 4. The map of Pomeranian Region

4. Analysis of Zoning Plan possible location Case Study of Zoning Plan in Gdańsk shipyard.

One of the possible locations for the planned Sport object is the Gdańsk Shipyard plot number 004-U51 in the Zoning Plan nr 1128. The proper name for this Zoning Plan is Nowe Miasto-Stocznia, Plac Solidarności. The total of the area is 1.9 ha. In restrictions the purpose for this area should be the public use services-primary education services. The principles of land development and land management are: 40 % of greenery, maximum height of the building 30 m, the form of the roof and building - free. The principles for the communication and technical infrastructure are that:

- water supply: from the water supply system,
- municipal sewage disposal: to the sanitary sewage system,
- rainwater drainage: to rainwater drainage, power supply: from the power supply network,
- gas supply: from a gas network,
- heat supply: from the heating network or low-emission local sources,
- waste management: after segregation, disposal at the municipal landfill

Principles of protection of cultural heritage, monuments, cultural landscape and modern culture goods. part of the area is located within the archaeological protection zone, earthworks require archaeological supervision. All investments require an approval of the proper conservation officer for the concept of the land development and the study of the landscape silhouette from the water side, taking into account the exposition and view corridors towards the historic buildings complex of Gdansk. The plot is empty and does not have an object with heritage or cultural values. In case of creating car parking must be the proportion of one tree per one parking place. In the principles for the public space there should be an isolating belt introduced with a width of at least 20m from the northern boundary of the site in the form of multi-bunk greenery. There shall be a ban on location of free-standing advertisement panels.

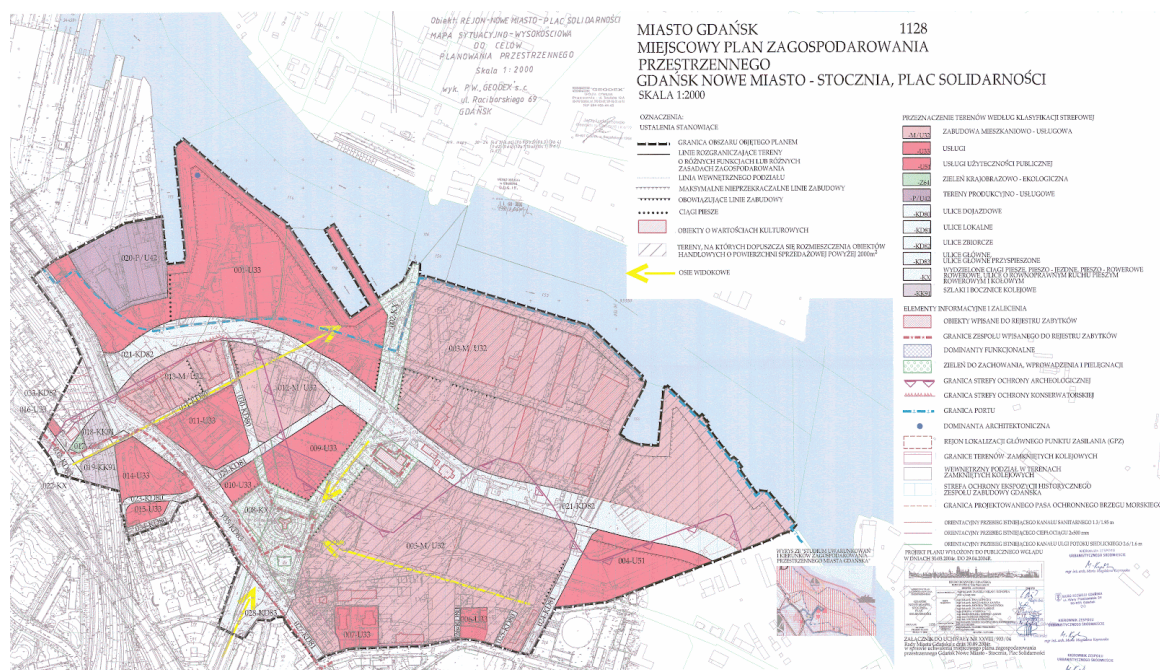


Fig.5. Zoning Plan of Historical City

5. Case Study of Zoning Plan in Brzeźno

There is another possible location for the sport object. The proposed area is described in details in the Zoning Plan nr 0304 with the plot nr 006 P/U41. The total surface has 9,76 ha. Plan was created in 29.06.2006 year. The plot is located between Gdańska and Uczniowska street in Brzeźno. Currently, this area is mainly undeveloped, and overgrown with grassy vegetation areas of the former Zaspasewage treatment farm. In the area there are small facilities such as motorization services. The general purpose for this plot is production and service development area. The maximum percentage of the building area is 50%. The minimum biologically active surface must be 20%. The maximum parameter for building density is 1.5. The detailed building parameters are; maximum height is 12 meters, the shape of the building and shape of the roof is free. The road accessibility: from Gdańska Street - 002-KD81, Uczniowska Street - outside the limits of the plan. There is new planned collective road Nowa Gdańska Street - 022-KD82 - at the intersection entrance shown in the drawing of the plan. This road is planned directly to the possible plot 006 P/U41. Designing the roads, squares and path must be usage of materials that prevent infiltration of contaminated rainwater into the ground.

Below the Zoning Plan 0304 there is an attachment to the existing version. There are drawn boundaries of the planned proposal for this area. The new version was published in 29.10.2020 and there is still in progress. In the analysis to the plan preparation is written that establishing the plan's purpose and defining how it will be developed, toward allowing residential and commercial development on the post industrial area. The purpose of urban planners for creating a new version is to allow for densification and intensification of building in great communicated areas in Gdańsk. Moreover plan arrangements will allow to create new quality of public space and transportation nodes. Furthermore, the aim is to adjust the decisions to the existing functional and spatial conditions and to the current economic and legal situation.

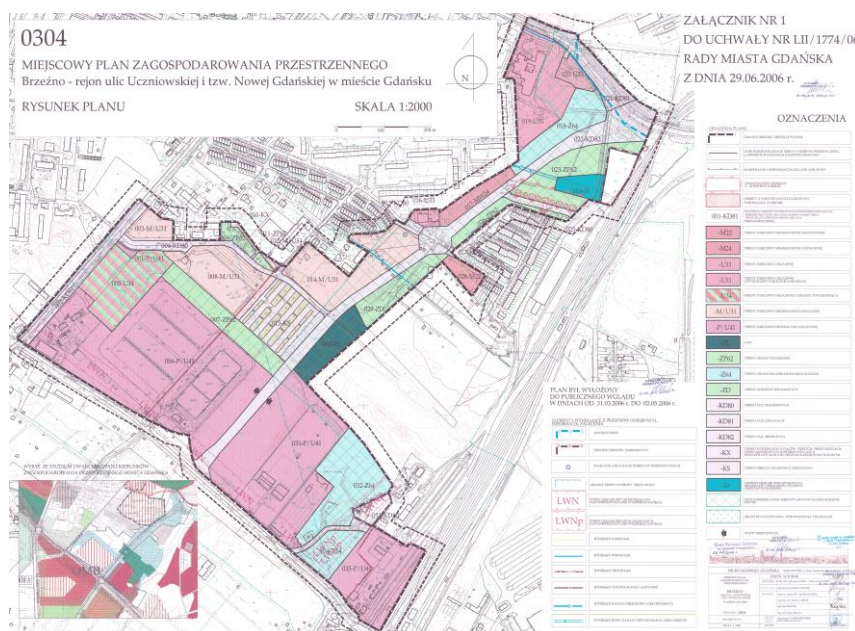


Fig. 6. Zoning Plan in Brzeźno, Gdańska and Uczniowska Street

Conclusions

Analysis of the amount of ice skating shows that there is a proven need for such an object in the Tri-city. Gdańsk has very densified urban tissue and other factors must be considered. The observed locations in Gdańsk which are given in the article have both, as well advantages as disadvantages. The plot in Shipyard might be too small (1.9 ha) for the ice skating. The other problem which would appear at the beginning is that the plot is in the shape of triangle and the plot is partly under conservation protection. The purpose for the plot are public use services-primary education services, which gives an open doubt about the ice skating on that area. In comparison the plot in Brzeźno is bigger (9,76 ha), additionally there are other roads and transportation nodes taken into the Zoning Plan. The purpose for the plot is production and service development area, which sport object as ice skating fit in. The existing public transport is working close to the area. In comparison maximum height of the building in the Shipyard plot is 30 m, but in Brzeźno is 12 m. In this case, Sport object would better fit with higher parameters. Summarising both plots have potential for the ice skating.

6. Planned investments in Tricity

The result of the chosen problem is the proven need for an ice rink, which has been planned for the last several years. The lack of the ice skating in Tricity has been observed also by the local governance. In the last few years the mayors of Gdynia and Gdańsk have been planning such an investment.

6.1. Investment in Gdansk-Ujeścisko

The centre of Gdansk as a dense urban tissue caused residential development move to south of the city. This area is not included in the critical flood zone. Recent years have shown a significant increase in the development in this direction. In addition, Gdansk South has been expanding its transport and technical infrastructure for several years. A new tramline and tram loop have been provided. The new investment proposed in Gdansk Ujeścisko is to be located by the tram loop. The area has been developed with new schools, internal and collective roads and also more extensive network of grocery stores and service facilities. Those reasons prove why municipality decided for the ice skating in this location.



Fig. 7 Visualization of the new sport object in Ujeścisko, author: Dyrekcja Rozbudowy Miasta Gdańska

On the 6th October 2022 the contract for preparing project documentation for the first stage of the ice skating was signed. The project will be designed by "TBI Architekci" architecture studio. The sport object will be three storeys building and its area will be over two thousand square meters. The ice skating stands are to accommodate three hundred people, and the curling rink one hundred fifteen. The design work for the first stage is to last twelve months, which is until October 2022. In the first stage will be realised the construction of a recreational ice skating with locker rooms, considering the requirements of Stage III. In the second stage will be realised the swimming pool hall. The third stage will be built the ice skating for trainings with additional sport facilities, such as gym or fitness studio. In this step the conference hall with tribunes will be constructed above the locker rooms completed in the first stage. The last phase will include construction of a curling hall with a tribunes for one hundred and fifteen people, with its own changing rooms and catering facilities, as well as rooms for clubs and sports unions. In addition, the project includes the development of greenery and other elements of the investment area. In the surroundings of the ice skating, among others, slopes, embankments, retaining walls and forty parking lots will be created. The cost of the whole investment, including the plan development, building and interior will be financed from the budget of the Municipality of Gdansk.

6.2. Investment in Gdynia- Shipyard

Local authorities in Gdynia have been planning the investment in the dense urban structure for the last few years. The future object will be located among the main road Morska 75. The location has easy and fast access to the Gdynia Shipyard fast city train stop. The railroad provides fast transport for the inhabitants of the entire Tricity. In case of a public sports facility, the aspect of public transport is very important.

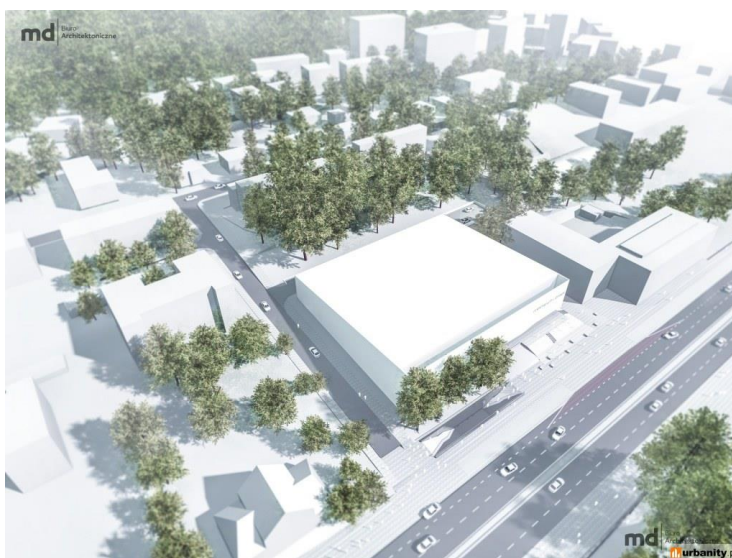


Fig. 8. Visualization of the planned ice skating in Gdynia, author: MD architecture office

The building would be also located close to the complex of gastronomic and hotel school and in the near surrounding of the Gdynia Maritime University. Building was designed by architects from MD architecture studio. An object would be a year-round ice rink with a full-size surface measuring thirty x sixty meters and tribunes that can accommodate tree hundred viewers. The main function of the object is the sport and recreation, the additional provided will be trading and services. The tree storey building will have changing rooms, skate rental and restaurant. In the area has been planned thirty-one parking lots for the visitors of the object. The sport object in the winter will be an ice-skating but in the summer roller skating. This solution will avoid wasting energy in the summer that would have to be used to cool

the ice rink hall. This same situation will allow you to maintain a similar temperature in the winter, during cooler temperatures outside. This solution is very smart and ergonomic.

According to the local governance information on 22.11.2017 the object was to be partly funded by the Ministry of Sport and Tourism. The city has already received a permission for the construction of the ice rink and completed the redevelopment of the heating network at the investment site. The ice skating should have been finished in 2019, but unfortunately today's status is still announced as "approved". Probably the financial and legal situation so far did not enabled the implementation of the investment to date.

7. Examples of ice skatings

7.1. Ice skating in Gdańsk-Oliwa

7.1.1. History
The beginning of establishment is close to the sport club in Shipyard of Gdansk. The Gdansk sport club "Stocznowiec" initiated the idea of creating such an object, which started be a great opportunity for training the winter sports. In 1961 has been made a decision of building the sport object.



Fig. 9. Photo of Olivia's Hall

The competition for the project was announced and the final design was won by engineer Stanisław Kus and architects Maciej Krasiński and Maciej Gintowt. The idea for the shape of the building is to resemble a ship overcoming sea waves. The construction started in 1966, tree years later in the winter 1969 was commissioned an open ice skating, among the volume of the emerging closed hall. In 1970, without audience has been played the first match. In 1972 16th of December the official opening has taken place. One of the most important events for Olivia's Hall is the first National Congress of the Solidarity Trade Union in 1981. In the period 1995-2000 the Hall was modernized. After the risk of roof collapse in 2007, this part of the hall was also renovated. In 2014 the interior of the bigger hall was renewed, two years later there has been a renovation of the glass façade, north façade and installed the light illumination, those renovations changed the whole appearance and quality of the whole sport object.

7.1.2. Meaning in the city

Olivia's Hall is one of the most recognizable sport object in Poland. It was the first ice skating in the Pomeranian Area. It is situated in Oliwa district in very close neighbourhood of Olivia Business Centre. On the north elevation of the Hall are visible the emblems; GKS "Stoczniowiec", logo of Association of Shipbuilding Industry, Grand Coat of Arms of the City of Gdansk, name of the hall. In the last decades there have been organised the not only local but also international events. Olivia's Hall is a very important sport object in Gdansk city, because there is one and only indoor ice skating in whole Tricity. Beyond the plans that are in the process of the ice skating in Gdynia on Morska Street or in Gdansk Ujeścisko, for today this is the only one object functioning round-year for training and sport clubs. Situation is different for the inhabitants who can use the ice rink only during the winter season, which last approximately five months. The sport object is full during the winter season and for the developing Tricity, especially Gdansk, from the last few years starts to be not enough. This brings a need in the city for another ice skating, possibly with extension of another function like swimming pool.

7.1.3. Function of the object

The sport Hall consists of two full size indoor ice rinks, which in total have 5060 square meters. There is also folded floor, that is used for the cultural events or pitch for matches. In the biggest hall can be organised event for 4500 people. This gives a lot of opportunities for the city and inhabitants. Apart from the ice rink, Olivia has also restaurant and hotel. The users of the sport object can enjoy figure skating, ice-hockey, short track, synchronized skating, curling. According to the cooperation with schools and universities, among others with Primary and Middle School Complex nr 17 with sports classes, XXI Sport Secondary School and Academy of Sport, there is possibility to learn and train the winter sports. In the Olivia's Hall there are skating and field hockey schools for both boys and girls, which are in high demand.

7.2. Lentpark in Cologne-Germany



Fig. 10. Interior of Lentpark in Cologne

7.2.1. History

Since 1909 there had been discussions and talks about building an artificial ice rink that could be used in both summer and winter seasons. In the 1930s the German company Linde AG presented ice blocks that could provide a technique for cooling ice and heating other spaces. In 1936 Linde company bought a property in the street (from German) Lentstraße and built a modern at those times multifunctional building. It became a sensation at that time, the building had an indoor swimming pool and two ice rinks. The pool water was used to create ice in the winter. In addition to the swimming pool and ice rink, a bicycle track, saunas and a tennis court were built there. The ice rink on Lenstraße hosted in the 1955 Olympic Games in ice hockey, and in later years the figure skating championships. Due to several modifications of the building and the long years of age of the structure and its defects, the building was in danger of collapsing. As a result, it was demolished in 2008. Year after, the construction of new building started. A new object was finished and officially opened in 2012. In reference to the historic building in the new, current ice skating remains with approximate dimensions of the ice rink and its orientation from the previous one. The name of the new building is Lentpark, which relates to the name of the street.

7.2.2. Meaning in the city

Lentpark is the only one object in Cologne that has both swimming and ice skating possibilities. Since 1930, the former facility had great importance for recreation and sports, continuation of Lentpark has taken over its role. The placement of the new building on the site of the previous one has hardened the roots and memory of this place. Residents have become accustomed to the sports function on Lent Straße, so the facility met their expectations. As it is the only facility of its kind in the entire city, it is extremely popular, not only for professional skaters and hockey players, but also for residents.

7.2.3. Function of the object

The shape of the plan's building resembles the rounded triangle. Those shapes are also placed as a small architecture in its surrounding, e.g. benches, the symbols of the plan in the lift. The building was designed by the Schultz Architekten company. The total area is 12 900 square meters, which includes both cool and warm spaces. The building is designed with green technology, for example the wasted energy from machines which is used for cooling an ice is given to warm up the swimming pool and saunas spaces. Additionally green technology solutions; designers thought about external steel panels on façade, which change the angle according to the sun route. In this case, they can catch the sun for swimming pool areas and in the same time with changing the angle of panels, it can protect from the sunrays in the ice rink areas. On the northern side is placed a 1800 square meters ice skating which is mainly used for training of the sport clubs, ice-hockey matches or figure skating events. On the southside there are placed swimming pool areas. This solution makes the building more energy efficient. The restaurant, saunas and lockers are placed in the middle of the structure. The most spectacular designed area is the 260 meters long and 8 meters wide ice rink loop, which is placed among the building. This space is used by everyone. While skating, from the second level, the full dimensions ice skating and swimming pools are visible. This solution makes the building very unique.

Lentpark was announced by the European Union Green Building program as the first ice sport objects in Europe due to the building's energy efficiency and its innovative solutions. In 2013 Schultz Architekten received the bronze IOC/IAKS Award in the Category D, which is the international architecture competition for sport and leisure facilities.

7.3. Torbyd in Bydgoszcz



Fig. 11. Photo of the Torbyd object at night

7.3.1. History

In the 1950's started discussions about building another closed ice-skating, in that time in Poland there was only one built in Silesia. Cities have started applying to get funds from the central budget to build an indoor ice rink. In 1959, the competition was won by a city Toruń, but Bydgoszcz also wanted to build their own investment, thankfully to social funds and cooperation with the Meat Factory, the construction of an indoor ice rink began. The only possible large area that would have access to ice reserves from the cold storage facilities of the Meat Factory was the square in Moniuszki Street. Mobilization and enthusiasm of Bydgoszcz citizens caused the finishing of construction of the ice rink a few days faster than in Toruń. Due to the record time of construction (9 months), building after years revealed many defects; leaking roof, breaking down lighting, narrow width of the rink and tribunes located several hundred meters from the ice surface. All these factors resulted in modernization of the rink and resignation from cooperation with the meat factory. In 1975, the own engine room and a new full-size rink were built and the facility gained a completely new quality of use.

In 2003, the collapse of the sports club resulted in the closing of the Torbyd object and the cancellation of its functions. Since 2006 city had been considering building a new hall for the rink and finally in 2016 the property of the old Torbyd was sold to a development company. The old facility was demolished and a housing development was built on the site. In the same year, construction of the modern Torbyd iceskating began, but in a different location: Central Park. Since 2017 modern object has been functioning for sports clubs and inhabitants.

7.3.2. Meaning in the city

Torbyd Ice skating in Bydgoszcz is a very important object not only for sport clubs but mostly for inhabitants. The ice skating is open all year round, so inhabitants can enjoy the facilities regardless the weather conditions. The history of Torbyd makes the residents feel sentimental about this object, even though nowadays it is located in a new plot and the building was built completely from the ground. The rink is close to city centre with easy access to public transportation. The construction of the new object has allowed the figure skating and field hockey teams to train. Residents appreciate the indoor locker rooms facilities, as well as the restaurant overlooking the ice surface. From this perspective, parents can watch their children learning to skate. The tribunes with a capacity of 300 seats allow for watching matches, events and performances. The construction of a modern facility provides many opportunities to train and educate athletes, which will contribute to improving the performance of the Polish national team and at the Olympic Games.

7.3.3. Function of the object

The main function of the facility is sports and recreation. The architectural project was designed by TBi Architects company, the construction project was made by Alstal building company. The building, apart from full-size ice rink with dimensions of 30 x 60 m, is provided with locker rooms, equipment rental, restaurant, sanitary facilities. The total area is 4605 square meters, and the height of the building is eleven meters. The exterior form resembles ice crystal, the facades are covered with silver panels and glass. At night, the building is illuminated, making the ice form even more visible. According to the ice rink were created tribunes which can take tree hundred people during the ice-hockey matches of figure skating events.

8. Winter sports, history and development till nowadays

8.1. Figure skating

Skating in general is one of the oldest sports. The first references to skates made from animal bones date back to the Bronze Age, found in Scandinavia. The main factor behind the invention of ice skates was the climate. Southern Finland has the highest concentration of lakes in the world. Among other reasons, skates have historically been a good transportation across frozen lakes and rivers. This encouraged the development of trade and the populating of new areas. Such solutions saved energy, which is very useful during sub-zero temperatures. Southern Finland has the highest concentration of lakes in the world. Among other reasons, skates have historically been a good means of transportation across frozen lakes and rivers. This encouraged the development of trade and the populating of new areas. Such a means of transportation saved energy, which is very useful during sub-zero temperatures.

The Schweizerisches Turnund Sportmuseum in Basel has some of the oldest skates in the world dating back to 4000 BC. The reference to skates also applies to Poland. In the settlement of Biskupin a specimen from the 6th century BC was found, which is now preserved in the Museum of Sport and Tourism in Warsaw. In the 14th century, skates were upgraded with steel blades, with a wooden boot

base. Commonly, this type of invention began to be used in England and Scotland in the 16th century. Although still skating at that time was treated as the main way of transportation, it has started to be treated as a sport. Skates began to evolve to accommodate technical skating, the blade was shortened. In the 18th century ice skating became a recreation at the royal courts.

Figure skating that is known today was invented by the American Jackson Heines in 1860s. The innovative idea of American was to perform on ice while dancing with a music. It is said that his performances were charismatic and entertained people, but not in United States. This is the reason why he had to move to Europe. He left his family in America in order to develop new sport discipline. He met the approval in Scandinavia, Russia and mostly in Austria. Because of the popularity of Waltz in Vienna at that time, he incorporated this type of music to his dancing on ice, which met with big success. Later on, the skating schools were created and figure skating typical for Jackson is called Viennese. At the end of the 19th century, figure skating was recognized as a sport. In 1863, the first sport on ice appeared in Norway-speed skating, which consists of completing a certain number of laps in the shortest time than the competitors. In 1892, the International Skating Union was founded, 4 years later the first world championships were held, in which soloists participated. In 1908, pair figure skating made its first appearance as a sport at the summer Olympics. In 1951, the last sport added to the Olympic Games was ice dancing. Currently very popular in the United States, the sport of synchronized skating has not yet been added to the Olympic Games.

8.1.1. Meaning of sport facility in the figure skating

Rule of rink dimensions. The International Skating Union prefers the top level competitions to be played on Olympic size rinks. According to the ISU rule no. 342 the ice rink for competitions organized by the ISU should be 30m x 60m. Factors affecting ice quality are water quality, temperature and usage. The ice surface in order to be the best possible quality should be at a temperature between minus 5.5 and minus 3.5 degrees. To ensure fair conditions for the players the ice should be cleaned every two groups.

In recent decades the technology in sports has improved a lot. This is observed both in the progress of skates, video analysis and even artificial intelligence. Not every sports facility in Poland provides such technology. Poland still lacks full-sized, year-round ice rinks for both training and recreational one. Good quality of ice would allow grinding techniques and winter sports. It would significantly increase the chances for further victories in the Olympic Games. Due to the lack of popularization of the sport, there is a small fraction of people interested in skating training and, consequently, in wanting to participate in competitions. Creating a new architecture that would encourage new users would help popularize skating, field hockey, curling, and also link further sports.

8.2. Ice hockey- History

The origins of field hockey date back to the 15th century. The sport originated in England or France, as evidenced by the 1494 old painting The Altar of St. Crispin and St. Crispiniana. Another Dutch painting from 1565 painted by Pieter Bruegel is Hunters in the Snow. Canada is officially considered the birthplace of field hockey. The game was invented in 1855 in Ontario by English soldiers. Due to the lack of other winter sports and the suitable climate in Canada, field hockey seemed the most interesting alternative. Ontario's regions are rich in numerous water reservoirs, which frozen in winter, created ideal conditions for field hockey. On March 3, 1875, the first ever field hockey game was played in Montreal. In 1877, students systematized the rules of the game, and a few years later a field hockey league was formed. The sport became popular in Europe in the early 20th century, the first official field hockey game was played in 1910 and in 1924 it was included in the Olympic Games. In Europe, field hockey was known at first in Germany, Belgium, Switzerland and the Czech Republic, came to Poland in the interwar period. The first national game was played in 1927.

8.2.2. Equipment and ice rink

In order to set up a good condition for playing ice-hockey, among others, must be provided good equipment. In the past, players used stones and wooden sticks. Since players use a hard puck and sticks, the sport can cause many injuries. Protection is very important. Today, a protective helmet, shoulder pads, hand pads, mouth guards and special pants are recommended equipment for a hockey player. Another factor is a quality of ice and dimensions of ice rink. The international Ice Hockey Federation accept 61 meters length and 30 m width ice rink. Gates on the ice must be 183 cm wide and 122 cm high. In case of other size, referees may refuse to allow the gate to be used in the match and replacement with a gate of proper size will be necessary. The edges of ice field are the arc of circle in the distance 7-8.5 meters. The ice hockey field is marked with red and blue lines which describe position of the players and separate the field on three parts. In the middle of the rink is marked one red line, which means the starting point on every match and after every goal. Red lines are also located on the edges, on the end of the field. The gates are placed on these lines at the appropriate places. The whole field is divided into three areas (parts) by two blue lines. In the middle is the natural zone, and on the sides are the offensive zone and the defensive zone. The zones are called thirds because they have equal length.

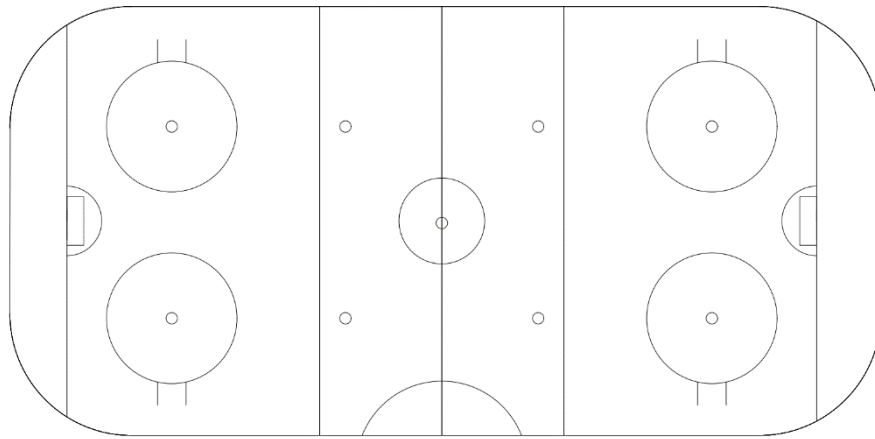


Fig. 12. Ice hockey field accepted by International Ice hockey Federation

8.3. Curling-history

The first note about throwing the stones on ice was marked in Scotland in the late Middle Ages. The description of competition about such a game was found in 1511 in Renfrew (Scotland). The climate allowed for practicing winter sport every season. Painters were inspired by curling.



Fig. 13. Winter Landscape with Ice skaters and Bird trap, painted by Pieter Bruegel from 1565

One of the evidence about this game is shown on the painting shortly known as “Winter Landscape” illustrating Dutch people throwing stones on ice. At the beginning it were flat stones found in the bottom of lakes which were not processed. The stones were not identical, so victory depended more on luck than on the skills of the players. The first championships had taken place in Falkirk and Edinburgh in 1959, which nowadays is known as “Goblet of Scotland”.

II PART

CONCEPT DESIGN

1. INTRODUCTION AND AIM OF STUDY

The aim of the project is the concept of multifunctioning sport object in Brzeźno district in Gdańsk on the plot nr 515/2, 515/3, 515/5.

The main idea of the project was to create a building and its closest neighbourhood that will provide access for residents to a year-round sports facility, which will include a swimming pool and ice rink. The facility was located in Gdańsk's Brzeźno district on Uczniowska Street. The site previously functioned as a sewage treatment plant, which has been removed. The project includes an architectural part in the concept phase and an urban part showing a sample proposal. The first stage of the project was to carry out analyses that shaped the current state of the site.

The analyses showed that there is a need for a sports facility that meets the current expectations of the residents and also encourages sports not only on a seasonal basis, but also throughout the year. With the proper place to train, the Polish national team in both ice and water sports would have a better chance of achieving better results not only in local competitions but also in the international arena.

2. ANALYSIS OF THE SITUATION

2.1. Existing Land Development

The project area includes three plots of land with the numbers: 515/2, 515/3, 515/5. The plot of land with no. 515/2 intended for the project is mainly undeveloped as of the current state. There are remains of the former sewage treatment plant on the plot, such as a slab road, which is relatively easy to remove. The remains of the tanks have been removed. The land is flat. The altitudes range from 3.4 m a.s.l. to 2.2 m a.s.l. Plot No. 513/5 has access to Uczniowska Street from the south-west, from which access is possible to the plot on which the facility has been directly designed. In the main plot nr 515/2 no development is possible on this plot due to the high voltage line located there, which excludes any development. Such a provision has also been included in the Local Area Plan. Plot No. 513/2 on which the park is proposed has direct access to Gdanska Street from the west. These plots have connections.

2.2. Analysis of the sport objects near to the chosen region

2.2.1. Swimming Pools

- 1- Swimming pool in Przymorze, Street Jagiellońska 14
- 2- Swimming pool in Przymorze, Street President Lech Kaczyński 35
- 3- Swimming pool in Zaspa, Street Pilotów 7
- 4- Swimming pool in Wrzeszcz, Street Wajdeloty 12
- 5- Swimming pool in Letnica, Street Mikołaja Reja 25



Fig. 14. Map of Gdańsk with selected swimming pools

The map above shows the number of swimming pools in the neighbourhood of the Brzeźno district. The blue border indicates the project area. The map includes the districts of Gdańsk - Przymorze, Zaspa, Wrzeszcz and Letnica. These are neighbouring districts of Brzeźno. As realised there is no public swimming pool in the Brzeźno district. Therefore, the idea of combining the functions of an ice rink and a swimming pool seemed simple and rational. This would attract both the residents of Gdansk and the whole of the Tricity. Multi-functional facilities are a more compact solution in the urban fabric and more efficient. Because the designed facility is year-round, the site itself and the neighbourhood would gain in value. The existing transport infrastructure is well developed, which emphasises the advantages of the site. Recently, the area has seen a proliferation of multi-family housing as well as services. A sports facility combining the functions of swimming and skating would certainly improve the quality of life for the residents of the Brzeźno district and the entire city of Gdańsk. It would be an innovative facility combining many interests. Most of the public swimming pools listed on the map above are pools located in educational institutions. This is the case for most of the Tricity. The designed sports facility is a stand-alone facility, which provides opportunities for a wider range of uses, both for professional training and use for entertainment. The building housing the ice rink as well as the swimming pool provides for the possibility of organising sports competitions. In Gdansk, there are certainly more swimming pools than ice rinks, but many of them are located in schools, so access to them is limited - children's school activities are the first priority. The newly designed facility would be available most of the time to individual users, but also to professional swimmers.

2.2.2. Ice skatings



Fig. 15. Map of Gdańsk with exististing and possible ice skatings

The map above shows ice rinks in the closest neighbourhood. The map covers the entire area of Gdansk. The green dot shows the ice rink planned for Gdańsk South-Ujeścisko. This decision by the city confirms that this facility is particularly needed in Gdansk. The investment is described above. The blue dot shows the ice rink at Plac Zebran Ludowych. This is a temporary, or so-called seasonal rink. The rink is built in a temporary balloon, which is only inflated in winter. In the summer, the site hosts concerts and local events, both student and international concerts. Therefore, it is not possible to speak of the ice rink as a sports facility here, but only as a temporary facility. In fact, at the moment there is only one year-round ice rink not only in Gdańsk, but in the entire metropolis. This is the rink in Olivia's Hall, the building is described above. The project that has been developed is marked with a red boundary. This map, shows the varied locations of the ice rinks, at relatively equally distanced locations from each other. It shows that the locations of the ice rinks have been selected after deeper analysis in the most crucial and needed parts in Gdansk. The location of the plot in Brzeźno is a proposal for the construction of a new sports facility and it does not detract in any way from the location of the newly planned investment in Gdańsk Ujeścisko.

2.3. Analysis of communication

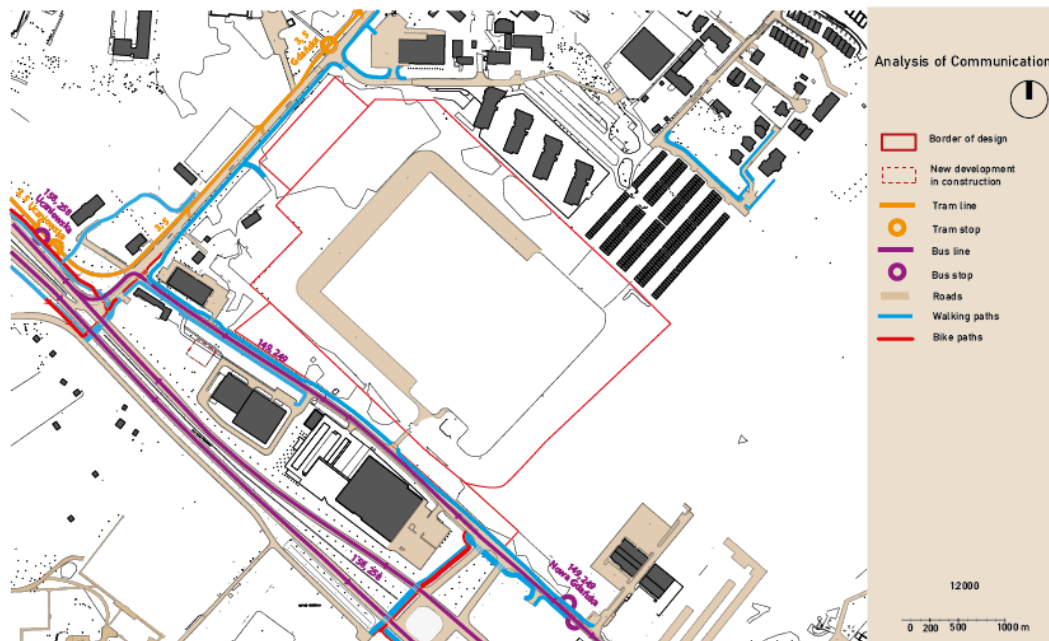


Fig. 16. Map showing existing communication in the designed area

The analysis presents access to the plot by public transport. One of the ways to get there is going with tram lines number 3 and 5. It is reachable from the centre of Wrzeszcz in a dozen or so minutes by getting off at the Uczniowska or Gdańska tram stop. The second way is to get to the site from the centre of Gdańsk by bus, lines 158 and 258, getting off at Uczniowska bus stop. The closest bus stop available is "Nowa Gdańska". Bus lines 149 and 249 arrive there. Near the project area, footpaths and cycle paths have been upgraded. In addition to access by public transport, it is of course also possible to get there by car or coach. After analysing the communication at a scale of 1:2000, it is easy to see that the plots that have been selected for the new development make up a large part of the map and can be accessed from several bus stops. This shows the scale of the extensive area. The varied and upgraded transport infrastructure offers many possibilities for land use. This is evidenced by the newly developed investments in the neighbourhood of the plot. The idea to develop the plot with a sports facility was rationally undertaken due to the good access and the size of the plot (9.7ha). The previously mentioned temporary slab roadway is visible on the selected plot. This is a leftover from the existing infrastructure at the former sewage treatment plant. Beyond this, the site is flat and easily accessible by public transportation.

2.4. Synthesis of Analysis

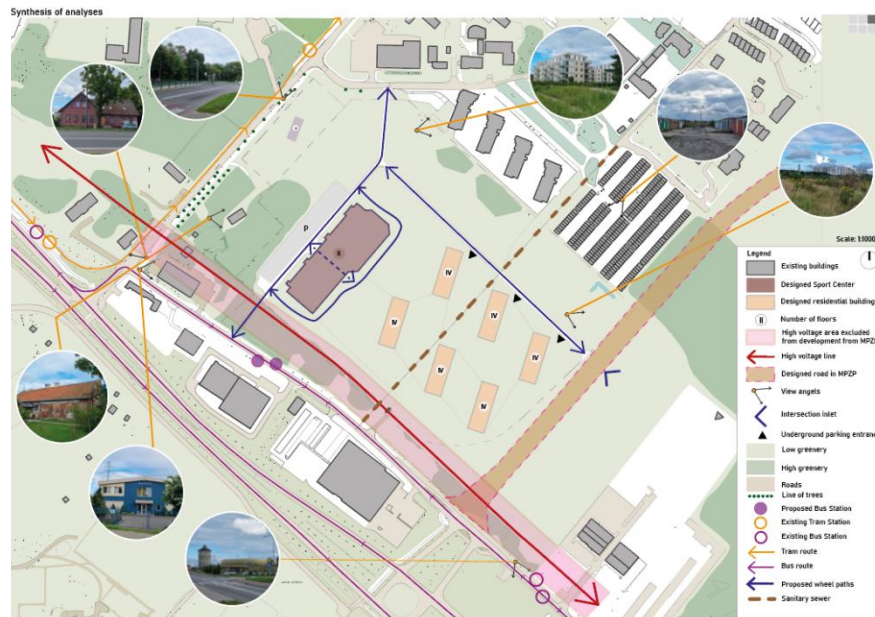


Fig. 17. Map showing synthesis of earlier prepared analysis

The map is the transition between the analyses and the land and development plan. It has been prepared at a scale of 1:1000, which is the scale between the analytical part and the site plan. Among other things, the map shows the public transport lines; the tram line and the path of the buses, the previously mentioned line numbers and the names of the stops. Purple dots have been used to mark the proposed bus line stop so that the facility is as easily accessible to users as possible. This proposal would encourage an environmentally friendly approach and abandon the use of the private car. The synthesis shows the main view angles and landmark locations in close proximity to the site. These include the historic water tower visible against the background of the PGE Arena stadium. These are some of the dominant heights and volumes relevant to the project. On the northern side of the designed site is the new Invest Komfort development, which is under construction. The blue lines show the proposed access and roads on the plot. Among other things, a road has been designed whose intersection inlet is in accordance with the Local Area Plan. It connects to the north-south road shown in brown colour. This is also a proposal from the Local Area Plan, which is perfectly legitimate; its route would improve the traffic flow in the northern part of the district by reaching Uczniowska Street. The main access road for the proposed sports facility is the road that goes from Uczniowska Street in a northern direction, it is not a blank street as it connects in the northern part with Gdańska Street. This would be an excellent crossing also for the residents of the settlements in the northern part of the map. An important approach in the project is to keep the streets open and walkable rather than closed. As the site is very large it had to be urbanised very well, together with a communication design that would facilitate access not only to the sports facility but also to the plot itself. Six low-rise buildings have been proposed on the plot. The idea is that these would be four-storey, multi-family buildings. They would be accessed from a newly designed road, the entrances to the underground garages have been marked with black triangles. Entrances to the buildings would also be located on the north and east sides. This

section has only been developed in the urban planning concept and is not part of the architectural design. It has been proposed as a future densification of the city and to show that the current location of the sports facility, even though it is a large-scale facility, does not deprive the space for a future housing development. The sanitary sewer, which is an important connection of the plot, has been marked with a thick, dotted line. Its relocation is not easy therefore it is an assumption from the Local Area Plan, newly designed buildings have been designed to avoid the cost of a possible relocation of this sewer. Another, probably one of the most important elements in shaping the urban concept of the new development is the area of the high voltage line. This is an area excluded from development, for which reason the sports facility had to be placed deep within the plot and an access road to the facility had to be designed.

2.5. Guidelines from Local Area Plan

The chosen plot is described in details in the Zoning Plan nr 0304 with the plot nr 006 P/U41.

The total surface has 9,76 ha.

The Master's Degree is some discussion or proposal with new elements for the existing Local Area Plan. The design proposals that will be made have justification and may prove to be an assistance in the future to view the area and its use in a different way.

The general purpose for this plot is production and service development area. This parameter has been The maximum percentage of the building area is 50%. The percentage of the building area for this design is 17%, which is less than the assumption.

The minimum biologically active surface must be 20%, in this project this percentage is 83%, which means that apart from the sport object and roads, nothing have been taken into account. It means that there is a place for future development and still the biologically active surface would be fulfilled.

The maximum parameter for building density is 1.5, in this project is 0,13 (taking into account only sport object).

The detailed building parameters are; maximum height is 12 meters. This parameter wasn't complied because is exceeded with 12,68 meters high. This parameter is slightly higher because of the type of the building and proper design of the construction which needs its high.

The shape of the building and shape of the roof is free.

The road accessibility: from Gdańska Street - 002-KD81, Uczniowska Street - outside the limits of the plan. This rule hasn't been accepted, because road does not meet expectations. Area near to Gdańska street is designed as park with café, so the road for cars wouldn't be a proper decision. There is possible access, it has been designed footpath as well as for people and bicycles.

There is new planned collective road Nowa Gdańska Street - 022-KD82 - at the intersection entrance shown in the drawing of the plan. This road is planned directly to the possible plot 006 P/U41. This rule has been fulfilled which is shown in the synthesis of analysis.

Parking indexes are established for the calculation of the parking space requirements of the development for cars. For arena and sports halls, stadiums: per 100 seats a minimum of 16 parking spaces plus 0.3 parking spaces for a bus. For swimming pools, gyms or small sports and leisure

facilities, a minimum index of 10 parking spaces per 100 m² of floor area has been set. As the entire sports facility is both a gymnasium and a swimming pool, both ratios must be matched. In this project these have been met as parking spaces are provided; 3 coach parking spaces, 3 disabled spaces and 126 spaces for cars.

Załącznik do uchwały Nr XXIX/732/20

Rady Miasta Gdańska

z dnia 29 października 2020 r.

**Granice obszaru objętego projektem miejscowego planu zagospodarowania
przestrzennego Brzeźno rejon ulic Uczniowskiej i Gdańskiej
w mieście Gdańsku**

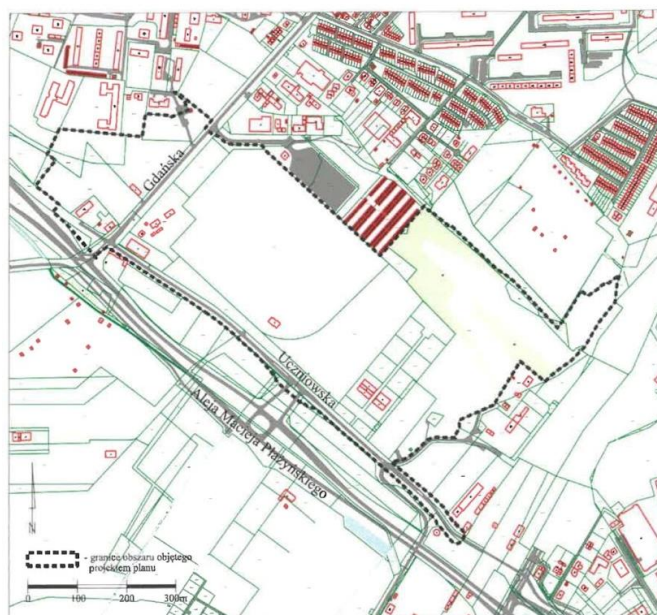


Fig.18.Boundaries of the new proposition for Zoning Plan in the region Uczniowska and Gdańska Street in Gdańsk

Below the Zoning Plan 0304 there is an attachment to the existing version. There are drawn boundaries of the planned proposal for this area. The new version was published in 29.10.2020 and there is still in progress. In the analysis to the plan preparation is written that establishing the plan's purpose and defining how it will be developed, toward allowing residential and commercial development on the post industrial area. The purpose of urban planners for creating a new version is to allow for densification and intensification of building in great communicated areas in Gdańsk. Moreover plan arrangements will allow to create new quality of public space and transportation nodes. Furthermore, the aim is to adjust the decisions to the existing functional and spatial conditions and to the current economic and legal situation.

3. MASTERPLAN AND MAIN ASSUMPTIONS OF THE DESIGN

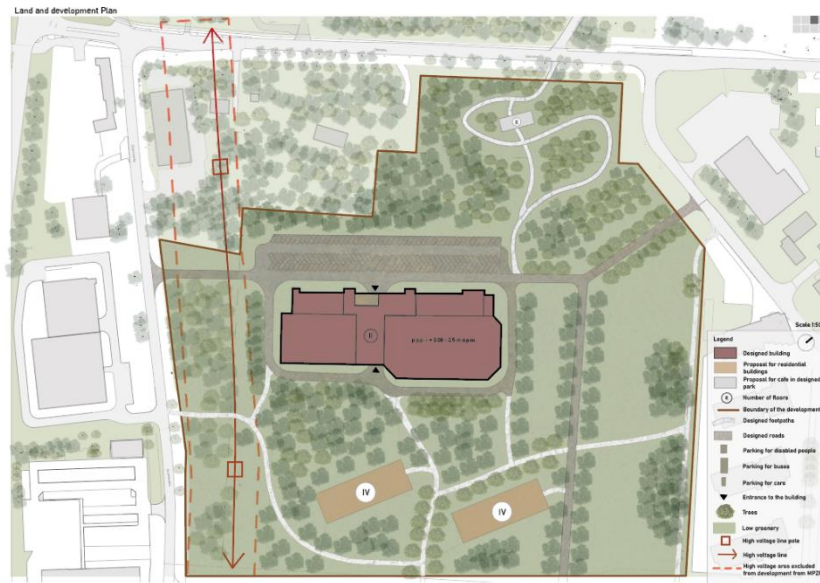


Fig. 19. Land and development Plan

The overall concept is to create a sports facility located along Uczniowska Street, to which an access road has been designed. The road is also the path of the fire services. A fragment of multi-family development is visible on the lower part of the plot. The four-storey development can be seen in point 2.4 Synthesis of analyses. There is also access to the building from Gdańska Street on the north side. The entire site is landscaped with plenty of greenery, the establishment of which was also a principle in the Local Area Plan. The number of parking spaces is 132, including 3 spaces for buses, 3 spaces for disabled people and 126 spaces for cars. The red dotted line marks the area excluded from the development, under which the access road to the facility and the pedestrian path have been designed. The centre of the assumption is the ice rink and swimming pool building, while the whole assumption is a combination of a sports facility with a proposal for a multi-family residential area and a park. On the side of Gdańska Street, a pedestrian route was designed together with high greenery and a small café. The park would provide a meeting place for both residents and users of the sports facility. The access road is also located under the building, this is also a possible passage for the fire brigade. The road for the fire brigade has been designed around the building so that every part is accessible. It is also a good solution for the exit of coaches. The building has two entrances; one to the pool and one to the ice rink, and two accesses; one from the car park and one from the west. The building has been positioned in the most sufficient way possible, as the ice rink is on the north-east side and the swimming pool on the south side. With this arrangement, the pool will draw heat to warm the room and the rink will not get too hot. Three footpaths filled with water-absorbing material have been drained from the circular road. These are alternative routes into the further part of the site and access to the proposed buildings. Due to the past function of the site; sewage treatment farm; the site is highly wet and has a high groundwater level. The response to this issue is a high percentage of active biological area: 83%. This ratio will ensure that water will have an outlet and not overflow outside the plot. The proposal of an estate among greenery is also a peaceful retreat not far from the sea.

3.1. General data

- Function- public building
- Name of development: Multifunctioning sport object with swimming pool and ice skating
- Address of the development: Gdańsk, Uczniowska Street
- Registry nr of plan: 0304
- Card: 006-P/U41, 005-U34, 022-KD82
- Field: Architecture

3.2. Data figures:

- Building area: 5947 m²
- Plot area: 99 634 m²
- Biologically active surface area: 82 990m²
- Road surface area: 1 013m²
- Total building area: 12 481,66m²
- Building height: 12,68 m

3.3. Vehicle and pedestrian traffic

On the plot there are provided two accesses; an entrance from the south side- Uczniowska Street and an entrance from the north side- Gdańska Street. The entrances are located on one road that runs along the building. It is possible to go around the whole building and to drive under the building in the central part. The road is 6 m wide and is a fire road. Three footpaths extend from this road from the eastern side. These paths lead to areas of the multi-family buildings developed in the urban design. The pedestrian routes are 2.5 m wide, with water-absorbing surfaces used and designed to facilitate crossings of the plot and access to the most important development elements located on the plot.

3.4. Public spaces and greenery

The public space is a park located in the north-western part of the plot. The area has been landscaped with an orderly high level of greenery and the creation of paths-passages to facilitate access to the sport facility. In the middle of the park, a two-storey café is proposed, developed in the urban development. It is a proposal for an additional park function.

The public spaces on the plot also include a green recreational space with paths in the western part of the plot, which leads to the multi-family buildings.

4. USAGE PROGRAMME OF THE OBJECT

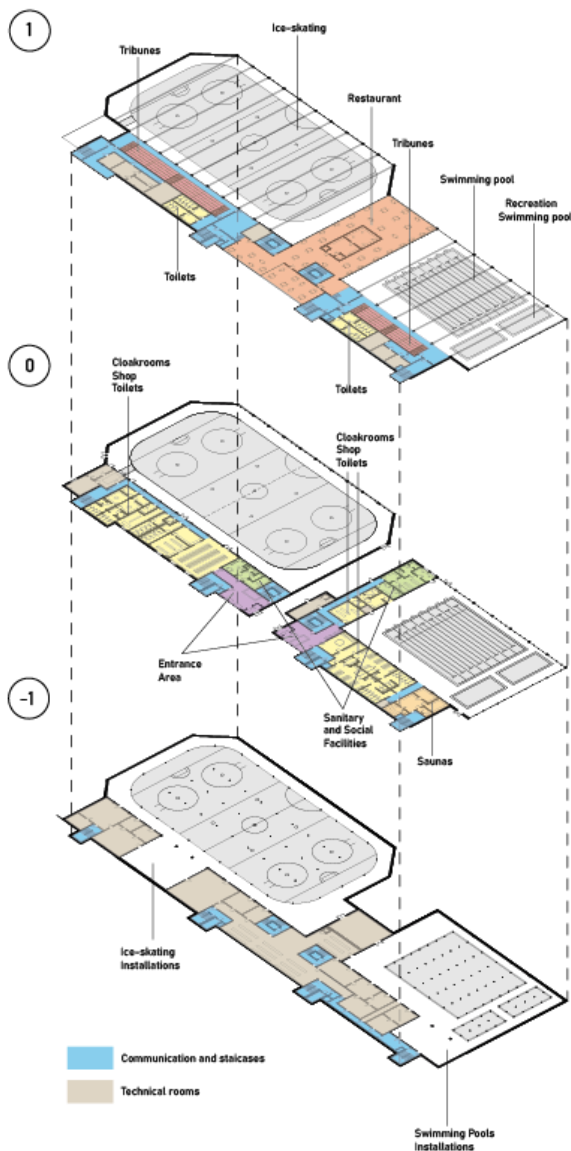


Fig.20. Funtional scheme of the building

Level 1

On the first floor, tribunes have been designed. The swimming pool tribunes were designed with 120 seats and the ice rink tribunes with 240 seats. The space behind the tribunes has been designed for toilets and technical rooms. The building is connected by a cafeteria, which has been designed half a metre higher than the tribunes. Due to fire brigade access, the height had to be raised to 4.5 metres. From the café it is possible to watch both the ice rink match and the pool competition. It is an element that combines both functions. It is possible to move from this area to the pool as well as the ice rink.

Level -1

The underground level mainly contains technical rooms, service rooms for the pool and ice rink installations. The space underneath the pool and ice rink provides structural support for these functions. Around the pools and the ice rink in the basement, space has been allocated for installations. In the central part, there are installations for processing the heat generated from making the ice, to transfer the energy to heat the water in the pools. There are also storage facilities, fan rooms, electrical switchgear and cold rooms.

Level 0

The building has been divided into a pool volume and an ice rink volume. As the swimming pool and the ice rink have different functional needs, this building has been divided into two linked parts.

There is a separate entrance and reception area for each facility. Each part of the building has been equipped with changing rooms and sanitary and social facilities. The swimming pool facilities include saunas, a shop and a changing room for the disabled people. The ice rink has been additionally equipped with a sharpening room and skate rental. In addition to the common changing rooms, changing rooms for the players have also been designed.

4.1. Architectural design

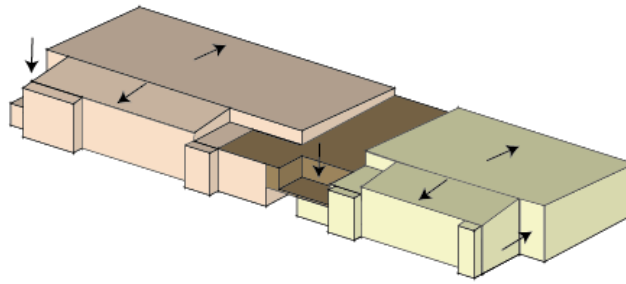


Fig. 21. Solid scheme of the building

The first step was to locate the largest functions of the building: the ice rink and swimming pools. At first a single large swimming pool measuring 25 m x 20 m was designed. The pool can be divided into eight lanes, each 250 cm wide. Later, due to the available space on the plot, two additional smaller pools measuring 6x12 m each were designed. The size of the ice rink is 31x60 m. Due to the need for space for both the swimming pool and the ice rink, the idea was to separate them into two volumes. However not the whole object has been divided. They are connected by a common underground and first floor, where is located the café. This is a common area for users of the entire facility. Parents or other users can spend time together there or watch the ice and pool situation at the same time. It is also great as a waiting area for parents whose children enjoy different sports. For example, a curling or hockey match and a swimming competition can be watched at the same time. In addition to the café, the main observation area are tribunes, separately for the pool and the ice rink; the space behind the tribunes has been used for technical rooms and toilets. By separating the bodies of the ice rink and swimming pool, a separate service area for each facility has been designed. The changing rooms for the ice rink have completely different needs to the changing rooms for the swimming pool. For this reason, two buildings have been created to serve the entire facility. The positioning of the blocks is not accidental, the ice rink has been designed on the north side so that it does not heat up too much. On the south side, the pool block covers the ice rink. This solution reduces the pool's heating and cooling costs, as this is regulated by its position in relation to the world's sides.

4.2. List of rooms

UNDERGROUND		
NUMBER	FUNTION	SURFACE
0.01	INSTALLATIONS OF SWIMMING POOL	1436.77 m ²
0.02	STAIRCASE	21.04 m ²
0.03	HALL	23.37 m ²
0.04	HALL	33.19 m ²
0.05	VENTILLATION ROOM	30.13 m ²
0.06	TECHNICAL ROOM	31.30 m ²
0.07	ELECTRICITY ROOM	38.94 m ²
0.08	TECHNICAL ROOM	23.45 m ²
0.09	TECHNICAL ROOM	34.82 m ²
0.10	TECHNICAL ROOM	50.82 m ²
0.11	WAREHOUSE	355.43 m ²
0.12	STAIRCASE	27.09 m ²
0.13	LIFT	10.07 m ²
0.14	TECHNICAL ROOM	3.49 m ²
0.15	LIFT	4.23 m ²
0.16	STAIRCASE	26.49 m ²
0.17	LIFT	4.22 m ²
0.18	STAIRCASE	25.82 m ²
0.19	CONVERSION AREA	108.92 m ²
0.20	MAGAZINE'S LIFT	2.00 m ²
0.21	VENTILLATION ROOM	34.93 m ²
0.22	STAIRCASE	29.75 m ²
0.23	LIFT	9.08 m ²
0.24	CONDESER ROOM	138.04 m ²
0.25	REFRIGARATION INSTALLATIONS	2734.48 m ²
0.26	COMPRESSOR ROOM	76.15 m ²
0.27	TECHNICAL ROOM	22.21 m ²
0.28	TECHNICAL ROOM	17.29 m ²
0.29	REFRIGARATION INSTALLATIONS	73.92 m ²
0.30	STAIRCASE	23.99 m ²
0.31	TECHNICAL ROOM	18.97 m ²
0.32	ELECTRICITY ROOM	23.53 m ²
SUM:		5493,93 m ²

GROUND FLOOR		
NUMBER	FUNTION	SURFACE
1.01	STAIRCASE	29.63 m ²
1.02	RECEPTION FOR ICE SKATING	80.67 m ²
1.03	CLOAKROOM FOR EMPLOYESS	15.87 m ²
1.04	UTILITY ROOM	4.74 m ²
1.05	HALL FOR EMPLOYEES	9.90 m ²
1.06	SOCIAL ROOM	19.90 m ²
1.07	BATHROOM FOR EMPLOYEES	4.27 m ²
1.08	WIND HALL	8.82 m ²
1.09	STAIRCASE	25.82 m ²
1.10	LIFT	4.22 m ²
1.11	CLOAKROOM FOR EMPLOYESS	126.27 m ²
1.12	HALL	49.11 m ²
1.13	SHARPENING ROOM	26.15 m ²
1.14	RENTAL SHOP	43.25 m ²
1.15	RESTROOM FOR DISABLED PEOPLE	5.06 m ²
1.16	WOMEN'S PLUGHOLES	11.76 m ²
1.17	WOMEN'S TOILETS	11.40 m ²
1.18	MEN'S TOILETS	11.08 m ²
1.19	MEN'S PLUGHOLES	11.31 m ²
1.20	SHOP FOR ICE SKATING VISITORS	35.42 m ²
1.21	TRAINER'S ROOM	9.06 m ²
1.22	CLOAKROOM FOR ICE SKATING TEAM 1	9.13 m ²
1.23	CLOAKROOM FOR ICE SKATING TEAM 2	8.71 m ²
1.24	CLOAKROOM 2 FOR ICE SKATING TEAM 2	17.51 m ²
1.25	CLOAKROOM 2 FOR ICE SKATING TEAM 1	18.34 m ²
1.26	BATHROOM FOR TEAM 1	3.35 m ²
1.31	PLUGHOLES FOR TEAM 1	5.82 m ²
1.32	TOILETS FOR TEAM 1	8.58 m ²
1.33	PLUGHOLES FOR TEAM 2	5.53 m ²
1.34	TOILETS FOR TEAM 2	8.19 m ²
1.35	BATHROOM FOR TEAM 2	3.21 m ²
1.36	STAIRCASE	30.74 m ²
1.37	ICE MACHINE ROOM	24.80 m ²
1.38	TECHNICAL ROOM	29.27 m ²
1.39	TECHNICAL ROOM	14.67 m ²
1.40	ICE SKATING HALL	2456.85 m ²
1.41	WAREHOUSE	31.60 m ²
1.42	MAGAZINE'S LIFT	2.00 m ²
1.43	WIND HALL	8.34 m ²
1.50	RECEPTION FOR SWIMMING POOL	77.44 m ²
1.51	HALL	42.25 m ²
1.52	SHOP FOR SWIMMING POOL' VISITORS	36.25 m ²
1.53	UTILITY ROOM	4.84 m ²
1.54	TOILET FOR DISABLED PEOPLE	8.55 m ²
1.55	CLOAKROOM FOR DISABLED PEOPLE	24.32 m ²

1.56	BATHROOM FOR DISABLED PEOPLE	8.57 m ²
1.57	SOCIAL ROOM	18.83 m ²
1.58	SINGLE CLOAKROOM FOR EMPLOYEES	4.00 m ²
1.59	CLOAKROOM FOR EMPLOYEES	26.98 m ²
1.60	HALL FOR EMPLOYEES	10.48 m ²
1.61	BATHROOM FOR EMPLOYEES	9.75 m ²
1.62	OFFICE FOR TRAINERS	14.09 m ²
1.63	TOILET FOR EMPLOYEES	3.96 m ²
1.64	SWIMMING POOL HALL AREA	594.08 m ²
1.65	SPORT'S SWIMMING POOL	546.00 m ²
1.66	RECREATION SWIMMING POOL	72.00 m ²
1.67	RECREATION SWIMMING POOL	72.00 m ²
1.68	STAIRCASE	27.72 m ²
1.69	TOILET	7.64 m ²
1.70	WET SUNA	16.30 m ²
1.71	SAUNA'S HALL	28.21 m ²
1.72	DRY SAUNA	15.83 m ²
1.73	WET SUNA	16.40 m ²
1.74	UTILITY ROOM	5.05 m ²
1.75	HALL	19.27 m ²
1.76	MEN'S SHOWERS	17.37 m ²
1.77	TOILETS	5.96 m ²
1.78	TOILETS	5.96 m ²
1.79	WOMEN'S SHOWERS	17.33 m ²
1.80	MEN'S CLOAKROOM	54.12 m ²
1.81	WOMEN'S CLOAKROOM	55.08 m ²
1.82	FAMILY CLOAKROOM	6.76 m ²
1.83	DRYING ROOM	26.16 m ²
1.84	CLOAKROOM	38.40 m ²
1.85	STAIRCASE	27.32 m ²
1.86	LIFT	4.22m ²
1.87	STAIRCASE	25.82m ²
1.88	LIFT	7.31m ²
1.89	LIFT	7.31m ²
SUM:		5493,93 m ²

FIRST FLOOR		
NUMBER	FUNTION	SURFACE
2.01	STAIRCASE	35.61 m ²
2.02	TECHNICAL ROOM	15.55 m ²
2.03	TECHNICAL ROOM	18.14 m ²
2.04	TECHNICAL ROOM	25.83 m ²
2.05	MEN'S TOILETS	12.97 m ²
2.06	WOMEN'S TOILETS	7.98 m ²
2.07	MEN'S PLUGHOLES	11.41 m ²
2.08	WOMEN'S PLUGHOLES	11.95 m ²
2.09	HALL	6.52 m ²
2.10	HALL	8.69 m ²
2.11	HALL FOR EMPLOYEES	13.92 m ²
2.12	TRIBUNES AREA	174.85 m ²
2.13	STAIRCASE	42.56 m ²
2.14	HALL	19.03 m ²
2.15	CAFE AREA	574.66 m ²
2.16	TERRASE	97.73 m ²
2.17	KITCHEN	33.91 m ²
2.18	CAFE PREPARATION AREA	36.23 m ²
2.19	TOILET FOR EMPLOYEES	3.45 m ²
2.20	TECHNICAL ROOM	23.99 m ²
2.21	HALL	58.89 m ²
2.22	STAIRCASE	29.69 m ²
2.23	TECHNICAL ROOM	5.40 m ²
2.24	HALL	17.13 m ²
2.25	MEN'S PLUGHOLES	11.61 m ²
2.26	MEN'S TOILETS	12.18 m ²
2.27	WOMEN'S PLUGHOLES	11.81 m ²
2.28	WOMEN'S TOILETS	7.98 m ²
2.29	TECHNICAL ROOM	38.36 m ²
2.30	TECHNICAL ROOM	14.41 m ²
2.31	TECHNICAL ROOM	13.24 m ²
2.32	HALL	59.89 m ²
2.33	TECHNICAL ROOM	24.56 m ²
2.34	TECHNICAL ROOM	19.57 m ²
2.35	STAIRCASE	31.04 m ²
2.36	TRIBUNES AREA	216.71 m ²
SUM:		1747,45 m ²
SUM TOTAL AREA : 12481,66 m ²		

Conclusions:

The project is the answer for insufficient quantity of ice-rinks and swimming pools in the city. The architecture would encourage people to practise sports. The object presents variety of the sports such as: figure skating, hockey, curling and many more. Additionally the second part of the building has its proposition as professional swimming or recreational one. Combining the two facilities into one represents one of the first solutions of its kind in Poland. Both parts have multiple sports to offer, therefore it can be called as multifunctioning sport object in Tricity metropolis or Poland.

5. CONSTRUCTION OF THE BUILDING

5.1. Structural system

The main system is reinforced concrete. It has been made as monolithic structure. The structural system is column and slab system. The construction of the bigger coverings; over the ice rink, swimming pool and tribunes has been made from glued timber trusses.

5.3. Load capacity assumptions for the structure

Permanent loads:

-have been assumed in accordance with PN-82/B-02001

Variable loads:

- technological

- restaurant/café - 3 kN/m² according to PN-82/B-02003 28
- office spaces - 2 kN/m² according to PN-82/B-02003
- communication spaces - 4kN/m² according to PN-82/B-02003
- tribunes- 4kN/m² according to PN-82/B-02003
- cloakrooms- 4kN/m² according to PN-82/B-02003

-environmental

- from snow - zone III according to PN-EN 1991-1-3
- from wind - zone II according to PN-EN 1991-1-4

5.4. Construction solutions

The building is designed as a free-standing building with no connection to other existing buildings. It has 1 underground storey and 2 above-ground storeys. Due to the high level of groundwater and the previous use of the land, the building was founded on a 60 cm thick foundation slab using white bathtub technology. The external and internal structural walls were made as 20 cm thick reinforced concrete. The floor above the swimming pool is supported by an arch truss made of glulam. The truss span is 290 x 10 cm and the height is 322 cm. The trusses are supported on 50 cm x 50 cm reinforced concrete columns. The ceiling above the ice rink is also supported by an arch truss made of glulam. The span of

the truss is 370 x 10 cm and the height is 386 cm. The trusses are supported on 50 cm x 50 cm reinforced concrete columns. In the tribune section of both the ice rink and pool building, the same type of truss with a span of 210 x 6 cm was used. The truss was made of glued laminated timber and is faced with the trusses above the pool and the ice rink.

The stairs are prefabricated. The lintels are designed as prefabricated lintels.

Partition walls are made of 12 cm thick Silka blocks. The cladding for the installation of utility shafts is made of 12 cm thick Silka blocks. The lift shafts are a 20 cm thick reinforced concrete wall separated from the building structure.

The structure in the underground supporting the rink and pool slab is supported on 20 x 20 cm reinforced concrete columns. The slab of the ice rink and pools is made of reinforced concrete and is 20 cm thick.

6. INSTALLATIONS

6.1. Electrical installation

The building will be connected to the city's electricity grid and will be equipped with an electrical installation. A technical room - electrical distributor is designed in underground.

The electrical installations will be distributed around the building in the shafts and in the ceiling void. Access has been provided to the shafts for inspection. The building also has a lightning protection system.

6.2. Fire installation

The building is equipped with a Fire Alarm System. Fire detectors have been installed in the rooms along with a public address system. The central control panel is located in the technical area in underground. The staircases are equipped with a smoke detection system. On the top floors above the staircases there are smoke vents measuring 100 cm x 150 cm.

The fire installation also has smoke detectors, an alarm button, a drive for the doors.

The automatic fire extinguishing system is located in an accessible and visible location, e.g. at the main entrance to the building, staircases, communication - corridors, halls.

6.3. Ventilation installation

The building was equipped with mechanical ventilation. Air handling units are located in the underground for the removal of used air from the machines. The ducts run through the shafts, where they extend into the ceiling void on each floor. The intake and exhaust vents are located on ground close to the north facade.

6.4. Sanitary sewage system

The building is connected to the sanitary system network. In the sanitary shafts are installed sewage pipes. Sewer vents are located on the roof.

6.5. Hot and cold water installations

The building was connected to hot and cold water from the municipal network. In the technical room in underground the connection was installed. Hot and cold water run in the sanitary shafts.

7. FAÇADE MATERIALS



Fig. 22. Northern-eastern facade

The body of the pool on the east and south elevations is glazed, the glass façade is held up by glulam profiles due to the humid conditions in the pool. The pool facades have been purposely kept very open due to the design of the pool on the south-east side, the pool will draw as much light as possible through the glass facades to heat the building. The swimming pool façade on the west-front side is covered with a cement-lime plaster in the colour as shown on the façade drawings - light blue - and an irregular arrangement of vertical cladding in blue colour. The colour is intended to resemble water and ice, common to both functions of the building, and its irregularity is intended to recall movement and the spirit of sport. The facades on the ice rink side are decidedly more closed, with only vertical windows that let in daylight but do not heat the building too much. Irregular cladding has been used between the windows to resemble hanging icicles of ice. The staircases have been glazed to break up the closed facades on the entrance side.

8. ACCESSIBILITY OF THE BUILDING FOR DISABLED PEOPLE

The building has been adapted for use for people with disabilities. The entrances to the ice rink and pool building are at ground level, with no stairs or steps. The entrance doors have been fitted with sensors for self-opening. Three disabled parking spaces have been provided along the access road. The building has been equipped with lifts with an appropriate size and it is possible to access each level of the building by lift. Cloakrooms and bathrooms for the disabled have been provided, with a manoeuvring area with a wheel diameter of 150 cm. Clear graphic signs are used in the lift and in the halls to find the rooms and Braille's alphabet for people who are blind or have low vision. Doors have no steps. The corridors are at least 150 cm wide. The building has been equipped with sound systems to provide voice announcements.

9. FIRE PROTECTION CONDITIONS

Technical parameters:

Fire category: ZL I

Height category: SW (between 12m and 25 m)

Fire protection class: B

Distance to the surrounded buildings:

The main building is a self standing object. The nearest house is located 85m from the west side. The distance of the building from the fire road has been maintained (5-15 m) and there are no permanent landscaping or trees between this wall and the road. The road under the building is minimum 4 meters wide and has 4,5 meters to the ceiling slab.

Conditions in case of evacuation:

The building has six staircases that allow evacuation, there are distanced more than 5 meters from each other. In rooms designed to accommodate more than 50 people at the same time, two emergency exits are designed at least 5 metres apart. In the designed building the escape routes are equipped with emergency lighting. The width of corridors is min. 1,4m. All doors openings open into the escape route and are equipped with self-closing devices. The building elements comply with the following fire resistance requirements:

R 120 - main load-bearing structure

R 30 - roof structure

REI 60 - external wall

EI 30 - internal wall

RE 30 - roof covering

10. RULES AND CONDITIONS OF WORK

Permanent work is assumed in the building for:

- 2 employees at the reception
- 1 employee for skate sharpening
- 2 employees for skate rental
- 5 employees cleaning the building
- 3 cafeteria attendants
- 2 employees for shop service
- 3 ice rink attendants
- 3 lifeguards and swimming coaches
- 1 person to operate the outdoor changing room at the swimming pool
- 1 person to operate the roller skating rink

The proposed facility provides space for staff and has designed social and sanitary facilities for those working in the pool, ice rink and café areas.

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