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WATERFRONT STUDENT CENTRE IN KRAKOW

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1. INTRODUCTION

“Waterfront revitalization is one of the most interesting phenomena of urban renewal of the last decades, bringing ‘cities on water’ around the world to a new leadership. [...] port and fluvial cities can be considered laboratories for the process of urban renewal in terms of residential [areas], transports, public spaces and quality of the environment”¹.

In the past, riverfronts in Krakow were mostly used as ports, locations for industrial plants or military facilities, as a result they were poorly developed. Now, they are actually abandoned and dilapidated.

Recently, Krakow hosted the International Biennale of Architecture which was oriented to the attempt of establishing connections between the city and the Vistula River. Equally important, according to the statistics, Krakow is considered a student city because of the high number of Polish and international students attending Krakow universities (151,000 students for 771,069 residents)². These aspects will be developed in the framework of this Master’s thesis with the intention of providing a new urban development to the abandoned area.

The study proposal will be focused on the elaboration of the new outlook of the Vistula River waterfront. It will be carried out on the terrain situated behind the building ‘C’ of the Andrzej Frycz Modrzewski Krakow University (AFMKU) closed to the old industrial port which will also be redeveloped. At that place, an ecological student centre will be provided. It will be opened to the public with formal living conditions and functions for both Polish and international students. At the same time, it will generate multifunctional inclusive spaces, community oriented, encouraging social interactions in view of attempting to find a balance between the riverfront and the new building.

To follow the trend of developing river waterfronts in cities, the area selected for the project should be developed in an inspiring way to face social and community problems. It must be vibrant, full of life, where different kinds of common urban scenarios such as casual gatherings, mini-lectures, outdoor theater seating etc. are possible to make people welcome and comfortable. The goal is to create a place that has a strong sense of community, a comfortable image and setting, a place where plenty of activities may be done and which have multiple uses.

As the nature must be taken into consideration during the development of a new building, the project will be designed according to the ecological regulations. It means that the project should be environmentally friendly, sustainable with a very low Carbon Footprint.

¹ Giovinazzi O. & Moretti M., *Port Cities and Urban Waterfront: Transformations and Opportunities*, TeMaLab Journal of Mobility, Land Use and Environment, 3, 2010, pp. 57–64.

² Knight F., *Krakow in numbers 2018*, Departments of the City of Krakow, Municipal Organizational Units, Statistical Office in Krakow, Krakow Technology Park sp. o.o., Krakow 2019.

The purpose of the project is to develop and propose a composition which will be the juxtaposition of a new green building, the Vistula River and its waterfronts.

2. REVIVAL OF WATERFRONT IN URBAN PLANNING

2.1. Genesis of waterfront redevelopment

Since the beginning of civilisation, rivers have occupied a crucial place in the development of towns, villages and cities. “The world’s major civilisations were developed along rivers”³. At the earlier times, rivers were used by the inhabitants as a reliable source of water for both drinking and farming and, on the other hand, for fishing and transportation of goods. The first great civilisations, such as those in Mesopotamia and Egypt, all grew up in river valleys. The name given to that civilisation, Mesopotamia, means "between rivers". The Nile valley in Egypt had been home to agricultural settlements as early as 5500 BC. The third one grew up along the Indus River around 2600 BC. The fourth great river civilisation emerged around 1700 BC along the Yellow River in China^{4,5}.

For centuries, cities have been organised along rivers. They were used not only for agricultural purposes but also for other needs of inhabitants. River cities have a personal and sometimes a complex relationship with the water; it is not considered a limit of the city, but its extension.

Due to the industrial development, that relationship was interrupted, and cities began expanding into the opposite direction (to the mainland). In addition, access to the riverfronts was completely blocked because of industrial structures and facilities⁶.

Towards the beginning of the 21st century, the ‘industrial city’ image and structure started to change rapidly, thus “cities where large urban areas have first become obsolete and then been abandoned can be defined ‘post-industrial’ cities”⁷.

The old waterfronts became ghost districts, and at the same time they were challenging the urban development. In order to face those challenges, many cities had to develop new strategies for these

³http://www.unesco.org/new/fileadmin/MULTIMEDIA/FIELD/Venice/pdf/special_events/bozza_scheda_DOW05_1.0.pdf (accessed 26 April 2020).

⁴ McCannon, J., *Barron's AP World History*, Barron's Educational Series Inc. 2008, pp. 57–60.

⁵ *The River Valley Civilization Guide*, www.rivervalleycivilizations.com (accessed 26 April 2020).

⁶ Moretti M., *Cities on Water and Waterfront Regeneration: A Strategic Challenge for the Future*, Grundtvig, II meeting Rivers of Change – River/Cities Warsaw, Poland, July 24th-27th 2008.

⁷ Ibid.

empty places. This planned restructuring of traditional waterfronts occurred almost simultaneously around the world and is studied extensively, mostly through individual cases⁸.

The redevelopment of waterfront appeared as a major project for urban development – whatever focused on business, leisure, or multifunctional development – as models of regeneration of brownfield areas, with a special heritage appeal through the preservation and reinterpretation of traditional port infrastructure and the reuse of the water for locals⁹.

In more recent years, urban settlements have reconquered the edges of their water and rivers as a result of renewed attention and awareness towards water in general, also related to the growing interest in environmental issues and the development of leisure activities.

The historical model for port-city development can be summarised in the following table.


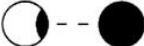



Stage	Symbol		Period	Characteristics
	○ city	● port		
(I) Primitive cityport			Ancient–medieval to 19th century	Close spatial and functional association between city and port
(II) Expanding cityport			19th–early 20th century	Rapid commercial and industrial growth forces port to develop beyond city confines, with linear quays and break–bulk industries
(III) Modern industrial cityport			mid-20th century	Industrial growth (especially oil refining) and introduction of containers and ro-ro facilities require separation and increased space
(IV) Retreat from the waterfront			1960–1980s	Changes in maritime technology induce growth of separate maritime industrial development areas
(V) Redevelopment of the waterfront			1970–1990s	Large-scale modern port consumes large areas of land- and water-space; urban renewal of original core

Figure 1. The historical model for port-city development¹⁰.

2.2. Waterfront in Krakow

Krakow is a medieval town and former capital of Poland. It has a thousand-year long tradition as a centre of science, culture and art, placed on the UNESCO list in 1978¹¹.

⁸ Hein C., *Port cities and urban waterfronts: how localized planning ignores water as a connector, waterfront revitalization and water as leisure and identity*, Wiley Periodicals Inc., Wires Water, 2016.

⁹ Ibid.

¹⁰ Kostopoulou S., *On the Revitalized Waterfront: Creative Milieu for Creative Tourism*, Sustainability, 5, 2013, pp. 4578-4593.

¹¹ Kulczycka J., Poda R., *Management of post-industrial sites in Cracow*, Gospodarka Surowcami Mineralnymi, Tom 21/2005, Zeszyt 4.

The city lies in the southern part of Poland on the Vistula River, which is the longest river in Poland. It flows through the whole country and through the city of Krakow¹².

“The town of Polish Kings”¹³ has also suffered from the industrialisation era like in other river-cities in Europe and America. As a result, it is ranked the fourth industrial city in Poland¹⁴.

The city centre of Krakow has been dynamically developing for ages. The development of Krakow was mainly concentrated on the left bank of the Vistula River. Even after the industrialisation era, some city districts with crucial historic importance have been almost forgotten. For this reason, the revitalisation of the Vistula waterfront has not included the areas along the eastern section of the river. Consequently, the Podgórze district is considered to be the least developed among the districts located closest to the city centre.

Since these last decades, the right bank of the Vistula River has been getting more and more developed. In view of regenerating that part of the city, several modern buildings have been erected, such as the Centre for the Documentation of the Art of Tadeusz Kantor – Cricoteka, The Museum of Modern Art in Krakow (MOC AK), the Andrzej Frycz Modrzewski Krakow University, and residential complexes. There are also other buildings under construction. But the two river sides have been effectively connected to each other after the construction of the pedestrian bridge named after Father Bernatek.

And still with these redevelopment projects of the Podgórze district, the Vistula River waterfront in its eastern part is completely abandoned and constantly dilapidating. In this Master’s thesis, a study will be conducted for the purpose of providing some solutions so that the area of the old post-industrial port in Zabłocie can be revitalised and merged into the new riverfront outlook.

2.3. Urban waterfront development

“Cities seek a waterfront that is a place of public enjoyment. They want a waterfront where there is ample visual and physical public access – all day, all year – to both the water and the land. Cities also want a waterfront that serves more than one purpose: they want it to be a place to work and to live, as well as a place to play. In other words, they want a place that contributes to the quality of life in all of its aspects – economic, social, and cultural”¹⁵.

¹² ANGIEL J., *The Vistula river as one of Poland's symbols and its perception by high school students from Vistula towns*, *Miscellanea Geographica*, Vol. 13, 2008. pp. 299–309.

¹³ Ibid.

¹⁴ Kulczycka J., Poda R., *Management of post-industrial sites in Cracow*, *Gospodarka Surowcami Mineralnymi*, Tom 21/2005, Zeszyt 4.

¹⁵ The Urban Land Institute, *Remaking the Urban Waterfront*, Seattle Department of Planning and Design, 2012.

According to the online version of the Longman Dictionary of Contemporary English, the word “waterfront” can be defined as “the part of a town or an area of land next to the sea, a river etc.”, and these areas usually correspond to those which are occupied by port infrastructures and port activities.

After the industrialisation era, many river cities around the world started to pay more attention to their rivers and riverfronts, and as a result, the revitalisation of waterfront areas became one of the most interesting phenomena of urban redevelopment since the years 1980. Therefore, marine cities and river cities can be actually considered laboratories for the process of urban redevelopment for the purpose of not only the broad range of cases but also the quality of the results. Despite the difference occurring between river cities in terms of history, areas, localisation, population and culture, they can be considered as important sources of inspiration for the establishment of a true relationship between the river and the city.

2.3.1. Types of waterfront regeneration

In her research, Marta Moretti¹⁶ indicated seven typologies for the regeneration of waterfronts. Its results were presented during the conference in Warsaw which took place from the 24th to the 27th of July 2008. The theme of the conference was: The rivers of change – Rivers // cities. The above-mentioned typologies are as follows:

- “new urban expansion”: it consists of localising riverside and old port areas and then reorganising them;
- “waterfront and great events”: the goal here is to use the waterfront as an opened exhibition hall for different kinds of events;
- “new urban waterfront itineraries”: this typology is based on the innovation of riverbanks and its surrounding areas in view of providing public facilities along pedestrian routes;
- “reuse of port areas”: as it is indicated by its name, the objective of this one is to regenerate old abandoned port areas in order to re-establish a connection between water and the city which was lost several years ago;
- “flood defense”: the principle here is to incorporate the flood defense system into the new riverfront design to make the whole area looks like one structure;
- “urban riverfront regeneration”: the purpose of this point is the revitalization of the riverside areas so that they were given new functions;

¹⁶ Moretti M., *Cities on Water and Waterfront Regeneration: A Strategic Challenge for the Future*. Grundtvig, II meeting Rivers of Change – River//Cities Warsaw, Poland, July 24th-27th 2008.

- “urban beaches”: they are described by urban planners as an artificially created environment in urban areas. They show a distinctive and alternative mode of waterfront reusing.

2.3.2 Key factors in urban waterfront regeneration

Established by Marta Moretti, factors in urban waterfront regeneration are composed of:

- “The ‘strategic’ value of waterfront areas for the development of the city as a whole”: the river can be used as a response to the question for the expansion of cities in their central areas, and usually they are useful when it comes to quality and quantity.
- “The ‘location’ factor of the waterfront”: that area is usually located not far from the city centre and can be developed so that it provides plenty of places for different types of activities.
- “A rich heritage of infrastructures and historical buildings”: historical-architectural buildings should always be preserved and maintained in very good conditions. Their silhouette and background do not have to be destroyed by new buildings or structures in view of keeping the original identity of the site.
- “Direct contact with water”: nowadays, rivers in a city are considered the main architectural element of the urban composition. They have a positive effect on the urban regeneration and can help to generate activities of all kinds which are organised to attract people.
- “The evocative and symbolic value of waterfront areas”: the old industrial port areas can be transformed into modern, vibrant and attractive places, full of life which have wealthy and psychological impact on the human being. The development of the old port area in Krakow mentioned in this Master’s thesis will be inspired by these factors.

2.3.3 Dangers on urban waterfront redevelopment

During the conference in Warsaw, Marta Moretti also presented possible complexities which can be faced while redeveloping urban waterfronts.

Firstly, it may happen that in certain cases, instead of creating new unique waterfronts different from each other, the phenomena of repeating the same waterfront design everywhere without any changes occur. Secondly, waterfront development could be used for the achievement of high profit levels rather than the quest for a high quality of life for inhabitants. Additionally, riverfront areas could be turned into an excessively commercial tourist atmosphere rather than a place for leisure, greenery, residential function. And at the end, there is a risk of a rarity of productive activities for people to whom the waterfront redevelopment was oriented.

2.4. Sustainability in urban redevelopment

2.4.1 Sustainable development

During the 11th international conference on Urban Regeneration and Sustainability (SC2016), Niemann B. and Werner T. said that the actual understanding of sustainability or sustainable development is based on the report “Our Common Future”, which has been published by Gro Harlem Brundtland, the Norwegian prime minister in 1987 and the World Commission for Environment and Development of the United Nations in 1987 also known as the “Brundtland-Report”. The first and official definition is: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”¹⁷.

The main task of the sustainable urban development at the waterfront is to provide and improve living conditions for the city's inhabitants. Additionally, it has to combine and promote ecological, economic and social goals. In other words, sustainable waterfront is “a place where people from all backgrounds and ages can live, work, play, visit, and learn in a way that strengthens and celebrates the beauty, the diversity, the economic vitality, the opportunities, the creativity, the heritage, and the natural environment of the city”¹⁸. Moreover: “the popular sign of success of many waterfronts development is bringing citizens and visitors back to the water’s edge, and providing tangible evidence of the continuing vitality of the cities”¹⁹. In conclusion, to design an effective urban waterfront, numerous requirements should be taken into consideration.

2.4.2 Criteria for a sustainable urban development at the waterfront

Still referring to the words of Niemann B. and Werner T. from the 11th conference on Urban Regeneration and Sustainability (SC2016), the basic rule for the achievement of a successful waterfront development in a river city is the environment protection. Areas closed to the waterfront are not less important than the ones forming the riverfront. Both areas coupled with the river constitute the world’s ecosystem. When enhancing old industrial port areas or during the development of new waterfronts, the existing ecosystem should be preserved. Furthermore, new designed waterfront must be perfectly integrated into the existing city urban structure in spite of competing with the city. New riverfront developments in cities have to be united with the existing urban heritage.

¹⁷ Niemann B., Werner T., *Strategies for the sustainable urban waterfront*, WIT Transactions on Ecology and The Environment, Vol 204, WIT Press 2016.

¹⁸ Ibid.

¹⁹ Ibid.

By implementing diverse facilities at the waterfront, they will attract people from all backgrounds. Another important element is the development orientation which should offer a multiplicity of cultural, social and commercial facilities as well as a diversity of living concepts. This does not mean that the huge mega complex of the city should be built at that place. On the contrary, the development should not destroy neither the architecture which existed there for years nor the ecosystem.

Public space is a key factor while regenerating waterfronts. It comprises squares, parks, greenery, seating places and promenades that have to be designed qualitatively and be accessible for inhabitants and visitors at any time. By the same token, it is essential to conserve the existing axes of view between the city and the new urban riverfront. Some new axes can be added in view of configuring attractive public spaces.

Niemann B. and Werner T. mentioned that waterfronts developments are mostly long-term projects, and that they often represent a challenge for more than one generation. They involve many participants such as the city council, investors, urbanists, ecologists, developers and entrepreneurs²⁰.

According to A. Zachariasz, in Krakow, the hydrographic layout composed of the Vistula River and its tributaries constitute an existing legible system of urban greenery which, independently of the effectiveness of successive spatial development plans and legal provisions, covers areas that are, obviously, free of buildings²¹.

3. RESEARCH PROGRAM AND METHODOLOGY

3.1. Data collection

Data collection for the project of the study is divided into four major parts including: history of the place (Zabłocie), cultural aspects, topography studies and relevant comparative case studies. Gathering information about the site, organising them into groups, analysing and synthesising as well as using them appropriately to develop the design recommendation will represent the steps of the research.

²⁰ Niemann B., Werner T., *Strategies for the sustainable urban waterfront*, WIT Transactions on Ecology and the Environment, Vol. 204, WIT Press 2016.

²¹ <http://kksm.arch.pk.edu.pl/housingenvironment/img/arts/2018.24/01%20Bednarz.pdf> (accessed 23 April 2020).

3.2. Data organisation

Organising information collected so far is one of the most important points in the study. This organisation will start with the use of data from the bigger context (town scale) to the smaller one (district scale). The first step of the organisation will be the apprehension of the place where the project will be designed and its surrounding areas. It will also contain some information about the historical development of Zabłocie. Next step will be focused on the repartition of all the data.

The main objective of the study is the rehabilitation of the Zabłocie old industrial port area in order to enhance the waterfront of the city. Case studies will be used to improve the new urban development on the Vistula River.

4. CONTEXT AND EXISTING CONDITIONS OF THE AREA

4.1. History of Zabłocie

The origin of the name Zabłocie comes from the Polish word “za błotem” meaning “behind mud”. In the middle ages, Zabłocie became known thanks to the river dock for shipping salt mined in nearby Wieliczka. After the second partition of Poland and the creation of the town Podgórze during the Austrian occupation, Zabłocie slowly became an industrial and storage outback of the city. At the beginning of the 21st century, this part of Krakow came to life for the third time becoming an important place for the future city development.

The essential point of the history was the part sold of Zabłocie by the Polish King Casimir III in 1357. It was only then, when the King started regulating the production principles and trades in the royal salt mines. Hence, the establishment of the port on the Vistula became crucial.

During the Austrian occupation and the first partition of Poland, Zabłocie was completely separated from Krakow. In the second half of the nineteenth century, a railway line was built through the eastern part of the city, and it was considered as the dividing line between Podgórze and Zabłocie. At the same period of time, the first industrial plants and warehouses were built along the tracks. The early twentieth century was marked by the considerable growth of the region, when the Vistula riverbanks started to be regulated. It was also planned to build water network canals among the Danube, the Oder, the Vistula and the Dniester rivers. Krakow, Podgórze and particularly Zabłocie led a crucial role in the imperial river transport development. There was even an ambition of creating a shipyard and a modern port in Zabłocie.

In the twenties and the thirties, Krakow literally ended at Zabłocie. At the beginning of the twentieth century, building materials factory, a slaughterhouse and a power plant for Podgórze were built. Simultaneously, the Vistula River left bank was also developing. The two riversides became progressively connected, and in 1915 Podgórze was finally joined to Krakow. The industrial development of the eastern part of the city continued during the interwar period.

During the World War II, further industrial development was programmed in Zabłocie. At the end of the second World War, the creation of the Nowa Huta district changed the city urban development. As a result, Zabłocie located in the centre of the growing city lost its strategic role²².

The impression of abandonment and isolation of Zabłocie from the rest of the city was strengthened by the relatively weak links with the urban transport system. Curiously enough, the means of transport most frequently seen here were cargo trains and river barges. The first changes in the urban space of Zabłocie occurred in the late nineties²³.

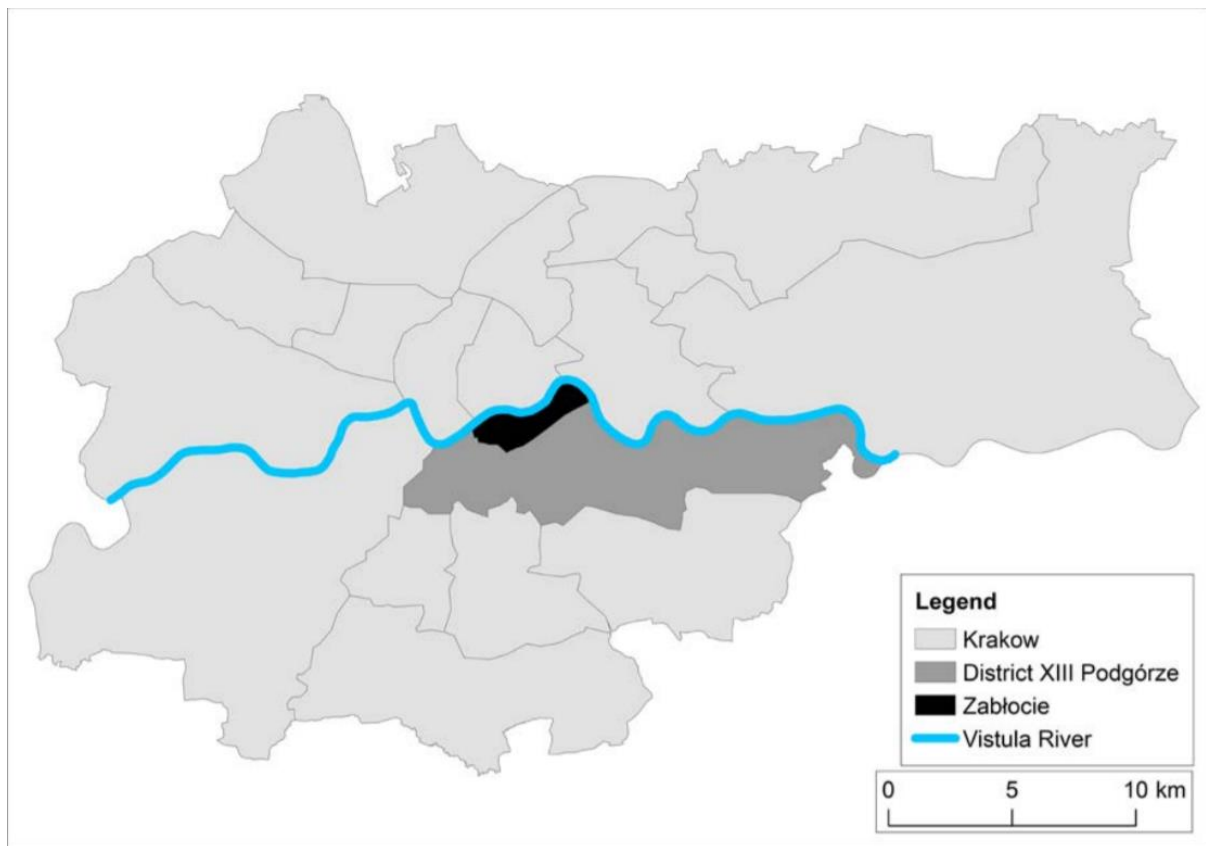


Figure 2. Location of Zabłocie in Krakow²⁴.

²² Wiśniewski M., *Zabłocie – a perfect example of revitalisation?*, *Art is changing (a) place*. Herito 04/2011.

²³ Ibid.

²⁴ Zwiech D., *Development perspectives and problems accompanying the regeneration of Zabłocie (Kraków) over the years*, *Urban Development Issues*, vol. 55, 2017, pp. 44–56.

4.2. Cultural aspects

Nowadays, Zabłocie, the industrial area of Krakow, is the seat of two cultural institutions and a centre of artistic initiatives. During the last decades, that district has been considerably developed. In December 2005, Plac Bohaterów Getta (Square of Ghetto Heroes) was rebuilt. A monument to the victims of the Krakow ghetto was installed on that square. It consists of 33 sculptures of metal chairs and 37 smaller copies. At the same time, the former “Emalia” factory which belonged to Oscar Schindler became part of the Historical Museum of Krakow. Six years later, the Museum of Contemporary Art in Krakow (MOCAK) was opened at the same place.

The new headquarters of “Cricoteka” and the Museum of Tadeusz Kantor were opened on the Vistula waterfront and a reading room, library and bookstore were built next to them. Not far from the area there is a proposition of creating a literature Forum in the former salt warehouse building²⁵.

4.3. Topographical studies

The city is located in a valley at the foot of the Carpathian Plateau, 219 metres above the sea level. The city covers an area of 327 km². The landscape and the geological structure are very diversified, both in Krakow and its vicinity²⁶.

Zabłocie is an almost rectangular area on the right bank of the Vistula, about as large as the historical Krakow within the Planty. It is adjoined by the river from the north and the three remaining sides are circumscribed by dual carriageway²⁷.

The total acreage of the study area (zabłocie) is 2.25 square kilometres²⁸. The area subject to development borders three important districts of Krakow: the Old Town (Stare Miasto), Grzegórzki and Podgórze on the banks of the Vistula River. In the land development and urban planning documents of the city of Krakow, this area has been marked as the public space which is to become a local focal point or a local centre. This area is located in the post-industrial part of the district of Podgórze²⁹.

²⁵ [https://pl.wikipedia.org/wiki/Zab%C5%82ocie_\(Krak%C3%B3w\)](https://pl.wikipedia.org/wiki/Zab%C5%82ocie_(Krak%C3%B3w)) (accessed 16 May 2020).

²⁶ Kulczycka J., Poda R., *Management of post-industrial sites in Cracow*, Gospodarka Surowcami Mineralnymi, Tom 21/2005, Zeszyt 4.

²⁷ Wiśniewski M., *Zabłocie – a perfect example of revitalisation?*, *Art is changing (a) place*, Herito, 04/2011.

²⁸ Zwiech D. *Development perspectives and problems accompanying the regeneration of Zabłocie (Kraków) over the years*, *Urban Development Issues*, vol. 55, 2017, pp. 44–56.

²⁹ Majerska-Pałubicka B., Latusek E., *A Concept of the Development of Riverside Embankment in the Context of Cracow (A Local Centre)*. *Buildings* 2020, 10, 56.

5. CASE STUDIES

5.1. Waterfront redevelopment in Hamburg

Hamburg is the second largest city in Germany³⁰, and it is considered the second largest port city in Europe. It is crossed by the river Elbe, one hundred kilometres upstream from the North Sea.

Since April 2007, Hamburg has had a different conception of urban development named the Spatial Vision of Hamburg. After the publication of STEK (Stadtentwicklungskonzept 2007) in 1996, significant changes have been observed in the city. Seizing the opportunities of a growing metropolis, while strengthening its character of a green city on the waterfront, it was planned to have “More city in city”. Therefore, Hamburg consistently gave the priority to higher densities, infill and sustainable spatial development³¹.

5.1.1. Beginning of the “String of Pearls” redevelopment

Similarly, to other river cities, Hamburg was industrialised, but in 1980s all port facilities and infrastructures from the mid-nineteenth century located near to the city centre became vacant and underused. Several years later, the idea of upgrading port areas raised high expectations. It was planned to attribute them new functions, identification points and attractions for citizens, visitors and tourists. Therefore, the authorities gave investors a site with a catchy name “String of Pearls”.

“Since then, a number of new buildings and conversions of older warehouses have significantly gentrified the area along the northern Elbe bank. Most of the new projects are office buildings including restaurants on the ground floor. The long periods of time that pass from riverfront sites falling derelict to surveys, designs and implementation works, are due to different reasons specific to each project. The implementation of projects was not strictly governed by planning requirements, but by the availability of plots and developers’ interests as well as investment considerations that originated from different periods and planning contexts. The metaphor of the “string of pearls” suggests that there had been an urban planning concept, but it was not coined until the project was already under way. More than two decades after the start of the retrieval of public access to the waterfront along the river a promenade connects the different parts of transformation”³².

³⁰ <https://en.wikipedia.org/wiki/Hamburg> (accessed 04 May 2020).

³¹ Schubert, D., *Waterfront transformations and city/port interface areas in Hamburg*, Revista Dimensión Empresarial, vol. 13, No. 1., 2014, pp. 9-20.

³² Ibid.

5.1.2. A giant step: HafenCity

The most important urban redevelopment project and one of the largest of this kind in Europe was realised in the HafenCity of Hamburg. It reconnected the River Elbe with the city centre and opened a new orientation for the growing of the city: down to and along the river. The site covers approximately 155 hectares. HafenCity redevelopment project started at the end of the 1990s and was oriented to offices, housing, shopping and recreation. Planners developed the project in such a way to avoid mistakes made in previous urban waterfront development like in London Docklands. Roughly 5,500 apartments for 10,000 to 12,000 inhabitants as well as educational and cultural facilities were planned.

The first phase of the zoning plan was entered in 2000, and then the land sales began. The first buildings were delivered in 2004. Two years later, the plan for the future centre (Überseequartier) of HafenCity was finalised. In 2007, the construction of a new metro line started, and other mixed-use developments were launched at the same time. The concert hall Elbphilharmonie and the Maritime Museum were opened as well.

In 2010, authorities decided to update the eastern part of the HafenCity. The attention was put on 3 districts: Baakenhafen neighbourhood, Oberhafen and Elbbrücken neighbourhoods. The first district was planned to be used for different types of housing and recreation, the second one to be transformed into a creative and cultural district, where existing older warehouses will be reused and sport facilities right by the water will be provided, and the last one to be the entrance gate with higher buildings and a mix of offices, residential and shopping facilities³³.

³³ Ibid.



Figure 2. HafenCity during the redevelopment³⁴.



Figure 3. HafenCity model³⁵.

³⁴ <https://informedinfrastructure.com/13536/hamburg-welcomes-a-mixed-use-urban-redevelopment/> (accessed 4 May 2020).

³⁵ <http://www.chriskarlson.com/blog/category/Germany> (accessed 4 May 2020).

5.2. Waterfront redevelopment in Bilbao

Bilbao is the largest city in the province of Biscay and in the Basque country in northern Spain³⁶. After the port was moved out of the city and industrial areas were closed, it became possible to redevelop the Nervión Waterfront and re-establish the connection between residents and the river. Public and social projects have been implemented to achieve that goal. Since the beginning of the 1990s, Bilbao has been in the process of revitalisation, therefore, with the coordination of the Spanish Ministry of Public Works, Transportation and Environment, the foundation Bilbao Ria 2000 was set up. Its responsibility is to manage and decide about specific uses and zoning classifications of lands, management and future maintenance of areas and structures. The regeneration concerned the strategic areas of Abandoibarra and the canal de Deutsco and Zorroza. The projects were spread over short and long terms. The redevelopment of the Nervión left bank was focused on the revitalisation of the urban fabric, whereas the right one was oriented to a spectacular city planning.

The short-term projects consisted of integrating the urbanised area of Abandoibarra with the Ensache urban fabric and the rest of the city. The integration was established with the construction of a pedestrian promenade along the river and the realisation of multiple projects such as the Maritime Museum, the Convention and Music Centre, Parco Ribera, Parco Ametzola, a residential and shopping complex, a financial centre, etc. On the other hand, long-term projects included opening of de Deutsco canal, integration of the Zorroca peninsula, establishment of an industrial port area and the construction of 7 bridges as well as new residential and office districts³⁷.

³⁶ <https://en.wikipedia.org/wiki/Bilbao> (accessed 4 May 2020).

³⁷ Giovinnazzi O. & Moretti M., *Port Cities and Urban Waterfront: Transformations and Opportunities*, TeMaLab Journal of Mobility, Land Use and Environment, 3, 2010, pp. 57–64.



Figure 4. Bilbao's waterfront – before and after the transformation³⁸.

5.3. Waterfront redevelopment in Warsaw

Warsaw is the capital and the largest city of Poland. The metropolis stands on the Vistula River in east-central Poland³⁹. The riverfront in Warsaw has been enhanced for years. The first attempts aimed at “orientating the front of the city towards the river” started in the 1990s with the construction of the open gardens on the roof of the University of Warsaw Library. The next achievement was the Copernicus Science Centre with the Discovery Park which was followed by the realisation of the Vistula River Boulevards. These boulevards are spread over three levels and are constructed in form of terraces. The waterfront on this section of the Vistula River is the extension of the Discovery Park. It is organised in such a way that visitors are provided with different kinds of facilities such as recreational spaces, green areas, small architectural forms and sequence of squares. The pedestrian and bicycle pathways run along the whole Warsaw Boulevards which are 70 kilometres long. The riverfront has been designed and executed in a multifunctional manner in view of generating a variety of activities which meet people needs. The waterfront is composed of urban beaches and club cafés, five active marinas, three kayaks and water-bicycle stations, the Czerniakowski Port and the two-

³⁸ <https://www.leekuananyeworldcityprize.com.sg/resources/case-studies/bilbao-ria-2000/> (accessed 3 May 2020).

³⁹ <https://en.wikipedia.org/wiki/Warsaw> (accessed 4 May 2020).

kilometre-long promenade starting from the Śląsko-Dąbrowski Bridge to the Świętokrzyski Bridge. Due to the high-risk of flooding, some facilities have been put on top of “floaters” in order to preserve them from the river water. The redevelopment of Warsaw waterfront is a good example of space organisation along rivers in cities. It is opened, attractive, full of life, does not spoil the existing historical architecture and can be easily re-adapted for new purposes.



Figure 5. Warsaw waterfront at the end of the 19th century⁴⁰.



Figure 6. Warsaw waterfront – beginning of the 20th century⁴¹.

⁴⁰ <https://warszawa.naszemiasto.pl/tag/stare-zdjecia-wisla-warszawa> (accessed 4 May 2020).

⁴¹ Ibid.



Figure 7. Warsaw waterfront nowadays⁴².

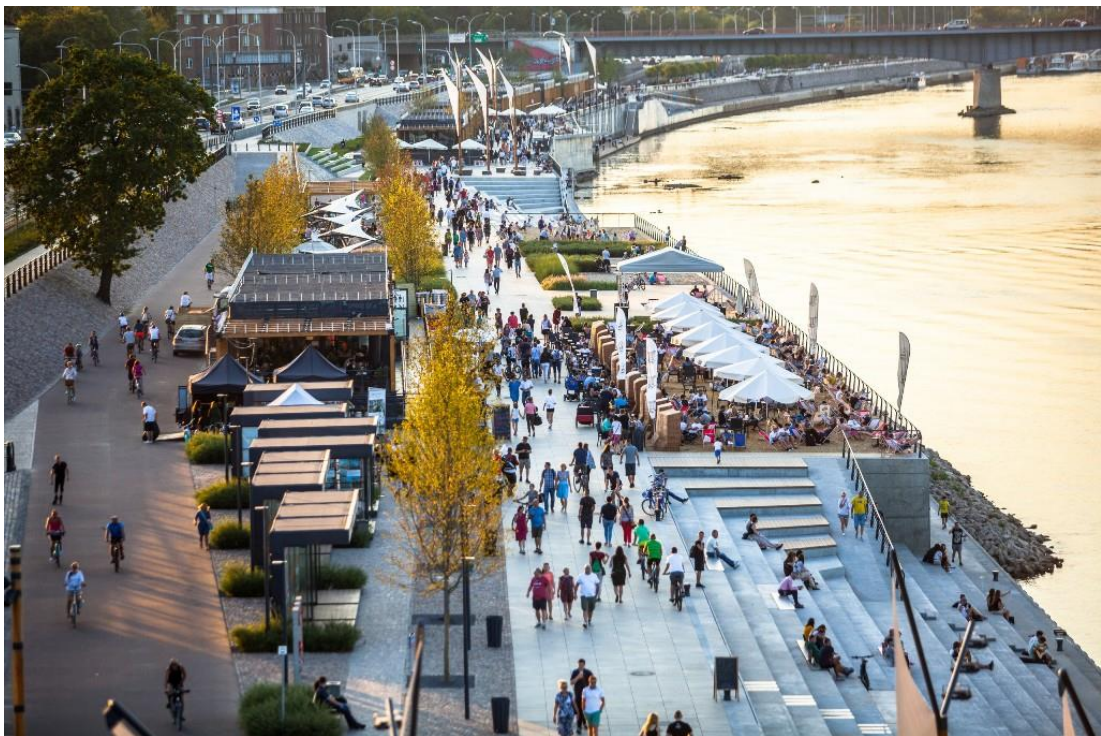


Figure 8. Warsaw waterfront nowadays⁴³.

⁴² <https://warsawtour.pl/en/project/the-vistula-boulevards/> (accessed 4 May 2020).

⁴³ <https://warsawtour.pl/en/project/the-vistula-boulevards/> (accessed 4 May 2020).

6. DESIGN PROCESS AND PROJECT BRIEF

6.1. Idea of the project

The relationship between human being and the environment has derived from values, developed and socially acceptable in various historical periods and cultural areas⁴⁴. At the end of the industrial era, slogans like "return to the river", "restoring the river to the city" or "urban waterfront renewal" already appeared in highly developed countries, such as the USA, Japan, Australia, Canada, Germany or Great Britain, albeit in Poland they appeared only in the end of the 20th and at the beginning of the 21st century⁴⁵. The Vistula riverfront in Krakow was abandoned and bare for several years. During the last decades, the revitalisation processes started to occur on the Vistula waterfront, however, many areas are still neglected and miserable both in Zabłocie and Podgórze district.

The idea of the project made in the framework of this Master's thesis is to provide a significant waterfront redevelopment in the old industrial port area which is located behind the Andrzej Frycz Modrzewski Krakow University and between the Kotlarski Bridge and the Railway Bridge. The development will be focused on the "RGB" (Red-Green-Blue) principle which consists of revitalising a riverfront together with the existing ecosystem principally the greenery and the river. In other words, the "RGB" (Red-Green-Blue) principle is a development concept which consists of three main objectives for the urban waterfront regeneration areas: waterfront revitalisation (Red), natural regeneration of river valleys (Green) and management of water quality and flood risk (Blue)⁴⁶.

The waterfront revitalisation focuses on the improvement of the quality of life and cultural background (Red), it includes: socio-economic recovery (through recreational and tourist activation and the commercial use of nearby water areas) and environmental recovery (transformation of structures and river banks' management, creating attractive and accessible public spaces). The natural regeneration of river valleys (Green) is aimed at restoring the quality and biodiversity of water and waterfront ecosystems as well as the continuity of valley eco-corridors with environmental education and the recovery of landscape values. The management of water quality and flood risk (Blue) with the use of blue and green infrastructure enables the re-establishment of the natural hydrological cycle in urban catchment areas (retention, infiltration, water treatment and evapotranspiration).

⁴⁴ Januchta-Szostak A., *Miasta przyjazne rzekom*, Poznań 2019, pp.10.

⁴⁵ Januchta-Szostak A., *Miasta przyjazne rzekom*, Poznań 2019, pp.85.

⁴⁶ Januchta-Szostak A., *Miasta przyjazne rzekom*, Poznań 2019, pp.86.

6.2. SWOT analysis – related to the study area

The SWOT analysis is an attempt of presenting the strengths, weaknesses, opportunities and threats of the study area.

Strengths: <ul style="list-style-type: none">- proximity to the city Centre;- proximity to the riverfront;- scenic views;- bike path and Riverpark;- historical situation.	Weaknesses: <ul style="list-style-type: none">- lack of access;- old industrial abandoned area;- lack of connections with the city.
Opportunities: <ul style="list-style-type: none">- connecting the downtown to the riverfront;- revitalising the area;- improving socio-cultural and economic conditions;- providing a vital place full of life for the city.	Threats: <ul style="list-style-type: none">- exposed to the flood;- separation of uses.

Figure 9. SWOT diagram (elaborated by Rodrigue Kongne Mousob).

6.3. Schematic design phases

6.3.1. Challenges

The challenges related to the redevelopment of the Vistula waterfront in Krakow are:

- reconnecting the city with the river;
- redeveloping the old abandoned port areas;
- making a place full of life for people from all backgrounds and of different ages;
- preserving the existing ecosystem;
- designing an environmentally friendly building.

6.3.2. Creations of activity areas

The district of Zabłocie is predominantly full of residential complexes, corporate offices, small shops and restaurants. The lack of public places and activities makes the area inactive during nighttime. In spite of having a unique waterfront area close to the city centre, there is not a single place such as a viewing terrace or a restaurant which can highlight the beauty of the views in that district. The new project will be designed in order to solve these problems by providing open public spaces, functions and facilities.

6.3.3. Design program

In the project made in the framework of this Master's thesis, a multifunctional centre which can be opened every day during the day and night is proposed. Additionally, the revitalisation proposal of the old port buildings and the industrial areas around is elaborated in the project. The design is made with the intention of renovating the place (old port area behind the Andrzej Frycz Modrzewski Krakow University) in order to reconnect the right abandoned bank of the river with the Vistula river and the rest of the city.

6.3.4. Concept

The principle is to firstly revitalise the abandoned area and create linking pedestrian paths leading to the riverfront.

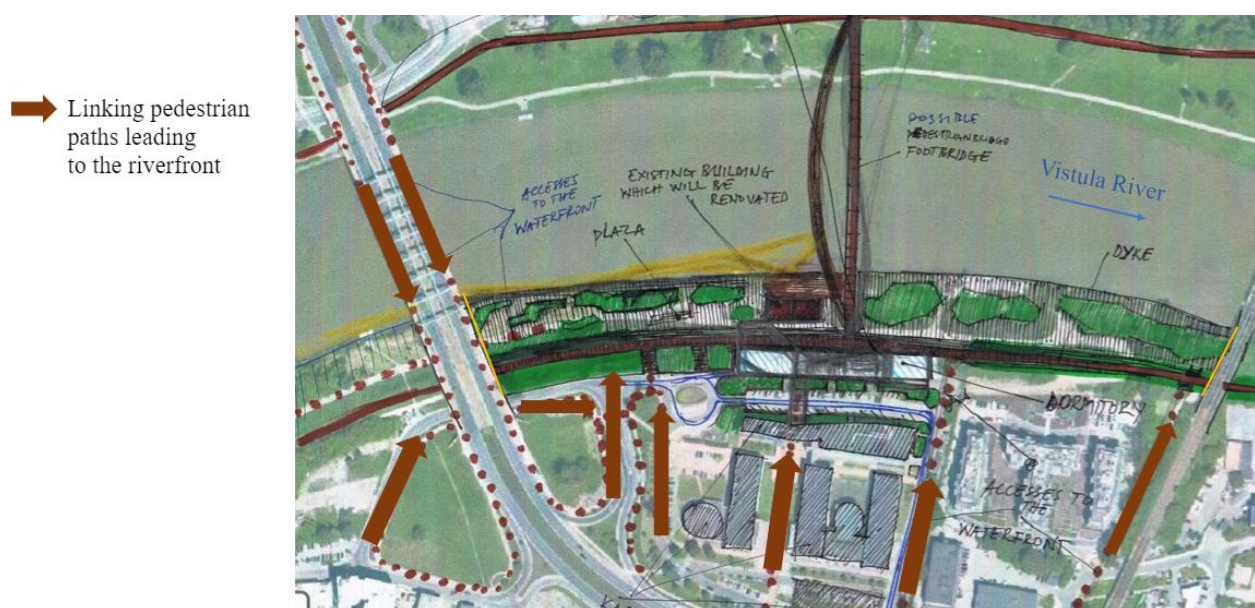


Figure 10. Creation of pedestrian paths (elaborated by Rodrigue Kongne Mousob).

Secondly, the aim is to design an attractive structure that will not spoil the existing background, and which will respond to residents' needs. And finally, to find a connection of the old industrial area with the Vistula River.

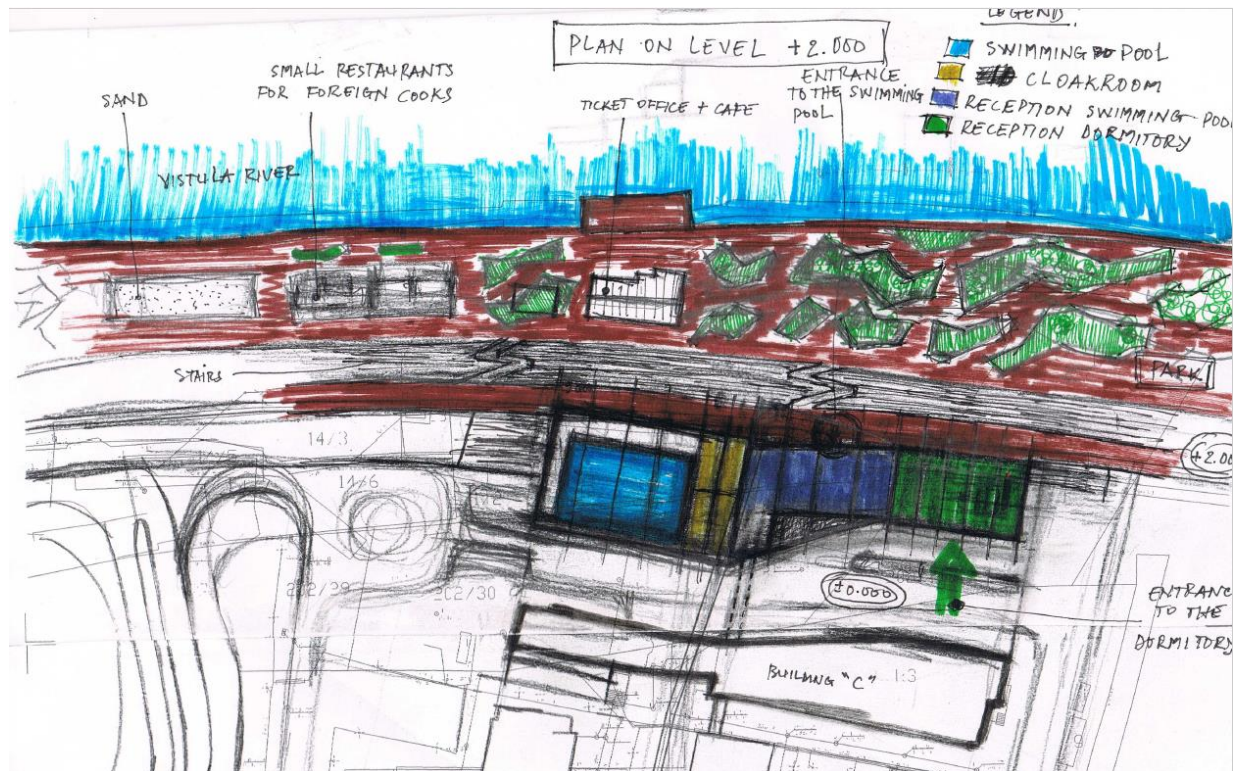


Figure 11. Organisation of the old industrial area (elaborated by Rodrigue Kongne Mousob).

In order to achieve a great architectural composition, the form of the building had to follow the forms of the existing ones and also the form of the dike built to prevent the area from floods. A green roof was designed also in order to make the building environmentally friendly.

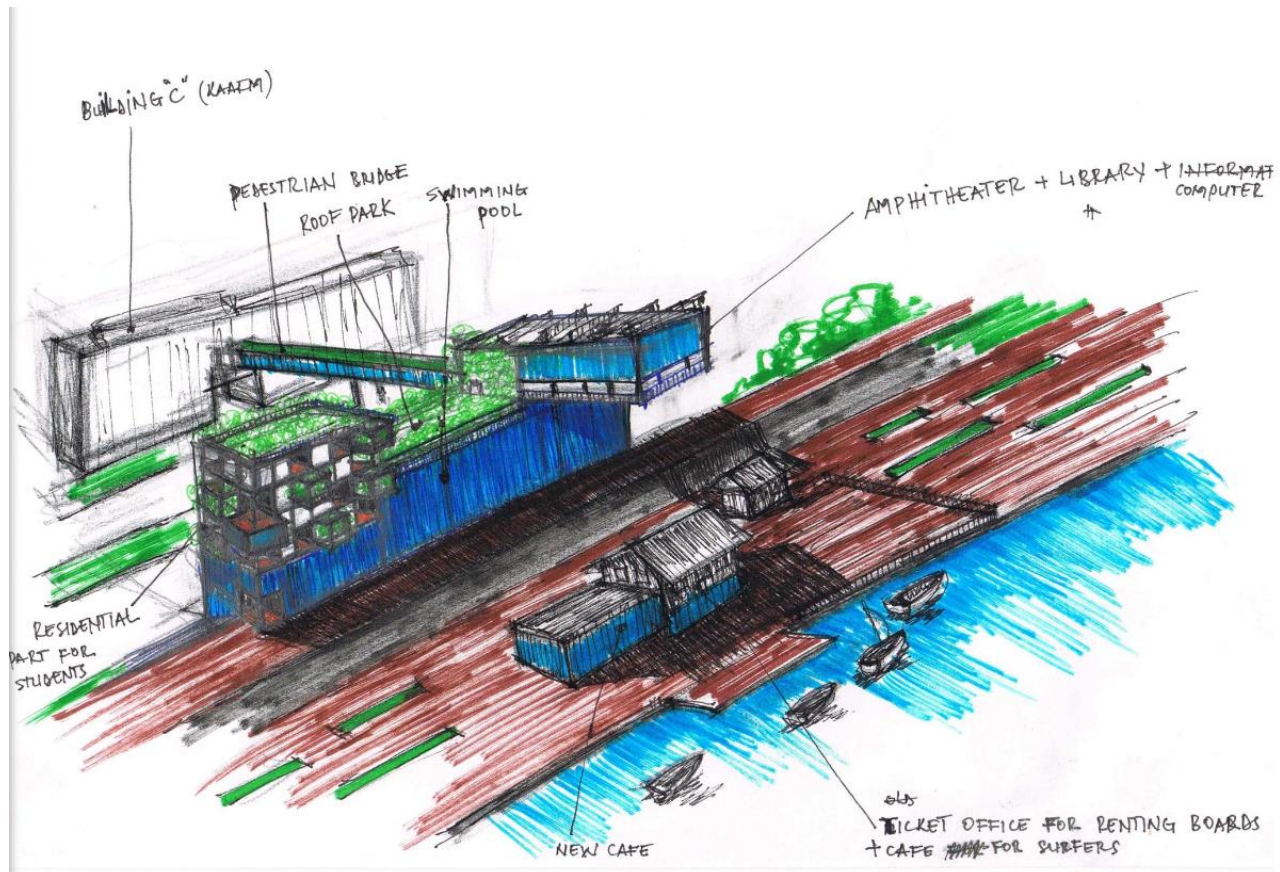


Figure 12. Space organisation (elaborated by Rodrigue Kongne Mousob).

6.4. Construction type

6.4.1. Foundations

Foundations in engineering are an element of a structure which connects it to the ground and transfers loads from the structure to the ground⁴⁷. The foundation type used in the project is called a raft foundation. It is also called mat foundation. A raft foundation is a slab on grade foundation type which extends over the entire building footprint in order to support and transfer loads to the ground. It is often used for weak soils, likewise it is the best foundation type for buildings with basements⁴⁸.

⁴⁷ [https://en.wikipedia.org/wiki/Foundation_\(engineering\)](https://en.wikipedia.org/wiki/Foundation_(engineering)) (accessed 12 June 2020).

⁴⁸ <http://www.understandconstruction.com/raft-foundations.html> (accessed 12 June 2020).

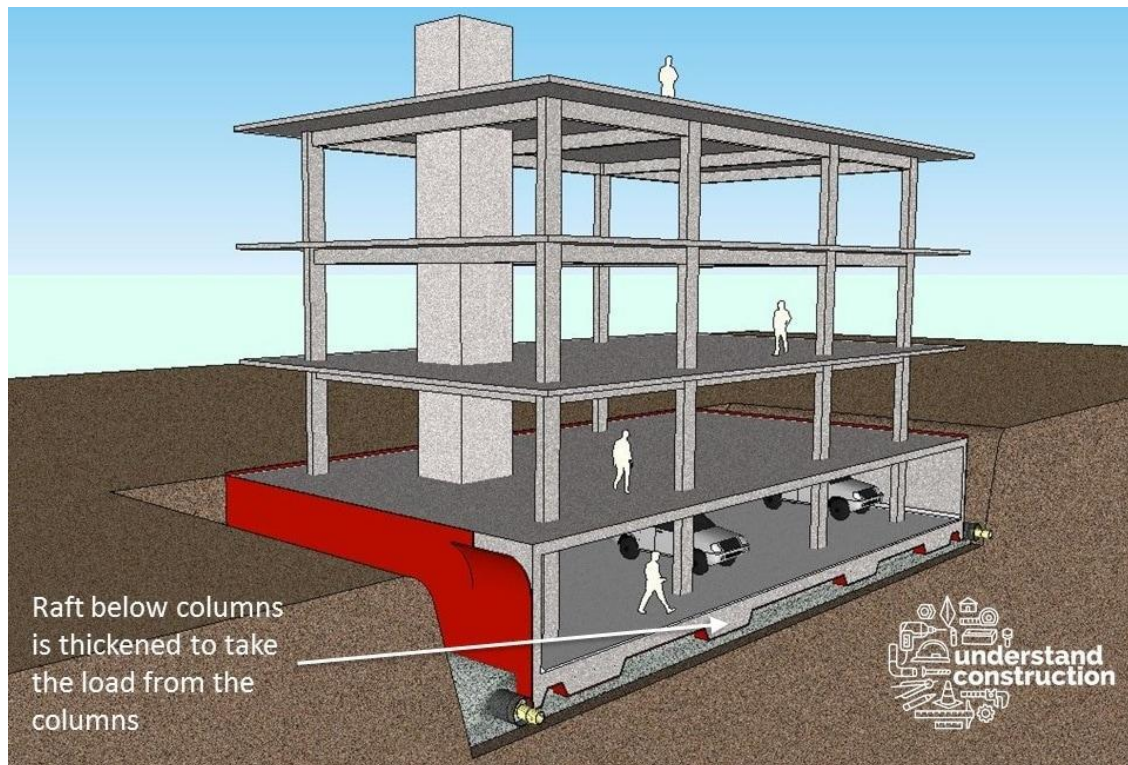


Figure 13. Mat foundation presentation⁴⁹.

6.4.2. Columns

The project is composed of a series of rectangular concrete columns with measurements: 650 mm x 650 mm.

6.4.3. Slabs

Due to the large span (up to 20 metres) and the smaller number of columns in the project, a special type of slab was proposed with the intention of having a rigid and aesthetic structure.

The eco-line or Bubble Deck slab is the type of slab proposed for the project developed in the framework of this Master's thesis. They are usually called voided biaxial slab. Voided biaxial slabs or hollow slabs are a type of reinforced concrete slab which incorporates air filled voids to reduce the volume of concrete required⁵⁰. There is a variety of hollow slabs: airdeck, cobiax, U-boot, polystyrene voiding blocks and bubbledeck system⁵¹. The Bubble Deck technology was invented by Jørgen

⁴⁹ <http://www.understandconstruction.com/raft-foundations.html> (accessed 12 June 2020).

⁵⁰ https://en.wikipedia.org/wiki/Voided_biaxial_slab (accessed 12 June 2020).

⁵¹ Churakov A., *Biaxial hollow slab with innovative types of voids*, Construction of Unique Buildings and Structures 2014, pp.70-88.

Bruenig in the 1990s. It is composed of reinforced module that consists of preassembled steel mesh and plastic bubbles. The bubbles are made up of high-density polypropylene materials or other recycled materials which do not react chemically with the concrete or reinforcement bars. The bubbles can have a spherical or ellipsoidal shape. The specification of this type of slab is that the beams are directly incorporated into the slab and its thickness varies from 230 millimeters to 600 millimeters. Eco-line slab has many advantages compared to the traditional slabs. It reduces the weight of the building, increases the strength, reduces the number of columns and has less CO₂ emission⁵².



Figure 14. Example of hollow slab (column reinforcement)⁵³.

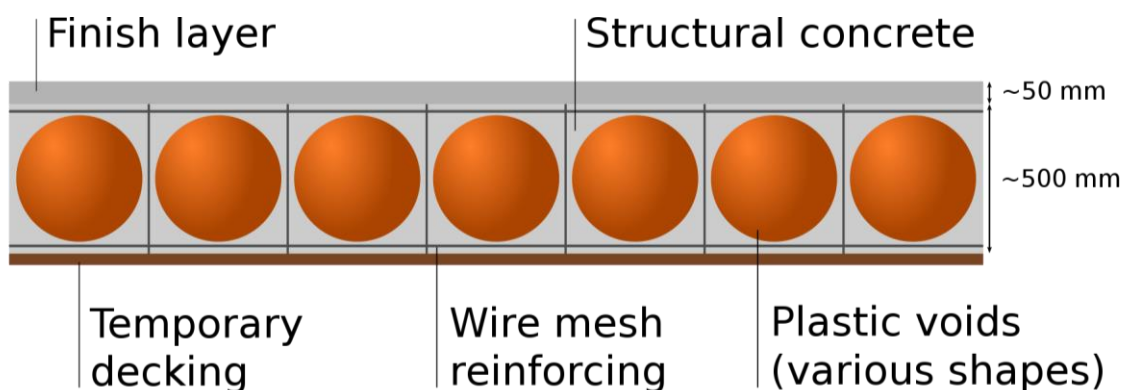


Figure 15. Cross-sectional diagram of a typical voided biaxial slab⁵⁴.

⁵² <https://theconstructor.org/structural-engg/bubble-deck-slab-types-material-advantages/8341/> (accessed 15 June 2020).

⁵³ Ibid.

⁵⁴ https://en.wikipedia.org/wiki/Voided_biaxial_slab (accessed 15 June 2020).

6.5. Basic data of the project

The building is a composition of 3 sections: 2 rectangular sections and 1 parallelogram section. The project is based on a rectangular grid of 9,000 mm x 9,900 mm.

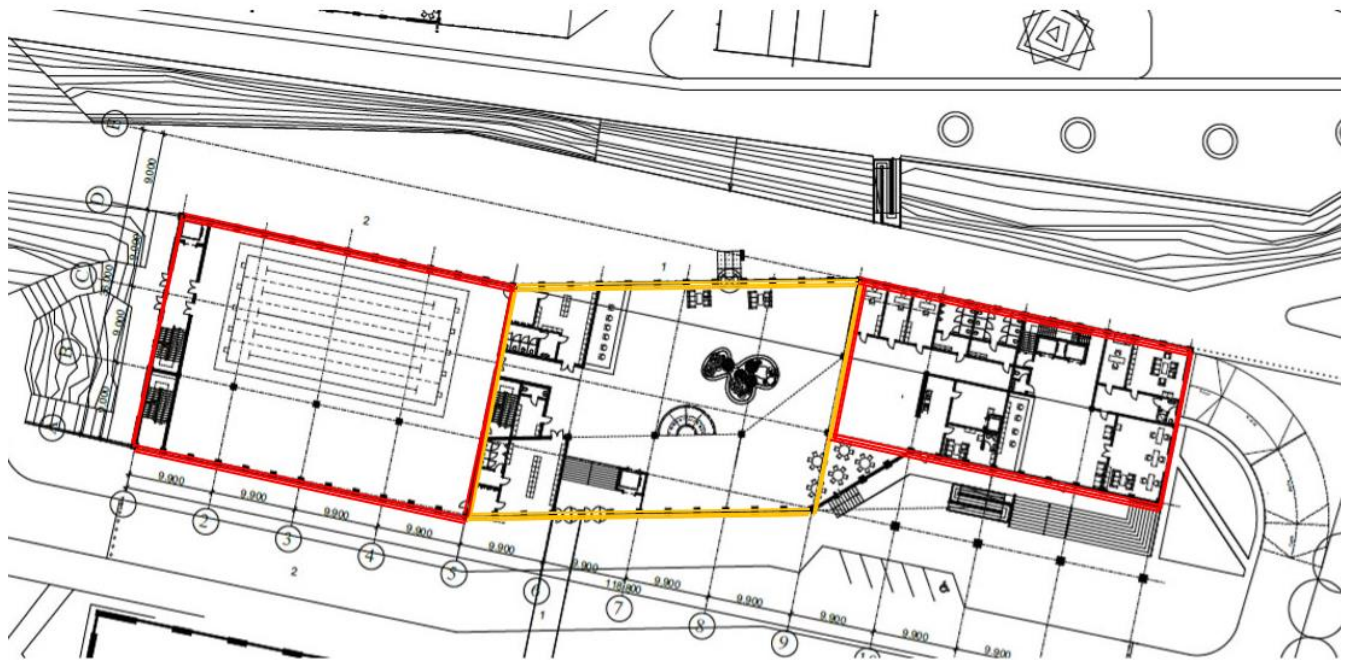


Figure 16. Shape of the project on the ground (elaborated by Rodrigue Kongne Mousob).

The ground floor is mainly opened to the public and is composed of a swimming pool with jacuzzis on the left, a reception hall with a resting zone, administration offices and a café in the centre of the building as well as the reception hall to the dormitory on the right side of the building.

Tribunes, a restaurant-café and a fitness club for the dormitory residents are on the first floor. The skyway bridge connecting the new building with the building 'C' of the Andrzej Frycz Modrzewski Krakow University (AFMKU) is on the same floor.

Dormitory rooms are organised on the second and the third floor with an additional roof garden for the dormitory residents.

A suspended club is topped on the swimming pool, offering magistral views on the Vistula River. The access to the second roof garden on the dormitory is provided from the student club. The building is 18.320 metres high and covers an area of 2895.92 square metres on the ground.

The large old port building was renovated and transformed into a river station point with a café and restaurant on the Vistula River. The smaller one was transformed into a ticket office for renting boards and surfboards and kayaks.

No.	Project name	Site area	Net area on the ground	Gloss floors area	Usable area	Building volume	Number of floors
1.	Waterfront student centre in Krakow	18,387.27 m ²	2,895.92 m ²	13,051.80 m ²	10,627.11 m ²	60,286.68 m ³	5

Table 1. Basic data of the project.

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