

Design Limitations for Riversides Areas. A "Marina" Project on the Warta River

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(Received in January, 2018; Accepted in April, 2018; Available Online from 8th of May, 2018)

Abstract

The theme of this work is the presentation of the concept showing group of the buildings with the center for water sports visitors. The whole project has been divided into 2 points whose location is closely connected with the Warta River. It is a part of the tourist route running through the Zaleczanski Landscape Reserve. This is an area with much natural beauty, which is one of the major tourist destinations in and around the town of Kępowizna. In this section there is also the longest stretch section of the Warta River, prepared in a natural way for any water sports. A large number of visitors, the surrounding nature, numerous trails and water activities possibilities and biking were among the main factors that determined the topic and location of this work.

Key words: *transformation, revitalization of the water route, city of Kępowizna, the Zaleczanski Landscape Reserve.*

Introduction

The aim of the study is to create a group of interconnected, new design buildings, which carry a spatial composition of the new value of the selected area. The main problem of this location is the need to look for construction and functional solutions at the border of buildings: set on the ground and floating on the water. The main aim of the conceptual work is an attempt to extract the landscape values at the same time respectful of the surrounding nature, that's why presented solutions. The project aims is to increase the importance of the water tourism and the number of visitors, as well as the presentation of the Zaleczanski Landscape Reserve. It is equally important to show technical solutions for buildings where the water level is constantly changing. A network of similar forms will be a recognizable part of the landscape, which at the macro level will be associated with Reserve, while at the micro level will be associated with its use.

Methods of research

The study will be presented as a first step – inspirations based on world famous examples, and as a next step in more details the study area with analyzes, aimed at bringing the issue of the scope of work.

In the next stage of work will be presented description of the buildings with special focus on the construction's solution use to respect problems of existing river water, bringing their location and design solutions adopted and the idea of the whole project.

For the easy understanding of the research method, the description has been attached by graphic material, whose job it is to bring shown assumptions.

In the final section there was drawn up a description of the architectural-construction solutions adopted and summary of the basic parameters of the object.

Development completed the presentation of its conclusions.

Results

A limitation to the investing to coastal areas by the rivers is, in a sense the legal aspect, lack of money for their adaptation to the new features, and, perhaps above all, a lack of vision. The

location of the objects is often limitation in the actions of future investors or developers. Trying to interest potential investors in the capabilities of these type areas and encourage them to similar initiatives arose from my participation in some interesting suggestions for adaptation for the new functions area in this category. Here is presented a short presentation of these studies.

Inspirations

Sun Moon Lake visitor center. Location: Yuchi, Taiwan. Realization: 2006–2010. Architects: Norihiko Dan and Associates, Tokyo.

Sun Moon Lake is located in the mountainous landscape and is the largest water reservoir in Taiwan (Fig. 1.). The place is mostly chosen by honeymooners and numerous groups of tourists due to its natural beauty. In 2003, a competition was organized to develop a concept center for visitors to the location on the western shore of the reservoir. The best suggestion turned out to be that proposed by the Tokyo architect Norihiko Dan. Two similar to each other in shape concrete forms stood on the shore of the lake. The west wing houses the tour, exhibition space, part of the teaching and cafes with a panoramic view towards the lake.



Fig. 1. View of the Sun Moon Lake visitor centre
(source: <http://www.morfae.com/content/wp-content/uploads/2011/03/0753>)

The left wing was earmarked for part of the administrative office. The buildings were designed so that gave the impression rising from the ground, which made it possible to introduce tourists to the green roof. The object in its organic form is a good example of today's opportunities posed by construction (Fig. 2.).

Information Center in Romsdalen`s-Geiranger Fjord. Location: Romsdalen`s-Geiranger Fjord, Norway. Realization: 2005–2010. Architects: Reiulf Ramstad Architects, Oslo.

Trollstigen (Troll Road) in Norway is one of the most spectacular roads that climb the slope of a mountain in the world. Annually, during the summer, it is estimated that the site is visited by 500 000 tourists, which was the basis for the creation of the information center there as well as restaurants and several viewing platforms.

The center is located on the river flowing from Valldal to Åndalsens in the western part of Norway (Fig. 3.). The entire assembly was carried out in stages. The first one started with the construction of viewing platforms and a parking. The second stage involved work on building desk with catering and adjacent auxiliary facilities and objects of small architecture. The central building is a small restaurant, information center and exhibition space. The property has been designed with a great deal of consistency with regard to the surrounding rocky peaks. Two concrete planes of sharp-edged complement each other, creating the impression of penetrating rocks. Most of the

vertical partitions are glazed allowing existing with nature while using the cafe or while watching the exposition.

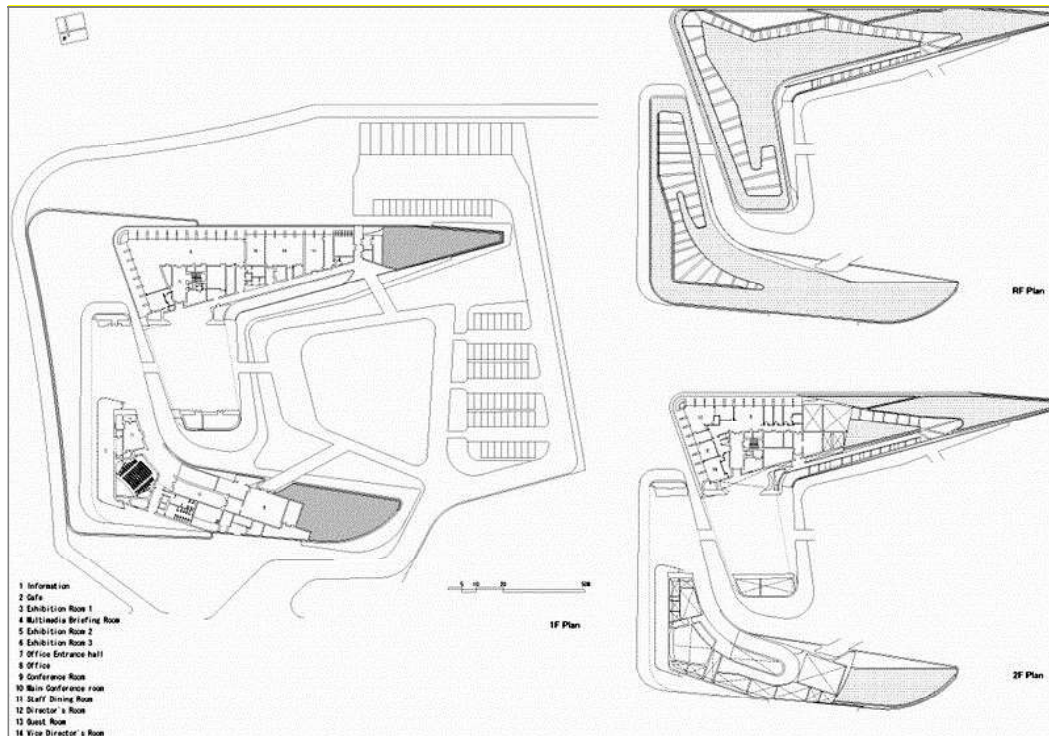


Fig. 2. Floor plans of the storeys?

(source: <http://www.ideamsg.com/wp-content/uploads/2011/10/Sun-Moon-Lake-visitor-centre-11.jpg>)

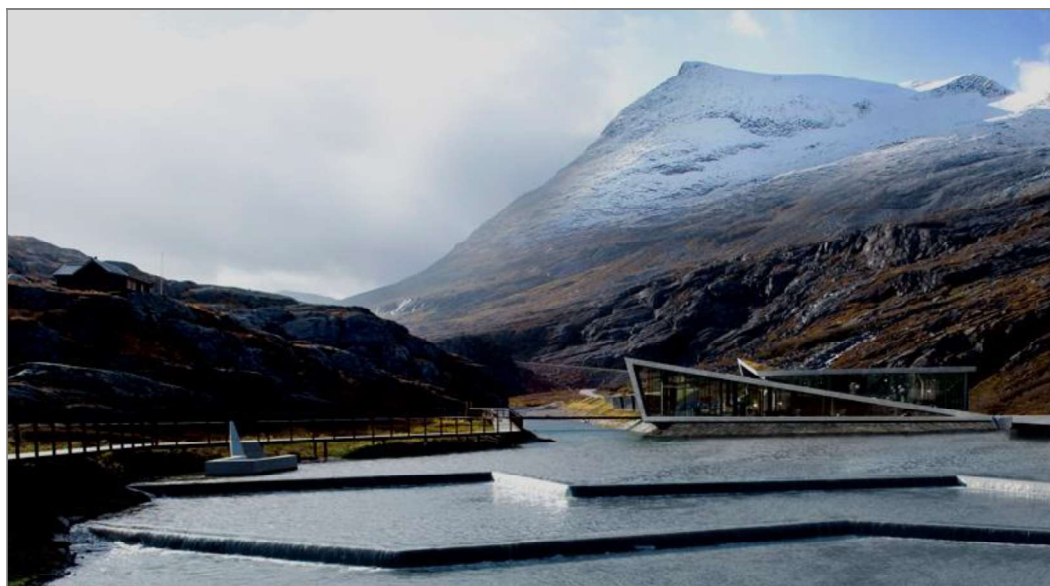


Fig. 3. Information centre view (photo by author)

Auxiliary buildings located within close proximity to the car park and a waterfall in itself shops and toilets and are closing the urban layout. This operates independently. From here it's possible to walk the designated route snaking along the slope to 4 viewing platforms from which overlooks the road and the surrounding area. Platforms, like the previous buildings made of concrete and cortensteel. Additional variety is surrounding water, which has become an inseparable part of the landscape.

Location. General characteristics of the "Marina" project on the Warta River. The water sports visitors' center often occurs in areas of landscape high values. They have to present the area

in which they are located, and thus also attracting more visitors. In the case of bands such center is the dominant feature. Features of such a facility are very diverse and largely depend on that location.

The project development area is located in the Lodz region, in the small town of Kępowizna (Fig. 4.). The area is located on the border of the Landscape Reserve in Załęcze, on the Warta River. Within a radius of several kilometers there are 5 National Nature Reserves, nature monuments, rocks and caves. Thus, the selected location outside the main assumption of the project allows vacationers to spend time actively in the Reserve.

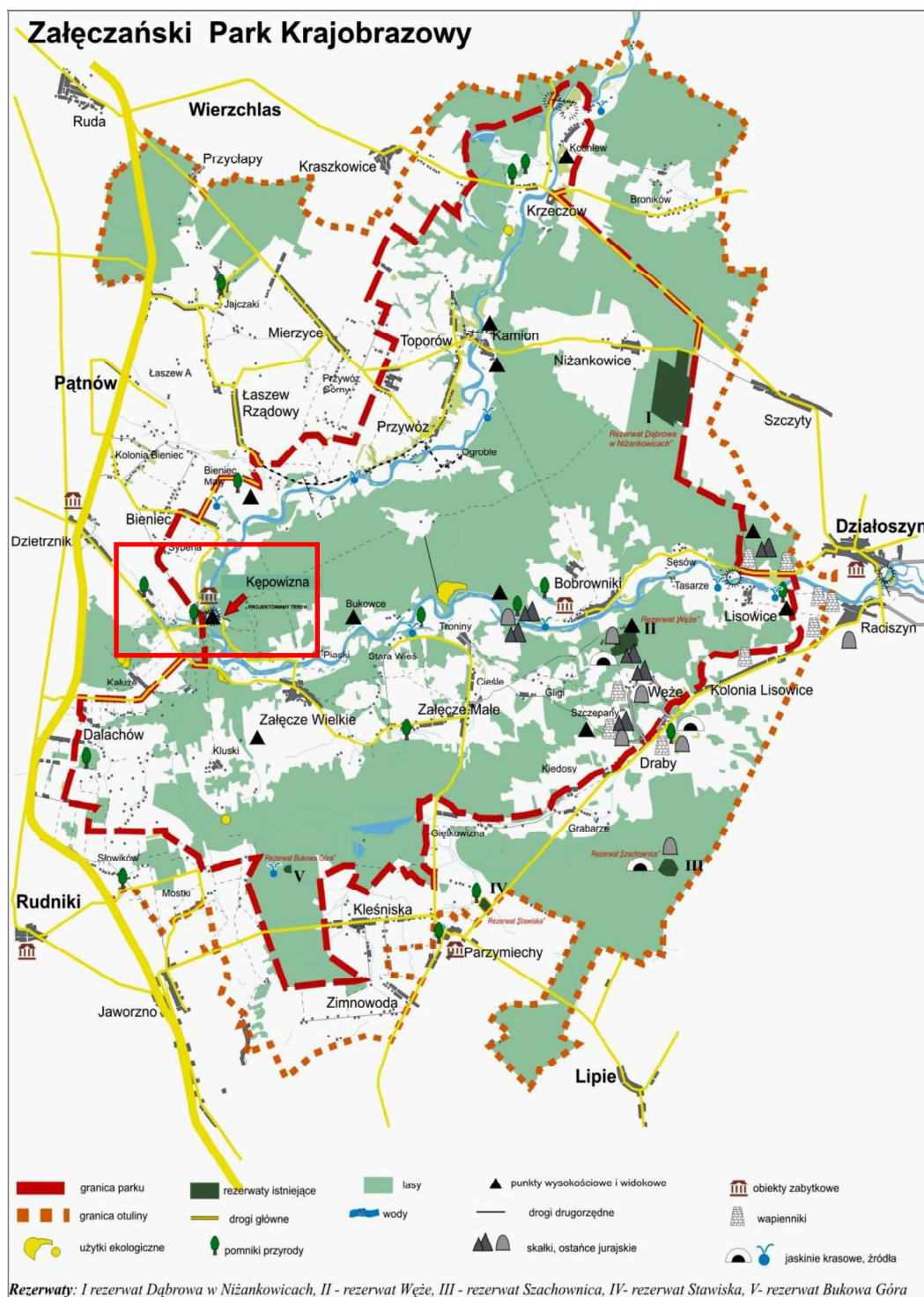


Fig. 4. Location of the Landscape Reserve in Załęcze (developed by arch. Agata Deska)

Existing terrain conditions. The plot being developed is located on the river itself. These areas are a floodplain. The place is overgrown with bushes, the river bank is disordered and practically not accessible. The area gently slopes towards the shore of the Warta River (Fig. 5.).



Fig. 5. Photos of the inventory of the terrain of the Warta River? (photo by author)

Architecture solution concept. General information and argumentation.

Division of functions into two blocks:

- minimizing the planned roads,
- the formation of the blocks on both sides of a narrow riverbed,

- design of a single-storey, horizontal building, so as not to dominate the landscape.

Location on the banks of the river, in flood plains:

- interesting view lines,
- overhang of the river basin – an illusory combination of two waters – the river and the pool.

The concept of blocks (Fig. 6.):

- simplicity of form,
- buildings on pillars protecting against small water spouts,
- building floating in the residential part – minimizing losses of material assets during the flood,
- a housing unit, being rooms for rent, or mini ownership units,
- providing sports facilities: swimming pool, gym, tennis and mini golf and river recreation,
- providing catering facilities for residents of building A and for users of sports facilities.



Fig. 6. Photo of the model (photo by author)

Functional program of the building B (standing on the stable ground). The building has mainly sports and gastronomic functions as well as communication between the car park and building A. The object is functionally divided into two parts with a wide lobby, which is also a communication connection with the building A. The left part contains gyms with sanitary, social and warehouse facilities.

The gymnasium is equipped with basic general gymnastics equipment. The sanitary part, divided into women's and men's, contains toilet, showers, and changing rooms. In addition, a toilet for the disabled was separated. The gym facilities include a hardware warehouse, a room for rescuers with a toilet and a room for cleaners with a toilet. A small point of sale of drinks and nutrients was also separated. The right part is the dining facilities, a dining room for 32 people with a separate bar and changing room. With access to sanitary facilities and an exit to the terrace, where there is a possibility of finding 48 consumption places.

Functional program of the building A (partly floating on the water). The floating part contains 28 residential units. The rooms vary in size. They contain a bathroom, a kitchenette and mezzanines. River-side rooms have terraces (Fig. 7.). In this part of the building there is also a social room with toilet and communication with exit directly to the recreational areas.

The second part of this building has a typical recreational and technical function. It is a place of public utility. Here is the main entrance hall with a separate reception. Social and technical rooms, pool equipment warehouse, bar facilities and a lifeguard room.

Pool area consisting of sanitary facilities, such as cloakroom, sanitary facilities, changing rooms and showers. All these parts are divided into women's and men's parts. In addition, a toilet was separated for disabled people. The pool room consists of a swimming pool basin with a depth of 2.1 m, a shallow basin with a depth of 0.9 m, as well as a mini bar. The deep basin is over the river, about 1/3 the length of the entire pool.

A technical room for the mechanical operation of the swimming pool was designed under a small part of the pool room. Access to this room is done by a manhole located in the corridor between the toilets and the pool.

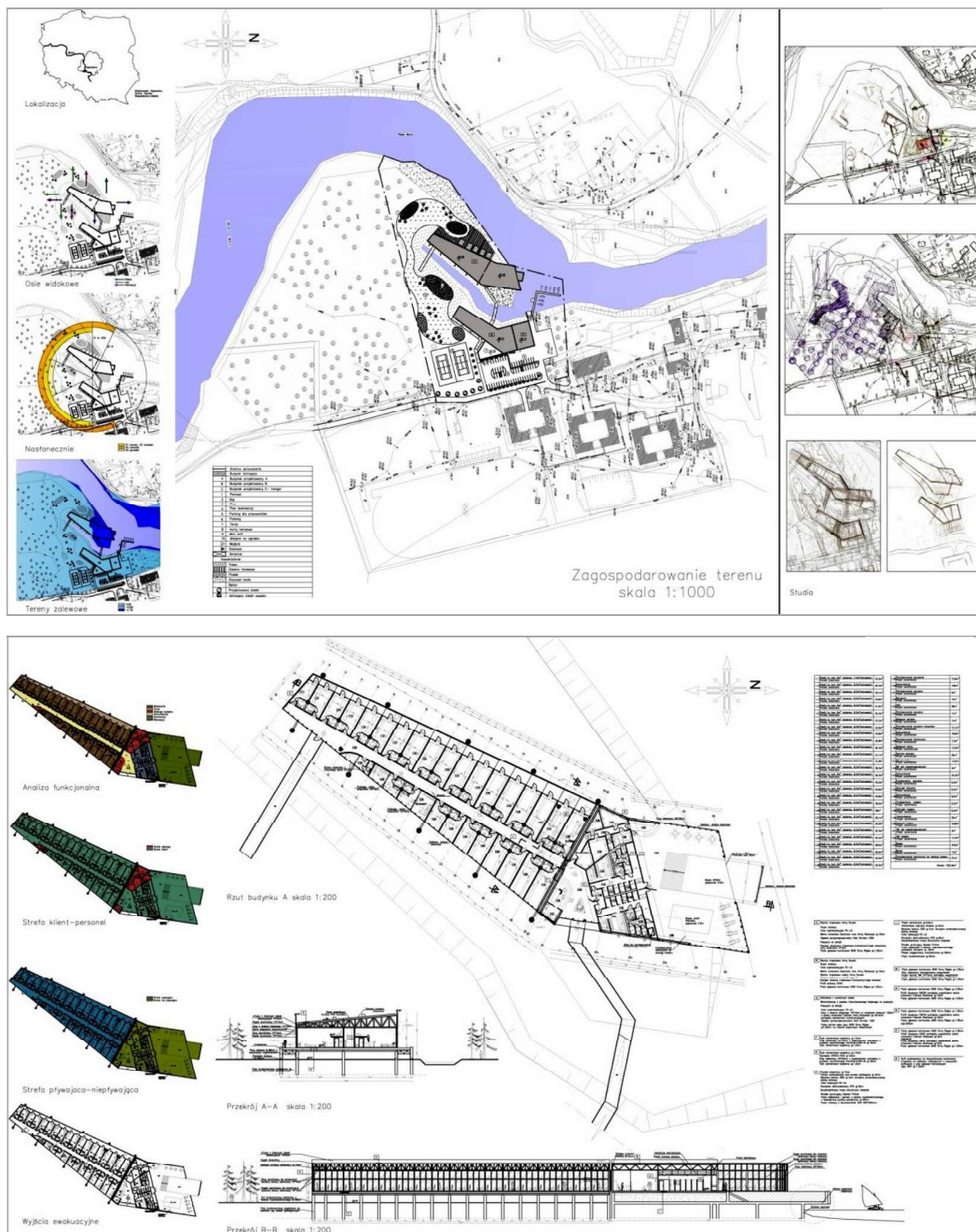


Fig. 7. Descriptions, locations, plans of the building A, sections of the A (diploma work: “Projekt koncepcyjny ośrodka “Marina” nad Wartą”) Author: arch. Agata Deska, promotor: Phd. arch. Konrad Dobrowolski

Structurally, the building A was designed in two technologies. Due to the foundation in the floodplain the building was divided into floating and standing on the ground, which forced the use of different construction solutions to maintain structural stability in various conditions of use – during floods and in dry periods. The floating residential part was designed in a wooden mullion-transom construction with wooden lattice girders. This fragment was placed on reinforced concrete foundation piles. The non-floating part was realized in a reinforced concrete structure with steel lattice girders. This fragment was placed on a foundation slab.

Construction of floating parts of the building A:

- foundations – foundation drilled piles are designed to be made of hydrotechnical concrete. The piles should be reinforced with $\varnothing 16$ rods and $\varnothing 10$ stirrups every 200 mm. Depth of foundation depends on geological research. Piles come 1.6 m above ground level. The steel finish should be used for the top finish of the post (Fig. 8.),

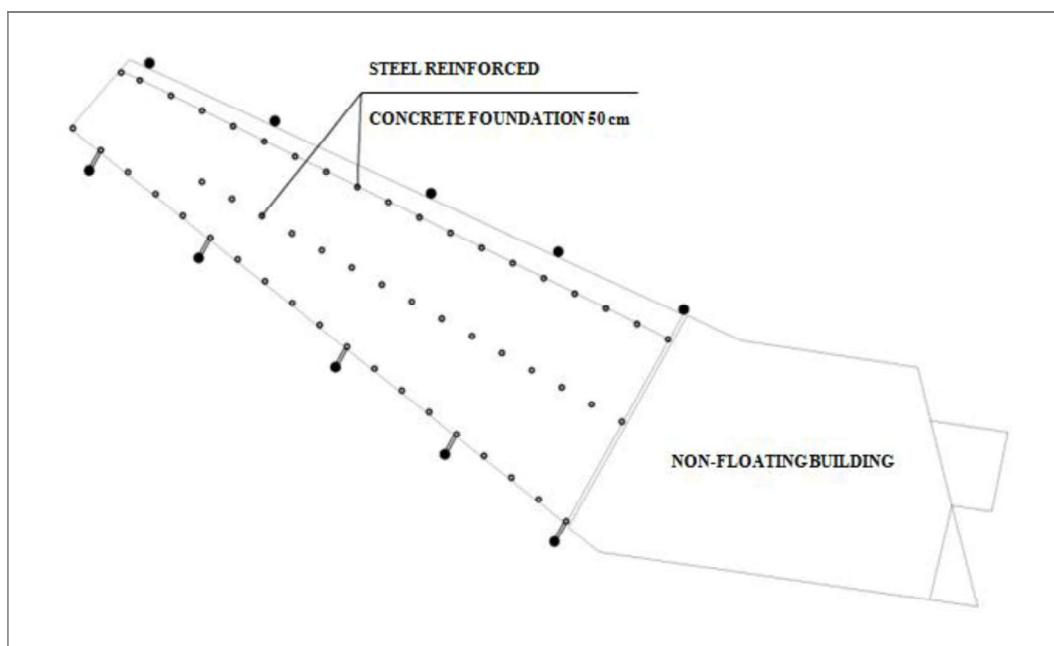


Fig. 8. Location of foundation piles – floating part (diploma work: “Projekt koncepcyjny ośrodka “Marina” nad Wartą”)

- steel grate made of I-sections – on the pile grid, place a steel grate made of HEB 300x300 steel I-sections. This construction is not floating, its task is to help the building settle down after the flood (Fig. 9.),
- 40 cm thick floor board, made in the form of a hydrotechnical concrete pontoon with an internal air gap. Double-arm plate, upside down with $\varnothing 16$ rods and $\varnothing 10$ stirrups every 300mm. The thickness of the air gap should be calculated so that the structure is light and gives good buoyancy of the building,
- structural walls are designed in a mullion-transom construction,
- roof girders made of wooden trapezoidal trusses with a 5% decrease. The spacing in the axis between the girders is 3.6 m, that is why transverse lattice beams that perform stiffening functions and also allow the plating to be installed crosswise to these elements. Wooden elements should be protected against fungi and insects as well as against fire.

Construction of standing on the ground parts of the building A:

- foundations – a 50 cm concrete plate set directly on the ground was designed. Foundation on the principle of drilled piles, as in the floating part. On the slab, make reinforced concrete walls 1.8 m high made of hydro-technical concrete. Cover the resulting basement with earth and mechanically compacted sand.

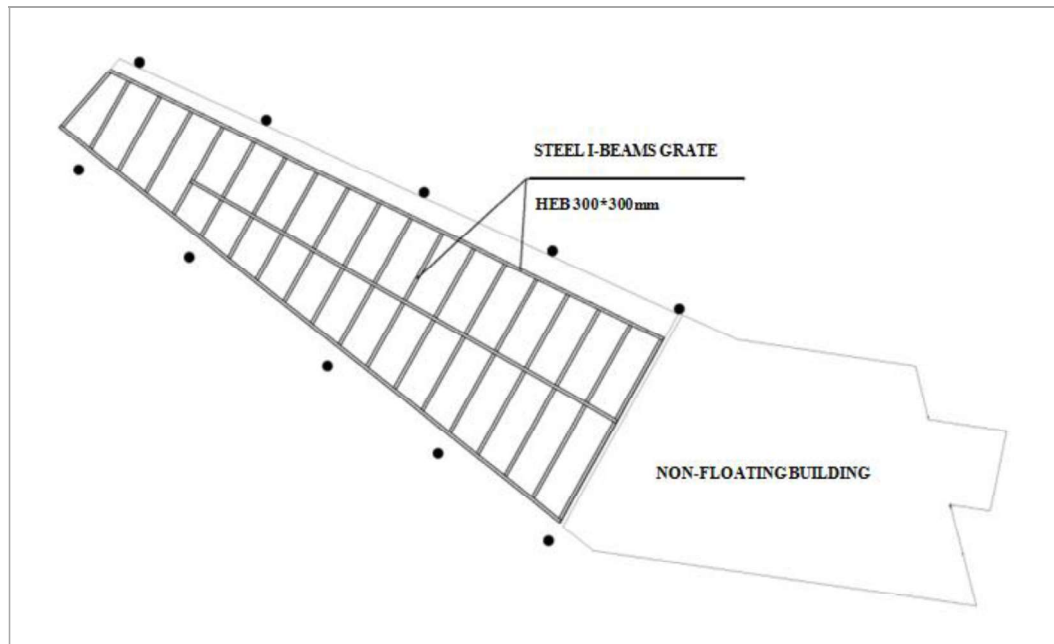


Fig. 9. Distribution of I-beam girders for floating floor
(diploma work: “Projekt koncepcyjny ośrodka “Marina” nad Wartą”)

From the side of the river, reinforced concrete retaining walls, as well as foundation piles, are designed. The walls should be made of hydro-technical concrete.

Apply a pressure wall with river stones to protect the wall from damage caused by floating elements in the river, e.g. branches, and before breaking or washing foundations through the river's current.

- floor plate – perform exactly as in the floating part. Sit not on the grate, only on the backwash basement and foundation walls (Fig. 10.).

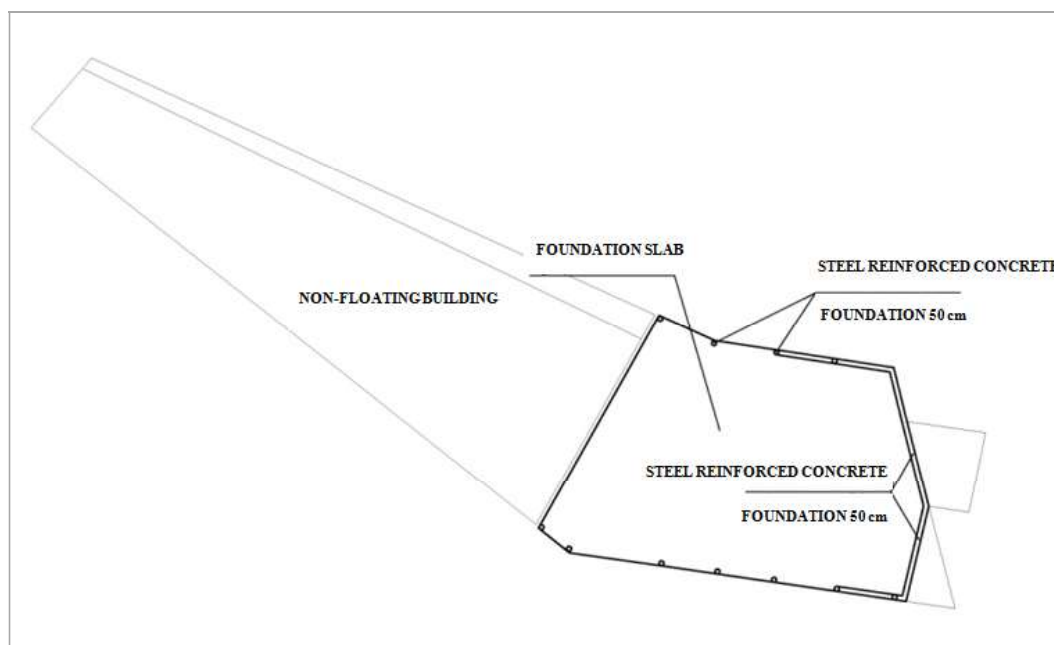


Fig. 10. Distribution of foundations – on the ground part
(diploma work: “Projekt koncepcyjny ośrodka “Marina” nad Wartą”)

Mechanism of lifting the building during the flood. Around the building at a distance of 3 m, steel pipes with a diameter of 96 cm, filled with concrete, 5 on each side were designed

(Fig. 11.). Buried in the ground to the depth of foundation of the foundation piles. Between the pipe and the foundation column, use a truss mounted on steel rings. The system used is to keep the building and prevent it from running out during the flood. The object has to move only vertically, "up down". When designing a floating building, the right of buoyancy should be applied. The building should float during floods and not sink, therefore, by buoyancy should balance the strength of gravity.

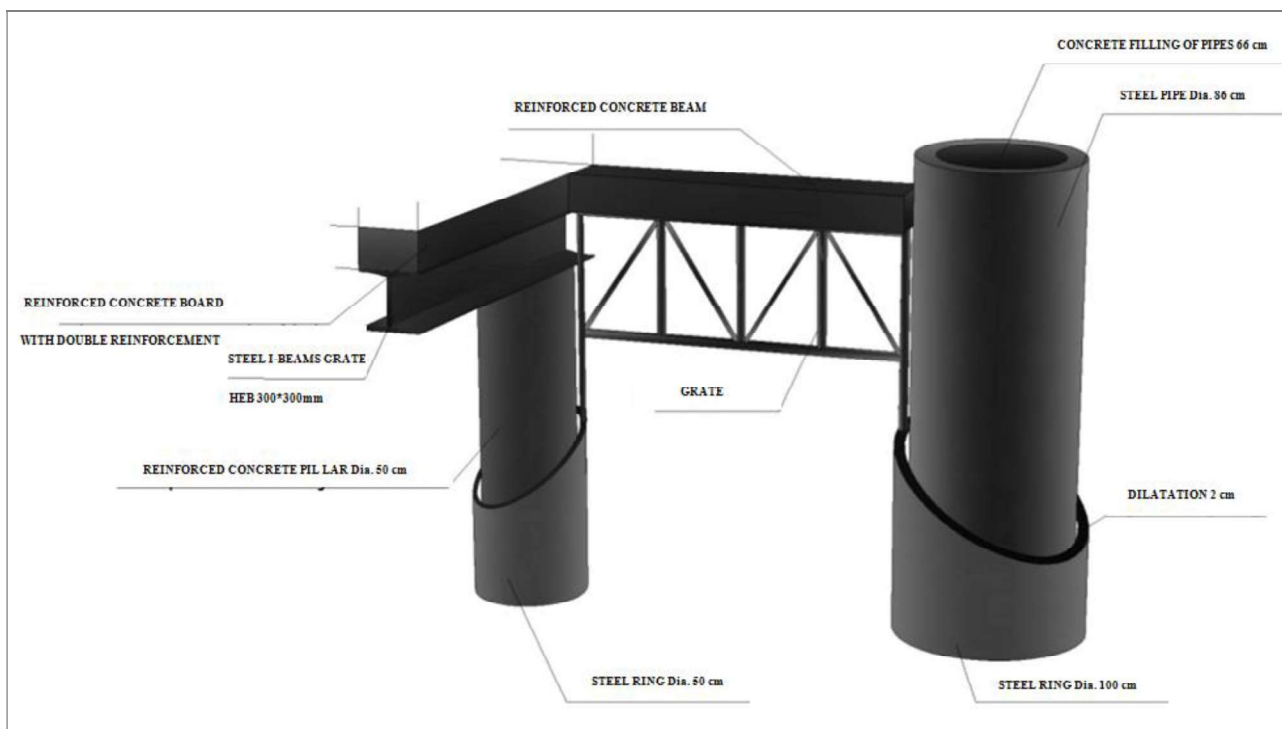


Fig. 11. Mechanism of lifting the building during the flood – detail
(diploma work: “Projekt koncepcyjny ośrodka “Marina” nad Wartą”)

Conclusions

Presented the concept draft gives the picture how complicated is design of the building in the range of the floods of the river. The presented example shows the complexity of the design of facilities located in the vicinity of water, in the case of a partially floating object connected with a continuously standing on the ground.

High complication of this description shows how high requirements are placed on buildings located near the river.

The solutions used in the project and both presented options - an insulated building prepared for the reception of flood waters and a building rising and floating in a limited by the construction manner on the water shows the basic difficulties of human interaction with nature and an attempt to solve accumulating problems.

Perhaps the regulation of the river and the stability of its tides would allow to minimize the research, and to focus attention of the researchers and designers only on the correct hydroequipment insulation of the facility, but due to the general policy of the lack of river waterfronts regulation (especially concerning the Warta river basin) it would be careless to ignore the flooding of coastal areas with flood water.

All this costs taken in designing and building these types of the buildings could be helpful to promote the region and a healthy lifestyle. Multi-functional part of this conception has been adapted so it's possible at any time alter their functions and adapt to the needs of customers.

Project of the Marina could be a part of the harmony of the landscape and is a very interesting solution for "good practice", complicated only at the level of construction that provides answers to problems found at the location.

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