



The city of Regensburg prepares itself for the Danube floods with IBS' modern defence systems

Introduction

The city of Regensburg is in a precarious position with regard to flooding, the main reason for this is where the Rivers Naab and Regen flow into the Danube in the heart of the Regensburg area.

At the beginning of the year 2000 discussions were held with a view to completely defending the 2000 year old Cathedral City from the threat of flooding.

In order to achieve this an Europe wide design competition was held, the design constraints were very strict in order to comply with the rules regarding listed structures, the

environment and water management. Also any outcomes arising from the 'Flood Defence Round Table', a committee formed from members of the public, also had to be taken into account.

At the start of 2006 the outcomes of these deliberations for the defence of Regensburg were submitted. Once the project planning and all legal procedures had been carried out for the first phase of the project construction should have commenced in 2007, however because of the multifaceted and complex constraints coupled with the area's recognition as one of UNESCO's world heritage sites in 2006

the time frame for the completion of the flood defence plan was forecasted to be complete in 2020. Due to the long completion date of this project an interim strategy was put into place by the Regensburg Local Authority, for purpose the IBS K-System was considered to be the best option and was supplied for the districts of Stadtamhof (2003), Reinhausen (2005 and 2006), the old town, Unterer and Oberer Wöhrd (2006).



View from the Steinernen Bridge of the defence line on Thundorferstrasse

Sandbags

In the past sandbags were considered to be the best option for defending property from the threat of flooding, however this antiquated method of flood defence is fraught with problems: an army of men is required to fill the bags and construct the wall, it is very time consuming, vast amounts of material has to be delivered to the site, a certain level of skill is required to ensure that the wall is constructed correctly, breaching of the wall is a constant threat, highly contaminated flood water

means that the sandbags should only be used once and the costly disposal of the contaminated sand.

The level of safety of the emergency flood defence system

The modern day equivalent to sandbags (often referred to as emergency systems) are widely available in the market place in varying forms. These systems of-

fer a safer alternative to the sandbag in the way in which they are constructed, but it must be understood that the barrier is only as good as the ground surface it is to be placed on.

The emergency system can never be as good on be considered an alternative to a planned and ground engineered solution such as a fully demountable flood defence system.

The principle of the IBS mobile emergency defence system (K-System)

The mobile barrier system consists of four components (K-trestles, dam beams, ground seals and pressing tools), in the assembly of which no mistakes are possible. The quality of the raised defence barrier is inbuilt and only depends on the task personnel constructing it with due care. The dismantling process incurs no inherent costs whatsoever.

All the necessary components for the complete construction of the K-System are included in the price and thus are available at all times. For assembly, simple lifting equipment, such as a tractor or light-weight forklift truck, would be helpful. If necessary, the system components can be delivered to the site by a lift truck or individually. Depending on the flood height four to eight people can erect a 100 m defence barrier in one hour.

Practical experience from twelve years of work developing flood defence systems was consequently used for the development of the K-System.

As a unique mobile barrier sys-



IBS system in the construction stage of K-trestles and the first dam beam with ground seal

tem the IBS K-System does not require a waterproof membrane draped over the barrier to make it waterproof along with large heavy chains and metal clips to stop the membrane being blown away in high winds. After each flood event the membrane has to be thrown away and a new one pur-

chased for the next event as the cleaning and inspection for tears etc are very time consuming and costly.

As a result of using high-quality materials which have been used for many years in flood defences, the life span of the IBS system is almost unlimited if properly stored. The system can be used any number of times, without the necessity of making regular replacement purchases.



IBS K-System along Regensburg's historical Danube promenade

Construction of the K-System according to Regensburg's requirements



Fastening possibility: K-trestle bolted with water-sided peg fixed into the street ground surface

The mobile barrier system had to be bendable up to 90 degrees. Radii over at least 20 m did not

require any special system components or equipment. The system had to be delivered with all

the necessary components. No infill panels or specials were required.



Transport container at LKW-hook being loaded

Three fastening possibilities were considered. First the anchoring of the trestles using a water-sided peg. Secondly the hitching of the trestles using tension booms to a safety rail running parallel to the flood defence line and thirdly the shoring to a curb or ground surface.

Storage and transport were of paramount importance to the client. The components of the K-System were to be safely stored in storage racks fixed one under the other without touching and specially designed for transport in rollable containers, prepared and numbered for each assembly area.

Having constructed the flood defence, no goods requiring removal were to be accumulated. The system had to be proven against water pressure to the top edge of the flood defence element in the event of a simultaneous horizontal load per unit length of 0.5 kN/m with point of contact at the top edge allowing for a safety factor of 1.1.

Load transfer into the subsoil and the corresponding statistical layout of the low-lying components was adduced by the city of Regensburg. The secure connecting of the fastening elements to the K-System was the responsibility of the manufacturer.



Container mit geöffneten Side-open-Türen

Conclusion

In terms of earlier flood defence provisions, Regensburg city has equipped itself with approx.

2,000 m² of mobile emergency defence systems. With the definition of load estimates and engineering consideration of the subsoil, which provided ancho-

rage points on the assembly site, and the well thought-out transport logistics, Regensburg city has made allowances for this large K-System construction.

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