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Self-Closing Flood Barrier a Preventive System to Defense Extreme High Flood Events

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***Abstract*—In recent decades due to global climate change, hundred year floods have been occurring worldwide with frightening regularity. Flooding is a natural phenomenon of the environment however floods are known to be the most common natural disaster. Extreme global flooding with increased frequency affects both the developed and the developing world with catastrophic results. In order to protect people and property from inland waterway floods caused by rainfall, a preventive system has to be designed to defense the flood. A self-closing flood barrier(SCFB) is such a vital and promising protective system.SCFBis establish to meet the growing requirement for global solution to extreme flood events. SCFB can be built in rural and urban areas. The present paperwork investigates a study of self-closing flood barrier made fully with aluminum metal which is very cheap and economic for our Indian country. It is an integrated design and product–specific solutions to combat extreme flooding and water incident events. The SCFB offers a optimal protection against extreme high water levels and the ongoing Research and Development program ensure that the SCFB will remain the seeking cost effective and superior flood defense solutions for decade to come.**

Keywords—*Self Closing Flood Barrier; Aluminum metal; Defense Solution;*

I. INTRODUCTION

Since over past decades several techniques have been proposed by many researchers regarding the flood defence system but none of the techniques have proven to be highly effective .Because of their own inherent limitations associated with each technique. The Self Closing Flood Barrier(SCFB) overcomes all the issues associated with these are older-generation flood defences. In operational use globally since 1998 the SCFB is acclaimed as the world's most effective flood protection system [1]. Its success can be attributed to the simple, but ingenious concept of using the approaching floodwaters to automatically raise the barrier; effectively using the problem to create the solution.With an unblemished track record the SCFB is a highly favorable preference when specifying optimal and cost effective but passive flood defense. Rapid onset flooding usually causes the greatest damage due to the lack of time to deploy the more traditional type of manually operated flood gatesand"demountable" systems, typically stored off site and requiring human intervention

The present paper work aims to create awareness about the self-closing flood barrier by suggesting a preventive system to defense the high extreme flood events by using aluminum barrier which is cost effective on par with steel barrier.

II. RESEARCH SIGNIFICANCE

The SCFB is a bespoke engineered solution with unlimited scope that mitigates the hazards that cause loss of human livesand to protect major infrastructure and whole communities as well as industrial or other strategic areas. SCFB significantly reduces man power and is cost effective on comparing with steel made one. The establishment of this self-control flood barrier is technically possible, economically feasible and environmentally acceptable preventive systems that cancutoff extreme flood events. This system finds variety of applications provide vehicular or pedestrian access and for Coastal defenses.

It gains importance to surround low lying buildings like pumping station andto protect critical infrastructure like power stations. Also, it extends its applicability to a roadway for heavy traffic loads and entrance of underground cark parks which prevent the entry of extreme flood level.

III. KEY BEBIFITS

- Infallible.
- Fully automatic deployment.
- Instant deployment justprior to threat of floodwater.
- No human intervention and save man power.
- Zero operational cost.
- No need of power source.
- Minimal maintenance.
- Permanently on site.

IV. MATERIAL USAGE

Aluminum metal is preferred which gives economic design and is light weight.The operation of the wall in a riverside is by means of a rubbergasket. Thealuminum lid closes off the basin to prevent any inflow of waste or debrisSupported by welded support plates on the exterior [2]. The flood wall itself is made from polyester, with a thickness of 4 – 8 mm. It is laminated in a climate controlled hall with permanent humidity and temperature control to guarantee a consistent lamination process. In order to minimize collision damage by flotsam, the flood wall is protectedby Kevlar with high impact strength. The flood wall is reinforced by laminated strips, and is filled with a polyurethane foam core which forms anextremely strong and impact resistant construction.

V. SITE CONSIDERATION

A site survey will be necessary for quotation purposes and in the event of a project going ahead, a more detailed survey should be undertaken for manufacturing and installation details.Initially a layout drawing will be prepared to show the location and the overall dimensions of a proposed SCFB for quotation purposes.Where the project involves a riverside location it may be possible to use gravity. ` The Drainage is to empty and the service pit when flooding recedes. This will depend on the relative levels of the normal water level and the adjacent ground level.The SCFB sections are in standard lengths of 1 meter which may be linked together. The use of pillars can facilitate changes of direction or deviations from a straight line in the run of the barrier.The fig.1 represents the section view of the barrier with concrete basin.

The route of the barrier therefore needs to be defined and divided into suitable section lengths up to 50 linear meter.Where a barrier is to protect a building entrance or drive-way.Top of the barrier installation will be at ground level when not in use. The service pit will require pumped drainage with a built-in pumping system, associated level switches and alarms if required. The fig.2 represents barrier installation in the undergroundsurface. For these projects, datum level sand gradients are important in ensuring that the installation provides full protection against flood conditions.

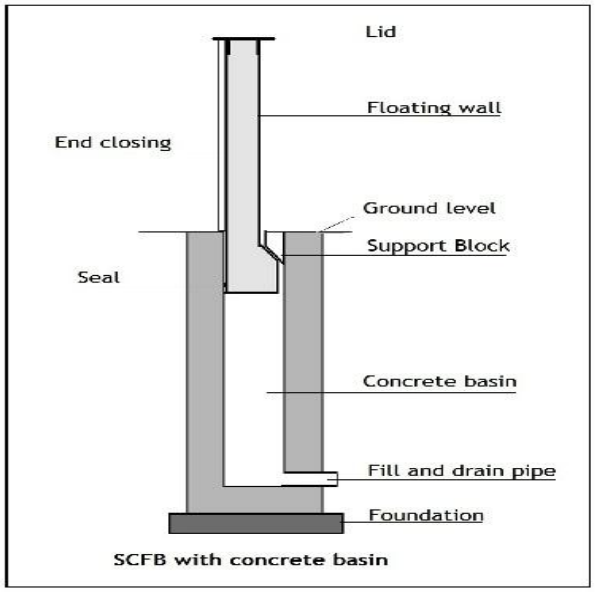

Fig. 1Section view of the barrier with service pit (or) concrete basin.

VI.GROUND CONDITION AND TERRAIN

The relative levels of normal water level, adjacent ground levels and historical data on type of flooding and maximum flood level to be defended will determine barrier height, depth of service pit means and of drainage (gravity or pumped) and, in some cases, whether the barrier installation may partly project above ground in its lowered state.

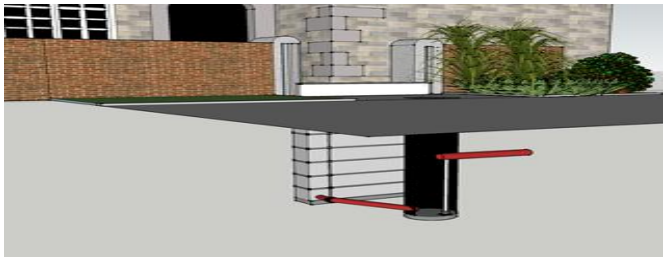

Fig.2 Barrier installation in the underground surface.

VII. PRINCIPLE OF OPERATION

Following installation and in non-flood conditions all operational parts of the barrier are invisibly concealed in the ground inside its basin. When floodwater rises to within 10 cm below the pre-flood level enclosed basin, which houses the floating wall starts to fill up through an inlet pipe from the adjacent flood pit. The fig.3 represents the normal water level with flood barrier recessed in ground.

The flood wall floats and rises. When the basin is totally filled, into position making it watertight.The fig.4 shows the flood water fills chamber.

The floodwater can now continue to rise without flooding the protected area. As the water level subsides back to its normal level, the flood water in the basin is drained by a pump located the flood [3]. As the water leaves the basin, wall returns to its rest inposition within the basin. In its closed resting position, the lid of the barrier seals to prevent the in flood waste or debris. TheFig.5 shows Hydrostatic ensures the barriers stay in until flood subsides

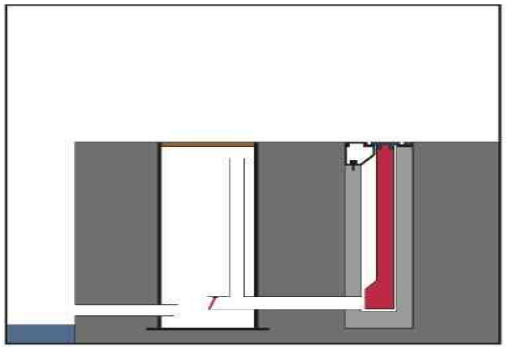

Fig.3 Normal water level with flood barrier recessed in ground.

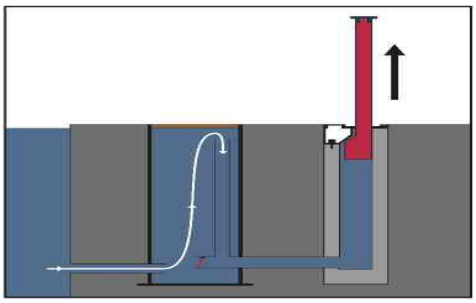

Fig.4 Flood waters fill chambers and force flood barrier to raise pressure

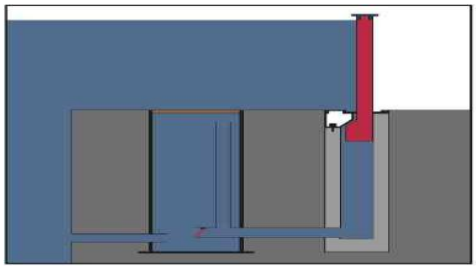

Fig.5 Hydrostatic ensures the barriers stay in until flood subsides.

IX. CIVILIZED METHODOLOGY

It will be necessary to use excavation and lifting equipment on the installation site and therefore necessary to consider the selection of suitable equipment for each project and to make sure that the equipment can gain access to required areas [4]. It may also be necessary to consider how trafficmay impact on site working will traffic controlor control of site working hours be necessary.

IX. THEORETICAL STATEMENTS

The flood wall is designed to withstand more than 10 times the hydrostatic pressure exerted by floodwater at its maximum height [5]. Calculations based on project-specific data are carried out to ensure that the rise times for the SCFB are such that the barrier will rise before flooding of the protected area can occur. These calculations will determine the positions and dimensions of intake structures for drive-way barriers to ensure that water will not enter the control pits unless flooding is taking place but will enter sufficiently rapidly when flooding commences. The calculations take into account type of flooding (flash flood, melting snow, heavy rainfall, etc), surface levels and gradients of surrounding area.

X. DESCRIPTIONFREQUENCY

The Hydrostatic testing of each complete system from intake structure were checking for leakage of seals at the base of the rising barrier during the test and that replace seals that show the signs ofleakagefor 12 months. Visual inspection of seals at the ends of the flood gate that have perished or testing of submersible pump. Finally the testing and cleaning of non-return flap valves in control pit is done.

XI. CONCLUSION

A technical investigation has been made on a preventive system ofself-closing flood barrier to defense extreme flood events and the following conclusions were drawn.

- The aluminum made barrier is found to be cost effective which can be easily prefabricated and is non corrosive and light weight in par with steel made barrier. This leads to low cost and feasible construction of barrier.
- It significantly reduces the man power since it operates by automatic and it greatly minimize the hazards that cause loss of human lives, residential properties, mineral resources, agricultural yield and predominantly the fear towards the extreme flood events.
- The present investigation has embolish the people towards the importance of self-closing flood barrier and created awareness among all human beings to meet the benefits and that we have found to be a good preventive solution in the right location.
- From the investigation a solution to extreme flood events has given which is technically possible, economically feasible and environmentally acceptable flood defense system.
- It is suggested that an experimental testing has to be made on self closing flood barrier to measure the performance with respect to different geological features of Indian country on par with other countries.

REFERENCES

[1] Passive flood defense system, unpublished
[2] O.P.Khanna," Material Science and Metallurgy",Dhanpat Rai Publication (P) Ltd. New Delhi, India, 1999.
[3] Syed R. Qasim, Edward Motley and Guang Zhu, "Water Works Engineering" – PHI learning private limited, New Delhi, India, 2012.
[4] B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, "Soil Mechanics and Foundtions"R.K. Gupta of Publications (P) Ltd. New Delhi, India, 2005.
[5] R.K.Bansal, "Fluid Mechanics",Laxmi Publications (P) Ltd. New Delhi, India, 1983.