

Issue 10 - June 2006

Customer orientation New Web site

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Fusegate system

The economical and reliable way
for increasing dam safety and capacity

[Flash animation](#)

Hydroplus launched its first Web site in 1997, leveraging online technology to keep industry professionals and the public at large informed about the Fusegate system. We have always been attentive and responsive to our clients' needs; accordingly, we have designed and developed a new Web site that better meets your needs and expectations. The site gives you easier access

to the detailed information you may be looking for regarding our products and services. Please visit us at www.hydroplus.com.

Among the enhancements you will find are browser-based data navigation, up-to-date information, and our new library, and free feasibility study. We will continue to add new data and

information and announce new releases through our Fusegate News magazine. We are confident that you will benefit from these new and improved features.

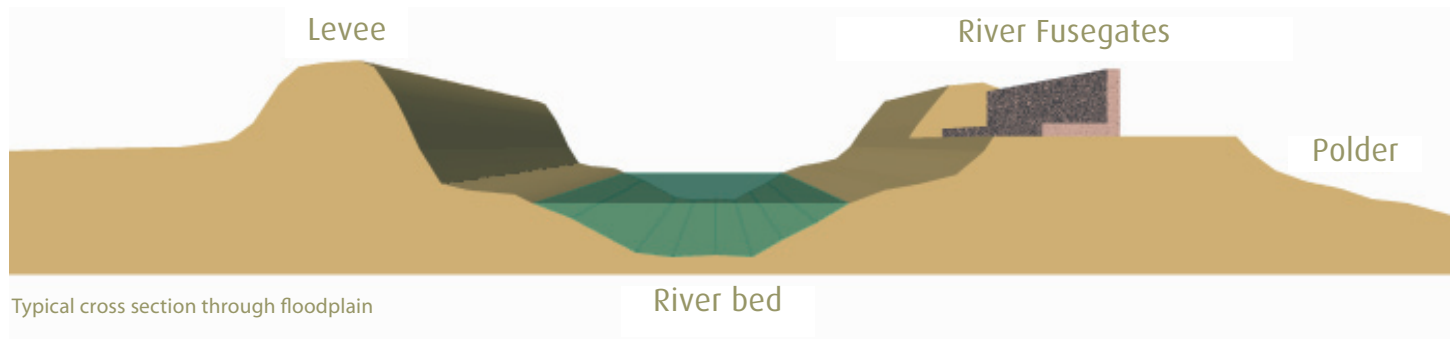
As always, we greatly appreciate your feedback. Please let us know what you think at contact@hydroplus.com.

Free Feasibility Study

To assess the technical feasibility of the Fusegate system on a specific project, we perform a feasibility study at no cost and with no obligation to you. For more information, please visit www.hydroplus.com. Our staff will always be available to answer your queries.

River Fusegates

An innovation and advancement for river flood management



Torrential rains, floods, rising river waters... these are hydrologic conditions that affect many parts of the world. Their impact on the environment and, especially, on local populations is of such magnitude that they have become an important political factor in many countries.

Traditional solutions to such problems have favored a "flood control" approach, resulting in the construction of dams and dykes. More recently, studies have focused on an "integrated flood management" approach in which temporary storage basins known as polders are built alongside streams and rivers. These polders are designed to accommodate the volume of river floodwater that would otherwise discharge over the dykes. By diverting excess water flow in this manner, polders reduce the magnitude of downstream flooding.

Adapting the Fusegate system – which has been used extensively on spillways – to river flood management represents a significant innovation from a technical standpoint as well as a solution that generates substantial direct and indirect savings.

Artificial levee modules (Fusegates), essentially consisting of a concrete skele-

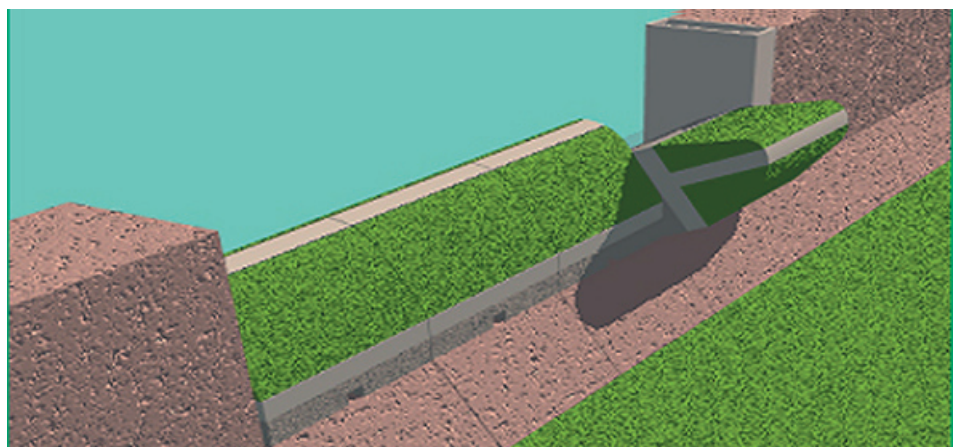
ton covered by grassed earth, act as a low environmental impact spillway.

Ordinary to medium floods are discharged through the limit of the river bed. For catastrophic events, Fusegates rotate progressively and automatically when the river surface reaches various predetermined levels. The controlled breaching of the levee enables to divert excess water flow into the polder.

The use of Fusegates during major floods can significantly reduce the size and frequency of use of polders, leading to savings in operations and indemnities. The use of Fusegates also allows for a reduction in the size of the spillway.

Environmental and socioeconomic benefits

- **Renewable and non-polluting energy source:** gravity and water pressure
- **Environmentally friendly:** locally and environmentally friendly materials
- **Flood protection:** Enhanced protection for at-risk areas
- **Land-use upgrade:** reduced volume and frequency of floodwaters in the polder
- **Implementation of polders:** smaller polders without loss of efficiency



Artist impression of a river spillway equipped with Fusegates covered by grassed earth

Sustainable Development

Extra storage in flood control reservoir

The main function of many dams around the world is flood protection. These dams remain empty much of the time and, as a result, have unused storage potential – an especially valuable asset for dams in locations, where persistent dryness prevails and/or water demand is continuously on the rise.

Many dam owners undertake upgrade work in order to significantly increase storage capacity while preserving or even enhancing the level of flood protection.

An increase in storage capacity is brought out by raising the spillway, preserving the section between the normal reservoir level and the spillway crest. This section is assigned to temporary storage for the purposes of flood attenuation.

A simple and efficient solution, making it possible to achieve the twin goals of storage and flood attenuation, was im-

plemented by the U.S. Army Corps of Engineers at the Terminus Dam located in California at the foot of the Sierra Nevada. The main purposes of this project were to provide irrigation for a vast plain downstream and to protect the town of Visalia against 40-year floods.

At the end of the 1990s, the U.S. Army Corps of Engineers, Sacramento District in collaboration with local players, planned to enhance storage capacity by 52 million m³ (an increase of 29.6%) while raising the flood protection level to 70-year floods. Meeting these two objectives required raising the normal reservoir level by 6.50 m.

Following an evaluation of technical and economic criteria, a decision was made to install 6.50m-high reinforced concrete labyrinth-crested Fusegates on the existing spillway.

Implementing this technology generated savings in excess of \$5 million as com-



Flood control reservoirs, an unexploited resource?

pared to the most cost-effective of the conventional solutions. The upgrade of the spillway cost \$11 million, which corresponds to \$0.21 per extra cubic meter of water. This figure alone justifies the upgrade, even without taking into account the benefits resulting from raising the flood protection level.



Terminus dam nearing full storage

Otter Brook Dam

Effective solution, minimal maintenance

Otter Brook Dam is owned and operated by the U.S. Army Corps of Engineers, New England District. It consists of a 40 m high embankment that was completed in 1958. It is part of a network of flood-control dams built on the tributaries of the Connecticut River. It is also a pleasant area for recreational activities.

A recent flood-reassessment study revealed that the spillway was incapable of discharging the revised design flood. In the light of environmental, maintenance, and cost factors, the dam owner decided to lower the spillway crest, while maintaining the top of the crest at its original level by installing Fusegates.

At Otter Brook, a total of six Fusegates, each 2.75 m high and 8.00 m wide, were installed during the second half of 2005. The first Fusegate tips when the headwater reaches 1.82 m above its crest. A flood of such magnitude has a very low probability of occurrence; for instance, the first and only spillway discharge at Otter Brook Dam involved only a 0.35-m headwater above the sill. Once all Fusegates have tipped, the discharge capacity is 1,650 m³/s as compared to 1,100 m³/s prior to the upgrade, thus protecting the dam from being overtopped. This project demonstrates the extremely



Close view of Otterbrook Fusegates

low level of maintenance required by the Fusegate system. The Fusegate's main structure was constructed in concrete and all other components were made of stainless steel. In this configuration, Fusegate maintenance is limited to annual visual inspections and twenty-year examinations that require the Fusegates to be lifted by a few millimetres to ensure no bonding has developed with the spillway sill. The project life expectancy is in excess of 100 years, as compared to an average of 30 years for conventional steel gates.

This is the fourth Fusegate project in the United States and the second undertaken by the U.S. Army Corps of Engineers. It confirms and consolidates the status of Fusegates as a reliable spillway control system.



View looking downstream

Events

USSD 2006
SAN ANTONIO, TX, UNITED STATES
May 1 to 5, 2006

ICOLD 2006
SITGES, SPAIN
June 18 to 23, 2006

HYDROVISION
PORTLAND, OR, UNITED STATES
July 31 to August 4, 2006

DAM SAFETY 2006
BOSTON, MA, UNITED STATES
September 10 to 14, 2006

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