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PORTABLE DAM AS A WAREHOUSE FOR RETENTION AND USE OF RAINWATER

PRZENOŚNY PRÓG PIĘTRZĄCY JAKO MAGAZYN DO RETENCJONOWANIA I WYKORZYSTANIA WODY OPADOWEJ

Summary: The portable dam is a monolithic device for storing and retaining rainwater. Ways of using portable weirs can be divided into categories depending on the length of the damming period. Short-term damming (several – several hours) may be useful in carrying out hydrological, hydraulic and biological measurements. In forest areas, pastures and meadows, it enables the damming of water necessary for the intake of water by the fire brigade while extinguishing the fire.

Keywords: water breaking threshold, rain water, little retention, rainwater management

Streszczenie: Przenośna zapora to monolityczne urządzenie do przechowywania i retencjonowania wody deszczowej. Sposoby wykorzystania jazów przenośnych można podzielić na kategorie w zależności od długości okresu piętrzenia. Piętnienia krótkotrwałe (kilka-kilkanaście godzin) mogą być przydatne przy wykonywaniu pomiarów hydrologicznych, hydraulicznych i biologicznych. Na terenach leśnych, pastwiskach i łąkach umożliwia spiętrzenie wody niezbędnej do poboru wody przez straż pożarną podczas gaszenia pożaru.

Słowa kluczowe: próg wodoszczelny, woda opadowa, mała retencja, zagospodarowanie wód opadowych

Introduction

At the Department of Water Engineering and Management of the Institute of Technology and Life Sciences in Falenty, a project was developed and prototypes of portable devices that can be used to raise the water level were made in cooperation with an external production plant. In a small watercourse or ditch, facilitating its collection without the need to obtain a water permit for the construction of a water device. The portable dam is a monolithic water-filled device made of material reinforced with polyester mesh, coated with PVC on both sides. It is equipped with four fire valves, two of which on the upper water side are used for gravity filling of the threshold with water in the watercourse channel, while two valves on the lower water side are used to empty the device or regulate the water outflow. A hole located on the crown of the threshold is used for venting. The weight of the threshold is about 20 kg, which allows it to be transported by two adults without the use of additional equipment. The threshold enables relatively quick damming of water up to a height of 60 cm, which does not require obtaining a water damming permit.

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of water necessary for the intake of water by the fire brigade while extinguishing the fire. When carrying out minor repairs of hydrotechnical devices, a portable damming dam enables quick closing of the flow for a specified period of time without making costly partitions. Long-term damming can be used mainly by farmers – damming the water in the ditch allows it to be used for e.g. irrigation purposes – for sprinkler pipelines or irrigation ditches, or for taking water for pasture for farm animals. The main feature of the designed portable devices is their mobility, easy operation, multifunctionality and relatively low price (1,800–2,100 PLN). Not without significance is also the small and only temporary impact of the considered structure on the natural environment.

Additional information

Dimensions 1. width at the bottom equal to 0.8 m, then width at the crown 2.6 m. width at the bottom equal to 1.5 m, then width at the crown 3.3 m The amount of stored water and the length of backsides: The use of a portable dam in the riverbed with a bottom slope of 1.5 ‰ made it possible to store 245 m³ of water in the upper stand of a structure with a base width of 1.50 m. Using a threshold with a base width of 0.80 m, this volume decreased to 163 m³ of water. The ranges of the backwaters created during the simulation were 400 m and 410 m, respectively.

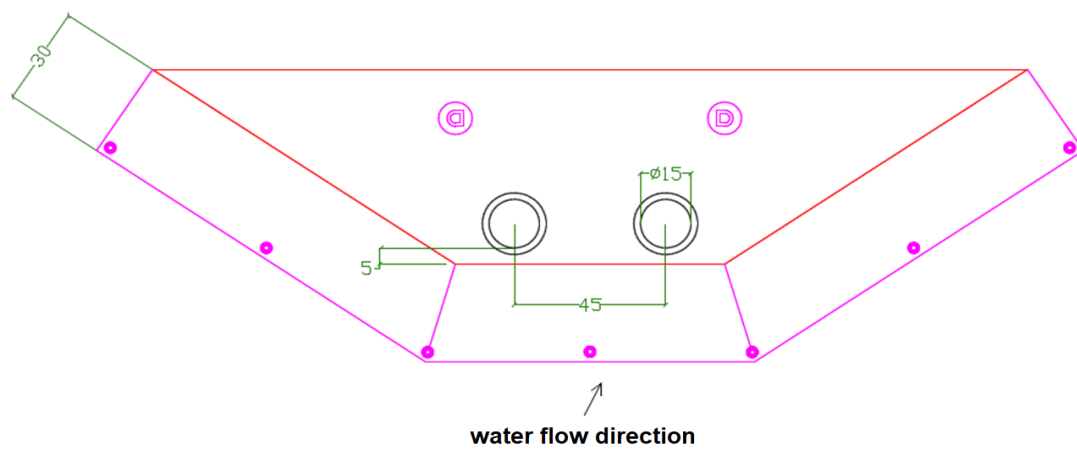


Fig. 1. Design of a portable water dam, part 1

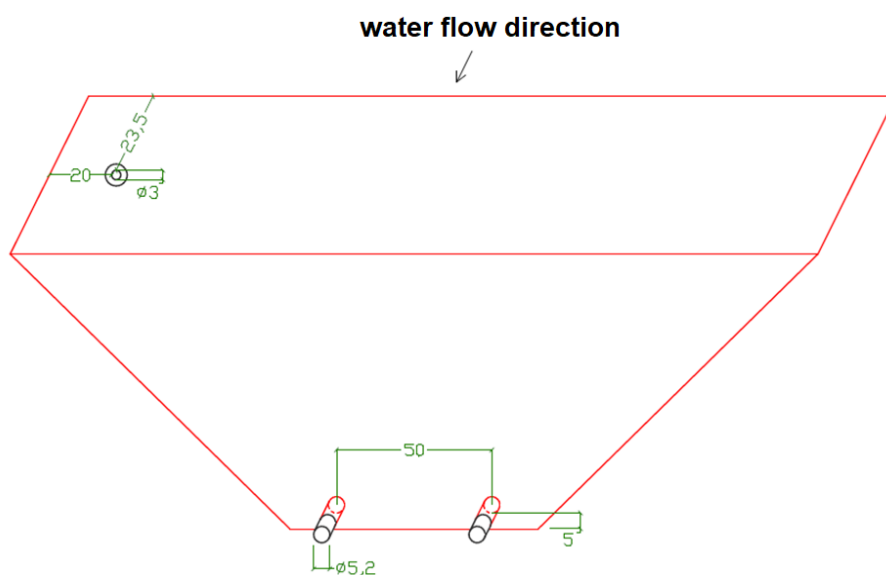


Fig. 2. Design of a portable water dam, part 2



Fig. 3. The threshold apron in the upper stand

Using the water dam

The water damming threshold can be used:

- in agriculture,
- in scientific and research activities,
- in the fire brigade,
- by local organizations, incl. Water Companies,
- in forest areas, pastures and meadows - damming up the water necessary for firefighting,
- in carrying out hydraulic, hydrometric and biological measurements,
- during minor repairs of hydraulic equipment,
- use of stored water by farmers,
- for irrigation purposes – at sprinkler pipelines or irrigation ditches,
- for watering cattle and other pasture animals,
- for use on an agricultural holding for purposes other than food, eg for washing agricultural machinery.

Advantages of a multifunctional device

The advantages of a multifunctional device are as follows:

- 1) Mobility - the possibility of multiple installation of the threshold in any place and time depending on the user's needs
- 2) Relatively low price – compared to permanent damming structures, the price is up to several times lower,
- 3) No need to apply for a building permit as opposed to permanent buildings,
- 4) Low weight – about 20 kg, which makes it possible to move the threshold to any place without the use of specialized equipment,

- 5) Durability of the device,
- 6) Simple operation of the device,
- 7) Multifunctionality 8. It takes no more than 2 people to assemble and disassemble the threshold,
- 8) A very small scope of preparatory works in the watercourse bed – limited to removing large movable obstacles and/or mowing lush vegetation in the bed,
- 9) Short installation and filling time of the device (depending on the speed flowing before the damming of the water – from 10 to 60 minutes,)
- 10) Small and periodic impact of the device on the environment.

Disadvantages and problems of the multifunctional device

The disadvantages and problems of the multifunctional device are as follows:

- 1) Lack of resistance to deliberate, harmful effects of third parties,
- 2) With the depth of flowing water, more than 20 cm, it is necessary to use one meter of steel bars to fix the apron on the bottom – in order to maintain the stability of the device,
- 3) Regardless of the type of soil in the bottom and slopes of the trough, it is impossible to completely eliminate water seepage under the device.

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The advertisement features a background image of a green field with wind turbines under a blue sky. The text 'Pracujemy na zielonej energii' is written in white script across the field. In the bottom left, there are social media icons for LinkedIn and Facebook. In the bottom center, the logo for 'WYDAWNICTWO SIGMA-NOT' is displayed. In the bottom right, there is a QR code. On the right side, there is a white certificate with a green border. The certificate text includes: 'respect energy CERTYFIKAT', 'Ten certyfikat potwierdza zakup energii pochodzącej w 100% z odnawialnych źródeł', 'przez WYDAWNICTWO CZASOPISM I KSIĄŻEK TECHNICZNYCH SIGMA-NOT SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ', 'Dzięki temu WYDAWNICTWO CZASOPISM I KSIĄŻEK TECHNICZNYCH SIGMA-NOT SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ redukuje emisję do 206248 kg CO₂ rocznie', and a QR code with the 'respect energy' logo below it.