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Dikes

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DIKES

D I K E S.

The term dikes is here used to refer duly to structures built out into running streams for the purpose of protecting the banks or of improving the channel of the river.

Under this head are many classes of structures.

The most simple of these is the ordinary stone dike.

This consists simply of a wall of loose stone extending from the bank out into the river at right angles to the current and are usually sloped from the river end upward until at the shore, they are about the elevation of high water. These are used in many places where stone is abundant and machinery for driving piling are not available. As a bank protection they answer reasonably well if they can be placed close enough together to keep the water of the channel and the eddy action of the dike from reaching the adjacent bank. They are also very serviceable as harbors for boats during the winter when there is danger of ice gorges destroying them. Solid dikes like this seldom cause much deposit of sediment above and below them, as is the case of a screening dike. The latter is seldom serviceable for harbor after the first winter, and it is not safe to have boats behind a screening dike until one big rise is over on account of their becoming fast aground.

A stone dike is objectionable on account of its forming such an obstacle to the current that the flow around it is very swift and steamers have a hard time passing them. The eddies under them are also very swift and render a boat practically unmanageable if it should strike too near the dike.

There is a rude form of pile and brush dike that very much resembles the rock dike and is serviceable in the same way, and has the same objectionable features. It consists of two or more rows of piling driven about ten feet, center to center each way, and filled in between with brush, and enough stone added to sink the mass to the bottom. In order to keep the stone from slipping off the brush, bundles are usually made with stone enough inside them, and then these bundles or fascines let down to rest.

Although this fascine dike, which by the way often consists of fascines alone thrown in, in a row until built up to the desired height and having no piling to support them, is very valuable in checking an eddy action caused by a structure that turns the direct current. If a dike is short there is often sufficient back current under the dike to eat away the bank and undermine the whole structure. In this case a row of fascines laid so the bundles lie parallel with the current will very effectively break up the eddy.

Where a tree with a large bushy top falls into the river it will often form a sand-bar; and structures resembling a tree in various ways have been used by different people with more or less degree of success. Systems of these have been used to make up dikes.

The dike that is in best favor at present is the pile dike with screening poles.

This may consist of two rows of piles or of as many as five rows of piles depending upon the amount that the dike is exposed to the force of the direct current. The piles are driven ten (10) feet center to center longitudinally and transversely. The penetration should be from 20 to 25 feet. At the shore end the dike should

extend up to the high water mark and continue at this elevation for from 200 to 500 feet from shore, then gradually slope down until the outer end is about 8 feet below high water, provided the dike is about 1000 feet long. For lengths under this the slope would be about the same, but the height of the end would be proportionately greater.

The piles are braced at the top transversely by a 4" x 8" x 12,' bolted on each side six inches from the top, and packing blocks two (2) feet long bolted securely between these braces and against the piles so that they form a solid shoulder against the pile. Longitudinally a 6" x 8" x 12" waling piece is bolted to each pile.

Around the dike forty (40) feet above, ten (10) feet below, and fifty (5) feet out from the outer end is woven a mattress from 8" to 12" thick of green young willows. The bank at the shore end should be graded down to a slope of one to one and the mattress woven up to the top of the bank above high water and all this shore portion should be paved by hand with heavy broken stone. The outer fifty (50) feet of the dike should have the mattress widened to forty (40) feet on its lower side, to insure against scour. This mattress is sunk to the bottom with broken stone uniformly thrown upon it.

The brush required to weave the mattress is from 0.7. to 0.8 cords per 100 sq.ft. and it requires about one cu.yd. of stone to sink a cord of brush, or 0.7 cu.yds. to sink each 100 sq.ft. of mattress.

The mattress has a 3/8" strand on each selvedge edge and a longitudinal double strand, over and under, fastened with clips, to

every ten (10) feet of its width; and a pair of 3/8" cross strand every twenty (20) feet is securely fastened together.

After the piling are driven, the mattress, woven and sunk, and the bracing put on, the screening poles are put on. These should be nailed to the wa ling of the lower row of a two row dike or the next to the upper row of a three or more row dike .

Screening poles are nailed on about six (6) inches center to center or frequent enough to make the opening about the width of the diameter of the poles used. Young cottonwood poles about three (3) inches diameter at the butt are very good. The large end is sharpened and driven through the mattress at the bottom and pushed well down so that in case the mattress settles, the poles will not come out. Screening is one of the most effectual points of a dike and if drift or ice should knock out any of the poles they should be replaced at once.

A dike of this kind which is illustrated by the accompanying drawings, will form a decided bar above and below it after one month of high water. The effect at first is to scour out very deep hole at the end of the dike and to form a very swift current there, but this lasts only while the water is forcing itself over to the other side, and when the new channel is finally cut out there is often a dry sand bar formed at the end of the dike.

There are so many different conditions existing at various places that it is hard to tell, sometimes exactly just what will happen. Sometimes the river will still hold against the dike and eventually take it out unless it be kept in repair and additionally strengthened.

When it becomes necessary to continue the dike across a part of the river bed, that is dry at the time, and consequently does not take a very high structure to reach the required elevation, a system of abatis are sometime used with good effect. This is a triangular frame work in cross section covered with screeningpoles that slope down the river from the vertical, making an angle of thirty degrees (30°) with the horizontal. The apex of the triangle lying on the ground on the upstream side is heavily loaded with stone, and the bottom of the frame is interlaced with willows so that the water flowing through the screening will not scour out a hole on the under side. When it is required to put these in water, they are built on barges and then pulled off the barge into place.

The drawings accompanying show an imaginary section of river with the dike projecting from a cutting bank and throwing the water over to the bluffs. It also shows the channel that is most likely to be approximately secured.