

The Clemson Beaver Pond Leveler



MINNESOTA DEPARTMENT OF NATURAL RESOURCES

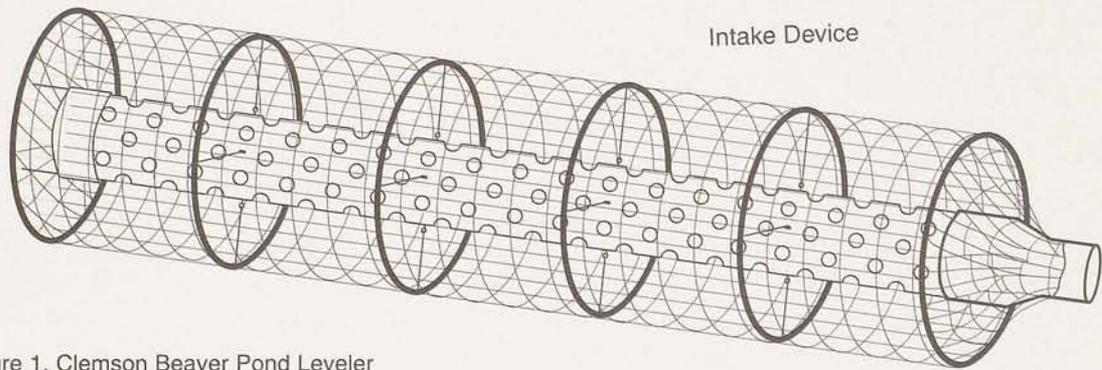


Figure 1. Clemson Beaver Pond Leveler

The Clemson beaver pond leveler is a simple, low-cost device that allows water to flow through a beaver dam or plugged culvert. It is made largely from PVC pipe. It was developed at Clemson University in South Carolina. The Minnesota Department of Natural Resources has field tested the leveler and determined it can be very effective in reducing flooding in certain situations, such as a beaver dam built in a culvert or a dam constructed at the outlet of a small pond.

The leveler does not work in all situations. The leveler is not a substitute for situations that require beaver population control. In some cases, the leveler provides the opportunity to live with, and occasionally derive benefits from, the presence of beavers.

How the Leveler Works

Beavers repair dams in response to the sight, sound, and feel of running water. The Clemson leveler transports water through a dam in such a way that beavers cannot sense it and as a result, beavers don't attempt to plug the leveler.

The intake device is the key component of the leveler (Figure 1). It is placed on the bottom of the pond, ditch or stream upstream from the dam (Figure 2). Also, it may be suspended off the bottom on steel posts. The intake device consists of a 10' long piece of 10" diameter PVC pipe with about 160 2" holes drilled along its length (Figure 3). The PVC pipe is suspended in the center of a 30" diameter welded wire tube (the wire keeps beavers away from the pipe and therefore the source of the leak in their dam). The intake device is connected with a reducer to a section of 8" diameter PVC pipe that runs

through the dam. Attached to this pipe is flexible or rigid PVC pipe that carries water at least 20' below the dam.

Beavers usually repair their dam after a leveler is installed but their efforts are no longer effective in controlling the water level. One Clemson leveler will handle water flows up to 1.5 cubic feet per second. This equals about 700 gallons per minute or 3 acre-feet per day.

Where the Leveler Works

The leveler works best at road culverts, beaver dams on small streams or ponds, and water level control structures. In these situations, flooding is often the result of a dam being built at a critical location rather than the presence of beavers in general. Once installed, the leveler is virtually maintenance free. The initial cost of a leveler can be recovered in months or even days, depending upon labor costs associated with repeated efforts to unplug beaver dams.

A leveler will not solve all flooding problems. The leveler is unsuited for situations when the normal water flow exceeds the capacity of one or more levelers; in large watersheds; where multiple beaver dams exist and the drop in elevation is slight; where water surges violently; or at the outlet of a lake where moving ice in the spring will damage the intake device. Likewise, a leveler may not work where there are extensive drainage ditch systems and large agricultural fields. In most beaver flooding situations, the most effective way to reduce flooding is to remove the beaver and then the dam or culvert plug.

Contact your DNR Area Wildlife Office to determine if a Clemson leveler will work for you.



How to Obtain a Leveler

You may construct a Clemson leveler intake device from the plans and specifications in this brochure with common tools and basic shop skills. Or, you may order a pre-built Clemson leveler intake device from MINNCOR Industries by using the order blank in this brochure. The installer is responsible for buying the outlet pipe and fittings to complete the installation. Materials are available through larger plumbing supply and drain tile outlets. The cost of outlet pipe hookups for most applications is \$100-150.

How To Build a Leveler

The Clemson leveler consists of 2 basic parts, the intake device (Figure 1), and the outlet pipe. If you choose to construct your own intake device, carefully follow the plans and specifications in this brochure (Table 1, Figures 1 and 3). Variation from these plans and specifications will decrease the effectiveness of the Clemson leveler.

How to install a Leveler

- The three basic applications are 1) a beaver dam (Figure 2), 2) a water level control structure (various applications), and 3) a plugged culvert (Figure 4). The intake device may be installed parallel to a road or dike using an elbow to connect with the outlet pipe.

- To install the leveler in a beaver dam, open a small notch in the dam large enough to accept the outlet pipe. This is frequently easier than it appears, using an axe, mattock or ice chisel. Before installing a leveler in a culvert or water level control structure, all debris must first be removed.

- Lowering of the water level 1 or 2 days before installation will make installation easier.

- The intake device should be assembled prior to delivery to the site. The completed intake device will measure about 11' long and 30" wide and will fit in a full-size pickup truck. Two people can typically load and unload it.

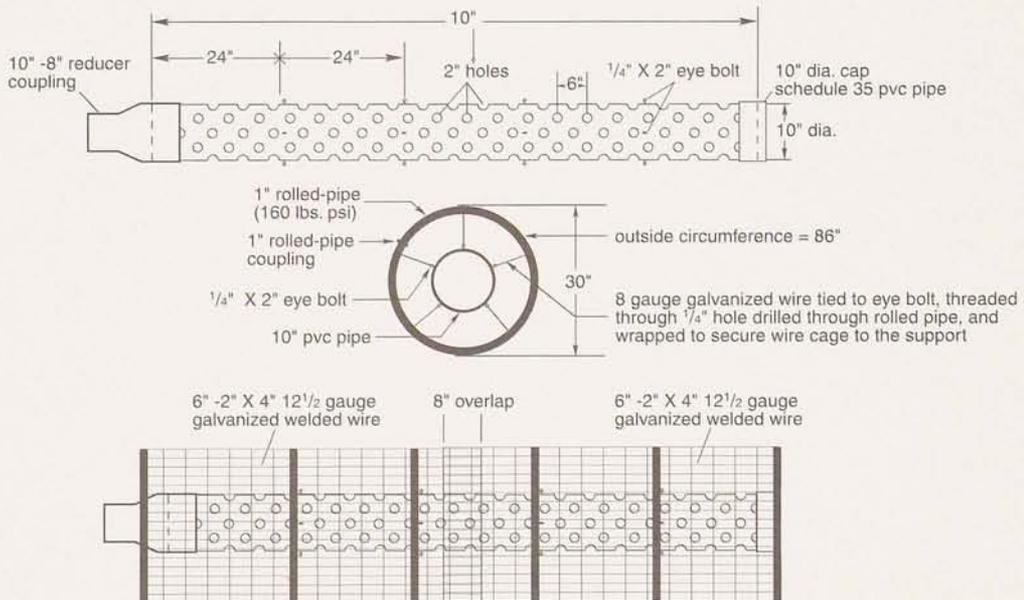


Figure 3. Design of Intake Device

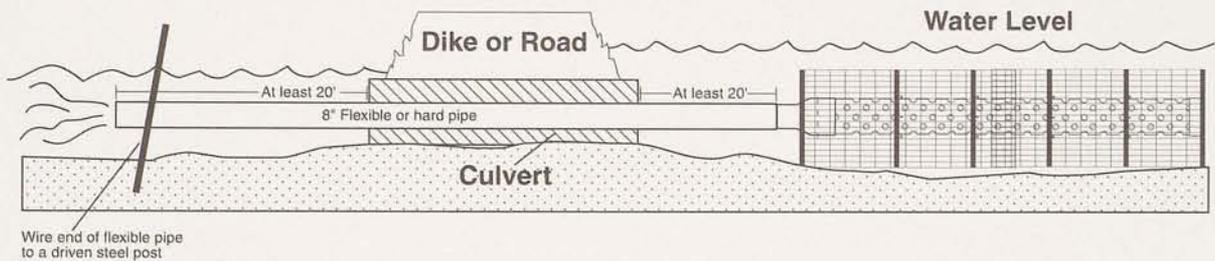


Figure 4. Typical Installation in a Road or Dike Culvert

- Connect the first discharge pipe to the intake device before placing it in the water. Use Schedule 35 8" diameter PVC pipe as the first attachment to the intake device. This comes in 10' and 13' lengths. Sections come with a male and female end that fit together; fitting is made easier by cutting out the rubber gasket in the female end if equipped.

- The intake device may be carried by 2 people or dropped from a boat. It must be placed at least 20' upstream from the beaver dam, plugged culvert, or control structure, preferably in 3-5' of water. The intake device will continue to work even if it is not completely submerged.

- The intake device is placed on the bottom of the pond, streambed, or ditch. In a high siltation area, the intake device may be suspended off the bottom by wiring to steel fence posts driven into the bottom; otherwise there is no need to secure the device to the bottom of the stream or pond.

- A second length of Schedule 35 8" diameter PVC discharge pipe may be added if necessary. The downstream end is then connected to the 8" black flexible PVC outlet pipe routed through the dam, culvert, or control structure to a discharge point at least 20' downstream from the dam or culvert discharge. In culvert applications, if the beaver have not previously plugged the downstream end of the culvert, the outlet pipe does not have to protrude out of the culvert.

- Do not glue pipe sections together. Instead, use lag bolts (1/4" x 1 1/2") or wire pins to hold joints or couplings together.

- Flexible 8" black non-perforated PVC pipe comes in 20' lengths. Sections are joined with a snap coupling. Flexible pipe is attached to the PVC with either a snap coupling for flexible pipe or a rubber

collar coupling. Lag bolt all connections. Schedule 35 8" PVC, although more expensive, may also be used as the outlet pipe.

- Avoid having a pipe coupling in the dam.

- To pass through control structure stop logs, either pre-cut 2 half-circles in 2 adjoining stop logs, or cut a circle to accept the 8" pipe in a stop log replacement insert.

- Flexible pipe tends to float until all air is expended. To sink the pipe either drill several small (1/16") holes in the top of the ribs or (preferably) weight down the pipe with rocks or sandbags.

- Upstream water levels can be maintained by using a variety of methods. For more information on this, contact the Wildlife Damage Management Program at 218-828-2427.

- The outlet pipe should discharge water on the bottom of the creek or ditch. Flexible pipe should be wired to a steel fence post driven into the stream or ditch bottom.

- The following tools are required for installation:

- ___ cordless drill and bits (1/16", 1/8" and 1/4")
- ___ socket wrench and ends, or open and box end wrenches
- ___ slip-joint pliers
- ___ wire cutter
- ___ saw to cut pipe (cross-cut saw)
- ___ maul, sledge hammer or post driver
- ___ wire (14 ga. or larger)
- ___ mattock, pickaroon, ice chisel or pulaski
- ___ axe
- ___ leather gloves are recommended



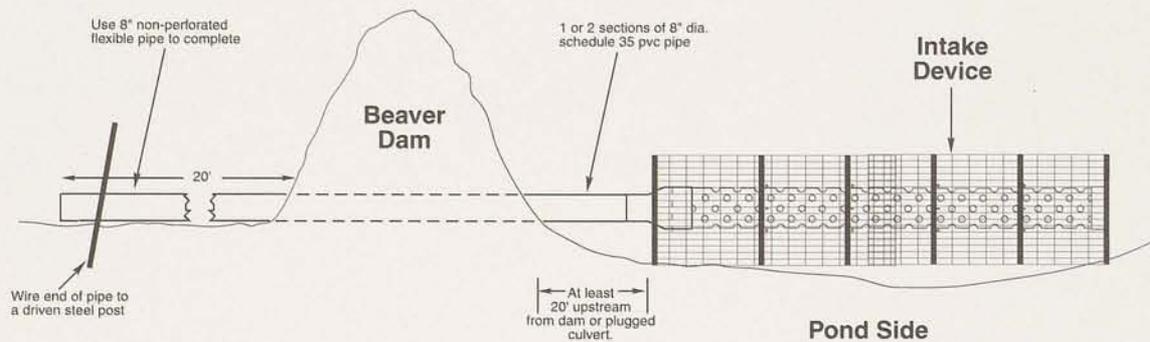
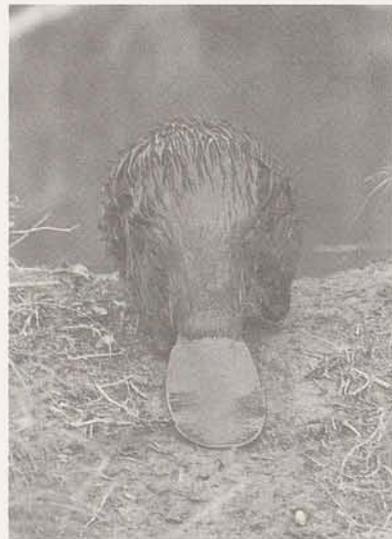


Figure 2. Typical Installation in a Beaver Dam.

Table 1. Materials List for Intake Device

Quantity	Item
1.....	10' section, 10" dia. PVC pipe (Schedule 35)
1.....	PVC cap for 10" dia. PVC pipe (Schedule 35)
1.....	10" x 8" PVC pipe reducer coupling (Schedule 35)
6.....	86" sections, 1" dia. plastic roll pipe (water pipe)
6.....	1" nylon couplings for roll pipe
30.....	1/4" x 2" galvanized eyebolts
30.....	1/4" galvanized nuts
30.....	1/4" galvanized flat washers
30.....	1/4" galvanized lock washers
30.....	16" sections, 8 ga. galvanized wire (medium hardness)
2.....	96" sections, 2" x 4" 12 ga. galvanized welded wire
.....	"C" fasteners or hog rings

Note: MINNCOR Units may be assembled with materials different from this list.



This information is available in an alternative format upon request.

© Copyright 2001, State of Minnesota, Department of Natural Resources.

Equal opportunity to participate in and benefit from programs of the Minnesota Department of Natural Resources is available to all individuals regardless of race, color, creed, religion, national origin, sex, marital status, status with regard to public assistance, age, sexual orientation or disability. Discrimination inquiries should be sent to MN-DNR, 500 Lafayette Road, St. Paul, MN 55155-4031; or the Equal Opportunity Office, Department of the Interior, Washington, D.C. 20240.

