

# 2½" Faircloth Skimmer® Surface Drain

## Instructions for Assembly, Use and Maintenance

### You Will Need:

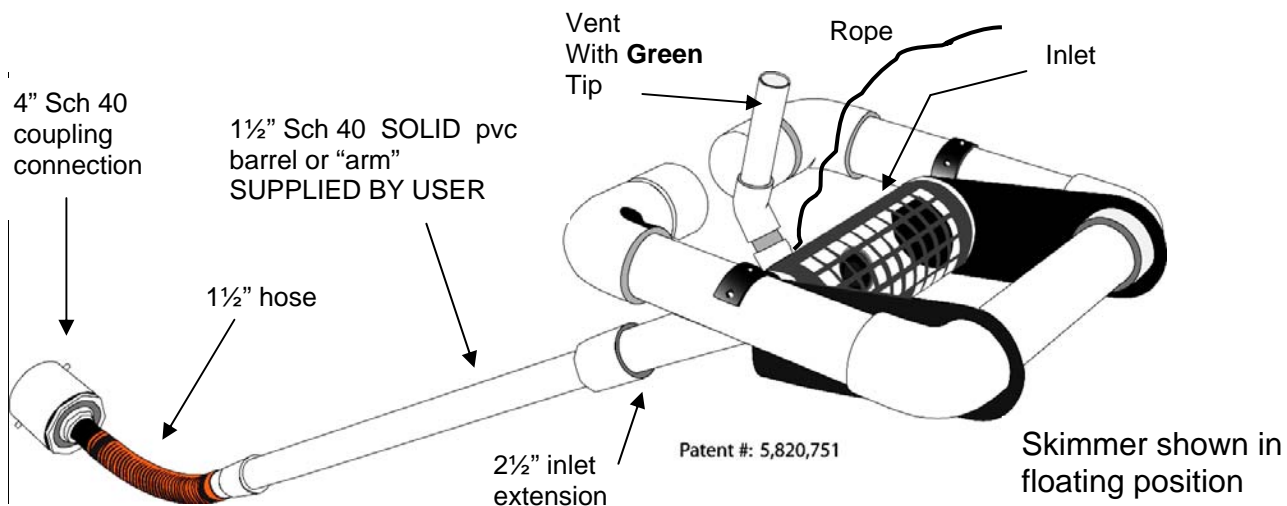
6 feet or more of 1½" Sch 40 PVC pipe SOLID  
Primer and glue for PVC pipe  
Phillips screw driver, maybe a knife

### Assembly and Installation Directions.

1. Glue on the 2½" **inlet extension** to the Tee on the **inlet**. Install the **vent**.

**Details** Prime and glue the 2½" **inlet extension** (with the coupling, 1½" bushing and screw on one end) into the 2½" end of the Tee on the side of the **Inlet** (5" horizontal tube suspended between the sides of the float with the aluminum screen door).

Install the **vent** into the socket in the Tee: back the screw out, insert the short end of the vent, point the long end toward the door on the inlet, and tighten the screw. Use a little grease so it can be removed later.



2. Glue the 6' long 1½" sch 40 **barrel** to the 1½" grey coupling on the **hose**.

**Details** You will need 1½" Sch 40 PVC pipe (solid, not foam core) for the **barrel** (or "arm") between the float assembly and the 1½" **hose**. The **length** of the pipe should be about 1.4 times the depth of the basin so the surface drain floats properly when the basin fills **with a minimum length of 6'** so the surface drain can be pulled to the side of the basin for maintenance.

**If barrel is longer than 8'** weight may have to be added to the inlet so it sits at the right depth.

3. Put the other end of the barrel into the socket on the inlet extension and tighten the screw.

**Details** Make sure the screw point is not protruding into the 1½" bushing on the outlet end of the inlet extension you glued onto the Tee.

**WITHOUT GLUE OR PRIMER**, but with a little grease, insert the other end of the pipe into the bushing all the way in until it hits bottom. It may be easier to do this in the basin after you have connected the hose to the pipe, riser or outlet structure. Tighten the screw so the point enters the pipe to secure it; it does not have to go all the way in. This connection is not glued to allow disassembly and possible reuse of the surface drain later.

4. Cut the **orifice** in the disk (size shown on the erosion control plans), put the disk in adaptor, and install the adaptor on the **inlet**, and tighten the screw. Close the door.

**Details** Refer to the erosion control plans for the orifice size. Open the door on the inlet and remove the 2½" disk in the inlet. Follow the instructions below for cutting the ORIFICE. Put the orifice in the adaptor, install the adaptor on the inlet, secure it with the screw (through the hole in the top of the inlet) and close the door and secure it with the screw eye. If you do not know the size of the orifice, refer to the instructions on the next page.

5. Cut a trench in the bottom of the basin 1' to 2' deep under where the surface drain will be placed. If required, place a support under the surface drain inlet.

**Details** If the surface drain will settle to the bottom when the basin drains it is recommended that a 1' - 2' deep trench a backhoe bucket wide should be excavated under the surface drain to catch sediment that will settle under the surface drain.

If a pool of water is to be provided, install the support under the surface drain inlet as shown on the erosion control plans. It is recommended that the hose connection to the pipe through the dam be low enough that the whole pond can be drained using the surface drain even if a pool of water is to be provided. Doing this will avoid using a pump to drain the very bottom of the pond.

**If ice is expected** during winter place the surface drain near the dam or side of the basin where the ice will be the thinnest and you can get to the inlet to break the ice and keep water flowing through the surface drain. But do not put it so close to the side that the surface drain cannot settle to the bottom and drain the whole basin.

6. Attach the 4" coupling on the hose to the pipe through the dam or the outlet structure.

**Details** Make sure the screw points are not protruding into the 4" coupling on the hose and attach it to the pipe through the dam. Tighten the screws just so the points go into the plastic to secure it. Greasing the pipe is recommended so the hose can be removed later.

If the connection pipe is larger than 4" you will need a coupling for that pipe, a bushing for that coupling with a 4" socket, and about 10" of 4" pipe to create an attachment.

If attaching to a metal pipe you will need a rubber coupling (Fernco) and a short piece of 4" pvc pipe to make the connection.

**OR** The 4" coupling can be removed and the hose connected using the 2" threaded fitting. If attaching to a concrete structure with a hole or orifice at the bottom, either: **1)** grout a 4" PVC pipe into the hole and connect the hose; or **2)** a more secure way is to use a steel plate with a hole cut in it and 2" coupling welded to it that will fit over the hole in the concrete and bolt the plate to the structure with sealant to make it water tight.

7. Attach the rope to the Tee and the other end to a stake on the side of the basin.

**Details** Tie one end of the rope around the Tee between the vent socket and the 5" tube on the inlet. Secure the other end to a stake or post on the dam or side of the basin where it can be used to pull the surface drain to the side if necessary to remove trash and debris.

8. Put a fence post, **1 not 2**, on the opposite side of the barrel from where the rope is tied to a stake to keep the surface drain in place.

**Details** Put the surface drain where you want it to settle to the bottom and drive a metal fence post into the ground **on the outside** of the barrel (away from the side) 2' from the float to hold the surface drain in that place. Posts on both sides of the barrel are not recommended because it will prevent pulling the surface drain to the side for maintenance.

9. Take a break.

## Maintenance



**Trash:** If the inlet screen clogs and there is water in the basin, tugging on the rope several times will usually wash the trash off and restore flow. If not, pull the inlet to the side of the basin and use a stick to clean the screen. Open the screen door and remove any trash or sediment inside so grass or trees do not grow in the inlet. (Yes, this can happen!)

**Sediment Accumulation Around Surface drain:** A shallow, long basin, using baffles, and inflow in the basin at the opposite end from the outlet help keep sediment away from the surface drain. If sediment restricts surface drain movement, pull the surface drain to one side and excavate under it.

**Ice:** Try to keep ice broken up at the inlet and around the barrel to keep water flowing, making it less likely the inlet will freeze. Spray painting the float black to absorb heat is recommended. Use paint that will stick to PVC plastic.

**Handling the Surface drain:** The surface drain is made of plastic and will withstand heat, cold and sunlight but it needs to be handled by hand, NOT grabbed with a backhoe bucket and yanked around, especially in cold weather. To remove the surface drain, disconnect the hose first, then disconnect the barrel from the inlet extension. DO NOT try to pull the surface drain loose with a backhoe.

**Vandalism:** Keep unauthorized persons that may do damage off the site. Do not provide rocks close to the surface drain if possible. If possible, taking other considerations into account, position the surface drain out in the basin away from the banks to decrease the potential for a successful hit.

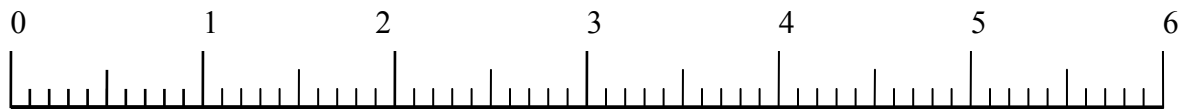
Call if you have problems or questions

## Cutting and Installing the ORIFICE in the Inlet

**Purpose:** cutting a smaller hole or **orifice** (less than 2½") in the disk and installing it on the inlet reduces the flow rate through the surface drain to match the volume of the basin and the number days to drain the basin. It customizes the surface drain for the basin it is used in and **is not optional** if the erosion control plan calls for a specific orifice.

1. The size of the orifice should be shown on the erosion control plans with the sediment basin specifications. If so use the following instructions to adjust the cutter, cut the orifice in the disk, put the disk in the adaptor, and install the adaptor over the inlet. If the size is not shown use the instructions on the next page to determine the orifice size or call us.
2. **Cutting the Orifice** After finding the size of the orifice on the plans or determining the size use the cutter provided to cut the hole in the center of the plastic disk you removed from the adaptor on the inlet.

Measure the radius (1/2 of the diameter) of the required orifice from the center of the pilot hole in the disk and mark it with a pencil.



### Fold Page on Bottom Line to Create Ruler for Measuring Orifice Radius

BE CAREFUL OF THE SHARP NAIL POINT! Loosen the bolt in the slot by turning the wing nut. Place the end of the bolt with the 2 nuts on it in the pilot hole in the center of the plastic disk. Place the point of the nail on the mark for the orifice radius.

While holding the bolt at the proper place, remove the cutter from the pilot hole and tighten the wing nut. You should be able to tighten it without a wrench or pliers.

Next, insert the end of the bolt back in the pilot hole in the disk so the nail point is against the plastic. Hold the disk in one hand while turning the cutter with the other hand and scour the plastic. Don't try to cut through the disk with just one turn, take several on each side. Turn the disk over and scour the other side several times.

The center of the hole should pop out after scouring both sides even if the plastic is not cut completely through around the entire perimeter. If not, CAREFULLY use a knife and cut around the scour line to finish cutting through.

3. **Installing the Orifice** Remove the screw eye holding the aluminum screen door on the inlet and open the door to get to the inlet:

Put the disk into the adaptor and then over the inlet, the 2½” pipe sticking through the side of the 5” pipe with the Tee attached to it. **See the picture above.** Tighten the screw on the adaptor enough so the point goes into the pipe. Put the Phillips screwdriver through the hole in the top of the inlet to reach this screw. Check to make sure the adaptor is secure.

DON'T GLUE THE ADAPTOR ON THE INLET. Doing so limits reusing the surface drain on another sediment basin that requires a different size orifice.

Close the door and replace the screw eye to hold it shut.

### Determining Orifice Size

Draining the sediment basin in the required time involves: **#1** choosing the size surface drain needed to drain the basin's volume in the specified number of days, in this case a 2½” surface drain; and **#2** adjusting the flow rate through the surface drain using a smaller **orifice** or hole placed over the inlet pipe. To determine the radius of this orifice divide the basin's volume by a **factor** (from #2 below) for the number of days to drain the basin; the result is the required area of the orifice. Then, calculate the orifice radius using  $Area = \pi r^2$  and solving for  $r$ ,  $r = \sqrt{(Area/3.14)}$ . The cutter can be adjusted to that radius and the orifice cut in the plastic disk that fits over the inlet as described above. This procedure “customizes” the surface drain for the basin it will be installed in.

1. Approximate surface drain maximum capacities based on typical draw down requirements, which can vary between States and jurisdictions and watersheds. Draining the basin in less than 2 days is not recommended.

2½” surface drain	6,234 cubic feet in <b>24</b> hours	31,170 cubic feet in <b>5</b> days
with a 2.5" head	12,468 cubic feet in <b>2</b> days	37,404 cubic feet in <b>6</b> days
	18,702 cubic feet in <b>3</b> days	43,638 cubic feet in <b>7</b> days
	24,936 cubic feet in <b>4</b> days	

2. **Factors** (in cubic feet of flow per square inch of opening through a round orifice for the draw down times shown) to use in determining the orifice radius in inches for a particular basin volume to be drained. This quick method works because the orifice is centered and has a constant head, (the distance between the center and the water surface).

An alternative method is to use the orifice equation ( $C = 0.59$ ) with the head for the particular surface drain (shown under #1 above) and determine the required orifice for the volume and draw down time.

2½” surface drain	1,270 to drain the basin in <b>24</b> hours	6,350 to drain the basin in <b>5</b> days
	2,540 to drain the basin in <b>2</b> days	7,620 to drain the basin in <b>6</b> days
	3,810 to drain the basin in <b>3</b> days	8,890 to drain the basin in <b>7</b> days
	5,080 to drain the basin in <b>4</b> days	

The **1)** size surface drain necessary for the sediment basin and **2)** the required orifice radius and diameter for the surface drain should be shown on the erosion control plan for each basin. Also give the basin volume and number of days to drain; this can be helpful when the contractor orders the surface drain. During the surface drain installation the required orifice can be cut in the plastic disk by the contractor using the supplied cutter and installed in the surface drain using the instructions with the surface drain.

The plan review and enforcement authority may require calculations showing that the surface drain used can drain the basin in the required time.

For more information on sizing the orifice and for an example problem go to our web site or call us.

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2½” Faircloth Skimmer®