SmartDitch® Technical Tips

1. **Importance of properly sizing SmartDitch (what happens if it's undersized?):**

   If you want your SmartDitch® installation to provide years of consistent performance, it is vital for you to choose the right sized SmartDitch channel. Here's why:

   - Storm events have become much more intense lately. SmartDitch should be sized to convey a 100-year storm flow.
   - Freeboard should be provided as determined by the design consultant.
   - SmartDitch is not designed to function properly when the flow depth is greater than the maximum recommended flow depth.
   - When flow depth is greater than the maximum recommended flow depth, the adjacent ground can become saturated and the earth anchors could lose holding capacity resulting in the ground not holding the anchors.

   If you have questions or need assistance in your design, please refer to the SmartDitch Technical Manual or call the hotline: 1-855-5-SMARTD.

2. **The Importance of knowing your soil conditions:**

   Soil conditions will determine the anchoring requirements to secure SmartDitch® and avoid failures caused by inadequate support.

   - SmartDitch is designed to prevent soil erosion in a flow channel.
   - The soil next to SmartDitch must be able to hold a 1:1 slope on its own without relying upon support from SmartDitch.
   - The Unified Soil Classification must be determined for the site to allow SmartDitch Engineers to calculate the anchor requirements. Anchor requirements are a function of the soil friction angle, channel slope, flow depth and channel width.
   - Soil used to backfill the void between SmartDitch and the trench wall must be angular to provide stability after backfilling has been completed. Rounded soil particles are not recommended.

3. **Why use edge protection?**

   If you want to minimize erosion and undermining of SmartDitch® after it is installed, we strongly recommend the use of edge protection

   - Lateral flow to SmartDitch can cause soil erosion along the channel's edge.
   - 30 mil HDPE edge protection is commended on the SmartDitch edges that receive lateral flow to control soil erosion along the SmartDitch® edge.
   - Edge protection is also recommended when SmartDitch is installed on slopes 30 percent or greater to control edge erosion.
   - Edge protection kits are available from SmartDitch and include a 560' roll of 30 mil HDPE, 400 screws, 400 washers and installation instructions.

4. **Why SmartDitch instead of rip rap?**

   Simply put, rip rap is not a permanent solution and becomes costly to maintain over time. Here are just a few reasons to consider SmartDitch as its replacement:

   - It's lightweight and easy to transport.
   - Easy to install, does not require heavy equipment.
   - Unlimited shear stress/ velocity.
   - SmartDitch is made from flexible HDPE can be installed on curves and can tolerate some settlement.
   - Eliminates erosion.
   - Virtually maintenance free, no vegetation growth.
   - Excellent Mannings flow coefficient.
   - High chemical resistance.
   - Easily removed and installed in another location.
   - Made from 70 -100 % recycled HDPE.

5. **The SmartDitch pre-construction checklist:**

   Having the proper tools is critical to a smooth and efficient SmartDitch installation. Tool requirements are listed on your installation guidelines included with every order. Below are your minimum suggested pre-construction needs:

   - Modified backhoe bucket to excavate trench to SmartDitch shape.
   - Various hand tools including 7/16" (11mm) sockets, 3/8" (10mm) open end wrench, socket adapters for cordless drills, hammers, vice grips, side snips, anchor drive rod, utility knives, tape measure, shovels and rakes, chalk line.
   - Drills/impact drivers with ½" (13mm) drill bits.
   - A reciprocating saw for cutting and trimming.
   - A leaf blower to remove debris, leaves and scrap from the channel after it's installed.
   - Driving tool to sink anchors into the ground.

6. **Accepted methods of driving in BetterBilt #680 anchors to secure SmartDitch®**
   *(Having this knowledge is will definitely make your anchoring process go smoother)***:**

   - A gas powered fence post driver, such as Rhino GPD-40 has been found to be effective. An adapter will be needed to fit the GPD 40 and the anchor drive rod (this needs to be fabricated).
   - Hammer drills, such as Hilti TE 70, with an adapter to attach the anchor drive rod (this will need to be fabricated).
   - A Small air hammer, with an adapter to fit the air hammer and the anchor drive rod.
   - A sledge hammer can be used to pound the anchor into the ground.

7. **Need to install SmartDitch on a curve? Here's how:**

   One of the advantages of using SmartDitch is that it can be installed on a curve. The minimum radius of curvature for 12" SmartDitch is 10 ft. For 24" SmartDitch it is 75 feet and requires a little bit of field cutting:

   - To install 24" SmartDitch on a 75' radius of curvature, cut off one upper knuckle on each side of the section at the mid point.
   - Place the 24" trapezoid section in the trench and install the gasket and self-tapping screws.
   - Bend the section to the trench curve and install anchors on each side of the removed knuckles.
   - Cover the area where the upper knuckles were removed with edge protection.

8. **Installing SmartDitch in high groundwater areas:**

   High groundwater will exert hydrostatic pressure on SmartDitch and could bulge up the bottom and sidewalls. Here's what you need to do to avoid that:

   - An installation detail is available from SmartDitch that shows you how to perforate the HDPE channel liner.
   - A 4" to 6" (100mm to 150mm) layer of ¾" (19mm) clean stone wrapped in filter fabric should be installed in the trench bottom.
   - ½" (13mm) holes should be drilled in the top of the ribs on the SmartDitch® bottom at appropriate intervals.

9. **Importance of stabilizing the soil adjacent to SmartDitch:**

   The soil adjacent to SmartDitch must be compacted to 90 % *Modified Proctor* density to ensure minimum voids and prevent surface water flow from saturating the ground and reducing the anchor strength. Here are a few tips to ensure that:

   - Do not compact close enough to SmartDitch® to cause the side-wall to bulge into the channel.
   - If lateral flow will occur, edge protection must be installed to control SmartDitch edge erosion.
   - Lateral flow areas must also have erosion mat installed to facilitate grass growth to stabilize the soil and minimize erosion.

10. Mannings "n" value on steep slope SmartDitch installations:

Steep slopes cause turbulent flow and reduce the Mannings "n" value, used to calculate SmartDitch® flow. Here's what you can expect:

- A Mannings "n" value of 0.022 is used when flow is not turbulent.
- A Mannings "n" value of 0.029 is used when flow is turbulent.
- 12" SmartDitch has turbulent flow when the slope is 1.2 percent or greater.
- 24" SmartDitch has turbulent flow when the slope is 1.0 percent or greater.
- Single base single sidewall MegaDitch® has turbulent flow when the slope is 0.7 percent or greater.

11. You can make SmartDitch permanent or temporary:

Another SmartDitch feature is that it can be installed, removed, and then re-installed in another location. Here are some quick tips for that:

- Remove any edge protection.
- Cut the anchor cables and remove the self-tapping screws.
- Remove the SmartDitch® sections and remove the gasket.
- New anchors, gaskets and edge protection would be required for the re-installation.
- Existing self-tapping screws can be reused.
- SmartDitch can also be recycled at the end of its useful life.

12. Using SmartDitch Flared Ends as Inlets and Outlets:
Here's how to tell the difference and how to convert from one … to the other?

Flared ends are made for an upstream inlet at the beginning of a channel and downstream discharge at the end of a channel. The difference between an upstream and downstream flared end is the number of ribs on the flared end. The ribs on an upstream flared end can be trimmed off to make a downstream flared end. Here's what you need to do to make the conversion:

- The 12" SmartDitch upstream flared end has three ribs.
  - To convert a 12" SmartDitch upstream flared end to a downstream flared end two ribs must be cut off. Make the cut at the rib valley.
- A 24" SmartDitch upstream flared end has two ribs.
  - To convert a 24" SmartDitch upstream flared to a downstream flared end one rib must be cut off. Make the cut at the rib valley.

NOTE: A downstream flared end can't be converted to an upstream flared end.