SMARTDITCH
FINALLY, SMARTER SOLUTIONS IN WATER MANAGEMENT.

PRODUCT SPECIFICATIONS

SmartDitch™ Lining System

General

The SmartDitch™ liner system is designed to install easily in existing, meandering irrigation ditches, laterals, or other components of gravity-flow irrigation systems with simple hand tools and unskilled labor. The product is designed to reduce water losses and leakage from earthen gravity-flow irrigation ditches. The system will also reduce maintenance requirements and increase the amount of water available from the irrigation system.

before

after

SmartDitch is covered by US Patent 6,273,640 B, for a transportable, flexible, lightweight liner system. The liner system is comprised of corrugated sections that are approximately 8' in length weighing approximately 40 lbs. per section. Modular outlet gate (diversion) sections with the exact dimensions as the corrugated sections can be installed at any location in the installation to divert water from the irrigation ditch for irrigation or other intended purposes.

Scope

This standard applies to the SmartDitch liner and is restricted to installations in ditches/laterals that have a minimum top and bottom width of 3 feet and a minimum slope of 1/2 percent. This standard includes requirements for the installation of the SmartDitch liner system.

Applications

To reduce water loss, improve reliable water flow, and reduce maintenance requirements for earthen irrigation ditches including agriculture/irrigation, erosion/repair, storm water management and public works.

Conditions Where Practice Applies

- Irrigation ditches and laterals to be lined shall serve as integral parts of an irrigation water distribution or conveyance system to facilitate the conservation of soil and water resources.
- Water supplies and irrigation deliveries for the area served shall be sufficient to make gravity-flow irrigation practical for irrigation water application methods to be used.
- Ditches, laterals and other components of the irrigation water distribution system that meander and/or are located in an area that prevents easy access by heavy equipment without significant alteration to existing topography or damage to the environment are prime applications for this product.

Design Criteria

Capacity: Lined ditch shall have enough capacity to meet the requirements as part of the planned irrigation water distribution/conveyance system without overflow. The maximum freeboard allowed is 2". The Mannings coefficient of friction for the lining system is n=0.022. This Mannings coefficient value shall be used for all calculations required to determine maximum capacity and flow velocities for the lined ditch.

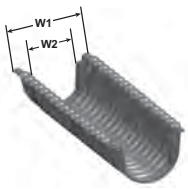
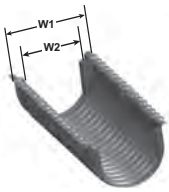
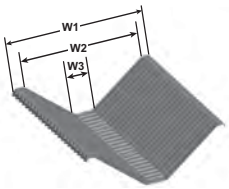
Velocity: The velocity in ditches lined with the liner shall be sufficient to carry the required flow. Velocity will vary dependent on slope of existing ditch, lateral, or other water work. Minimum slope requirement for installation of SmartDitch liner system is 1/2 percent.

Side Slopes/Bottom: Side slopes and bottom of the earthen ditch shall be free of debris, rocks and other sharp objects that may damage the liner system once installed.

Leak Rate: The average leak rate based on 6 fasteners submerged per connection on a typical SmartDitch installation is 0.039 cfs/1000 ft.

Technical Data

A. Corrugated Section Specifications:
   a. Material: High Density Polyethylene
   (See Appendix A for material properties)

	 24" Semi-Circular	 36" Semi-Circular	 Trapezoidal
Length	8′	8′	8′
Width 1	33″	42″	90″
Width 2	24″	36″	75″
Width 3	—	—	12″
Radius	12″	18″	—
Height	20″	28″	27″
Weight	35 lbs.	42 lbs.	78 lbs.
Mannings Coefficient of Friction	n=.022	n=.022	n=.022

B. Earth Anchor:
   a. Material: Aluminum with Stainless Steel Cable
   b. Length: 60" (36" & 24") 40" (Trapezoidal)
   c. Cable Diameter: 3/32"

System Performance

Flow rate calculations for the liner system are based on the standard hydraulic flow formula:

Q = (1.49/n) A R2/3 S1/2

Where:
Q = total flow
N = Manning's Coefficient of Friction (0.022)
A = area (sf)
R = hydraulic radius (ft) [R = A/wetted perimeter]
S = slope (%)

Note: Maximum flow through system is at 2" freeboard

Plans & Specifications
Plans and specifications for the installation of the SmartDitch lining system shall be in keeping with requirements contained in this standard and shall describe the minimum requirements for installation of the SmartDitch liner system to achieve its intended purpose.

Installation. All activities associated with the installation of the SmartDitch lining system shall conform to the requirements contained in the SmartDitch Installation Guide.

Sub-grade Preparation. Sub-grades on which the SmartDitch liner will be installed shall be free of debris, rocks and sharp objects. Tree roots shall be trimmed and removed.

Tool Requirements. The following minimum tools are required for the installation of the SmartDitch lining system.

- 1/4" drill bit
- 1/2" drill bit
- Portable Drill (Cordless)
- Rubber mallet
- Carpenter's Hammer
- Carpenter's Level (36" minimum)
- Shovel
- Vice Grip (2)
- Anchor installation tool (1/2" x 36" rod)
- Pliers
- Wire Cutters
- Utility

Connecting the Liner
(for diagrams and more detailed instructions see the installation guide)

STEP 1
Install foam gasket strip inside the channel groove (female end).
NOTE: 58" Foam caulking strip for 36" ditch. 39" Foam caulking strip for 24" ditch.

STEP 2
Nest the section by placing the male end having the "No Swimming" logo over the next section staking column having the foam caulking strip.

STEP 3
Once parts are nested, place one vise grip on each side of nested area and clamp to secure for installation of ratchet fasteners.

STEP 4
Drill 1/4" holes through both nested liners at the dimples visible on the top side of the male liner and install ratchet fastener clips. (8 fastener clips per connection.)
NOTE: Visually inspect backside of connected liners to ensure that ratchet fastener clips have pushed through and secured overlapped liners.

Placement
Drive cable anchor into ground at desired location close to staking columns.
Pull up on cable to engage anchor horizontally.
After liners have been placed in the ditch, anchor first section in place.
Pull on unanchored end of last section to straighten connected sections tight. Anchor each section.
(Connect no more than 10 sections together prior to placement into the ditch.)

Anchoring

STEP 1
Drill 1/2" holes through both nested liners at the recessed barrel of the staking column.

STEP 2
Drive cable anchor into ground at desired location close to staking columns.
Pull up on cable to engage anchor horizontally.
After liners have been placed in the ditch, anchor first section in place. Pull on unanchored end of last section to straighten connected sections tight.
Anchor each section.

STEP 3
Thread loose end of cable anchor up through 1/2" holes drilled in stake column.

STEP 4
Slide the washer over the cable and on to the stake column. Take a cable lock and thread the cable up through the narrow end of the cable lock and slide the cable lock down snugly against the washer on the stake column.
NOTE: Do not over extend cable anchors such that the section connection is bowed out. (See Figure 8B)

STEP 5
Using a pliers, grip the cable securely and tighten the cable lock until cable anchor is taut. Trim excess cable.

STEP 6
Repeat process to all other stake columns. Cut/trim excess cable flush with cable lock.

Backfill. Backfill between liner system and irrigation ditch using material free of debris, rocks and sharp objects.

Maintenance. Inspect SmartDitch lined irrigation ditches, laterals, or other components of the water distribution system regularly to ensure proper operation and delivery of water. Remove any rocks, debris, or other obstructions from liner system to ensure maximum flow and efficiency.