The SmartDitch® System

When it's all about ...

CONTROL





Quick Overview

Why SmartDitch is a wise choice...

- 1 About The Company
- 2 The SmartDitch System
- 3 Typical Applications
- 4 Features & Benefits
- 5 Typical Specifications
- 6 Installation Procedures
- 7 Project Highlights
- 8 MegaDitch





The Manufacturer

Penda Corporation

Based in Portage WI, Penda is North America's #1 heavygauge thermoformer





Considered the market leader in several industry segments

- State of-the-art, 250,000 square-foot engineering, manufacturing, testing & warehousing facility
- \$100 million company
- ISO 9000 Certified, TS 16949 & ISO 14001 compliant
- Outstanding relationships with our OEM customers



The Manufacturer

Penda Corporation

North America's #1
heavy-gauge
thermoformer &
Tier 1 supplier status
for more than 40
years

Considered the market leader in several industry segments



- Pick-up Truck Bedliners & Tonneau Covers
 - Ford & Dodge
- Custom Thermoformed Products
 - Jacobson & Kawasaki
- Water Management Products
 - Cultec Stormwater Chambers
 - SmartDitch Systems





The SmartDitch System

A flexible, thermoformed HDPE channel/ditch lining System

Engineered to provide consistent & predictable flow rates

Sizes & shapes
offer a broad range
of installation
capabilities



- Designed & manufactured in the USA
- HDPE construction provides exceptional tensile strength, chemical & abrasion resistance
- Resins contain UV stabilizers that inhibit the physical & chemical process of UV induced degradation



The SmartDitch System

A flexible, thermoformed HDPE channel/ditch lining system

Engineered to provide consistent & predictable flow rates

Length & weight make it easy to handle & install



- Manning's "n" coefficient meets the industry standard of 0.022
- Corrugated design helps regulate water flow
- Self-scouring ability during high flow rates helps keep channels clear



The SmartDitch System

A flexible, thermoformed HDPE Channel/Ditch Lining System

Engineered to provide consistant & predictable flow rates

Length & weight make it easy to handle & install



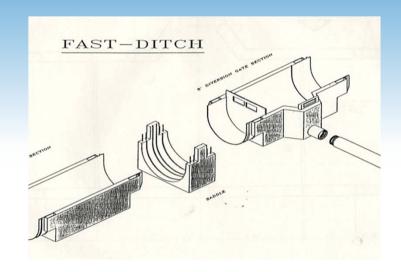
- 12" Depth Trapezoidal sections are 10' long & weigh just 52 lbs
- 24" Depth Trapezoidal is 9.5' long & weighs 89 lbs
- 24" Depth Semicircular is 8' long & weighs 36 lbs



History of the SmartDitch Concept

In 2003, an engineer from New Mexico approached Penda to help refine his liner concept to repair a badly corroded irrigation ditch.

- ✓ A group of farmers and engineers in New Mexico needed to repair over 7 miles of corroded and cracked concrete irrigation ditch
- ✓ Losing over 60% of the water out of corroded ditch system
- ✓ Too expensive to dig up and replace
- ✓ Need for a ditch lining system that would withstand a harsh climate
- ✓ Needed to be leak proof
- ✓ Needed to be easy to install & maintain
- ✓ Needed to be affordable



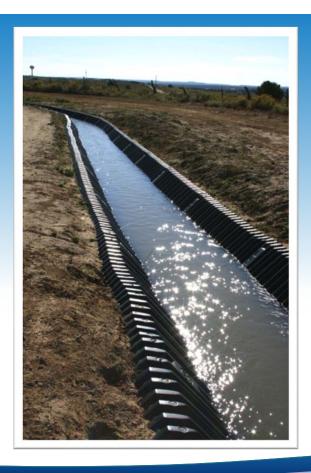


History of the SmartDitch Concept

"Eight years later, the relined irrigation now delivers over 90% of the water to the farmers."

- Ed Suazo ❖ FastDitch







SmartDitch Today

There has been a paradigm shift in the ditch lining system approach

Traditional methods of building and/or relining irrigation and water conveyance channels must now be rethought. SmartDitch is now a proven alternative to traditional ditch and channel lining systems.

- Traditional methods include:
 - ✓ Rip Rap
 - ✓ Turf Mats
 - ✓ Geotextile Ditch Liners
 - ✓ Vegetated Ditches
 - ✓ Concrete Lined





SmartDitch Today

Product Approvals

Industry standards are being met:

- The product has been specified by the U.S. Army Corps of Engineers and the U.S. Navy
- Specified by the Canadian Ministry of Transportation
- The product has been used for numerous erosion and drainage DOT projects
- The Natural Resources Conservation
 Service (NRCS) has issued a standard specification
 for the use of SmartDitch
 (Code 428B)
- The U. S. Forest Service





Complete Line of Fittings

Trapezoidal Straight Bulkhead --Flared End Section -Downstream Inlet/Outlet **Directional Bulkhead** Straight Bulkhead -Upstream Directional Tee Section -Directional Gate -Left/Right Left/Right



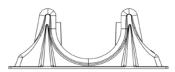
Complete Line of Fittings

24"-Depth Semi-Circular

Straight Section -



Standard Saddle -



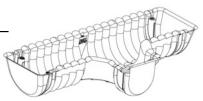
Straight Bulkhead – Downstream



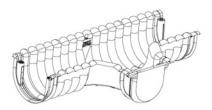
Straight Bulkhead – Upstream



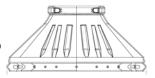
Directional Bulkhead/
Directional Tee Section –
Left/Right



Directional Gate – Left/Right



Flared End Section -- Inlet/Outlet Transition Section - 24" Semi to 24" Trap





Easy to Transport & Handle

Product is shipped on pallets and can be easily handled in the field







Material Testing

HDPE material meets or exceeds these ASTM specifications:

- ✓ D 638, Type IV Tensile Yield & Elongation
- ✓ D1693 ESCR
- ✓ D 790 Flexural Modulus
- ✓ D1505 Density
- ✓ D746 Brittleness
- ✓ D5420 Impact Resistance
- ✓ D696 Linear Thermal Expansion
- √ D3350 Cell Classification





The Installation Process

New Projects: Prepare the trench

Ditch Rehabilitation: Clear old debris

Lower sections into trench

Apply gasket

Overlap down stream end of ditch section

Install self-tapping screws included in install kit



Drive anchoring system into the ground

Draw cable tight to secure ditch section

Backfill obvious voids along the ditch

Depending on conditions, re-grade & seed along ditch

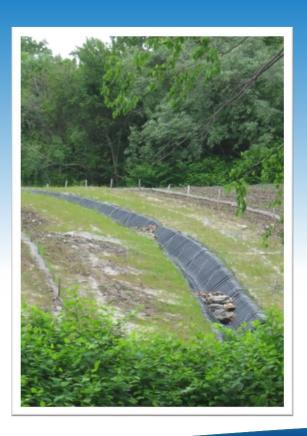
Grade and plant native vegetation up to the side walls

Typical work crew consists of 4-6 and installs 350-400ft /day

Landfill Drainage

Provides erosion control on landfill let-down slopes







Roadside Drainage Outfalls

MI DOT Outfall - 24" SmartDitch replaced rip rap that continued to fail







Slope Drainage Runoff Control

Roadside drainage projects where capturing stormwater runoff is critical



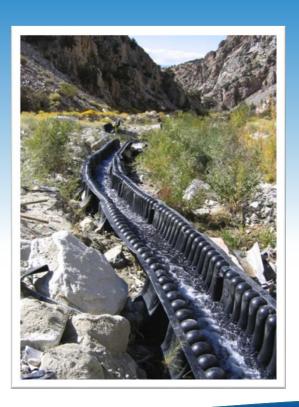




Above Ground Water Diversions

Can be installed above ground on saddles for permanent or temporary flow diversions







Slope Stabilization

Stabilizes steep slopes and efficiently Controls water runoff on slopes up to 20%







Industrial Site Drainage & Spill Control

Capture spills and runoff at industrial sites such as this ethanol plant







Residential Stormwater Drainage

Subdivision stormwater drainage solution







Typical Installations

Construction Site Dewatering/Clarification

Water clarification channel for construction site dewatering







Army Corps of Engineers

Camp Pendleton Marine Corps Base

Roadside Erosion Control for the primary Landfill on the Base...BEFORE









Army Corps of Engineers

Camp Pendleton Marine Corps Base

AFTER SmartDitch Installation...2,300 LF installed in 6 Days!









SmartDitch Grows to MegaDitch

"Sure, SmartDitch looks like a great solution and will work for a lot of applications.

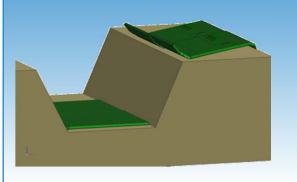
But... do you have anything bigger?"

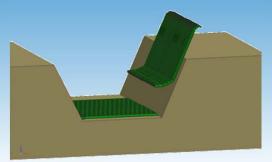


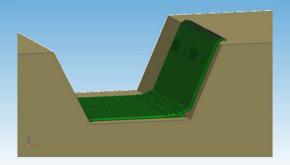
SmartDitch is Expanding

Introducing MegaDitch

The Infinitely Expandable HDPE Ditch Lining System





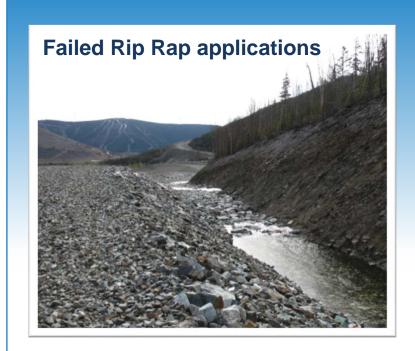


- ✓ Lightweight Wall & Base Panels
- √ Easy to Install
- ✓ Walking Path on Base
- √ Same Anchoring System

- ✓ Exceptional Flow Rates & Control
- ✓ HDPE-Will Not Corrode or Degrade
- ✓ Ribbed Design Provides Exceptional Strength



Perfect for Large Scale Channel Construction& Repairs









How Big is Your Drainage or Erosion Control Problem





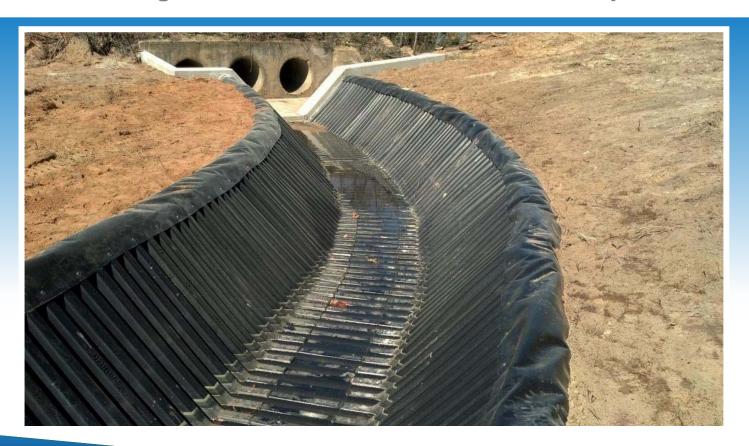
Solving Drainage & Erosion Control Problems Where Others Have Failed





The MegaDitch System- COE Ft. Gordon

Perfect for Large Scale Channel Construction& Repair







Perfect for Large Scale Channel Construction& Repair

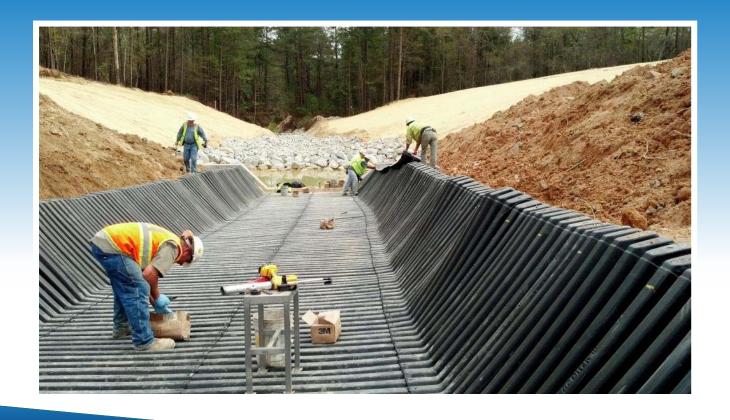








Perfect for Large Scale Channel Construction& Repair







In Summary

SmartDitch & MegaDitch

Unlimited Applications

- Site construction drainage/dewatering
- Public works and municipal projects
- Drain inlets, outlets
- Landfill erosion control
- Steep slope erosion control/stabilization
- Bottom channels
- Irrigation & water conservation
- Residential stormwater drainage





