SmartDitch™

Finally, Smarter Solutions in Water Management.™

Product Comparison Chart: Open Channel Ditch Lining Systems

- SmartDitch™
- Riprap Lined
- Concrete Lined
- Turf Reinforcement Mat (TRM)
- Articulated Concrete Blocks
- Reinforced Concrete Pipe
- HDPE Pipe


Specify SmartDitch for:
• Stormwater flow
• Irrigation improvement
• Erosion control
• Slope stabilization
• Stream bed stabilization
• Water diversion
• Spill control & containment

	SmartDitch™	Riprap Lined	Concrete Lined	Turf Reinforcement Mat (TRM)	Articulated Concrete Blocks	Reinforced Concrete Pipe	HDPE Pipe
Weight 	5.8 lb/ft (12" trap) 9.9 lb/ft (24" trap) **Advantages** • Light weight • Cost-effective to transport • Easy to install with minimal equipment in areas with limited access **Disadvantages** • Requires anchoring to prevent shifting due to fluid momentum or wind	Varies depending on size **Advantages** • Heavy weight for larger riprap • Does not require anchoring **Disadvantages** • Difficult to install in areas with limited or difficult access such as steep or remote terrain • Can require heavy equipment to transport and install	675 lb/ft (12" SmartDitch Trap equivalent) 450 lb/ft (30" dia ~ 24" SmartDitch Trap equivalent) **Advantages** • Does not require anchoring **Disadvantages** • Difficult to install in areas with limited or difficult access such as steep or remote terrain • Can require heavy equipment to transport and install	Varies per product **Advantages** • Light weight • Cost-effective to transport **Disadvantages** • Requires anchoring to prevent shifting due to fluid momentum or wind until vegetation can be established	115 to 350 lb/ft (24" SmartDitch Trap equivalent) 200 to 600 lb/ft (30" dia ~ 24" SmartDitch Trap equivalent) **Advantages** • Does not require anchoring **Disadvantages** • Difficult to install in areas with limited or difficult access such as steep or remote terrain • Can require heavy equipment to transport and install	250 lb/ft (18" dia ~ 12" SmartDitch Trap) 450 lb/ft (30" dia ~ 24" SmartDitch Trap) **Advantages** • Does not require anchoring **Disadvantages** • Difficult to install in areas with limited or difficult access such as steep or remote terrain • Can require heavy equipment to transport and install	6.4 lb/ft (18" dia ~ 12" SmartDitch Trap equivalent) 15.4 lb/ft (30" dia ~ 24" SmartDitch Trap equivalent) **Advantages** • Does not require anchoring **Disadvantages** • Difficult to install in areas with limited or difficult access such as steep or remote terrain • Can require heavy equipment to transport and install
Maximum Sheer Stress/Velocity 	Unlimited	4 to 8 lb/SF	Unlimited	up to 12 lb/SF, 20 fps	Up to 30 lb/SF, 23 fps	Unlimited	Unlimited
Flexibility 	Flexible HDPE construction **Advantages** • Can be installed on curves and changing slopes without fittings • Can tolerate some settlement of the sub base material **Disadvantages** • Weak lateral strength can result in the bending and the deformation of the cross sectional shape of the material from lateral earth pressures or interior hydraulic pressure	Flexible **Advantages** • Individual stones that can move independently from each other • Can tolerate settlement of the sub base material **Disadvantages** • Acts as a system of individual stones and not as a uniform system that can distribute loads	Rigid once concrete sets **Advantages** • Flexible during installation but rigid upon set up • Can be formed to curves and changing slopes **Disadvantages** • Cannot tolerate settlement of the sub base material or seismic shifts • Susceptible to damage from freeze/thaw cycles and buckling due to thermal expansion	Flexible **Advantages** • Can be installed on curves and changing slopes without fittings • Can tolerate some settlement of the sub base material **Disadvantages** • No lateral strength to resist lateral earth pressures or interior hydraulic pressure	Flexible **Advantages** • Can be installed on curves and changing slopes without fittings • Can tolerate some settlement of the sub base material **Disadvantages** • Limited lateral strength to resist lateral earth pressures or interior hydraulic pressure	Rigid **Advantages** • None **Disadvantages** • Cannot tolerate settlement of the sub base material or seismic shifts	Flexible **Advantages** • Can tolerate some settlement of the sub base material **Disadvantages** • Limited angular joint deflection
Tensile Strength 	3,000 psi (min) **Advantages** • High tensile strength resists failure in the direction of flow **Disadvantages** • None	**Advantages** • None **Disadvantages** • No tensile strength to distribute stress between stones	**Advantages** • Some tensile strength if reinforcement is used **Disadvantages** • Cracks may develop due to tensile loading that may lead to liner degradation	**Advantages** • None **Disadvantages** • Limited tensile strength	Tensile strength varies depending on cabling system used **Advantages** • Cable system provides tensile strength in the direction of flow **Disadvantages** • Tensile strength may decrease with time due to cable system corrosion	Tensile strength provided by steel reinforcement **Advantages** • None **Disadvantages** • Cracks may develop due to tensile loading	3,200 psi **Advantages** • High tensile strength resists failure in the direction of flow **Disadvantages** • None

Permeability 	0.039 CF/s/1000 feet **Advantages** • Does not lose water to seepage in situations where water is to be beneficially used (irrigation) or infiltration is undesirable (contaminated sites/landfills) • Does not require the establishment of vegetation • Shear interface transferred between HDPE and soil as opposed to water and soil, thereby eliminating erosion **Disadvantages** • Does not allow the infiltration of stormwater when desired for stormwater volume reduction	Permeable **Advantages** • Allows infiltration of stormwater in situations where infiltration is desirable • Does not require the establishment of vegetation **Disadvantages** • Allows the loss of water in scenarios where it is considered undesirable such as irrigation projects or contaminated sites	Generally impermeable **Advantages** • Does not lose water to seepage in situations where water is to be beneficially used (irrigation) or infiltration is undesirable (contaminated sites/landfills) • Does not require the establishment of vegetation **Disadvantages** • Does not allow the infiltration of stormwater when desired for stormwater volume reduction • May lose water through cracks developing over time due to freeze/thaw and thermal expansion	Permeable **Advantages** • Allows infiltration of stormwater in situations where infiltration is desirable **Disadvantages** • Allows the loss of water in scenarios where it is considered undesirable such as irrigation projects or contaminated sites	Permeable **Advantages** • Allows infiltration of stormwater in situations where infiltration is desirable **Disadvantages** • Allows the loss of water in scenarios where it is considered undesirable such as irrigation projects or contaminated sites	Generally impermeable **Advantages** • Does not lose water to seepage in situations where water is to be beneficially used (irrigation) or infiltration is undesirable (contaminated sites/landfills) • Does not require the establishment of vegetation **Disadvantages** • Does not allow the infiltration of stormwater when desired for stormwater volume reduction • May lose water through cracks and at leaking joints	Soil tight only **Advantages** • Does not require the establishment of vegetation **Disadvantages** • Does not allow the infiltration of stormwater when desired for stormwater volume reduction • May lose water through leaking joints
Manning's No. 	0.022 **Advantages** • Can move a large volume of water with a smaller cross sectional geometry • Useful for moving large volumes of water for beneficial use • Useful for stream diversions during bridge or box culvert construction **Disadvantages** • In stormwater applications, the low manning's number decreases the time of concentration of the stormwater leading to higher peak flows and potential for flooding problems	0.07 to 0.08 **Advantages** • Higher manning's number means lower velocity of the water resulting in lower shear force **Disadvantages** • Higher manning's number means lower velocity and lower flow potentially backing up water causing increased flooding • Will vary depending on size and variety of rocks used	0.013 **Advantages** • Can move a large volume of water with a smaller cross sectional geometry • Useful for moving large volumes of water for beneficial use or to prevent upstream flooding **Disadvantages** • In stormwater applications, the low manning's number decreases the time of concentration of the stormwater leading to higher peak flows and potential downstream flooding problems • Does not dissipate energy well potentially leading to scour at the discharge point	0.018 - 0.035 depending on vegetation **Advantages** • Higher manning's number slows the velocity of the water resulting in less shear force **Disadvantages** • Higher manning's number means lower velocity and lower flow potentially backing up water causing increased flooding	Varies **Advantages** • Higher manning's number slows the velocity of the water resulting in less shear force **Disadvantages** • Higher manning's number means lower velocity and lower flow potentially backing up water causing increased flooding	0.013 **Advantages** • Can move a large volume of water with a smaller cross sectional geometry • Useful for moving large volumes of water for beneficial use or to prevent upstream flooding **Disadvantages** • In stormwater applications, the low manning's number decreases the time of concentration of the stormwater leading to higher peak flows and potential downstream flooding problems • Does not dissipate energy well potentially leading to scour at the discharge point	0.012 **Advantages** • Can move a large volume of water with a smaller cross sectional geometry • Useful for moving large volumes of water for beneficial use or to prevent upstream flooding **Disadvantages** • In stormwater applications, the low manning's number decreases the time of concentration of the stormwater leading to higher peak flows and potential downstream flooding problems • Does not dissipate energy well potentially leading to scour at the discharge point
Chemical Resistance 	High chemical resistance	Limited data available	Susceptible to acidic chemicals	Limited data available	Susceptible to acidic chemicals	Susceptible to acidic chemicals	High chemical resistance

Durability 	**Advantages** • Material lasts many years with minimal maintenance • Resists abrasion from sediment-laden water and from heavy debris **Disadvantages** • None	**Advantages** • Durability depends on the quality of stone used **Disadvantages** • Variability of stone may lead to weak points within the liner	**Advantages** • Resistant to abrasion **Disadvantages** • Can crack and degrade over time	**Advantages** • Long lasting • Works with vegetation to provide resistance to shear **Disadvantages** • None	**Advantages** • Resistant to abrasion • Works with vegetation to provide resistance to shear **Disadvantages** • None	**Advantages** • Resistant to abrasion **Disadvantages** • Can crack and degrade over time	**Advantages** • Material lasts many years with minimal maintenance • Resists abrasion from sediment-laden water and from heavy debris **Disadvantages** • None
Reusable/ Recyclable 	**Advantages** • Can be easily removed and reassembled in another location • Can be recycled **Disadvantages** • None	**Advantages** • None **Disadvantages** • Not practical to reuse	**Advantages** • None **Disadvantages** • Cannot be reused • Cannot be practically recycled	**Advantages** • None **Disadvantages** • Cannot be reused • Cannot be practically recycled	**Advantages** • None **Disadvantages** • Cannot be reused • Cannot be practically recycled	**Advantages** • None **Disadvantages** • Not practical to reuse	**Advantages** • Materials may be recycled **Disadvantages** • Not practical to reuse
Maintenance 	**Advantages** • Low maintenance • Impedes vegetation growth • Prevents erosion • Resistant to UV degradation **Disadvantages** • May be difficult to remove accumulated sediment, using heavy equipment, without damaging the liner • Potential for erosion and undermining along the exterior sides of the liner if not installed properly	**Advantages** • Low maintenance • Impedes vegetation growth • Resistant to UV degradation **Disadvantages** • May be difficult to remove accumulated sediment • Need to occasionally replace stones that shift or wash out of place	**Advantages** • Low maintenance • Impedes vegetation growth • Resistant to UV degradation **Disadvantages** • Cracks may develop and require repairs	**Advantages** • Resistant to UV degradation **Disadvantages** • May be difficult to remove accumulated sediment without damaging the liner • Occasional repairs to rill and gully erosion required • Requires maintenance of vegetation • May be damaged during mowing activities	**Advantages** • Reasonably low maintenance • Does not rely on vegetation for performance • Resistant to UV degradation **Disadvantages** • Requires maintenance of vegetation	**Advantages** • Low maintenance • Impedes vegetation growth • Prevents erosion • Resistant to UV degradation **Disadvantages** • Difficult to remove accumulated sediment	**Advantages** • Low maintenance • Impedes vegetation growth • Prevents erosion • Resistant to UV degradation **Disadvantages** • Difficult to inspect, access and repair
Aesthetics 	**Advantages** • Cleaner look than concrete especially over time **Disadvantages** • Man-made materials not indigenous to local environment	**Advantages** • If native rocks used, can present more natural look **Disadvantages** • Not natural looking when rocks appear to be dumped and not carefully placed as specified • May be overrun with weeds or invasive species	**Advantages** • None **Disadvantages** • Not natural looking • Weeds may begin to grow in cracks causing cracks to widen • Becomes discolored and/or stained from pollutants, sediment and mildew buildup	**Advantages** • Vegetation grows through the product for a more natural look **Disadvantages** • May be overrun with weeds or invasive species	**Advantages** • Vegetation grows through the product for a more natural look **Disadvantages** • May be overrun with weeds or invasive species	**Advantages** • Pipe is buried and out of sight **Disadvantages** • None	**Advantages** • Pipe is buried and out of sight **Disadvantages** • None

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