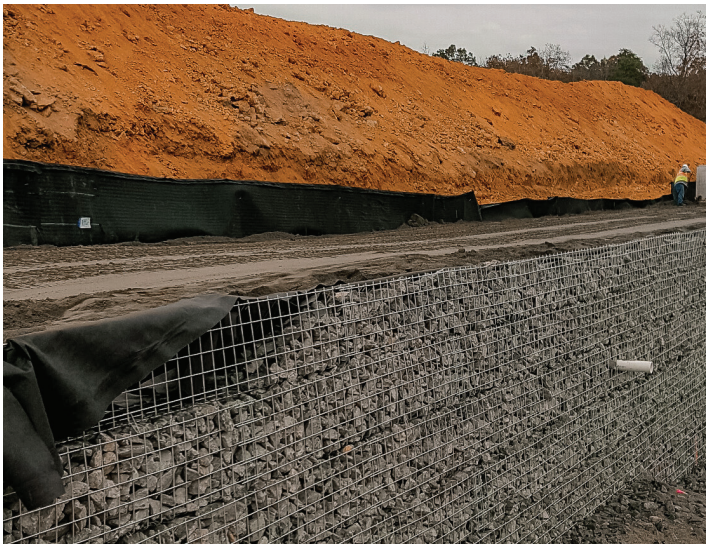


# SITEDRAIN™

PREFABRICATED DRAINS FOR CIVIL ENGINEERING APPLICATIONS



Focusing Our Sites On Gaining Ground



CIVIL & SITE  
SOLUTIONS



**AWD**  
AMERICAN WICK DRAIN



TRANSPORTATION  
SOLUTIONS



# WHY AWD

AWD arms clients with the tools to gain ground in the collection and re-direction of water, leveraging decades of expertise in drainage solutions for various construction applications. We offer a clean, modern system and an innovative product line that combines geotextiles with specially designed drainage cores. From structural walls to perimeter drains and landscape projects to athletic fields, AWD is the trusted name working below the surface to help ensure that your next project stays dry, solid and secure.

Architects, engineers and owners are always looking for ways to reduce initial costs and extend the service life of construction projects. The desired result is a sustainable, high performance product at an affordable price. AWD products provide solutions to help you meet your objectives.



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LANDSCAPE  
SOLUTIONS



SOIL CONSOLIDATION  
SOLUTIONS



ATHLETIC FIELD  
SOLUTIONS



RESIDENTIAL  
SOLUTIONS



BUILDING  
SOLUTIONS



SUSTAINABLE  
SOLUTIONS

# AGGREGATE vs. AWD

## THE PROBLEM

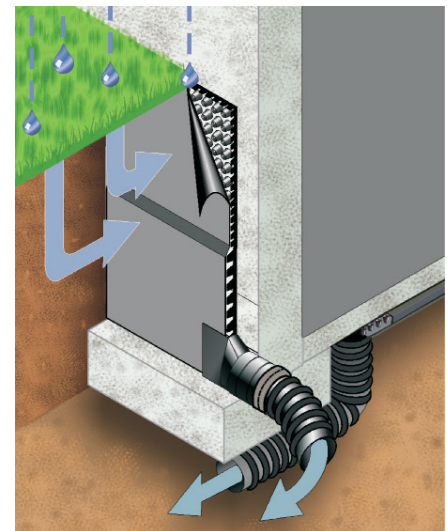
Since historic times, civil engineers and builders have used crushed stone (aggregate) or a combination of stone and some sort of pipe for soil drainage. While providing reasonably satisfactory results, aggregate drainage has several drawbacks. Clean and properly sized material is often expensive or not readily available. Transportation is expensive due to weight and volume. Quality control requires close monitoring of material and construction. Waterproofing materials have to be protected from damage from the aggregate and installation equipment. Aggregate tends to clog with soil over time, thereby reducing drainage capability. Despite great care in the design and construction of aggregate drains, their limitations often result in increased hydrostatic pressure, which increases loads on the structure and allows moisture intrusion into the structure.

## THE SOLUTION

Prefabricated drains have two components that act as replacements to the aggregate system

1. The geotextile replaces the aggregate for water collection and allows the water to enter the drain from one or both sides drain without clogging the core.
2. The formed plastic core replaces the pipe for transporting the collected water.

Water, which flows through the fabric and into the core, is removed in several ways depending upon the drainage situation. One of the newest methods is through the use of prefabricated combination drain, which has a larger profile core at the bottom to serve as a high-flow conduit to move water to the designated drainage exits.



## PREFABRICATED DRAIN ADVANTAGES

**LOW INSTALLED COST** - Combined installation and material cost is usually less than half of that for aggregate drains.

**EASY TO HANDLE AND INSTALL** - Lightweight (less than 5 oz/ft<sup>2</sup>, 0.4 kg/m<sup>2</sup>), easy-to-handle sheet drain is placed easily and quickly. No heavy equipment or skilled labor is required. Inexpensive to store and transport.

**REDUCES DRAINAGE SYSTEM SPACE REQUIREMENTS** - Thicknesses of 1/4" (6mm) and 7/16" (11 mm) require much less space than aggregate drains.

**STRONG AND DURABLE** - Crush strength of core resists damage during installation. High tear and puncture strength of fabric insures no damage during backfilling or use.

**SIMPLE INSPECTION** - Visual inspection of material and installation is easy and less time consuming.

**SUSTAINABLE DESIGN** - AWD products have a high recycled content, increase water efficiency, manage storm-water runoff and help effectively manage site issues.

**CHEMICALLY RESISTANT** - Both core and fabric are resistant to all naturally occurring soil materials. Optional fabrics and cores are available for unusual chemical situations.

**HIGH FLOW CAPACITY, REDUCED CLOGGING** - Structure of core provides multiple channels for vertical and horizontal water flow. Filter fabric permits high volume entry of water into core while restraining soil particles.

**PREDICTABLE PERFORMANCE** - Uniform properties and quality assure predictable performance.

**HOLDS REINFORCED SHOTCRETE** - Formed core provides good surface for adhesion of shotcrete and other construction materials.

# AWD PREFABRICATED DRAINS

## ENGINEERED PRODUCTS

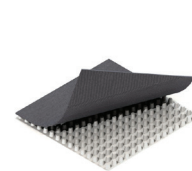
AWD prefabricated drains provide a specific, engineered response to a particular drainage problem - how to collect and redirect water away from a structure or site.

AWD manufactures a full line of products to address drainage requirements for a broad range of construction applications. Our prefabricated drains consist of formed three dimensional polymeric cores that are combined with a geotextile filter fabric. The core offers strength and provides a secure flow channel for collected water. The filter fabric retains soil particles while allowing water to freely enter the drainage core. AWD's sheet, strip, combination and wick drains each provide a specific engineered response to your drainage problem.

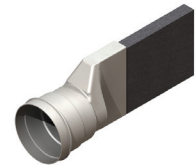
## PREDICTABLE PERFORMANCE

Unlike pipe and stone systems, AWD products are manufactured to meet specific physical and mechanical properties that are verified by independent testing laboratories per ASTM standards, ensuring your project will "flow" according to plan. Critical design considerations typically include three basic physical properties - water flow rate, core compressive strength and the fabric's ability to filter soil particles.

## AWD PRODUCT CLASSIFICATIONS



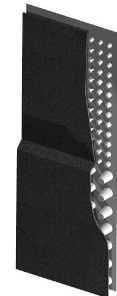
SHEET DRAINS



STRIP DRAINS



WICK DRAINS

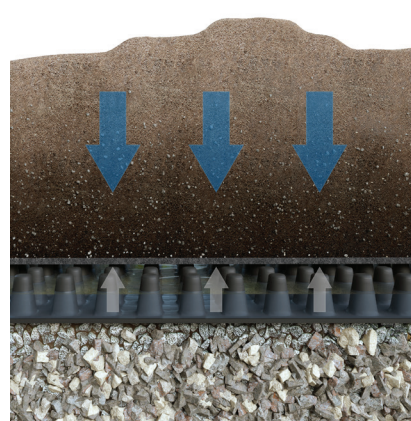


COMBINATION DRAINS



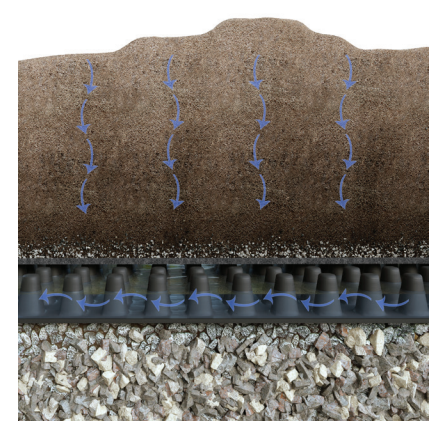
### WATER FLOW RATE:

The volume of the fluid that passes through the formed core in a specific amount of time



### CORE COMPRESSION:

The maximum compressive stress the formed core can withstand without failure.

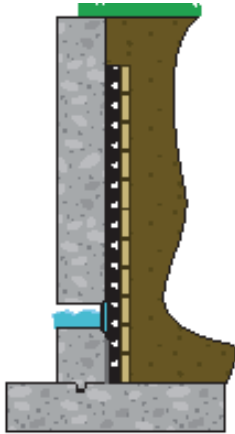


### FILTER FABRIC:

The mechanical separation of soil particles from the water that enters the core.



# SITEDRAIN™



At AWD, we understand that every unique drainage challenge calls for an equally unique drainage solution. By incorporating critical design considerations into a versatile and expanded product line, SITEDRAIN products give our partners in civil and transportation design the power to break away from traditional limitations in both product selection and specification design.

Specially designed drainage cores that address strength and flow combined with geotextiles meeting AASHTO specifications provide the choices you need to manage the most challenging ground water conditions. SITEDRAIN products offer a cost-effective, performance-driven, sustainable alternative to pipe and stone. We work with you to factor in the many site variables that are critical to performance - existing soil conditions, core strength and flow capacity requirements. The flexibility of our manufacturing process allows us to respond quickly to specific needs and tailor solutions to any site or structural drainage application. To everyone at AWD, the most successful and rewarding projects are grounded in collaboration and innovation as we "focus our sites on gaining ground".

## SITEDRAIN PRODUCT OVERVIEW

Sheet Series	Large surface area, single-sided drainage. Flow capacity equivalent to 6 - 12 feet of stone.
DS Sheet Series	Large surface area double-sided drainage. Flow capacity equivalent to 6 - 12 feet of stone.
Chimney Series	Special width sheet drains save installation time in applications with high penetration detail designs.
Strip Series	High collection, high flow capacity double-sided replacement for perforated pipe and stone.
HQS Series	High flow capacity, double-sided water collection system for sheet drains. Replacement for pipe.
HQ Series	High flow capacity, single-sided water collection system for sheet drains. Replacement for pipe.
Geotextiles	All SITEDRAIN Series products are available with filter fabrics meeting AASHTO M 288-06 specifications.

MECHANICAL PROPERTIES	SHEET & DS SERIES			CHIMNEY SERIES		STRIP SERIES	HQ SERIES
	90	180*	450	C-90	C-180	6000 & 9000	HQS SERIES
Core Thickness	1/4"	7/16"	1/4"	1/4"	7/16"	1"	7/16" - 1"
Compression (psf)	9,000	18,000	45,000	9,000	18,000	6,000 OR 9,000	9,000
Flow (gpm)	13	22	14	13	22	21	50
Recycled Content	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Roll Width	4'	4', 6' or 8'	4'	12", 16", & 24"		6" - 36"	12", 18" & 24"
Roll Length	50'	50'	50'	200'		150' & 500'	50'
AASHTO M 288-06 Survivability Options	Class 1, 2 or 3			Class 1, 2 or 3		Class 1, 2, or 3	Class 1, 2 or 3

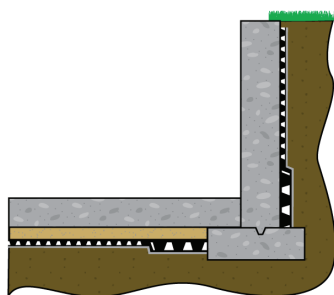
*\*SITEDRAIN SHEET 180 SERIES PRODUCTS ARE AVAILABLE IN 4', 6' or 8' ROLL WIDTHS.*



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### STRUCTURAL WALLS

SITEDRAIN Sheet drain is used on the exterior of subsurface walls to intercept ground water before it reaches the structure. Water is easily routed by the SITEDRAIN HQ system to a discharge pipe or other designated drainage outlet. The sheet drain system reduces hydrostatic pressure buildup against walls and slab, reducing the risk of leakage and extending the life of the structure.



### UNDER SLABS

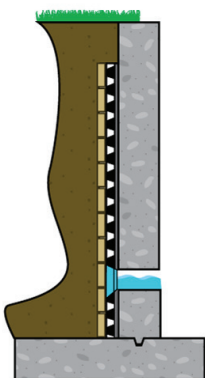
SITEDRAIN Sheet drain is used under structural slabs to intercept ground water before it reaches the slab. Water is then routed to a discharge pipe, sump or other designated drainage outlet.

### LAGGING & SHORING WALLS

Where space is limited or where aggregate drainage is difficult to install, SITEDRAIN Sheet drain provides superior drainage with a low profile, lightweight product that reduces excavation requirements.

### SHOTCRETE & GUNNITE WALLS

SITEDRAIN Sheet drain provides effective drainage for shotcreted walls. Sheet drain provides a solid surface for adhesion of reinforced shotcrete or other construction materials.



### RETAINING WALLS:

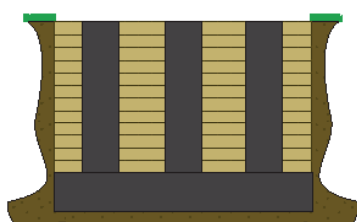
SITEDRAIN Sheet drain reduces hydrostatic pressure from the backfill behind subsurface walls, assisting in maintaining the structural integrity of the wall from grade to footer.

### EARTH, ROCK & ROLLED CONCRETE DAMS

SITEDRAIN Sheet drain is used to prevent seepage at the toe of the dam and as a cutoff drain within the dam. Slope stability during rapid draw down is also aided.

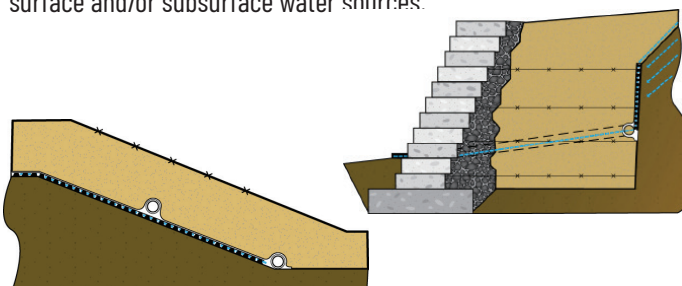
### CHIMNEY DRAINS

SITEDRAIN Chimney drain is installed vertically in applications where full wall coverage is not practical due to protrusions in the wall surface, such as soil nails. Chimney drains may also be used in select applications where full wall coverage is not required and/or cost effective.



### EMBANKMENTS & SLOPES

SITEDRAIN Sheet drain is used in embankment and slope drainage applications to minimize soil swelling, weakening and failure from surface and/or subsurface water sources.



### TUNNELS & BOX CULVERTS

Water can attack these structures from four directions: top, bottom and either side. SITEDRAIN Sheet drain provides rapid removal of water to reduce hydrostatic pressure and to minimize the risk of leakage into the structure.

### POND LINERS

The installation of SITEDRAIN Sheet or Strip drain under pond liners prevents uplift due to methane gas buildup in organic soils.

### CONCRETE CHANNEL LINERS

The installation of SITEDRAIN Sheet drain under concrete-lined channels prevents uplift due to hydrostatic pressure, greatly reducing the risk of leakage or structural failure.

### CUT-OFF DRAINS

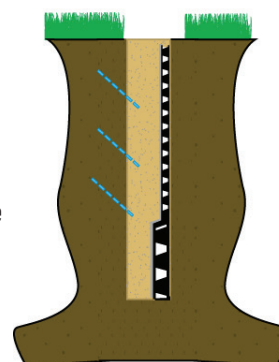
SITEDRAIN Sheet, Strip or Combination drains are used instead of, or in addition to, aggregate to intercept, collect and transport water flow.

### FRENCH, TRENCH DRAINS

SITEDRAIN Sheet, Strip or Combination drains are used instead of, or in addition to, aggregate to intercept, collect and transport water flow.

### PERIMETER COLLECTION DRAINS

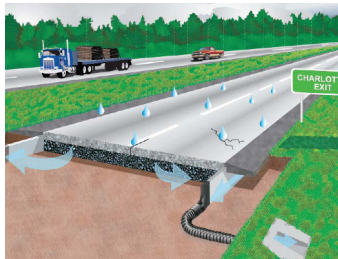
SITEDRAIN Strip or Combination drains are used as a direct replacement to perforated pipe and stone perimeter drain systems. Combination drains have an engineered core flange designed to connect to sheet drains to provide a complete drainage system.



### LANDFILL CAPS & UNDERDRAINS

SITEDRAIN Sheet drain is used above landfill caps to intercept water from the surface and route it to designated drainage exits. Sheet drain is used below landfill caps and liners as a leachate collection





America continues to invest billions of dollars annually for infrastructure projects. Engineers are constantly searching for ways to improve highway and bridge designs to achieve better performance at a lower cost. Extensive studies have shown that excessive water can cause accelerated deterioration of pavement systems and create hydrostatic pressure against concrete structures. AWD offers a complete line of prefabricated sheet, strip and combination drains that are engineered to address these design concerns at a significant cost savings over aggregate designs.

## COLLECTION CAPACITY COMPARISON

Prefabricated strip drains have the ability to collect large amounts of water without the additions of aggregates. The following data calculates and compares the collection capacity for perforated pipe without aggregate, perforated flattened pipe, and SITEDRAIN Strip drains

Perforated Pipe (Fig 1) collection capacity per foot is equal to the cross sectional area of the perforations times the number of perforations per linear foot. For a standard 4" perforated pipe, there are usually eight holes 0.5" in diameter which provide 1.6 in<sup>2</sup> of open area per linear foot of pipe. 1.1% of the total area is open for drainage. Typically for a perforated pipe to function, a large surrounding volume of aggregate must be added to increase collection capacity.

Flattened perforated pipe (Fig 2) has 144 slots (0.065" x 0.75") per linear foot, which provide 7 in<sup>2</sup> of open area per linear foot of drain. 2.5% of the total area is open for drainage.

SITEDRAIN Strip drain (Fig 3) has a total open area (both sides) of 188 in<sup>2</sup> per linear foot. 60% of the total area is open for water collection and drainage.

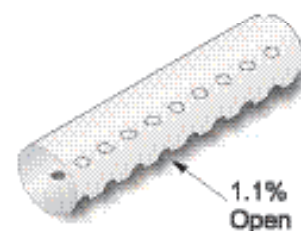


FIG 1

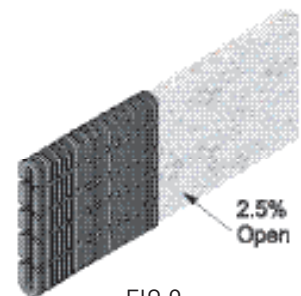


FIG 2

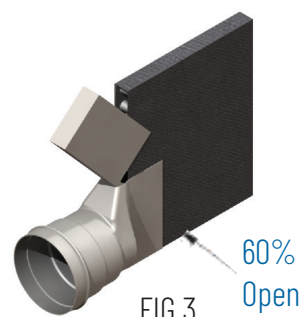


FIG 3

## SHEAR STRENGTH COMPARISON

The compressive strength of SITEDRAIN Strip drain has demonstrated the ability to withstand shear stresses. Shear loads are developed during backfill and by uneven settlements caused by heavy dynamic loading during the life of the roadway. Deformation from both the normal and shear loading may greatly influence flow capacity of a collection system. In laboratory tests, SITEDRAIN Strip drain has proven its ability to support significantly higher loads at much lower deformations than those seen in perforated pipe or flat pipes.





## EDGE UNDERDRAINS & CONCRETE STRUCTURES

### EDGE UNDERDRAINS

Prefabricated strip drains provide solutions for excessive water buildup in the pavement system by creating a positive and rapid drainage system for water that enters the pavement structure. The result is a sustainable, cost-effective design that reduces expensive maintenance requirements.

SITEDRAIN Strip drain is constructed with a high flow, formed and perforated core that is fully wrapped with a nonwoven, needle-punched, geotextile filter fabric. The fabric prevents soil particles from entering the flow channel while allowing water or other liquids to freely enter the core and flow to designated exits.



### CONCRETE STRUCTURES

Prefabricated sheet drains provide solutions for concrete structures by providing a positive and rapid evacuation of subsurface ground water before the accumulated hydrostatic pressure can compromise the structure. The result is a sustainable, cost-effective design that reduces expensive maintenance requirements.

SITEDRAIN Sheet drains are constructed with a formed core that has a nonwoven or woven geotextile bonded to one side for single-sided drainage applications.

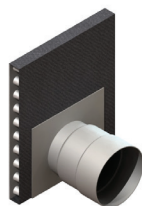
SITEDRAIN DS Sheet drains are constructed with a formed and perforated core that has a nonwoven geotextile bonded to both sides for double sided drainage applications.

SITEDRAIN Chimney drains are constructed with special width sheet drain cores that are fully wrapped with a geotextile filter fabric. Chimney drains provide single sided drainage for applications where full wall coverage is not practical (due to protrusions in the wall surface) or required.

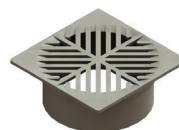
**AASHTO M 288-06 FILTER FABRICS:** All SITEDRAIN Series prefabricated drains offer products constructed to geotextile survivability classification for subsurface drainage as specified in AASHTO M 288-06. Please visit our website for individual product Technical Data Sheets.

### FITTINGS

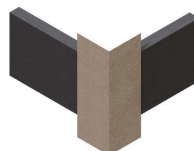
AWD has a complete line of fittings that convert collected water from prefabricated drains to pipe for evacuation to daylight.



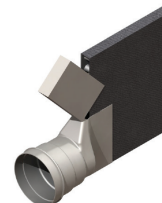
Universal Tee Outlets



Drain Grates



Corner Guards



Universal End Outlets

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