ADS Engineered Turf Drainage

Golf Courses ▪ Baseball Diamonds
Football Fields ▪ Soccer Fields
Polo Fields ▪ Racetracks

The High Performance Future of Engineered Drainage- When the Score Counts

ADS®
ADVANCED DRAINAGE SYSTEMS, INC.

The New Standard for Athletic Field Performance

Drainage is the Foundation of High Performance Athletic Fields.

In a society with an ever increasing interest in outdoor sports and events, both as spectators and participants, the demands for and on turf continue to grow. The era of the synthetic turf appears to be over, at least for now, due primarily to injuries and the lack of "give" in the surface. Grass (natural turf) is very tough, but for the loadings and traffic expected of many athletic fields, the grass needs some help. Under ideal conditions natural turf can withstand substantial traffic and still recover. Minor changes of soil moisture, either too much or too little, can cause changes in the soil-turf system that are detrimental to the turf. A properly designed and maintained drainage system can offer the following benefits:

Healthier Grass & Sod

Proper drainage helps promote deeper root growth. With deeper root growth you also promote the "knitting" effect of the roots which will stabilize your playing surface and lessen the tearing of the turf.

More Effective Use of Turf Nutrients

A well drained field will improve nitrogen, potassium and magnesium uptake.

Less Chance of Turf Disease

A turf that does not continuously sit in damp soils will be more resistant to disease.

Drainage Maximizes Playability

You'll have fewer games and events cancelled because of rain outs. A well drained golf course can allow golfers to resume play faster and with less damage to the course.

Less Chance of Compaction

Drainage reduces the negative effects of traffic and compaction.

Removal of Soluble Salts

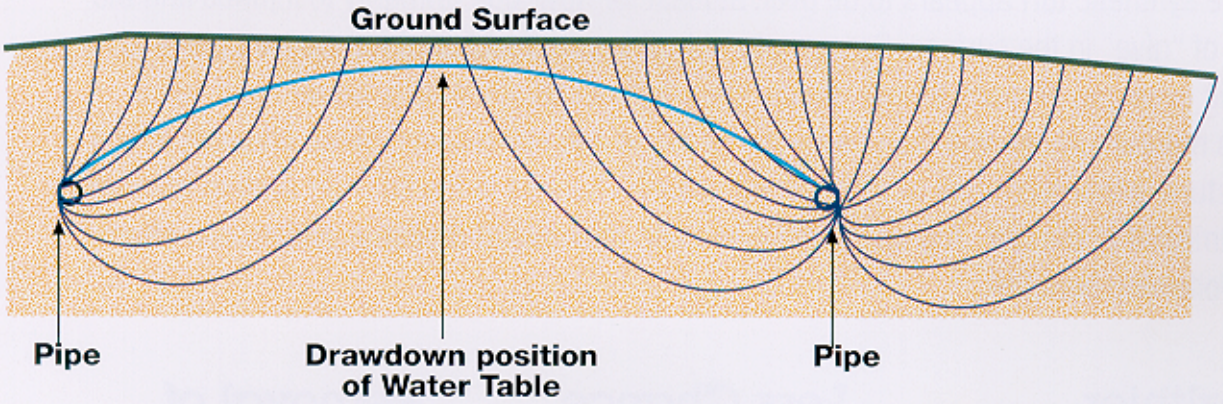
Improved turf quality due to the leaching of soluble salts in arid and semi-arid locations.

Protect Your Investment & Your Players

With proper drainage you will have less damage to your field. With a more stable turf, your players will have better footing and less chance of injury.

How Do You Determine Athletic Field Drainage?

Ideal Flow of Water Through a Uniform Soil and Water Table Between Two Drainage Lines



For years, agricultural soil engineers have known that water moves through gravity and capillary action. To understand drainage, an understanding of the water table is necessary.

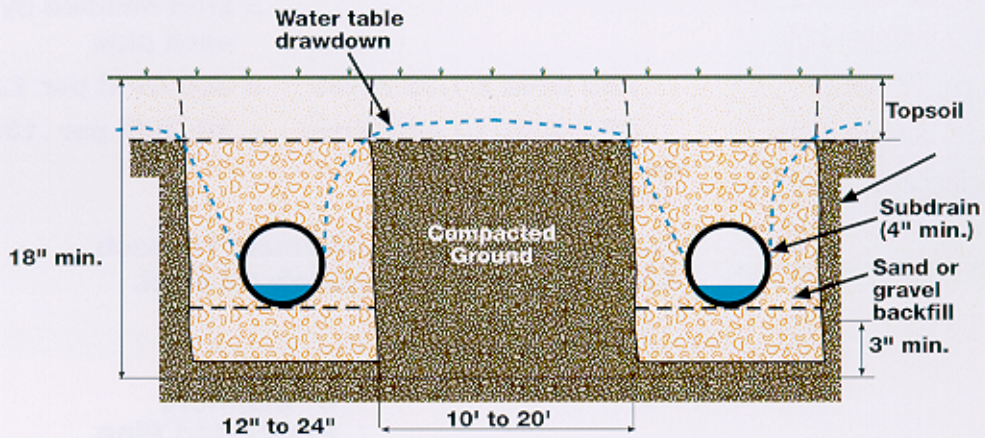
In uniformly structured soils, the drawdown is directly related to pipe depth. The optimum spacing and depth of the pipe is determined by soil permeability, depth of the pipe and the inches of water per 24 hours you wish to drain from the field.

Because of the shallow characteristics of turf grasses, most athletic field drainage is needed in only the top foot of soil. This, plus rapid water removal, dictates a drain depth of one to two feet. However, in some areas where salinization may be a problem, a deeper drainage pipe may be warranted.

The aeration tools used by the field superintendent after the field is constructed should be carefully considered. Some aeration tines can be 9″ deep which could hit the buried pipe.

Permeability of the soils in the drainage area, either insitu or imported, is critical to the design of your drainage system. Many times a 6″ to 8″ soil/sand mix is imported to the site. This soil is usually of higher permeability than the existing sub-base which is sometimes compacted up to 95%. Since this imported soil does drain quickly, it is important to have the drainage lines close enough to accept and carry the water away to an outlet. Care must be taken not to cover the drainage lines with an impermeable layer of soil. This will not allow the water to pass through to the drainage lines and cause a failure in providing adequate drainage of the field.

Drawdown Position Between Two Pipe Laterals on Compacted Ground



Permeability of Soil

Soil Type	Diameter (range in MM)	Permeability	Percolation Rate (inches/hour)
Clay	Below 0.002	Very slow	Less than 0.05
Silt	0.05 – 0.002	Slow	0.05 – 0.2
Very fine sand	0.10 – 0.05	Moderately slow	0.2 – 0.8
Fine sand	0.25 – 0.10	Moderate	0.8 – 2.5
Medium sand	0.5 – 0.25	Moderately rapid	2.5 – 5.0
Coarse sand	1.0 – 0.5	Rapid	5.0 –10.0
Very coarse sand	2.0 – 1.0	Very rapid	10.0 and over

Rectangular Sports Turf Drainage Design–

What's Underneath It All?

An important factor in determining the spacing for your field or golf course is the quantity of water that needs to be removed in a short period of time. A professional football or baseball team's stadium may be designed to remove several inches per hour of water while a high school field may be designed to remove 1/2 inch per hour. A drainage rate that keeps up with the amount of rainfall is necessary. In most cases, a rate of 1/2 inch per hour or twelve inches per 24 hours (220 GPM per acre) is used in the design criteria to facilitate rapid water removal.

Given:

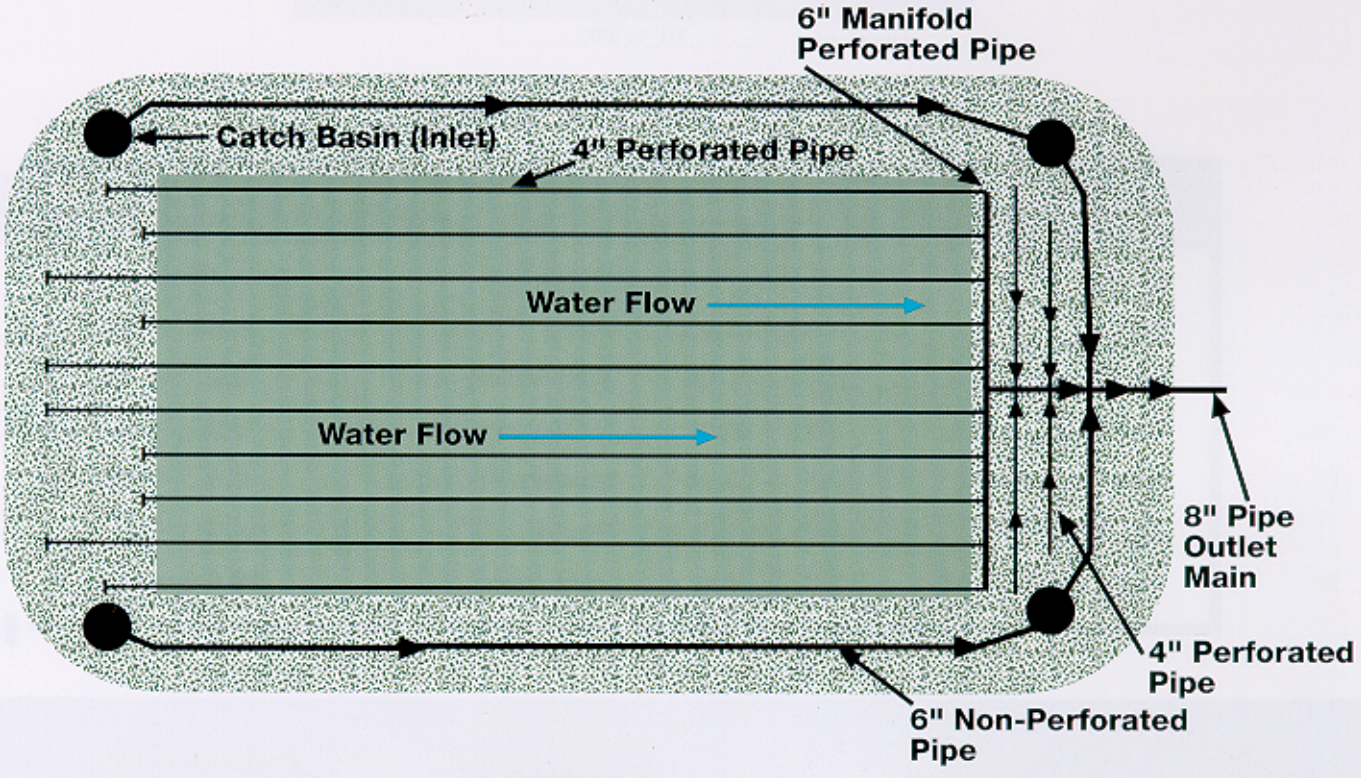
Football Field	**= 160 feet by 360 feet**
Desired removal rate	**= 12 inches in 24 hours (288 GPM per acre)**
Pipe	**= ten lines 360 feet long, 16 feet apart**

Then,

160 feet x 360 feet	**= 57,600 square feet**
	= 1.32 acres
	= area of field
16 feet x 360 feet	**= 5,760 square feet**
	= .132 acres
	= area handled by each pipe
288 GPM x 1.32 acres	**= 380 GPM per 1.32 acres**
380 GPM/10 pipe lines	**= 38 GPM per .132 acre**

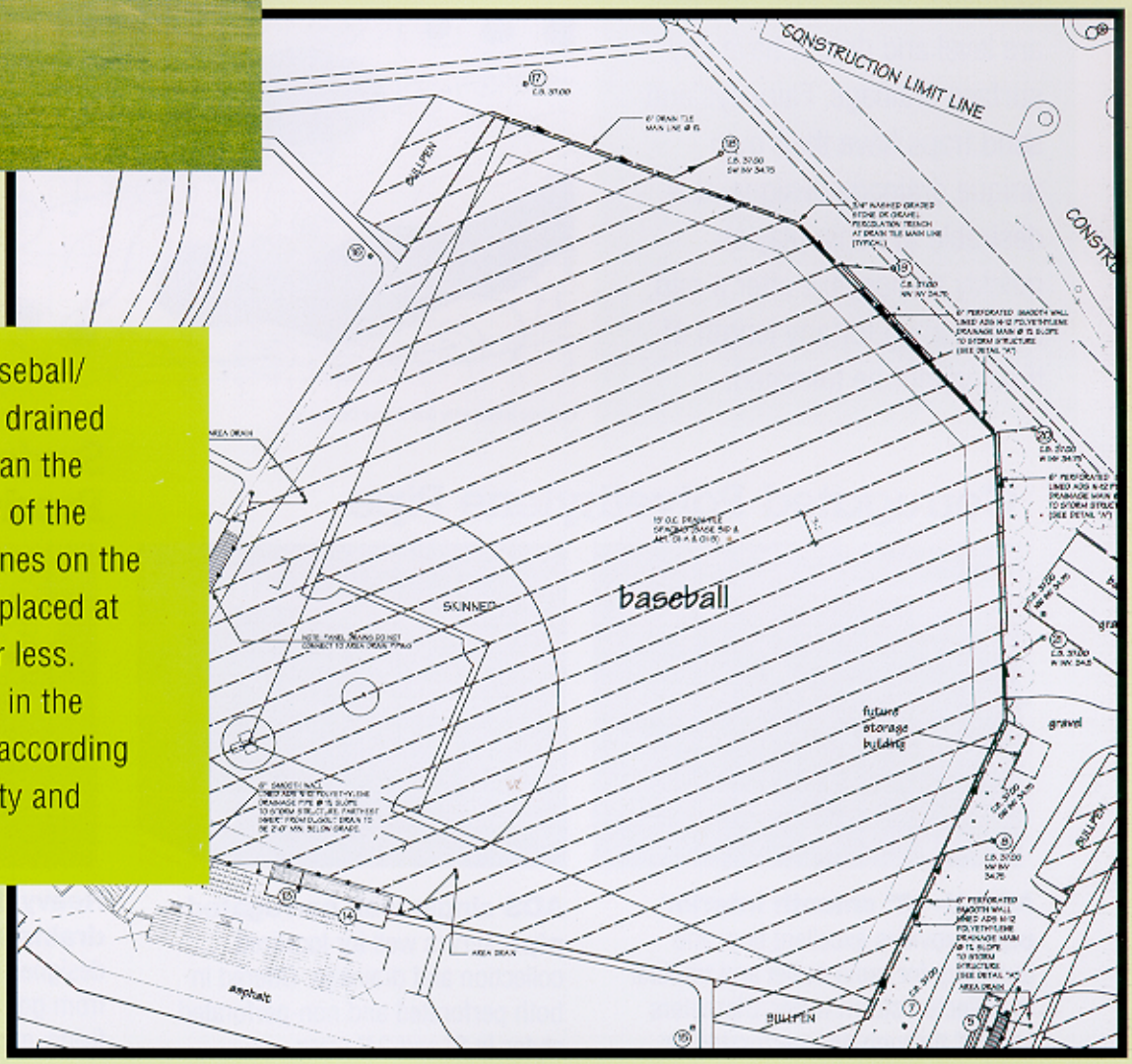
Therefore,

the water removal requirement for each line of pipe is approximately 38 GPM.



Baseball/Softball Drainage Design–

What's Underneath It All?



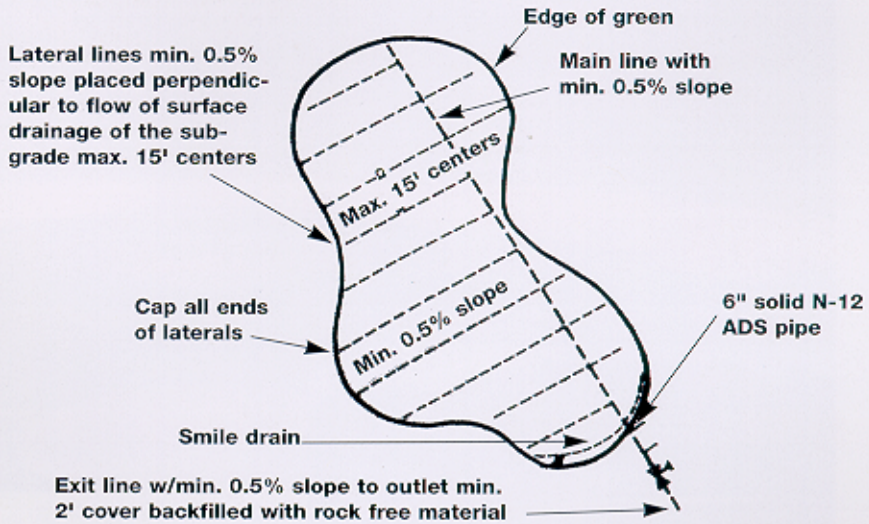
The infields of baseball/softball fields are drained more intensely than the outfields because of the extra play. Drainlines on the infield should be placed at intervals of 15' or less. Drainage spacing in the outfield will vary according to soil permeability and climate.

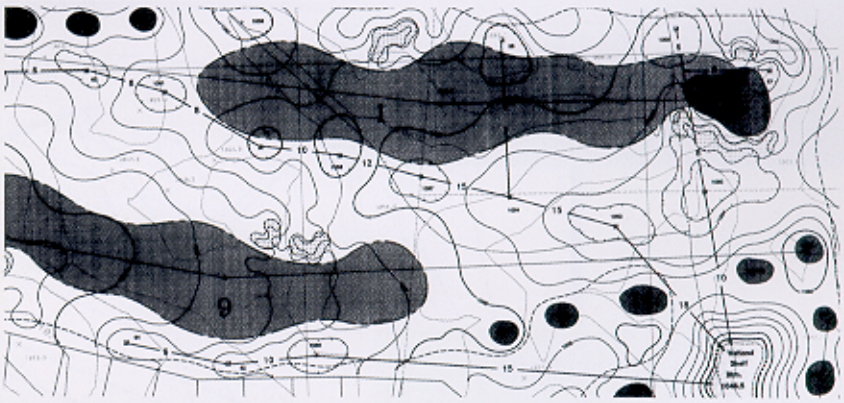
Courtesy James Burkart Associates, Inc.

Golf Course Drainage Design–

What's Underneath It All?

A golf course owner wants to have his course playable as quickly as possible in order to maximize play (and income) without damaging the turf. Golf course drainage is more specific; according to USGA standards, greens should be drained with drainage lines spaced at 15 foot intervals. Tee boxes should be drained similar to greens, especially if the tees are level and do not have any surface drainage. Fairways and sand traps have their own unique drainage designs. It is desirable to begin play as quickly as possible after a rain, and flooding for any length of time cannot be tolerated.





Courtesy Hurdzan/Fry Golf Course Design, Inc.

Corrugated Polyethylene Pipe

ADS N–12® smooth interior pipe provides excellent flow and durability for rapid outlet and transfer of collected storm water. Diameters from 4" through 48", perforated or non-perforated.

ADS single wall corrugated pipe serves well for localized collection and drainage. Offered in both perforated and non-perforated styles in 3" and 24" sizes.

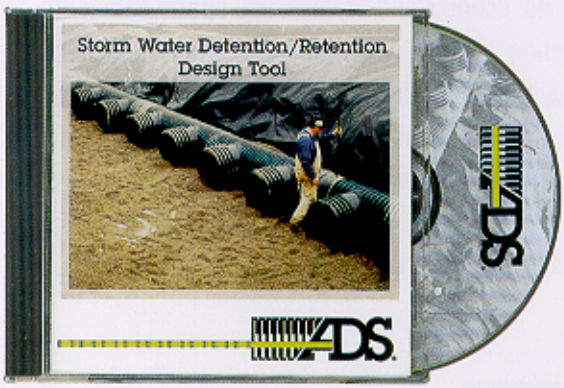
Surface Drainage Products

Heavy duty Nyloplast® inline drains and drain basins are designed for removal of surface water from golf courses, parks, athletic fields, etc. Solid cast iron surface grates will easily stand up to traffic from carts, mowers, and tractors.

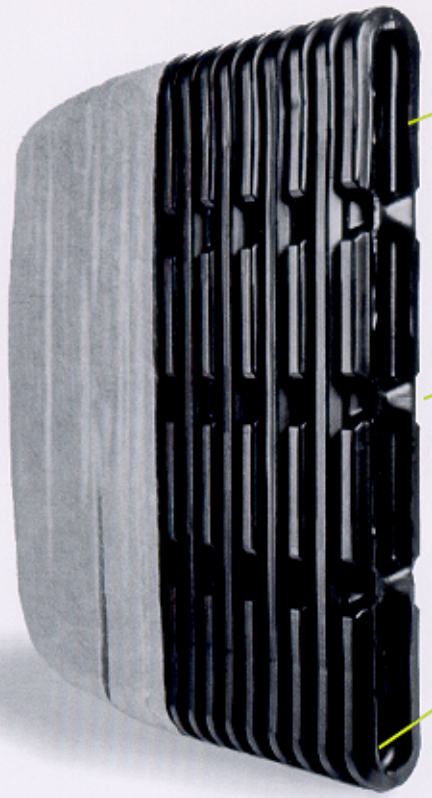
Drainage for the Entire Athletic Facility

Surface water draining from bleachers, running tracks, buildings and parking areas around the turf area should also be taken into consideration. Drainage mains and outlet pipe should be sized large enough to transfer all surface water away from the site.

Storm water retention and detention may be needed when the sudden outflow of water is too great for the existing storm sewer to handle. To address this issue, ADS has designed a CD-ROM incorporating AutoCad® Insertable Blocks to assist engineers with the expedient design of a retention/detention system.



AdvanEDGE® Panel Pipe for Athletic Field and Golf Course Drainage



AdvanEDGE® Panel Pipe is one of the newer developments in subsurface drainage, having first been used in 1989. The product consists of a perforated panel shaped plastic core which is available with or without fabric.

The distinguishing performance feature of panel pipe is its ability to rapidly collect and remove water. Compared to 4" round pipe, an equal length of 12" panel pipe has twice the soil contact area, and will drain a given quantity of water in about 60% of the time.

Cities, schools and professional sports teams are finding AdvanEDGE to be highly effective in keeping playing fields drained. For retrofit drainage on existing turf areas, AdvanEDGE is a natural choice because of its rapid installation in narrow trenches with minimum turf disturbance. AdvanEDGE's slim 1.5" profile permits a narrow trench and faster installation.

Geocomposite Edgedrains

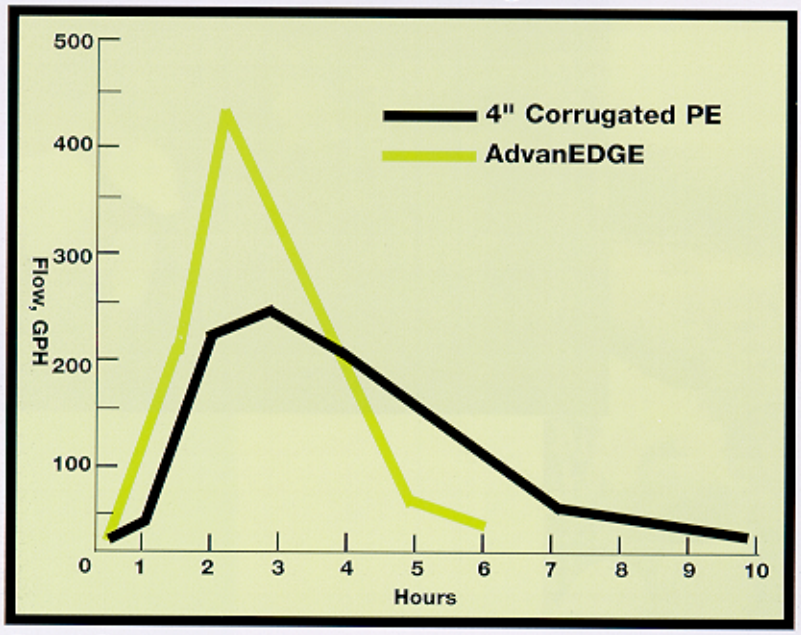
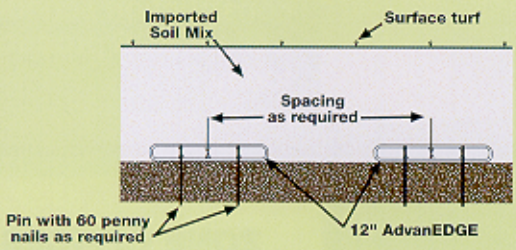


Figure 1. Flow rate vs. 4" round pipe.
Adapted From: Illinois DOT tests, March, 1991

Trenchless Construction– AdvanEDGE Installs Flat

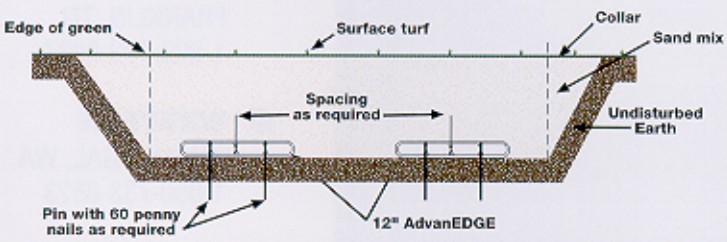
Athletic Field— Horizontal Installation Chart



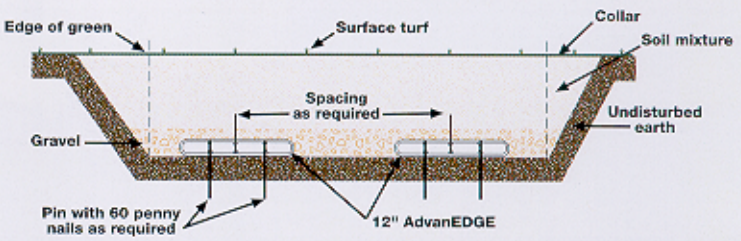
For athletic field horizontal applications without gravel, AdvanEDGE with sock material is recommended.

Putting Greens

California Sand Green



Typical Putting Green



For California sand greens, AdvanEDGE with sock material is recommended.

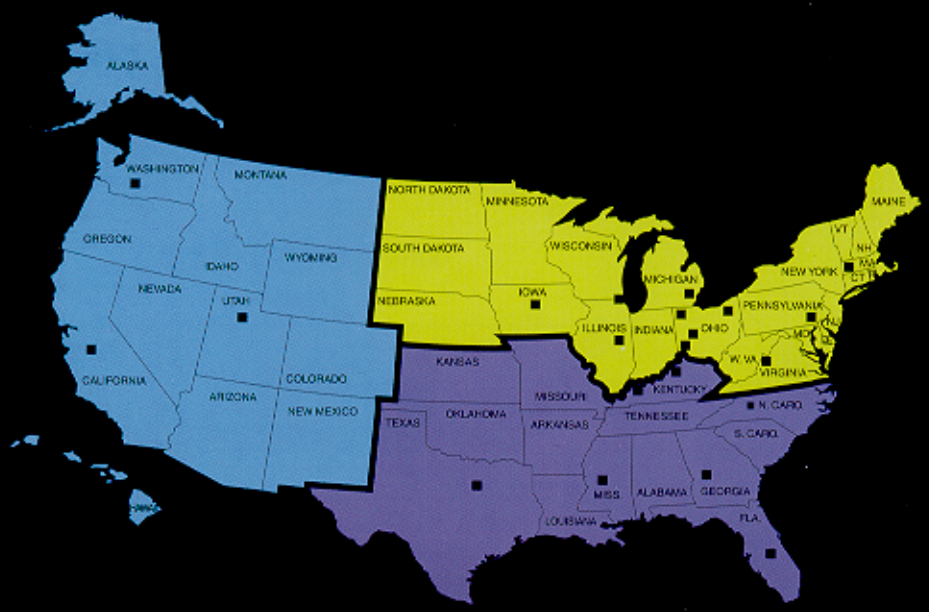
Geosynthetic Products

ADS offers a complete line of geotextile construction fabrics, silt fencing, geogrids, and erosion control mats for soil stabilization, reinforcement, filtration, separation, and sub-surface drainage.

ADS: We're more than partners in delivering drainage solutions.

ADS is the largest manufacturer of corrugated polyethylene pipe and related drainage products in the country. With 21 manufacturing plants, 30 customer service centers and over 4,000 distributors, we supply the highest quality drainage products and meet your demanding construction schedule. Call for ADS products today.

ADS Sales and Service Locations



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