Golf and Turf Drainage

Keeping golf courses and athletic fields playable – and profitable

ADS®

Play longer, better – and drier – with engineered turf drainage

The increasing popularity of golf, field sports, and other outdoor events places growing demands on turf design and maintenance. Technology is responding with new soil/sand composites, hybrid seeds, improved forms of artificial turf, and other advances.

But underneath it all, proper drainage is perhaps your most productive investment in the long-term health and playability of recreational surfaces. Consider the following benefits of a well designed and maintained drainage system:

Healthier grass and sod

Good drainage promotes deeper root growth and the "knitting" effect of the roots, which stabilizes your playing surface and lessens the tearing of the turf.

More effective use of soil nutrients

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

Reduced risk of disease

Turf that does not continuously sit in damp soils will be more resistant to fungus and disease.

Maximum playability

Fewer games and events will be cancelled or extensively delayed due to heavy rain. A well drained golf course allows golfers to resume play faster, with less damage to the course.

Reduced compaction

Drainage lessens the surface deformation caused by heavy traffic and soil compaction.

Removal of soluble salts

Drainage improves turf quality in arid and semi-arid areas through the leaching of soluble salts.

Safer surfaces

Good drainage reduces field damage and turf instability, providing players with better footing and less chance of injury.

The bottom line for designers, owners and managers is that proper drainage increases the playability of turf surfaces while reducing maintenance and repair costs.

ADS: Everything for turf drainage

No other company can match ADS's broad product offering of pipe, fittings and accessories. Those suited for the turf industry are detailed below:

N-12® smooth interior pipe

Provides excellent flow and durability for rapid outlet and transfer of collected storm water. Available with soil-tight or water-tight built-in gasketed bell and spigot joints for quick installation. Delivered in 6m lengths, 4" through 60" diameters, perforated or non-perforated.

Single wall corrugated pipe

3" through 24" diameter perforated or solid pipe serves well for localized collection and drainage. Coils available in 3" through 6" and 20 ft. lengths in larger sizes.

Fittings

ADS offers a complete line of couplings, elbows, tees, wyes, and reducers for joining corrugated pipe. In 4" through 8" diameters, fittings are injection molded and provide quick, snap-together connections for soil-tight or water-tight joints. Fabricated fittings are available for larger pipe sizes.

AdvanEDGE® flat pipe

A perforated panel-shaped polyethylene core in 12" and 18" widths and in coils up to 100 ft. Can be used with or without a covering geotextile sock for filtration of fines. The primary benefit of the panel design is rapid drainage response: 12" AdvanEDGE has twice the response rate of 4" round pipe, removing a given quantity of water 60% faster. AdvanEDGE can be installed vertically in narrow trenches for field and perimeter drainage, or laid flat directly on the subgrade of greens, bunkers and athletic fields.

DrainTech™ Drain Basins, Grates, and Valve Boxes

ADS now offers a full line of basins, grates, channel drains & valve boxes made of rigid, lightweight polyolefins. DrainTech structures easily adapt to the most common types of pipe, including corrugated and smooth wall polyethylene, and schedule 40 PVC. See page 6 for more information.

Nyloplast® inline drains and drain basins

Designed for rapid collection of surface water from all types of playing surfaces. Ductile iron grates will easily withstand loadings from carts, mowers and tractors.

Duraslot® surface drains

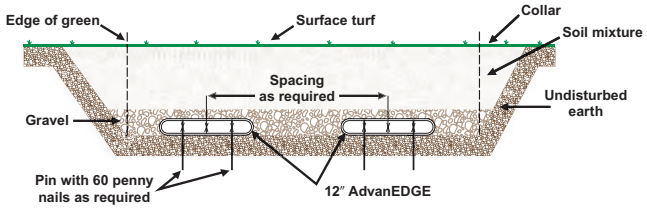
Linear drains designed to capture sheet flow from sloping surfaces. Made from 4" through 36" N-12 pipe with an aluminum slot mounted on top. Typically specified for parks, cart paths, parking lots, dugouts, running tracks and similar applications.

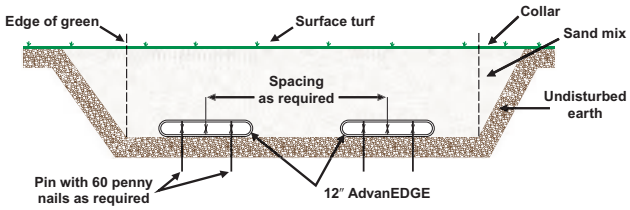
Geosynthetic products

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

Golf Courses

AdvanEDGE® Pipe for Putting Greens





USGA Greens

In the United States today, two basic types of putting greens are predominant. **USGA greens** are more prevalent nationally, employing a soil mixture root zone above a layer of gravel.

California Greens

California greens feature an all-sand root zone with no gravel layer. AdvanEDGE flat pipe is recommended for use with both types. California green specifications call for the flat pipe to be covered with a geotextile sock.

Putting greens

For more than four decades, the USGA has been publishing a wealth of data on golf course design and construction, and is considered the world's foremost authority in this field. In 2004, after three years of research in conjunction with The Ohio State University, the USGA issued a revised recommendation for putting green construction.

For the first time, this new standard permits both round pipe and now flat pipe for green drainage. The flat pipe must conform to ASTM D 7001, be a minimum of 12" in width, and not covered by a geotextile sleeve (waffle drains or any tubing encased in geotextile sleeves are specifically prohibited). **AdvanEDGE flat pipe is in full compliance with all the specifications of ASTM D 7001.**

Trenchless green drainage

The use of AdvanEDGE flat pipe placed directly on the green's sub-base has two distinct benefits: better drainage performance and lower installed cost. The panel pipe's large surface area results in a water removal rate almost twice that of 4" round pipe. And because there are no trenches to dig, no gravel backfill to buy or install, and no trench spoils to dispose of, green construction costs can be significantly reduced.

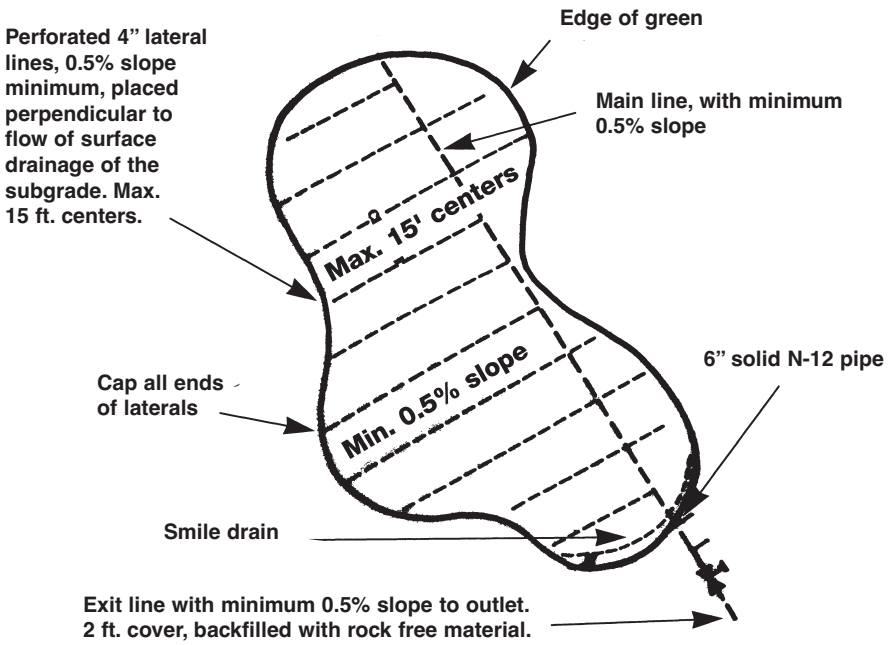
An AdvanEDGE drainage layout can be installed in less than two hours, compared to a full day for trenched round pipe. One expert has estimated the cost savings to be as much as $40,000 for 18 holes.

Traditional green drainage

ADS round pipe and fittings are also well suited for drainage of putting greens. Illustrated at right is a typical layout using 4” perforated laterals and 6” solid N-12® pipe installed in gravel-filled trenches in the subgrade.

Course drainage

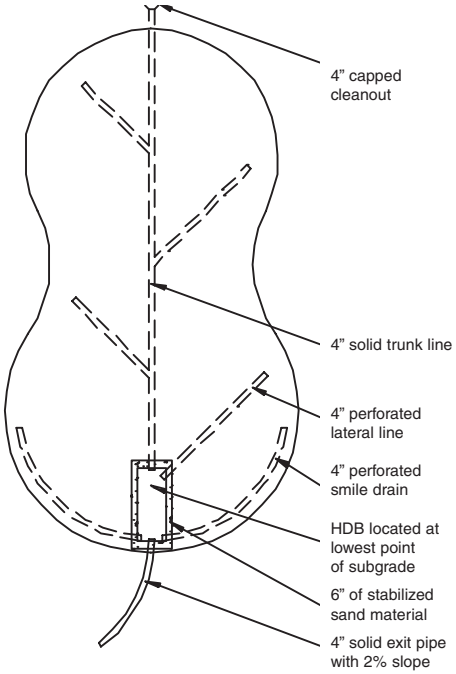
Unmanaged storm water results in ponding and mushiness, which damages turf and reduces the number of rounds that can be played. Tee boxes and fairways can be effectively drained with ADS polyethylene pipe. Smaller diameter, perforated, single wall pipe is used for laterals and local collection, feeding larger trunks and outlet lines made with N-12 pipe. Nyloplast inline drains and drain basins collect surface water from low spots.

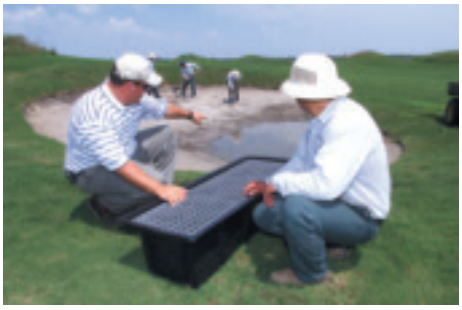


Horizontal Drain Basin (HDB): A cure for wet bunkers

Sand traps present a special drainage challenge due to periodic clogging of the perforated drain lines. Removing the accumulated silt has been a time-consuming and costly process. The ADS Horizontal Drain Basin (HDB) is an effective and economical solution to this problem.

The HDB consists of a 12” high x 16” wide x 48” long polyethylene water receptacle covered by a filtration screen sandwiched between two fiberglass grates. It is installed in the subgrade at the lowest point(s) of the bunker. Drainage pipes are tapped into the sides, and an exit drain is installed at the downstream end. The mesh screen helps to keep silts out of the drain water, and greatly extends the cleaning interval. When rejuvenation is needed, simply uncover the unit, remove the grate, flush out the screen and receptacle, reassemble and re-cover.





DrainTech

DrainTech Drain Basins, Grates, and Valve Boxes

The innovative DrainTech line offers a complete selection of products in rigid, lightweight polyolefins for outdoor drainage and turf irrigation. DrainTech drain basins are available in sizes ranging from 6" to 18", and can be attached to many sizes of pipe by using DrainTech locking adapters. A full line of grates, both round and square, can be used with drain basins or attached directly to pipe. Valve boxes with risers are available to protect irrigation controls and utility meters. We also offer a line of channel basins, grates, and channel fittings for use as horizontal drains on driveways, walkways and paths.

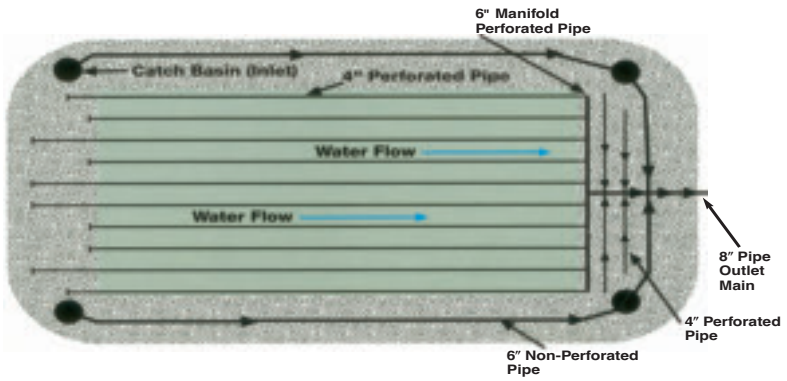
DrainTech grates and valve boxes come in a variety of colors to blend with grass, concrete or sand surfaces.

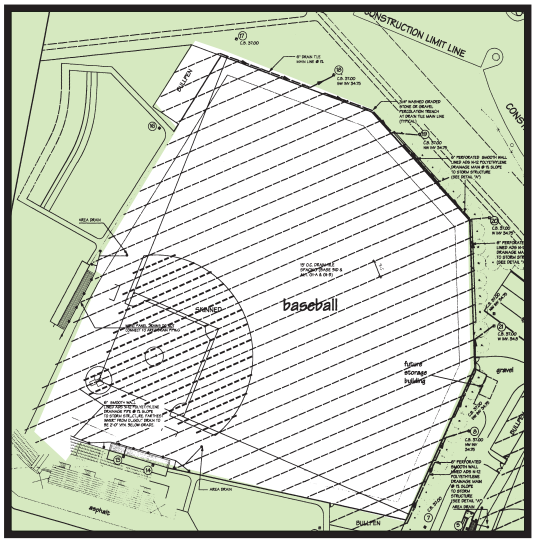
Water removal rate

Professional sports stadiums, particularly those subject to frequent heavy rainfall, may call for several inches per hour of water removal, while for most other venues, a removal rate of a half-inch per hour would be adequate.

If we know the playing field dimensions, the desired water removal rate, and the space between 4" lateral drain lines, we can calculate the water removal rate needed for each line as follows:

Given:
Area of football field = 160 ft. x 360 ft. = 57,600 sq. ft. = 1.32 acres
Desired water removal rate = 12" in 24 hrs = 288 GPM per acre
4" lateral drain pipe = 10 lines, each 360 ft. long, 16 feet apart
Then:
Area drained by each pipe = 16 ft. x 360 ft. = 57,600 sq. ft. = .132 acres
Removal rate for entire field = 288 GPM x 1.32 acres = 380 GPM
Removal rate per line of pipe = 380 GPM ÷ 10 lines = 38 GPM per line





The infields of baseball/softball diamonds may require more intense drainage than the outfields because of the extra play. Drain lines on the infield should be spaced at intervals of 15 ft. or less. Drainage spacing in the outfield will vary according to soil permeability and the frequency and severity of rainfall events.

Athletic Fields

Pipe depth

Most athletic fields have uniformly structured soils in the root zone, which drain relatively quickly. The depth of the pipe is primarily determined by the permeability of the surrounding soil, and the inches of water that need to be removed in a 24-hour period.

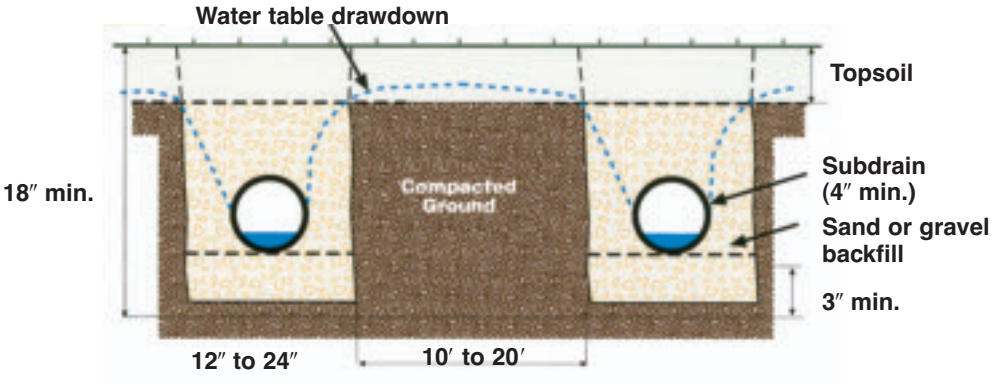
Turf grass root zones are fairly shallow, and drainage for most athletic fields is needed in only the top foot of soil. This, plus rapid water removal requirements, dictates a drain depth of one to two feet. However, in areas where salinization may be a problem, a deeper drain depth may be warranted.

Many times, particularly in stadiums, a 6" to 8" soil/sand mix is imported to the site. This soil is usually of higher permeability than the existing subgrade, which can be compacted up to 95%. Because the imported soil does drain quickly, it is important to position the drainage lines close to the soil mixture in order to accept and carry the water away to an outlet.

Pipe should never be covered with an impermeable layer of soil.

Turf aeration equipment should also be considered. Some aeration tines can penetrate to a depth of 9", which could damage the buried pipe.

Drawdown Position Between Two Pipe Laterals on Compacted Ground



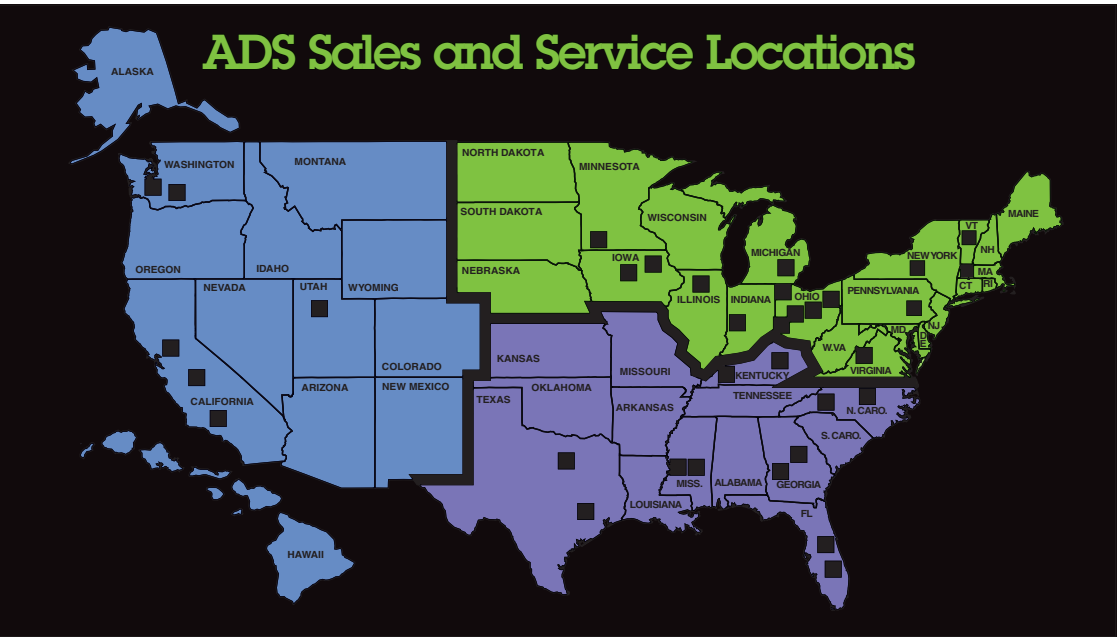
Quality drainage products when and where you need them

Advanced Drainage Systems (ADS) is the world's largest manufacturer of polyethylene drainage products. Since the 1960s, the company has led the industry with a record of painstaking research, new product development, and breakthrough applications. Customers around the world insist on ADS quality and service to protect their job site investments.

ADS offers unparalleled resources to assist designers and installers of turf drainage systems: more than 350 field sales professionals, 35 regional application engineers, 40 domestic and international plants, over 30 distribution yards, and over 100 customer service representatives, not to mention more than 4,000 local stocking distributors of construction, drainage and turf maintenance supplies.

For information, technical assistance, or the name of the outlet serving your area, contact your local ADS representative or call 1-800-821-6710.

ADS Sales and Service Locations



To learn more about ADS turf drainage products, log on to www.ads-pipe.com, or call 1-800-821-6710.

Customer Service Centers

- **MIDWEST / NORTHEAST**
  LONDON, OH
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- **SOUTHERN**
  FRANKLIN, TN
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ADS "Terms and Conditions of Sale" are available on the ADS website, www.ads-pipe.com

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