Drainage Solutions

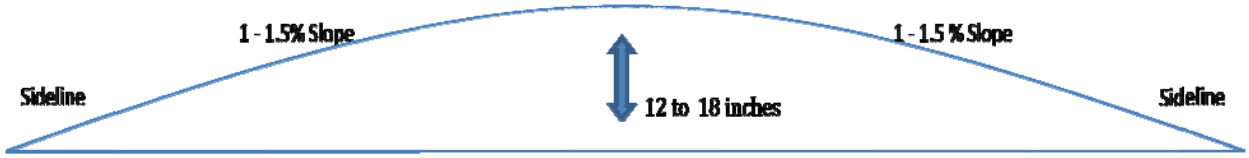
Soil Amendments

Coarse sand is commonly added to athletic surfaces to improve drainage. When adding sand to a native soil, the mixture should be made up of at least 70 percent sand. If there is less than 70 percent, internal drainage may actually be slowed. There must be enough sand particles in contact to increase macroporosity and improve drainage. When the sand and native soil are combined, they should be mixed offsite. If the sand is tilled into the native soil, it will create a marbling effect that is not ideal.

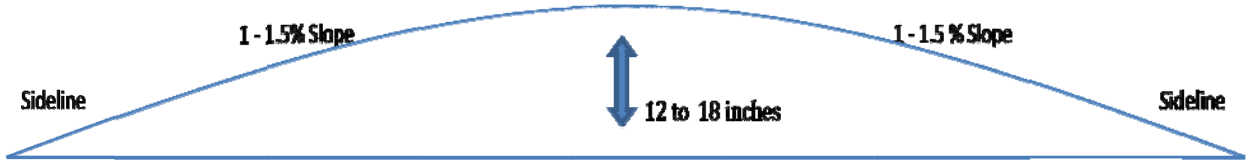
Crowns

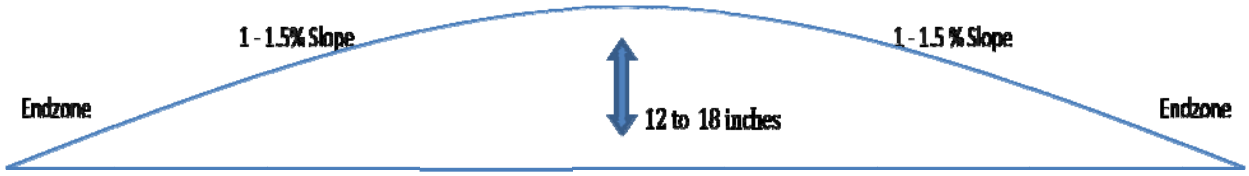
Crowns are the most effective drainage solution for athletic fields to remove surface water. Crowns should have a 1-1.5% slope and direct water the shortest distance possible to a drain system.

Crowns that slope away from the center so the field drains toward the sidelines are the most effective solution for sports that use goals. It is important to direct water away from goal mouths to keep that area safe and playable. This design can be used for sports such as football, rugby, field hockey, soccer and lacrosse.

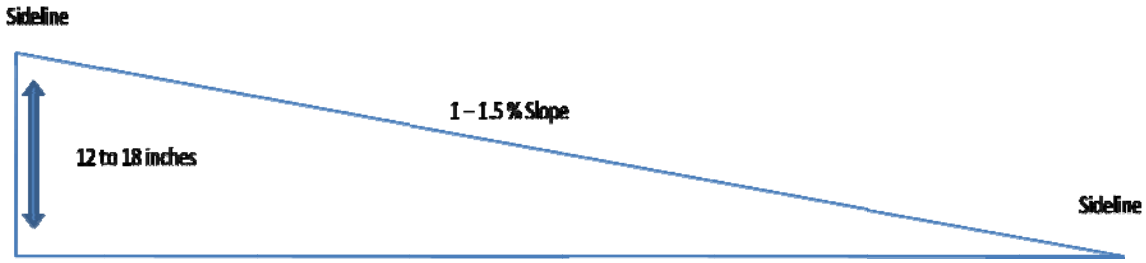


Turtle hump crowns work the best for fields used only for football. In this case, the field drains to both sidelines as well as both endzones. Be aware that a turtle hump crown works only for football. For a sport such as soccer, this type of crown would cause water to drain toward the goal mouth, creating an unsatisfactory and unsafe playing surface.





Some fields are flat and slope to one side so they only drain to one side of the field. Although it is not ideal, this field design is effective for football, rugby, soccer, field hockey and lacrosse.



Baseball and Softball Field Crowns

The highest point on a baseball field is the pitcher's mound, which is 10 inches higher than home plate. The field slopes away from the mound in all directions. Apart from the pitcher's mound, the infield is higher than the rest of the field and has a .5 percent slope into the outfield. The outfield then slopes away at a 1 to 1.5 percent slope.

On softball fields, the infield should be the highest point on the field. The outfield should then slope away from the infield at a 1 to 1.5 percent slope.

Catch Basins and Sideline Drains

Crowned fields and contours in the landscape can direct runoff water to catch basins and sideline drains for collection. These drains then conduct water into a storm sewer. Catch basins and sideline drains are only effective when they are situated lower than the surrounding area.

Aeration

Layers can be formed when topdressing particle sizes differ from the existing particle size of the rootzone. Shallow layers within a rootzone can be detrimental to turfgrass health. Aeration and deep tine core aeration can be an effective way to improve drainage. Aeration breaks through these layers allowing a channel for turfgrass roots to grow into and for water to infiltrate. Deep tine aeration will only work if there is an underlying layer that that can be accessed for better drainage. If the existing rootzone is made up completely of fine textured soil with no underlying drainage system, deep tine aeration will not improve drainage.

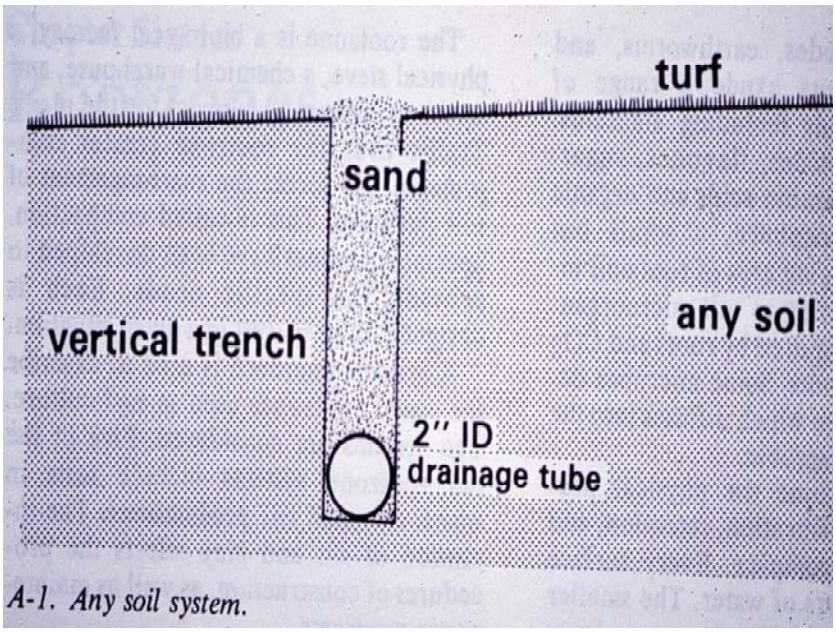
Pipe Drains

Pipe drains work by slowly and consistently removing water from the subsoil. Pipe drains are 4 inch perforated pipes laid on beds of gravel in trenches that are 12 inches wide and 2 to 3 feet deep. The pipes are then surrounded by 12 to 18 inches of sand or gravel. The trenches should generally be about 20 feet apart. It is also important that the sub-base not be overly compacted.

There are many disadvantages of pipe drains. Unless the trenches are filled to the surface with sand or gravel, the layer of topsoil overlying the trench can create a perched water table. This topsoil must be saturated before water can enter into the layer of sand or gravel. If sand is filled to the surface, drought conditions can cause the trenches to dry out much faster than the rest of the field. The sand can also affect turf growth and traction.

Interceptor Drains

Interceptor drains are designed to intercept and channel away water that may flow onto an athletic field from surrounding areas. They are pipe drain systems that remove surface and subsurface water from problem areas.



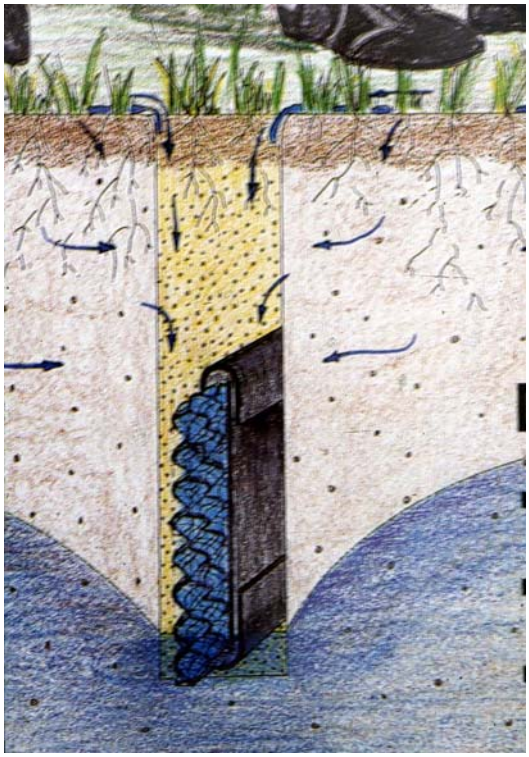
A-1. Any soil system.

Trackside Drain

A trackside drain is a pipe drain system that runs along the interior of the track with both the track and the field sloping towards the drain.

Strip Drains

Strip drains are cloth wrapped plastic or fiber structures about an inch wide and 4 to 6 inches high. They can be installed in narrow, shallow trenches with less labor and less disruption to a field. The trench can be filled with sand to the surface. Strip drains can be spaced 20 feet apart at a 45-90 degree angle to surface runoff for best performance. Strip drains are attractive because they do not require water to flow across the entire field to drain. It is important that the topsoil and sub-base are not overly compacted as that could lead to drainage problems.



Sand-Slit Drains

Sand-slit drains are narrow trenches with thin perforated pipe at the bottom. Running perpendicular, or in a herringbone pattern, is another set of sand filled trenches to help conduct water to the perforated drain pipe. Trenches should be filled to the surface with coarse textured sand. If trenches are covered with topsoil, water will not move as efficiently into the drain due to the formation of a perched water table. To prevent contaminating the sand with smaller particle sizes, the field should be topdressed with sand that matches what is used in the trench.