A pull up riser with at least one drainage port near its upper end is provided for attachment to a subsurface drain system to speed drainage from low areas during times of high water.
RISER FOR SUBSURFACE DRAINAGE PIPE

CROSS REFERENCES TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/374,178 filed Apr. 19, 2002, the disclosure of which is herein incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] This invention relates to an attachment for an underground drainage pipe system. Subsurface drainage systems have been known for many years. The classic French Drain, which is an earth-covered, gravel-filled sloping trench, with various improvements, is in extremely wide use to rid poorly drained areas of standing water. One of the shortcomings, however, of this type of drainage system is that its drainage capabilities fail over time, due to a buildup of silt in the system, leading to water standing in the area of the drain for more lengthy periods of time.

[0003] An improvement to a subsurface drainage system to more quickly drain water from a poorly drained area or silted in drain would be very desirable.

[0004] One variation of the French drain is used to drain sand bunkers on a golf course. The drains are preferably placed during bunker construction, by forming a sloping trench along the bottom of the bunker, laying landscape fabric in the trench, laying a perforated pipe on the fabric, filling over the pipe with gravel, folding the fabric over the gravel, and layering the sand over the folded fabric. Over time, however, silt collects in the bunker in such a manner to prevent rapid water infiltration to the pipe, resulting in standing water after heavy rains, which is typically must be pumped out by maintenance crews to bring the course back into serviceable condition within a reasonable period of time.

[0005] Standing water in the bunkers changes the designed difficulty of the course, is unsightly, and may give rise to vermin such as mosquitoes. It is therefore necessary to promptly remove the water so that golfers traversing the course over time enjoy the same quality of services.

[0006] A less labor intensive technique to drain these bunkers would be very desirable.

OBJECTS OF THE INVENTION

[0007] It is an object of this invention to provide an improved subsurface drainage system.

[0008] It is another object of this invention to provide an attachment for a subsurface drainage system which can be used to increase its performance.

[0009] It is a further object of this invention to provide a drainage method which is especially useful for draining golf course bunkers.

[0010] It is a further object of this invention to provide an apparatus and method for improving drainage of surface waters by improving flow to a subsurface drainage system.

SUMMARY OF THE INVENTION

[0011] In one embodiment of the invention, there is provided an improvement for a subsurface drainage system comprising a buried perforated drain pipe sloped to carry water away from a pick up area to a desired destination, wherein water infiltration from the surface of the earth to the pipe is inadequate under all conditions to prevent a pool of water from forming on the surface of the earth above the buried drain pipe. The improvement comprises a riser tube mounted to the drain pipe so as to be extendable from a retracted position in which an upper end of the riser tube is beneath the surface of the earth to an extended position in which the upper end of the riser tube is above the surface of the earth. When in the extended position, the riser tube forms a flow path from the pool of water to the pipe to provide rapid drainage of water from the pool.

[0012] In another embodiment of the invention, there is provided a method to provide means for more rapid draining of water from pool of water standing in a low area and having a subsurface drain pipe situated underneath, on an as needed basis. The method is carried out by providing the drain pipe with an extendable riser tube, said riser tube having an at least one opening near its upper end to form a flow path from a surface of the sand bunker to the subsurface drain pipe when the riser tube is in an extended position.

[0013] In a further embodiment of the invention, there is provided a method for draining water from a sand bunker. The method is carried out by locating an upper end of a riser tube buried beneath an upper surface of the sand in the sand bunker, said riser tube being in flow communication with a subsurface drain pipe running beneath the sand bunker, and pulling up the riser tube until an upper end of the riser tube is above the surface of the sand to expose at least one drain hole leading into the riser tube to water standing in the bunker.

[0014] The invention will allow golf course maintenance crews to tie existing sub-surface drainage with a telescoping surface drain pipe. When drainage is not necessary, the drain pipe can be lowered below the bunker sand surface. This allows the drain to go undetected by golfers.

[0015] Today’s maintenance crews are expected to pump all sand bunkers after a rain. This wastes many man hours and increases the time it takes the golfer to complete a round of golf. If maintenance crews’ time is increased and golf rounds are cut back because of water in the bunkers, the golf course owner/operators have wasted money. The dollar value saved by the bunker drain depends on the amount of annual rain fall and annual rounds of golf played on the course. When these two primary factors are substantial then the dollar value saved is substantial.

[0016] Although the invention is described primarily in terms of its application in a golf course setting, it expected to provide substantial benefits in any setting where silt or clay impedes percolation of surface water to the subsurface drain.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is a cross section of a golf course bunker showing the riser in an extended position.

[0018] FIG. 2 is a detailed view of a portion of the invention as shown in FIG. 1.

[0019] FIG. 3 is a detailed view of the invention as shown in FIG. 2 with the riser in the retracted position.
A subsurface drain system 20 comprises a buried perforated drain pipe 22 sloped to carry water away from a pick up area to a desired destination. The drain pipe is generally positioned in a bed of gravel 26, and perforations 24 are oriented downwardly. The invention has it greatest application where water infiltration from the surface 28 of the earth to the pipe is inadequate under all conditions to prevent a pool 40 of water from forming on the surface of the earth above the buried drain pipe. The improvement comprises a riser tube 30 mounted to the drain pipe so as to be extendable from a retracted position in which an upper end of the riser tube is beneath the surface of the earth (FIG. 3) to an extended position in which the upper end of the riser tube is above the surface of the earth (FIG. 2). The riser tube, when in the extended position, forms a flow path from the pool of water to the pipe to provide rapid drainage of water from the pool.

For a general landscape application, the upper end of the riser tube is buried under a layer of earth or fill, for example, bark, when it is in the retracted position. For a golf course application, the upper end of the riser tube will generally be buried under sand. FIG. 1 shows such an embodiment of the invention in use to drain a pool formed in a golf course sand bunker having a subsurface drain pipe underlying the bunker.

Because the end of the riser can be buried, it can be placed in the lowest part of the bunker. This will provide the best drainage. Because the end of the riser can be elevated above the surface of the sand, it can be used without permitting high levels of sand to enter the drain system, which can lead to eventual plugging. Prior art attempts to solve the problem of water accumulating in the bunkers always faced one of these shortcomings. Devices that are on the surface of the bunker when not in use cannot be placed in the lowest part of the bunker, because they are too likely to interfere with the lay of the ball.

As shown in FIGS. 2 and 3, the riser tube telescopes vertically into the drain pipe. Best results are obtained when the drain pipe is fitted with an upwardly facing collar through which the riser tube closely slides. A “T” fitting mounted on the drain pipe will provide good results and is preferred. Existing drain pipe can be employed. Commonly, such pipe is plastic corrugated (banded) pipe, referred to in the industry as ADS pipe.

Preferably, the upper end of the riser tube is fitted with a removable end plug 2. A threaded plug has been used with good results. An upper side of removable end plug is preferably fitted with a lift handle facing away from the drain pipe. A U-bolt 3 has been used with good results.

If desired, the removable end plug can be associated with a metal to facilitate its detection when in a buried state. For example, a ferrous metal could be embedded in the plug for detection with an electronic metal detector or a powerful magnet. The riser can also be located with a probe.

The riser optionally has a plurality of lateral openings 11 near the upper end of the riser tube to form a portion of the flow path from the pool of water to the pipe to provide rapid drainage from the pool. Three-eighths inch openings can be used with good results. By having the end plug removable to form a portion of the flow path from the pool of water to the pipe even more rapid drainage from the pool can be provided, and using the end plug without the lateral openings is presently preferred.

In a preferred embodiment, and with reference to the drawings, element 1 is a 4 inch threaded PVC Tee. It is used to house the inner sleeve and bushing and can be attached to multiple types of underground pipe by using commercially available adapters. Element 2 is a 3 inch threaded PVC plug. This plug can be removed when the drain is in the up position to allow large volumes of water to be discharged. Element 3 is a ¾ inch U bolt with nuts. This element permits the 3 inch PVC nipple to be pulled up and the 3” PVC plug to be removed. Element 4 is the riser, which is a 3 inch PVC pipe nipple. The nipple allows the opening of the drain to be moved up and down, generally on the order of about 6-8 inches. The riser can be any desired length, depending on the burial depth of the existing drainage piping, and will generally be selected so that it is buried 3-4 inches in the retracted position, without unduly blocking drainage through the existing drainage pipe, and positionable up to 3-4 inches above the predominant sand surface in the bottom of the bunker when in the extended position. For many applications, the riser will be 6-12 inches in length. Element 5 is a 4 inch threaded PVC Bushing. This element keeps sand from entering element 1 and keeps element 4 from pulling out of the housing, by way of the nipple stop. Element 6 is a 3 inch threaded PVC female adapter. This element allows elements 2 and 4 to be connected. Element 7 is a 3 inch nipple stop to prevent element 4 from being pulled out of the housing. In a prototype unit, a pop rivet was used with good results. Element 8 is block or mass of stabilized sand, or cement or concrete, preferably poured around the unit to keep the drain from pulling free from existing drainage pipe when the riser and plug are manipulated. Element 9 is bunker sand, which permits the drain to be covered while hiding it from view of golfers. Element 10 is compacted soil.

While certain preferred embodiments of the invention have been described herein, the invention is not to be construed as being so limited, except to the extent that such limitations are found in the claims.

What is claimed is:

1. In a subsurface drain system comprising a buried perforated drain pipe sloped to carry water away from a pick up area to a desired destination, wherein water infiltration from the surface of the earth to the pipe is inadequate under all conditions to prevent a pool of water from forming on the surface of the earth above the buried drain pipe, the improvement comprising a riser tube mounted to the drain pipe so as to be extendable from a retracted position in which an upper end of the riser tube is beneath the surface of the earth to an extended position in which the upper end of the riser tube is above the surface of the earth, said riser tube when in the extended position forming a flow path from the pool of water to the pipe to provide rapid drainage of water from the pool.

2. A drain system as in claim 1 wherein the upper end of the riser tube is buried under a layer of earth when in the retracted position.
3. A drain system as in claim 2 wherein the upper end of the riser tube is buried under sand.

4. A drain system as in claim 3 wherein subsurface drain pipe underlies a golf course sand bunker.

5. A drain system as in claim 1 wherein the riser tube telescopes vertically into the drain pipe.

6. A drain system as in claim 5 wherein the riser tube slides up and down in a "T" fitting mounted on the drain pipe.

7. A drain system as in claim 5 wherein the upper end of the riser tube is fitted with a removable end plug.

8. A drain system as in claim 7 wherein an upper side of the removable end plug is fitted with a lift handle facing away from the drain pipe.

9. A drain system as in claim 7 wherein the removable end plug is associated with a metal to facilitate its detection when in a buried state.

10. A drain system as in claim 7 wherein a plurality of lateral openings near the upper end of the riser tube are provided to form a portion of the flow path from the pool of water to the pipe to provide rapid drainage from the pool.

11. A drain system as in claim 7 wherein the removable end plug is removable to form a portion of the flow path from the pool of water to the pipe to provide rapid drainage from the pool.

12. A method to provide means for more rapid draining of water from pool of water standing in a low area and having a subsurface drain pipe situated underneath, on an as needed basis, said method comprising

   providing the drain pipe with an extendable riser tube, said riser tube having an at least one opening near its upper end to form a flow path from a surface of the sand bunker to the subsurface drain pipe when the riser tube is in an extended position.

13. A method as in claim 12 wherein the lower area is a golf course sand bunker and the riser tube is extendable from a retracted position in which the upper end of the riser tube is beneath the surface of the sand bunker so that the riser tube can be concealed by sand in the bunker.

14. A method for draining water from a sand bunker, said method comprising

   locating an upper end of a riser tube buried beneath an upper surface of the sand in the sand bunker, said riser tube being in flow communication with a subsurface drain pipe running beneath the sand bunker, and

   pulling up the riser tube until an upper end of the riser tube is above the surface of the sand and exposing at least one drain hole leading into the riser tube to water standing in the bunker.

* * * * *