DRAINAGE SYSTEM FOR USE IN BASEMENTS AND A METHOD FOR ITS INSTALLATION AND USE

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Abstract
A basement drainage system and method for its use comprising a combination of floor drains, poly drains and an exterior drainage system, wherein the exterior drainage system and poly drains can prevent water from entering the basement and wherein one or more floor drains can each transport water to one or more sump basins to be pumped out of a basement and away from a building. The present basement drainage system can effectively remove ground water located below a basement floor as well as water collected on the surface of the basement floor, and prevent ground water from entering the basement.
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CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of application Ser. No. 13/041,953, filed in the USPTO on Mar. 7, 2011, entitled AN IMPROVED DRAINAGE SYSTEM FOR USE IN BASEMENTS AND A METHOD FOR ITS INSTALLATION AND USE, which is incorporated by reference herein in its entirety.

FIELD OF THE INVENTION

[0002] The present drainage systems are improvements upon existing systems used to protect buildings, particularly the basements of buildings, from water infiltration.

BACKGROUND

[0003] Foundations and basement walls support the weight of the entire upper portion of a building and are typically made from poured concrete or cinderblocks. These materials can often allow water to penetrate through them because they are either porous or contain cracks. Hydrostatic pressure outside of a building’s basement can push water through these pores, cracks and other small spaces in basement and foundation walls as well as through basement floors. This water, once it has penetrated into the basement, can damage the interior of the building, lead to the growth of mold and musty odors, and can even damage the walls and foundation by expanding and eroding existing cracks.

[0004] The current system, which is widely used and approved under the National Building Code, provides for a sump basin to collect water from the surface of the basement floor. The sump basin contains a sump pump to remove water from the basement and move it away from the building. In addition to the collection of water from the basement floor, this system contains a poly drain beneath the floor to collect any water in the ground located under the building, relieving water pressure asserted by such water against the floor.

[0005] This system has proven effective for removing some water from the ground located underneath the surface of the basement floor. However, the use of a sump basin alone to remove moisture from the surface of the basement floor is not particularly efficient or effective, and the current system does not prevent water from entering into the basement. This can create wet basement floors for prolonged periods, which can lead to unsafe conditions and the growth of harmful organisms. Additionally, liquid on the inside of the floor can ruin any finishing materials, such as carpeting, wall board, and wood trim, that have been installed in the basement.

[0006] What is needed is a system which can both prevent ground water from seeping up and into the basement as well as efficiently and effectively remove water from both the surface of the basement floor and the ground underneath the surface of the basement floor as well water located outside of the basement walls.

SUMMARY OF THE INVENTION

[0007] It is an aspect of the present inventive concept to provide a basement drainage system which can both prevent ground water from seeping up and into the basement as well as efficiently and effectively remove water from both the surface of the basement floor and the ground underneath the surface of the basement floor as well water located outside of the basement walls.

[0008] The above aspect can be obtained by a basement drainage system, comprising: a basement having walls at its perimeter and a basement floor located in the area within the walls; at least one sump basin located within the basement and located partially below the basement floor; at least one sump pump located within the sump basin; a poly drain placed in the basement, along the walls, and below the basement floor connected to the sump basin; an outer floor drain placed in the basement and along the perimeter of the walls and connected to the sump basin; and an upper exterior drainage system located outside of the basement and along the outer perimeter of the basement wall.

[0009] The above aspect can also be obtained by a basement drainage system, comprising: a basement having walls at its perimeter and a basement floor located in the area within the walls; at least one sump basin located within the basement and located partially below the basement floor; at least one sump pump located within the sump basin; a poly drain placed in the basement, along the walls, and below the basement floor connected to the sump basin; an outer floor drain placed in the basement and along the perimeter of the walls and connected to the sump basin; an inner floor drain placed in the basement and along the perimeter of the walls, and within the outer floor drain, and connected to the sump basin; an upper exterior drainage system located outside of the basement and along the outer perimeter of the basement wall; and a lower exterior drainage system located outside of the basement and along the outer perimeter of the basement wall and below the upper exterior drainage.

[0010] The above aspect can also be obtained by a method for installing and using a basement drainage system, the method comprising: providing a basement drainage system, comprising: a basement having walls at its perimeter and a basement floor located in the area within the walls; at least one sump basin; at least one sump pump; a poly drain; an outer floor drain placed in the basement and along the perimeter of the walls and connected to the sump basin; and an upper exterior drainage system located outside of the basement and along the outer perimeter of the basement wall; placing at least one sump basin in a basement floor, wherein the sump basin is located partially below the surface of the basement floor; placing at least one sump pump into at least one sump basin, wherein the sump pump can transport water from the sump basin out of the basement; placing at least one poly drain constructed to drain water to at least sump basin using gravity, wherein one or more poly drains constructed to drain ground water located below the basement floor to one or more sump basins using gravity, where it can be pumped out of placing an outer floor drain along the inner perimeter of a basement wall constructed to drain water to at least one sump basin, this outer floor drain being capable of collecting water located on the surface of the basement floor; placing an inner floor drain located along the inner perimeter of the outer floor drain constructed to drain water to at least one sump basin, this inner floor drain being capable of collecting water located on the surface of the basement floor; and placing at least one exterior drainage system along the outer perimeter of the basement wall, wherein the exterior drainage system is capable of draining water to lower ground or a water drainage system.
These together with other aspects and advantages of the present inventive concept, which will be subsequently apparent, reside in its details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part thereof, wherein like numerals refer to like parts throughout.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Further features and advantages of the present device, as well as the structure and operation of various embodiments of the present device, will become apparent and more readily appreciated from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings of which:

**FIG. 1** is a cut-away view of a standard basement drainage system known to exist in the prior art;

**FIG. 2** is a cut-away view of a basement drainage system comprising an outer floor drain, but no poly drain, known to exist in the prior art;

**FIG. 3A** is a cut-away view of a basement drainage system comprising an outer floor drain, and a poly drain, according to an embodiment;

**FIG. 3B** is a cut-away view of a basement drainage system comprising an inner floor drain a poly drain and an upper exterior drainage system, according to an embodiment;

**FIG. 3C** is a cut-away view of a basement drainage system comprising an inner floor drain a poly drain and an upper and lower exterior drainage system, according to an embodiment;

**FIG. 4A** is a cut-away view of a basement drainage system comprising an outer floor drain, an inner floor drain, a poly drain, according to an embodiment;

**FIG. 4B** is a cut-away view of a basement drainage system comprising an outer floor drain, an inner floor drain a poly drain and an upper exterior drainage system, according to an embodiment;

**FIG. 4C** is a cut-away view of a basement drainage system comprising an outer floor drain, an inner floor drain, a poly drain and an upper and lower exterior drainage system, according to an embodiment;

**FIG. 5** is a top plan view of a basement drainage system comprising an outer floor drain, and inner floor drain, a poly drain (not visible) and an exterior drainage system, according to an embodiment;

**FIG. 6** is a top plan view of the basement drainage system shown in **FIG. 5**, comprising an outer floor drain, an inner floor drain, a poly drain (not visible) and an exterior drainage system, wherein the outer edge of the foundation is depicted by broken lines, according to an embodiment; and

**FIG. 7** is a top plan view of a basement drainage system shown in **FIG. 5** and **FIG. 6**, wherein the poly drain and the outer edge of the foundation are each depicted by broken lines, according to an embodiment.

**DETAILED DESCRIPTION**

This description of the exemplary embodiments is intended to be read in connection with the accompanying drawings, which are to be considered part of the entire written description. In the description, relative terms such as "lower," "upper," "horizontal," "vertical," "above," "below," "up," "down," "top," and "bottom" as well as derivative thereof (e.g., "horizontally," "downwardly," upwardly," etc.) should be construed to refer to the orientation as then described or as shown in the drawing under discussion. These relative terms are for convenience of description and do not require that the apparatus be constructed or operated in a particular orientation. Terms concerning attachments, coupling and the like, such as "connected" and "interconnected," refer to a relationship wherein structures are connected and/or attached to one another either directly or indirectly through intervening structures, as well as both movable or rigid attachments or relationships, unless expressly described otherwise.

A system for both removing water from accumulating on the surface of a basement floor as well as preventing ground water from infiltrating the basement from below has been developed. The purpose of this system is to create a basement drainage system that is effective enough to prevent water infiltrating a basement from reaching the basement floor's surface except at its edges. This system also comprises at least one poly drain sufficient to prevent ground water from infiltrating the basement from below as well as at least one external drain designed to remove water from outside of a basement's walls. The proposed basement drainage system complies with the standards set forth under the National Building Codes.

A sump basin, containing a sump pump, is typically installed in buildings having basements. Cracks and the porous nature of basement walls and foundations often allow water to enter into basements of buildings through these structures, which can lead to the growth of mold, or damage these walls. Additionally, ground water can infiltrate basements from below when water tables rise. A drainage system comprising multiple drains, in addition to at least one sump basin and sump pump, can provide adequate capacity to remove both types of infiltrating water and meet the criteria set forth by the BOCA, SBCCI and ICBO National Building Codes.

Reference will now be made in detail to the present inventive concept, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

**FIG. 1** is a cut-away view of a standard basement drainage system 100 known to exist in the prior art.

A standard basement drainage system 100 typically comprises a sump basin 101 and a sump pump 102. A sump basin 101 is often a roughly cylindrical hole having a bottom two to three feet below the surface of a basement floor 103. The basement floor 103 is usually graded so that water can flow from anywhere on the floor 103 toward and into the sump basin 101. Water collected in the sump basin 101 is then transported out of the basin 101 and away from the home by a sump pump 102 located in the sump basin 101. Tubing (not pictured) is commonly attached to a sump pump 102, which directs the water from the pump 102 outside the basement and away from the building.

This standard basement drainage system 100 also removes ground water from below the basement floor 103. In such systems, ground water is collected in permeable, flexible tubing, commonly referred to as "poly drains" 104. Poly drains 104 are typically located below the basement floor 103 and inside the foundation 105. The poly drains 104 are positioned so that ground water can be pushed by gravity to flow through the poly drain 104 to the sump basin 101 to be removed by the sump pump 102.

The standard basement drainage system 100 has proven to be mostly effective for removing both ground water and large quantities of water from the surface of basement
floors 103 and has been National Build Code approved. However, many modern buildings comprise finished basements, which contain building materials and furnishings, which can be damaged or ruined if contacted by water. Therefore, it is more important than ever to remove water from basement floors as quickly as possible in order to avoid such damage. Standard basement drainage systems 100, such as that depicted in FIG. 1, allow water to flow on the surface of the basement floor 103 until it reaches the sump basin 101 or evaporates. While such systems are effective in removing water from a basement, these systems allow water to contact building materials and furnishings, which can cause substantial damage each time water is able to penetrate the basement's walls 106.

[0032] FIG. 2 is a cut-away view of an unapproved basement drainage system 200 comprising a floor drain 207, but no poly drain, which is known to exist in the prior art.

[0033] The unapproved basement drainage system 200 depicted in FIG. 2 is designed to remove water from the surface of a basement floor 103 quickly after it has penetrated the basement walls 105. By placing a floor drain 207 along the bottoms of the basement walls 106, water is collected before it can reach most of the carpets, furnishings and similar material located in the middle of the basement, inside the perimeter created by the floor drain 207. The floor drain 207 can be roughly at the same level as, or slightly below the level of the top of the basement floor 103. Gravitational forces can be used to move water captured by the floor drain 207 to the sump basin 101, where it can be pumped out of the basement. However, the unapproved basement drainage system 200 has not been National Build Code approved because it does not prevent ground water from reaching the basement floor 203 from below.

[0034] FIG. 3A is a cut-away view of a basement drainage system 300 comprising an outer floor drain 207, and a poly drain 104, according to an embodiment.

[0035] The basement drainage system 300, depicted in FIG. 3A, combines the features of the drainage systems depicted in FIGS. 1 and 2. The basement drainage system 300 comprises a poly drain 104 for preventing the infiltration of ground water as found in the standard basement drainage system 100. It also comprises a outer floor drain 207 along the basement walls as found in the unapproved basement drainage system 200. This outer floor drain 207 can be designed to catch any water that has penetrated the walls 106 of the basement, thus preventing damage to objects located within the outer floor drain 207.

[0036] FIG. 3B is a cut-away view of an embodiment of the present basement drainage system 300 comprising an inner floor drain 207, a poly drain 104 and an upper exterior drainage system 301, according to an embodiment.

[0037] In this embodiment, the drainage system 300 further comprises an upper exterior drainage system 301 along the outer perimeter of the base wall 106. In an embodiment, the exterior drainage system 301 can comprise a perforated pipe 304, pebbles 303, and top soil 302. The upper exterior drainage system 301 can be installed by making a longitudinal cut in the ground 305 parallel to the basement wall 106, placing a perforated pipe inside the cut, filling up the cut with pebbles 303, and placing top soil 302 on top of the pebbles 303. The exterior drainage system 301 can be capable of preventing water from entering the basement from outside by ducting the water away from the house towards low ground or a water drainage system (not shown).

[0038] FIG. 3C is a cut-away view of an alternative embodiment of the present basement drainage system 300 comprising an inner floor drain 207, a poly drain 104 and an upper exterior drainage system 301, and a lower exterior drainage system 312, according to an embodiment. In this alternative embodiment, a lower drainage system 312, similar to the upper drainage system 301, can be installed near the base of the basement wall 106. This lower exterior drainage system 312 can be used to direct water away from the base of the basement wall 106, which can be effective in the removal of ground water away from the basement wall 106. In an embodiment, a vent line 310 can be used to vent the lower drainage system 312.

[0039] FIG. 4A is a cut-away view of a present basement drainage system 400 comprising an outer floor drain 207, an inner floor drain 411, a poly drain 104 and an exterior drainage system 301, according to an embodiment.

[0040] In this alternative embodiment, two floor drains can be placed along the basement walls 106 comprising the basement. An outer floor drain 207 can be placed in roughly the same position as that used in the single floor drain embodiment discussed above in FIGS. 3A-C and an inner floor drain 411 can be placed inside and parallel to the outer floor drain 207. Both floor drains can carry water to the sump basin, where it can be pumped out of the basement.

[0041] FIG. 4B is a cut-away view of a present basement drainage system 400 comprising an outer floor drain 207, an inner floor drain 411, a poly drain 104 and an upper exterior drainage system 301, according to an embodiment.

[0042] As described in FIG. 3B above, an upper exterior drainage system 301 can be placed along the outer perimeter of the basement wall 106. The exterior drainage system 301 can be capable of keeping water from entering the basement from outside by ducting the water away from the house towards low ground or a water drainage system.

[0043] FIG. 4C is a cut-away view of a present basement drainage system 400 comprising an outer floor drain 207, an inner floor drain 411, a poly drain 104, an upper exterior drainage system 301 and a lower exterior drainage system 312, according to an embodiment. This embodiment is identical to the embodiment described in FIG. 3C except that the additional inner floor drain 411 has been added.

[0044] FIG. 5 is a top plan view of a present basement drainage system 400 comprising an outer floor drain 207, an inner floor drain 411, a poly drain 104 (not shown in FIG. 5), and an exterior drainage system 301, according to an embodiment.

[0045] In this embodiment, the present basement drainage system 400 can comprise an outer floor drain 207, which can be relocated along the entire base of a basement wall 106 and an inner floor drain 411, which can be located along the inner perimeter of the outer floor drain 207. Both the outer floor drain 207 and the inner floor drain 411 can carry the water away from the basement through the use of a sump pump 102. An exterior drainage system 301 can be placed along the outer perimeter of the base wall 106. The exterior drainage system 301 can be capable of keeping water from entering the basement from outside by directing it away from the building and towards low ground or a water drainage system.

[0046] FIG. 6 is a top plan view of a present basement drainage system 400 as described above, comprising an outer floor drain 207, an inner floor drain 411, a poly drain 104 (not
picted) and an exterior drainage system 301, wherein the outer edge of a foundation 105 is depicted by broken lines, according to an embodiment.

In an embodiment, the present basement drainage system 400 can comprise an outer floor drain 207 is located over the foundation 105, between the base of the inside of the basement wall 106 and the edge of the inside of the foundation 105. The inner floor drain 411 can be located inside of the inside edge of the foundation 105 so that it is not over the foundation 610. An exterior drainage system 301 can be placed along the outer perimeter of the basement wall 106. The exterior drainage system 301 can be configured to prevent water from entering the basement from outside by directing it away from the building and towards low ground or a water drainage system.

FIG. 7 is a top plan view of a basement drainage system 400, shown in FIGS. 5 and FIG. 6, wherein the poly drain 104 and the outer edge of the foundation 105 are each depicted by broken lines, according to an embodiment.

In an embodiment the poly drain 104 can be placed along the inside edge of the foundation 105 below the basement floor thus forming a perimeter approximately one foot within the perimeter formed by the basement wall 106. As do the inner floor drain 411 and outer floor drain 207, the poly drain 104 can use gravity to transport water to the sump basin. Poly drains 104 are typically perforated drain hoses made from a polymer. As discussed above, an exterior drainage system 301 (and/or 311) can be placed along the outer perimeter of the basement wall 106. The exterior drainage system 301 (and/or 311) can be configured to prevent water from entering the basement from outside by directing it away from the house towards low ground or a water drainage system.

Although the present drainage system has been described in terms of exemplary embodiments, it is not limited thereto. Rather, the appended claims should be construed broadly, to include other variants and embodiments of the system, which may be made by those skilled in the art without departing from its scope and range of equivalents.

What is claimed is:

1. A basement drainage system, comprising: a basement having walls at its perimeter and a basement floor located in the area within the walls; at least one sump basin located within the basement and located partially below the basement floor; at least one sump pump located within the sump basin; a poly drain placed in the basement, along the walls, and below the basement floor connected to the sump basin; and an upper exterior drainage system located outside of the basement and along the outer perimeter of the basement wall.

2. The basement drainage system as recited in claim 1, comprising a lower exterior drainage system located outside of the basement and along the outer perimeter of the basement wall and below the upper exterior drainage system.

3. The basement drainage system as recited in claim 1, wherein the poly drain is a perforated drain hose made from a polymer.

4. The basement drainage system as recited in claim 1, wherein the top of the outer floor drain is level with the top of the basement floor.

5. The basement drainage system as recited in claim 1, wherein the upper exterior drainage system comprises a perforated pipe surrounded by pebbles and covered with topsoil.

6. A basement drainage system, comprising: a basement having walls at its perimeter and a basement floor located in the area within the walls; at least one sump basin located within the basement and located partially below the basement floor; at least one sump pump located within the sump basin; a poly drain placed in the basement, along the walls, and below the basement floor connected to the sump basin; an outer floor drain placed in the basement and along the perimeter of the walls and connected to the sump basin; an inner floor drain placed in the basement and along the perimeter of the walls, and within the outer floor drain, and connected to the sump basin; an upper exterior drainage system located outside of the basement and along the outer perimeter of the basement wall; and a lower exterior drainage system located outside of the basement and along the outer perimeter of the basement wall and below the upper exterior drainage.

7. The basement drainage system as recited in claim 6, wherein the lower drainage system comprises a vent pipe.

8. The basement drainage system as recited in claim 6, wherein the poly drain is a perforated drain hose made from a polymer.

9. The basement drainage system as recited in claim 6, wherein the tops of both the inner and outer floor drains are level with the top of the basement floor.

10. The basement drainage system as recited in claim 6, wherein the upper exterior drainage system and the lower exterior drainage system each comprise a perforated pipe surrounded by pebbles and covered with topsoil.

11. A method for installing and using a basement drainage system, the method comprising:

- providing a basement drainage system, comprising: a basement having walls at its perimeter and a basement floor located in the area within the walls; at least one sump basin; at least one sump pump; a poly drain; an outer floor drain placed in the basement and along the perimeter of the walls and connected to the sump basin; and an upper exterior drainage system located outside of the basement and along the outer perimeter of the basement wall;
- placing at least one sump basin in a basement floor, wherein the sump basin is located partially below the surface of the basement floor;
- placing at least one sump pump into at least one sump basin, wherein the sump pump can transport water from the sump basin out of the basement;
- placing at least one poly drain constructed to drain water to at least sump basin using gravity, wherein one or more poly drains constructed to drain ground water located below the basement floor to one or more sump basins using gravity, where it can be pumped out of placing an outer floor drain along the outer perimeter of a basement wall constructed to drain water to at least one sump basin, this outer floor drain being capable of collecting water located on the surface of the basement floor;
- placing an inner floor drain located along the inner perimeter of the outer floor drain constructed to drain water to
at least one sump basin, this inner floor drain being capable of collecting water located on the surface of the basement floor; and
placing at least one exterior drainage system along the outer perimeter of the basement wall, wherein the exterior drainage system is capable of draining water to lower ground or a water drainage system.

12. The method as recited in claim 11, wherein the poly drain is a perforated drain hose made from a polymer.
13. The method as recited in claim 11, wherein the top of the inner floor drain is level with the top of a basement floor.
14. The method as recited in claim 11, wherein the top of the outer floor drain is level with the top of a basement floor.
15. The method as recited in claim 11, wherein the inner floor drain is located above a foundation.
16. The method as recited in claim 11, wherein the outer floor drain is not located above a foundation.
17. The method as recited in claim 11, wherein the installation of the exterior drainage system comprising:
   making a longitudinal cut in the ground parallel to the basement wall;
   placing a perforated pipe inside the cut;
   filling up the cut with pebbles; and
   placing top soil on top of the pebbles and perforated pipe.