An under drainage method for building using perforated drain pipes is disclosed. Groundwater entering from underground of a building is collected into collecting drain pipes via horizontal drain pipes, which are wrapped with filtering means such as nonwoven fabric, without using a collecting well. The collected groundwater is maintained in a prescribed water level within vertical drain pipes, which are wrapped with the filtering means, or drained to the surface of the earth. The drained groundwater is utilized as domestic water. Therefore, the method can effectively manage the groundwater, is economical as not requiring the installation of the collecting well, and allows to effectively use perforated drain pipes, which are inexpensive.
FIG. 4A.

FIG. 4B.
FIG. 5.
FIG. 6.
UNDER DRAINAGE METHOD FOR BUILDING USING PERFORATED DRAIN PIPES

CLAIMING FOREIGN PRIORITY

[0001] The applicant claims and requests a foreign priority, through the Paris Convention for the Protection of Industrial Property, based on a patent application filed in the Republic of Korea (South Korea) with the filing date of Sep. 24, 2001, with the application number 10-2001-0059039, by the applicant. (See the Attached Declaration)

FIELD OF THE INVENTION

[0002] The present invention relates to an under drainage method for building using perforated drain pipes. More particularly, the present invention relates to an under drainage method for building using perforated drain pipes, which can save costs in installing an additional collecting well by promoting efficiency of overall the perforated drain pipes's use and which can manage groundwater effectively by using the perforated drain pipes provided with filtering means and other drainage apparatus.

BACKGROUND OF THE RELATED ART

[0003] In general, there are various under drainage methods for buildings. As shown in FIG. 1A, a method for preventing groundwater (W) from entering from under the underground bottom of the building by directly pouring and finishing floor concrete 2 provided with a waterproofing layer 1 or lean concrete after completing an under-foundation diggig without using drain pipes such as perforated drain pipes has been used. Also, a method for draining groundwater (W) entering and collected has been used. The method is that, as shown in FIG. 1B, a plurality of perforated drain pipes 5 are arranged on an upper part of an under-foundation bottom surface 3 and connected to each other in a prescribed form to drain water easily, floor concrete is poured while forming permeable layers such as gravels covering the perforated drain pipes or without the permeable layers so as to allow the groundwater entering from under the underground bottom of the building to enter the perforated drain pipes, the groundwater entering the perforated drain pipes is collected into a collecting well 4 buried in a specific area under the under-foundation bottom surface 3 via the inside of the perforated drain pipes as shown in FIG. 1C, and the collected groundwater is drained through a sewage pipe 6 or through a river by a pump or a natural gradient.

[0004] However, the method for treating the groundwater entering from under the floor concrete of the building by pouring the floor concrete provided with the waterproofing layer or the lean concrete has a structure that the floor concrete or the lean concrete prevents the entrance of the groundwater without draining the groundwater. Thus, as time passes, the floor concrete or the lean concrete shows a drop in durability and water tightness, and thereby the groundwater enters the underground of the building. Therefore, to treat it, the method requires a waterproofing work, and thereby expenses for repair work are needed and the life of the building is reduced due to the entrance of the groundwater. Furthermore, the groundwater entering during the under-foundation digging work cannot be effectively utilized for domestic water because being discharged through the sewage pipe as it is. Moreover, the method has another problem that it is complicated in under drainage treatment of the building because groundwater treatment plan must be made beforehand before the floor concrete or the lean concrete is dredged and the building construction must be carried out while the groundwater is drained.

[0005] Meanwhile, the method for treating the groundwater entering from under the floor concrete of the building using the perforated drain pipes has a high drainage effect by using the permeable layers such as the perforated drain pipes and gravels. However, the groundwater entering the perforated drain pipes must be collected into the collecting well and then drained, and thereby expenses for installing the collecting well are required. Moreover, because the permeable layers are paved on the perforated drain pipes and the floor concrete is directly formed on the water flow layers, self weight of the floor concrete and building is directly applied to the water flow layers and the perforated drain pipes, thereby damaging the water flow layers and the perforated drain pipes. Furthermore, because the groundwater collected in the collecting well is drained through sewage pipes, if a great deal of groundwater is drained, groundwater level around the building would drop continuously, thereby causing ground settlement of the building, and thereby the groundwater cannot be used effectively. Additionally, the method for treating the groundwater wastes water resources by draining the groundwater, which can be utilized as domestic water, and thereby the groundwater cannot be used effectively.

SUMMARY OF THE INVENTION

[0006] Accordingly, the present invention is directed to an under drainage method for building using perforated drain pipes that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0007] An object of the present invention is to provide an under drainage method for building using perforated drain pipes, which can effectively utilize groundwater by preventing ground settlement of the ground bottom of a building due to excessive drain of the groundwater.

[0008] Another object of the present invention is to provide an under drainage method for building using perforated drain pipes, which can collect and treat the groundwater collected into a lower part of the underground bottom of the building without installing a collecting well for treating the groundwater.

[0009] A further object of the present invention is to provide an under drainage method for building using perforated drain pipes, which can provide means for using the collected groundwater as domestic water.

[0010] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by means of the structure particularly described in the written description and claims hereof as well as the appended drawings.

[0011] It is to be understood that both the foregoing general description and the following detailed description of
the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiments of the invention and together with the description serve to explain the principle of the invention. In the drawings;

[0013] FIGS. 1A to 1C illustrate conceptual views of a conventional method for treating groundwater under the underground bottom of a building;

[0014] FIG. 2A illustrates a perspective view of a connection of perforated drain pipes according to the present invention;

[0015] FIG. 2B illustrates an exploded view of the perforated drain pipes;

[0016] FIG. 2C illustrates a perspective view of the perforated drain pipes installed;

[0017] FIGS. 3A and 3B illustrate perspective views showing an installation state of horizontal drain pipes according to the present invention;

[0018] FIGS. 4A to 4C illustrate perspective views showing that collecting drain pipes and vertical drain pipes of various shapes are connected to the horizontal drain pipes;

[0019] FIG. 5 illustrates a flow chart of a drainage method for building according to the present invention; and

[0020] FIG. 6 illustrates a view showing a state that the vertical drain pipes are filled with the groundwater.

DETAILED DESCRIPTION OF THE INVENTION

[0021] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0022] The present invention can have advantages, which may be generated by groundwater existing under the ground without being drained under the underground bottom of a building. Additionally, the present invention provides means for effectively draining the groundwater entering from under the underground bottom of the building by using perforated drain pipes, which are wrapped with nonwoven fabric, as horizontal drain pipes, outside pipes and vertical drain pipes without installing a collecting well, thereby saving installation expenses. Referring to FIGS. 2 through 6, a preferred embodiment of the present invention will be described in detail.

[0023] An under drainage method for building using the perforated drain pipes includes the steps of installing the horizontal drain pipes under an under-foundation bottom surface, connecting the collecting drain pipes to the horizontal drain pipes and installing the collecting drain pipes outside the contour of the underground bottom of the building, i.e., outside a construction line of the building, and connecting the vertical drain pipes to the collecting drain pipes and installing the vertical drain pipes to the surface of the earth.

[0024] First, the horizontal drain pipes, the collecting drain pipes and the vertical drain pipes used in the under drainage method according to the present invention will be described, and then, an installation method thereof will be described. For horizontal drain pipes 100, the collecting drain pipes 200, and the vertical drain pipes 300, the perforated drain pipes 20 having filtering means 10 such as nonwoven fabric formed on the outside surface are used.

[0025] Each perforated drain pipe has a plurality of holes 22 formed in a pipe body 21. The perforated drain pipe serves as a drain pipe allowing the groundwater to enter through the holes and to be collected into a final collecting place along the pipe by the gradient of the pipe. The perforated drain pipe may be made of concrete, but since the pipe made of concrete is heavy in weight, it is preferable to be made of poly vinyl chloride (PVC), which is light in weight and easily processed.

[0026] In case of the perforated drain pipes made of PVC, perforated drain pipes having projections of wave form formed on the pipe body are mainly used. Such perforated drain pipes having the projections of wave form are high in strength against outside load and in rigidity against bending. Each perforated drain pipe has a plurality of holes formed in the pipe body besides the projections. Also, in the present invention, it is preferable to use the PVC perforated drain pipes of wave form, but the present invention will not be restricted to the above.

[0027] The filtering means 10 wrapping the outside surface of the perforated drain pipe is made in such a manner that fibers are arranged in a parallel or in a irregular direction without a fabric cloth process and bonded with synthetic resin adhesive to be made in the form of a felt. Preferably, the fiber is nonwoven fabric, which is synthetic fiber such as nylon. The nonwoven fabric is suitable for the filtering means for passing the groundwater through the holes formed in the perforated drain pipes while filtering foreign matters contained in the groundwater, because having excellent water permeability, being easy in transportation and treating (pavement), and preventing large-sized particles from passing between fibrous tissues. Therefore, the groundwater filtered through the nonwoven fabric can be utilized as domestic water by being drained to the surface of the earth through the vertical drain pipes connected to the collecting drain pipes. In the preferred embodiment of the present invention, the nonwoven fabric is used as the filtering means, but other materials, which can be easily adhered to the perforated drain pipes, may be used.

[0028] To connect the horizontal, collecting and vertical drain pipes provided with the filtering means, as shown in FIG. 2A, in case that two or more perforated drain pipes are connected to each other, a connection pipe 30, which is made by cutting the perforated pipe having prescribed diameter and length for inserting the perforated drain pipes, is used at a connected portion of the perforated drain pipes having the same diameter. In the present invention, because the PVC perforated drain pipes of the wave form are used as the drain pipes, the connection pipe can be easily manufactured by processing the perforated drain pipe in a prescribed dimension. In FIG. 2A, a dotted line part designates the filtering
means such as the nonwoven fabric. In the other drawings, the perforated drain pipe is not indicated by the dotted line but indicated definitely. In the drawings and this specification, if there are no indication and explanation, the perforated drain pipe is in a condition that the filtering means such as the nonwoven fabric is adhered on the perforated drain pipe. Also, as shown in FIG. 2B, if the perforated drain pipes 20 are inserted into the connection pipe 30 and faced and connected to each other at about the center of the connection pipe, the plurality of perforated drain pipes can be economically connected to each other without additional connection pipes. FIG. 2C illustrates a state that the perforated drain pipes connected to each other are installed under the ground. That the perforated drain pipes having the filtering means such as the nonwoven fabric is used for collecting the groundwater is a common function in all of the horizontal, collecting and vertical drain pipes. However, the drain pipes are divided into the horizontal, collecting and vertical drain pipes according to the position that the drain pipes are buried. That is, as shown in FIGS. 3A and 3B, the perforated drain pipes that are installed under an underfoundation bottom surface of the building and collect the groundwater infiltrated the underground bottom of the building are called the horizontal drain pipes 100. The perforated drain pipes of various shapes that are connected to the horizontal drain pipes to finally collect the groundwater collected through the horizontal drain pipes having a prescribed gradient and buried outside a construction line (G) for constructing the building, i.e., outside under the underfoundation bottom surface are called the collecting drain pipes 200. The perforated drain pipes that are vertically installed on the collecting drain pipes to allow the groundwater collected in the collecting drain pipes to be discharged to the surface of the earth are called the vertical drain pipes 300. That is, for the horizontal, collecting and vertical drain pipes, the same perforated drain pipes 20 having the filtering means 10 such as nonwoven fabric are used, but divided into three kinds according to the installation position and functions.

The horizontal drain pipes 100 are installed in such a manner that the plurality of straight perforated drain pipes are connected to each other in the form of a lattice or a straight line. FIG. 3A illustrates a state that the horizontal drain pipes are installed in a straight gradient. FIG. 3B illustrates a state that the horizontal drain pipes are installed in a lattice gradient. The collecting drain pipes 200 are connected to the horizontal drain pipes at the contour of the construction line of the building and serve as the drain pipes to collect the groundwater. Therefore, the collecting drain pipes must be manufactured in the structure and shape capable of being connected with the horizontal drain pipes. FIG. 4 illustrates a detailed view of the connection of the horizontal drain pipes and the collecting drain pipes. That is, as shown in FIG. 4A, the cross-shaped collecting drain pipes are installed in such a manner that the horizontal drain pipes are connected with the collecting drain pipes in three directions (A, B and C) and the groundwater is collected in the residual direction (D). Such cross-shaped collecting drain pipes are mainly used for connecting the horizontal drain pipes installed between the horizontal drain pipes located outermost. Furthermore, as shown in FIG. 4B, T-shaped collecting drain pipes 220 may be used in such a manner that the horizontal drain pipes are connected in two directions (A and B) and the groundwater is collected in the residual direction (C). The T-shaped collecting drain pipes are mainly installed on the outermost horizontal drain pipes. Also, as shown in FIG. 4C, the horizontal drain pipe is connected to one direction (A) and a straight drain pipe 230 may be connected to the other direction (B) opposed to the above direction (A) for collecting the groundwater. The straight drain pipe 230 is mainly used for directly inducing the groundwater from each inside drain pipe to the vertical drain pipe. The cross, T-shaped and straight perforated drain pipes are used independently or in combination according to installation position and structure of the horizontal drain pipes.

The under drainage method for building according to the present invention provides means for utilizing the groundwater, which enters from under under-foundation bottom surface of the building, as domestic water. The under drainage method for building includes the steps of: forming the under-foundation bottom surface for the building by excavating the ground, and bringing the under-foundation bottom surface to a level; digging a drain pipe foundation of prescribed depth and width under the under-foundation bottom surface; forming the plurality of horizontal drain pipes by connecting the perforated drain pipes to each other at a space formed by the drain pipe foundation digging; forming the collecting drain pipes by connecting the perforated drain pipes, which are manufactured in a prescribed shape, to the horizontal drain pipes on the contour of the under-foundation bottom surface, and vertically installing the plurality of vertical drain pipes from the collecting drain pipes to the surface of the earth. Hereinafter, referring to FIG. 5 showing a flow chart of the under drainage method for building, the under drainage method for building according to the present invention will be described in detail.

First, as shown in FIG. 5(1), the ground, on which the building 400 will be constructed, is dug using an excavator to make the under-foundation, and thereby the under-foundation bottom surface is formed. At this time, because the under-foundation surface formed by the excavator is in a uneven condition, for example, convexo-concave parts are formed, prescribed gradients are formed, and thereby, the horizontal drain pipes cannot be easily installed. Therefore, the under-foundation bottom surface is made level using a machine or manually as shown in FIG. 5(2). After the leveling, a plurality of trenches 600 for burying the horizontal drain pipes are formed under the under-foundation bottom surface (drain pipe foundation digging) as shown in FIG. 5(3). The width, depth and shape of the trenches are determined in consideration of the diameter and length of the horizontal drain pipes, which will be buried, and an inflow amount of the groundwater. At this time, the trenches must have a gradient for allowing the groundwater flowing inside the horizontal drain pipes to be collected into a prescribed position. The gradient is determined in consideration of the past conditions in connection with drainage treatment of rivers around the building or the groundwater of neighboring buildings. It will be appreciated that the number and direction of the horizontal drain pipes installed can be changed according to an area and a use of the building, which will be constructed, and groundwater level around the building.

FIG. 5(4) illustrates a state that the straight horizontal drain pipes 100 are buried in prescribed intervals, but, if necessary, the horizontal drain pipes 100 may be buried in
the form of the lattice. At this time, the connection pipes 30 are used at the intersections. The horizontal drain pipes are extended and buried to the contour of the under-foundation bottom surface as shown in FIGS. 3A and 3B. At this time, the horizontal drain pipes are in the condition that the filtering means such as the nonwoven fabric is adhered on the outer surface of the horizontal drain pipes. A gravel layer is paved between the buried inside drain pipe and the excavated under-foundation space to allow the groundwater to easily enter the horizontal drain pipes.

[0033] When the horizontal drain pipes are buried, as shown in FIG. 5(5), the collecting drain pipes 200 manufactured in various shapes are installed at each end of the installed horizontal drain pipes to collect the groundwater, which is collected through the horizontal drain pipes, at the outside of the under-foundation bottom surface and at the outside of the construction line (G) of the building. At this time, the cross-shaped collecting drain pipes 210 as shown in FIG. 3A, the T-shaped collecting drain pipes 220 as shown in FIG. 3B and the straight collecting drain pipes 230 as shown in FIG. 3C may be used according to the position where each end of the horizontal drain pipes is formed. The cross-shaped collecting drain pipes are used when the horizontal drain pipes between the horizontal drain pipes installed on the outermost contour are connected to each other. The T-shaped collecting drain pipes are used when the horizontal drain pipes installed at the outermost contour. The straight collecting drain pipes are used when the horizontal drain pipes are connected individually.

[0034] After the collecting drain pipes of the various shapes (cross shape, T-character shape and straight shape) are installed, each collecting drain pipe is connected to the collecting drain pipe. As shown in FIG. 5(6), the vertical drain pipes 300 are vertically installed to the contour ground of the construction line (G) of the building from under the under-foundation bottom surface. The vertical drain pipes serve to form a space filled with the groundwater, which is collected by the collecting drain pipes, in a prescribed water level by water pressure due to the collected amount of the groundwater. Therefore, the collecting well, which was used in conventional under drainage methods for building, is not required. That is, the collecting drain pipes and the vertical drain pipes are used as a substitute for the collecting well having inflow and outflow hole, which is formed in a rectangular parallelepiped made of concrete or plastic material and through which the perforated drain pipes pass. Because the collecting and vertical drain pipes are manufactured by using the perforated drain pipes, it is possible to dispose the groundwater only by installing the perforated drain pipes. At this time, L-shaped connection pipes 40 are used for connecting the collecting drain pipes and the vertical drain pipes.

[0035] FIG. 6 illustrates a change of water level of the groundwater entering and filling the vertical drain pipes. Conventionally, the groundwater entering under the under-foundation bottom surface is collected into the collecting well through the perforated drain pipes and drained through sewage pipes or the pipes communicating with the rivers whether an amount of the groundwater is large or small. Thereby, in case that the amount of the drained groundwater is large, groundwater pressure made by the groundwater under the under-foundation bottom surface drops rapidly as time passes. Therefore, the ground settlement occurs due to the drop of the groundwater pressure supporting the lower part of the foundation of the building, thereby causing fine cracks in the building due to differential settlement of the building, generating a defect in waterproofing by permeation of the groundwater into the cracks, and reducing the life of the building by decreasing the durability of the concrete building. The problems are resulted from using the method of unconditionally draining the groundwater in the construction step for a dry construction without effectively using the groundwater. Therefore, in the present invention, the vertical drain pipes are filled with the groundwater to a prescribed water level (indicated as an E line in FIG. 6) by atmospheric pressure and the groundwater collected in the collecting drain pipes and the vertical drain pipes is prevented from being drained excessively from the under-foundation bottom. Thus, the settlement of the under-foundation bottom is not generated. If the groundwater is collected too much and reaches an F line (shown in FIG. 6) above the E line of the vertical drain pipes, the groundwater is drained to the outside of the surface of the earth by using a water level detecting sensor 700, a sensor detecting device 800 and a submerged pump 900. Thus, the groundwater can be utilized as domestic water (e.g., water for grass; but cannot be used as drinking water). The water level detecting sensor, the sensor detecting device and the submerged pump are sensors, a sensor detecting device and a submerged pump, which are used typically. Because the vertical drain pipes are connected to the collecting drain pipes and installed to the surface of the earth, the length and diameter of the pipes are determined according to the depth of the under-foundation bottom surface and the diameter of the collecting drain pipes, and the number of the vertical drain pipes installed is determined according to the amount of the groundwater. Also, it is preferable that the automatic water level sensor and the automatic submerged pump are installed according to a place for using domestic water and a level of utilization of the groundwater amount, and thereby, there is no need to install the water level sensor and the submerged pump every vertical drain pipes. Furthermore, the vertical drain pipes are not opened all. Some of the vertical drain pipes are stopped from the surface of the earth (by using a stopper suitable for the diameter of the vertical drain pipes or permanently stopping) and the other vertical drain pipes are opened. The stopped vertical drain pipes maintains the water pressure uniform under the underground bottom of the building and the groundwater is drained to the extent of need through the opened vertical drain pipes, thereby utilizing the groundwater more effectively.

[0036] A drainage path of the groundwater through the horizontal, collecting and vertical drain pipes will be described hereinafter. The groundwater entering from under the under-foundation bottom surface enters the horizontal drain pipes and is collected into the collecting drain pipes via the horizontal drain pipes in a state that foreign matters contained in the groundwater are filtered through the filtering means such as nonwoven fabric. If the groundwater moved from the collecting drain pipes into the vertical drain pipes does not reach the prescribed water level enough to be drained, the groundwater is not drained. If the groundwater more than the prescribed water level fills the vertical drain pipes, the groundwater is automatically drained to the outside of the surface of the earth so as to be utilized as domestic water. Also, the collecting drain pipes and the vertical drain pipes have the filtering means such as non-
woven fabric, and thereby the groundwater passing through the collecting drain pipes and the vertical drain pipes can be utilized as domestic water.

[0037] As described above, when the horizontal, collecting and vertical drain pipes are installed, the building is constructed, and then, finally, a desired building is completed. According to the present invention, even though ejection of the groundwater occurs due to excessive amount of water because the groundwater can be effectively managed from the time of the under-foundation digging, additional draining facilities are not required. Moreover, because the dry construction can be performed when the building is constructed, the term of construction is not influenced by the groundwater.

[0038] As described above, the present invention can effectively utilize the groundwater by preventing the ground settlement under the under-foundation bottom surface due to the excessive discharge of the groundwater. Additionally, the present invention can save expenses for installing the collecting well because the groundwater collected under the under-foundation bottom surface is collected only through the perforated drain pipes without the collecting well for disposing the groundwater. Furthermore, the collected groundwater can be utilized as domestic water. Moreover, the present invention can effectively drain and manage the groundwater by effectively using the perforated drain pipes, which are easy in process and transportation and inexpensive.

[0039] The foregoing embodiments are merely exemplary and are not to be construed as limiting the present invention. The present teachings can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art.

What is claimed is:

1. An under drainage method for building using perforated drain pipes, the method comprising:
   - forming an under-foundation bottom surface for building by excavating the ground and making the under-foundation bottom surface level; digging a drain pipe foundation of prescribed depth and width under the under-foundation bottom surface;
   - forming a plurality of horizontal drain pipes by connecting perforated drain pipes to each other in a space formed by the drain pipe foundation digging; forming a plurality of collecting drain pipes by connecting perforated drain pipes, which are manufactured in a prescribed shape, to the horizontal drain pipes at the contour of the under-foundation bottom surface; and vertically installing a plurality of vertical drain pipes from the collecting drain pipes to the surface of the earth, wherein the groundwater entering from under the under-foundation bottom surface is collected into the collecting drain pipes via the horizontal drain pipes and then drained.

2. The method according to claim 1, wherein the collecting drain pipes are manufactured by using cross-shaped perforated drain pipes, T-shaped perforated drain pipes, or straight perforated drain pipes.

3. The method according to claim 1 or 2, wherein the perforated drain pipes used for the horizontal, collecting and vertical drain pipes are made in such a manner that filtering means such as nonwoven fabric is wrapped on the outer surface of the perforated drain pipes.

4. The method according to claim 1 or 2, wherein the horizontal drain pipe and the collecting drain pipe are connected through a connection pipe, the connection pipe being formed by cutting the perforated drain pipe in a prescribed length, the perforated drain pipe having a prescribed diameter for inserting the horizontal drain pipe and the collecting drain pipe.

5. The method according to claim 1 or 2, further comprising a step of forming a permeable layer such as rubbles or gravels on an upper part of the horizontal drain pipes.

6. The method according to claim 1, wherein some of the vertical drain pipes are installed under the surface of the earth in a state that the pipes are sealed with stopper and the other of the vertical drain pipes are installed to the surface of the earth without stopper.

7. The method according to claim 6, wherein the vertical drain pipes, which are installed to the surface of the earth without stopper, have a submerged pump therein.

8. The method according to claims 6 and 7, wherein a water level detecting sensor and a sensor detecting device are adhered to the vertical drain pipes having the submerged pump, and the submerged pump is automatically operated and drains the groundwater to the outside if water contained in the vertical drain pipe is above a prescribed water level.