METHOD OF INSTALLING MUSHROOM PILING

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The present invention relates to a method of installing mushroom pilings in beach sand or its equivalent.

It is well recognized by engineers that sand such as beach sand, presents peculiar problems in so far as excavation work of any kind is concerned. If the sand is wet and saturated with water it will run and drift freely, and it is impossible to work in such wet sand without using some method of enclosure to prevent the wet sand from filling the excavation.

The sand lends itself readily to excavation work until the water level in the sand is reached, whereupon the sand will run and cave.

Bearing all of these problems in mind, we have devised a method of installing mushroom piling in beach sand, without the necessity of using any support for the sides of the excavation, without the necessity for using any type of excavating tools except a conventional auger post hole digger or any other similar apparatus used for excavation of this type, without the use of any mechanical or hydraulic apparatus for pressing or forcing the sand at the base of pile to enlarge it into the mushroom shape. By our method the sand forms a piling mold into which the concrete may be poured, no pile drivers, pistons, jacks, or similar apparatus being used for forcing or pressing the concrete out into a mushroom shape at the base of the pile.

If required, a metal shell may be inserted into the hole just before the concrete is deposited. It has been heretofore customary to use a metal shell with some type of apparatus to force it down into the sand, subsequently removing the sand from within the shell, and filling the shell with concrete, after which a mechanical or hydraulic apparatus has been applied to force out the concrete at the base of the pile.

Our method of excavating and installing the pilings is made possible by the use of a well point system for lowering and predetermining the water level. The method may be more fully understood from the following description in connection with the accompanying drawing which is a somewhat diagrammatic sectional view showing the finished excavation which serves as a mold for the piling and showing the well point apparatus for predetermining the water level in the sand.

The reference character 10 has been used to designate the sand in which an excavation is to be made, said excavation serving as a mold into which concrete may be poured to form a mushroom piling. The normal water level in the sand is indicated by the dot and dash line A—A. The dot and dash line B—B indicates the depth to which the excavation must be carried for the piling.

The first step of the method consists in sinking a set of well points 11 into the sand in which the excavation is to be made. Preferably these well points are arranged about the proposed area of excavation. The well points are of known construction including vertical pipes 12 and flexible hose leads 13 connected to a pump line 14. It will be noted that the well points are sunk to a point below the maximum depth of the proposed excavation, and by creating a suction in the pump line 14, the water will be sucked from the sand through the well points, and the water level in the particular section of sand to be worked upon, will be lowered to the line B—B, or to the exact depth of the proposed excavation.

The next step consists in drilling a straight cylindrical hole 15 into the sand. This hole may be formed by use of a conventional type of auger, post hole digger or by similar apparatus commonly employed for this type of excavation work. When the opening 15 reaches the new water level B—B in the sand, further excavation by the post hole digger or other excavating tool will cause the water saturated sand at the bottom of the hole to run, the sand running on approximately the angle indicated at 16, and as this sand runs, the sand above will cave on the angle indicated at 17. The running angle and caving angle of the sand are approximately 7° and 45° respectively. It will thus be seen that by continuing to excavate with the post hole digger, the natural action of the sand will provide an undercut opening 18 at the bottom of the hole 15, the excavating tool being used merely to remove the sand which falls in by the natural
running and caving action. The dotted lines at 19 indicate roughly the depth to which the excavating tool will be carried for removing the inflowing sand from the opening 18. Thus the opening 18 may be made as large as is required, simply by the continued action of the excavating tool, and when the opening has reached the desired size, the excavating tool is withdrawn and the concrete is poured directly into the mold formed by the excavation.

If desired a metal shell 20 may be inserted into the stem of the excavated mold to prevent the concrete from coming into contact with the sand as the concrete is being poured into the mold. This shell is left in place to reinforce the completed pile.

It is to be noted that this method of installing pilings involves no mechanical or hydraulic means for undercutting to form the opening 18. We merely predetermine the water level and form this opening or pocket by the natural running and caving action of the sand. It is also to be noted that the method involves no pressing with mechanical or hydraulic means or driving of the concrete, and no sheathing or reinforcements while the excavating is being done.

In some instances the maximum depth of the excavation will be above the normal water level in the sand. In this instance we produce the running and caving action artificially by sinking a cylindrical shaft down to the maximum depth of the excavation, and then continuing to excavate while pouring water into the hole. In this instance the water thoroughly saturating the sand at the bottom of the hole, will produce the running and caving action above described. Here again there is no necessity for using mechanical or hydraulic undercutting tools.

We claim—

1. A method of installing mushroom pilings in beach sand, which includes the steps of lowering the water level in the sand to a predetermined extent by use of a well point system, sinking a vertical shaft down to the water level and continuing to excavate after the water level has been reached, thereby enlarging the lower end of the shaft by the natural running and caving action of the sand, then pouring concrete in the sand mold thus formed.

2. A method of preparing a sand mold for a concrete mushroom piling in water bearing sand which includes the steps of boring down to the water level in the sand and continuing to bore after said water level is reached, whereby the hole is enlarged by the natural running and caving action of the sand, then pouring concrete into the mushroom sand mold thus formed.

3. A method of forming in beach sand, an excavation for a concrete mushroom piling where the normal water level in the sand is above the lower end of the proposed piling, which consists in inserting a series of well points in the sand and removing water from the sand through said well points to lower the water level in the sand to the depth of the proposed excavation, excavating to form a straight shaft until the new water level is reached, and then continuing to excavate in a similar manner until the natural running of the sand at the water line and caving of the sand above the water line, enlarges the diameter of the lower end of the shaft to the desired extent.

4. A method as set forth in claim 1, wherein a shell is inserted in the vertical shaft just prior to pouring the concrete.

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