Cylindrical, interconnected stacked vertical sleeves provide a vertical pit (or shaft shoring system) for use in subterranean construction projects. Large-diameter, interlocking fiberglass, plastic, or polymeric sleeves have an interlocking portion at the top and a second interlocking portion at the bottom, which allow sleeves to be safely and securely seated upon each other to build the vertical pit up to 20 feet deep. Lifting rings on the interior wall of the cylinders allow lifting, placement, and removal by a crane or other piece of heavy lifting equipment.
MODULAR VERTICAL SHORING SYSTEM
WITH CYLINDRICAL INTERCONNECTED SLEEVES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable.

THE NAMES OF THE PARTIES TO A JOINT RESEARCH OR DEVELOPMENT


BACKGROUND OF THE INVENTION

[0004] 1. Field of the Invention

[0005] The present invention relates to shoring devices and particularly to a modular vertical pit or shaft shoring system comprising a series of large-diameter interlocking fiberglass, plastic, or polymeric sleeves, each sleeve section having a first interlocking portion at the top thereof and a second interlocking portion at the bottom thereof which allows a first sleeve section to be safely and securely seated upon a second sleeve section; each sleeve section further comprises a plurality of lifting rings on the interior wall thereof which allows lifting and placement by a crane or other piece of heavy equipment of a vertical array of interconnected sleeves to form an underground work space.

[0006] 2. Description of Related Art Including Information Disclosed Under 37 CFR 1.97 and 1.98

[0007] Shoring is used to define a work space within which a worker can work in an excavation area in relative safety. The safety of workers only several feet below ground level has become a concern due to the potential of the collapse of the unsupported dirt. Many states have laws that require a trench box or other earth retaining device be used for worker safety where the trench more than four feet deep. Prior art devices fail to address adequately the need for an easy to install shoring system for a limited work environment. The prior patents lack interior attached rings to receive hooks for lifting a series of stackable units for fast and easy installation and removal.

[0008] U.S. Pat. No. 5,401,122, issued Mar. 28, 1995 to Pate, Jr., is for an excavation shield apparatus and method for preventing the collapse, or cave-in, of soil about a hole in the ground. The excavation shield apparatus comprises a longitudinal body having a lateral perimeter wall surrounding a longitudinal throughway adapted to be placed substantially vertically within the hole. A bottom end of the longitudinal body is placed below the ground level and a top end is placed in close proximity to the ground level. The longitudinal throughway is of sufficient size to permit passage of a person therethrough and has sufficient strength to endure forces imposed by the surrounding soil without substantial deformation. One or more apertures are situated in the lateral perimeter wall approximately at the bottom end for receiving utility apparatus therethrough so that a worker can operate upon the utility apparatus within the longitudinal throughway.

[0009] Four U.S. patents, U.S. Pat. No. 6,484,451 issued Nov. 26, 2002; U.S. Pat. No. 6,655,093 issued Dec. 2, 2003; U.S. Pat. No. 6,877,281 issued Apr. 12, 2005 and U.S. Pat. No. 6,986,227 issued Jan. 17, 2006 to Gavin, describe a stackable riser having a substantially smooth outer surface which has a first open end defined by an edge and a second open end defined by a pair of adjacent channels, so that the edge defining the first open end of a first riser can mate with one of the channels defining the second open end of a second riser.

[0010] U.S. Pat. No. 6,431,789, issued Aug. 13, 2002 to Schneider et al., provides a fiberglass manhole adjustment ring comprising a fiberglass pipe and a self-centering lip attached to the edge of the pipe, and a method for installing the fiberglass manhole adjustment ring in an existing fiberglass manhole. The self-centering lip can either be attached to the interior edge of the pipe to form a sleeve or to the exterior edge of the pipe to form a collar. An interior self-centering lip, or sleeve, slides into an adjoining fiberglass manhole section while an exterior self-centering lip, or collar, slides over an adjoining manhole section. The manhole adjustment ring is inserted between the cone section and barrel section of an existing fiberglass manhole to accommodate changes in elevation of the surrounding grade level. The self-centering lip may also be used on manhole sections to enable field assembly of a manhole.

[0011] U.S. Pat. No. 5,386,669, issued Feb. 7, 1995 to Almeida, shows a leak-proof modular manhole system comprising a plurality of separate cooperating, plastic form units that snap fit together in a vertical stack. The deployed system provides a complete replacement for an existing manhole, or forms entirely new corrosion resistant and leak-proof manhole. Each of the seamless units is preferably rotationally molded from polyethylene plastic. Each double walled unit interiorly defines a material receptacle annular cavity. The cavity may be filled with structural or non structural fill material. A generally tubular base unit is disposed at the bottom of the excavation for connection with the sewer line by an eccentric reducer coupling. A concrete invert is formed in the base in fluid flow communication with the sewer line. One or more tubular riser units extend serially upwardly from the base. The risers are available in varying lengths to accommodate different manhole depths.

[0012] U.S. Pat. No. 4,089,139, issued May 16, 1978 to Moffa et al., claims a segmented cylindrical reinforced plastic manhole structure comprising a cylindrical body surrounded by a transition element. The transition element is adapted to support a conventional manhole cover and frame assembly and has an opening closable by the manhole cover. The manhole structure body comprises a plurality of curved, nestable segments of cast or molded reinforced plastic material. Each segment is provided with vertical side edges configured to provide an interlocking joint between it and an adjacent segment and the segments may be so sized as to require two, three or more segments to complete the circumference of the manhole structure body. Each segment is provided with horizontal top and bottom edges configured to provide an interlocking joint between it and an adjacent segment thereabove or therebelow so that the segments may be arranged in tiers to provide a manhole structure body of desired height. The transition element may also be cast or molded of reinforced plastic material and may be segmented or in the form of an integral one-piece structure. A cast reinforced concrete slab-like transition element may also be used. A base member may be provided for the manhole structure body, which base member may also be cast or molded of reinforced plastic material.
The segments, transition element and the base member, if used, are joined together by an appropriate adhesive sealant to form fluid-tight joints therebetween.

[0013] U.S. Pat. No. 4,275,757, issued Jun. 30, 1981 to Singer, discloses a multi-piece prefabricated manhole assembly and method of making the same. The manhole assembly is formed from a cured mixture of a polyester and fiberglass that may have the components thereof wholly or partially assembled in the field to rest on a manhole foundation to provide a manhole structure that is dimensionally stable and one that is substantially impervious to the corrosive action of sewage and gases emanating from the latter such as hydrogen sulfide, methane and the like.

[0014] What is needed is a series of stackable shoring sleeves fabricated of lightweight, heavy duty materials with mating top and bottom connector necks and interior lifting rings to be quickly and easily installed in and removed from a hole in the ground with a lift device for providing a safe, rapidly installed in-ground working environment.

BRIEF SUMMARY OF THE INVENTION

[0015] An object of the present invention is to provide a series of stackable shoring sleeves fabricated of lightweight, heavy-duty materials with mating top and bottom connector necks and interior lifting rings that can be quickly and easily installed in and removed from a hole in the ground with a lift device, providing a safe, rapidly installed in-ground working environment.

[0016] Another object of the present invention is to provide lifting rings that allow for easy installation and removal of the system.

[0017] In brief, a modular vertical pit or shaft shoring system comprises a series of large-diameter interlocking fiberglass, plastic, or polymeric sleeves, each sleeve section having a first interlocking portion at the top thereof and a second interlocking portion at the bottom thereof which allows a first sleeve section to be safely and securely seated upon a second sleeve section; each sleeve section further comprises a plurality of lifting rings on the interior wall thereof which allows lifting and placement by a crane or other piece of heavy equipment.

[0018] The present invention is used by underground infrastructure contractors in the construction industry. It will be used for shoring and protection of workers while they perform underground construction.

[0019] An advantage of the present invention is that it provides a lightweight, heavy-duty design that allows for easy handling, installation, and removal.

[0020] Another advantage of the present invention is that it provides superior protection of workers while working underground.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0021] These and other details of my invention will be described in connection with the accompanying drawings, which are furnished only by way of illustration and not in limitation of the invention, and in which drawings:

[0022] FIG. 1 is an elevational view of a stack of cylindrical interconnected sleeves of the modular vertical shoring system of the present invention positioned in the ground for use;

[0023] FIG. 2 is a perspective view of one of the cylindrical interconnecting sleeves of the modular vertical shoring system of the present invention showing an exploded detail of one of the lifting rings.

DETAILED DESCRIPTION OF THE INVENTION

[0024] In FIGS. 1-2, an assembled shoring structure 10 comprises a plurality of stackable shoring sleeves 20 which assemble vertically into a shoring structure 10 in an excavated hole in the ground. Each of the shoring sleeves 20 is fabricated of lightweight, heavy-duty material and has a series of lifting rings 23 on the interior surface for ease of lifting and installing. Each shoring sleeve 20 comprises a cylindrical structure 21 having a top inner ring 22 to mate with and lock with a bottom outer ring 28 of an adjacent cylindrical structure 21 in a vertical, stacked array in an excavated hole to provide a rapidly installed and rapidly removed, safe, in-ground working environment.

[0025] In FIGS. 1-2, the assembled shoring structure 10 comprises a plurality of assemblies of modular mating cylindrical shoring sleeves 20. These assemblies are constructed to be available in both a different diameter (42" or 48") and different height (24" or 48") series of mating cylindrical sleeves to accommodate different work environment requirements. The various work environments include, but are not limited to: water service connections, valve box and rod repairs, utility locating, and utility repair actions.

[0026] In FIGS. 1-2, the assembled shoring structure 10 comprises at least one of the following lightweight, heavy-duty materials: synthetic material, a polymeric material, fiberglass, plastic, a combination of fiberglass and plastic, aluminum, wood, light weight steel, rubber, and a composite of fiber.

[0027] In FIG. 2, the lifting rings 23 comprise a series of steel rings 26 pivotally secured to a series of steel plates 24 attached by steel fasteners 25 spaced around an interior surface of the cylinder 21 so that each of the rings 26 pivots vertically. The series of steel rings 23 receive a series of hooks from elongated flexible lifting members from a powered lifting device for installing and removing the shoring sleeves 20 with the sleeves stacked vertically to the desired depth of the in-ground working space.

[0028] In use, soil is extracted to form a hole for working in the ground. A stacked array of the shoring sleeves 20 of the present invention are installed in the excavated hole to the required depth using a lifting crane with hooks in the interior rings 26 of the bottom sleeve 20. A ladder is installed once excavation depth has been achieved. The work task can then be performed. Once the work task is completed, the sleeve array 10 can be quickly and easily removed by using a powered lifting device to hook into the lifting rings on the interior of the sleeves and lifting the array of sleeves out of the excavated hole. The hole is then backfilled, as required.

[0029] It is understood that the preceding description is given merely by way of illustration and not in limitation of the invention and that various modifications may be made thereto without departing from the spirit of the invention as claimed.

What is claimed is:

1. An assembled shoring structure for pit and shaft shoring comprising: a plurality of stackable shoring sleeves to assemble vertically and lower into a shoring structure in an excavated hole in the ground, each of the shoring sleeves fabricated of lightweight heavy duty material and each having a series of lifting rings on an exterior surface for ease of
lifting and installing using external lifting machinery, each of
the shoring sleeves comprising a cylindrical structure having
a bottom outer ring to mate with and overlap a top inner ring
of an adjacent lower cylindrical structure in a vertical stacked
array lowered into the hole to provide a rapidly installed and
rapidly removed safe in-ground working environment.

2. The assembled shoring structure of claim 1 comprising
a plurality of assemblies of modular mating cylindrical shor-
ing sleeves, each of the assembly comprising a different
diameter and different height series of mating cylindrical
sleeves for different work environment requirements.

3. The assembled shoring structure of claim 1 wherein the
lightweight heavy duty material comprises at least one of the
lightweight heavy duty materials taken from the list of light-
weight heavy duty materials comprising synthetic material, a
polymeric material, fiberglass, plastic, a combination of
fiberglass and plastic, aluminum, wood, light weight steel,
rubber, and a composite of fiber.

4. The assembled shoring structure of claim 1 wherein the
lifting rings comprise a series of steel rings pivotally secured
to a series of horizontal rings spaced around an interior sur-
face of the cylinder so that each of the rings pivots vertically
and the series of steel rings receive a series of hooks from
elongated flexible lifting members from a powered lifting
device for installing and removing the shoring sleeves.

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