ICC-ES Evaluation Report
ESR-1559

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DIVISION: 31 00 00—EARTHWORK
Section: 31 63 00—Bored Piles

REPORT HOLDER:

CANTSINK MANUFACTURING, INC.

EVALUATION SUBJECT:

CANTSINK HELICAL PILE FOUNDATION SYSTEMS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2021, 2018, 2015, 2012 and 2009 *International Residential Code*® (IRC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Property evaluated:

Structural and geotechnical

2.0 USES

2.1 IBC:

Cantsink Helical Pile Foundation Systems are used either to underpin foundations of existing structures or to form deep foundations for new structures; and are designed to transfer compression and tension loads from the supported structure to suitable soil bearing strata. Underpinning of existing foundations is generally achieved by attaching the helical piles to the repair brackets, which support compression loads. Deep foundations for new construction are generally obtained by attaching the helical piles to new construction brackets that are embedded in concrete pile caps or grade beams, which support both compression and tension loads.

2.2 IRC:

Under the IRC, the Cantsink Helical Pile Foundation Systems may be used as an alternate foundation system supporting light-frame construction, exterior porch deck, elevated walkway and stairway construction and accessory structures. When helical piles are installed under the IRC, an engineered design is required in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 GENERAL:

The Cantsink Helical Pile Foundation Systems consist of a helical pile lead section, optional extension sections, and a bracket that allows attachment to the foundation of the supported structure. The helical pile is screwed into the ground by applying torsion to a desired depth and suitable soil bearing strata. The bracket is then installed to connect the pile to the concrete foundation of the supported structure.

3.2 System Components:

3.2.1 Shafts: The lead sections consist of the following shaft sizes: $2^{7}/_{8}$-inch-outside-diameter (73 mm) round steel tubing (round HSS2.875x0.203) having a nominal wall thickness of 0.203 inch (5.16 mm) and 1.5-inch (38 mm) solid-round-cornered square (RCS) steel bar. The helical plates, which are factory-welded to the lead, allow advancement into the soil as the pile is rotated. For $2^{7}/_{8}$-inch-outside-diameter (73 mm) round steel tubing leads and extension with helical plates, the helical plates are hexagonally shaped with an area equal to a helix of either 8-, 10-, 12-, 14-, 16-, or 19-inch outside diameter (203, 254, 305, 356, 406 or 483 mm), and are made from $^{3}/_{8}$-inch-thick (9.5 mm) steel plates. For 1.5-inch RCS steel bar leads and extension with helical plates, the helical plates are hexagonally shaped with an area equal to a helix of either 8-, 10-, 12-, 14-, or 16-inch outside diameter (203, 254, 305, 356 or 406 mm), and are made from $^{3}/_{8}$-inch-thick (9.5 mm) steel plates. The helical plates are formed with either a 3-inch (76 mm) pitch for the $2^{7}/_{8}$-inch-outside-diameter (73 mm) round steel tubing or 2.9-inch (74 mm) pitch for the 1.5-inch (38 mm) RCS steel bar and radially stiffening ribs, and are then factory-welded to the lead. The extension sections are available in shafts with and without helical plates. Extension sections for the $2^{7}/_{8}$-inch-outside-diameter (73 mm) round steel tubing have a factory cold-formed bell-shaped end segment to fit over the lead shaft or other extension sections. Connection of the $2^{7}/_{8}$-inch-outside-diameter (73 mm) round steel tubing extension sections to the lead shaft or other extension sections is made by through-bolted connections with three $^{3}/_{4}$-inch-diameter (19 mm) steel bolts through the extension bell-shaped segment and the connected lead or other extensions.

Extension sections for the 1.5-inch RCS steel bar have a forged upset socket at one end of the steel bar, which allows the upper end of the lead shaft or other end without the upset socket of an extension to be fitted. Connections of the 1.5-inch RCS steel bar lead shaft and extensions sections is made by through-bolted connection of a single $^7/_8$-inch-diameter (22.2 mm) bolt through the upset socket and end of the shaft. Leads and extensions may be either bare steel or hot-dipped galvanized in accordance with ASTM A123, with a minimum coating thickness of 0.005 inch per side (0.127 mm). See Table 1A, 1B, 1C and Figures 1B, 1C, 5 and 6 of this report.

3.2.2 Foundation Attachments (Brackets):

3.2.2.1 Repair Bracket: A foundation repair bracket is used to transfer compressive loads from existing concrete foundations to a helical pile. The main body of the bracket is cut from square HSS10x10x$^3/_8$ inch (254 by 254 by 9.5 mm) steel tubing. The 12-inch-wide-by-11-inch-high (305 mm by 279 mm) steel shelf and supporting tabs are cut from ¼-inch-thick (6 mm) ASTM A36 steel and are factory-welded to the HSS main body. A lifting T-pipe consists of a rectangular HSS3 x 2 x $^1/_4$ inch (76 by 51 by 6 mm) steel tubing and a 2$^3/_8$-inch-outside-diameter (60 mm) round steel tubing (round HSS2.375 x 0.154) having a nominal wall thickness of 0.154 inch (4 mm) and a length of 48 inches (1219 mm). When connecting the repair bracket to the 1.5-inch RCS shaft, the lifting T-pipe is the same as described above, except that it has a 2$^3/_8$-inch-outside-diameter (60 mm) round steel tubing (round HSS2.375 x 0.213) having a nominal wall thickness of 0.213 inch (5.4 mm) and a length of 48 inches (1219 mm). The lifting T-pipe is connected to the bracket main body through two $^7/_8$-inch-diameter (22 mm) steel threaded rods with matching steel nuts and matching steel washers at each end of the threaded rod. See Figures 2 and 3 of this report. The repair bracket may be either bare steel or hot-dipped galvanized in accordance with ASTM A123 with a minimum coating thickness of 0.005-inch per side.

3.2.2.2 2$^7/_8$ HSS Shaft New Construction Bracket (NCB-TC): This bracket is embedded into concrete footings, grade beams, or pile caps. The bracket consists of a 6-by-6-by-$^1/_2$-inch (152 by 152 by 12.7 mm) steel plate factory-welded to 3½-inch-outside-diameter (89 mm) steel round tubing (round HSS3.5 x 0.216) having a nominal wall thickness of 0.216 inch (5.49 mm) and a length of 6.5 inches (165 mm). The bracket includes three predrilled holes used to receive three (3) ¾-inch-diameter (19 mm) bolts as described in Section 3.3.5 of this report. The bracket comes in bare steel or hot-dipped galvanized steel in accordance with ASTM A123. See Figure 2B.

3.2.2.3 1.5 RCS Shaft New Construction Bracket: This bracket is embedded into concrete footings, grade beams, or pile caps. The bracket consists of a 6-by-6-by-$^1/_2$-inch (152 by 152 by 12.7 mm) steel plate factory-welded to 2.38-inch-outside-diameter (60 mm) steel round tubing (round HSS2.375 x 0.218) having a nominal wall thickness of 0.218 inch (5.54 mm) and a length of 6 inches (152 mm). The bracket comes with one predrilled hole used to receive one $^7/_8$-inch diameter (22.2 mm) bolt as described in Section 3.3.5 of this report. The bracket comes in bare steel or hot-dipped galvanized steel in accordance with ASTM A123. See Figure 2A.

3.3 Material Specifications:

3.3.1 Helical Plates: The carbon steel plates conform to ASTM A36, having a minimum yield strength of 36,000 psi (248 MPa) and a minimum tensile strength of 58,000 psi (400 MPa). The helical plates and the shafts to which they are factory-welded may be either bare steel or hot-dipped galvanized in accordance with ASTM A123 with a minimum coating thickness of 0.005 inch per side (0.127 mm).

3.3.2 Leads and Extension Sections: The leads and extension sections of the 2$^7/_8$ HSS shafts are carbon steel round tubes that conform to ASTM A500, Grade B, except for having a minimum yield strength of 50,000 psi (345 MPa) and a minimum tensile strength of 65,000 psi (448 MPa). The leads and extension sections of the 1.5-inch RCS steel bar conform to 1530M2 and/or 1045M2, having a minimum yield strength of 85 ksi (586 MPa) and a minimum tensile strength of 100 ksi (689 MPa). The leads and extension sections may be either bare steel or hot-dipped galvanized in accordance with ASTM A123 with a minimum coating thickness of 0.005 inch per side (0.127 mm).

3.3.3 Repair Bracket: The square steel tubing used to fabricate the repair bracket main body conforms to ASTM A500 Grade B, having a minimum yield strength of 46,000 psi (317 MPa) and a minimum tensile strength of 58,000 psi (400 MPa). The round steel tubing which is part of the lifting T-pipe is made from steel conforming to ASTM A500 Grade B, having a minimum yield strength of 46,000 psi (290 MPa) and a minimum tensile strength of 58,000 psi (400 MPa). The rectangular steel tubing which is part of the lifting T-pipe is made from steel conforming to ASTM A500 Grade B, except for having a minimum yield strength of 50,000 psi (345 MPa) and a minimum tensile strength of 58,000 psi (400 MPa). The steel shelf plate and supporting tabs are made from ASTM A36 steel having a minimum yield strength of 36,000 psi (248 MPa) and a minimum tensile strength of 58,000 psi (400 MPa). The steel threaded rods conform to ASTM A307 Grade A. ASTM A563 nuts and ASTM F844 washers are used to fasten the threaded rods to the bracket. The repair bracket may be either bare steel or hot-dipped galvanized in accordance with ASTM A123 with a minimum coating thickness of 0.005-inch per side.

3.3.4 New Construction Bracket: The steel plate conforms to ASTM A572 Grade 50, having a minimum yield strength of 50,000 psi (345 MPa) and a minimum tensile strength of 65,000 psi (448 MPa). The round steel tubing conforms to ASTM A500, Grade B, and has a minimum yield strength of 50,000 psi (345 MPa) and a tensile strength of 65,000 psi (448 MPa). The new construction bracket is made from bare steel or galvanized in accordance with ASTM A123 with a minimum coating thickness of 0.005 inch per side (0.127 mm).

3.3.5 Bolts for Coupling and for New Construction Brackets: The bolts, used to connect the 2$^7/_8$ HSS lead and extension sections, conform to ASTM A307 Grade A and the matching hex nuts conform to ASTM A563, Grade A or ASTM A194, Grade 2H. The bolts used to connect the 1.5-inch RCS steel bar lead and extension sections conform to ASTM F3125 Grade A325 and the matching hex nuts conform to ASTM A563, Grade DH. The bolts used to connect the 2$^7/_8$ HSS and 1.5-inch RCS shafts to the new construction brackets conform to ASTM F3125 Grade A325 with matching hex nuts conforming to ASTM A563, Grade DH. Bolts and nuts can be either bare steel or hot-dipped galvanized in accordance with ASTM A153.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Engineering calculations and drawings, prepared by a registered design professional, must be submitted to the code official for each project, must be based on accepted engineering principles as described in IBC Section 1604.4, and must conform to IBC Section 1810. Under the IRC, the registered design professional must design the helical pile system and devices, including the bracket, used as a foundation element. The applied loads must not exceed the published capacities shown in this report for the helical pile system and devices. The registered design professional may determine the design forces in accordance with IRC Section R301 or, as an alternate, in accordance with IBC provisions. The load capacities shown in this report are based on allowable stress design (ASD), described in IBC Chapter 2 and AISC 360 Section B3.4. The engineering analysis must address helical foundation system performance related to structural and geotechnical requirements. The calculations must address the ability (considering strength and stiffness) of the supported foundation and structure to transmit the applied loads to the helical foundation system and the ability of the helical piles and surrounding soils to support the loads applied by the supported foundation and structure. The structural analysis must consider all applicable internal forces (shear, bending moments and torsional moments, if applicable) due to applied loads, load transfer between the bracket and the pile segments (leads and extensions) and maximum span(s) between helical foundations. The result of the analysis and the structural capacities must be used to select a helical foundation system. The minimum embedment depth for various loading conditions must be included, based on the most stringent requirements of the following: engineering analysis; tested conditions described in this report; a site-specific geotechnical investigation report; and site-specific load tests, if applicable.

A site-specific geotechnical investigation report must be submitted to the code official as part of the required construction (submittal) documents, prescribed in IBC Section 107, at the time of permit application. Under the IRC, a site specific soil investigation report is not required if the helical pile system described in the evaluation report is being installed to support IRC structures defined in Section 2.2 of this report and the soil capacity of the helical pile must be established in accordance with Equation 3 in Section 4.1.5 of this report. The site-specific geotechnical investigation report must include, but is not limited to, all of the following:

1. A plot showing the location of the soil investigation.
2. A complete record of the soil boring and penetration test logs and soil samples.
3. A record of soil profile.
4. Information on groundwater table, frost depth and corrosion-related parameters, as described in Section 5.5 of this report.
5. Soil design parameters, such as shear strength, soil bearing pressure, unit weight of soil, deformation characteristics and other parameters affecting pile support conditions as defined in IBC Section 1810.2.1.
6. Confirmation of the suitability of helical foundation systems for the specific project.
7. Recommendations for design criteria, including, but not limited to, mitigation of effects of differential settlement and varying soil strength and effects of adjacent loads.
8. Recommended center-to-center spacing of helical pile foundations, if different from spacing noted in Section 5.14 of this report; and reduction of allowable loads due to the group action, if necessary.
9. Field inspection and reporting procedures (to include procedures for verification of the installed bearing capacity, when required).
10. Load test requirements.
11. Any questionable soil characteristics and special design provisions, as necessary.
12. Expected total and differential settlement.
13. The axial compression and axial tension load soil capacities, if values cannot be determined from this evaluation report.

    The allowable axial compressive or tensile load of the helical pile system must be based on the least of the following in accordance with IBC Section 1810.3.3.1.9:

    - Area of the helical bearing plate affixed to the pile shaft times the ultimate bearing capacity of the soil or rock comprising the bearing stratum divided by a safety factor of at least 2. This capacity will be determined by a registered design professional based on site-specific conditions.
    - Allowable capacity determined from well-documented correlations with installation torque. Section 4.1.5 of this report includes torque correlation factors used to establish pile capacities based on documented correlations.
    - Allowable capacity predicted by dividing the ultimate capacity determined from load tests by a safety factor of at least 2.0. This capacity will be determined by a registered design professional for each site-specific condition. Under the 2021 IBC, the load tests must comply with 2021 IBC Section 1810.3.3.1.2.
    - Allowable axial capacity of pile shaft and pile shaft couplings. Section 4.1.3 of this report includes the smaller of pile shaft and shaft coupling capacities.
    - Allowable axial capacity of helical bearing plates affixed to the pile. Section 4.1.4 of this report includes helical plate axial capacities.
    - Allowable axial capacity of the bracket connecting to the foundation. Section 4.1.2 of this report includes bracket capacities.

4.1.2 Bracket Capacity: The concrete foundation must be designed and justified to the satisfaction of the code official with due consideration to the direction and eccentricity of applied loads, including reactions provided by the brackets, acting on the concrete foundation. Only localized limit states of supporting concrete, including punching shear and bearing, have been considered in this evaluation report. Other limit states are outside the scope of this evaluation report and must be determined by the registered design professional. The effects of reduced lateral sliding resistance due to uplift from wind or seismic loads must be considered for each project. Reference Table 2 for the allowable bracket capacities.

4.1.3 Pile Shaft Capacity: The top of the shafts must be braced as described in IBC Section 1810.2.2. In accordance with IBC Section 1810.2.1, any soil other than fluid soil must be deemed to afford sufficient lateral support to prevent buckling of the systems that are braced, and the unbraced length is defined as the length of piles standing in air, water, or in fluid soils plus an additional 5 feet (1524 mm) when embedment is into firm soil, or an additional 10 feet (3048 mm) when embedment is into soft soil. Firm soils must be defined as any soil with a Standard Penetration Test (SPT) blow count of five or greater. Soft soils must be defined as any soil with a SPT blow count greater than zero and less than five. Fluid soils must be defined as any soil with a SPT blow count of zero [weight of hammer (WHO) or weight of rods (WOR)]. Standard Penetration Test blow count must be determined in accordance with ASTM D1586. Under the IRC, when helical pile shafts are fully embedded into soil conditions defined in IRC Table R401.4.1 the helical pile shafts are deemed adequately supported to prevent buckling. The ASD shaft capacities recognized in Table 4 of this evaluation report are for helical pile shafts that are installed in fully braced conditions as noted in this section, including piles not standing in air, water, or fluid soils. The shaft capacity of the helical foundation systems in air, water or fluid soils must be determined by a registered design professional.

The elastic shortening/lengthening of the pile shaft will be controlled by the strength and section properties of the shaft sections and the shaft couplers, as applicable. The mechanical properties of the shaft sections are shown in Tables 3A and 3B and can be used to calculate the shortening of the pile shaft. The slip of the $2^7/_8$-inch HSS shaft helical pile coupler is 0.0625 inch (1.6 mm) at rated allowable compression/tensile load per coupling. The slip of the 1.5-inch RCS shaft helical pile coupler is 0.124 inch (3.2 mm) at rated allowable compression/tensile load per coupling.

4.1.4 Helix Plate Capacity: The allowable axial compressive/tensile load capacities of the hexagonally shaped helical plates described in Section 3.2.1 of this report are included in Table 5.

4.1.5 Soil Capacity: Table 6 describes the geotechnical related properties of the piles. The allowable axial compressive or tensile soil capacity must be determined by a registered design professional in accordance with a site-specific geotechnical report, as described in Section 4.1.1, combined with the individual helix bearing method (Method 1), or from field load tests conducted under the supervision of a registered design professional (Method 2). For either Method 1 or Method 2, the predicted axial load capacities must be confirmed during the site-specific production installation, such that the axial load capacities predicted by the torque correlation method are equal to or greater than that is predicted by Method 1 or 2 as described above.

The individual bearing method (the individual bearing method is defined as the area of the helical bearing plate times the ultimate bearing capacity of the soil or rock comprising the bearing stratum, divided by a safety factor of at least 2) must be used by a registered design professional when the appropriate soils information is available for the site. Under the 2021 IBC, the axial capacity is equal to the sum of the areas of the helical bearing plates times the ultimate bearing capacity of the soil or rock comprising the bearing stratum plus the shaft resistance. The shaft resistance is equal to the area of the shaft above the uppermost helical bearing plates times the ultimate skin friction.

The design allowable axial load must be determined by dividing the total ultimate axial load capacity predicted by either Method 1 or 2, above, by a safety factor of at least 2. The torque correlation method must be used to determine the ultimate capacity (Q_{ult}) of the pile (Equation 1). A factor of safety of at least 2 must be applied to the ultimate capacity to determine the allowable soil capacity (Q_{all}) of the pile (Equation 2). Under the IRC, if the helical pile device is being installed to support structures governed by the IRC as defined in Section 2.2 of this evaluation report, and a site-specific geotechnical report is not available, a safety factor of 2.5 must be used with the torque correlation method in lieu of Method 1 or 2 to determine the allowable soil capacity of the pile (Equation 3).

$Q_{ult} = K_t T$ *(Equation 1)*

$Q_{all} = 0.5\ Q_{ult}$ *(Equation 2)*

$Q_{all} = 0.4\ Q_{ult}$ *(Equation 3)*

where:

Q_{ult} = Ultimate axial compressive or tensile capacity (lbf or N) of helical pile, which must be limited to the maximum ultimate values noted in Table 6.

K_t = Torque correlation factors are described in Table 6.

T = Final installation torque in ft-lbf or N-m. The final installation torque is the torque measurement recorded at the final installation depth.

4.2 Installation:

The Cantsink Foundation Systems must be installed by a Cantsink-certified installer, in accordance with Section 4.2 of this report; IBC Section 1810.4.11; the Cantsink published installation instructions; and approved site-specific construction documentation. In case of conflict, the most stringent requirement governs.

4.2.1 Helical Piles: The helical piles must be installed and located in accordance with the approved plans and specifications. The helical piles are typically installed using hydraulic rotary motors having forward and reverse capabilities, as recommended by Cantsink Manufacturing, Inc. The installation torque must not exceed the values shown in Table 6. Helical piles must be installed vertically into the ground with a maximum allowable angle of inclination of 1 degree from vertical. The helical piles must be rotated clockwise in a continuous manner with the lead section advancing at the helix pitch. Extensions (number and length) are selected based on the approved plans as specified per the site conditions by a registered design professional. The extensions and the lead section must be connected by the use of coupling bolts and nuts as described in Section 3.3.5. Coupling bolts must be snug-tightened as defined in Section J3 of AISC 360. The final installation torque must equal or exceed that specified by the torque correlation method, to support the allowable design loads of the structure. The helical piles must be installed to the minimum depth described in the approved plans, but with the helical plate not less than 5 feet (1.53 m) below the bottom of the supported concrete foundation.

4.2.2 Foundation Attachments:

4.2.2.1 Repair Bracket: The repair bracket must be installed as specified in the approved plans. The repair bracket is installed by excavating the bottom of the footing or foundation a minimum of 30 inches wide (762 mm) x 30 inches deep (762 mm) from final face of the footing. Footing is chipped back so exposed footing from the wall is less than the footing depth. The excavation is extended under the footing for 12 inches (305 mm) and below the footing for 12 inches (305 mm) The underside of the footing for the bracket bearing plate is cleaned and chipped if highly irregular. Existing concrete footing capacity must not be altered, such as with notching of concrete or cutting of reinforcing steel, without the approval of the registered design professional and the code official. The helical pile is installed vertically and located 2 to 3 inches (51 to 76 mm) from the footing face. The repair bracket is installed over the pile facing, away from the concrete footing. The bracket is rotated into place under the footing and raised into position. The pile is cut off squarely 3 inches (76 mm) above the bracket in the raised position. The T-pipe is installed over the pile shaft, and threaded rods, nuts and washers are added to hold the bracket in position. Coupling nuts, jacking bracket and lifting jack are installed to raise the foundation to the desired elevation. Any lifting of the existing structure must be verified by a registered design professional and is subject to approval of the code official to ensure that the foundation, superstructure and helical piles are not overstressed. Once the foundation has been raised to its desired elevation, the hex nuts over brackets are tightened and jacking brackets and lifting jacks are removed. The threaded-rod nuts must be snug tightened. The field cutting and bolting must be in accordance with the most restrictive requirements as described in this evaluation report, the IBC, AISC 360, and the manufacturer's written instructions. The excavation must be backfilled in accordance IBC Section 1804.

4.2.2.2 New Construction Bracket: New construction brackets must be placed over the top of the helical piles. The top of pile elevation must be established and must be consistent with the specified elevation. If necessary, the top of the pile may be cut off level to the required length in accordance with the manufacturer's instructions and AISC 360 requirements so as to ensure full, direct contact (bearing) between the top of the pile shaft and the bracket. For tensile load applications of the New Construction Bracket (NCB-TC), up to three ¾-inch-diameter (19 mm) bolts and matching nuts as described in Section 3.3.5 of this report must be installed. For tensile load applications of the New Construction Bracket (NBC-TC 1.5 RCS), one $^{7}/_{8}$-inch-diameter (22.2 mm) bolt and matching nut as described in Section 3.3.5 of this report must be installed. The bolts must be snug-tightened as defined in Section J3 of AISC 360. The embedment and edge distance of the bracket into the concrete foundation must be as described in the approved plans and as indicated in Table 2 of this report. The concrete foundation must be cast around the bracket in accordance with the approved construction documents.

4.3 Special Inspection:

4.3.1 IBC: Continuous special inspection in accordance with 2021, 2018, 2015 and 2012 IBC Section 1705.9 (2009 IBC Section 1704.10) must be provided for the installation of the helical piles and foundation brackets. Where on-site welding is required, special inspection in accordance with 2021 IBC Section 1705.13 (2018, 2015 and 2012 IBC Section 1705.12 and 2009 IBC Section 1704.3) is also required. Items to be recorded and confirmed by the special inspector must include, but are not necessarily limited to, the following:

1. Verification of product manufacturer and the manufacturer's certification of the installers.
2. Product configurations and identification (including catalog number) for lead sections, extensions, brackets, bolts, nuts, and washers, if applicable.
3. Installation equipment and written installation procedures.
4. Required target installation torque of piles and depth of helical foundation system.
5. Inclination and position of helical piles; top of pile extension in full contact with bracket; full-surface contact of foundation brackets with concrete; tightness of all bolts and threaded rods.
6. Verification that supported foundation is in a condition adequate to resist applied loads resulting from installation of repair bracket.
7. Compliance of installation with the approved construction documents and this evaluation report.

4.3.2 IRC: Continuous special inspection of helical pile system and devices installed under the provisions of the IRC defined in this report is not required.

5.0 CONDITIONS OF USE

The Cantsink Helical Pile Foundation Systems described in this report comply with, or are suitable alternatives to what is specified in, those codes indicated in Section 1.0 of this report, subject to the following conditions:

5.1 The Cantsink Helical Pile Foundation Systems are manufactured, identified and installed in accordance with this report, the manufacturer's written installation instructions (which must be available at the jobsite at all times during installation), and the approved construction documents. In the event of a conflict, the most restrictive requirement governs.

5.2 The Cantsink Helical Pile Foundation Systems have been evaluated for use to support structures in Seismic Design Categories A, B and C in accordance with IBC and IRC. Use of the systems to support structures located in Seismin Design Category D, E, or F under the IBC or D_0, D_1, D_2 or E under the IRC is outside the scope of this report, and are subject to the approval of the building official, based upon submission of a design in accordance with the code by a registered design professional.

5.3 Both the repair bracket and the new construction bracket must be used only to support structures that are laterally braced as defined in IBC Section 1810.2.2. Shaft couplings must be located within firm or soft soil as defined in Section 4.1.3.

5.4 Installation of the helical foundation systems is limited to regions of concrete members where analysis indicates no cracking will occur at service load levels.

5.5 Use of the helical foundation systems in exposure conditions to soil that are indicative of a potential pile deterioration or corrosion situations, as defined by the following: (1) soil resistivity less than 1,000 ohm-cm; (2) soil pH less than 5.5; (3) soils with high organic content; (4) soil sulfate concentrations greater than 1,000 ppm; (5) soils located in landfill; or (6) soil containing mine waste; is beyond the scope of the evaluation report.

5.6 Zinc-coated steel and bare steel components must not be combined in the same system, unless, they are designed as bare steel elements. All helical foundation components must be galvanically isolated from concrete reinforcing steel, building structural steel, or any other metal building components.

5.7 Special inspection is provided in accordance with Section 4.3 of this report.

5.8 The helical piles must be installed vertically into the ground with a maximum allowable angle of inclination of 1 degree from vertical. To comply with the requirements found in IBC Section 1810.3.1.3, the superstructure must be designed to resist the effects of helical pile eccentricity.

5.9 A site-specific geotechnical investigation report in accordance with Section 4.1.1 of this evaluation report for each project site must be submitted to the code official for approval under the IBC.

5.10 The load combinations prescribed in 2021 IBC Section 1605.1 (2018, 2015, 2012 and 2009 IBC Section 1605.3) must be used to determine the applied loads.

When using the alternative basic load combinations prescribed in 2021 IBC Section 1605.2 (2018, 2015, 2012 and 2009 IBC Section 1605.3.2), the allowable stress increases permitted by material chapters of the IBC (Chapters 19 through 23, as applicable) or the referenced standards are prohibited.

5.11 Engineering calculations and drawings in accordance with recognized engineering principles as described in IBC Section 1604.4, and in compliance with Section 4.1 of this report, are prepared by a registered design professional and approved by the code official.

5.12 The applied loads must not exceed the allowable capacities described in Section 4.1 of this report.

5.13 The adequacy of the concrete structures that are connected to the brackets must be verified by a registered design professional in accordance with applicable code provisions, and is subject to the approval of the code official.

5.14 In order to avoid group efficiency effects, an analysis prepared by a registered design professional must be submitted where the center-to-center spacing of the helical piles is less than three times the diameter of the helical plate at the depth of bearing.

5.15 Compliance with IBC Section 1810.3.11.1 for buildings assigned to SDC C, and with 2012 and 2009 IBC Section 1810.3.6 for all buildings, is outside the scope of this report. Such compliance must be addressed by a registered design professional for each site, and is subject to approval of the code official.

5.16 Settlement of the helical pile is outside the scope of this report and must be determined by a registered design professional, as required in IBC Section 1810.2.3.

5.17 For tension application, the helical pile must be installed such that the minimum depth from the ground surface to the uppermost helix is 12D, where D is the diameter of the largest helix. In cases where the installation depth is less than 12D, the minimum embedment depth shall be determined by a registered design professional based on site-specific soil conditions, which must be subject to the approval of the code official. For tension applications where the helical pile is installed at an embedment depth less than 12D, the torque-correlation soil capacity, P4, is outside the scope of this report.

5.18 The Cantsink Helical Pile Foundation Systems are manufactured at the Cantsink Manufacturing, Inc., facility located in Winder, Georgia, under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Helical Pile Systems and Devices (AC358), dated June 2020 (editorially revised March 2021).

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-1559) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.

7.2 In addition, the Cantsink Helical Pile Foundation System components are identified by a tag or label bearing the address of Cantsink Manufacturing and the catalog number.

7.3 The report holder's contact information is the following:

CANTSINK MANUFACTURING, INC.
71 FIRST AVENUE
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TABLE 1A—HELICAL PILE FOUNDATION SYSTEM COMPONENTS

PRODUCT DESCRIPTION	SHAFT TYPE	CATALOG NUMBER
5-foot lead with 8-inch helix	$2^7/_8$ HSS Lead Sections	2.5-40L05-8
7-foot lead with 8-inch helix		2.5-40L07-8
10-foot lead with 8-inch helix		2.5-40L10-8
5-foot lead with 10-inch helix		2.5-40L05-10
7-foot lead with 10-inch helix		2.5-40L07-10
10-foot lead with 10-inch helix		2.5-40L10-10
5-foot lead with 12-inch helix		2.5-40L05-12
7-foot lead with 12-inch helix		2.5-40L07-12
10-foot lead with 12-inch helix		2.5-40L10-12
5-foot lead with 14-inch helix		2.5-40L05-14
7-foot lead with 14-inch helix		2.5-40L07-14
10-foot lead with 14-inch helix		2.5-40L10-14
5-foot lead with 16-inch helix		2.5-40L05-16
7-foot lead with 16-inch helix		2.5-40L07-16
10-foot lead with 16-inch helix		2.5-40L10-16
5-foot lead with 19-inch helix		2.5-40L05-19
7-foot lead with 19-inch helix		2.5-40L07-19
10-foot lead with 19-inch helix		2.5-40L10-19
5-foot lead with 8 and 10-inch helix		2.5-40L05-8-10
7-foot lead with 8 and 10-inch helix		2.5-40L07-8-10
10-foot lead with 8 and 10-inch helix		2.5-40L10-8-10
5-foot lead with 8 and 14-inch helix		2.5-40L05-8-14
7-foot lead with 8 and 14-inch helix		2.5-40L07-8-14
10-foot lead with 8 and 14-inch helix		2.5-40L10-8-14
5-foot lead with 10 and 12-inch helix		2.5-40L05-10-12
7-foot lead with 10 and 12-inch helix		2.5-40L07-10-12
10-foot lead with 10 and 12-inch helix		2.5-40L10-10-12
5-foot lead with 12 and 14-inch helix		2.5-40L05-12-14
7-foot lead with 12 and 14-inch helix		2.5-40L07-12-14
10-foot lead with 12 and 14-inch helix		2.5-40L10-12-14
5-foot lead with 8, 10 and 12-inch helix		2.5-40L05-8-10-12
7-foot lead with 8, 10 and 12-inch helix		2.5-40L07-8-10-12
10-foot lead with 8,10 and 12-inch helix		2.5-40L10-8-10-12
5-foot lead with 10, 12 and 14-inch helix		2.5-40L05-10-12-14
7-foot lead with 10, 12 and 14-inch helix		2.5-40L07-10-12-14
10-foot lead with 10,12 and 14-inch helix		2.5-40L10-10-12-14
10-foot lead with 8, 10,12 and 14-inch helix		2.5-40L10-8-10-12-14
10-foot lead with 10, 12, 14 and 16-inch helix		2.5-40L10-10-12-14-16

TABLE 1A—HELICAL PILE FOUNDATION SYSTEM COMPONENTS (Continued)

5 foot lead with 8-inch helix	**1.5 RCS Lead Sections**	1.5RCSL05-8
5 foot lead with 10-inch helix		1.5RCSL05-10
5 foot lead with 12-inch helix		1.5RCSL05-12
5 foot lead with 14-inch helix		1.5RCSL05-14
5 foot lead with 16-inch helix		1.5RCSL05-16
5 foot lead with 8 and 10-inch helix		1.5RCSL05-8-10
5 foot lead with 8, 10 and 12-inch helix		1.5RCSL05-8-10-12
7 foot lead with 8-inch helix		1.5RCSL07-8
7 foot lead with 10-inch helix		1.5RCSL07-10
7 foot lead with 12-inch helix		1.5RCSL07-12
7 foot lead with 14-inch helix		1.5RCSL07-14
7 foot lead with 16-inch helix		1.5RCSL07-16
7 foot lead with 8 and 10-inch helix		1.5RCSL07-8-10
7 foot lead with 10 and 12-inch helix		1.5RCSL07-10-12
7 foot lead with 12 and 14-inch helix		1.5RCSL07-12-14
7 foot lead with 8, 10 and 12-inch helix		1.5RCL07-8-10-12
7 foot lead with 10, 12 and 14-inch helix		1.5RCSL07-10-12-14
10 foot lead with 8-inch helix		1.5RCSL10-8
10 foot lead with 10-inch helix		1.5RCSL10-10
10 foot lead with 12-inch helix		1.5RCSL10-12
10 foot lead with 14-inch helix		1.5RCSL10-14
10 foot lead with 16-inch helix		1.5RCSL10-16
10 foot lead with 8 and 10-inch helix		1.5RCSL10-8-10
10 foot lead with 8 and 14-inch helix		1.5RCSL10-8-14
10 foot lead with 10 and 14-inch helix		1.5RCSL10-10-14
10 foot lead with 8, 10 and 12-inch helix		1.5RCL10-8-10-12
10 foot lead with 10, 12 and 14-inch helix		1.5RCSL10-10-12-14
10 foot lead with 8, 10, 12 and 14-inch helix		1.5RCSL10-8-10-12-14
10 foot lead with 10, 12, 14 and 16-inch helix		1.5RCSL10-10-12-14-16
2-foot extension	**2$^7/_8$ HSS Extension Sections**	2.5-40X02
3-foot extension		2.5-40X03
4-foot extension		2.5-40X04
5-foot extension		2.5-40X05
7-foot extension		2.5-40X07
3.5 foot bolt-on extension with 14-inch helix		2.5-40X3.5-14
3.5 foot bolt-on extension with 16-inch helix		2.5-40X3.5-16
3.5 foot bolt-on extension with 19-inch helix		2.5-40X3.5-19
7 foot bolt-on extension with 14 and 16-inch helix		2.5-40X07-14-16
7 foot bolt-on extension with 16 and 19-inch helix		2.5-40X07-16-19
10-foot extension		2.5-40X10
3-foot extension	**1.5 RCS Extension Sections**	1.5RCSX03
4-foot extension		1.5RCSX04
5-foot extension		1.5RCSX05
7-foot extension		1.5RCSX7
10-foot extension		1.5RCSX10
3.0 foot bolt-on extension with 14-inch helix		1.5RCSX03-14
3.0 foot bolt-on extension with 16-inch helix		1.5RCSX03-16
5.0 foot bolt-on extension with 14-inch helix		1.5RCSX05-14
5.0 foot bolt-on extension with 16-inch helix		1.5RCSX05-16
5.0 foot bolt-on extension with 14 and 16-inch helix		1.5RCSX05-14-16
New Construction Bracket	**2$^7/_8$ HSS**	NCB-TC
New Construction Bracket	**1.5 RCS**	NCB-TC 1.5 RCS
Foundation Repair Bracket	**2$^7/_8$ HSS**	UPB-D
Foundation Repair Bracket	**1.5 RCS**	UPB-1.5RCS

For **SI:** 1 inch = 25.4 mm, 1 foot = 305 mm.

TABLE 1B—2.875 HSS HELICAL PILE LEAD AND EXTENSIONS WITH HELICAL PLATES

CATALOG NUMBER	HELICAL PILE AND EXTENSIONS WITH PLATE SPACING (inches)						
	L	M	N	O	P	Q	R
2.5-40L05-8	63	58	-	-	-	-	-
2.5-40L07-8	84	79	-	-	-	-	-
2.5-40L10-8	126	121	-	-	-	-	-
2.5-40L05-10	63	58	-	-	-	-	-
2.5-40L07-10	84	79	-	-	-	-	-
2.5-40L10-10	126	121	-	-	-	-	-
2.5-40L05-12	63	58	-	-	-	-	-
2.5-40L07-12	84	79	-	-	-	-	-
2.5-40L10-12	126	121	-	-	-	-	-
2.5-40L05-14	63	58	-	-	-	-	-
2.5-40L07-14	84	79	-	-	-	-	-
2.5-40L10-14	126	121	-	-	-	-	-
2.5-40L05-16	63	58	-	-	-	-	-
2.5-40L07-16	84	79	-	-	-	-	-
2.5-40L10-16	126	121	-	-	-	-	-
2.5-40L05-19	63	58	-	-	-	-	-
2.5-40L07-19	84	79	-	-	-	-	-
2.5-40L10-19	126	121	-	-	-	-	-
2.5-40L05-8-10	63	34	58	-	-	-	-
2.5-40L07-8-10	84	55	79	-	-	-	-
2.5-40L07-10-12	84	49	79	-	-	-	-
2.5-40L07-12-14	84	43	79	-	-	-	-
2.5-40L10-8-10	126	97	121	-	-	-	-
2.5-40L05-8-14	63	34	28	-	-	-	-
2.5-40L07-8-14	84	55	79	-	-	-	-
2.5-40L10-8-14	126	97	121	-	-	-	-
2.5-40L05-10-12	63	28	58	-	-	-	-
2.5-40L07-10-12	84	49	79	-	-	-	-
2.5-40L10-10-12	126	91	121	-	-	-	-
2.5-40L05-12-14	63	22	58	-	-	-	-
2.5-40L07-12-14	84	43	79	-	-	-	-
2.5-40L10-12-14	126	85	121	-	-	-	-
2.5-40L05-8-10-12	63	10	34	58	-	-	-
2.5-40L07-8-10-12	84	16	52	79	-	-	-
2.5-40L10-8-10-12	126	67	97	121	-	-	-
2.5-40L07-10-12-14	84	13	49	79	-	-	-
2.5-40L10-10-12-14	126	55	91	121	-	-	-
2.5-40L10-8-10-12-14	126	19	61	94	121	-	-
2.5-40L10-10-12-14-16	126	16	54	90	120	-	-
2.5-40X3.5-14	42	-	-	-	-	13	-
2.5-40X3.5-16	42	-	-	-	-	13	-
2.5-40X3.5-19	42	-	-	-	-	13	
2.5-40X07-14-16	82	-	-	-	-	11	53
2.5-40X07-16-19	82	-	-	-	-	14	53

For **SI**: 1inch=25.4 mm.

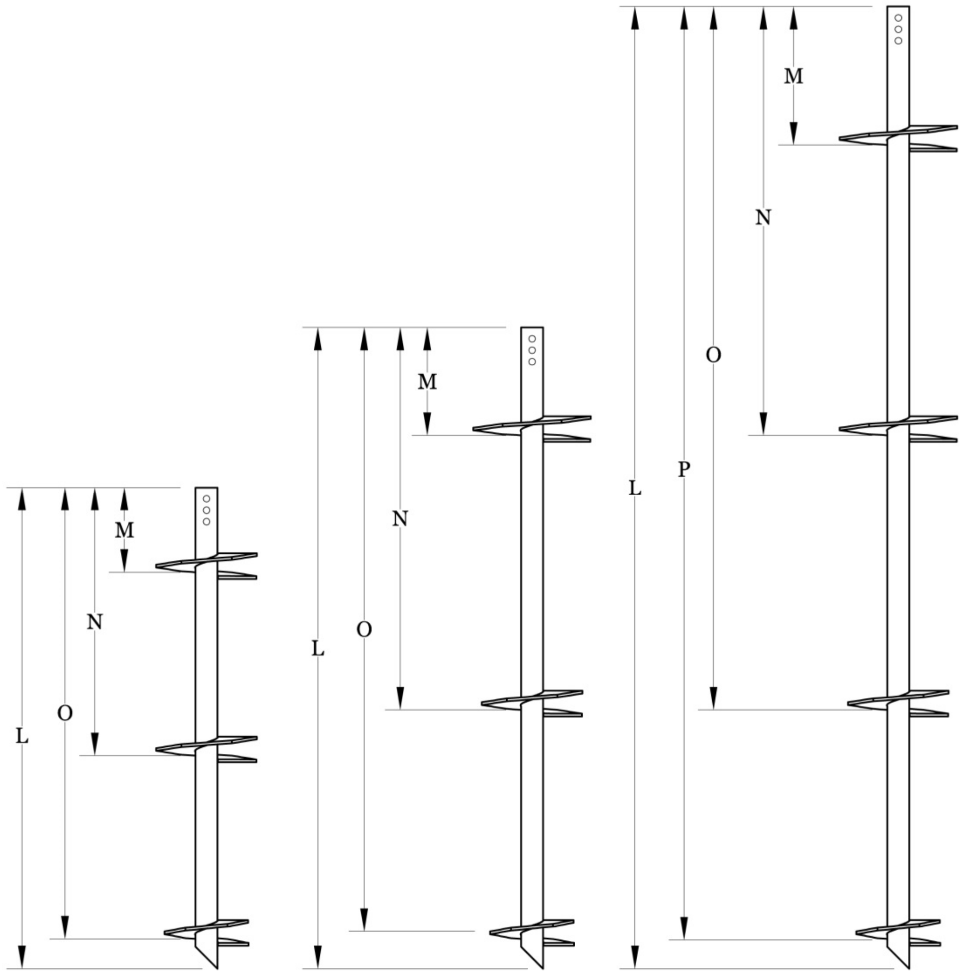

FIGURE 1B—2.875 HSS HELICAL PILE LEAD

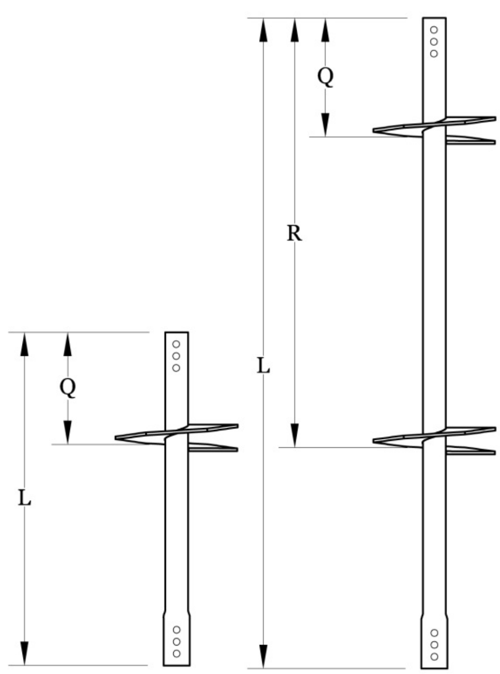

FIGURE 1B—2.875 HSS EXTENSIONS WITH HELICAL PLATES

TABLE 1C—1.5 RCS HELICAL PILE LEAD AND EXTENSIONS WITH HELICAL PLATES

CATALOG NUMBER[1]	HELICAL PILE AND EXTENSIONS WITH PLATE SPACING (inches)						
	L	M	N	O	P	Q	R
1.5RCSL05-8	60	54	-	-	-	-	-
1.5RCSL05-10	60	54	-	-	-	-	-
1.5RCSL05-12	60	54	-	-	-	-	-
1.5RCSL05-14	60	54	-	-	-	-	-
1.5RCSL05-16	60	54	-	-	-	-	-
1.5RCSL05-8-10	60	30	54	-	-	-	-
1.5RCSL05-8-10-12	60	11	35	56	-	-	-
1.5RCSL07-8	84	54	-	-	-	-	-
1.5RCSL07-10	84	54	-	-	-	-	-
1.5RCSL07-12	84	54	-	-	-	-	-
1.5RCSL07-14	84	54	-	-	-	-	-
1.5RCSL07-16	84	54	-	-	-	-	-
1.5RCSL07-8-10	84	54	78	-	-	-	-
1.5RCSL07-8-10-12	84	21	51	78	-	-	-
1.5RCSL07-10-12-14	84	15	51	78	-	-	-
1.5RCSL10-8	120	54	-	-	-	-	-
1.5RCSL10-10	120	54	-	-	-	-	-
1.5RCSL10-12	120	54	-	-	-	-	-
1.5RCSL10-14	120	54	-	-	-	-	-
1.5RCSL10-16	120	54	-	-	-	-	-
1.5RCSL10-8-10	120	90	114	-	-	-	-
1.5RCSL10-8-14	120	87	114	-	-	-	-
1.5RCSL10-10-14	120	84	114	-	-	-	-
1.5RCSL10-8-10-12	120	60	90	114	-	-	-
1.5RCSL10-10-12-14	120	48	84	114	-	-	-
1.5RCSL10-8-10-12-14	120	15	51	84	114	-	-
1.5RCSL10-10-12-14-16	120	15	57	87	114	-	-
1.5RCSX03-14	36			-	-	14	-
1.5RCSX03-16	36			-	-	14	-
1.5RCSX05-14	60					14	-
1.5RCSX05-16	60					14	-
1.5RCSX05-14-16	60					14	50

For **SI:** 1 inch = 25.4 mm, 1 foot = 305 mm.

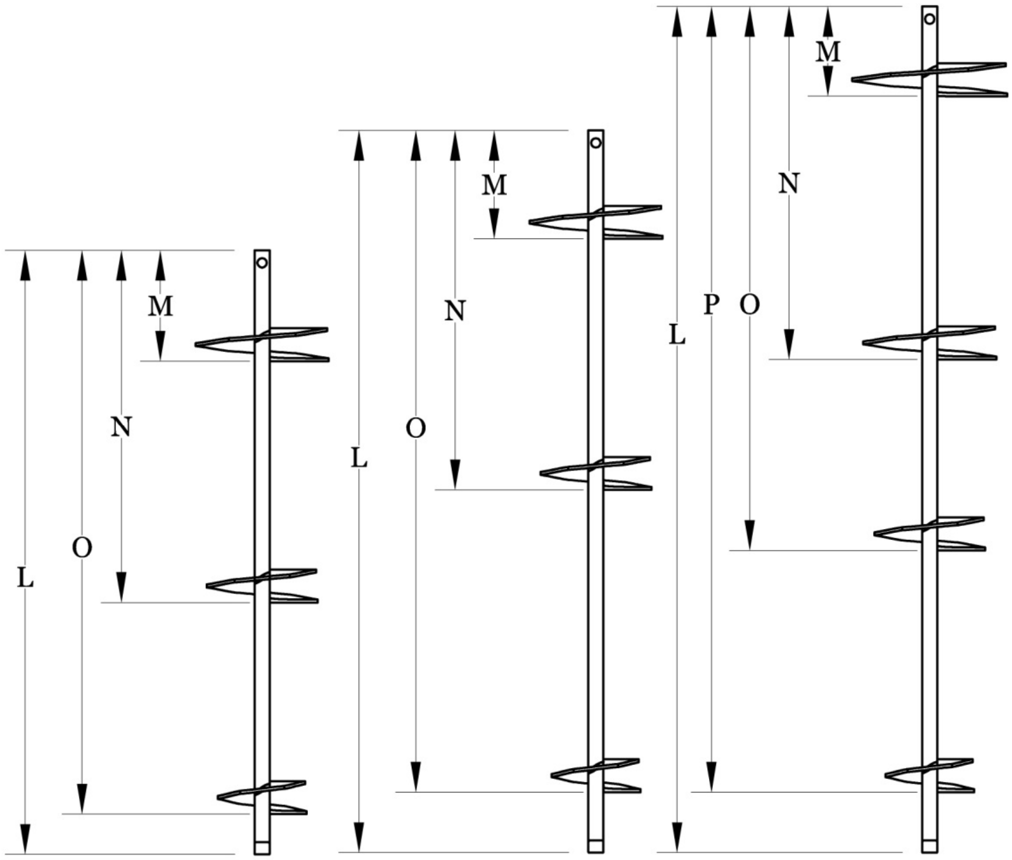

FIGURE 1C—1.5 RCS HELICAL PILE LEAD

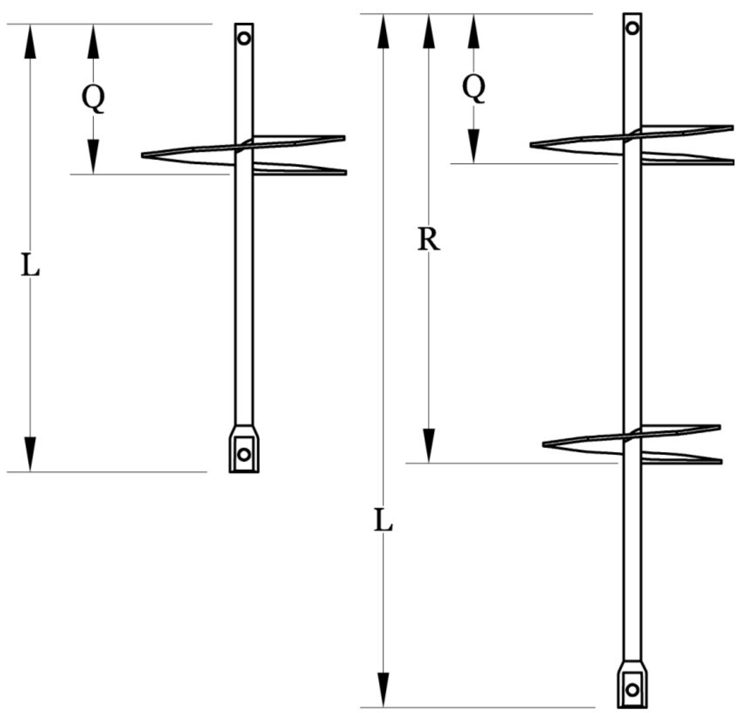

FIGURE 1C—1.5 RCS EXTENSIONS WITH HELICAL PLATES

TABLE 2—ALLOWABLE LOAD CAPACITY OF BRACKETS[6]

BRACKET TYPE[7]	ALLOWABLE AXIAL COMPRESSIVE LOAD CAPACITY (kips)	ALLOWABLE AXIAL TENSILE LOAD CAPACITY (kips)
UPB-BD	23.5[1]	-
UPB-RCS1.5	22.0[1]	-
NCB-TC	30[2]	30[3]
NCB-TC 1.5 RCS	30[4]	30[5]

For **SI:** 1 kip (1000 lbf)=4.48 kN.

[1]Load capacity is based on full scale load tests per AC358 with an installed 5′-0 unbraced pile length having a maximum of one coupling per IBC Section 1810.2.1. Repair bracket must be concentrically loaded. Minimum specified compressive strength of concrete is 2500 psi.

[2]The allowable capacity is based on limit states associated with steel strength, concrete punching shear and concrete bearing strength. The allowable capacity has been determined assuming minimum reinforcement has been provided as specified by ACI 318-19 and ACI 318-14 Section 9.6.1.2 and ACI 318-11 Section 10.5.1. The bracket must be installed with a minimum of 8 inches of concrete cover measured from the top of the bracket plate to the centerline of top reinforcement of concrete footing. The concrete footing must have a minimum width of 16 inches and a minimum depth of 12 inches, and must be normal-weight concrete having a minimum specified compressive strength of 2500 psi.

[3] The allowable capacity is based on limit states associated with steel strength, concrete punching shear and concrete bearing strength. The allowable capacity has been determined assuming minimum reinforcement has been provided as specified by ACI 318-19 and ACI 318-14 Section 9.6.1.2 and ACI 318-11 Section 10.5.1. The bracket must be installed with a minimum embedment of the bracket plate of 8 inches. The embedment of the bracket plate is measured from the bottom of the plate to the centerline of bottom reinforcement of the concrete footing. The concrete footing must have a minimum width of 20 inches and a minimum depth of 20 inches, and must be normal-weight concrete having a minimum specified compressive strength of 2500 psi. Three (3) ¾-inch diameter bolts with matching nuts must be installed in accordance with Section 4.2.2.2 of this report. Threads excluded from shear plane.

[4]The allowable capacity is based on limit states associated with steel strength, concrete punching shear and concrete bearing strength. The allowable capacity has been determined assuming minimum reinforcement has been provided as specified by ACI 318-19 and ACI 318-14 Section 9.6.1.2 and ACI 318-11 Section 10.5.1. The bracket must be installed with a minimum of 7 inches of concrete cover measured from the top of the bracket plate to the centerline of top reinforcement of concrete footing. The concrete footing must have a minimum width of 18 inches and a minimum depth of 16 inches, and must be normal-weight concrete having a minimum specified compressive strength of 2500 psi.

[5] The allowable capacity is based on limit states associated with steel strength, concrete punching shear and concrete bearing strength. The allowable capacity has been determined assuming minimum reinforcement has been provided as specified by ACI 318-19 and ACI 318-14 Section 9.6.1.2 and ACI 318-11 Section 10.5.1. The bracket must be installed with a minimum embedment of the bracket plate of 6 inches. The embedment of the bracket plate is measured from the bottom of the plate to the centerline of bottom reinforcement of the concrete footing. The concrete footing must have a minimum width of 20 inches and a minimum depth of 20 inches, and must be normal-weight concrete having a minimum specified compressive strength of 2500 psi. One (1) $^7/_8$-inch diameter bolt with matching nut must be installed in accordance with Section 4.2.2.2 of this report. Threads excluded from shear plane.

[6]The capacities listed in Table 2 assume the pile foundation system is sidesway fully braced and complies with requirements described in Section 4.1.3 of this report.
[7] Allowable capacities are based on bare steel losing 0.036-inch (318 μm) steel thickness as indicated in Section 3.9 of AC358 for a 50-year service life.

TABLE 3A—MECHANICAL PROPERTIES AFTER CORROSION LOSS OF 2.875-INCH HSS HELICAL PILE SHAFT AND EXTENSIONS

PARAMETER	VALUE	
	Bare Steel[1]	Galvanized Steel[2]
Steel yield strength, Fy	50 ksi	
Steel tensile strength, Fu	65 ksi	
Modulus of Elasticity, E	29,000 ksi	
Design wall thickness	0.153 inch	0.181 inch
Outside diameter	2.839 inch	2.872 inch
Inside diameter	2.533 inch	2.510 inch
Cross-sectional area	1.291 inch^2	1.530 inch^2

For **SI:** 1 inch = 25.4; 1 ksi =6.89 MPa.

[1]Dimensional properties are based on bare steel losing 0.036-inch steel thickness as indicated in Section 3.9 of AC358 for a 50-year service life.
[2]Dimensional properties are based on hot-dipped galvanized steel with a minimum coating thickness of 0.005 inch per side and losing 0.013-inch steel thickness as indicated in Section 3.9 of AC358 for a 50-year service life.

TABLE 3B—MECHANICAL PROPERTIES AFTER CORROSION LOSS OF 1.5-INCH RCS HELICAL PILE SHAFT AND EXTENSIONS

PARAMETER	VALUE	
	Bare Steel[1]	Galvanized Steel[2]
Steel yield strength, Fy	85 ksi	
Steel tensile strength, Fu	100 ksi	
Modulus of Elasticity, E	29,000 ksi	
Design shaft depth	1.464 inch	1.494 inch
Cross-sectional area	2.097 inch^2	2.179 inch^2
Moment of Inertia	0.361 inch^4	0.390 inch^4
Radius of Gyration	0.415 inch	0.423 inch
Section Modulus	0.385 inch^3	0.409 inch^3
Plastic Section Modulus	0.656 inch^3	0.693 inch^3

For **SI:** 1 inch = 25.4; 1 ksi =6.89 MPa.

[1]Dimensional properties are based on bare steel losing 0.036-inch steel thickness as indicated in Section 3.9 of AC358 for a 50-year service life.
[2]Dimensional properties are based on hot-dipped galvanized steel with a minimum coating thickness of 0.005 inch per side and losing 0.013-inch steel thickness as indicated in Section 3.9 of AC358 for a 50-year service life.

TABLE 4—SHAFT ALLOWABLE CAPACITY [1,2]

SHAFT TYPE	STEEL TYPE	COMPRESSION (KIPS)	TENSION (KIPS)	TORQUE RATING (FT-LB)
2.875 HSS	BARE[3]	24.63	22.71	6,000
	GALVANIZED[4]	29.95	27.71	
1.5 RCS	BARE[3]	60	29.12	6,687
	GALVANIZED[4]	60	35.57	

For **SI:** 1 inch=25.4 mm; 1 kip (1000 lbf)=4.48 kN; 1 ft-lb= 1.356 N-m

[1] Capacity based on shaft fully braced condition in that the pile length is fully embedded in firm or soft soil and the supported structure is braced in accordance with IBC Section 1810.2.2.
[2] Capacity based on shafts and extensions connected with bolts and matching nuts installed in accordance with Section 3.2.1 of this report.
[3] Allowable capacity based on bare steel losing 0.036-inch steel thickness as indicated in Section 3.9 of AC358 for a 50-year service life.
[4]Allowable capacity based on hot-dipped galvanized steel with a minimum coating thickness of 0.005 inch per side and losing 0.013-inch steel thickness as indicated in Section 3.9 of AC358 for a 50-year service life.

TABLE 5—ALLOWABLE AXIAL COMPRESSION/TENSION CAPACITY OF HELICAL PLATES (lbf)[1,2,3]

SHAFT TYPE	HELICAL PLATE DIAMETER (inches)					
	8	10	12	14	16	19
2.875 HSS	52,225	52,013	49,011	42,490	51,922	51,323
1.5 RCS	30,727	30,244	31,433	30,723	31,237	N/A

For **SI:** 1 inch=25.4 mm; 1 lbf=4.48 N

[1] Helical plates must comply with Section 3.2 of this report.
[2] For helical piles with more than one helix, the allowable capacity for the helical foundation system, may be taken as the sum of the least allowable capacity of each individual helix.
[3] Allowable capacity based on bare steel losing 0.036-inch steel thickness as indicated in Section 3.9 of AC358 for a 50-year service life.

TABLE 6—SOIL CAPACITY AXIAL TENSION AND COMPRESSION[1]

GEOTECHNICAL RELATED PROPERTIES	2.875-inch HSS helical pile[1]		1.5-inch RCS helical pile	
	Compression	Tension	Compression	Tension
Maximum Torsion Rating (ft-lbs)	6,000	6,000	6,687	6,687
Torque Correlation Factor, K_t (ft^{-1})	9	8	10	8
Maximum Ultimate Soil Capacity/ Maximum Allowable Soil Capacity from Torque Correlation (lbf)[2]	54,000/27,000	48,000/24,000	64,000/32,000	53,500/26,750

[1] Helical pile system must be installed in accordance with Section 4.2.1 of this report.
[2]The provided maximum allowable soil capacity values from torque correlation must be multiblied by a reduction factor of 0.8 for IRC application without site-specific geotechnical report as per section 4.1.5 of this report.

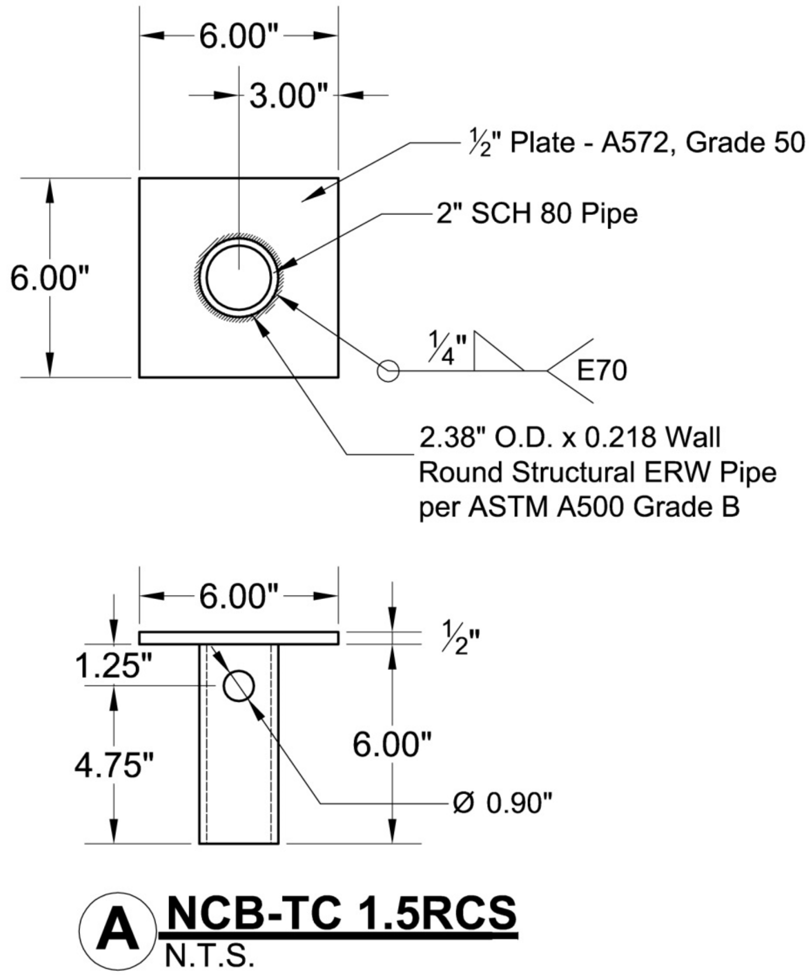

FIGURE 2A—1.5 RCS SHAFT NEW CONSTRUCTION BRACKET (NCB-TC 1.5 RCS)

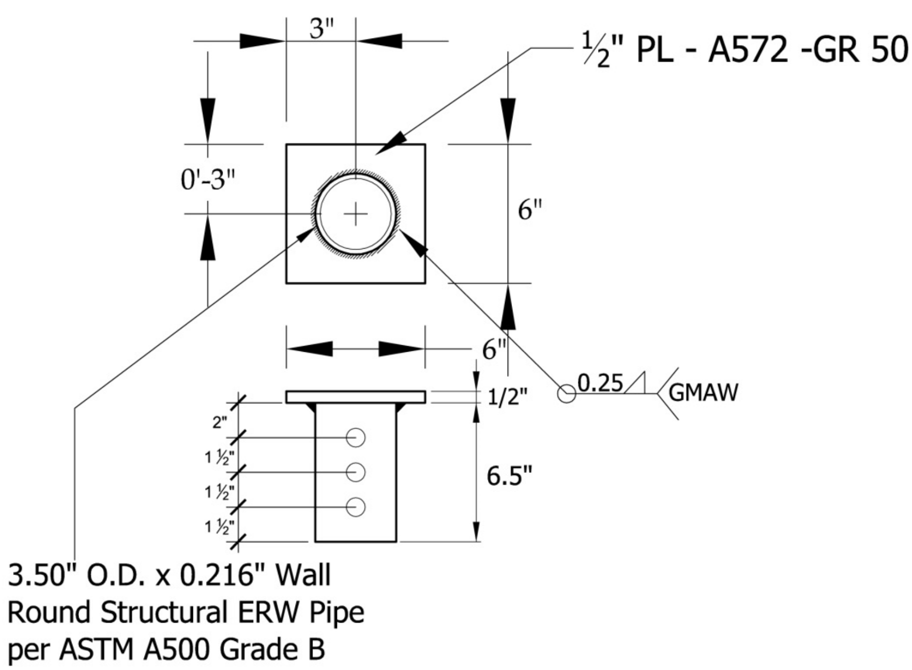

FIGURE 2B—2$^7/_8$ HSS SHAFT NEW CONSTRUCTION BRACKET (NCB-TC)

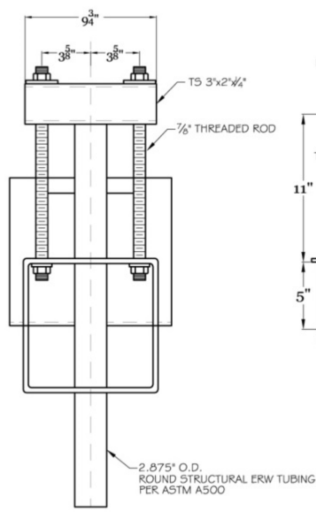

FIGURE 3—FOUNDATION REPAIR BRACKET (UPB-BD SHOWN)

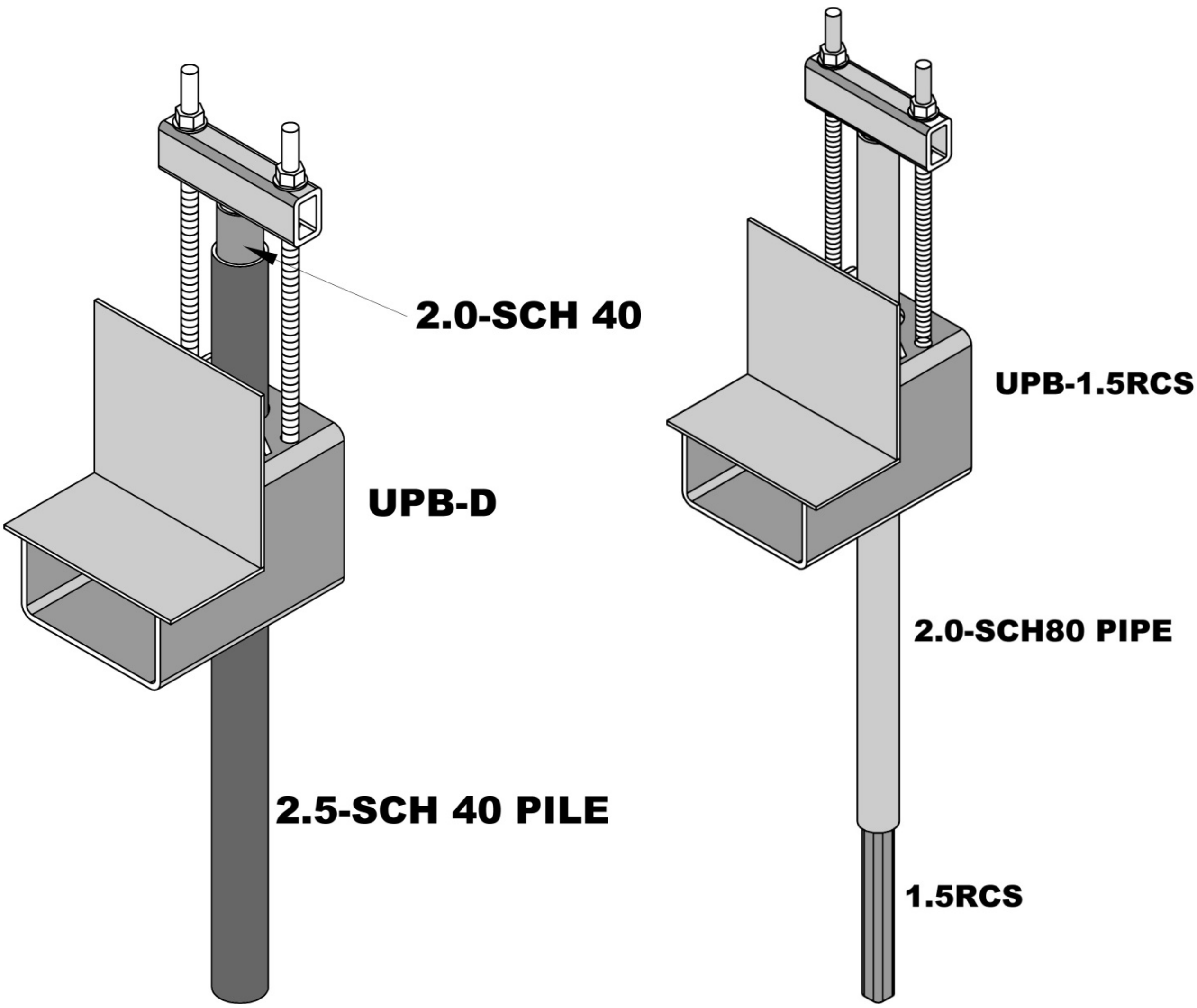

FIGURE 4—FOUNDATION REPAIR BRACKET (UPB-BD AND UPB-RCS1.5)

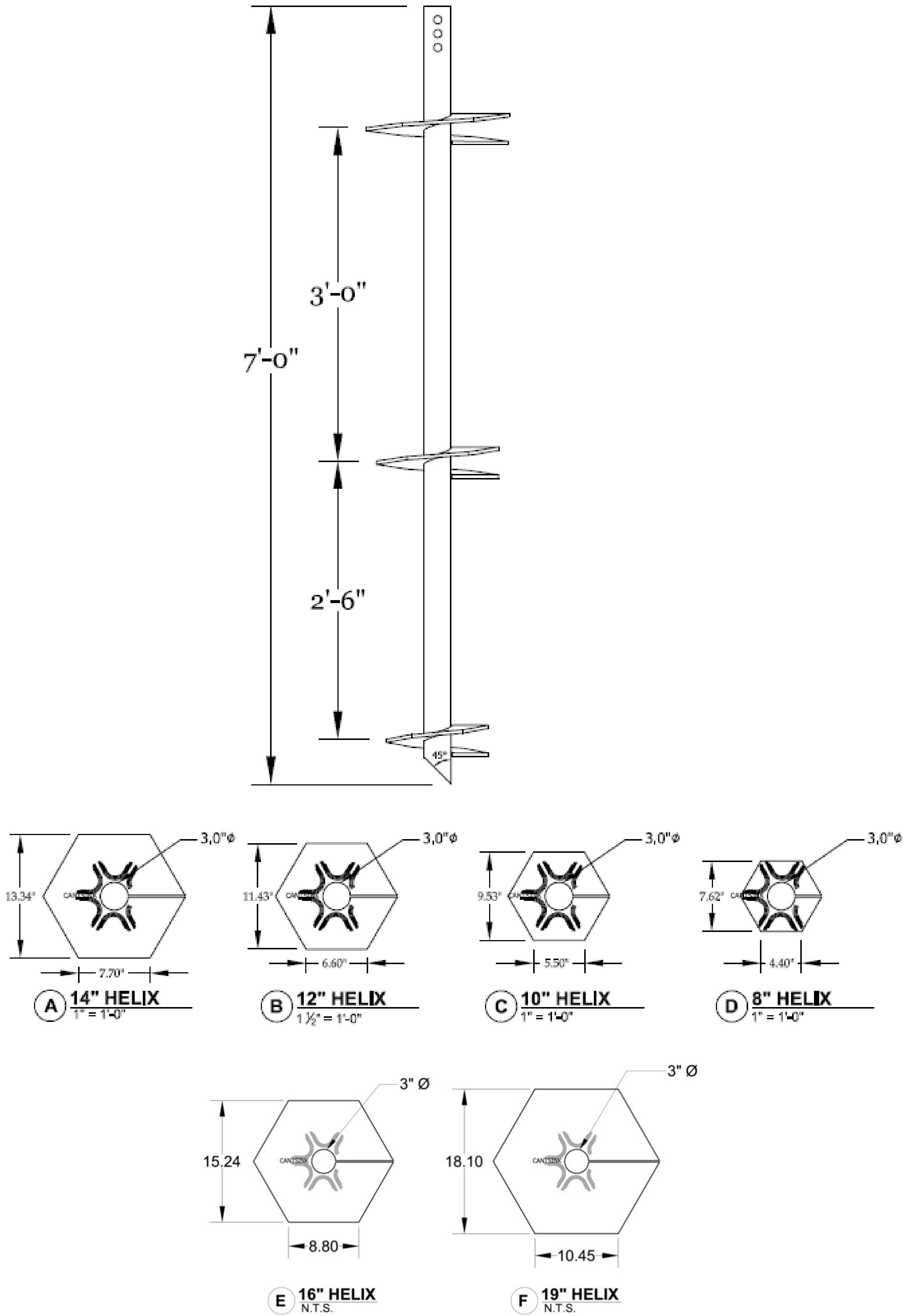

FIGURE 5— (CONTINUED BELOW)

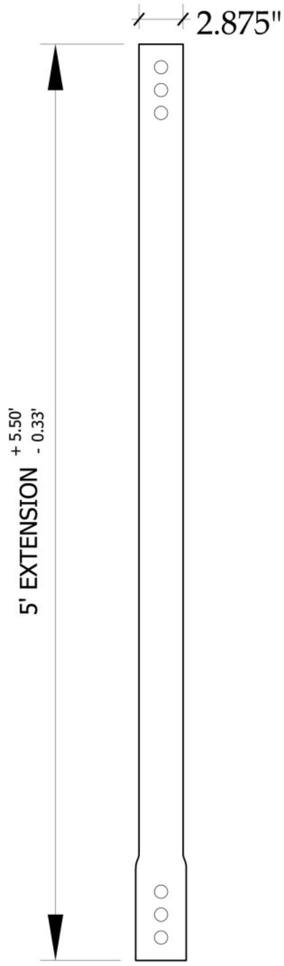

FIGURE 5—2.875-INCH DIAMETER SHAFT HELICALPILE LEAD SECTION, EXTENSION SECTION AND HELICAL PLATES (TYPICAL)

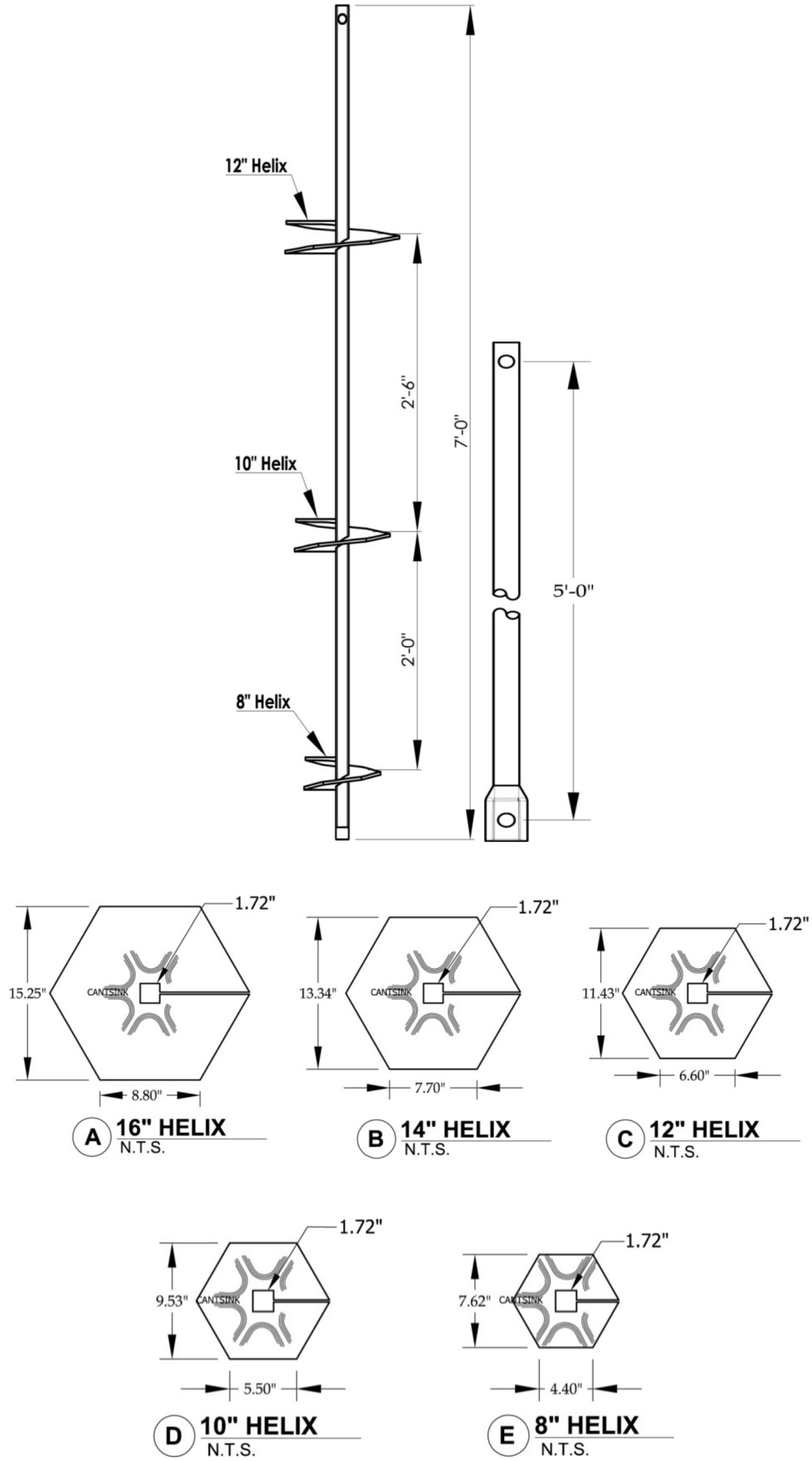

FIGURE 6—1.5-INCH SQUARE SHAFT HELICAL PILE LEAD SECTION, EXTENSION SECTION AND HELICAL PLATES (TYPICAL)

ICC-ES Evaluation Report

ESR-1559 FBC Supplement

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DIVISION: 31 00 00—EARTHWORK
Section: 31 63 00—Bored Piles

REPORT HOLDER:

CANTSINK MANUFACTURING, INC.

EVALUATION SUBJECT:

CANTSINK HELICAL PILE FOUNDATION SYSTEMS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Cantsink Helical Pile Foundation Systems, described in ICC-ES evaluation report ESR-1559, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2023 *Florida Building Code—Building*
- 2023 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The Cantsink Helical Pile Foundation Systems, described in Sections 2.0 through 7.0 of the evaluation report ESR-1559, comply with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable, provided the design requirements are determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-1559 for the 2021 *International Building Code®* meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential,* as applicable, with the following conditions:

Design wind loads must be based on Section 1609 of the *Florida Building Code—Building* or Section R301.2 of the *Florida Building Code—Residential*, as applicable.

Use of the Cantsink Helical Pile Foundation Systems for compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential* has not been evaluated, and is outside the scope of this evaluation report.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality-assurance program is audited by a quality-assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report ESR-1559, reissued December 2022 and revised August 2023.