

**EXAMPLE SPECIFICATION
FOR
HELICAL PILE INSTALLATION**



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1. SCOPE

This item pertains to the installation of helical piles at the locations shown on the Plans or staked by the Owner or General Contractor. These specifications and the Plans shall be used in conjunction with a standard contract to procure the work.

2. ACCESS

Owner will provide for right of entry of helical pile Contractor, all necessary personnel, and equipment for conducting the helical pile installation work. Owner or General Contractor will remove and replace any structures, utilities, pavements, landscaping and other improvements in the work area to facilitate helical pile installation. Reasonable care shall be exercised by helical pile Contractor to avoid damage to existing structures, utilities, pavements, landscaping and other improvements during the course of the helical pile installation work.

3. UTILITIES

Owner or General Contractor will locate all underground structures and utilities. Any such underground structures and utilities in and nearby areas of the helical pile installations will be clearly marked prior to helical pile installation work. Any utility or underground structure within a horizontal distance of three feet of a planned helical pile location or within the average helix diameter plus one foot, whichever is greater, will be located by hydro vacuum excavation.

4. SAFETY

In accordance with generally accepted construction practices, the helical pile Contractor shall conduct construction operations in such a manner as to assure maximum safety of persons and property in the immediate vicinity of helical pile installation work. Helical pile Contractor shall provide and utilize personal protective equipment such as hard hats, safety glasses, steel-toe boots, ear protection, leather gloves, and other safety clothing and equipment in accordance with General Contractor's safety plan and OSHA Standards.

5. INSURANCE

Helical pile Contractor shall obtain and maintain general liability insurance to the limits described in the Owner's contract and adequate Worker Compensation Insurance as prescribed by the Worker's Compensation Act. This insurance shall cover all of the Helical pile Contractor's personnel on site at anytime.

6. CAPACITY

Loads shown on the Plans are design allowable loads. A Minimum Factor of Safety of 2.0 should be used to determine the required ultimate capacity of the helical piles with regard to geotechnical capacity, torque correlations, and their interaction with soil and bedrock. Helical pile capacity in soil and bedrock depends on the geometric configuration of the helical bearing plates, the subsurface conditions, and the torque applied during installation. Manufacturer's recommendations should be followed regarding the ultimate bearing/pullout capacity to torque relationship for the particular helical piles selected. The capacity to torque relationship typically depends on shaft diameter. The ratio of required ultimate helical pile capacity to the total area of the helical blades shall not exceed the ultimate subsurface material bearing capacity provided by the Soils Engineer.

7. MATERIALS

Helical piles shall be manufactured by Magnum Piering, Inc. following an ISO9001:2008 accredited quality program. Helical piles shall have the required number of helical blades so as to provide for adequate load carrying capacity. The strength of the helical bearing plates, connections and hub, and the hub itself shall be sufficient to support the design allowable loads specified on the Plans. Factors of safety and/or load and resistance factors for mechanical strength shall be as specified by the most recent edition of AISC 360. Allowance shall be made for a minimum of 50 years of corrosion as per ICC-ES AC358. Except for temporary use only, if any portion of the helical pile extends above ground or if ground conditions are determined to represent a severe corrosive environment defined in ICC-ES AC358, helical piles shall be protected from corrosion by hot-dip galvanizing per ASTM A153/A123.

8. TOLERANCE

Unless otherwise noted on Plans, standard tolerance for helical pile positioning is $\pm 3"$, elevation is $\pm 1/4"$, and angle is $\pm 3^\circ$.

9. INSTALLATION

Connect the lead section to the torque motor using the drive tool and drive pins. Position and align the lead section at the location and to the inclination shown on the drawings and crowd the pilot point into the soil. Advance the lead section and continue to add extension sections to achieve the termination criteria. Connect extensions using bolts shown on drawings. Bolts shall be "snug-tight" per the aisc. "the snug-tightened condition is the tightness that is attained with a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench to bring the connected plies into firm contact". Bolts do not require a specific torque, do not over torque bolts. All sections shall be advanced into the soil in a smooth, continuous manner at a rate of rotation between 10 and 30 revolutions per minute. Constant axial force (crowd) shall be applied

while rotating the helical piles/anchors into the ground. The crowd applied shall be sufficient to ensure that the helical pile/anchor advances into the ground a distance equal to at least 80% of the blade pitch per revolution during normal advancement. The torsional strength rating of the helical pile/anchor shall not be exceeded during installation.

Helical piles/anchors shall be advanced until both of the following criteria are satisfied:

1. Final installation torque is achieved. Final installation torque is shown on the Plans summary table or pile schedule.
2. Minimum depth is obtained. The minimum depth shall be as shown on the Plans, that which corresponds to the planned bearing stratum, or the depth at which the final installation torque is measured, whichever is greater.

If maximum torque has been reached or augering occurs prior to achieving the minimum depth, contractor shall have the following options:

1. Reverse the direction of torque, back-out the helical pile/anchor a distance of 1 to 2 feet and attempt to reinstall by decreasing crowd and augering through the obstruction.
2. Terminate the installation at the depth obtained subject to the review and acceptance of the engineer.
3. Remove the helical pile/anchor and install a new one with fewer and/or smaller diameter helical bearing plates. The new helical configuration shall be subject to review and acceptance of the engineer.
4. Remove the helical pile/anchor and pre-drill a pilot hole in the same location and reinstall the anchor/pile. Pilot hole diameter shall match the diameter of the helical pile shaft.
5. If the obstruction is shallow, remove the helical pile/anchor and remove the obstruction by surface excavation. Backfill and compact the resulting excavation and reinstall the pile/anchor.
6. Remove the helical pile/anchor and sever the uppermost helical bearing plate from the lead section if more than one helical bearing plate is in use, or reshape the helical bearing plates to create the patented magnum dual cutting edge shape by cutting with a band saw. Reinstall the pile/anchor.

If the final installation torque is not achieved at the contract length, the contractor shall have the following options:

1. Until the maximum depth is achieved, if any, install the helical pile/anchor deeper using additional extension sections.
2. Remove the helical pile/anchor and install a new one with additional and/or larger diameter helical bearing plates.
3. Decrease the rated load capacity of the helical pile/anchor and install additional helical piles/anchors. The rated capacity and additional unit location shall be subject to the review and acceptance of the engineer.

If the minimum depth has been obtained but the final installation torque is not

achieved due to augering on an obstruction under maximum crowd (refusal):

1. Record "refusal" on installation logs in place of final torque.
2. Submit installation logs to the engineer of record for review and approval.

The pile/anchor may be deemed acceptable if one of the following conditions are met: a.) the boring logs indicate suitable bearing stratum at the approximate depth of refusal, b.) the piles, on either side of the pile(s) in question, achieved torque at similar depths, or c.) pile capacity is verified by dynamic or static load test. Otherwise, the pile shall be downgraded based on last credible torque reading obtained prior to refusal and additional piles/anchors shall be installed. The rated capacity and additional pile/anchor location shall be subject to the review and acceptance of the engineer.

10. BRACKETS

A connection shall be provided between the helical pile and the structure. The connection shall be constructed per the reinforcing steel detail provided in the Plans. If a reinforcing steel detail is not provided, a manufactured grade beam or wall pile bracket shall be installed on the top of the helical pile as appropriate. The connection shall be manufactured by Magnum Piering, Inc. or equivalent and shall be hot-dip galvanized and able to support the design allowable loads with factors of safety referenced in ACI or AISC standards, as applicable. If the helical pile is required to carry tensile loads, the pile bracket shall be bolted per manufacturer recommendations. All helical pile components including the hub and manufactured bracket shall be isolated from making a direct electrical contact with any concrete reinforcing bars or other non-galvanized metal objects as this may alter corrosion rates.

11. MODIFICATIONS

Field welding, if required, shall be in accordance with the "Code for Welding in Building Construction" of the American Welding Society. Welding of galvanized steel can produce toxic gases and should be done in adequate ventilation and with adequate gas detection, breathing gear, and other safety equipment. Cutting of manufactured helical pile blades is prohibited and shall not be performed without first consulting the engineer.

12. INSPECTION

Installation of helical piles shall be observed by a representative Inspector of a professional Soils or Structural Engineering firm to verify the depth and installation torque. The Helical pile Contractor shall notify Inspector at least 24 hours prior to installation work. The Inspector shall observe the installations and document the Helical pile Contractor's method and materials used. The Inspector shall log installation depth and torque at 3-foot intervals during installation and record final depth and torque. Submit installation logs to magnum for review prior to completion of the project. The Helical pile Contractor shall provide the Inspector with recent calibration information for the instrument used to measure torque.

13. DRAINAGE

The General Contractor shall provide proper site drainage in the area of all installed helical piles at all times during and after construction. Proper site drainage shall conduct surface water runoff away from the structure and helical piles.

14. CLEANLINESS

Immediately upon completion of the work, the helical pile Contractor shall remove any and all equipment, tools, building materials, rubbish, unused materials, concrete forms, and other like materials belonging to him or used under his direction. Also during the work, the site occupied by the helical pile Contractor and his material stockpiles shall be kept in a reasonable state of order and cleanliness.