Part 1 General

1.1 SECTION INCLUDES

1. Helical piles.

1.2 RELATED REQUIREMENTS

1. Section 03 20 00 - Concrete Reinforcing.
2. Section 03 30 00 - Cast-in-place Concrete.

1.3 DEFINITIONS

1. Delegated Design Professional: The specialist or supporting design professional contracted to the contractor, fabricator or manufacturer to design and/or review specific building components or sub-components, and provide Shop Drawings and Delegated Design Submittals to meet the requirements of authorities having jurisdiction.
2. Helical Pile: Pile with one or more helical shaped steel helix attached to a central steel shaft connected to the structure with a steel bracket.

1.4 REFERENCE STANDARDS

1. ASTM A36/A36M-19 Standard specification for carbon structural steel
2. ASTM A53/A53M-22 Standard specification for pipe, steel, black and hot-dipped, zinc-coated, welded and seamless
3. ASTM A123/A123M-17 Standard specification for zinc (hot-dip galvanized) coatings on iron and steel products
4. ASTM A153/A153M-23 Standard specification for zinc coating (hot-dip) on iron and steel hardware
5. ASTM A252/A252M-19 Standard specification for welded and seamless steel pipe piles
6. ASTM A500/A500M-21a Standard specification for cold-formed welded and seamless carbon steel structural tubing in rounds and shapes
7. ASTM A572/A572M-21e1 Standard specification for high-strength low-alloy columbium-vanadium structural steel
8. ASTM A775/A775M-22 Standard specification for epoxy-coated steel reinforcing bars
9. ASTM Standard A1018/A1018M-23 Standard specification for steel, sheet and strip, heavy-thickness coils, hot-rolled, carbon, commercial, drawing, structural, high-strength low-alloy, high-strength low-alloy with improved formability, and ultra-high strength
10. ASTM D1143/D1143M-20 Standard test methods for deep foundation elements under static axial compressive load
11. STD G40.20/G40.21-13 General requirements for rolled or welded structural quality steel/structural quality steel

1.5 PRICE AND PAYMENT PROCEDURES

1. Designed Piles:
    1. Design Pile Quantity: Determined by the quantity of piles indicated in the Contract Documents.
    2. Design Pile Length: By the linear metre
2. Actual Piles:
    1. Actual Pile Quantity: Determined by quantity of piles identified in the Project Record Documents.
    2. Actual Pile Length: Determined by length of piles identified in Project Record Documents.
3. Adjustments in Contract Price will be made due to changes in number and length of piles identified by site measurements and verified by the Consultant, based on unit prices established in the Agreement as follows:
    1. Actual pile quantity.
    2. Contract unit price per unit length, multiplied by the actual pile length.
4. No payment will be made for rejected piles, including piles installed out of plumb position or piles damaged during handling or installation.

1.6 ADMINISTRATIVE REQUIREMENTS

1. Section 01 31 00: Project management and coordination procedures.
2. Coordination: Coordinate with other work having a direct bearing on work of this section.
3. Pre-installation Meetings: Convene two (2) week before starting work of this section, with mandatory attendance by all parties involved.

1.7 ACTION SUBMITTALS

1. Section 01 33 00: Submission procedures.
2. Product Data: Submit manufacturer's product and technical data, including corrosion protection coating.
3. Shop Drawings:
    1. Provide Shop Drawings indicating pile details and schedules of pile installation, including:
        1. Pile layout.
        2. Type of pile.
        3. Pile loads.
        4. Grade and details of steel.
        5. Elevations of top and base of piles.
    2. Provide alternative pile/pile cap Shop Drawings to replace rejected piles mislocated or out of plumb.
    3. Provide Shop Drawings stamped and signed by the Delegated Design Professional.

1.8 INFORMATIONAL SUBMITTALS

1. Section 01 33 00: Submission procedures.
2. Reports: Certification of Product testing.
3. Records: Records of underground utility locations, indicating location plan of existing utilities as found in field and relocated and abandoned services.
4. Installation Data: Manufacturer's special installation requirements.
5. Delegated Design Submittals:
    1. Submit documentation indicating compliance to performance/design criteria, signed and sealed by the Delegated Design Professional responsible for their preparation.
        1. Design Data: Include material data, calculations and details.
        2. Replacement of Rejected Piles: Provide revised design for new piles/pile caps.
    2. Letters of Assurance: Submit the following documents as required by authorities having jurisdiction or as specified in Section 01 33 00.
        1. Letter of Compliance: Submit after completion of Work of this Section.

1.9 CLOSEOUT SUBMITTALS

1. Section 01 77 00: Submission procedures.
2. Record Documentation: Record actual locations of piles, pile diameter, and pile length.
    1. Sizes, lengths, and locations of piles.
    2. Final base and top elevations.
    3. Deviation from indicated locations.
    4. Field test procedures and results.

1.10 QUALITY ASSURANCE

1. Products of This Section: Manufactured to ISO 9001 certification requirements.
    1. Submit testing results and reports showing compliance with specified performance characteristics and physical properties.
    2. Submit copy of mill test certificates, indicating that steel meets the requirements of Contract Documents, minimum four (4) weeks prior to installation of helical piles.
2. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.
3. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years documented experience and approved by the manufacturer.
4. Delegated Design Professional Qualifications: Professional Structural Engineer experienced in design of this Work and licensed in the province where the project is located.

5. Sequence of Installation: Do not install helical piles until Designated Design Professional has reviewed the sequence of installation for all helical piles.

1.11 DELIVERY, STORAGE, AND HANDLING

1. Store helical pile assemblies dry and supported off the ground. Damaged materials will be rejected.

1.12 SITE CONDITIONS

1. Existing Conditions:

    1. Review Geotechnical data for soil properties, design parameters, corrosion protection requirements and minimum pile spacing recommendations.

    2. Protect existing surface features from damage while Work is in progress. In event of damage, immediately make repair to approval of Delegated Design Professional.

    3. Prevent movement, settlement or damage to adjacent grades. Provide bracing and shoring as required.

    4. Provide temporary railings, supports and site protection as required.

1.13 WARRANTY

1. Provide an additional five (5) year warranty to include coverage for failure to meet specified requirements.

Part 2 Products

2.1 PERFORMANCE / DESIGN CRITERIA

1. Delegated Design: Design helical piles by a licensed design professional, to support design loads as indicated on Drawings.

2. Size and number of bearing plates sufficient for piles and anchors to achieve appropriate torque and capacity within minimum and maximum length requirements.

3. Bearing plates, shaft connections, brackets, and pile shaft sufficient to support design loads as indicated on Drawings times appropriate service load factors.

2.2 MATERIALS

1. Central Shaft:

    1. Hollow Steel Tube or Pipe (Type HS): High strength structural steel tube or pipe to CSA-G40.20/G40.21, Grade 350W.

    2. Solid Steel Bar (Type SS): Hot rolled square solid steel bars to ASTM A29/A29M.

2. Shaft Couplings: Internally forged upset socket coupling or factory welded connection; material properties and finish to match parent shaft material.

3. Helical Bearing Plates: Hot rolled carbon steel sheet, strip, or plate to ASTM A36/A36M.

4. Bolts: Standard hex bolts to ASTM F3125/F3125M, and standard nuts, zinc coated.

5. Plates, Shapes, Pier Caps: Structural steel plates and shapes to ASTM A36/A36M.

2.3 FINISHES

1. Corrosion Protection:
    1. Hot-dip galvanized after fabrication, to ASTM A123/A123M as applicable.

Part 3 Execution

3.1 PREPARATION

1. Use placement method which will not cause damage to nearby structures.
2. Protect structures near the Work from damage.
3. Protect buried services which are required to remain undisturbed.
4. Prepare to place piles from existing site elevations.

3.2 INSTALLATION

1. Install helical piles in accordance with geotechnical, logistical, environmental, and load carrying conditions of the project.
2. Position lead section at location shown on Drawings.
3. Advance helical piles into soil in a smooth, continuous manner.
4. Monitor torque readings during the installation; record final torque reading values for each helical pile.
5. Remove all obstructions encountered or relocate and adjust piles as required, within allowable tolerances. Ensure helix of the pile is embedded into undisturbed soil.
6. Provide extension sections as needed for minimum overall length and installation torque as shown on stamped and approved Shop Drawings.
7. Prepare installation log, recording numbers of pile, actual installed length to refusal, elevation of top of pile, location of top of pile related to indicated plan location. Installation log to be stamped by Delegated Design Professional.
8. Rejected Piles: Install minimum of two (2) additional piles at location of rejected piles, with pile cap over rejected pile to support structure above, in accordance with Delegated Design Professional's design.

3.3 PLACEMENT TOLERANCES

1. Centerline of Helical Pile: Maximum 75 mm from indicated plan location.
2. Helical Pile Plumbness: Within 50 mm of design alignment.
3. Top elevation of Helical Pile: Within +25 mm to -50 mm of design vertical elevation.
4. Independent survey of top of piles to be carried out by Survey Company designated by Consultant.
5. Contractor will pay costs of survey.

End of Section