SECTION 316329

DRILLED CONCRETE PIERS AND SHAFTS

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***NOTE TO SPECIFIER***

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

***Use this section where pile and grade beam foundation system is required and Drilled Concrete Piers are a part of the Work. Before editing this Section, obtain the "Report of Subsurface Investigation" prepared by the Geotechnical Engineer. Read the report and incorporate the recommendations included in the report into this Section.***

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1. GENERAL
	1. SUMMARY
		1. Section Includes:
			1. Bored end bearing belled cast-in-place concrete piers with reinforcing steel.
			2. Pier inspection and load tests.
		2. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
		3. Related Sections:
			1. Section 032000 - Concrete Reinforcement: Drilled pier reinforcing.
			2. Section 033000 - Cast-In-Place Concrete: Concrete for drilled piers, pier caps, and grade beams.
		4. Unit Prices:
			1. Base bids on number, spacing, and length of piers indicated on Structural Drawings. Provide test piers two feet longer than pier lengths indicated on Structural Drawings.
			2. Determine number and length of piers based on Project Record Documents.
	2. REFERENCES
		1. American Society for Testing and Materials (ASTM):
			1. ASTM A 252 - Specification for Welded and Seamless Steel Pipe Piles.

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**NOTE TO SPECIFIER**

Include ASTM D 1143, D 3689 and D 3966 when used in body of Specification. Delete if not used.

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* + - 1. ASTM D 1143 - Method of Testing Piles Under Static Axial Compressive Load.
			2. ASTM D 3689 - Method of Testing Individual Piles Under Static and Axial Tensile Load.
			3. ASTM D 3966 - Method of Testing Piles under Lateral Loads.
	1. SYSTEM DESCRIPTION
		1. Design Requirements:
			1. Load Carrying Capacities: Indicated on Structural Drawings.
	2. SUBMITTALS
		1. Section 013300 - Submittal Procedures: Procedures for submittals.
			1. Shop Drawings:
				1. Details and schedule of pier installation and testing.
				2. Pier lengths and diameters.
				3. Reinforcing quantities, sizes, and lengths for each pier.
			2. Section 014000 - Quality Requirements: Procedures for Quality Assurance/Control submittals.
				1. Mix Design: Pier concrete as specified herein for Section 033000 mix design.
				2. Qualification Documentation: Submit installer documentation of experience indicating compliance with specified qualification requirements.
		2. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals:
			1. Project Record Documents: Submit log of the following, recorded at time of pier placement.
				1. Top of pier elevation.
				2. Pier shaft and under ream diameters.
				3. Depth of bottom of pier.
				4. Date pier was drilled and poured.
				5. Soil stratum at bottom of pier.
				6. Sequence of pier placing.
				7. Alignment deviations.
	3. QUALITY ASSURANCE
		1. Installer Qualifications: Company specializing in performing Work of this Section with minimum 10 years documented experience.
		2. Pre-Installation Meeting:
			1. Convene a pre-installation meeting at site, one week prior to commencing Work of this Section.
			2. Require attendance of parties directly affecting Work of this Section.
			3. Review conditions of installation, installation procedures and coordination with related work.
			4. Agenda:
				1. Tour, inspect and discuss condition of soil substrate, pier locations and other preparatory work performed by other trades.
				2. Review structural loading requirements.
				3. Review pier system requirements (drawings, specifications and other contract documents).
				4. Review pier drilling methods and equipment.
				5. Review and finalize construction schedule related to pier work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
				6. Review required inspections, testing and certifying procedures.
				7. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
				8. Review safety precautions relating to drilled concrete pier and shaft installation.
1. PRODUCTS
	1. MATERIALS

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**NOTE TO SPECIFIER**

Verify casing material type and specifics. Modify as required for project site requirements.

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* + 1. Casing: ASTM A 252, Grade 1, Grade 2, and Grade 3 single length steel pipe.
			1. Wall: Plain.
			2. Ends: Plain.
			3. Diameter: Indicated on Structural Drawings.
			4. Wall Thickness: Indicated on Structural Drawings.

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**NOTE TO SPECIFIER**

Select concrete type, aggregate, size, strength, and slump requirements as required by project site conditions.

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* + 1. Concrete Materials and Mix: Specified in Section 033000 using Type [I] [ \_\_\_ ] cement, [3/4] [ \_\_\_ ] inch aggregate size, [3000] [ \_\_\_\_\_ ] psi 28 day strength, [6] [ \_\_\_ ] inch slump.
		2. Reinforcement: Specified in Section 032000.
1. EXECUTION
	1. EXAMINATION
		1. Section 017300 - Execution: Verification of conditions before staring work.
		2. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
			1. Verify site conditions will support drilling equipment for performance of pier drilling operations.
			2. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings and are not located in an area that may be damaged.
		3. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
		4. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
	2. INSTALLATION
		1. Drill vertical concentric pier shafts to diameters and depths indicated on Structural Drawings.
		2. Provide shaft liners as drilling progresses or immediately after drilling and inspection of pier shafts as indicated on Structural Drawings.
		3. Clean shaft bottom of loose material. Maintain shafts free of water.
		4. Obtain Contracting Officer inspection and approval of pier shafts prior to reinforcing and concrete placement. Prevent foreign matter from falling into shaft.
		5. Set tops of piers to elevations indicated on Structural Drawings.
		6. Place reinforcing steel as specified in Section 032000.
		7. Place concrete in single pour, in accordance with Section 033000. Use equipment designed for vertical placement of concrete. Vibrate concrete full depth of pier.
		8. Progressively raise shaft liner during concrete placement. Do not permit top of pier to deform to a mushroom shape due to premature removal of liner.
		9. Install dowels at top of pier as indicated on Structural Drawings for connection to grade beams.
		10. Install anchor bolts with setting templates at top of pier as indicated on Structural Drawings.
		11. Place concrete through tremie if an inflow of subsurface water occurs. Place concrete to height sufficient to effect seal.
		12. Provide protection for open pier holes. Do not leave pier holes open overnight.
	3. CONSTRUCTION
		1. Site Tolerances:
			1. Maximum Variation From Vertical For Plumb Piers: 1 in 48.
			2. Minimum Variation From Required Angle for Batter Piers: 1 in 24.
			3. Maximum Variation From Top of Pier Elevation: 2 inches.
			4. Maximum Out-of Position: 4 inches.
	4. FIELD QUALITY CONTROL
		1. Section 014000 - Quality Requirements: Inspection and testing procedures.
		2. Inspection: Obtain Contracting Officer inspection and approval of pier shafts before reinforcing and concrete placement.
		3. Site Tests:

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**NOTE TO SPECIFIER**

Select appropriate ASTM testing specifications for specific site conditions. Indicate number of test piers required to determine acceptability of pier and grade beam foundation system for the specific site conditions. Select loading factor for tests.

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* + - 1. Perform testing using equipment, load carrying device, load, and instrumentation in conformance with [ASTM D 1143] [and] [ASTM D 3689, and ASTM D 3966].
			2. erify site conditions will support cribbing and load for testing purposes.
			3. Establish stable working elevation for test equipment.
			4. Provide materials and equipment for testing except hydraulic jack.
			5. Provide test piers same diameter and type specified for piers, constructed in same manner.
			6. Test [6] [ \_\_\_ ] indicator piers at locations as directed by Contracting Officer.
			7. Subject piers to [1-3/4] [2] [ \_\_\_ ] times design load.
			8. Perform concrete testing for pier concrete as specified in Section 033000.
			9. Document test equipment used and method of calibrating and recording.

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**NOTE TO SPECIFIER**

Select acceptable permanent set.

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* + 1. Acceptable Permanent Set of Piers After Load Testing: [1/8] [1/4] [ \_\_\_ ] inch.
		2. Accepted test piers may be used in Work.
		3. Non-Conforming Piers: Provide additional piers or supplement piers to conform to specified requirements at non-conforming piers.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022