

531 Ancillary Structure Foundations

531.1 Description

- (1) This section describes constructing drilled shaft foundations for the following:
 - Overhead sign structures constructed under [532](#).
 - High mast light towers constructed under [532](#).
 - Structural steel sign supports constructed under [635](#).
 - Camera poles constructed under [677](#).
- (2) This section describes constructing anchor assemblies for poles mounted on structures.

531.2 Materials

531.2.1 General

- (1) Use materials conforming to the following requirements:
 - Concrete [501](#)
 - Steel reinforcement..... [505](#)
- (2) Furnish grade A concrete as modified in [716](#). Furnish concrete coarse aggregate conforming to [501.2.7.4](#).
- (3) Provide QMP for class II ancillary concrete as specified in 716.

531.2.2 Anchor Rod Assemblies

- (1) The department furnishes galvanized anchor rod assemblies for camera poles. For other ancillary structures, furnish steel anchor rod assemblies conforming to the following:
 - Anchor Rods [ASTM F1554](#), grade 55, supplementary specification S4
 - Heavy Hex Nuts..... [ASTM A563](#) grade DH or [ASTM A194](#) grade 2H
 - Washers [ASTM F436](#)
 - Templates..... [ASTM A36](#)
 - Galvanizing^[1] according to ASTM A153, class C and as follows:
 - Hot-dipped [ASTM F2329](#)
 - Mechanical..... [ASTM B695, Class 55](#)
- (2) Furnish galvanized anchor rods with a rolled thread on the top 12 inches and bottom 6 inches. Ensure that nuts run freely on the rods after coating the threads and nuts with a wax-based lubricant. Submit a certified report of test or analysis to the engineer for the anchor rods, nuts, and washers. Do not install until the engineer approves the material.

^[1] Use either hot-dipped or mechanical, but use the same process for all parts of the assembly.

531.3 Construction

531.3.1 General

Revise 531.3.1 to add information for F four-chord truss structure span information and update example in Table 531-1.

- (1) Under the Concrete Masonry and Steel Reinforcement bid items, construct foundations for type NS (non-standard) ancillary structures.
- (2) Under the Foundation bid items, construct foundations for standard, overhead sign structures, high mast, and camera pole structures.
- (3) Under Anchor Assemblies Poles on Structures; furnish and erect anchor assemblies with templates for poles mounted on other structures.
- (4) Bid item types are encoded as defined in table 531-1.

Table 531-1 Ancillary Structure Foundation Bid Item Type Encoding

Type (structure)(span)-(design) Example: <i>A monotube cantilever type III is coded as a Type MC-III.</i>				
STRUCTURE		SPAN		DESIGN
M	Monotube	C	Cantilever	I
T	Two-chord truss	F	Full-span	II
F	Four-chord truss	B	Butterfly	III
				IV
				V
				NS
				Standard WisDOT designs
				Non-standard

531.3.2 Drilling Shafts

- (1) Before drilling, locate existing underground cable, utility, or drainage structures. Drill shafts for foundations to the depth and diameter the plans show with minimal disturbance to adjacent soil. Make shafts vertical within less than 1/8 inch per foot.
- (2) Case holes as necessary to prevent introduction of unconsolidated material or water. Install engineer-approved casing during drilling operations with casing in intimate contact with shaft sidewalls. Ensure casing can withstand insertion and removal stresses as well as concrete and soil pressure.
- (3) The engineer will coordinate with BOS to determine if casing will be left in place or removed. If removing, withdraw while placing concrete or immediately after concrete placement. If removing casing while placing concrete, place at least 3 feet of concrete before pulling the casing and maintain 2 feet of concrete head while pulling. Do not dislocate stub posts, the anchor rod assembly, or steel reinforcement. Prevent soil from mixing with the concrete.
- (4) The engineer will coordinate with BOS if shallow obstructions, including bedrock, are encountered.

531.3.3 Placing Concrete

- (1) Construct drilled shaft foundations as specified for foundations in [502.3](#). Cure exposed portions of foundations as specified in [502.3.8.1](#). Wait until concrete has attained 3500 psi compressive strength or has cured for 7 equivalent days, as specified in [502.3.10](#), before erecting any portion of the structure on the foundation.
- (2) If the contract requires, install a 5/8-inch by 10-foot copper clad ground rod next to the support or as the engineer directs.
- (3) Secure steel reinforcement and anchor rod assemblies in place before placing concrete. Maintain the clear distance between soil and the reinforcing steel cage the plans show. Ensure that anchor rod assemblies and post stubs remain secured in their specified location until the concrete hardens. Do not weld anchor rods. Protect anchor rod threads above the top of the foundation level from concrete splash. If required, place electrical conduit in the foundation as the plans show.
- (4) Remove and replace the foundation under one or more of the following:
 - Twisting, racking, or other movement of the anchor rods.
 - Anchor rods are out of plumb, projection, or pattern.
 - Anchor rod threads are damaged.
- (5) Unless specified otherwise, the contractor may place concrete against the soil without forming. Form the portion that extends above the grade. Place concrete conforming to [502.3.5](#) in one continuous pour without construction joints. Provide a level plane finish on the upper surface.
- (6) Construct single shaft foundations to extend above the finished grade as the plans show. Line the upper 18 inches with disposable casing and remove the casing before backfilling.

531.3.4 Clean up

- (1) Dispose of drilling spoils and other surplus material and restore the site.

531.4 Measurement

- (1) The department will measure Concrete Masonry Ancillary Structures Type NS by the cubic yard acceptably completed. The department will base measurement on the dimensions the plans show or that the engineer orders in writing. The department will not measure concrete placed outside the designated dimensions.

- (2) The department will measure the Steel Reinforcement bid items by the pound acceptably completed. The department will compute the weight as specified for bar steel reinforcement under [505.4](#).
- (3) The department will measure the Drilling Shaft bid items by the linear foot acceptably completed.
- (4) The department will measure the Foundation bid items as each individual foundation acceptably completed.
- (5) The department will measure Anchor Assemblies Poles on Structures as each individual assembly acceptably completed.

531.5 Payment

Revise 531.5 to add bid item range for foundation two-shaft butterfly (type) (structure) and revise number range for foundation single-shaft (type) (structure).

- (1) The department will pay for measured quantities at the contract unit price under the following bid items:

<u>ITEM NUMBER</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
531.1100	Concrete Masonry Ancillary Structures Type NS	CY
531.1140	Steel Reinforcement HS Ancillary Structures Type NS	LB
531.1160	Steel Reinforcement HS Coated Ancillary Structures Type NS	LB
531.2000 - 2999	Drilling Shaft (diameter)	LF
531.4000-4099	Foundation Camera Pole (height)	EACH
531.4500-4599	Foundation High Mast (height) (structure)	EACH
531.5000-5099	Foundation Two-Shaft Butterfly (type) (structure)	EACH
531.5100-5999	Foundation Single-Shaft (type) (structure)	EACH
531.6000-6999	Foundation Two-Shaft (type) (structure)	EACH
531.8990	Anchor Assemblies Poles on Structures	EACH

- (2) Payment for Concrete Masonry Ancillary Structures Type NS is full compensation for providing concrete for non-standard sign structure foundations; and for anchor rod assemblies. The department will pay separately for excavating and backfilling drilled shafts under the Drilling Shafts bid items.
- (3) Payment for the Steel Reinforcement bid items is full compensation for providing reinforcement used for non-standard sign structures foundations.
- (4) Payment for the Drilling Shaft bid items is full compensation for excavating and backfilling; and for providing and removing casing.
- (5) Payment for the Foundation bid items is full compensation for providing concrete foundations; for anchor rod assemblies; for reinforcing steel; and for embedded conduit and electrical components. The department will pay separately for excavating and backfilling drilled shafts under the Drilling Shafts bid items.
- (6) Payment for Anchor Assemblies Poles on Structures is full compensation for providing anchor assemblies.
- (7) The department will pay for removing ancillary structures foundations and their associated superstructures under the Removing Ancillary Structures bid items as specified in [204.5](#).