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ALABAMA DEPARTMENT OF TRANSPORTATION



STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION

2018 EDITION

- 505-F Permanent Concrete Sheet Piling (width) - per linear foot {meter}
- 505-G Pile Points (**) - per each
- 505-H Pilot Holes - per linear foot {meter}
- 505-I Temporary Steel Sheet Piling - per square foot {square meter}
- 505-M Steel Piling Furnished and Driven (*) - per linear foot {meter}
- 505-N Concrete Piling Furnished (*) - per linear foot {meter}
- 505-O Concrete Piling Driven (*) - per linear foot {meter}

* Pile Designation/Size

** Type/Size of Pile Point

Example: 505-G Pile Points (Type A 10")

SECTION 506

DRILLED SHAFT CONSTRUCTION

506.01 Description.

This work shall consist of all labor, materials, equipment and services necessary to perform all operations to complete a drilled shaft installation in accordance with these Specifications and the details and dimensions shown on the plans.

506.02 Materials.

(a) General.

All materials shall conform to requirements set forth in Division 800, Materials. The requirements provided for Structural Portland Cement Concrete, Section 501, shall apply in all respects to drilled shafts, except where otherwise indicated by specific requirements given hereinafter in this Section or noted by plan details.

(b) Concrete.

Portland cement concrete used in construction of drilled shafts shall hereinafter be referred to as either "Class DS1", "Class DS2" or "Class DS3" concrete. The specific class of concrete that is required will be shown in the Pay Item Description for Drilled Shaft Construction.

The concrete producer shall establish the proportion of materials for each class of drilled shaft concrete following the guidelines described in ALDOT-170, "Method of Controlling Concrete Operations for Structural Portland Cement Concrete", and the criteria outlined hereinafter in this Subarticle. The concrete supplier shall submit for approval the proposed concrete mixture design to the State Materials and Test Engineer following the requirements in ALDOT-170. The distribution of the approved concrete mixture design and re-approval of concrete mixture designs will be as per ALDOT-170 respectively. Any changes of the materials and/or proportions of the mixture design will require a concrete mixture resubmittal.

1. Criteria applicable to Class DS1, Class DS2 and Class DS3 concrete:

Minimum Compressive Strength at 28 days shall be 4000 psi {30 MPa}.

The amount of cementitious material shall be a minimum of 600 pounds {360 kg} and a maximum of 800 pounds per cubic yard {475 kg per cubic meter} of concrete.

The range of total air content shall be 2.5 % to 6.0 % by volume except for concrete that is completely embedded below the ground line or mud line. An air content less than 2.5 % will be acceptable for shafts that are completely embedded below the ground line or mud line.

The maximum water to total cementitious material ratio shall be 0.40.

Slump requirements:

- The allowable range of consistency slump during concrete placement shall be from 6 inches to 9 inches {150 mm to 230 mm}.
- The minimum consistency slump for all of the concrete placed in an individual shaft shall be no less than 4 inches {100 mm} at the end of the concrete placement in that shaft.

The temperature of the concrete, at the time of placement in the shaft, shall not be less than 50 °F {10 °C} nor more than 95 °F {35 °C}.

Gradation of the coarse aggregate used shall meet the requirements for either ALDOT Size No. 57, No. 67 or No. 7.

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(f) Testing of Slurry.

1. Frequency.

Tests to determine density, viscosity and pH value shall be done during the shaft excavation to establish a consistent working pattern. A minimum of four sets of tests shall be made during the first 8 hours of slurry use. When the results show consistent behavior the testing frequency may be decreased to one set every four hours of slurry use.

2. Test Reports.

Reports of all tests required above, signed by an authorized representative of the Contractor, shall be furnished to the Engineer on completion of each drilled shaft.

(g) DISPOSAL.

Disposal of all slurry shall be done off site by the Contractor.

506.06 Excavation Measurement and Cleaning.

(a) General.

The Contractor shall provide equipment and personnel for checking the dimensions and alignment of each permanent shaft excavation. The dimensions, depth and alignment shall be determined under the direction and to the satisfaction of the Engineer after final cleaning.

(b) Cleaning.

Unless otherwise stated in the contract, a minimum of 50 percent of the base of each shaft will have less than 1/2 inch {13 mm} of sediment at the time of concrete placement. The maximum depth of sediment or any debris at any place on the base of the shaft shall not exceed 1.5 inches {40 mm}. Shaft cleanliness will be determined by visual inspection for dry shafts. For wet shafts the bottom of the shaft shall be sounded with an airlift pipe, a tape with a heavy weight {mass} attached to the end of the tape or other means acceptable to the Engineer. In addition, for dry excavations the maximum depth of water covering the bottom of the excavation shall not exceed 3 inches {75 mm} prior to concrete pour.

506.07 Reinforcing Steel Construction and Placement.

(a) General.

The reinforcing steel cage, consisting of longitudinal and transverse bars, ties, cage stiffeners, spacers, centralizers, and other necessary appurtenances, shall be completely assembled and placed as a unit immediately after the shaft excavation is inspected and accepted, and prior to concrete placement. The reinforcing steel in the shaft shall be securely tied and supported so that the reinforcing steel will remain within allowable tolerances given in Subarticle 506.11(c) of this Specification.

(b) Spacers.

1. Concrete spacers or other approved noncorrosive spacing devices shall be used at sufficient intervals near the bottom, and at intervals not exceeding 10 feet up the shaft, to insure concentric spacing for the entire cage length.

2. Spacers shall be constructed of approved material equal in quality and durability to the concrete specified for the shaft. The spacers shall be of adequate dimension to insure the proper annular space between the outside of the reinforcing cage and the side of the excavated hole and/or permanent casing as detailed on the plans or proposed in the installation plan. If not detailed on the plans, a minimum 4 inch {100 mm} annular space will be required.

(c) Cage Supports.

Cylindrical concrete feet (bottom supports) shall be provided to insure that the bottom of the cage is maintained at the proper distance above the base as specified by the project plans.

(d) Cage Extension.

If the drilled shaft excavation is extended to an elevation lower than the plan bottom elevation, reinforcing cage length shall also be extended by the same amount. Cages may be extended at the plan bottom elevation by lap splicing additional longitudinal bars, per planned cage requirements, of sufficient length to provide a compression splice, 4.17 feet {1270 mm} in length, plus the required extension. Hoops for the extension shall be spaced the same as shown for other hoops. Any additional splices of the cage above the plan bottom elevation and not shown on