

ALABAMA DEPARTMENT OF TRANSPORTATION

General Application Special Provision

DATE: June 5, 2024

GASP No. 22-GA0042(2)

EFFECTIVE DATE: December 1, 2024

SUBJECT: Drilled Shaft Construction.

Alabama Standard Specifications, 2022 Edition, SECTION 506 shall be amended as follows:

SECTION 506 DRILLED SHAFT CONSTRUCTION

506.02 Materials.

Subarticle 506.02(b) shall be replaced by the following:

(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.

All materials used in manufacturing the concrete shall conform to the requirements of the Specifications.

2. Additional criteria applicable to Class DS1 concrete:

Type I, Type II, Type IL, Type IP, or Type IS cement shall be used.

The cementitious content may be composed of up to 30% by weight {mass} substitution of either Class C or Class F fly ash additive. In lieu of fly ash, ground granulated blast furnace slag may be substituted for cement up to a minimum substitution rate of 25% and a maximum substitution rate of 50% by weight {mass}.

3. Additional criteria applicable to Class DS2 concrete:

Type II, Type IL, Type IP, or Type IS cement containing a maximum of 8% C3A shall be used.

The cementitious content shall be composed of no less than 20% nor more than 30% by weight {mass} of Class F fly ash additive. In lieu of fly ash, ground granulated blast furnace slag may be substituted for cement up to a minimum substitution rate of 35% and a maximum substitution rate of 50% by weight {mass}.

4. Additional criteria applicable to Class DS3 concrete:

Type II, Type IL, Type IP, or Type IS cement containing a maximum of 8% C3A shall be used.

The cementitious content shall be composed of 20% by weight {mass} of Class F fly ash and 10% by weight {mass} of microsilica additives. In lieu of the percentages of fly ash and microsilica, the cementitious content may be composed of 50% by weight {mass} substitution of ground granulated blast furnace slag and 5% by weight {mass} addition of microsilica additives.

506.06 Excavation Measurement and Cleaning.

Subarticle 506.06(b) shall be replaced by the following:

(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 sounding with an airlift pipe, a tape with a heavy weight attached to the end of the tape, a borehole camera with visual sediment depth measurement gauge, or other means acceptable to the Engineer. 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.