

SP00396 (Special Provisions for the 2024 Book) (Bidding on or after: ~~098-01-26~~
Last updated: ~~064-0123-26~~
Requires SP02001, SP02010, SP02020,
SP02050, ~~SP02080~~, SP02415,
~~& SP02510 and SP02690~~
Requires SP02080 when rock and ground anchor grout is required.
Requires SP02690 when PCC Aggregates are required.)

SECTION 00396 - SHOTCRETE SLOPE STABILIZATION

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [purple text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all purple text before preparing the final document. All other modifications to this Section will require ODOT Technical Resource and State Specifications Engineer approval.)

Comply with Section 00396 of the Standard Specifications modified as follows:

00396.01 Definitions - Replace the definition "Dry-Mix Shotcrete" with the following definition:

Dry-Mix Shotcrete - Shotcrete process where all dry constituents except accelerator and water are mixed before introduction into the delivery hose. Compressed air is used to deliver the dry mix through the hose. Water is added under pressure in the nozzle body, where it is mixed thoroughly with the dry constituents before the mixture is jetted from the nozzle onto the substrate.

Replace the definition "**Substrate**" with the following definition:

Substrate - The surface where Shotcrete is placed.

Replace the definition "**Wet-Mix Shotcrete**" with the following definition:

Wet-Mix Shotcrete - Shotcrete process where all constituents, except accelerator, are mixed before introduction into the delivery hose. Compressed air and accelerator are added to the mixture at the nozzle, in such a way that the quantity can be properly regulated.

00396.10 Materials - Replace the Material that begins "Non Epoxy Grout..." with the following Material:

Rock and Ground Anchor Grout.....02080.80

00396.12 Aggregates - Replace the paragraph that begins "Combined Fine Aggregates ..." with the following paragraph:

Furnish combined Fine Aggregates and Coarse Aggregates meeting the following grading requirements as determined by AASHTO T 27:

00396.13 Steel Fiber Reinforcement - Replace this subsection, except for the subsection number and title, with the following:

If steel Fiber Reinforced Shotcrete is required, furnish steel fibers that:

- Are between 1/2 and 1 1/2 inches long.
- Meet the requirements of ASTM A820 Type 1, Deformed.
- Have a length-to-diameter ratio of less than 80.
- Have a minimum tensile strength of 160,000 psi.

Only steel fibers manufactured specifically for use in Shotcrete applications are allowed. Use a steel fiber content of not less than 100 pounds per cubic yard of shotcrete.

00396.14 Synthetic Polymer Fiber Reinforcement - Replace this subsection, except for the subsection number and title, with the following:

If synthetic polymer Fiber Reinforced Shotcrete is required, furnish synthetic polymer fibers that:

- Are between 1/2 and 3 inches long.
- Meet the requirements of ASTM C1116 Type III.
- Have a minimum diameter of 0.012 inch.
- Have a minimum tensile strength of 75,000 psi.

Furnish synthetic polymer fibers manufactured specifically for use in Shotcrete applications. Follow the manufacturer's recommendations for the proportion of synthetic polymer fibers in the mix.

00396.15 Shotcrete Mix Requirements - Replace the paragraph that begins "Determine the exact proportions ..." with the following paragraph:

Determine the exact proportions both by weight and by volume of Cementitious Materials, Fine Aggregate, Coarse Aggregate, fiber reinforcement (if any), admixtures, and water, subject to the Engineer's approval. Furnish shotcrete meeting the following minimum requirements:

00396.16(a)(1) Test Panels - Replace this subsection, except for the subsection number and title, with the following:

Prepare Shotcrete test panels on vertically supported open-face forms. Provide forms that:

- Have internal dimensions of at least 24 by 24 by 5 inches.
- Are rigid, nonabsorbent, and nonreactive with cement.

Place the Shotcrete in the forms using the same Shotcrete mix, air pressure, water pressure, and nozzle tip used in the production shotcrete. Protect the panels for at least 24 hours or until final set has taken place.

00396.16(b)(2) Shotcrete Compressive Strength - Replace this subsection, except for the subsection number and title, with the following:

Furnish shotcrete cores that attain 2,500 psi compressive strength at 7 Calendar Days.

00396.16(c) Shotcrete Quality - Replace this subsection, except for the subsection number and title, with the following:

Submit a visual description of each core. Include details concerning the presence of voids, Sand pockets, laminations, and other deficiencies. The accepted visual quality of the cores is no lower than Grade 2 according to Shotcrete grading requirements of ACI 506.2.

00396.21 Pump System - Replace this subsection, except for the subsection number and title, with the following:

Provide a pump system that conveys premixed Shotcrete constituents delivered in a uniform and continuous flow, without segregation or loss of constituents.

00396.22 Air Compressor - Replace the paragraph that begins "Furnish air compressor(s)..." with the following paragraph:

Provide air compressor(s) capable of providing:

00396.23 Dry-Mix Delivery Equipment - Replace this subsection, except for the subsection number and title, with the following:

Provide dry-mix delivery Equipment capable of discharging the cement/Aggregate mixture into the delivery hose and delivering a continuous stream of uniformly mixed Material to the discharge nozzle. Equip the discharge nozzle with a manually operated water injection system (water ring) for directing an even distribution of water through the cement/Aggregate mixture. Provide a water valve, convenient to the Nozzle Operator that is capable of ready adjustment to vary the quantity of water. Provide greater water pressure than the operating air pressure at the discharge nozzle to ensure that the water is thoroughly mixed with the other Materials. Use steady, nonpulsating water pressure. Regularly inspect and replace Equipment parts, especially the nozzle liner and water ring, as necessary or as directed.

When using the dry-mix process, provide and use Predampening Equipment.

00396.24 Wet-Mix Delivery Equipment - Replace this subsection, except for the subsection number and title, with the following:

Provide wet-mix delivery Equipment capable of discharging the premixed Materials into the delivery hose and delivering a continuous stream of uniformly mixed Material to the discharge nozzle. Follow the manufacturer's recommendations on the type and size of nozzle to be used, and on cleaning, inspection, and maintenance of the Equipment.

00396.30 Personnel Qualifications - Replace this subsection, except for the subsection number and title, with the following:

At least 7 Calendar Days before beginning Shotcrete Work, provide written evidence that the on-site supervisor, Nozzle Operator, and delivery Equipment operator have performed

satisfactory Work in similar capacities elsewhere for a sufficient length of time to be fully qualified to perform their duties.

Provide an on-site supervisor with not less than 2 years of full-time experience as a Shotcrete Nozzle Operator.

Provide Nozzle Operators with current certification by the American Concrete Institute for wet-mix or dry-mix vertical placement of shotcrete, as appropriate to the proposed mixing process.

Provide Nozzle Operators and delivery Equipment operators with at least 1 year of full-time experience each on similar applications with the same type of Equipment as proposed for the Project. Before starting Shotcrete Work, have the Nozzle Operator, in the presence of the Engineer, demonstrate the ability to apply Shotcrete on a test panel according to 00396.16. Visual quality of core samples from test panels are required to meet the requirements of 00396.16(c). Before being allowed to place Shotcrete in permanent construction, have each Nozzle Operator make one satisfactory test panel for each mix used during the course of the Work.

Provide a helper to assist the Nozzle Operator to operate a blowpipe for the purpose of keeping the work area free of Rebound.

00396.46 Shotcrete Application - Replace the paragraph that begins "Apply Shotcrete from the lower ..." with the following paragraph:

Apply Shotcrete from the lower portion of the area to the top so Rebound does not accumulate on the area still to be covered. Hold the nozzle approximately perpendicular to the working face, and at a distance that minimizes Rebound and maximizes compaction. Apply the shotcrete so that it emerges from the nozzle in a uniform and continuous flow. When, for any reason, the flow becomes intermittent, divert the nozzle from the Work until uniform and continuous flow resumes. Provide a Nozzle Operator's helper, equipped with blowpipe, to attend the Nozzle Operator at all times during Shotcrete placement to keep the work area free of Rebound.

00396.90 Payment - Replace the paragraph that begins "Payment will be payment ..." with the following paragraph:

Payment will be payment in full for furnishing and placing all Materials, and for providing all Equipment, labor, and Incidentals necessary to complete the Work as specified.