

**SECTION 02001 - CONCRETE**

*(Follow all instructions. If there are no instructions above a subsection, paragraph, sentence, or bullet, then include them in the project. The specifications may be modified to include project specific specifications, but all additions, deletions, or modifications must be sent to the ODOT Technical Resource and Senior Specifications Engineer for review and approval.)*

Comply with Section 02001 of the Standard Specifications modified as follows:

*(Use the following subsection .10 when synthetic fiber reinforcing is required.)*

**02001.10 Materials** - In the list of materials, add the following line:

Synthetic Fiber Reinforcing ..... 02045

*(Use the following subsection .20(a) when drilled shaft concrete is required.)*

**02001.20(a) Strength** - Replace Table 02001-1 with the following Table 02001-1:

**Table 02001-1**

<b>Concrete Strength and Water/Cementitious Material (w/cm) Ratio</b>		
<b>Type of Concrete</b>	<b>Strength (psi)</b>	<b>Maximum w/cm Ratio</b>
Structural	3300	0.50
	3300 (Seal)	0.45
	4000	0.48
	4000 (Deck)	0.40
	HPC4000	0.40
	5000 and above	0.40 <sup>1</sup>
	HPC5000 and above	0.40
Drilled Shaft	4000	0.48
Paving	4000	0.44
<sup>1</sup> PPCM's with cast-in-place decks and no entrained air may have w/cm as follows: 5000 psi - 0.48; 5500 psi - 0.44; 6000 psi and up - 0.42		

*(Use the following subsection .20(c) when drilled shaft concrete is required.)*

**02001.20(c) Slump** - Add the following paragraph to the end of this subsection:

For drilled shaft concrete, maintain a minimum slump of 6 inches throughout the drilled shaft placement, including temporary casing extraction.

*(Use the following subsection .31(f) when bridge deck concrete is required.)*

**02001.31(f) Aggregate** - Replace the bullet that begins "Use 3/4 inch nominal maximum..." with the following bullet:

- Use 1 inch nominal maximum size or larger aggregates in bridge deck concrete.

*(Use the following lead-in paragraph and subsection .31(g) when synthetic fiber reinforcing is required.)*

Add the following subsection:

**02001.31(g) Synthetic Fiber Reinforcing for Concrete** - Use synthetic fiber reinforcing from the QPL and according to Section 02045 in all bridge deck and silica fume overlay concrete. Use synthetic fiber reinforcing according to the manufacturer's recommendations at the rate designated on the QPL. Fiber packaging is not allowed in the mixed concrete.

*(Use the following subsection .32(a) when new mix designs are required.)*

**02001.32(a) Trial Batch** - Add the following sentences to the end of the paragraph:

Notify the Engineer at least 48 hours before making each trial batch. The Engineer may witness the preparation and testing.

**02001.32(b) Plastic Concrete** - Replace this subsection, except for the subsection number and title, with the following:

For each trial batch, test the temperature, slump, density, and air content and compute the w/cm ratio and yield according to the following test methods:

<b>Test</b>	<b>Test Method</b>
Sampling Fresh Concrete	WAQTC TM 2
Slump	AASHTO T 119
Density	AASHTO T 121
Yield	AASHTO T 121
Air Content	AASHTO T 152
Concrete Temperature	AASHTO T 309
Molding Concrete Specimens	AASHTO T 23 or R 39 <sup>1</sup>
Water-Cement Ratio	<sup>2</sup>

<sup>1</sup> Cast cylinders in single-use plastic molds

<sup>2</sup> Use ODOT's Field Operating Procedure for AASHTO T 121 in the MFTP

**02001.32(d) Length Change Tests** - Replace this subsection, except for the subsection number and title, with the following:

For all HPC and Silica Fume Concrete (SFC) mix designs, make at least three specimens from the trial batch for length change testing. Test samples according to ASTM C 157. Sample prisms shall have a square, 4 by 4 inch cross-section. Wet cure the samples until they have reached an age of 28 days, including the period in the molds. Store and measure samples according to ASTM C 157, section 11.1.2. Report length change results at 28 days.

Test	Test Method	Acceptance Value
Length Change	ASTM C 157	-0.045% max. at 28 days

**02001.32(e) Permeability Tests** - Replace the paragraph that begins "Permeability tests are..." with the following:

Test	Test Method	Acceptance Value
Permeability	AASHTO T 277	1,000 coulombs max. at 90 days

Permeability tests are not required when HPC and SFC mix designs contain cementitious material with 66 percent portland cement, 30 percent fly ash, and 4 percent silica fume.

**02001.34 Current Mix Designs** - Replace this entire subsection, including subsection .34(a) and .34(b), with the following subsection:

**02001.34 Current Mix Designs** - Mix designs that meet the requirements for the specified class of concrete and are currently being used or have been used within the past 12 months on any project, public or private may be submitted for review.

**(a) Length Change Tests** - For all HPC and SFC mix designs make at least three specimens for length change testing. Test samples according to ASTM C 157. Wet cure the samples until they have reached an age of 28 days, including the period in the molds. Store and measure samples according to ASTM C 157, section 11.1.2. Report length change results at 28 days.

Test	Test Method	Acceptance Value
Length Change	ASTM C 157	-0.045% max. at 28 days

**(b) Permeability Tests** - For alternate HPC mix designs make at least three specimens for permeability testing. Prepare, cure, dry and test according to AASHTO T 277. Report permeability in coulombs at 90 days.

Test	Test Method	Acceptance Value
Permeability	AASHTO T 277	1,000 coulombs max. at 90 days

Permeability tests are not required when HPC and SFC mix designs contain cementitious material with 66 percent portland cement, 30 percent fly ash, and 4 percent silica fume.

*(Use the following subsection .35(h) when drilled shaft concrete is required.)*

**02001.35(h) Plastic Concrete Tests** - Add the following paragraph and bullets to the end of this subsection:

For drilled shaft concrete, report the following additional information:

- The total time estimate from initial batching through drilled shaft placement, including haul time, placing concrete, and temporary casing extraction.
- Initial slump test results and subsequent results at 15 minute intervals, verifying a minimum slump of 6 inches is maintained for the total time estimated for drilled shaft placement, including temporary casing extraction. Report data in a table or graph format.