SECTION 02001 - CONCRETE

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the Project. Delete all orange 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 02001 of the Standard Specifications modified as follows:

02001.02 Abbreviations and Definitions:

Add the following definition:

Lightweight Concrete - Structural concrete having a specified density using lightweight Aggregates.

Replace the sentence that begins "**Pozzolans** - Fly ash, silica fume…" with the following sentence:

Pozzolans - Fly ash, natural Pozzolans, silica fume, and high-reactivity Pozzolans.

Replace the sentence that begins "**Supplementary Cementitious Materials** - Fly ash, silica fume…" with the following sentence:

Supplementary Cementitious Materials - Pozzolans and ground granulated blast furnace slag.

02001.15(a) Current Mix Designs - Replace this subsection, except for the subsection number and title, with the following:

Mix designs that meet the requirements for the specified class of concrete and are currently being used or have been used within the past 24 months on any project, public or private, may be submitted for review. Provide individual test results that comprise the average if more than one data point exists. For paving designs the flexural strength testing must be from within the last two years. For HPC designs the length change and permeability tests must be from within the last two years.

02001.15(b)(1) Trial Batch Plastic Properties - Replace this subsection, except for the subsection number and title, with the following:

For each trial batch, test according to the following test methods:

Test	Test Method

Sampling Fresh Concrete	WAQTC TM 2
Concrete Temperature	AASHTO T 309
Slump	AASHTO T 119 [1]
Air Content	AASHTO T 152 or T 196 [2]
Density	AASHTO T 121
Yield	AASHTO T 121
Molding Concrete Specimens	AASHTO T 23 or R 39 [3]
Water Cement Ratio	[4]

[1] For drilled shaft concrete test the slump retention by subsequent tests at ~~half-hour~~60 minute intervals for the duration of the estimated drilled shaft placement~~, including temporary casing extraction~~. Report in table or graphical format.
[2] Use AASHTO T 196 for lightweight concrete.
[3] Cast cylinders in single use plastic molds.
[4] Use ODOT's Field Operating Procedure for AASHTO T 121 in the MFTP.

(Use the following lead-in paragraph and subsection .15(b)(2)(e) when lightweight concrete is required.)

Add the following subsection:

02001.15(b)(2)(e) Lightweight Equilibrium Density - For lightweight concrete mix designs, determine the measured oven-dry density and calculate the approximate equilibrium density according to ASTM C567.

02001.15(c)(10) Plastic Concrete Tests – Replace the bullet that begins "Initial slump test result and subsequent…."

- Initial slump test results and subsequent results at 60-minute intervals, verifying a minimum slump of 4 inches is maintained for the total time estimated for drilled shaft placement, including temporary casing extraction. Report data in a table or graph format.

02001.15(c)(12) Documentation of Average Compressive Strength - Replace this subsection, except for the subsection number and title, with the following:

Provide an analysis, showing applicable data and calculations for documentation of average compressive strength according to ACI 301.

(Use the following lead-in paragraph and subsection.15(c)(15) when IC is specified to mitigate shrinkage in Bridge decks. Contact ODOT Structure Services prior to selecting internal curing.)

Add the following subsection:

02001.15(c)(15) LWFA - Submit most recent ASTM C330 test report.

(Use the following lead-in paragraph and subsection .15(c)(15) when lightweight concrete is required.)

Add the following subsection:

02001.15(c)(15) Lightweight Equilibrium Density Results - For lightweight concrete designs, report densities according to 02001.15(b)(2)(e).

02001.20(a) Strength - Replace Table 2001-1 with the following Table 2001-1:

Table 02001-1

Concrete Strength and Water/Cementitious Material (w/cm) Ratio		
Type of Concrete	**Strength f'_c (psi)**	**Maximum w/cm Ratio**
Structural	3300	0.50
	3300 (Seal)	0.45
	4000	0.48
	4000 (Drilled Shaft)	
	HPC4500	0.40
	HPC(IC)4500	
	5000 +	
Paving	4000	0.44
PPCM's (with cast-in-place decks and no entrained air)	5000	0.48
	5500	0.44
	6000 +	0.42

02001.20(a)(1) Required Average Compressive Strength (f'_{cr}) - Replace this subsection, except for the subsection number and title, with the following:

Except for PPCM designs, provide the required average compressive strength according to ACI 301 for mix design approval.

(Use the following lead-in paragraph and subsection .20(f) when IC is specified to mitigate shrinkage in Bridge decks. Contact ODOT Structure Services prior to selecting internal curing)

Add the following subsection:

02001.20(f) Internal Curing - For HPC(IC) concrete, internally cure the mixture according to the following:

- Substitute 350 lbs (SSD) LWFA for standard Fine Aggregate.

(Use the following lead-in paragraph and subsection .20(g) when lightweight concrete is required. Contact the Statewide Structural Materials Engineer who will provide densities to be used to fill in the blanks.)

Add the following subsection:

02001.20(g) Unit Weight - Provide high performance lightweight concrete with a maximum plastic density of _____ pounds per cubic foot at time of placement and a maximum calculated approximate equilibrium density of _____ pounds per cubic foot.

02001.30(e)(1) HPC Coarse Aggregate Content - Delete the paragraph that begins "Two or more Aggregate products or sources…"

(Use the following lead-in paragraph and subsection .30(e)(2) when IC is specified to mitigate shrinkage in Bridge decks. Contact ODOT Structure Services prior to selecting internal curing)

Add the following subsection:

02001.30(e)(2) Lightweight Fine Aggregate for Internal Curing - Use lightweight Fine Aggregate (LWFA) according to ASTM C1761 for Internally Cured (IC) concrete. Provide a Test Report from within the last calendar year showing the product meets ASTM C330.

Maintain the LWFA at or above Saturated Surface Dry (SSD) condition by uniformly saturating and allowing drain down prior to batching and verify moisture condition by sampling and testing according to ODOT TM 249. Maintain the SSD condition during all batching operations.

Add the following subsection:

02001.50(d) Concrete Strength Testing Technician (CSTT):

- Receive concrete test cylinders
- Record data
- Strip cylinders
- Store cylinders
- Test cylinders
- Record test data
- Report test data