SECTION 710 GENERAL CONCRETE QMP

710.1 Description

(1) This section describes contractor QC testing requirements common to all concrete classes under part 7. Exceptions and additional requirements for concrete testing are specified in:

- Section 715 for class I concrete used in structures and pavement.
- Section 716 for class II and class III concrete used in ancillary applications.

710.2 Small Quantities

(1) For contracts with only small quantities of material subject to testing, as defined under specific contract QMP provisions, modify the requirements of section 710 as follows:

1. The contractor may submit an abbreviated quality control plan as allowed in 701.2.2.
2. The engineer may accept aggregate gradation based upon satisfactory records of previous testing.

710.3 Certification Requirements

(1) Have a certified PCC technician I, or ACT-PCC working under a certified technician, present at the project site, prepared and equipped to perform required sampling and testing whenever placing concrete.

710.4 Concrete Mixes

(1) The contractor is responsible for mix performance.

(2) At least 3 business days before producing concrete, provide documentation ensuring that materials conform to section 501 unless the engineer allows or specific QMP provisions provide otherwise. Include the following:

1. For mixes: quantities per cubic yard expressed as SSD weights and net water, water to cementitious material ratio, and air content.
2. For cementitious materials and admixtures: type, brand, and source.
3. For aggregates: absorption, SSD bulk specific gravity, wear, soundness, freeze thaw test results if required, and air correction factor. Also include proposed gradation limits if using a combined gradation as allowed under 715.2.2.

(3) Do not use any chemical admixtures, other than air-entraining agents, water reducers, or water reducing retarders from the department's approved products list, without conforming to the following:

- Obtain the engineer's approval in advance.
- Document, by independent laboratory test reports, that the admixture conforms to AASHTO M194.

(4) Document mix adjustments daily during concrete production.

(5) Prepare and submit modifications to a concrete mix to the engineer for approval before using that modified mix. Modifications requiring the engineer's approval include changes in:

1. Source of any material.
2. Amounts of cementitious materials.
3. Adjustment of fine to total aggregate greater than ±3 percent by weight.
4. Addition or deletion of admixtures. Minor admixture dosage adjustments required to maintain air content or slump do not require engineer review or approval.

(6) When the department requires or allows high early strength concrete, use type III cement or add a minimum of an additional 95 pounds of cement per cubic yard to a previously accepted mix.

710.5 Sampling and Testing

710.5.1 Sampling

(1) Sample fresh concrete at the point of placement.

710.5.2 Slump

(1) Provide material conforming to the slumps specified in 501.3.7.1. The contractor need not test slump for concrete placed by slip-form methods unless the engineer requests. For other placement methods, test slump whenever an air content test is performed, cylinders are made, and as the engineer directs.

710.5.3 Air Content

(1) Provide material conforming to the air contents specified in 501.3.2.4.2. On each day of production, test at start-up and as frequently as practicable until concrete is conforming and concrete production is under control. Subsequently, test at the QC testing frequency specified in specific contract QMP provisions and as the engineer directs.

(2) If an individual air test is outside the spec limits, notify the engineer and test as often as practicable on subsequent loads until the air content is conforming.

710.5.4 Concrete Temperature

(1) Measure concrete temperature of the same sample used for air content testing and report the results along with the air content.

710.5.5 Compressive Strength

(1) Cast all 6-inch by 12-inch cylinders in a set from the same sample. Do not cast more than one set of cylinders from a single truckload of concrete. Mark each cylinder to identify the lot and sublot or location on the project it represents.

(2) Provide facilities for initial curing. For up to 48 hours after casting, maintain the temperature adjacent to the specimens in the range of 60 to 80 degrees F and prevent moisture loss. Between 24 and 48 hours after casting, transport the specimens to a department-qualified laboratory for standard curing until testing at 28 days.

(3) Determine the 28-day compressive strength of each cylinder in psi. Test each cylinder to failure. Use a compression machine that automatically records the date, time, rate of loading, and maximum load of each cylinder. Provide a printout of this information for each cylinder tested.

710.5.6 Aggregate Testing

710.5.6.1 General

(1) Test each stockpile for each component aggregate during aggregate production or when building stockpiles at the concrete production location. If aggregate was stockpiled before the contract, and test records from production or stockpiling are not available or not acceptable to the engineer, test during concrete production.

(2) For testing performed during aggregate production or stockpiling, conform to the individual gradation limits for the coarse and fine aggregate fractions as specified in the contractor's quality control plan. For testing performed during concrete production, conform to combined gradation limits submitted in the contractor's quality control plan.

710.5.6.2 Gradation Testing During Aggregate Production or Stockpiling

(1) Determine the complete gradation, including P200, using a washed analysis for both fine and coarse aggregates. Test each stockpile for each component aggregate during aggregate production or stockpiling as follows:

DAILY AGGREGATE PRODUCTION	MINIMUM FREQUENCY PER STOCKPILE
1000 tons or less	One test per cumulative total of 1000 tons
more than 1000 tons through 2000 tons	Two tests per day
more than 2000 tons	Three tests per day

(2) In addition to the testing performed during aggregate production or stockpiling, determine the combined P200 during concrete production. Ensure that the combined P200 is 2.3 percent or less. Use a washed analysis for both fine and coarse aggregates. Randomly, test at least once for each 50 cubic yards of concrete. For daily production greater than 50 cubic yards, one test per day is sufficient for constant mix conditions. The engineer may allow testing to be reduced to a minimum of once per 5 days of concrete production after 5 consecutive tests show that the combined P200 is less than or equal to 1.8 percent.

710.5.6.3 Gradation Testing During Concrete Production

(1) Determine the complete gradation, including P200, using a washed analysis for both fine and coarse aggregates. Test each stockpile for each component aggregate as follows:

DAILY CONCRETE PRODUCTION	MINIMUM FREQUENCY PER STOCKPILE
250 cubic yards or less	One test per cumulative total of 250 cubic yards
more than 250 cubic yards through 1000 cubic yards	One test per day
more than 1000 cubic yards	Two tests per day

(2) Report results for the 1 1/2", 1", 3/4", 1/2", 3/8", #4, #8, #16, #30, #50, #100, and #200 sieves.