Concrete Related Specifications & Documents

Summary of Changes

01/2008 – 07/2010

Specifications 346

346-2: Materials

- **346-2.3 Pozzolans and Slag**
- (4) d - Class I and Class II concrete, excluding Class II (Bridge Deck), are not required to meet the minimum fly ash or slag requirements. The fly ash content can't be more than 25% (if used) and the slag can't be more than 70% (if used)

346-2: Materials

- **346-2.3 Pozzolans and Slag**
- (6) d – Cure in accordance with the manufacturer's recommendation and as approved by the Engineer from silica fume to all materials in this subarticle
- This applies to all, not just silica fume

346-2: Materials

- **346-2.4 Coarse Aggregate Gradation**
- Removed statement “Ensure the maximum coarse aggregate size does not violate the reinforcement spacing provisions given for reinforced concrete in the AASHTO LRFD Bridge Design Specifications”

346-2: Materials

- **346-2.5 Admixtures**
- Added requirement to use admixtures in accordance with the manufacturer's dosage rate

346-3: Classification, Strength, Slump and Air Content

- Added language to address when the Contractor opts to substitute a higher class of concrete for a lower class of concrete
  - Acceptance is based on the requirements of the lower class of concrete
  - If the strength does not meet the design mix requirements of the higher class, notify the Engineer

346-3: Classification, Strength, Slump and Air Content

- **Table 2 Notes**
  - Note (c) – A mix design revision for slip form must be submitted to the Engineer
  - The PA will forward to the District Materials Office to process for entering into the database (with a new mix design number)

346-3: Classification, Strength, Slump and Air Content

- **346-3.2 Drilled Shaft Concrete**
- The Contractor is now required to test each load of concrete for slump to ensure the concrete is within the limits of Table 2 and 346-6.4
- The definition of elapsed time has been expanded to include bolt/embedment installation

346-3: Classification, Strength, Slump and Air Content

- **346-3.2.1 Slump Loss Test Requirements**
- Added that personnel performing slump test must meet the requirements of Section 105

346-3: Classification, Strength, Slump and Air Content

- **346-3.2.1 Slump Loss Test Requirements**
- Added language for when the Engineer may require a new slump loss
  - temperature changes more than plus or minus 15°F
  - environmental conditions change
  - the volume increases

346-3: Classification, Strength, Slump and Air Content

- **346-3.2.1 Slump Loss Test Requirements**
- (2) The slump loss test is performed at a temperature consistent with the highest ambient and concrete temperatures expected during actual concrete placement
- This test may be used for **lower temperature placements without any admixture adjustments**

346-3: Classification, Strength, Slump and Air Content

- **346-3.2.1 Slump Loss Test Requirements**
- *(*5) The Contractor is now required to verify the water to cementitious materials ratio and other delivery ticket data meet design mix requirements

346-3: Classification, Strength, Slump and Air Content

- **346-3.2.1 Slump Loss Test Requirements**
- (6) Added language to concrete mixing requirement to clarify the mixing operations "…at a speed greater than or equal to the midrange of the manufacturer's recommended mixing speed"

346-3: Classification, Strength, Slump and Air Content

- **346-3.2.1 Slump Loss Test Requirements**
- (6) When concrete is not being mixed, agitate the mixer at the midrange of the manufacturer's recommended agitating speed.”

346-3: Classification, Strength, Slump and Air Content

- **346-3.2.1 Slump Loss Test Requirements**
- (9) Cylinders must be cast to determine when 500 psi compressive strength is obtained for the purpose of transporting field samples to the laboratory

346-3: Classification, Strength, Slump and Air Content

- **346-3.3 Mass Concrete**
- Added maximum PLACED concrete temperature requirement of 180°F
- Added requirement for Specialty Engineer to be consulted if the maximum temperature is exceeded

346-3: Classification, Strength, Slump and Air Content

- **346-3.3 Mass Concrete**
- The Contractor is not permitted to remove the temperature control mechanisms until the core temperature is within 35°F of the ambient temperature

346-3: Classification, Strength, Slump and Air Content

- **346-3.3 Mass Concrete**
- The Contractor is now required to furnish a copy of all recorded temperature readings to the Engineer as they are recorded and a final report within three days of completion of monitoring of each element

346-3: Classification, Strength, Slump and Air Content

- **346-3.3 Mass Concrete**
- The Contractor is now required to describe methods of preventing thermal shock in the temperature control plan

346-4: Composition of the Concrete

- **346-4.2.3 Control Level for Corrective Action**
- For failing chloride concrete, the engineering analysis must be performed by a Professional Engineer, registered in the State of Florida, knowledgeable in the areas of corrosion and corrosion control

346-6: Control of Quality

- **346-6.3 Delivery Certification**
- The quantities incorporated into the batch must be printed on the delivery ticket
- Change made to time recorded on the delivery ticket by contractor personnel
- It is the time that concrete mix has been completely placed, not discharged

346-6: Control of Quality

- **346-6.3 Delivery Certification**
- The Contractor is now required to verify that the chloride content as shown on the delivery ticket does not exceed Table 4

346-6: Control of Quality

- **346-6.4 Plastic Property Tolerances**
- The slump target range has been eliminated
- The tolerance range is ± 1.5”
- The slump target is specified in Table 2

346-6: Control of Quality

- **346-6.4 Plastic Property Tolerances**
- The Contractor must reject concrete with slump or air content that does not fall within the specified tolerances and immediately notify the concrete production facility that an adjustment of the concrete mixture is required so that it will fall within specified tolerances

346-6: Control of Quality

- **346-6.4 Plastic Property Tolerances**
- If a load does not fall within the tolerances, the Contractor must test each subsequent load and the first adjusted load

346-6: Control of Quality

- **346-6.4 Plastic Property Tolerances**
- If failing concrete is not rejected or adjustments are not implemented, the Engineer may reject the concrete and terminate further production until the corrections are implemented

346-7: Mixing and Delivering Concrete

- **346-7.2 Transit Mixing**
- When the total number of drum mixing revolutions exceeds 160, do not make additional mix adjustments.
- Seek approval from the Engineer prior to using a central mixer and depositing the batch into a truck mixer

346-7: Mixing and Delivering Concrete

- **346-7.7 Adding Water to Concrete at the Placement Site**
- If the slump, as delivered, is outside the tolerance range, the Contractor must reject the load

346-7: Mixing and Delivering Concrete

- **346-7.7 Adding Water *to* Concrete at the Placement Site**
- The Contractor may adjust **any** load if the slump is within the tolerance range, by adding water provided the addition of water does not exceed the water to cementitious materials ratio as defined by the mix design

346-7: Mixing and Delivering Concrete

- **346-7.7 Adding Water to Concrete at the Placement Site**
- If the Contractor adjusts any load, he must check the slump to ensure it is still within tolerance
- The Contractor must also perform a slump on the next load to ensure that the slump is still within tolerance

346-7: Mixing and Delivering Concrete

- **346-7.8 Sample Location**
- The Contractor is now required to describe concrete placement and sampling methods in the Quality Control Plan

346-7: Mixing and Delivering Concrete

- **346-7.8 Sample Location**
- When the concrete is discharged directly from the mixer into the bucket, it must be discharged within 25% of the total allowable transit time to be sampled from the mixer

346-7: Mixing and Delivering Concrete

- **346-7.8 Sample Location**
- The Sample Correlation procedure has been refined and clarified

346-8: Plastic Properties Sampling and Testing

- Added reference to FM for calculating w/c ratio
- The Contractor is now required to reject any concrete batches that do not have a mixer identification card

346-8: Plastic Properties Sampling and Testing

- The Contractor may now remove the mixer identification cards when a truck mixer is discovered to be in noncompliance. When the mixer identification card is removed for noncompliance, forward the card to the District Materials Engineer in the District where the plant is located

346-8: Plastic Properties Sampling and Testing

- The Contractor cannot place concrete until the QC test results confirm that concrete meets the specified plastic properties

346-8: Plastic Properties Sampling and Testing

- Moved language for one load deliveries from small quantities so that it applies to all concrete placements of only one load
- The acceptance sample and plastic properties tests may be taken from the initial portion of the load

346-8: Plastic Properties Sampling and Testing

- Removed the word consecutive when 3 lots or 5 lots in two days fail
- Added language to give the Contractor the option to obtain samples when the Department performs Independent Verification

346-8: Plastic Properties Sampling and Testing

- IV is compared to the Independent Assurance Checklist tolerances
- When IV does not compare, the Engineer may require the Contractor to revise the concrete portion of the QC Plan

Questions?

346-9: Acceptance Sampling and Testing

- **346-9.1 General**
- Clarified Department's option to inspect lieu of performing plastic properties tests
  - This applies to precast plants producing Class I and II only

346-9: Acceptance Sampling and Testing

- **346-9.1 General**
- FDOT Standardized Sample Number / Lot Number System is required
- Instructions and examples can be found on the State Materials Office Internet website

346-9: Acceptance Sampling and Testing

- **346-9.1 General**
- Clarification provided for determining comparison criteria for QC strength results and V strength results

346-9: Acceptance Sampling and Testing

- **346-9.2 Sampling Frequency**
- Clarification on Lot Size, Lot Numbering and Independent Verification
  - Any Department person may perform IV for any reason

346-9: Acceptance Sampling and Testing

- **346-9.4 Acceptance of Concrete**
- Added plastic properties as an acceptance requirement
  - Concrete with failing plastic properties must be rejected

346-9: Acceptance Sampling and Testing

- **346-9.5 Resolution Procedure**
- Reduced the amount of time the Engineer has to inform QC and Verification labs to transport the hold cylinders from 5 days to 4 days

346-9: Acceptance Sampling and Testing

- **346-9.5 Resolution Procedure**
- Added language for when verification strength test results are deemed to be the most accurate, the Department will assess a 5 percent reduction of payment to cover the costs of the Resolution Investigation

346-10 Investigation of Low Strength Concrete for Structural Adequacy

- **346-10.4 Core Conditioning and Testing**
- Added time frames for testing cores
  - 3 days for wet cores
  - 6 days for dry cores

346-11 Pay Adjustments for Low Strength Concrete

- **346-11.2 Basis for Pay Adjustments**
- For prestressed concrete, cores are no longer allowed for pay adjustments

346-12 Pay Reduction for Plastic Properties

- Added language for pay reduction for failing plastic properties
  - the payment for concrete represented by the plastic property tests will be reduced by twice the invoice price per cubic yard for all concrete in the load that is placed
  - if the Engineer authorizes placement of the concrete, there will be no pay reduction

Other Specifications

Other related specifications

- No major changes to 923 or 924

921
PORTLAND CEMENT AND BLENDED CEMENT

921-1 General

- **921-1.2 Alkali Content**
- Portland cement containing a maximum of 0.60 percent needs no further testing

921-1 General

- **921-1.2 Alkali Content**
- Perform ASTM C-33 X1.3 on coarse and fine aggregate
- If the test indicates the aggregate to be non-reactive to alkalis, a supplementary cementitious material meeting the requirements of Section 929 must also be used

921-1 General

- **921-1.3 Heat of Hydration**
- When the cement heat of hydration is 80 cal/g or less at seven days the cement may be used in moderately and slightly aggressive environments without pozzolans or slag

921-1 General

- **921-1.3 Heat of Hydration**
- If the heat of hydration is between 81 and 88 cal/g at 7 days, pozzolans or slag meeting the requirements of Section 929 shall be used
- If the heat of hydration is greater than 88 cal/g at 7 days, use cement in slightly aggressive environments only

921-2 Terminology

- Expanded definition of Approved Lab include “actively participating in their proficiency program”
- Added definition for a Milled Test Report

921-5 Quality Control Plan

- **921-5.1 General**
- Changed certification requirement to mill test report requirement
- Changed QC frequency from per 400 ton LOT to one per day

921-5 Quality Control Plan

- **921-5.1 General**
- Added language for use of limestone in cement
  - Sample of Limestone
  - Sample of cement
  - Analysis for both

921-5 Quality Control Plan

- **921-5.2 Acceptance of Portland Cement**
- Acceptance is based on:
  - Milled Test Report
  - Delivery Ticket on the producer's letterhead and traceable to the milled test report

921-5 Quality Control Plan

- **921-5.4 Quality Control Plan Approval Control**
- For a failing cement sample taken by the Department from the cement production facility, DOT will retest the failing sample instead of taking a new sample

921-5 Quality Control Plan

- **921-5.4 Quality Control Plan Approval Control**
- Failure of the retest will be considered adequate evidence to withdraw the quality control plan

929
POZZOLANS AND SLAGS

929-1 Basis for Source Approval

- **929-1.1 General**
- Allowed use of repulpable bags for all materials in Section 929, not just silica fume

929-6 Ultra Fine Fly Ash

- The acceptance of ultra fine fly ash has been added to Section 929

Materials Manual 9.2
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9-2.4 GENERAL INFORMATION

- The concrete producer may request a reduced scheduling frequency for the plant inspections from the District Materials and Research Engineer (DMRE)
- If approved by the DMRE, the inspection frequency shall be a minimum frequency of once every six (6) months or less

9-2.6 CONCRETE PRODUCERS ROLES AND RESPONSIBILITIES

- **9-2.6.4 Scales and Meters**
- Frequency changed from “quarterly” to once every 3 months

9-2.6 CONCRETE PRODUCERS ROLES AND RESPONSIBILITIES

- **9-2.6.6 Batch Adjustments for Materials**
- Added language to clarify that batch adjustments shall not be used for batch tolerances of aggregate and cementitious materials

9-2.6 CONCRETE PRODUCERS ROLES AND RESPONSIBILITIES

- **9-2.6.7 Batch Adjustments for Moisture**
- Added use of moisture probe readings for coarse and fine aggregate moistures
- Identified aggregate sample weights for determining free moisture

9-2.6 CONCRETE PRODUCERS ROLES AND RESPONSIBILITIES

- **9-2.6.8 Substitution of Materials**
- When the materials in more than one concrete mix design are being substituted and the cementitious materials, coarse aggregate, fine aggregate and admixtures are the same, the Producer has the option to test the chlorides on the mix with the greatest cementitious material content

9-2.7 DESIGN MIXES

- Moved standard form to Appendix B
- Allowed for the option of use of a similar form containing the same information

9-2.7 DESIGN MIXES

- Hot Weather concrete requirements moved from Section 346 to 9.2 and clarified
- Producer requirements, not Contractor
- 9-2.7 includes requirements for both standard concrete (68º – 86º) and hot weather concrete (above 86º)

9-2.7 DESIGN MIXES

- Mix Design Submittal
- Added requirement to provide specific gravity for all cementitious material except cement
- Added requirement to provide a copy of any changes to the Standard Specifications

9-2.9 MIXER DESIGN

- **9-2.9.2 Design**
- For initial design changes, the producer shall provide uniformity test data, based on ASTM C94 testing

9-2.9 MIXER DESIGN

- **9-2.9.2 Design**
- The unit serial number represents the entire mixing system
- The metal rating plate may be located on the inside of the driver's door
- Mixer drum Id numbers or part numbers may or may not compare with the serial number on the rating plate

9-2.9 MIXER DESIGN

- **9-2.9.2 Design**
- Added language for when the Contractor removes a mixer identification card - the Contractor shall forward the identification card to the DMRE in the District that the plant is located

9-2.14 SAMPLING AND TESTING OF MATERIALS

- **9-2.14.1.1 General**
- Added requirement the specific gravity (saturated surface dry) shall be provided to the concrete production facility by the aggregate producer providing the coarse and fine aggregate

9-2.14 SAMPLING AND TESTING OF MATERIALS

- **9-2.14.1.2 Chloride Testing**
- The laboratory performing the chloride test must meet and maintain at all times the qualification requirements in Section 105
- Removed instructions to chloride laboratory from 9.2 Volume II

9-2.15 DELIVERY TICKET/CERTIFICATION

- The truck number on the delivery ticket must match the truck number making the delivery

9-2.17 FORMS

- Added Appendix B – Design Mix Form

346 Future Revisions

- Goal for July 2011 Workbook
  - Draft for Industry Review Closes December 13th
  - Goal of FHWA Approval Dec 2010

Questions?

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