Concrete Related Specifications & Documents

Summary of Changes

08/2010 – 01/2013

Section 346
Portland Cement Concrete

346-2: Materials

- **346-2.1 Materials**
- Added the following: in excess of that specified in the above listed Sections

346-2: Materials

- **346-2.2 Types of Cement**
- Added Type II(MH) as an approved type
- This type cement must be used in all mass concrete elements and elements in extremely aggressive environments

346-2: Materials

- **346-2.2 Table 1**
- Updated table 1 to reflect Type II(MH) requirements, allow Type III in moderately aggressive environments
- Removed all references to the use of fly ash or slag in moderately and extremely aggressive environments

346-2: Materials

- **346-2.3 Pozzolans and Slag**
- Added the requirement to use fly ash or slag materials in all classes of concrete. Used as a cement replacement on an equal weight replacement basis.
- Changed cement replacement rate to 18% to 30% from 18% to 22%

346-2: Materials

- **346-2.3 Pozzolans and Slag Cont'd**
- Deleted the exclusions for class I and class II concrete
- Defined type IP as it pertains to the quantity of pozzolan
- When silica fume, metakaolin or ultrafine fly ash is used, it must be used in combination with fly ash or slag

346-2: Materials

- **346-2.5 Admixtures**
- Added clarification to allow dosage rates outside the manufacturer's recommended dosage rate

346-2 Materials

- **346-2.5 Admixtures**
- **346-2.5.4 Corrosion Inhibitor Admixture**
- Clarified when to use a corrosion inhibitor admixture with what type of cement

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

- **346-3.1 General**
- Air content range for all classes of concrete is now 1.0 to 6.0 per cent, except Class IV (Drilled Shaft) which remains at 0.0 to 6.0 per cent
- Clarified the substitution of a higher class of concrete for a lower class

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

- **Table 2**
- Deleted the “Air Content Range” column
- Note (d) – Clarified the time frame for submitting the resistivity test specimens

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

- **346-3.2 Drilled Shaft Concrete**
- Clarified and reorganized the section

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

- **346-3.2 Drilled Shaft Concrete**
- **346-3.2.1 Slump Loss Test Requirements**
- Slump loss test requirements have been moved to the Materials Manual Volume II Section 9.2

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

- **346-3.2 Drilled Shaft Concrete**
- Added the requirements and action to be taken when the elapsed time during placement is exceeded

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

- **346-3.3 Mass Concrete**
- Changed temperature differential when removal of temperature control mechanisms maybe removed
- Clarified the type of day when the final report and the determined temperature differentials must be to the Engineer

346-4: Composition of the Concrete

- **346-4.2 Chloride Content Limits for Concrete Construction**
- **346-4.2.1 General**
- Clarified subsection -- removed paragraphs, requirement is found in Materials Manual Volume II Section 9.2

346-4: Composition of the Concrete

- **346-4.2 Chloride Content Limits for Concrete Construction**
- **346-4.2.2 Certification**
- Moved certification requirement to Materials Manual Volume II Section 9.2
- Renamed subsection

346-4: Composition of the Concrete

- **346-4.2 Chloride Content Limits for Concrete Construction**
- **346-4.2.3 Control Level for Corrective Action**
- Renumbered subsection
- Clarified action to be taken when notified of chlorides which exceed table 4 requirements

346-5 Sampling and Testing Methods

- Table 5
- Renamed FM 5-501, now reads “Initial Sampling of Concrete from Revolving Drum Truck Mixers or Agitators”
- Clarified and added footnotes for table 5

346-6: Control of Quality

- **346-6.1 General**
- Deleted the requirement for identifying in the QCP the provisions for all plastic concrete testing at the point of final placement
- Clarified paragraph four by adding the words “and controlling”, “is correct and”, and “is” for clarification

346-6: Control of Quality

- **346-6.2 Concrete Design Mix**
- Added a paragraph discussing lumps and balls and the use of a grate on conveyance equipment for concrete with a slump of 6 or more inches

346-6: Control of Quality

- **346-6.3 Delivery Certification**
- (2) Placed has been changed to discharged
- (6) has been clarified
- The requirement for the Contractor to verify that the chloride content as shown on the delivery ticket does not exceed Table 4 has been deleted

346-6: Control of Quality

- **346-6.4 Plastic Property Tolerances**
- Delete “so that it will fall within specified tolerances” in paragraph 2 to clarify

346-7: Mixing and Delivering Concrete

- **346-7.2 Transit Truck Mixing**
- "Do not add water after" has been added to clarify. The total mixing revolutions has been reduced to 130 when water may not be added

346-7: Mixing and Delivering Concrete

- **346-7.2 Transit Truck Mixing**
- **346-7.2.1 Transit Time**
- This section and table, from 346-7.6, was relocated to 346-7.2 for clarification

346-7: Mixing and Delivering Concrete

- **346-7.2 Transit Truck Mixing**
- **346-7.2.2 Placement Time**
- This subsection added to clarify time frames

346-7: Mixing and Delivering Concrete

- **346-7.3 On-site Batching and Mixing**
- Subtitle changed for clarification
- Added requirement to include in the QCP provisions for on site mixing

346-7: Mixing and Delivering Concrete

- **346-7.4 Concreting in Cold Weather**
- Updated section to match the requirements located in section 400
- Clarified section for precast operations in a temperature controlled environment, added the words “mixing and”.

346-7: Mixing and Delivering Concrete

- **346-7.5 Concreting in Hot Weather**
- Redefined the temperature range for hot weather concrete as concrete exceeding 86°F but less than 100°F

346-7: Mixing and Delivering Concrete

- **346-7.6 Adding Water to Concrete at the Placement Site**
- Added the requirement to perform a slump test after adding water
- Perform a slump test of the next load if an adjustment is made at the plant

346-7: Mixing and Delivering Concrete

- **346-7.6 Adding Water to Concrete at the Placement Site Cont'd**
- Added the following "Include water missing from the water storage tanks upon arrival at the project site in the jobsite water added."

346-7: Mixing and Delivering Concrete

- **346-7.7 Sample Location**
- Clarified that the acceptance sample must be taken at the point of final placement.
- The Contractor is now required to describe concrete sampling methods at the point of final placement in the Quality Control Plan

346-7: Mixing and Delivering Concrete

- **346-7.7 Sample Location Cont'd**
- Added time frame for discharging from the bucket, when concrete is discharged into the bucket
- Added new paragraph defining the Sample Correlation procedure which has been refined and clarified
- The sampling correlation procedure has been removed

346-8: Plastic Properties Sampling and Testing

- Defined requirements for each truck
- Clarified action to be taken when the truck is found to be in non-compliance and cannot be repaired immediately
- Paragraph added to define actions taken when a truck designated for QC testing arrives at the project site

346-8: Plastic Properties Sampling and Testing

- Defined action QC has failing plastic properties and any other trucks which are discharging
- Redefined when production is found to be outside the Specification requirements (deleted reference to LOTs and now reference loads)

Questions?

346-9: Acceptance Sampling and Testing

- **346-9.1 General**
- Added as an exception Incidental Precast plants to the Department's option to inspect in lieu of performing plastic properties tests
- Clarified the Department's responsibility for comparing QC and V concrete samples

346-9: Acceptance Sampling and Testing

- **346-9.2 Sampling Frequency**
- Clarification on the definition of a Lot when a mix design is used for different applications. The Lot is defined by the application

346-9: Acceptance Sampling and Testing

- **346-9.2 Sampling Frequency Cont'd**
- **Table 8**
- Redefined the lot size for Class I (Pavement)
- Clarified the lot size for Class IV (Drilled Shaft)

346-9: Acceptance Sampling and Testing

- **346-9.2.1 Reduced Frequency for Acceptance Tests**
- Procedure for reduced frequency for acceptance tests was clarified

346-9: Acceptance Sampling and Testing

- **346-9.4 Acceptance of Concrete**
- Clarified section -- Deleted the following sentence: "Accept or reject concrete on the basis of plastic property results in accordance with 346-6.4."

346-9: Acceptance Sampling and Testing

- **346-9.5 Resolution Procedure**
- Changed language for when verification strength test results are deemed to be the most accurate, the Department will assess a “$1,000 pay” reduction for the cost of the Resolution Investigation

346-10 Investigation of Low Strength Concrete for Structural Adequacy

- **346-10.1 General**
- Clarified strength results falling below the minimum strength, deleted 10% and the greater deviation from the specified minimum strength
- Time to report core test data to the Engineer changed from 14 to 10 calendar days

346-10 Investigation of Low Strength Concrete for Structural Adequacy

- **346-10.2 Determination of Structural Adequacy**
- Clarified strength results falling below the minimum strength, -- deleted the 10%, whichever is greater to match 346-10.1

346-10 Investigation of Low Strength Concrete for Structural Adequacy

- **346-10.3 Coring for Determination of Structural Adequacy**
- Clarified the section – Deleted the requirement to furnish cores to the Department
- Added requirements for the Engineer
- Clarified requirements for the Contractor

346-10 Investigation of Low Strength Concrete for Structural Adequacy

- **346-10.4 Core Conditioning and Testing**
- Clarified section and placed responsibility of testing on the Contractor

346-11 Pay Adjustments for Low Strength Concrete

- **346-11.2 Basis for Pay Adjustments**
- Clarified strength results falling below the minimum strength, -- deleted the 10%, to match 346-10.1
- Deleted the submission of the cores to the Engineer for testing

346-11 Pay Adjustments for Low Strength Concrete

- **346-11.4 Core Conditioning and Testing**
- Clarified the section – placed responsibility of testing cores on the Contractor

346-11 Pay Adjustments for Low Strength Concrete

- **346-11.5 Core Strength Representing Equivalent 28-Day Strength**
- Clarified the type of days by adding the word “calendar”

346-11 Pay Adjustments for Low Strength Concrete

- **346-11.6 Core Strength Adjustments**
- Clarified the type of days by adding the word “calendar”
- Clarified Engineer’s responsibility in developing core strength adjustments for cores tested later than 42 days

346-12 Pay Reduction for Plastic Properties

- Clarified language for pay reduction for failing plastic properties
- The pay reduction for cast-in-place concrete will be twice the invoice price per cubic yard of the quantity of concrete in the rejected load.

346-12 Pay Reduction for Plastic Properties Cont'd

- The pay reduction for placing a rejected load of concrete into a precast product will be applied to that percentage of the precast product that is composed of the concrete in the rejected load
- Defined procedure for reducing payment for the precast product

346-12 Pay Reduction for Plastic Properties Cont'd

- The Engineer may authorizes placement of the concrete, even though plastic properties require rejection, there will be no pay reduction.

Questions?

Continue with Other Specifications

Other related specifications

- No major changes to Section 924

Section 347

Portland Cement Concrete – Class NS

347-2 Materials

- **347-2.1 General**
- Section 921 requirements are now required

347-3 Production, Mixing, and Delivery

- **347-3.1 Concrete Production Requirements**
- Clarified by adding the provision for allowing the substitution of structural concrete for non-structural concrete

347-4 Control of Quality

- **347-4.1 Concrete Mix Design**
- Clarified the requirements for design mix approval

Questions?

Section 901
Coarse Aggregate

901-1 General

- 901-1.1 Composition
- Clarified where recycled concrete aggregate maybe used and the limitations which may apply

901-1 General

- 901-1.2 Deleterious Substances
- Added the maximum allowable deleterious substances for reclaimed Portland cement concrete aggregate

901-5 Reclaimed Portland Cement Concrete

- Clarified the requirements for reclaimed Portland cement concrete
- Clarified the requirements for the sources of reclaimed Portland cement concrete

Questions?

Section 902
Fine Aggregate

902-1 General

- **902-1.1 Composition**
- Clarified the type of aggregate

902-3 Sands for Miscellaneous Uses

- 902-3.2 Brick Masonry
- Defined how the aggregate should be graded

Questions?

921
PORTLAND CEMENT AND BLENDED CEMENT

921-1 General

- 921-1 General
- Defined the specification requirement and the applicability

921-1 General

- **921-1.1 Type of Cement**
- Added Type II(MH) to the allowed types

921-1 General

- **921-1.2 Alkali Content**
- Deleted the requirement for using a supplementary cementitious material meeting the requirements of Section 929 when 0.60 percent is exceeded

921-1 General

- **921-1.3 Heat of Hydration**
- The cement heat of hydration for Type II(MH) shall be 88 cal/g or less at seven days.
- When used in mass concrete the cement heat of hydration for Type II(MH) shall be 80 cal/g or less at seven days.

923
WATER FOR CONCRETE

923-1 General

- Defined types of water allowed by the Department
- Defined recycled and reclaimed water and where they may be used (sprinkle coarse aggregate stockpile & 347 concrete)

923-2 Evaluation of Water for Concrete

- **923-2.1 General**
- Defined laboratories to be used for testing for chemical and physical properties

923-2 Evaluation of Water for Concrete

- **923-2.2 Initial Sampling and Testing Frequency**
- Defined the time frame for testing open bodies of water and well water
- Failing test results will result in restarting initial sampling and testing.

923-2 Evaluation of Water for Concrete

- **923-2.3 Production Sampling and Testing Frequency**
- Changed subsection title
- Defined sampling and testing frequency

923-3 Chemical Requirements

- **923-3.1 Testing**
- **Reference to AASHTO T26 is deleted**
- Test methods defined as those in Table 1 and 2

923-3 Chemical Requirements

- **923-3.2 Recycled and Reclaimed Water**
- Defined test methods and limits for those test methods in Table 1

923-3 Chemical Requirements

- **923-3.3 Open Bodies and Well Water**
- Defined test methods and limits for those test methods in Table 2

923-4 Physical Requirements for Mortar

- Redefined the test methods from AASHTO to ASTM

929
POZZOLANS AND SLAGS

929-2 Fly Ash

- **929-2.1 General**
- Sub-section added to clarify specification and sampling/testing

929-2 Fly Ash

- **929-2.2 Fly Ash (Class F)**
- Separated class C into its own subsection to clarify section

929-2 Fly Ash

- **929-2.2.1 Petroleum Coke Class F**
- Clarified section, listed test methods

929-2 Fly Ash

- **929-2.2.2 Bark Ash Class F**
- Clarified section

929-2 Fly Ash

- **929-2.3 Fly Ash (Class C)**
- Clarified the requirements for using class C fly ash and the testing requirements

929-2 Fly Ash

- **929-2.5 Acceptance Testing of Fly Ash**
- Clarified section
- Deleted the test for Effectiveness in Controlling Alkali-Silica Reaction when the loss on ignition exceeds 5%

929-3 Silica Fume

- **929-3.2 Acceptance Testing of Silica Fume**
- Clarified the acceptance method for Silica Fume.

929-4 Metakaolin

- **929-4.2 Acceptance Testing of Metakaolin**
- Clarified this section

929-6 Ultra Fine Fly Ash

- **929-6.2 Acceptance Testing of Ultra Fine Fly Ash**
- Clarified this section

Materials Manual 9.2
Volume II

9.2.4 GENERAL INFORMATION

- Added number of missed inspections before the Department may place plant in a status “B”
- Plants in a status other than A may be inspected before returning to status A

9.2.6 CONCRETE PRODUCERS ROLES & RESPONSIBILITIES

- **9.2.6.1 Material Requirements**
- Deleted all material specification references. Refer to the individual specifications for material specifications

9.2.6 CONCRETE PRODUCERS ROLES & RESPONSIBILITIES

- **9.2.6.4 Admixtures**
- With written recommendations the dosage rate may be outside the rate on the technical data sheet

9.2.6 CONCRETE PRODUCERS ROLES & RESPONSIBILITIES

- **9.2.6.5 Scales, Meters, and other Weighing or Measuring Devices**
- **9.2.6.5.1 General Requirements**
- Sections for scales, meters and other weighing or measuring devices have been consolidated for general requirements

9.2.6 CONCRETE PRODUCERS ROLES & RESPONSIBILITIES

- **9.2.6.5 Scales, Meters, and other Weighing or Measuring Devices**
- **9.2.6.5.2 Scales**
- Added accuracy for the maximum load normally handled

9.2.6 CONCRETE PRODUCERS ROLES & RESPONSIBILITIES

- **9.2.6.5Scales, Meters, and other Weighing or Measuring Devices**
- **9.2.6.5.3 Water Measuring Devices**
- Deleted the time frame for accuracy (see the general requirements)
- Deleted guidelines for checking measuring devices for conformity

9.2.6 CONCRETE PRODUCERS ROLES & RESPONSIBILITIES

- **9.2.6.8 Batching Accuracy**
- **9.2.6.8.1 Batch Adjustments for Materials**
- Clarified variation in aggregate adjustment
- Clarified dosage rates outside the technical data sheet range

9.2.6 CONCRETE PRODUCERS ROLES & RESPONSIBILITIES

- **9.2.6.8 Batching Accuracy**
- **9.2.6.8.2 Batch Adjustments for Moisture**
- Clarified time frame for conducting moisture test
- Added comparison criteria to moisture test methods and action when criteria is not met.

9.2.6 CONCRETE PRODUCERS ROLES & RESPONSIBILITIES

- **9.2.6.9 Substitution of Materials**
- Deleted requirements for chloride testing

9.2.7 DESIGN MIXES

- Moved Design mix requirements to this section
- Clarified this section
- Added design mix requirements for slab replacement and extended transit time mixes
- Added data required to accompany design mix submittal

9.2.7 DESIGN MIXES

- **9.2.7.1 Concrete trail mix temperature between 68°F to 86°F**
- Clarified the title of this mix type
- Added requirement to calculate w/cm

9.2.7 DESIGN MIXES

- **9.2.7.2 Concrete trail mix temperature of 94°F**
- Clarified the title of this mix type
- Added requirement to run slump and air content when adding water at the end of the mixing period
- Added requirement to calculate w/cm

9.2.7 DESIGN MIXES

- **9.2.7.3 Concrete trail mix for extended transit time mixes**
- Added requirements for trial mix for extended transit time mixes

9.2.7 DESIGN MIXES

- **9.2.7.4 Concrete trail mix for Specifications Section 353 (slab replacement)**
- Added requirements for trial mix for slab replacement mixes

9.2.8 Drilled Shaft Concrete

- Moved entire section from the specification 346 to the Materials Manual Volume II Section 9.2
- Updated the Slump Loss Test (SLT) requirements

9.2.9 Plant Batching Requirements

- **9.2.9.3 Scales**
- Update to clarify section

9.2.10 Mixers

- 9.2.10.1 General Requirements
- Clarified the mixer inspection frequency

9.2.10 Mixers

- **9.2.10.3 Truck Mixers**
- Clarified section
- Added the truck mixer must be parked level for calibration of water gauge
- Removed the requirement for the truck identification card to be in truck cab when delivering to FDOT

9.2.10 Mixers

- **9.2.10.4 Automated Slump Monitoring System**
- Added requirement, if the system adds water in route to the project, an additional 30 revolutions at mixing speed must be done upon arrival at the project site.

9.2.10 Mixers

- 9.2.10.5 Central Mixers
- Moved inspection requirement to 9.2.10.1

9.2.11 Mixing and Delivering Concrete

- **9.2.11.1 General Requirements**
- Clarified accounting for all water entering the drum (batch water)

9.2.11 Mixing and Delivering Concrete

- **9.2.11.3 Transit Mixer**
- Clarified accounting for water used and the requirement for water storage tanks on trucks to be filled
- Update delivery tickets
- Water missing from tanks shall be jobsite water added

9-2.12 QUALITY CONTROL PROGRAM

- Defined action to be taken when lumps and balls are found in high slump concrete by the Department and the plant

9-2.13 PERSONNEL

- Clarified the equivalent training (ACI)
- Deleted reference to FDOT Specification Section 105 throughout section

9-2.13 PERSONNEL

- **9.2.13.1 Concrete Batch Plant Operator**
- Clarified qualification requirement

9-2.13 PERSONNEL

- **9.2.13.2 Certified Technicians**
- Clarified certified by deleting qualified

9-2.13 PERSONNEL

- **9.2.13.3 Concrete Production Facility Manager of Quality Control**
- Clarified time requirement for MOQC to be on site

9-2.13 PERSONNEL

- **9.2.13.4 Concrete Mix Designer**
- Clarified alternate qualifications for the Concrete Mix Designer

9-2.15 SAMPLING AND TESTING OF MATERIALS

- **9-2.15.1 General**
- Table 1 – deleted Absorption (FM 1-T084 & T085) testing
- Table 1 – Added Total Minus 200 (FM 1-T011) testing

9-2.15 SAMPLING AND TESTING OF MATERIALS

- **9-2.15.1 General**
- Added footnote to Table 1 to clarify the action to be taken when the sampling frequency for water is not followed

9-2.15 SAMPLING AND TESTING OF MATERIALS

- **9-2.15.2 Chloride Testing**
- Clarified the certification time frame to the contractor and the supporting data included in the certification
- Added clarification as to the action to be taken when the sampling frequency for chloride testing is not followed

9-2.16 DELIVERY TICKET/CERTIFICATION

- Clarified form to be used
- Removed chloride test date and test results from required data
- Clarified Manufacturer
- Clarified batch water
- Clarified items which do not apply

Questions?

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