QC/QA Implementation: NY

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Need for change?

- Reduced staffing
- Loss of expertise
- QC vs. QA oversight
- Innovations

History

1996:

- Precast Producers QA Program
  - For MH and DI's only
  - Initial plant / lab inspection
  - Trial production period
  - Monitor / Audit program – Air and Strength

History

2000:

- Precast QC/QA Program
  - Expanded coverage
    - All non-structural precast including box culverts, retaining and noise walls, median barrier
  - Initial plant / lab inspection
  - Trial production period
  - Regular audit process / reporting
  - Monitor cores – air and strength
  - Job site evaluation

Implementation

- Precast production

History

2005:

- Proposed QC/QA in 2005 for all PCC
- Considered P2P

2010:

- Draft Standard Specification

2013:

- Performance spec with QC/QA
- Regional use of QC at PCC plants

History

2015:

- Performance Specs
  - New tools adopted by FHWA
  - Nat'l program for performance specs – FHWA
  - AASHTO PP84 – *Developing Performance Engineered Concrete Paving Mixtures*

Implementation

- Design Build Projects (47)
  - QC/QA requirements – risk based

- Bundled bridges
- Major projects
- Train Stations

Performance Specification

- Defines QC and QA responsibilities
  - Assumes adherence to previous requirements *unless* otherwise defined by producer in a QC Plan and approved by the DOT
  - QC Plan for production / handling PCC
- Materials - Use AL materials
  - Includes cement and pozzolan combinations for ASR, and agg sources friction req.

Performance Specification

- Batching facilities
  - Certified by Producer / Dept approval
- Mixers / Trucks
  - Producer responsibility to inspect / maintain
    - Use of NRMCA program acceptable
- Proportioning
  - Producer designed mixtures

Mix Design

- Performance criteria for mixtures
  - Strength
  - Resistivity (permeability)
  - Air content
  - Friction
  - ASR resistance
  - F/T resistance

TABLE 501-3 CONCRETE MIXTURES
Design Mix Guidelines (where sand fineness modulus = 2.80)[1]

Class	TCM Content (lb/cy)	Sand (% Total Agg)	w/c (total)	Air (%)	Slump (in)	Agg gradation	Primary use
A	606	36.2	0.46	5-8	2.5 – 3.5	CA2	General purpose structural
C	605	35.8	0.44	5-8	1 - 3	CA2	Pavement
D	725	45.8	0.44	6-9	2.5 – 3.5	CA1	Thin structural / overlays
DP	725	45.8	0.40	6-9	3 - 5	CA1	Thin structural / overlay
H	675	40.0	0.40	5-8	3 – 4	CA2	pumping
HP	675	40.0	0.40	5-8	3 – 5	CA2	Pumping, structural / decks

Table 501-3 Concrete Mixtures[1]				
Design Mix Performance Criteria				
Primary Application / use[2]	Compressive Strength (psi)	Air Content % desired (range)	Resistivity[3] (kΩ-cm) α = 1.5	Specialty Criteria: Scaling, freeze/thaw, or shrinkage requirements
Superstructures: bridge decks, approach slabs, sidewalk and safety walk on decks, concrete barrier	4000	5-9	>24	ASTM C672 ≤ 2 or ASTM C666 DF ≥ 90% or Air bubble spacing factor / specific surface C457 or SAM Paste factor 25% max
Substructures: abutments, backwalls, wing walls, columns, pier caps, pedestals	4000	5-9	>24	--
Footings	4000	--[5]	>14 [4]	--
Piles, drilled shafts, underground applications	4000	--[5]	>14 [4]	--
Tremie	4000	--[5]	>14 [4]	--
Overhead sign bases, signal pole bases, and bases supporting overhead uses	4000	5-9	>14 [4]	--
Sign bases, misc items	3000	5-9	--	--
Pavement, driveways	4000	5-9	--	ASTM C672 ≤ 2 or ASTM C666 DF ≥ 90%
Pavements - HES	4000 @ 28 days 2500 @ opening	5-9	>16.5	ASTM C672 ≤ 2 or ASTM C666 DF ≥ 90% Paste factor 25% max
Sidewalks, gutters, curbs	4000 psi	5-9	>16.5	ASTM C672 ≤ 2 or ASTM C666 DF ≥ 90%
Barriers	4000 psi	5-9	>16.5	--
Headwalls, drainage elements, pipe inverts	4000 psi	5-9	>16.5	--
Maintenance repair	3000 psi	5-9	>16.5	

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Sub wall				
Foot				
Piles appl				
Tren				
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Sign bases, misc items	3000	5-9	--	--
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Compressive Strength (psi)
Air Content % desired (range)
Resistivity[3] (kΩ-cm) α = 1.5
Specialty Criteria: Scaling, freeze/thaw, or shrinkage requirements

Performance Specification

- Proportioning (con't)
  - No slump requirement
  - No w/c ratio defined
  - Pozzolan use not required (other than ASR)
  - Agg gradations not defined

Performance Specification

- Handling, Measuring and Batching
  - Batching tolerances maintained
- Mixing, Transporting and Discharge
  - Uniformity requirements remain
  - Retempering requirements remain
  - 90 minute delivery – extension allowed

Performance Specification

- Delivery QC
  - Contractor responsible for QC
    - Per MM9.1
      - initial trucks
      - when problems perceived
      - 50 CY intervals
      - As desired by contractor
  - Testing observed by Dept

Performance Specification

- Delivery QA
  - Department responsible for QA
    - 1X per day minimum
    - Approx every 200 CY (or as desired)

- PCC testing
  - Air content
  - F/T resistance (SAM)
  - Strength
  - Resistivity (SR meter)

Tools

- Super Air Meter (SAM)
  - 24 meters in use
- Surface resistivity Meter
  - 24 meters in use

Performance Specification

- Pay Factors
  - Based on application requirements

Compressive Strength	Pay Factor (PF)
≥100% of f'_c	The Department will pay 100%
≥95.0% and <100.0% of f'_c	The Department will pay 87.5%
≥90.0% and <95.0% of f'_c	The Department will pay 75%
< 90.0% of f'_c	Reject concrete

Surface Resistivity (kΩ-cm)	Permeability Coulombs (C)	Pay Factor (PF)
≥37	≤1000	The Department will pay 100%
<37 and ≥27	>1000 and ≤1500	The Department will pay 87.5%
< 27and ≥19	>1500 and ≤2500	The Department will pay 75%
<19	>2500	Reject concrete

Implementation ongoing

- KBridge-2 project

National participation

- Pooled Fund –
  Performance Engineered Mixtures

- Pooled fund –
  Super Air Meter (SAM)

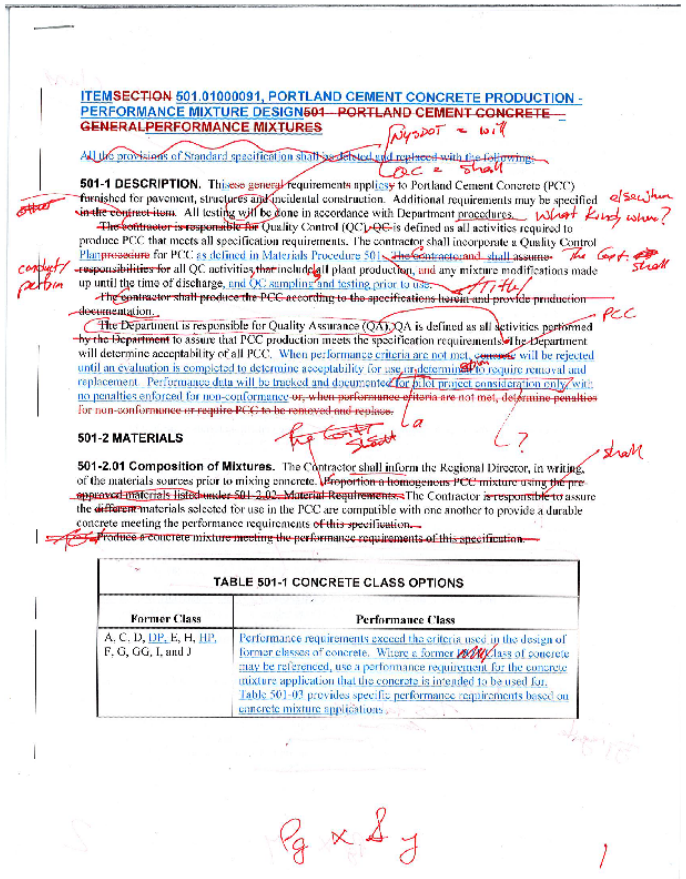
Implementation

- Hands-on use of equipment ongoing
  - SAM's and SR Meters
  - Data gathering

- To do:
  - Complete specs
  - Implement detailed QC plans
  - 1 – 2 years using specs w/o penalty

Headaches (?)

- QC/QA spec acceptance



ITEMSECTION 501.01000091, PORTLAND CEMENT CONCRETE PRODUCTION - PERFORMANCE MIXTURE DESIGN501 PORTLAND CEMENT CONCRETE – GENERALPERFORMANCE MIXTURES

All the provisions of Standard specification shall be deleted and replaced with the following:

501-1 DESCRIPTION. This ~~is a~~ general requirements applies to Portland Cement Concrete (PCC) furnished for pavement, structures and incidental construction. Additional requirements may be specified in the contract item. All testing will be done in accordance with Department procedures.

~~The Contractor is responsible for~~ Quality Control (QC). ~~QC~~ is defined as all activities required to produce PCC that meets all specification requirements. The contractor shall incorporate a Quality Control Plan~~process~~ for PCC as defined in Materials Procedure 501. ~~The Contractor and shall assume responsibilities~~ for all QC activities ~~that include~~ all plant production, and any mixture modifications made up until the time of discharge, and QC sampling and testing prior to use.

~~The Contractor shall produce the PCC according to the specifications herein and provide production documentation.~~

The Department is responsible for Quality Assurance (QA). QA is defined as all activities performed by the Department to assure that PCC production meets the specification requirements. The Department will determine acceptability of all PCC. When performance criteria are not met, ~~concrete~~ will be rejected until an evaluation is completed to determine acceptability for use or determine to require removal and replacement. Performance data will be tracked and documented for pilot project consideration only with no penalties enforced for non-conformance ~~or, when performance criteria are not met, determine penalties for non-conformance or require PCC to be removed and replace.~~

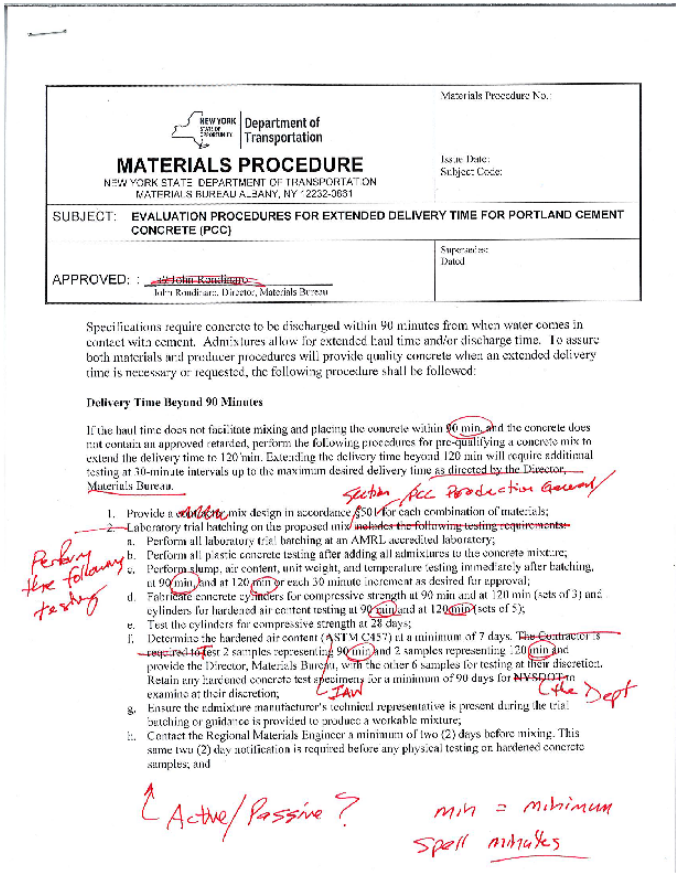
501-2 MATERIALS

501-2.01 Composition of Mixtures. The Contractor shall inform the Regional Director, in writing, of the materials sources prior to mixing concrete. ~~Proportion a homogeneous PCC mixture using the pre-approved materials listed under 501-2.02 Material Requirements.~~ The Contractor is responsible to assure the ~~different~~ materials selected for use in the PCC are compatible with one another to provide a durable concrete meeting the performance requirements ~~of this specification.~~

~~Produce a concrete mixture meeting the performance requirements of this specification.~~

TABLE 501-1 CONCRETE CLASS OPTIONS

Former Class	Performance Class
A, C, D, DP, E, H, HP, F, G, GG, I, and J	Performance requirements exceed the criteria used in the design of former classes of concrete. Where a former ~~class~~ of concrete may be referenced, use a performance requirement for the concrete mixture application that the concrete is intended to be used for. Table 501-03 provides specific performance requirements based on concrete mixture applications.



NEW YORK STATE Department of Transportation

Materials Procedure No.:

MATERIALS PROCEDURE

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU ALBANY, NY 12232-0641

Issue Date:
Subject Code:

SUBJECT: **EVALUATION PROCEDURES FOR EXTENDED DELIVERY TIME FOR PORTLAND CEMENT CONCRETE (PCC)**

APPROVED: ~~/s/ John Rondinaro~~
John Rondinaro, Director, Materials Bureau

Supersedes:
Dated

Specifications require concrete to be discharged within 90 minutes from when water comes in contact with cement. Admixtures allow for extended haul time and/or discharge time. To assure both materials and producer procedures will provide quality concrete when an extended delivery time is necessary or requested, the following procedure shall be followed:

Delivery Time Beyond 90 Minutes

If the haul time does not facilitate mixing and placing the concrete within 90 min, and the concrete does not contain an approved retarder, perform the following procedures for pre-qualifying a concrete mix to extend the delivery time to 120 min. Extending the delivery time beyond 120 min will require additional testing at 30-minute intervals up to the maximum desired delivery time as directed by the Director, Materials Bureau.

1. Provide a ~~concrete~~ mix design in accordance ~~with~~ 501 for each combination of materials;
2. Laboratory trial batching on the proposed mix ~~includes the following testing requirements~~:
   a. Perform all laboratory trial batching at an AMRL accredited laboratory;
   b. Perform all plastic concrete testing after adding all admixtures to the concrete mixture;
   c. Perform slump, air content, unit weight, and temperature testing immediately after batching, at 90 min and at 120 min or each 30 minute increment as desired for approval;
   d. Fabricate concrete cylinders for compressive strength at 90 min and at 120 min (sets of 3) and cylinders for hardened air content testing at 90 min and at 120 min (sets of 5);
   e. Test the cylinders for compressive strength at 28 days;
   f. Determine the hardened air content (ASTM C457) at a minimum of 7 days. ~~The Contractor is required to~~ test 2 samples representing 90 min and 2 samples representing 120 min and provide the Director, Materials Bureau, with the other 6 samples for testing at their discretion. Retain any hardened concrete test specimens for a minimum of 90 days for ~~NYSDOT~~ to examine at their discretion;
   g. Ensure the admixture manufacturer's technical representative is present during the trial batching or guidance is provided to produce a workable mixture;
   h. Contact the Regional Materials Engineer a minimum of two (2) days before mixing. This same two (2) day notification is required before any physical testing on hardened concrete samples; and

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Headaches (?)

- QC/QA spec acceptance
- Mixture Development
  - Pro / Con
- Testing frequencies
  - Contractor / field staff – duplication
  - New tests not yet “accepted”
- Pay factor fears

Implementation ongoing

- PEM paving projects (2)
  - Specs cite AASHTO PP84

Questions