

Local Systems Regional Seminar (2019)

DISTRICT MATERIALS UPDATE

Materials IM Revisions

Materials IM 204, Appendix E

- PCC paving sampling and testing frequencies for RCE Office, Ready Mix concrete, QMC (air)
 - Was 1 per 100 CY
 - Now 1 per 200 CY
- QMC Flexural Beam (April 2019)
 - Requires set at 1/10,000 CY by RCE, tested by CTRL
 - Maximum of 3 sets

Materials IM 204, Appendix F

- HMA sampling and testing frequencies for interlayer asphalt binder and uncompacted field sample (hot box):
 - Minimum of 1 quart binder per day, perform the MSCR test first and last days' samples of binder
 - For uncompacted mix samples, in addition to required mix samples tested by contractor and District Lab, sample and retain at least one additional uncompacted mix for each day of interlayer placement

Materials IM 204, Appendix H

- Foamed cellular concrete density test requirements are added:
 - Contractor required to test density of each load
 - RCE to witness contractor testing

Materials IM 316 – Flexural Strength PCC

- New wording for Marking of the reference lines on the beams in the April 2019 update

Materials IM 328 – Flexural PCC Beams

- Previously, allowing the use of the 4" x 4" beams
- Revision indicates that consolidation of concrete by spading is only permitted when making beams using the larger (6" x 6") beam forms
- April 2019 Revision: For the 4" x 4" beams, the revised rod count per layer of concrete is 28

Materials IM 335 – Soil Moisture Testing

- Balance Accuracy Change – from 0.5 g accuracy to 0.1 g accuracy

Materials IM 340 – Density of Concrete

- New method of density test for Foamed Cellular Concrete
 - Can determine using standard concrete density method with air pot (using smaller 0.10 CF container)
 - Utilize the method describer in the IM using the 400 ml cup

Materials IM 346 – Locating Concrete Pavement Cores

- April 2019 revision: Discussion regarding sections on multi-year projects:
 - On multiple year projects, a separate section will be formed for each year. If less than 20,000 square yards are placed in one year, that section will be grouped with a previous or subsequent year.

Materials IM 383 – Concrete Maturity

- PCC mix batch used for curve development can now be within 0.02 of maximum w/c ratio (previous requirement was must be at maximum w/c ratio)
- Curve validation – must be done at frequency of at least every 90 days (used to be every 30 days)

Materials IM 383 – Concrete Maturity

- April 2019 revisions:
 - Wording recommending first testing of beams for Class C and QMC mixes is now 8-12 hours (not 12-16 hours)
 - Test age may need to be decreased if temperature is greater than 80°F (rather than 85°F)
 - Curve validation may begin on first day of startup – rather than prior to startup as previously required
 - Curve validation for structures with psi requirement greater than 4500 psi required once every month (not two weeks)

Materials IM 504 - Cold-in-Place Recycling

- Field Check for Stabilizing Agent (Foaming Action)
 - The "Bucket Test"
 - Expansion Component – ratio of top extent of expansion in bucket to un-foamed depth in bucket; ideal ratio is approximately 8:1
 - Half-life Check – the time in which the foaming dissipates to a half volume in the bucket; 4 to 6 seconds is considered a preferred half-life

Materials IM 504 - Cold-in-Place Recycling

- Field Check for Stabilizing Agent (Foaming Action)
 - The Bucket Test should be performed at start up, and a tanker exchanges, at a minimum
 - If the tests do not indicate a good foaming action the contractor should stop CIR production and make changes to the operation



Materials IM 504 - Cold-in-Place Recycling

- Criteria for Beginning Placement of HMA Overlay
 - 3.5% maximum, OR
 - 0.3% above residual pavement moisture, OR
 - Reach a plateau of less than 5.0% and remain constant (within $\pm 0.3\%$) for minimum of 3 calendar days, OR
 - CIR has reached an age of 21 days

Materials IM 510 – HMA Mix Designs

- Asphalt Binder Bump Criteria for high RAP binder content in mix designs has been revised
- Appendix A Mix Design Criteria has been revised in some of the tables

Materials IM 527 – PCC Plant Inspection

- April 2019 Revisions:

- Copies of aggregate, cementitious materials delivery tickets, and admixture delivery tickets will be made for the Engineer at the end of project.
- General rewrite and update of Quality Control and Verification sampling, testing, and reporting requirements for various levels of production (continuous, intermittent, low)
- Special notation regarding need for additional aggregate moisture testing in event of variation, such as when rain event occur

Materials IM 528 – Ready Mix Inspection

- For non-structural and miscellaneous concrete - test air and slump at the minimum rate for structural concrete or at least once daily for concrete exposed to freezing and thawing
- For strength testing, contract requirements may also require cylinders for compressive strength

Materials IM 529 – PCC Proportions

- Updates to some mix proportions and additions of some new mixes to the IM
 - Added BR, QMC and some HPC mixes to the IM listings
 - No specific absolute volumes for aggregates listed in some of these mixes since mix design proportions are established when the mix is developed

Materials IM 535 – PCC Plant Monitor

- Appendix C for Non-Structural and Miscellaneous Concrete added the verbiage for the field test requirements for concrete exposed to freezing and thawing:
 - Test a minimum of 1/day for concrete exposed to freezing and thawing
- For 2507 Revetment Grout, Fabric Formed Revetment
 - Test air only at 1/day (new) – no slump test noted in table now

SWAP

And

IM 103

**INSPECTION SERVICES PROVIDED TO COUNTIES, CITIES, AND OTHER
STATE AGENCIES**

IM 103

INSPECTION SERVICES PROVIDED TO COUNTIES, CITIES, AND OTHER STATE AGENCIES

4. Farm-to-Market, Local, or State-assisted projects on county roads or city streets that do not involve any work on primary highway through traffic lanes or turn lanes that will be owned and maintained by the Department.
 - Farm-to-Market (FM, LFM)
 - RISE (RC, RCX, RM, RMX, RFM, RFMX, RP-M)
 - Traffic Safety Improvement Program (FM-TSF, L-TSF, CS-TSF)
 - State Bridge (SBRC, SBRM, SBRFM)
 - State Recreational Trails (RT)
 - Curb Ramp Program (ADA)
 - Federal-aid Swap (BHM-SWAP, BHOS-SWAP, BHS-SWAP, BRM-SWAP, BROS-SWAP, BRS-SWAP, STBG-SWAP, ICAAP-SWAP, HSIP-SWAP)
 - 100% Locally funded city or county projects let at the Department (L, CS). Note: 100% locally funded city or county projects that are let locally have no Department involvement in any aspect of the project development or construction.

IM 103

B. Equipment Calibration

The DME may assist the local agency in witnessing the calibration of PCC and HMA plant equipment for Category 1-3 Projects and for Category 4 projects (FM and Federal-aid Swap projects only).

Ready Mix calibrations are performed annually.
There is no charge for this service.

IM 103

C. Source Inspection

4. For Category 4 Projects (All Projects), the DME, when requested, will perform the source inspection tasks in [IM 204](#). This source inspection will include inspection for precast and prestressed concrete bridge units ([Specification Section 2407](#) items) on FM and Federal-aid Swap projects, unless specifically requested by the local agency to be excluded from inspection.

Source Inspection

- IM 204 Appendixes are divide into three categories
 - Source Inspection
 - Plant Inspection
 - Grade Inspection
- When we refer to Source Inspection in IM103 we are referring to this portion of the IM 204 Appendix
- When IM 103 was rewritten in 2001 we specifically excluded Plant and Grade Inspection, except for limited HMA testing.

Source Inspection

- Most source inspection items are covered by our approved source or approved brand program
- For aggregate source inspection check with your local District Materials Office. In many cases stockpiles will already have been inspected since part of the stockpile may be used on primary or interstate projects.

Sampling & Testing Guide-Minimum Frequency

PORTLAND CEMENT CONCRETE PAVEMENT, PAVEMENT WIDENING, BASE WIDENING

CURB & GUTTER, & PAVED SHOULDERS

April 16, 2019

Supersedes October 16, 2018

Section 2122, 2201, 2213, 2301, 2302, 2310, Quality Management Concrete (QM-C)

Matls. IM 204

Appendix E (US) Units

| MATERIAL OR CONSTRUCTION ITEM | TESTS | METHOD OF ACCEPTANCE & RELATED IMs | QUALITY CONTROL | | | | | INDEPENDENT ASSURANCE & VERIFICATION S&T | | | | | REMARKS |
|--|------------|------------------------------------|-----------------|-------|-------------|---------|-------|--|------------|-----------|-------------|---------|--|
| | | | SAMPLE BY | FREQ. | SAMPLE SIZE | TEST BY | REPT. | S&T TYPE | SAMPLE BY | FREQ. | SAMPLE SIZE | TEST BY | |
| SOURCE INSPECTION | | | | | | | | | | | | | |
| Aggregates-Fine (4110) | | AS 209 | | | | | | | | | | | |
| Aggregate-Coarse (4115), Intermediate | | AS 209 | | | | | | | | | | | |
| Portland Cement (4101) | Quality | AS 401 | | | | | | | | | | | |
| Fly Ash (4108) | Quality | AS 491.17 | | | | | | | | | | | |
| GGBFS (Ground Granulated Blast Furnace Slag) | Quality | AS 491.14 | | | | | | | | | | | |
| Curing Compounds (4105) | Lab Tested | 405 | | | | | | | | | | | |
| Clear Curing Compounds (4105) | | AB 405.07 | | | | | | | | | | | |
| Air Entraining Admixture (4103) | Quality | AB 403 | | | | | | | | | | | |
| Water Reducing Admix. (4103) | Quality | AB 403 | | | | | | | | | | | |
| Retarding Admixture (4103) | Quality | AB 403 | | | | | | | | | | | |
| Joint Sealer (4136.02) | Lab Tested | 436.01, 436.02, 436.03 | | | | | | | | | | | |
| Backer Rod (4136.02) | Lab Tested | AB 436.04 | | | | | | | | | | | |
| Mixing Water (4102) | Lab Tested | | | | | | | V | RCE/ CONTR | 1/ source | 1 pint | CTRL | Not required for potable water from municipal supply (1) |

AS-Approved Source Cert- Certification Statement RCE-Resident Construction Engineer/Project Engineer IA-Independent Assurance
 ASD-Approved Shop Drawing DME-District Materials Engineer V-Verification
 S&T-Sampling & Testing CTRL-Central Materials Office M-Monitor
 AB-Approved Brand CONTR-Contractor QMC-Quality Management Concrete

(1) DME may waive sampling of water from an established well that has shown past compliance.

NOTE: RCE/CONTR indicates that the contractor shall assist in the sampling at the direction of and witnessed by the project engineer.

Plant Inspection

- RCE = Project Engineer
- DME = District Materials
- IA = Independent Assurance
- Sampling and testing by RCE is required
- IA is a Federal aid requirement and will not be required or supported on SWAP projects
- Those items marked DME sample are not required on SWAP projects
- District Materials will not sample those items on SWAP projects

Plant Inspection

- You may if you desire take the sample yourself, fill out the 193 form and take it to the District Materials lab
- We will enter it in the LIMS system and transport it to Ames for testing. There is a charge for this service.
- Check with District Materials before you decide to sample at the plant. We may have already taken samples for one of our projects.

Sampling & Testing Guide-Minimum Frequency

**PORTLAND CEMENT CONCRETE PAVEMENT, PAVEMENT WIDENING, BASE WIDENING
CURB & GUTTER, & PAVED SHOULDERS**

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Section 2122, 2201, 2213, 2301, 2302, 2310, Quality Management Concrete (QM-C)

Matls. IM 204

Appendix E (US) Units

| MATERIAL OR CONSTRUCTION ITEM | TESTS | METHOD OF ACCEPTANCE & RELATED IMs | | QUALITY CONTROL | | | | | INDEPENDENT ASSURANCE & VERIFICATION S&T | | | | | REMARKS | |
|---|--------------|------------------------------------|------|-----------------|------------------|-------------|---------|--------|--|---------------|---|------------|---------|---------|--|
| | | | | SAMPLE BY | FREQ. | SAMPLE SIZE | TEST BY | REPORT | S&T TYPE | SAMPLE BY | FREQ. | SAMP. SIZE | TEST BY | | REPORT |
| PLANT INSPECTION | | | | | | | | | | | | | | | |
| Aggregates-Coarse (4115), Intermediate | Grad QMC | 302 306 336 | | CONTR | QMC 1/1500 cy | IM 301 | CONTR | 800240 | V | RCE/ CONTR | Sample 1/day, test 1 st day+2/-week | IM 301 | RCE | | IM 530 for intermittent production |
| | Grad Non-QMC | 302 306 336 | | CONTR | 1/day | IM 301 | CONTR | | IA | RCE/ CONTR | Sample 1/day, test 1 st day + 1/week | IM 301 | RCE | | IM 527 for intermittent or low production |
| | Moist | 308 | | CONTR | IM 527 | IM 301 | CONTR | | IA | | | | | | |
| | Sp. Gr. | 307 | | CONTR | IM 527 | IM 301 | CONTR | | | | | | | | |
| | Quality | AS | 209 | | | | | | V | DME | 1/100,000 sy | 50 lb | CTRL | | |
| Portland Cement (4101) | Quality | AS | Cert | | Each Load | | | | V | DME | 1/100,000 sy | 15 lb | CTRL | | |
| | Cement Yield | | | CONTR | 1/10,000 cy | | CONTR | 820912 | | | | | | | |
| Fly Ash | Quality | AS | Cert | | Each Load | | | 800240 | V | DME | 1/100,000 sy | 15 lb | CTRL | | |
| GGBFS(Ground Granulated Blast Furnace Slag) | Quality | AS | Cert | | Each Load | | | | V | DME | 1/100,000 sy | 15 lb | CTRL | | |
| Air Admixture | Quality | AB | 403 | | | | | | M | DME | 1/project | 1 pint | CTRL | | Sample batches not previously reported or as required by DME |
| Water Reducer | Quality | AB | 403 | | | | | | M | DME | 1/project | 1 pint | CTRL | | |
| Retarding Admixture | Quality | AB | 403 | | | | | | M | DME | 1/project | 1 pint | CTRL | | |

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 ASD-Approved Shop Drawing DME-District Materials Engineer V-Verification
 S&T-Sampling & Testing CTRL-Central Materials Office M-Monitor
 AB-Approved Brand CONTR-Contractor QMC-Quality Management Concrete

NOTE: IA may be accomplished by system approach or on a per project basis (IA at 1 per 100,000 sy of concrete) at the discretion of the DME.

NOTE: When Certified Plant Inspection is not provided, the engineer is responsible for performing quality control sampling and testing.

NOTE: Quality samples not required when mix quantity is less than 2000 sq. yds., except for curing compound.

NOTE: RCE/CONTR indicates that the contractor shall assist in the sampling at the direction of and witnessed by the project engineer.

Grade Inspection

- RCE = Project Engineer
- DME = District Materials
- IA = Independent Assurance
- Sampling and testing by RCE is required
- IA is a Federal aid requirement and will not be required or supported on SWAP projects
- Those items marked DME sample are not required on SWAP projects
- District Materials will not sample those items on SWAP projects

Grade Inspection

- You may if you desire take the sample yourself, fill out the 193 form and take it to the District Materials lab
- We will enter it in the LIMS system and transport it to Ames for testing. There is a charge for this service.
- Check with District Materials before you decide to sample at the plant. We may have already taken samples for one of our projects.
- Note due to staffing and equipment limitations we will not be able to provide MIT thickness testing on Category 4 projects.

Sampling & Testing Guide-Minimum Frequency

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|---|---------------|------------------------------------|-------------------------------|------------------------------|--------------|---------|---|--|---------------|---|--|------------|--|-------|
| | | | SAMPLE BY | FREQ. | SAMPL E SIZE | TEST BY | REPT. | S&T TYPE | SAMP. BY | FREQ. | SAMPLE SIZE | TEST BY | | REPT. |
| GRADE INSPECTION | | | | | | | | | | | | | | |
| Chloride Solution | Concentration | 373 | RCE | 1/day | | | | | | | | | | |
| Steel Reinforcement: Dowels | Quality | AS 451.03B | | | | | | V | DME | 1/Source/Yr | 1 dowel bar | CTRL | | |
| | Quality | AS 451 Cert 451.03B | | | | | | | | | | | | |
| Dowel Basket Assembly | Quality | AS 451 | | | | | | V | DME | 1/Source/Yr | 1 tie bar | CTRL | | |
| Tie Bars | Quality | AS 451 | | | | | | V | DME | 1/Source/Yr | 48 in | CTRL | | |
| General Use | Quality | AS 451 | | | | | | V | DME | 1/batch | 1/qt | CTRL | | |
| Curing Compound (4105) | Quality | Tested 405 | | | | | | | | | | | Sample batches not previously reported or as required by DME | |
| Plastic Concrete | Air QMC | 318 327 | CONTR | 1/350 cy, 1/100 cy ready mix | | CONTR | E115 | V | RCE | 1/700 cy, 1/200 cy ready mix 1/100,000 sy | | RCE | Min. 1 test/pour | |
| | Air Non-QMC | 318 327 | | | | | E115 | IA V | RCE | 1/700 cy, 1/100 cy ready mix 1/100,000 sy | | DME RCE | Min. 1 test/pour | |
| | Slump | 317 | | | | | | IA V | RCE | 1/700 cy, 1/100 cy ready mix | | DME RCE | For hand finish or fixed form only. Min. 1/pour | |
| | Grade Yield | | RCE | 1/1000 cy | | RCE | | | | | | | | |
| | Beams** | 316, 327, 328 | RCE | 2/day | | RCE | E115 | | | | | | | |
| | Beams QMC | 327, 328, 530 | RCE | 1/10000 cy | | CTRL | | | | | | | Maximum 3 sets | |
| Hardened Concrete | Thickness* | 346, 347 | | | | | | V | RCE/ CONTR | 1/2000 sy | | RCE DME | | |
| | Smoothness | 341 | CONTR | | 100% | CONTR | | V | DME | | 10% | DME | | |
| AS-Approved Source ASD-Approved Shop Drawing S&T-Sampling & Testing | | | Cert- Certification Statement | | | | RCE-Resident Construction Engineer/Project Engineer DME-District Materials Engineer CTRL-Central Materials Office CONTR-Contractor | | | | IA-Independent Assurance V-Verification M-Monitor QMC-Quality Management Concrete | | | |

*IA thickness cores sent to Central Lab for additional project information testing (Interstate and Primary only.) **None required when maturity is used.

NOTE: IA may be accomplished by system approach or on a per project basis (IA at 1 per 100,000 sy of concrete or as noted in the table) at the discretion of the DME.

NOTE: Quality samples not required when mix quantity is less than 2000 sq. yds., except for curing compound.

NOTE: RCE/CONTR indicates that the contractor shall assist in the sampling at the direction of and witnessed by the project engineer. NOTE: Form #F115 available from the Office of Const. & Matls.

Risk Assessment

- Epoxy Coated Steel
 - 2017 149 samples
 - 2018 125 samples- Zero failures
- Portland Cement
 - 2018 375 Samples- Zero failures

IM 103

D. Project Inspection

4. For Category 4 Projects (FM and Federal-aid Swap projects only), the DME, when requested, will perform limited testing.
 - a) HMA mix design paper review or evaluation of test strip results.
 - b) Verification testing of un-compacted mixture will be done the first day and then one test per week maximum.
 - c) Verification testing of asphalt binder will be done the first day and then one test per week maximum.
 - d) Verification testing of smoothness will be done at the rate in [IM 204](#).
 - e) Verification testing of uncompacted Cold-in-Place recycling maximum of one sample per day
 - f) Verification testing of stabilizing agent will be done the first day and then one test per week
 - g) QMC, HPC, BR, and C-SUD mix design paper review

Note: These items are being added to the IM 103. These services will be available this season.

Advice and Trouble Shooting

- District Materials will still be answering questions, providing advice, and help with problem solving.
- There is no charge for this service.
- And it's worth every cent.

Form 519324

Link from IM 103 &
Materials Forms or ask
your Local DME for a copy

Request for Materials Inspection

SEE Materials IM 103

Contracting Authority _____

Project Number(s) _____

Requested by: _____

Place an X in the boxes below to select the inspection requested.

Plant Calibrations For Categories 2 - 3 and FM & SWAP Only Described in IM 103

- HMA
- PCC

Source Inspections For Categories 2 - 4 Described in IM 103

- Aggregate source - Gradation Testing**
- Aggregate source - Quality Testing**
- Steel Fabrication Inspection**
- Precast Prestressed Concrete Beams** For FM and SWAP inspection will be provided unless requested otherwise.
- Precast Prestressed Concrete Piles** For FM and SWAP inspection will be provided unless requested otherwise

Source/Description/Instruction

Project Inspection For Projects in Categories 2 - 4 (FM & SWAP only) Described in IM 103

- HMA Mix Design, Paper Review**
- Uncompacted Mix, Lab Testing** First Day and then 1 per week
- Asphalt Binder, Lab Testing** First Day and then 1 per week
- Smoothness Testing** 10 % of Project
- CIPR, Lab Testing** Max 1 sample per day
- Stabilizing Agent** First Day and then 1 per week
- QMC, HPC, BR, C-SUD Mix designs, Paper Review**

Contractor/Description/Instruction

Approved By _____ File, Lab, Area Insp. Other District(s), Ames

IM 101 Submittal Federal Aid Projects

- When using Doc Express please submit IM 101 to the working drawer.
- Please e-mail a note that the IM 101 was submitted to Doc Express
- You may also send them through the mail or by e-mail.
- Please CC the Local Systems Tech for your area.

Any Questions for the DME?