

QUALITY ASSURANCE REVIEW CHECKLIST

COR 516 CONCRETE PAVEMENT PATCHING

0.00 ECMTS -- POM & PUB 10X APPENDIX T -- Environmental commitments and mitigation activities ensured to be completed and the Environmental Commitments and Mitigation Tracking System (ECMTS) Construction Tracking Signature Sheet current, properly completed, and on file.

- A. Project personnel have a thorough understanding of the project's environmental commitment responsibilities and clearly know their role in fulfilling those responsibilities. (POM B/4/8-1)
- B. Changes to contract work that involve previously undisturbed areas, are outside of the original project area, may potentially affect an environmental resource (i.e., wetlands, parks, historic resources, etc.) have been submitted to the District Environmental Unit for review before the contractor is authorized to begin work. (POM B/3/1-29)
- C. Inspection staff notified the contractor if mitigation measures are not being completed in the required sequence. (Pub 10X - Appendix T-9)
- D. Inspection staff verified the contractor completed mitigation activities by maintaining the ECMTS Construction Tracking Signature Sheet. (Pub 10X - Appendix T-11)

1.00 CERTIFICATIONS -- SECTION 106.03 & POM B/6/3 -- All certifications for material incorporated in this operation properly completed and on file.

- A. Certifications completed on CS-4171 and/or CS-4171F and / or CS-4171C as applicable for wire mesh, dowels, load transfer units, rebar, bond breaker, anchor material, subbase, bond breaker lubricant, and curing materials. [Sections 106.03(b)3, and others]
- B. Certifications for other related materials on CS-4171.
- C. Materials received from an approved Bulletin 14, 15 or 42 supplier, or approved by LTS.

2.00 PROJECT OFFICE DOCUMENTATION -- SECTIONS 106.02, 516.3 & POM -- Documentation applicable to this operation current, properly completed, and on file.

- A. Source-of-supply approved in ECMS before delivery to the project. [Sect. 106.02(a)]
- B. Mix design approved by a District representative. (POM B/7/9-1)
- C. Source documents and I/E book properly completed. (POM B/1/4-1)
- D. No material paid for without proper certification. (POM B/6/2-1)
- E. Concrete Pavement Patching Quality Control Plan reviewed and on file. [Sect. 516.3(a)]

3.00 TEST DOCUMENTATION/FREQUENCY -- SECTIONS 501.3, 516.3, 704 & POM -- All testing properly documented and performed at the proper frequency.

- A. Concrete Inspector's Daily Record Book (CS-472) or MCCID Application complete and current.
- B. Trucks selected for Acceptance Testing according to PTM 1, at the proper frequency with recorded results, including re-tests and failures. [Sect. 704.1(d)5]
- C. Control test frequency according to Quality Control Plan. [Sect. 516.3(a)]
- D. At the discretion of the ACE, straight-line diagrams (TR-4254) for slump, air content, water/cement ratio and compressive strength current (minimum of 10 tests per class of concrete) and includes AT, FV/VT, QA, and IA results. (POM B/1/13-1 & POM B/6/5-2 to 12)
- E. Disposition of rejected material documented. (POM B/6/2 & B/9/1)
- F. Batcher-mixer slip & concrete delivery tickets properly prepared. [Sect. 704.2(c) & AASHTO M 157]
- G. Action points defined in Quality Control Plan are identified and being followed. [Sect. 516.3(a)]
- H. Air meter calibrated within 2 weeks of use and calibration date(s) recorded in the Concrete Inspectors Daily Record Book (CS-472) or MCCID Application. [POM B/6/7& 8, B/9/18-1 & Sect. 704.1(d)3]
- I. Compressive strength forms (CS-458A) or MCCID Application complete and current. (POM B/6/5-10 and B/6/10-1)
- J. An accurate daily record of ambient air and curing temperatures during cold or cool weather in the Concrete Inspectors Daily Record Book (CS-472) or MCCID Application (POM C/10/10-2 and 10-6)
- K. If the forecasted air temperature falls below 40 F during the curing period, temperatures recorded from high-low thermometers placed on the concrete surface. [Sect. 501.3(l)2]
- L. Lots and sublots computed properly. [Sect. 704.1(d)5]
- M. Verification Testing performed at the proper frequency for each type of concrete specified in Table B. [Sect. 704.1(d)6]

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4.00 STAFFING -- Project adequately staffed. Inspectors and contractor supervisory personnel are knowledgeable of specification requirements.

- A. Department inspection.
- B. Consultant inspection.
- C. Contractor supervision.

5.00 SAFETY -- SECTION 107.08 -- Operation conducted in a safe manner.

- A. All personnel acting in a safe manner.
- B. All personnel are wearing proper safety attire.
- C. Working conditions are safe.
- D. Equipment operated in a safe manner.
- E. Contractor Safety Plan on file.
- F. Material Safety Data Sheets on file.

6.00 STAKEOUT -- SECTION 516.3(a) -- Stakeout adequate to control pavement grade and alignment.

- A. Areas to be patched were surface marked by the Representative prior to sawing operations.

7.00 SAWCUTTING -- SECTION 516.3(b) -- Saw-cutting properly performed.

- A. Full-depth saw-cut in the existing longitudinal joint was made for the full depth of the patch when only one lane was to be patched. [Sect. 516.3(b)]
- B. When multiple lanes are patched one lane at a time, a full-depth-saw cut was made parallel to the existing longitudinal joint not more than one foot into the second lane. [Sect. 516.3(b)]
- C. When multiple lanes are patched one lane at a time, the longitudinal joint was saw-cut for the length of the patch and a temporary rigid separator was inserted between the second lane and the patch-area. [Sect. 516.3(b)]
- D. Transverse saw-cuts are full depth. [Sect. 516.3(b)]
- E. Additional length of patch, required due to break back, placed at no expense to the Department. [Sect. 516.3(b)]
- F. Additional saw-cuts to facilitate slab removal did not extend transversely into the adjacent pavement remaining in place. [Sect. 516.3(b)]
- G. Corner repairs are sawed 2 inches in depth and a minimum of 2 inches beyond damaged areas establishing repair area boundary. [Sect. 516.3(b)]
- H. Corner repairs full-depth saw cuts along existing joints to relieve restraints of dowel or tie bars. [Sect. 516.3(b)]

8.00 REMOVAL OF PAVEMENT -- SECTION 516.3(c), 516.3(d) & RC-26 -- Existing pavement properly removed.

- A. Pavement removed without any damage to adjacent pavement to remain in place. [Sect. 516.3(c)]
- B. Subbase removed with hand tools and replaced with concrete when disturbed > 1 inch in depth by the pavement removal operations. [Sect. 516.3(c)]
- C. Subbase irregularities > 1 inch and not caused by removal operations corrected by loosening the surface, then adding or removing subbase material to slope & grade then recompact. [Sect. 516.3(c)]
- D. Unsuitable subbase material removed and replaced. [Sect. 516.3(d)]
- E. Class 4, Type A Geotextile installed on patches where subbase was removed for patches greater than 20' in length and a minimum of 8' in width. (RC-26)

9.00 TRANSVERSE JOINTS -- SECTION 516.3(e), RC-20, RC-21, RC-26 & RC-27 -- Transverse joints properly constructed.

- A. Pavement removed and replaced where a crack or spall occurred prior to final inspection and all issues resolved regarding the condition of the pavement. [Sect. 516.3(e)1]
- B. 3/4 inch expansion joint material installed to reflect an adjacent lane expansion joint that will remain when the single lane patching replaced an existing Expansion Joint. [Sect. 516.3(e)1 & RC-26]

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- C. Drilled holes were a maximum of 1/8 inch larger than the coated dowel bars with a minimum embedment of 8-1/2 inches. [RC-26 & Sect. 516.3(e)2]
- D. Drilling machine is frame-mounted, not hand held, to ensure proper hole alignment. [Sect. 516.3(e)2]
- E. Holes drilled at 1/2 pavement depth and at 1 foot center-to-center. (RC-26)
- F. Vertical and horizontal skew does not exceed 1/4 inch from one end of the dowel to the other. (RC-26)
- G. Dowels 1-1/4 in. diameter by 18 in. long for pavement depths less than or equal to 10 inches. (RC-26)
- H. Dowels 1-1/2 in. diameter by 18 in. long for pavement depths greater than 10 inches. (RC-26)
- I. Approved anchoring material placed into the rear of drilled hole before inserting dowel and flush with the existing concrete face. [Sect. 516.3(e)2]
- J. Dowels rotated three to five complete rotations to purge air voids. [Sect. 516.3(e)2]
- K. The distance between the transverse joint and the tie bar or tiebolts is 30". (RC-20).
- L. Dowel bar anchor verification on the three random locations from the first day of dowel bar anchoring operation. [Sect. 516.3(e)2.a]
- M. Corner repairs have 1/2 inch expansion joint material installed to reestablish original transverse joint. [Sect. 516.3(e)1]
- N. Corner repairs have 5/8 inch diameter drilled and tie bars installed. [Sect. 516.3(e)1 & RC-26]

10.00 LONGITUDINAL JOINTS -- SECTION 516.3(l), RC-20, RC-21, RC-26 & RC-27 -- Longitudinal joints properly prepared and constructed.

- A. Type L joints for two-lane patching constructed in accordance with Standard Drawings. [Sect. 516.3(l)]
- B. Bond breaker (1/4") provided for Type A and Type B patching, single lane. [Sect. 516.3(l)]
- C. Longitudinal joint saw-cut required on pavements, regardless whether to be overlaid or not. [Sect. 516.3(l)]

11.00 FORMS -- SECTIONS 501.3(d) & 516.3(f) -- Forms were properly placed.

- A. All sides of patch not in contact with concrete were formed. [516.3(f)]
- B. Forms were clean, free of warps and defects. [501.3(d)]

12.00 REINFORCEMENT STORAGE -- SECTION 106.05(d) & 1002.3(b)-- Reinforcement properly stored.

- A. Stored in a clean, dry condition on a platform. [106.05(d)]
- B. Stored in an orderly manner and plainly marked to facilitate inspection. [106.05(d)]
- C. Epoxy Coated Bars handled to minimize damage. [1002.3(b)]

13.00 REINFORCEMENT -- SECTIONS 705 & 1002 -- Load transfer units/dowel bars and tie bars/tiebolts of proper type, clean, and properly placed.

- A. Grade of steel meets min. requirements as indicated on the contract drawings (Grade 60). [Sect. 709.1]
- B. Free from injurious defects such as cracks or laminations and free from frost, dirt, oil, grease, paint, mortar, loose rust, and other materials that would reduce bond. [Sect. 1002.3(a)]
- C. Damaged bars replaced or damaged areas of epoxy coated bars properly repaired as per ASTM D 3963 if allowed based on percent damaged in a 1 foot section.. [Sect. 1002.3(g)1]
- D. Not more than 5% of total bar surface area of epoxy coated bars covered with patching material. [Sect. 705.3(b)]

14.00 REINFORCEMENT PLACEMENT -- SECTION 501.3(i), RC-20, RC-21, RC-26 & RC-27 -- Load transfer units/dowel bars and tie bars/tiebolts placed as per specifications, Standard Drawings and contract documents; properly supported and secured.

- A. Load transfer units installed adjacent to existing joints for single lane patching and joint-spacing corresponding to RC-20, RC-21, RC-26, and / or RC-27 when adjacent lanes were patched.
- B. LTU assemblies were properly placed and anchored to prevent misalignments not exceeding the limits specified in Section 501.3(i). [Sect. 516.3(e)3]
- C. Distance between the transverse joint and the wire fabric reinforcement is 12" to 15". (RC-21)
- D. Tie bars or tiebolts provided in Type C patches and excluded within 30" of transverse joints. (RC-21)

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15.00 CONCRETE PLACEMENT/CONSOLIDATION -- SECTIONS 501.3 & 704.2-- Concrete properly placed and consolidated.

- A. Pre-molded expansion joint filler of proper thickness placed full-depth around fixed objects and at expansion joints. [Sect. 501.3(f)]
- B. Concrete placed and consolidated without causing segregation. [Sect. 501.3(f)]
- C. Successive batches of concrete placed within 30 minutes. [Sect. 501.3(i)1]
- D. Concrete not allowed to come in contact with aluminum. [Sect. 704.2(c)]
- E. Vibrators not used to flow concrete. [Sect. 501.3(f)]
- F. Vibrators not in one place more than 5 seconds. [Sect. 501.3(f)]

16.00 FINISHING -- SECTIONS 501.3(k) -- Concrete properly struck off and finished.

- A. Uniform roll of concrete maintained ahead of finishing machine across entire length. Overlap any previously screeded concrete. [Sect. 501.3(k)1.a]
- B. No water or monomolecular film added to surface to aid finishing. [Sect. 501.3(k)1.a]
- C. No manual strike-off except at bulkheads and small turnouts. [Sect. 501.3(k)1.b]
- D. Open-textured areas filled in, smoothed and floated as necessary. [Sect. 501.3(k)2]
- E. 12-foot straightedge used to test deficient or irregular areas. [Sect. 501.3(k)3]
- F. Vibrating and tamping elements immediately disengaged when paver's forward movement stopped. [Sect. 501.3(g)3]
- G. Motorized mechanical finishing equipment operated according to manufacturer's recommendations.

17.00 TEXTURING -- SECTIONS 501.3(k) & 516.3(i) -- Concrete pavement properly textured, when required.

- A. Center-to-center random transverse texture tine spacing. [501.3(k)4.b]
- B. Grooves are rectangular in shape. [Sect. 501.3(k)4.b]
- C. Groove depth 1/8 inch to 3/16 inch and width from 3/32 inch to 3/16 inch.. [Sect. 501.3(k)4.b]
- D. Performed in a single pass producing a uniform finish. [Sect. 501.3(k)4.b]
- E. Texturing device free of hardened concrete particles. [501.3(k)4.b]
- F. Longitudinal texturing in accordance with Section 501.3(k)4.a
- G. Type A and Type B patches were textured to correspond with the texture of the surrounding pavement. [Sect. 516.3(i)]
- H. Type C patches textured in accordance with Section 501.3(k)4. [Sect. 516.3(i)]

18.00 CURING -- SECTIONS 516.3(j) & 501.3(l) -- Concrete properly cured.

- A. Concrete for normal strength patches cured immediately after finishing operations completed and within bleed water dissipation. [Sect. 501.3(l)]
- B. Concrete cured with wet burlap and polyethylene, or wet burlap-backed polyethylene sheeting, or poly-alpha-methylstyrene (PAMS). [Sect. 501.3(l)1]
- C. Type 2 white pigmented liquid membrane curing compound used in lieu of PAMS. [Sect. 516.3(j)]
- D. Accelerated concrete cured with insulation or heated mats and temperature controlled and monitored to ensure no temperature change in excess of 40F in any 1-hour period. [501.3(l)1]
- E. Rapid set concrete patching materials used for corner repairs cured in accordance with manufacturer's recommendations. [Sect. 516.3(g)]

19.00 PATCH STABILIZING -- SECTION 516.3(k) -- Concrete around patches properly stabilized.

- A. Patches stabilized after curing, but prior to opening to traffic in accordance to Section 679 using the hole pattern shown on the Standard Drawings.

20.00 JOINT SEALING -- SECTION 516.3(m) -- Longitudinal and transverse joints properly sealed.

- A. All joints constructed as part of this work are sealed. [516.3(m)]
- B. Only expansion joints sealed on pavements to be overlaid in same construction season. [516.3(m)]
- C. All saw-cuts extending beyond patch limits were sealed. [516.3(m)]

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- D. Pavements not overlaid during the same construction season have sealant reservoirs and joints sealed as specified in Section 501.3(n). [516.3(m)]
- E. Accelerated concrete patches opened to traffic prior to second stage sawing has backer rod installed near the surface. [516.3(m)]
- F. Accelerated concrete patches have second stage sawing and sealing as specified in Section 501.3(n) within 24 hours. [516.3(m)]

21.00 OPENING TO TRAFFIC -- SECTIONS 501.3(q) & 516.3(q) -- Strength and/or time requirements met prior to opening to traffic.

- A. Minimum strength met for normal strength patches based on slab thickness in accordance with Section 501.3(q) Table D.
- B. Minimum strength of 1,200 psi met for accelerated strength concrete. [Sect. 501.3(q)]
- C. Samples obtained for each 200 cubic yards and final load of accelerated strength patches.
- D. Minimum strength of 1,000 psi met for rapid set concrete patching material repairs. [Sect. 516.3(q)]

22.00 CEMENT CONCRETE -- SECTIONS 516.2 & 704 -- Concrete delivered and discharged properly.

- A. Furnished the indicated class of concrete according to the requirements of revised Table A in Section 501.2(a).
- B. Conduct concrete temperature tests according to ASTM C 1064. [Sect. 704.1(d)4.a]
- C. Number of truck drum revolutions after discharge must be less than 300. [Sect. 704.2(c)]
- D. Agitated for at least 20 revolutions immediately prior to placement. [Sect. 704.2(c)]
- E. Concrete exceeding 45 minutes without agitation not used. [Sect. 704.2(c)]
- F. Concrete not containing set-retarding admixtures discharged within 1-1/2 hours, or within 2 hours if set-retarding admixtures are used when the concrete temperature was below 80 F. [Sect. 704.2(c)]
- G. Concrete discharged within 1 hour when not containing a set-retarding admixture, or within 1 ½ hours if set retarding admixtures are used when the concrete temperature was 80 F or above. [Sect. 704.2(c)]
- H. Normal strength concrete temperature was between 50 F and 90 F. [Sect. 704.1(f)2]
- I. Accelerated concrete temperature was between 50F and 100F. [704.1(f)2]
- J. Water / Cement ratio as per mix design. [Sect. 704.1(c)]

23.00 CONCRETE SAMPLING -- SECTION 704.1(d)1 AND PTM 601 -- Concrete sampling performed properly and at point-of-placement.

- A. Samples obtained at the point-of -placement. [Sect. 704.1(d)5]
- B. Sampling performed as per current PTM 601. [Sect. 704.1(d)4.a]

24.00 CONCRETE SLUMP -- SECTION 704.1(d)4.a AND AASHTO T 119 -- Concrete slump tested properly and is within the specified range.

- A. Testing performed as per AASHTO T 119. [Sect 704.1(d)4.a]
- B. Slump within ranges indicated in the Quality Control Plan
- C. When the initial slump was outside the selected target range, and below the upper limit, a full set of cylinders were molded for both Control and Acceptance in addition to the cylinders originally made from PTM 1 if the air content and temperature were within the specified limits and the contractor incorporated the concrete. [Sect. 704.1(d)4.a]

25.00 CONCRETE AIR CONTENT -- SECTION 704 & AASHTO T 196 OR T 152 -- Concrete air content tested properly and is within the specified range.

- A. Concrete tested for air content as per AASHTO T 152 for stone & gravel (Do not apply an Aggregate Correction Factor). [Sect. 704.1(d)4.a]
- B. Plastic air content within specified range (7.0% +/- 1.5%). [Sect. 501.2(a)(b)(c)]

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26.00 COMPRESSIVE STRENGTH CYLINDERS – SECTION 704.1(d) & PTM 611 -- Concrete compressive strength cylinders molded and cured properly.

- A. Compressive strength cylinders molded and cured as per PTM 611. [Sect. 704.1(d)]
- B. Compressive strength evaluated as per PTM 604. [Sect. 704.1(d)]
- C. Acceptance, Control and Verification compressive strength testing performed at 28 days. [Sect. 704.1(d)]
- D. QC Cylinders molded from same sample of concrete selected for Acceptance & Verification testing. [Sect. 704.1(d)4.b]
- E. Cylinder mold diameters do not vary from the prescribed length by more than 1/16 inch and no two separate mold diameters differ by more than 1/8 inch. (PTM 611)
- F. Tight fitting, domed caps used on all cylinder molds. [704.1(d)3]

27.00 TESTING FACILITIES, EQUIPMENT AND PROCEDURES – SECTION 704.1(d) -- Acceptance testing and quality control testing performed by proper personnel and with separate equipment.

- A. Sufficient thermometers, air meters and slump cones provided for each separate project operation. [Sect. 704.1(d)3]
- B. Verification tests performed by the Representative on the initial Acceptance test and a minimum of one of every ten Acceptance tests thereafter. [Sect. 704.1(d)6]
- C. Quality Control & Acceptance tests performed by contractor technician. [Sect. 704.1(d)2]
- D. Cylinders tested for compressive strength in accordance with PTM 604. [Sect. 704.1(d)4, 5, 6 & 7]
- E. Communication between patching operation and plant being effectively maintained.
- F. Action points defined in Quality Control Plan are being followed. [Sect. 704.1(d)4.a]
- G. Back-up equipment available to ensure that no tests are missed. [Sect. 704.1(d)3]
- H. Verification testing (air content, temperature & compressive strength) was performed from the same sample of concrete using the same air meter as the Acceptance testing. [Sect. 704.1(d)6]
- I. Field technician had PennDOT Certification and carries Certification Card during all placements. [Sect. 704.1(d)2.a]