|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| REVIEW OF NEW SPECIFICATION OR SPECIFICATION CHANGE | | | | 106-28 |
| **Specification Section No.:** 106 | | | **Item:** Revision of Section 106  Conformity to the Contract Of Hot Mix Asphalt  (Less Than 5000 Tons With Volumetric Verification) | |
| **Originating Office:** Materials and Geotechnical | | | **By:** Gallegos/Standford | |
| **Date Sent For Review:** August 29, 2017 | | | **Date Comments Due: September 26, 2017** | |
| Submit response to: STANDARDS AND SPECIFICATIONS UNIT, DIVISION OF PROJECT SUPPORT 4TH FLOOR, CDOT HEADQUARTERS | | | | |
| **Vote**  **/N** | **Concurrent Reviews – Others Commenting** | | The attached Draft Specification is submitted for your review and comments. If not returned by Date Comments Due, the draft specification will be considered to be approved unless the Standards and Specifications Unit of the Project Development Branch [(303) 757-9474, (303) 757-9402] is advised otherwise.  **REMARKS:**  If these proposed changes are approved, we will issue these in a revised version of this standard special provision. The version to be issued will modify the 2017 version of the CDOT Standard Specifications. | |
|  | **Spec Committee Members:** | **✓** |
|  | Co-Chairman: Lacey |  |
|  | Region 1: Quirk |  |
|  | Region 1: Lucerna |  |
|  | Region 2: Phillips |  |
|  | Region 3: Jean |  |
|  | Region 4: Boespflug |  |
|  | Region 5: Valentinelli |  |
|  | Project Development: Vacant |  |
|  | Specifications: Brinck |  |
|  | Bridge: Hasan |  |
|  | Contracts & Market Analysis: Eddy |  |
|  | Materials: Schiebel |  |
|  | Traffic Engineering: Matthews |  | REVIEWER COMMENTS:  ( ) Approved ( ) Disapproved ( ) Modified  If disapproved or modified, give reason why and show any modifications on the attached draft copy:    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_  Name/Signature Date | |
|  | Maintenance: Weldon |  |
|  | FHWA: Larson |  |
|  | Attorney General: Milan |  |
|  |  |  |
|  | **Others:** |  |
|  | Colorado Contractors Assoc.: Moody |  |
|  |  |  |
|  | **Technical Committees:** |  |
|  | PDAC |  |
|  | Drainage Advisory Committee (DAC) |  |
|  | Water Quality Advisory Committee (WQAC) |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **COLORADO DEPARTMENT OF TRANSPORTATION** **SUBMITTAL OF NEW SPECIFICATION OR SPECIFICATION CHANGE** | | | Log No. (Assigned by Standards and Specifications Unit)  106-28 | |
| TO: Standards & Specifications Unit Project Development Branch | | FROM:  Materials and Geotechnical/Region 1  (Region, Branch or Technical Committee) | | |
| SPECIFICATION SECTION NO.  106 | ITEM  CONFORMITY TO THE CONTRACT OF HOT MIX ASPHALT  (LESS THAN 5000 TONS WITH VOLUMETRIC VERIFICATION) | | | Priority  Routine  Fast |
| Reason for this new or changed specification:  To clearly identify in the specification as to when a target value VMA adjustment is applicable. Also to include the applicable acceptance sieves to the verification testing.  These changes are applicable to ensure production processes are controlled so the product placed on the roadway is of the highest percent of quality.  This revision was accepted by the MAC in November of 2016 and was to be proposed for inclusion to the 2017 standard specifications. Formal submittal of these changes in November 2016 were inadvertently overlooked. | | | | |
| New or Revised Specification:  **See Attached.** | | | | |
| Note: See Procedural Directive 513.1 for a description of appropriate specification development procedures. | | | | |

**CDOT Form #1215 1/15**

REVISION OF SECTION 106

CONFORMITY TO THE CONTRACT OF HOT MIX ASPHALT

(LESS THAN 5000 TONS WITH VOLUMETRIC VERIFICATION)

Section 106 of the Standard Special Provisions is hereby revised for this project as follows:

Delete subsection 106.05 and replace with the following:

**106.05 Sampling and Testing of Hot Mix Asphalt.** All hot mix asphalt, Item 403, except Hot Mix Asphalt (Patching) and temporary pavement shall be tested in accordance with the following program of process control testing and acceptance testing:

The Contract will specify whether process control testing by the Contractor is mandatory or voluntary.

1. *Process Control Testing.*
2. Mandatory Process Control. When process control testing is mandatory the Contractor shall be responsible for process control testing on all elements and at the frequency listed in Table 106‑1. Process control testing shall be performed at the expense of the Contractor.

After completion of compaction, in-place density tests for process control shall be taken at the frequency shown in Table 106-1. The results shall be reported in writing to the Engineer on a daily basis. Daily plots of the test results with tonnage represented shall be made on a chart convenient for viewing by the Engineer. All of the testing equipment used for in-place density testing shall conform to the requirements of acceptance testing standards, except nuclear testing devices need not be calibrated on the Department’s calibration blocks.

For elements other than in-place density, results from quality control tests need not be plotted, or routinely reported to the Engineer. This does not relieve the Contractor from the responsibility of performing such testing along with appropriate plant monitoring as necessary to assure that produced material conforms to the applicable specifications. Quality control test data shall be made available to the Engineer upon request.

1. Voluntary Process Control. The Contractor may conduct process control testing. Process control testing is not required, but is recommended on the elements and at the frequency listed in Table 106-1.

All of the testing equipment used for in-place density testing shall conform to the requirements of acceptance testing standards, except nuclear testing devices need not be calibrated on the Department’s calibration blocks.

1. *Acceptance Testing.* Acceptance testing is the responsibility of the Department. For acceptance testing the Department will determine the locations where samples or measurements are to be taken and as designated in Section 403. The maximum quantity of material represented by each test result, the elements, the frequency of testing and the minimum number of test results will be in accordance with Table 106-1. The location or time of sampling will be based on the stratified random procedure as described in CP 75. Acceptance sampling and testing procedures will be in accordance with the Schedule for Minimum Materials Sampling, Testing and Inspection in the Department’s Field Materials Manual. Samples for project acceptance testing shall be taken by the Contractor in accordance with the designated method. The samples shall be taken in the presence of the Engineer. Where appropriate, the Contractor shall reduce each sample to the size designated by the Engineer. The Contractor may retain a split of the each sample which cannot be included as part of the Contractor’s process control testing. Dispute of the acceptance test results in accordance with CP-17 will not be allowed unless a provision for check testing has been included in the Contract and it has been successfully completed. All materials being used are subject to inspection and testing at any time prior to or during incorporation into the work.

**Table 106‑1**

**SCHEDULE FOR MINIMUM SAMPLING AND TESTING**

|  |  |  |
| --- | --- | --- |
| **Element** | **Process Control** | **Acceptance** |
| Asphalt Content | 1/500 tons | 1/1000 tons |
| Theoretical Maximum Specific Gravity | 1.1000 tons, minimum 1/day | 1/1000 tons, minimum 1/day |
| Gradation | 1/Day (1) | 1/2000 tons |
| In-Place Density | 1/500 tons | 1/500 tons (2) |
| Joint Density | 1 core/2500 linear feet of joint | 1 core /5000 linear feet of joint |
| Aggregate Percent  Moisture (3) | 1/2000 tons or 1/Day if less than 2000 tons | 1/2000 tons |
| Percent Lime (3) (4) | 1/Day | Not applicable |
| Notes:   1. Process control tests for gradation are not required if less than 250 tons are placed in a day. The minimum number of process control tests for gradation shall be one test for each 1000 tons or fraction thereof. 2. The minimum number of in-place density tests for acceptance will be 5. 3. Not to be used for incentive/disincentive pay. Test according to CP 60B and report results from Form 106 or Form 565 on Form 6. 4. Verified per Contractor’s QC Plan. | | |

1. *Reference Conditions.* Three reference conditions can exist determined by the Moving Quality Level (MQL). The MQL will be calculated in accordance with the procedure in CP 71 for Determining Quality Level (QL). The MQL will be calculated using only acceptance tests. The MQL will be calculated on tests 1 through 3, then tests 1 through 4, then tests 1 through 5, then thereafter on the last five consecutive test results. The MQL will not be used to determine pay factors. The three reference conditions and actions that will be taken are described as follows:

1. Condition green will exist for an element when an MQL of 90 or greater is reached, or maintained, and the past five consecutive test results are within the specification limits.

2. Condition yellow will exist for all elements at the beginning of production or when a new process is established because of changes in materials or the job‑mix formula, following an extended suspension of work, or when the MQL is less than 90 and equal to or greater than 65. Once an element is at condition green, if the MQL falls below 90 or a test result falls outside the specification limits, the condition will revert to yellow or red as appropriate.

3. Condition red will exist for any element when the MQL is less than 65. The Contractor shall be notified immediately in writing and the process control sampling and testing frequency increased to a minimum rate of 1/250 tons for that element. The process control sampling and testing frequency shall remain at 1/250 tons until the process control QL reaches or exceeds 78. If the QL for the next five process control tests is below 65, production will be suspended.

If gradation is the element with MQL less than 65, the Department will test one randomly selected sample in the first 1250 tons produced in condition red. If this test result is outside the tolerance limits, production will be suspended. (This test result will not be included as an acceptance test.)

After condition red exists, a new MQL will be started. Acceptance testing will stay at the frequency shown in Table 106‑1. After three acceptance tests, if the MQL is less than 65, production will be suspended.

Production will remain suspended until the source of the problem is identified and corrected. Each time production is suspended, corrective actions shall be proposed in writing by the Contractor and approved in writing by the Engineer before production may resume.

Upon resuming production, the process control sampling and testing frequency for the elements causing the condition red shall remain at 1/250 tons. If the QL for the next five process control tests is below 65, production will be suspended again. If gradation is the element with MQL less than 65, the Department will test one randomly selected sample in the first 1250 tons produced in condition red. If this test result is outside the tolerance limits, production will be suspended.

1. *Mix Verification Testing.* After the mix design has been approved and production commences, the Department will perform a minimum of three verification tests for each of the following elements to verify that the field produced hot mix asphalt conforms to the approved mix design:

(1) Air Voids

(2) Voids in Mineral Aggregate (VMA).

(3) Asphalt Content (AC).

(4) Sieve Analysis

The test frequency shall be one per day unless altered by the Engineer.

The test results will be evaluated and the Contractor shall make adjustments if required in accordance with the following:

1. Target Values. The target value for VMA will be the average of the first three field test results conforming to the tolerances set forth in the original Form #43 for asphalt content, gradation, air voids and voids in mineral aggregate (VMA) on project produced hot mix asphalt or the target value specified in Table 403-1 and Table 403-2 of the specifications, whichever is higher. The target value for VMA will be set no lower than 0.5 percent below the VMA target on Form 43 prior to production. The target values for the test element of air voids, AC and gradation shall be the mix design air voids, mix design AC and mix design gradation as shown on Form 43.

2. Tolerance Limits. The tolerance limits for each test element shall be:

AC ± 0.3 percent

Air Voids ± 1.2 percent

VMA ± 1.2 percent

Passing the 9.5 mm (3/8”) and larger sieves ± 6 percent

Passing the 4.75 mm (No. 4) and 2.36 mm (No. 8) sieves ± 5 percent

Passing the 600 µm (No. 30) sieve ± 4 percent

Passing the 75 µm (No. 200) sieve ± 2 percent

3. Quality Levels. Calculate an individual QL for each of the elements using the volumetric field verification test results. If the QL for VMA or AC is less than 65 or if the QL for air voids is less than 70, the production shall be halted and the Contractor shall submit a written proposal for a mix design revision to the Engineer. Production shall only commence upon receipt of written approval from the Engineer of the proposed mix design revision.

After a new or revised mix design is approved, three additional volumetric field verification tests will be performed on asphalt produced with the new or revised mix design. The test frequency shall be one per day unless altered by the Engineer.

If the QL for VMA or AC is less than 65 or the QL for the test element of air voids is less than 70, then production shall be halted until a new mix design has been completed in accordance with CP 52 or CP 54, a new Form 43 issued, and the Contractor demonstrates that he is capable of producing a mixture meeting the verification requirements in accordance with A or B below:

1. The Contractor shall produce test material at a site other than a CDOT project. The Contractor shall notify the Engineer a minimum of 48 hours prior to the requested test. The location and time of the test are subject to the approval of the Engineer, prior to placement. Three samples will be tested for volumetric properties. If the QL for VMA or AC is equal or greater than 65 and the QL for the element of air voids is equal or greater than 70, full production may resume or;
2. The Contractor may construct a 500 ton test strip on the project. Three samples in the last 200 tons will be tested for volumetric properties. After construction of the test section, production shall be halted until the testing is complete and element QLs are calculated. If the QL for VMA or AC is equal or greater than 65 or the QL for the element of air voids is equal or greater than 70, full production may resume. If the QL for VMA or AC is less than 65 or the QL for the element of air voids is less than 70, the material shall be removed and replaced at no cost to the Department. The time count will continue, and any delay to the project will be considered to have been caused by the Contractor and will not be compensable.

The costs associated with mix designs shall be solely at the Contractor’s expense.

If the Contractor fails to verify the new mix design in accordance with A or B, then production shall be halted until a new mix design has been completed in accordance with CP 52 or CP 54, a new Form 43 issued, and the Contractor demonstrates they are capable of producing a mixture meeting the verification requirements in accordance with A or B.

4. New or Revised Mix Design. Whenever a new or revised mix design is used and production resumes, three additional volumetric field verification tests shall be performed and the test results evaluated in accordance with the above requirements. The test frequency shall be one per day unless altered by the Engineer.

5. Field Verification Process Complete. When the field verification process described above is complete and production continues, the sample frequency will revert back to a minimum of 1/10,000 tons. The Engineer has the discretion to conduct additional verification tests at any time.

1. *Stability Verification Testing.* After the mix design has been approved and production commences, the Department will perform a minimum of three stability verification tests to verify that the field produced HMA conforms to the approved mix design:

The test frequency shall be one per day unless otherwise directed by the Engineer.

The test results will be evaluated and the Contractor shall make adjustments if required in accordance with the following:

1. The minimum value for stability will be the minimum specified in Table 403-1 of the specifications. There will be no tolerance limit.
2. Quality Level. Calculate a QL for stability. If the QL for stability is less than 65, then production shall be halted and the Contractor shall submit a written proposal for a mix design revision to the Engineer. The Engineer shall give written approval to the proposed mix design revision before production continues.

After a new or revised mix design is approved, three additional stability tests will be performed on asphalt produced with the new or revised mix design. The test frequency shall be one per day unless altered by the Engineer.

If the stability QL is less than 65, then production shall be halted until a new mix design has been completed and approved using plant produced material or the Contractor shall submit a written proposal for a mix design revision to the Engineer. The Engineer shall give written approval to the proposed mix design revision before production continues.

1. New or Revised Mix Design. Whenever a new or revised mix design is used and production resumes, three additional stability field verification tests shall be performed and the test results evaluated in accordance with the above requirements. The test frequency shall be one per day unless altered by the Engineer.
2. Field Verification Process Complete. When the field verification process described above is complete and production continues, the sample frequency will revert back to 1 per 10,000 tons.