

500-R-559 CONCRETE PAVEMENT

(Adopted 11-20-08)

The Standard Specifications are revised as follows:

SECTION 501, BEGIN LINE 27, INSERT AS FOLLOWS:

Coarse Aggregate, Class AP, Size No. 8*904

SECTION 501, BEGIN LINE 53, DELETE AND INSERT AS FOLLOWS:

~~The CMDS is used to conduct a trial batch in accordance with 501.06. Upon completion of the trial batch, the Contractor shall document the adjustments to the CMDS and submit the concrete mix design trial, CMDT, to the DMTE for approval. The CMDT shall be submitted a minimum of three work days prior to production to the DMTE utilizing the Department furnished spreadsheet. Production shall not commence without an approved CMDT. Both the Contractor's and the Engineer's tests will be included in the CMDT submittal.~~

~~The CMDT is used to start production. The CMDT can be adjusted in accordance with 501.17 and will be documented as a concrete mix design for production, CMDP. The CMDP shall be submitted by the end of the second lot to the DMTE utilizing the Department's spreadsheet. Production shall stop upon the end of the first subplot of the third lot if the CMDP is not received by the DMTE.~~

~~(a) Change in Materials~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

- ~~1. cement source, except for type I~~
- ~~2. cement types for IA, IIA, ISA, IP-A, IS, II, III, IP, ISM~~
- ~~3. admixture type~~
- ~~4. pozzolan source or type~~
- ~~5. aggregate material~~

~~(b) Change in Source~~

~~A change in a CMDP to any of the following requires a new CMDT.~~

- ~~1. cement source, type~~
- ~~2. admixture source utilizing the same type~~
- ~~3. aggregate source~~

~~When changes in the CMDP are in accordance with 501.04(b), the new CMDT shall be verified on the first subplot of production in accordance with 501.06, except the DMTE will use the acceptance test results for verification. The CMDT will be documented as a CMDP after verification. Production may continue until flexural strength tests are completed as long as all other properties are in accordance with 501.05. If the flexural strength is not in accordance with 501.05, production shall stop. All PCCP constructed with the new CMDT will be adjudicated as a failed material in accordance with normal Department practice in accordance with 105.03. No CMDT adjustments in accordance with 501.17 will be allowed. The CMDP shall be submitted to the DMTE utilizing the Department furnished spreadsheet by the end of the second lot. Production~~

~~shall stop upon the end of the first subplot of the third lot if the CMDP is not received by the DMTE.~~

~~A CMDP from a previous contract may be submitted for use on additional contracts.~~

The CMDS is used to conduct a trial batch in accordance with 501.06. Upon completion of the trial batch, the Contractor shall submit the concrete mix design for production, CMDP. The CMDP shall be submitted to the DTE utilizing the Department furnished spreadsheet a minimum of three work days prior to production. Production shall not commence without an approved CMDP. Both the Contractor's and Engineer's test results from the trial batch will be included in the CMDP submittal.

A CMDP may be changed or adjusted in accordance with the following:

(a) Change in Materials

A change in a previously approved CMDP, for a given contract, to any of the following shall be submitted to the DTE as a CMDS, referencing the original CMDP.

1. *cement source or type*
2. *pozzolan source or type*
3. *coarse aggregate source or type*
4. *admixture type*

A trial batch shall be conducted in accordance with 501.06, or verification of the new CMDS may be made during the first day of production by tests conducted by the Contractor and the Engineer. Acceptance test results may be used for the Engineer's verification tests. Production may continue until flexural strength tests are completed, provided all other properties are in accordance with 501.06. The test results shall be submitted to the DTE utilizing the Department spreadsheet no later than one day after the flexural strength test results are complete. If the flexural strength is not in accordance with 501.06, production shall stop and all PCCP constructed with the new CMDS will be adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.

(b) Adjustments to Materials

An adjustment in a previously approved CMDP, for a given contract, to any of the following shall be submitted to the DTE as a CMDS, referencing the original CMDP.

1. *admixture source*
2. *admixture product of the same type and from the same source designated in the original CMDP*
3. *fine aggregate source*
4. *target unit weight due to change in aggregate properties*
5. *fine to total aggregate ratio in excess of ± 3 % from the value designated by the original CMDP*
6. *increase in cement content from the amount designated in the original CMDP*

The new CMDS shall be submitted to the DTE utilizing the Department spreadsheet a minimum of one work day prior to production. A trial batch or verification testing is not required for approval. Production shall not commence without an approved CMDP.

(c) Other Adjustments

Other adjustments in an approved CMDP, for a given contract, to any of the following will be permitted and DTE notification and approval prior to use is not required.

1. *admixture dosage rate*
2. *fine aggregate to total aggregate ratio within ± 3 % of the value designated by the original CMDP*

An approved CMDP from a previous contract may be used on additional contracts. The CMDP shall be submitted to the DTE for review and approval prior to use.

SECTION 501, BEGIN LINE 99, DELETE AND INSERT AS FOLLOWS:

501.05 Concrete Mix Criteria

The CMD shall produce workable concrete mixtures having the following properties:

~~Minimum portland cement content..... 440 lbs/yd³ (260 kg/m³)~~
Minimum portland cement content..... 400 lbs/yd³ (240 kg/m³)

SECTION 501, BEGIN LINE 141, DELETE AND INSERT AS FOLLOWS:

501.06 Trial Batch

A trial batch shall be produced and tested by the Contractor's certified technician to verify that the CMDS ~~or CMDT~~ meets the concrete mix criteria. *Concrete produced at a plant* ~~The concrete~~ shall be batched within the proportioning tolerances of 508.02(b). *Concrete batched in a laboratory shall be in accordance with ASTM C 192.* The Engineer will test the trial batch and provide the Contractor with the results. The trial batch shall be of sufficient quantity to allow the Contractor and the Engineer to perform all required tests from the same batch. Trial batch concrete shall not be used for more than one test, except the concrete used for the unit weight (mass) may be used to conduct the air content test. *The air content shall be 5.0% to 10.0%. The plastic unit weight (mass) shall be within $\pm 3.0\%$ from the target plastic unit weight of the CMDS. The water/cementitious ratio shall be within ± 0.030 of the target value of the CMDS and shall not exceed 0.450. The flexural strength shall be determined by averaging a minimum of two beam breaks and shall be a minimum of 570 psi (4000 kPa).*

~~The target unit weight (mass) and water/cementitious ratio of the plastic concrete shall be determined by the trial batch. The flexural strength shall be determined by averaging a minimum of two beam breaks.~~

Test results shall be added to the *Department spreadsheet CMDS or CMDT* and submitted to the DMTE in accordance with 501.04. *Adjustments to the target unit weight (mass) and the target water/cementitious ratio may be made.*

A trial batch is not required for a CMDS that has any of the following criteria:

- (a) minimum cement content of 564 lbs/yd³ (335 kg/m³) and a target water/cementitious ratio of 0.420*
- (b) class C concrete in accordance with 702 using Class AP coarse aggregate*

SECTION 501, BEGIN LINE 165, DELETE AND INSERT AS FOLLOWS:

Lots and sublots will be *numbered and tested on the CMD's* for a given pay item. ~~Lots and sublots~~ regardless of the number of CMD's used and will be closed out at the end of the paving season or construction phase.

SECTION 501, LINE 180, DELETE AND INSERT AS FOLLOWS:

Test or Determination	Frequency	Test Method	Precision
7-Day Flexural Strength	Two beams per subplot	AASHTO T 97	1 psi (10 kPa)
Air Content	One per subplot	AASHTO T 152 or ASTM C 173	0.1
Unit Weight	One per subplot	AASHTO T 121	1
Water/Cementitious Ratio	Onee per two lots week	ITM 403	0.001
Thickness	Two per subplot	ITM 404	0.1

SECTION 501, BEGIN LINE 290, DELETE AS FOLLOWS:

501.17 CMDT Adjustments Blank

~~The target water/cementitious ratio and target unit weight may be adjusted during the first lot of each year's production or as a result of fluctuations in fine or coarse aggregate specific gravities.~~

~~Adjustments to the dosage amount of admixtures will be permitted; however, a new CMDS will be required for the addition or deletion of an admixture.~~

~~The fine aggregate to total aggregate ratio may be adjusted by $\pm 3\%$ within the limits of 501.05.~~

SECTION 502, BEGIN LINE 40, DELETE AND INSERT AS FOLLOWS:

~~(a) Change in Materials~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

- ~~1. cement type~~
- ~~2. admixture type~~
- ~~3. pozzolan type~~
- ~~4. aggregate material~~

~~(b) Change in Source~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

- ~~1. cement source~~

- ~~2. admixture source~~
- ~~3. pozzolan source~~
- ~~4. aggregate source~~

~~(c) Change in Mixture~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

- ~~1. proportions of aggregates by weight (mass) exceeding $\pm 2\%$~~
- ~~2. addition or deletion of an admixture~~

Any of the following changes or adjustments to an existing CMDP shall require a new CMDS to be submitted to the DTE.

- (a) cement source or type*
- (b) pozzolan source or type*
- (c) aggregate source or type*
- (d) admixture source or type*
- (e) addition or deletion of an admixture*
- (f) proportioning of the concrete in accordance with 502.04 as follows:*

- 1. cement content or cement reduction*
- 2. pozzolan to cement substitution ratio*
- 3. target water/cementitious ratio*
- 4. proportion of aggregate by weight (mass) exceeding $\pm 2\%$*

A CMDP in accordance with 501.05 ~~may be used upon the approval of the DMTE.~~ A or a CMDP in accordance with 502.04 from a previous contract may be submitted for approval ~~of~~ to the DMTE.

SECTION 502, BEGIN LINE 77, DELETE AND INSERT AS FOLLOWS:

Maximum substitution of fly ash for portland cement	20%
Maximum cement reduction for fly ash replacement	20%
Fly Ash/portland cement substitution ratio	1.25 by weight (mass)
Maximum substitution of GGBFS for portland cement	30%
Maximum cement reduction for GGBFS replacement	30%

SECTION 505, BEGIN LINE 52, DELETE AND INSERT AS FOLLOWS:

(c) Exceptions to AASHTO T 121

The exceptions to AASHTO T 121 for determining the unit weight of concrete shall be as follows.

- ~~1. A strike-off bar in accordance with AASHTO T 152 may be used in lieu of a strike-off plate.~~

2 l. Weight (mass) shall be determined to the nearest 0.01 lb (0.005 kg).

SECTION 506, BEGIN LINE 44, DELETE AND INSERT AS FOLLOWS:

~~The CMDS is used to conduct a trial batch in accordance with 506.05. Upon completion of the trial batch, the Contractor shall submit results of the concrete mix~~

~~design trial to the DMTE for approval a minimum of three work days prior to production utilizing the Department provided spreadsheet. The DMTE will approve the submission as a CMDP, and production may commence. Both the Contractor's and the Engineer's tests will be included in the CMDS submittal.~~

~~(a) Change in Material~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

- ~~1. cement type~~
- ~~2. admixture type~~
- ~~3. aggregate material~~

~~(b) Change in Source~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

- ~~1. cement source~~
- ~~2. admixture source~~
- ~~3. aggregate source~~

~~Verification of the new CMDS will be conducted during production including sampling and testing within the first 10 cyd (8 m³), for the following.~~

- ~~1. cement source, type I only~~
- ~~2. admixture source, air entraining admixtures only~~

~~A new CMDP will be issued upon approval of test verification by the DMTE.~~

~~(c) Change in Mixture~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

- ~~1. proportions of aggregates by weight (mass) exceeding $\pm 2\%$~~
- ~~2. addition or deletion of an admixture~~

~~A CMDP in accordance with 506.04 in the current or previous calendar year may be substituted for use upon the approval of the DMTE.~~

The CMDS is used to conduct a trial batch in accordance with 506.05. Upon completion of the trial batch, the Contractor shall submit the concrete mix design for production, CMDP. The CMDP shall be submitted to the DTE utilizing the Department furnished spreadsheet a minimum of three work days prior to production. Production shall not commence without an approved CMDP. Both the Contractor's and Engineer's test results from the trial batch will be included in the CMDP submittal.

A CMDP may be changed or adjusted in accordance with the following:

(a) Change in Materials

A change in a previously approved CMDP, for a given contract, to any of the following shall be submitted to the DTE as a CMDS, referencing the original CMDP.

1. cement source or type
2. pozzolan source or type
3. coarse aggregate source or type
4. admixture type(s)

A trial batch shall be conducted in accordance with 506.05, or verification of the new CMDS may be made during the first day of production by tests conducted by the Contractor and the Engineer. Production may continue until flexural strength tests are completed, provided all other properties are in accordance with 506.04. The test results shall be submitted to the DTE utilizing the Department spreadsheet no later than one day after the flexural strength test results are complete. If the flexural strength is not in accordance with 506.04, production shall stop and all PCCP patching constructed with the new CMDS will be adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.

(b) Adjustments to Materials

An adjustment in a previously approved CMDP, for a given contract, to any of the following shall be submitted to the DTE as a CMDS, referencing the original CMDP.

1. admixture source
2. admixture product of same type and from same source designated in the original CMDP
3. fine aggregate source
4. fine to total aggregate ratio in excess of ± 3 % from the value designated by the original CMDP
5. Increase in cement content from amount designated in the original CMDP.

The new CMDS shall be submitted to the DTE utilizing the Department spreadsheet a minimum of one work day prior to production. A trial batch or verification testing is not required for approval. Production shall not commence without an approved CMDP.

(c) Other Adjustments

Other adjustments in previously approved CMDP, for a given contract, to any of the following will be permitted and DTE notification and approval prior to use is not required.

1. admixture dosage rate
2. fine aggregate to total aggregate ratio within ± 3 % of the value designated by the original CMDP

An approved CMDP, from another contract in the current or previous calendar year may be used on additional contracts. The CMDP shall be submitted to the DTE for review and approval prior to use.