

Proposed Specification Revisions February 2015

The CAS Bureau is proposing revisions to 9 Standard Specifications. These proposed revisions will be out for comment during the month of February, 2015.

1.	105.03.3	Quality Incentive Allowance	Reword
2.	109.10	Overpayments	Delete STIP
3.	208.03.2	Water Pollution Control	Address termination
4.	401.03.1	Mix Design	Add Form
5.	551	Concrete	Cleanup
6.	610.03.2	Seeding, Fertilizing, and Mulching	Contract Time
7.	620.03.1	General	Beads off QPL
8.	620.03.7	Final Pavement Markings	Final Markings on $\frac{3}{8}$ "
9.	713.05	Topsoil	Add Landscape Grade

105.03.3 Quality Incentive Allowance

Quality incentive allowances will be used to offset any price reductions.

The net incentive or disincentive amount will applied as a line item adjustment on the pay estimate following completion of the item of work.

Deleted: All quality incentive allowance remaining after all price reductions have been deducted will be paid as a lump sum

109.10 OVERPAYMENTS

1. Notify the Contractor of the overpayment. The Contractor has 30 calendar days from the date of receipt of notification of overpayment to repay the money owed. If the money owed is not received by the Department before the 30-day period expires, interest will be charged on the overpayment beginning with the date of receipt of notification of overpayment. The interest rate charged will be 10% or the highest rate allowed by the law for the period in which the overpayment is not repaid.

The Contractor may be barred from bidding on Department projects until the money that is owed has been received.

Deleted: the average Short Term Investment Pool (STIP) rate, determined by the Montana State Board of Investments,

208.03.2 Water Pollution Control

If it is determined the permit can be terminated, terminate the permit with the agency and pay any applicable fees. Submit the invoice of the termination fee to the Project Manager. The Department will reimburse the invoice price of the termination.

401.03.1 Mix Design

Submit to the Project Manager 4 copies of a plant mix design following AASHTO R 35 and meeting AASHTO M 323. [Use form MDT-MAT-009 as a mix design cover page.](#) **Ensure all fields are completed.** [The mix design and cover sheet may be submitted electronically. Mix designs submitted without the cover sheet or submitted with a cover sheet that doesn't contain all the applicable information will be rejected.](#) Include the binder supplier's recommended mixing and compaction temperature ranges. This compaction temperature range is for testing purposes only. Choose the design air voids target to be the lowest value, within the range of 3.4 to 4.0, as long as all other criteria are met. Report the D/A for the target asphalt content. The mix design is to be produced on a total weight of mix basis. On contracts with multiple gravel sources, or combination of gravel sources, provide a mix design and meet all the requirements for each source or combination of sources and suppliers. For mix designs using RAP, furnish the asphalt content and gradation of the RAP and furnish the total asphalt content and Job Mix Formula gradation including the RAP. Furnish all specific gravities.

551.02.1 Cement

Furnish low-alkali hydraulic cements meeting the following requirements as specified in the contract:

- A. Furnish low-alkali hydraulic blended cement in accordance with AASHTO M 240, Type IP or IS. When fly ash or ground granulated blast furnace slag (GGBFS) is used in blended cement, limit the replacement amount to the maximums specified in Subsections [551.03.2\(A\)\(5\)](#).

551.03.2 Composition of Concrete

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TABLE 551-3
CONCRETE REQUIREMENTS

Class	Nominal Maximum Aggregate Size inches (mm) ¹¹	Maximum Cementitious Materials Content, lbs./yd ³ (kg/m ³) ¹³	Indicated Compressive Strength, 7-Day, PSI (MPa)	Minimum Required Compressive Strength, 28-Day, PSI (MPa) ⁷	Maximum Water / Cement Ratio (W/C) ⁷	Maximum Target Value for Slump, inches (mm) ³	Slump Tolerance, inches (mm)	Required Air Content, (%) ⁹
General ¹⁰	1½ (37.5) - ¾ (19)	658 (390)	—	4000 (28)	0.45	5 (130)	+1½ (37) to -2 (50)	5.5-8.5
Pave ¹	1½ (37.5) - ¾ (19)	658 (390)	Note 5	4000 (28)	0.45	3 (75)	—	5.5-8.5
Pre ²	¾ (19)	—	—	Note 2	0.40	—	—	—
SCC	¾ (19)	—	—	Note 6	0.42	See Special Requirements for SCC Concrete	—	5.5-8.5
Deck	¾ (19)	564 (334)	Note 4	4000 (28)	0.42	5 (130)	—	5.5-8.5
Overlay-SF	½ (12.5)	580 (344)	Note 12	4000 (28)	0.42	5 (130)	+1½ (37) to -2 (50)	5.5-8.5
Overlay-LM	½ (12.5)	660 (392) min	Note 12	4000 (28)	0.30 - 0.40	5 (130)	—	3.0-6.5
Structure	1½ (37.5) - ¾ (19)	580 (344)	Note 4	4000 (28)	0.42	6 (150)	—	5.5-8.5
Drilled Shaft	¾ (19)	—	Note 4	4000 (28)	0.45	See Special Requirements for Drilled Shaft Concrete	—	Note 14

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Notes:

- For concrete pavement, the 28-day flexural strength requirement is 500 psi (3.5 MPa) minimum, determined by AASHTO T 97.
- The strength for transfer of pre-stress and the 28-day strength requirement vary with beam length and design. Check plans and specifications for each project.
- The designed target value for slump may be changed, within requirements, when necessary to facilitate proper placement.
- Compressive strength must be 80% of the design strength before form removal.
- For full-depth concrete pavement, the flexural strength requirement to open to traffic is 350 psi (3.5 MPa) minimum determined by AASHTO T 97 or 3500 psi (24 MPa) compressive strength.
- For self-consolidating concrete, the 28-day strength may vary with the class of concrete specified. Check plans and specifications for each project.
- Maximum water cement ratios and minimum 28-day design strength requirements do not relieve the contractor of supplying concrete producing adequate freeze-thaw protection.
- Mix designs with other nominal maximum aggregate sizes may be requested based on certain placement and design scenarios.
- If 1½-inch (37.5 mm) nominal maximum aggregate is used in the design, the air content requirement is reduced to 4.5% - 7.5%.
- When class General is specified for seal concrete, air entrainment is not required.
- Nominal Maximum aggregate size is defined as one sieve size larger than the first size to retain more than 10%.
- Compressive strength must reach a minimum of 3,000 psi (21 MPa) before opening to traffic.
- When high-early strength concrete is required by contract, higher cement contents may be submitted for approval.
- Air entrainment is required if any portion of the drilled shaft is above the finished grade or water level.
- Air entrainment is required if any portion of the drilled shaft is above the finished grade or water level.

A. Design. Design the concrete mix as follows:

2. Design the concrete mix to meet Table 551-3 requirements or the requirements stated below for specific classes of concrete. State the design proportions in terms of aggregates in a saturated, surface dry condition. Submit the proposed aggregate source and proportion computations. Submit a final mix design for approval at least 15 business days before intended use on form [MDT-MAT-008](#).

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B. Class Deck and Overlay-SF. Design and produce class Deck and Overlay-SF concrete in accordance with Table 551-3 and the following:

- [Use silica fume. Include fly ash and/or GGBFS as SCMs.](#)
- [SCMs replacement quantities must meet the requirements of Subsection 551.02.](#)
- [Use compatible air entraining, water reducing and/or super-plasticizing admixtures.](#)
- Mix requires trial batch rapid chloride permeability test results in accordance with AASHTO T 277 less than 1500 coulombs at 28 days or surface resistivity test results in accordance with AASHTO TP 95 greater than 35 kilohm-centimeters at 28 days.
- Submit a batching sequence procedure with the mix design including the amount of material charged and the time before the next material will be added. Include approximate mixer revolutions for each stage of the sequence.

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D. Class Structure Concrete. Design and produce Class Structure concrete in accordance with Table 551-3.

5. Include in the mix design air-void spacing results according to ASTM C457 modified point-count method at 100x magnification. The average of all tests must not exceed 0.009-inch ([0.230 mm](#)) with no single test greater than 0.010-inch ([0.260 mm](#)). The total air content must exceed 5.5%.

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F. Prepackaged Concrete. Prepackaged concrete or rapid set patching material must contain a product data sheet proving the product [meets](#) the specifications required for its intended use. Prepackaged concrete is subject to Project Manager approval.

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551.03.8 Testing and Acceptance of Concrete

A. [Pre-testing of Concrete \(Classes Structure, Deck and Overlay\).](#) [Pre-testing is not required for concrete placements smaller than 7 cubic yards \(m³\). The Department will perform pre-tests for air content and slump at the start of each concrete production run and any time there is a significant change in the pumping configuration or concrete placement as determined by the Project Manager. Meet the following requirements:](#)

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- [1. Discharge and waste a minimum of 0.25 cubic yards \(0.2 cubic meters\) of concrete.](#)
- [2. Collect a sample.](#)
- [3. If slump and air content pre-tests indicate the sampled concrete meets applicable specifications, placement may begin.](#)
- [4. If a pre-test produces a failing result, the truck may be dosed, with approved admixtures in accordance with Subsection 551.03.3\(H\).](#)
- [5. If the pre-test again produces a failing result, the truck will be rejected. The testing process will be repeated on subsequent trucks until passing air and slump results are achieved. Pre-test results are not used for concrete lot acceptance.](#)

B. Sampling and Testing. Furnish an adequate and representative sample of concrete in accordance with MT 105 from the point of placement to an area designated by the Project Manager for testing of concrete properties and molding of test specimens. Do not drop or agitate samples. The sampling and transport must be witnessed by the Department. The Department will take possession of the sample and begin the following applicable tests.

C. Acceptance of Concrete. The concrete must meet all contract specifications and the following:

- 1. Classes General, Deck, Pave, Structure, Overlay and Drilled Shaft Concrete.** These classes of concrete are evaluated for acceptance on a lot-by-lot basis.

An individual lot is defined as a single days pour or every 200 yd³ (150 m³) of concrete poured (i.e. 200 yd³ = 1 lot, 400 yd³ = 2 lots, etc.) whichever is less, excluding Class Pave. An individual lot of Class Pave concrete is defined as a single day's pour or every 1,000 yd³ (750 m³) of concrete poured, whichever is less. Each lot is accepted or rejected based on the lot acceptance air tests, strength tests, gradation tests and when applicable, permeability tests. The pay factors for each lot accepted are determined from Table 551-5, 551-6, 551-7 and 551-8.

Deleted: Partial lots may be created or added to the preceding lot at the Project Manager's discretion.

The overall lot pay factor will be calculated for each bid item that has concrete as a component poured on the project and will be applied as a line item adjustment on the estimate.

Pay factors will not be calculated for precast items.

- a. Strength.** A minimum of 2 standard compressive strength sets will be made for each lot. Each set will be made from concrete taken from a separate batch or load randomly selected from all loads or batches in the lot. For a lot less than 30 cubic yards (23 m³), the Project Manager may elect to make 1 set of compressive strength cylinders to represent that lot.

Three cylinders from each set of cylinders are tested for compressive strength at 28 days and the fourth is tested at 7 days. The test result is the average of the strengths of the 3 individual 28 day cylinder specimens unless an outlier is identified. An outlier is defined here as 1 compressive strength specimen with a result differing from the average of the 2 closest compressive strength specimens by greater than or equal to 10% of the averaged value. If an outlier is identified, that specimen will be removed and the average strength will be determined using the remaining 2 specimens. To determine an outlier, the results of the 2 specimens with the closest strengths, will be averaged. If the strength result of the remaining cylinder differs by more than 10% from the average, it will be considered an outlier.

The lot acceptance strength is the average of the test results for the lot.

TABLE 551-5

CONCRETE STRENGTH PAY FACTORS

Strength Pay Factors	
Classes Deck, Overlay, Structure, General, Pave, and Drilled Shaft Concrete	
lot acceptance strength, x psi (1 psi = 6.9 kPa)	
strength, x (psi)	strength pay factor, PF _s
x ≥ 4,000	PF _s = 1.0
4,000 > x ≥ 3,500	PF _s = 1.0 - $\frac{0.15(4000 - x)}{500}$
3,500 > x ≥ 2,800	PF _s = 0.85 - $\frac{0.85(3500 - x)}{700}$
2,800 > x	PF _s = 0, remove and replace

The pay factors shown will be used when the department determines the concrete is acceptable at less than the specified strength. The Department may require removal and replacement or corrective action for any concrete not in accordance with the required strength.

- c. **Permeability.** Concrete permeability will be determined at or after 28 days in accordance with either AASHTO T 277 (Table 551-7); A minimum of 1 set of 3 cylinders will be cast per lot following MT 101 for testing permeability. The lot acceptance permeability is the average of the test results for the lot. The pay factor for each lot based on permeability is determined from Table 551-7.

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TABLE 551-7

CONCRETE PERMEABILITY PAY FACTORS (COULOMBS)

Lot Acceptance, Permeability, x (coulomb)	
Classes Deck and Overlay ¹	
lot chloride permeability test result, x (coulombs)	permeability pay factor, PF _p
1,500 ≥ x	PF _p = 1.05
2,000 ≥ x > 1,500	PF _p = 1.05 - $\frac{0.05(x - 1500)}{500}$
3,000 ≥ x > 2,000	PF _p = 1.00 - $\frac{0.30(x - 2000)}{1000}$
x > 3,000	0.70

Note 1: If Class Structure is specified for a bridge deck, the incentive may be paid, but no deduction will occur for permeability results.

The pay factors shown will be used when the department determines the permeability of the in-place concrete is acceptable with results less than specified. The Department may require removal and replacement or corrective action for any concrete not in accordance with the required permeability.

- d. **Gradation.** Concrete aggregate gradations will be determined in accordance with MT 202 or MT 215, if applicable. A minimum of one gradation test will be performed per 200 cubic yards. The test result will be used in the OLPF calculation for each lot of concrete placed within that 200 cubic yards.

- 1) **Conventional Gradations.** For concrete designed with conventional gradations, the Department will calculate the pay factor for the gradation using the following formula.

$$PF_G = 1.0 - \frac{(x)}{1000}$$

Where:

x = The sum of the individual percentages out of range on each aggregate fraction.

PF = Pay Factor

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CONCRETE PERMEABILITY PAY FACTORS (KQ-CM)
Lot Acceptance, Permeability, x (kQ-cm)
Classes Deck and Overlay¹

Deleted: Concrete aggregate gradations will be determined in accordance with MT 202 or MT 215, if applicable. The lot acceptance gradation is the average of the test results for each lot of concrete placed.

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2) **Optimized Gradations.** For concrete designed with optimized gradations the Department will calculate the pay factor for the gradation using the following formula.

$$PF_G = 1.0 - \frac{0.25(x) + 2(y)}{250}$$

Where:

x = The sum of percentages out of tolerance on each individual aggregate fraction (reported to the whole number).

y = Percentage out of tolerance on the No. 200 (0.075 mm) sieve fraction (reported to the tenth of a percent).

PF = Pay Factor

If all gradation tests in the lot produce passing results, the following pay factor will be used:

$$PF_G = 1.02$$

The following formulas are used to calculate the OLPF and unit price adjustment ADJ. All pay factors (PF_S , PF_P , PF_{AC} , and PF_G) must be 1.00 or greater for the production lot to be eligible for positive ADJ (incentive). If any individually calculated pay factor (PF_S , PF_P , PF_{AC} , and PF_G) is less than 1.00, the maximum value for its companion pay factor (PF_S , PF_P , PF_{AC} , and PF_G) to be used in the OLPF calculation for the respective production lot will not exceed 1.00. No OLPF can exceed 1.07.

$$OLPF = PF_S \times PF_{AC} \times PF_P \times PF_G$$

$$ADJ = (OLPF - 1) \times Price$$

Where

ADJ = Price adjustment per pay unit to be applied to the production lot quantity

Price = Contract unit price for the pay item

If a pay factor is not applicable to a specific class of concrete, the pay factor (PF) will be 1.00. Use Table 551-9 to determine pay factors applicable to specific classes of concrete.

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Deleted: For concrete designed with optimized gradations not in accordance with the specified tolerances in Section 701, the Project Manager will make determinations regarding the disposition, payment, or removal of the material. The Department will adjust the contract unit price for the concrete contract item in accordance with the following formulas. When there is not a separate contract unit price for an item of work or the concrete is a minor component of the contract unit price, the Department will reduce payment based on the Contractor-provided invoice amount for the concrete in question. The following pay factor will be used when all gradation tests in the lot produce passing results with no individual aggregate fraction out of tolerance.

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$$PF_G = 1.0 - \frac{0.25(x) + 2(y)}{25}$$

Where:¶

x = The sum of percentages out of tolerance on each individual aggregate fraction (reported to the whole number).¶

y = Percentage out of tolerance on the No. 200 (0.075 mm) sieve fraction (reported to the tenth of a percent).¶

PF = Pay Factor¶

TABLE 551-9

PAY FACTORS FOR CONCRETE

PF Type	Deck	Overlay	Structure	General	Drilled Shaft	Pave
PF _S	X	X	X	X	X	X
PF _{AC}	X	X	X	X		X
PF _P	X	X				
PF _G	X	X	X	X	X	X

610.03.2 Seeding, Fertilizing, and Mulching

B. Seeding Season. The seeding season is October 1st through May 15th. Obtain the Project Manager's approval to seed outside this period. [If contract time has been stopped awaiting the seeding season, contract time assessment will resume when the seeding begins or October 15th, whichever occurs first.](#)

620.03.1 General

Furnish a manufacturer's material certification or data sheet for the product to be used. Do not apply materials that do not meet the contract requirements. The Project Manager may request a manufacturer's sample or take field samples for testing. Furnish a material sample weighing at least 2 pounds (0.91 kg). Furnish temporary waterborne traffic paint, waterborne traffic paint, high durability waterborne traffic paint and epoxy traffic paint listed on the QPL.

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620.03.7 Final Pavement Markings

[For markings on seal coats and concrete,](#) apply final pavement markings a minimum of 30 calendar days, and a maximum of 45 calendar days, after concrete is placed or after seal coat operations through initial sweeping are completed. When final pavement markings are the only remaining item of work on the project, contract time assessment will be suspended until either [final pavement marking application begins](#), or [until](#) 45 calendar days elapse after seal coat operations are completed or concrete placement is completed. The Project Manager may extend the 45 days due to holidays or inclement weather that prevent the application of final pavement markings.

[For markings on 3/8-inch plant mix, apply final pavement marking immediately following the completion of mainline paving.](#)

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713.05 TOPSOIL

Furnish topsoil meeting Table 713-4 gradation requirements.

**TABLE 713-4
TOPSOIL GRADATION REQUIREMENTS**

Fraction	Particle Size (mm)	Max. % Of Soil (-10 Mesh) (2mm) Fraction
Sand	0.05-2.0	85
Silt	0.005-0.05	80
Clay	less than 0.005	50
Gravel	larger than 2.0	max. % of total sample ¹

Notes:

1. A maximum of 20% is allowable. Any quantity exceeding 10% is not included in the basis for payment. Gradation is tested in accordance with AASHTO T 88.

Meet the following:

1. Soil pH between 5.5 and 8.0 or up to 8.5 if the exchangeable sodium is less than 10%;
2. Soil electrical conductivity less than 4.0 mmhos/cm; and
3. Organic content between 2% and 10%. When landscape grade topsoil is specified, ensure organic content is between 5% and 10%.

Topsoil is sampled and tested in accordance with MT 601.

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