NOTICE

This is a project special provision that revises or modifies CDOT’s *Standard Specifications for Road and Bridge Construction*. It has gone through a formal review and approval process and has been issued by CDOT’s Construction Engineering Services Branch with formal instructions for its use on CDOT construction projects. It is to be used as written without change. Do not use modified versions of this special provision on CDOT construction projects, and do not use this special provision on CDOT projects in a manner other than that specified in the instructions unless such use is first approved by CDOT’s Standards and Specifications Unit. The instructions for use on CDOT construction projects appear below.

Other agencies which use the *Standard Specifications for Road and Bridge Construction* to administer construction projects may use this special provision as appropriate and at their own risk.

**Instructions for use on CDOT construction projects:**

Use this standard special provision on projects with structural concrete.

The Standard Special Provision issued October 4, 2019 is revised as follows:

Delete subsection 601.02 Class P Items (4) & (8) and replace with the following:

(4) ASTM C150 Type III cement may be used for early opening.

(8) A minimum of 20 percent Class F fly ash or High Reactivity Pozzolan or 30 percent Slag cement by weight shall be used to replace any ASTM C150 cement, or ASTM C595 Type IL cement. ASTM C595 Type IT(MS), IT(HS), IP(MS) or IP(HS) cements may be used without cement substitutions. Class C fly ash may be used if the calcium oxychloride is determined to be less than 15 g CaOXY/100 g cementitious paste as determined in accordance with AASHTO T 365 for Class 0 Sulfate Exposure.

Delete subsection 601.02 Class PS and replace with the following:

**Class PS** Class PS concrete is used for prestressed concrete members. Requirements for Class PS concrete are specified in subsection 618.11. ASTM C150 Type III cement may be used.

Delete subsection 601.04 and replace with the following:

**601.04 Sulfate Resistance.** The Contractor shall provide protection against sulfate attack on concrete structures and pavements by providing concrete manufactured according to the requirements of the specified Sulfate Exposure Class. The sulfate exposure class for all concrete except Class PS shall be Class 2 unless otherwise specified on the plans. The sulfate exposure class for Class PS shall be Class 0. The requirements for a higher sulfate exposure class may be used for lower sulfate exposure classes.

The Contractor may request to test the soil and water at a structure location to change the sulfate exposure class. Testing and sampling of the location shall be at a frequency approved by the Engineer, in consultation with the Region Materials Engineer. If the Contractor provided test reports that show another class of exposure exists at a structure location, the Engineer may accept a concrete mix for that location at the changed sulfate exposure class.

Cementitious material requirements for each Sulfate Exposure Class are as follows:

Class 0 requires that the concrete have a maximum Water/Cementitious Material Ratio of 0.45 and one of the following:

1. ASTM C150 Type I, II, III or V
2. ASTM C595 Type IL, IP, IP(MS), IP(HS) or IT

Class 1 requires that the concrete have a maximum Water/Cementitious Material Ratio of 0.45 and one of the following:

1. ASTM C150 Type II or V
2. ASTM C595 Type IP(MS) or IP(HS)
3. ASTM C150 Type III. Type III shall have no more than 8 percent C3A.
4. ASTM C595 Type IL(MS), IL(HS), IT(MS) or (HS)

Class 2 requires that the concrete have a maximum Water/Cementitious Material Ratio of 0.45 and one of the following:

1. ASTM C150 Type V with a minimum of a 20 percent substitution of Class F fly ash or slag cement by weight
2. ASTM C150 Type II or III with a minimum of a 20 percent substitution of Class F fly ash or slag cement by weight. The Type II or III cement shall have no more than 0.040 percent expansion at 14 days when tested according ASTM C452.
3. ASTM C150 Type II, III, or V plus High-Reactivity Pozzolan where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C1012
4. A blend of portland cement meeting ASTM C150 Type II or III with a minimum of 20 percent Class F fly ash or slag cement by weight, where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C1012
5. ASTM C595 Type IP(HS), IL(HS) or IT(HS). Class F fly ash, slag cement, or High-Reactivity Pozzolan may be substituted for Type IL cement.
6. ASTM C595 Type IL(MS) or IT(MS) plus Class F fly ash, slag cement, or High-Reactivity Pozzolan where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C1012

Class 3 requires that the concrete have a maximum Water/Cementitious Material Ratio of 0.40 and one of the following:

1. A blend of portland cement meeting ASTM C150 Type II, III, or V with a minimum of a 20 percent substitution of Class F fly ash or slag cement by weight, where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C1012
2. ASTM C150 Type II, III, or V plus High-Reactivity Pozzolan where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C1012
3. ASTM C595 Type IL(MS) or IT(MS) plus High-Reactivity Pozzolan where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C1012
4. ASTM C595 Type IP(HS), IL(HS), or IT(HS) having less than 0.10 percent expansion at 18 months when tested according to ASTM C1012. Class F fly ash, slag cement, or High-Reactivity Pozzolan may be substituted for Type IL cement.
5. ASTM C595 Type IL with a minimum of a 20 percent substitution of Class F fly ash or slag cement by weight, where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C1012
6. ASTM C150 Type I, II, III, or V or ASTM C595 Type IL plus a minimum of 20 percent Class F fly ash when the R factor of the fly ash is less than 0.75. R factor is determined using the following from the chemical composition of the fly ash:



ASTM C150 Type III cements may only be used in Class P or PS Concrete when approved by the Engineer.

Class C fly ash shall not be substituted for cement when Class 1, 2, or 3 sulfate resistance/exposure class is specified.

The maximum Water/Cementitious Material Ratio may be exceeded when an expansive cement additive is used.

When fly ash or high-reactivity pozzolan is used to enhance sulfate resistance, it shall be used in a proportion greater than or equal to the proportion tested in accordance to ASTM C1012, shall be the same source, and shall have a calcium oxide content no more than 2.0 percent greater than the fly ash or high-reactivity pozzolan tested according to ASTM C1012. ASTM C1012 test results are acceptable for up to two years from the completion date of the test.

**Table 601-2**

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| **Water-Soluble Sulfate (SO4) in Dry Soil, (%)** | **Sulfate (SO4) in Water, ppm** | **Sulfate Exposure Class** |
| 0.00 to 0.10 | 0 to 150 | Class 0 |
| 0.11 to 0.20 | 151 to 1,500 | Class 1 |
| 0.21 to 2.00 | 1,501 to 10,000 | Class 2 |
| 2.01 or greater | 10,001 or greater | Class 3 |

Delete subsection 601.05, fourteenth and fifteenth paragraph and replace with the following:

The Contractor shall submit a new Concrete Mix Design Report meeting the above requirements when a change occurs in the source, type, or proportions of cement, slag cement, fly ash, high-reactivity pozzolan, silica fume, or aggregate. Addition, removal, change of source, dosage change or type of fibers to an approved mix design shall require a new mix design. Adjustments to aggregate weights may be made to adjust yield if the combined gradation remains constant (+/-1 percent) or within the optimized band.

In subsection 701.01, delete ASTM C1157 Type GU, MS & HS