**Notice**

Sample Project Special Provision WORKSHEET

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

Use in projects with Concrete Pavement Repair or Rehabilitation Activities.

Typically PCCP repair can be completed with Class P (fast track) but when Project constraints limit lane closure time to 8 hours or less or when concrete needs to achieve opening strength of 2,500 psi in 6 hours or less, Class PRS Concrete should be specified. **(Pick Choice 2)**

When longer lane closures are allowed or concrete is allowed to gain strength in a longer period, specify Class P (fast track). The project may want to allow the Contractor the option of using Class PRS Concrete. **(Pick Choice 1)**

Do not include this Project Special Provision when Class PRS concrete is not allowed.

Do not use without approval by the Region Materials Engineer if the project intends to include Class PRS.

Include Revision of Sections 701 & 711 Rapid Hardening Cement Standard Special Provision.

Pick :

When either Class P or PRS is allowed, the pay item will remain Class P, **(Choice 1):**

When Class PRS is required, **(Choice 2):**

**Delete Subsection 412.45 and include the following:**

**412.45 Materials.** Concrete used shall be an approved Class P or PRS mix as specified in the Contract that will achieve 2500 psi in the time indicated in the plans.

**(CHOICE 2)** Subsection 412.51 shall include the following pay item.

|  |  |
| --- | --- |
| Pay Item | Pay Unit |
| Replace Concrete Pavement (Class PRS) | Square Yard |

**Revise Section 601 of the Standard Specifications for this project to include the following:**

**Description**

**601.26** This work consists of furnishing and placing accelerated pavement concrete on existing pavements in accordance with these specifications and in conformity with the lines, grades and dimensions as shown on the plans or established.

**Materials**

**601.27** The accelerated pavement concrete shall be designated as Class PRS (Class P rapid strength).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Concrete Class** | **Required Field Compressive Strength (psi)** | **Air Content: % Range (Total)** | **Slump** | **Maximum Water/Cementitious** **Material Ratio:** |
| **PRS** | 4500 at 28 days | 4 - 8 | +/- 2” of Form 1373 Slump | w/cm on Form 1373 |

**(Choice 1) Class PRS** concrete is used for concrete pavement rapid repairs. Class PRS may be substituted for Class P concrete when approved by the Engineer. Additional requirements are:

**(Choice 2) Class PRS** concrete is used for concrete pavement rapid repairs. Class PRS shall be substituted for Class P concrete. Additional requirements are:

1. ASTM C1600 rapid hardening hydraulic cement shall be used.
2. Set-retarding admixtures such as citric acid or those meeting the requirements of AASHTO M194 may be used.
3. The unrestrained shrinkage shall not exceed 0.050 percent at 28 days when tested by CP-L 4103.
4. The mix shall either have a permeability not exceeding 2,500 coulombs at an age of not more than 56 days when tested in accordance with ASTM C1202 or have a surface resistivity of at least 12 kΩ-cm at 28 days using AASHTO T358.
5. The mix shall consist of a minimum 55 percent AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 357, or No. 467 coarse aggregate by weight of total aggregate.
6. The mix may use an OG with a nominal maximum aggregate size of at least ¾ inch.
7. Pozzolan shall not be substituted for cement.

**601.28 Mix Design Submittal Requirements.** Mix design submittals shall meet the requirements of subsection 601.05 with the following additional requirements.

1. Class PRS concrete shall include CP-L 4103 shrinkage test results at 28 days.
2. Class PRS concrete shall include a report of maturity relationships in accordance with CP 69.
3. Class PRS concrete shall include AASHTO T97 (ASTM C78) Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading). At least two specimens will be tested at 7 days and four specimens at 28 days. The lab trial mix shall produce a flexural strength of at least 650 psi at 28 days

Mix designs for Class PRS Concrete are approved for one year from date of the trial mix. When a Self-Contained Mobile Mixer (volumetric mixer truck) is used on the Project, the trial mix shall be performed with the volumetric mixer truck.

* 1. **Batching.** Batching shall meet the requirements of subsection 601.06

**601.30 Mixing.** Mixing shall meet the requirements of subsection 601.07. Mixing Class PRS shall require the use of a Self-Contained Mobile Mixer. The CDOT Engineer may approve other methods of mixing upon the Contractor placing a test section successfully with the proposed mixing method.

Self-Contained Mobile Mixer (Volumetric truck) are required for Class PRS concrete. The requirements of sub-section 601.07 (d) with the following shall be met:

1. When ice is used to cool the mix water, it must be melted before entering the mixer.

**601.31 Placing.** Placing shall meet the requirements of Section 412 with the following additional requirements:

(a) General. A pre-pour meeting with the Contractor, sub-contractor, material supplier and Department personnel shall be held prior to Class PRS concrete placement to discuss the following:

1. Delivery of mix. The sample ticket for each batch shall list all cements, water, aggregates & admixtures. One shall be required from each truck.
2. How/when the Strength/Maturity Meter Curve will be verified in the field.
3. Concrete curing.
4. Concrete protection.
5. Time and depth of early age saw cutting.
6. Washout bin staging.
7. Handling of concrete cylinders.
8. Placement of maturity probes.
9. Hot Weather placements.
10. Cold weather placements.
11. Opening to traffic.
12. Test Section requirements
13. Class PRS shall require a test section. The location of the test section shall be approved by the Engineer. The test section shall have a cross section similar to the repair cross section and be a minimum of one slab in length or as approved by the Engineer. The test section placement shall have the same haul time, placing crew, finishing crew, and curing as the project. If saw cutting is required on the project, the test section shall be saw cut to determine the minimum curing time to minimize sawcut raveling. If the test section has excessive voids, cracking, surface irregularities or fails to gain adequate strength, determined by maturity meter(s), within the project time limits, an additional test section shall be required.
14. Class PRS concrete placement may occur when the concrete temperature is between 50 and 90 degrees F, when tested immediately after discharge from chute.
15. **Curing.** Curing shall be applied immediately following finishing operations. Curing compound manufacturer recommended application rates shall be followed, with a minimum rate of 200 SF/Gal. Curing Compound shall be an approved ASTM C 309, Type 2, Class B.
16. **Hot Weather Limitations.** A plan shall be submitted for approval prior to any placement when air temperature is expected to exceed 80 F. Procedures for maintaining and monitoring of temperatures of water, aggregates and admixtures during mixing, placement and curing of concrete shall be detailed as well as procedures to be implemented upon abrupt changes in weather conditions. Placing of concrete during hot weather shall be limited by the temperature of the concrete at the time of placing. Class PRS concrete which has a temperature of 90 F or higher, shall not be placed.
17. **Cold Weather Limitations.** When the ambient temperature is forecast to drop below 40 degrees F during placement and up to 24 hours after placement a plan shall be submitted for approval prior to any placement. Procedures for maintaining and monitoring of temperatures of water, aggregates and all other admixtures during mixing, placement and curing of concrete shall be detailed as well as procedures to be implemented upon abrupt changes in weather conditions. Concrete shall not be placed on frozen subgrade. When blankets are used for cold weather protection, the blankets shall cover the entire placement area and at least 1 ft beyond the placement area in each direction.

**601.32 Finishing.** During finishing of Class PRS concrete, water and finishing aids shall not be added or worked into the surface. The surface texture of the Class PRS concrete shall match the texture of adjacent concrete pavement. The finished transverse and longitudinal surface elevation of the pavement shall be measured using a 10-foot straightedge. Areas to be measured will be directed by the Engineer. The Contractor shall furnish an approved 10-foot straightedge, depth gauge, and operator to aid the Engineer in testing the pavement surface. Areas showing high spots of more than 3/16 inch in 10 feet shall be marked and diamond ground until the high spot does not exceed 3/16 inch in 10 feet. Areas in a lane with more than 250 continuous feet of paving or diamond grinding in the direction of traffic, the surface texture will be considered acceptable when the average texture depth (ATD) of the panel is greater than 0.05 inch. The Contractor will perform surface texture testing in accordance with CP 77 Method B. Areas in a lane with more than 250 continuous feet of paving will be tested at a frequency of one test per 250 linear feet. Areas with deficient surface texture shall be diamond ground and retested.

**601.33 Opening to Traffic.** The pavement shall not be opened to traffic until the concrete has achieved a compressive strength of at least 2500 psi. Concrete compressive strength shall be determined by a maturity meter placed no more than 10ft from the end of the final placement of the shift. The contractor shall provide maturity meters and all necessary wires and connectors. The Contractor shall be responsible for the placement and maintenance of the maturity meters and wires. For placements with multiple maturity meters, the lowest compressive strength shall determine when the pavement may be opened to traffic. Prior to opening the pavement to traffic the roadway shall be cleaned.

**601.34 Acceptance and Pay Factors.** Class PRS concrete will be accepted following the requirements of subsection 601.17 with the following exceptions:

1. Compressive strength specimens shall be cast and initially cured at the placement location for at least 4 hours. Compressive strength specimens shall be moved prior to opening to traffic.
2. Slump testing will not be used for acceptance.
3. Sampling shall occur after at least 1 cu yd has been discharged from the mixer.