

From Pennsylvania Turnpike Authority Specifications

J06.00 WHITE CLASS AA CEMENT CONCRETE FOR BRIDGE PARAPETS

07/02/02

J06.01 Description – This work in the construction of concrete bridge parapets with White Class AA Cement Concrete.

J06.02 Material – Section 1001.2; except:

(a) Cement Concrete. Section 1001.2(a), add the following:

Class AA Cement Concrete per Section 704.1(b) except revise as follows:

1. Cement – Section 701. Except use White Portland Cement containing no more than 0.50% by weight of iron oxide.

Do not add fly ash or ground granulated blast – furnace slag to concrete.

2. Fine Aggregate – Section 703.1, Type A, except add the following: Provide white fine aggregate, from an approved source, of either crushed white marble, white limestone, or calcite. Provide aggregate that is clean, washed and free from dirt or any discoloring matter not containing more than 0.75 percent of ferric oxide. (Two possible sources of acceptable fine aggregate are Ontario Stone Corporation, Cleveland, OH and Hempt Brothers, Inc., Toland Quarry, PA).

3. Coarse Aggregate, Type A – Section 703.2, except use only light colored crushed stone or aggregate with at least three faces resulting from fracture. Do not use slag. Use No. 57, No. 67 or No. 8 size coarse aggregate to facilitate construction method. Note: Smaller size coarse aggregate may result in a concrete mix with a pasty consistency which may affect finishing.

4. Water – Section 720.1. Potable and free from iron or other impurities which may cause staining.

5. Admixtures – Section 711.3. Use only those admixtures that do not discolor the white cement concrete. Obtain written assurance from manufacturer that the admixture does not cause staining.

6. Pozzolan – Section 724. Add Section 724.4 – High-Reactivity Metakaolin. Certify as specified in Section 106.03(b)3. Remove 5% by mass (weight) of the cement and replace with an equal amount of high-reactivity metakaolin. Keep the water-to-cement+pozzolan ratio constant.

High-reactivity metakaolin is being used to control efflorescence by reacting with the free calcium hydroxide (lime) in the mix.

If the concrete is less fluid than required, use a water-reducer or superplasticizer instead of adding more water. Also be aware that the initial set time may be reduced by 5% to 8% when using high-reactivity metakaolin.

(b) Forms. Section 1001.2(a), add the following:

The white cement concrete will be cast against nonabsorbent surfaces, such as steel, treated wood, or overlaid (plastic-coated) wood forms.

J06.03 Construction – In accordance with Contract Drawings and 1001.3; except as follows:

- (a) Section 1001.3(a)1. Add the following:
Use only form release oil that will not contribute to the discoloration of the white cement concrete. Obtain written assurance from the manufacturer to this effect.
- (b) Section 1001.3(j). Add the following:
Use clean equipment for batching and mixing to prevent contamination by materials which may contribute to discoloration. Cement bins, weigh hoppers and mixers to be free of loose gray cement.
- (c) Section 1001.3(k)11. Add the following:
At least thirty (30) days prior to the anticipated construction of any bridge parapets or the construction of the 50-foot test section required for slip forming bridge parapets, mix a trial mixture using the approved mix design, the type of mixer and the mixing procedure planned for the project, and construct a test section of parapet at least 10 feet long. The 10-foot test section will be constructed off the bridge, wingwalls or approach slabs. Form the parapet test section using the same forms and forming procedures that are proposed for the cast-in-place parapet sections on the project. The mix will be placed in the form and evaluated for workability, slump, and plastic air content. Four cylinders will be molded for quality control testing. Field cure the cylinders in accordance with PTM No. 611.

Cure the test section using the same curing procedures proposed for the cast-in-place parapet sections on the project. Remove forms in the same manner and time period, and finish the concrete surfaces as proposed for the project. All exposed surfaces of the test parapet will be inspected after finishing and, if excessive irregularities and holes exist, the contractor will propose corrective methods to prevent such irregularities from occurring in the production parapets. Corrective methods will include, but not limited to, reevaluating form release agents and the use of overlays on wood forms.

The test section will be evaluated for relative reflectivity based on spectrophotometer values of L=75 (wet) and L=82 (dry). A minimum of 20 reading will be taken at random locations on the traffic side of the parapet for each wet and dry case. ASTM E1164 “Standard practice for Obtaining Spectrophotometric Data for Object-Color Evaluation” will be followed. Measurement will be made in daylight. Concrete will be acceptable for “whiteness” based on the following:

Wet Condition: 80% of the readings will be L 75 and the average will not be less than L 75.

Dry Condition: 60% of the readings will be L 82 and the average will not be less than L 82.

Do not construct any bridge parapets until written approval of the test section of parapet by the Engineer is received. A test section will be required for each bridge unless all parapets are to be placed on one continuous operation as

determined by the Engineer. The 10-foot parapet test sections are in addition to the 50-foot test sections for Slip Forming Bridge Parapets.

Construct an additional 10-foot test section in the event there is a change in the concrete mix design, concrete supplier, or construction method. Also, a 10-foot test section will be constructed on a biannual basis if directed by the Engineer.

(d) Curing White Cement Concrete Bridge Parapets.

- Cure by using white, liquid membrane-forming curing compound and the procedures in Section 1001.3(p)3.a. and cover with white polyethylene sheeting.
- Curing Cast-in-Place Fixed Formed Parapets:
 - Initially cure concrete by the water method of curing per Section 1001.3(p)3.b until form removal. Use only new burlap that is free of sizing or any substance that will cause staining. Thoroughly rinse the new burlap in water to remove soluble substances before placing on concrete surface.
 - Finish cure by applying liquid membrane forming curing compound per Section 1001.3(p)3.a after form removal. Do not use water-curing method after form removal.

J06.04 Measurement and Payment – Concrete bridge parapets with White Class AA Cement Concrete is included with the lump Sum bid price for the indicated structures.