Guide Specification for Highway Construction

Texturing Concrete Pavement for Reduced Tire/Pavement Noise using Artificial Turf Drag

Designation: CPSCP GS 2-11 (rev 3/1/2011)

National Concrete Pavement Technology Center

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1. SCOPE

1.1. This document provides language that can be used by an Owner-Agency to develop materials and construction specifications with the objective of reducing tire/pavement noise. While the practices described herein are largely prescriptive, they have been demonstrated to increase the likelihood of constructing a durable, quieter concrete surface.

1.2. Guidance is provided herein for texturing the concrete surface since texture geometry has a paramount effect on tire/pavement noise. Guidance for curing is also provided to improve strength and durability of the surface mortar, and thus to improve texture durability.

2. SIGNIFICANCE AND USE

2.1. While these practices were developed with the intent of use in their entirety, some benefit is possible with partial implementation. Measures should be taken to ensure that implementation is compatible with the friction design policy of the Owner-Agency. The Owner-Agency should also recognize that aspects of a prescriptive specification could conflict with end-result or performance specifications. Measures should be taken during implementation to minimize the potential for conflict.

3. CONSTRUCTION

3.1. Complete final texturing as soon as possible after finishing, but before the concrete has attained its initial set.

3.2. Drag artificial turf longitudinally along the concrete pavement surface after finishing to enhance texture. The turf shall be mounted on a work bridge or a moveable support system capable of varying the area of turf in contact with the pavement.

3.3. The turf drag shall be a single piece of artificial turf of sufficient length to span the full width of the pavement being placed. The turf shall have a means to adjust the height and/or length so as to always maintain a minimum of 5-foot longitudinal length of turf in contact with the concrete being placed. Where construction operations necessitate and with the approval of the Owner-Agency, the length and width of the turf may be varied to accommodate specific applications.

3.4. The turf used shall be an artificial grass type having a molded polyethylene pile face. The pile shall contain blades that are curled and/or fibrillated. The pile shall not contain straight, smooth monofilament blades. The pile shall include blade lengths of 0.6 to 1.3 inch. The turf shall have a minimum weight of 60 ounces per square yard. The backing shall be a strong, durable material not subject to rot, and shall be adequately bonded to withstand use as specified. Turf dragging operations should be delayed if there is excessive bleed water. During paving, prevent the turf

from getting plugged with grout or dragging larger aggregates or foreign materials by cleaning or replacing as necessary. Measures should be taken to ensure a surface of uniform appearance that is free from deep striations. Turf should be thoroughly cleaned or replaced at the end of each day's use. Damaged or worn turf should be repaired and/or replaced.

3.5. When surface corrections for pavement smoothness are made in the hardened concrete, no additional texturing is required.

4. TEXTURE REQUIREMENTS

4.1. Texture depth shall be verified by either Mean Texture Depth (MTD) per ASTM E 965 or the Estimated Texture Depth (ETD) calculated from the Mean Profile Depth (MPD) per ASTM E 1845.

4.2. Verification testing shall be conducted after concrete has hardened sufficiently. The Owner-Agency will determine representative test locations at points located in the outside wheel path without excessive curing compound that may affect the results. The running average of three MTD/ETD test results measured sequentially along the length of the pavement shall be no less than 0.03 in. If this value is not achieved, corrective action should be made to the affected area by diamond grinding and/or longitudinal diamond grooving.

5. CURING

5.1. Immediately following the texture operation, spray the concrete surface uniformly with 2 coats of membrane curing compound at an individual application rate not to exceed 180 sf/gal. If the evaporation rate during paving operations does not exceed 0.1 lb/sf/hr, then only 1 coat of membrane curing compound at an individual application rate not to exceed 180 sf/gal is permissible. Do not allow the concrete surface to dry before applying the curing compound. Remove any standing pools of bleed water that may be present on the surface before applying the curing compound. Apply the first coat within 10 min. after completing texturing operations. If applicable, apply the second coat within 30 min. after completing texturing operations.

Note 1—Unless an alternate technique is approved by the Owner-Agency, evaporation rate shall be evaluated using the Menzel nomograph or its underlying equations. For more information, refer to the "Guide to Curing Concrete," 308R-01, ACI International, http://www.concrete.org.

5.2. Maintain and promptly repair damage to curing materials on exposed surfaces of concrete pavement continuously for at least 3 curing days, or until the pavement is open to the traveling public, whichever occurs first. A curing day is defined as a 24-hr. period when either the temperature taken in the shade away from artificial heat is above 50°F for at least 19 hr. or when the surface temperature of the concrete is maintained above 40°F for 24 hr. Curing begins when the concrete curing system has been applied. Stop concrete paving if curing compound is not being applied promptly and maintained adequately.