
Guide Specification for Highway Construction

**Texturing Concrete Pavement for
Reduced Tire/Pavement Noise using
Transverse Tining**

Designation: CPSCP GS 4-11 (rev 3/1/2011)

National Concrete Pavement
Technology Center



**National Concrete Pavement Technology Center
2711 South Loop Drive, Suite 4700
Ames, IA 50010**

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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. SURFACE TEXTURE

- 3.1. Complete final texturing as soon as possible after finishing, but before the concrete has attained its initial set. This is accomplished by applying both a drag pretexture and by tining.

4. DRAG PRETEXTURE

- 4.1. Drag artificial turf or burlap longitudinally along the concrete pavement surface after finishing to enhance texture. The turf or burlap shall be mounted on a work bridge or a moveable support system capable of varying the area of turf or burlap in contact with the pavement.
- 4.2. The turf or burlap drag shall be a single piece of artificial turf or burlap of sufficient length to span the full width of the pavement being placed. The turf or burlap shall have a means to adjust the height and/or length so as to always maintain a minimum of 4-foot longitudinal length of turf or burlap 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 or burlap may be varied to accommodate specific applications.
- 4.3. 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.

- 4.4. The burlap material used shall meet Class 3 or Class 4 requirements of AASHTO M 182, "Standard Specification for Burlap Cloth Made from Jute or Kenaf." The trailing end of the burlap that is in contact with the concrete surface shall be frayed by removing yarns perpendicular to the direction of paving. The frayed burlap shall be 2 to 6 inches in length and uniform across the width of the pavement being placed.
- 4.5. Turf or burlap dragging operations should be delayed if there is excessive bleed water. During paving, prevent the turf or burlap 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 or burlap should be thoroughly cleaned or replaced at the end of each day's use. Damaged or worn turf or burlap should be repaired and/or replaced.

5. TINING

- 5.1. Texture is further enhanced through the placement of transversely tined grooves in the surface of a pavement while the concrete is plastic. The tining shall be done with a mechanical device such as a wire comb. The comb shall have a single row of tines that each has a nominal width of 5/64 inch to 1/8 inch. The nominal spacing of the tines shall be $1/2 \pm 1/8$ inch center-to-center. The nominal depth of tined groove in the plastic concrete shall be $1/8 \pm 1/32$ inch.
- 5.2. Transverse tining shall be accomplished by equipment with automated horizontal and vertical controls to ensure straight, uniform depth tined grooves. The texture geometry shall be uniformly imparted throughout the length of the tining comb and between successive passes of the tining comb. Successive passes of the tining comb shall be overlapped the minimum necessary to attain a continuously textured surface.
- 5.3. The tining operation shall be done at such time and manner that the desired surface texture will be achieved while minimizing displacement of the larger aggregate particles and before the surface permanently sets. Where abutting pavement is to be placed, the tining shall extend as close to the edge as possible without damaging the edge. If abutting pavement is not to be placed, the 6-inch area nearest the edge or 1 foot from the face of the curb shall not be tined. Hand-operated tining equipment that produces an equivalent texture may be used only on small or irregularly shaped areas. Tines should be thoroughly cleaned at the end of each day's use, and damaged or worn tines replaced.
- 5.4. When surface corrections for pavement smoothness are made in the hardened concrete, no additional texturing is required.

6. CURING

- 6.1. 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>.

- 6.2. 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.