Special Specification 3012
Next Generation Concrete Surface (NGCS) Grinding

1. DESCRIPTION

Construct Next Generation Concrete Surface (NGCS) using diamond grinding and grooving techniques on existing and new pavement surfaces. Remove resulting residue at locations shown on the plans or as directed.

2. EQUIPMENT

Provide machinery, tools, and equipment necessary for proper execution of the work.

2.1 **Diamond Grinding Equipment**. Utilize diamond grinding equipment that:

- has diamond blades mounted on a self-propelled machine designed for grinding and texturing pavement;
- weighs a minimum 35,000 lbs. (grinding head included);
- has sufficient size to grind a strip at least 4 ft. wide, and can produce overlapping match lines out of the wheel path;
- will not cause ravels, aggregate fractures, spalls, or disturbance to the transverse or longitudinal joints; and
- has a positive means of vacuuming the grinding residue from the pavement surface and will leave the pavement in a clean, near-dry condition.

3. CONSTRUCTION

Perform and schedule construction operations to produce a neat, uniform finished surface. Transition auxiliary or ramp lane grinding from the edge of the mainline as required to provide drainage and an acceptable riding surface. Complete pavement repair operations, if required, before performing any grinding. Complete joint sealing subsequent to the diamond grinding operations and install joint sealing in a recessed condition.

Construct a single lane NGCS test grind 500 ft. in length.

Demonstrate that the equipment and operation procedures used are capable of attaining the desired surface texture and smoothness requirements.

Work will not be allowed to proceed until test grind has been approved by the Engineer.

3.1. **Grinding**. Perform grinding in a longitudinal direction beginning and ending at lines perpendicular to the pavement lane lines.

Do not overlap passes of the grinding head more than 1 in. No unground surface area between passes will be permitted. Grind to a depth sufficient to remove the existing transverse tining, when specified, but not exceeding 0.25 in. The pavement profile will meet an average International Roughness Index (IRI) of 75 in./mi. or less when measured in accordance with Tex-1001-S prior to constructing the two-pass NGCS.

3.2. **Two-Pass NGCS Operation.** Perform two separate operations to construct the NGCS section. The first operation will create a flush ground surface. Mount the blades that are used to flush grind, onto a 4 ft. grinding head, stacked with 0.125 in. wide blades separated by the 0.035 +/-0.005 in. wide spacers. Produce

Commented [AN1]: This line in the spec has caused confusion in the past between the Prime and grinding subcontractor. The prime assumes that a "corrective" grind is incidental to the specification and therefore the sub has to fix the smoothness deficiencies prior to the NGCS construction at the sub-contractors expense. The subcontractors believe that the prime contractor should deliver the new pavement at new pavement specs such as 65 in/mi or 75 in/mile as mentioned below, before constructing the NGCS. If grinding need be used to remove existing transverse tining it should be called out in the project spec. and by a line item in the contract.

Commented [AN2]: The purpose of this addition to the spec is to eliminate some of the contractional issues between the prime and the sub-contractor. The paving spec as written calls for the prime contractor to pave to 65 in/mile or 75 in/mile depending upon the circumstances. However, the prime can take a penalty and deliver a pavement as rough as 95 in/mile. The prime has then been telling the grinding sub to construct NGCS on this 95 in/mile surface when the sub is expecting to receive a pavement much smoother to start working on. This precipitates an argument as to who is then responsible for the smoothness correction prior to NGCS. In worst cases, some of the lesser quality oriented contractors are actually trying to construct NGCS on these rough surfaces hence the poor quality I have seen in some sections. If enforced this additional language should help this situation. The best-case scenario is to separate the paving from the NGCS construction, allowing the NGCS to be built as a standalone project immediately after the paving project is done.

the flush ground surface using blades that are flat across their contact surface and in the same plane with the other flush ground blades when mounted. Ensure the complete head, when stacked with the blades, is straight across in length without bowing when mounted on the diamond grinding machine.

No unground surface area between passes will be permitted. Lateral drainage shall be achieved by maintaining a constant cross slope between grinding extremities in each lane. The finished cross slope shall mirror the pregrind cross slope and shall have no depressions or misalignment of slope greater than 0.125 inch in 12 feet when measured with a 12 foot straightedge placed perpendicular to the centerline. Straightedge requirements will not apply across longitudinal joints or outside the ground area.

Commented [AN3]: We believe that some of the driver tracking complaints are a function of bad match lines between passes of the grinding machine. When enforced this language should help reduce drive complaints of tracking/wander.

Attain and measure the smoothness level stated to the satisfaction of the Engineer before starting the second operation.

The second operation will provide the longitudinal grooves.

3.3. **Final Surface Finish.** Produce a pavement surface that is true to grade and uniform in appearance with a longitudinal grooved texture. Cut the line-type texture with corrugations that are:

- 0.~~125~~095 in. wide ±0.005 in.
- 0.125 in. to 0.1875 in. deep
- Spaced on 0.5 in. to 0.625 in. centers
- Parallel to Centerline
- Use a guide to ensure proper alignment of the grooves to centerline.
- Provide a flush ground surface that appears smooth and contains no ridges that exceed 0.03 in. At a minimum, texture 98% of the pavement surface with both the flush ground and grooved surface.

Commented [AN4]: Making the groove width narrow will reduce drive complaints of tracking/wander. This is the most important change we can make to the spec and is an easy fix.

3.4. **Repairs.** As directed, perform repairs in accordance with Item 720, "Repair of Spalling in Concrete Pavement," if spalls are 0.25 – 3 in. in depth. As directed, clean and seal existing joints in accordance with Item 438, "Cleaning and Sealing Joints."

3.5. **Smoothness Requirements.** Produce a finished NGCS final profile that has an average International Roughness Index (IRI) of 50 in./mi. or less when measured in accordance with Tex-1001-S. See Table 1 for Pay Adjustment Schedule.

Measure surfaces for smoothness acceptance following the flush grinding operation and before the longitudinal grooving operation.

Generate the smoothness profile using inertial profile equipment on the Department's approved list of Inertial Profilers with equipment shown to have line lasers. Provide operators from the approved list of Inertial Profile Operators.

Depressed pavement areas due to subsidence or other localized causes are excluded from the smoothness requirements. These areas will be reviewed and approved by the Engineer.

Bumps exceeding 0.3 in. per 25 ft. will not be allowed in the finished ground surface.

3.6 **Slurry Removal.** Remove and dispose of residue from the pavement surface in a manner to satisfy environmental regulations. Immediately and continuously, remove the slurry or residue resulting from the grinding operation. Keep pavement in a washed clean condition, free of slipperiness from the slurry, etc. Do not permit the residue to flow across shoulders or lanes occupied by traffic or into gutters or other drainage facilities.

4. MEASUREMENT

4.1 **Grinding.** Diamond grinding of concrete pavement will be measured by the square yard of surface area ground.

4.2 **Next Generation Concrete Surface Grinding of Concrete Pavement.** NGCS Diamond grinding of concrete pavement will be measured by the square yard of surface area ground and accepted, regardless of the number of passes required to achieve acceptable results.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Grinding" or "Next Generation Concrete Surface Grinding of Concrete Pavement." This price is full compensation for grinding the pavement surface; loading, hauling, and disposing of the residue material; labor; tools; equipment; and incidentals. Demonstration work to receive approval for use of equipment will not be paid for unless work is performed in accordance with the contract and is accepted.

Cleaning and sealing existing joints and cracks will be incidental to the Item "Next Generation Concrete Surface Grinding of Concrete Pavement."

Table 1
Pay Adjustment Schedule

Average IRI for each 0.10 mi. of Traffic Lane (in./mi.)	Pay Adjustment ($/0.10 mi. of Traffic Lane)
0-35	704
35.1-45	-69.703(IRI)+3143.6
45.1-50	0.00
>50	Corrective Action