DS-01067
(Replaces DS-01029)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATION

FOR

PAVEMENT SURFACE REPAIR (DIAMOND GRINDING)

Effective Date
October 18, 2005

THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

Replace all of Section 2532 of the Standard Specifications with the following:

01067.01 DESCRIPTION.
This work involves grinding an existing PCC pavement surface for profile improvement, for use as a traffic surface, using a diamond grinder. Grinding and texturing shall be performed at the locations shown in the contract documents except for bridge decks in which case the complete deck shall be ground according to Article ~~2532~~01067.03, B.

The existing surface and the coarse aggregate will be described in the contract documents.

This work may involve~~s~~ grinding a newly constructed deck surface for providing temporary surface texture, using a diamond grinder. Grinding shall be performed prior to opening the deck segment to traffic.

01067.02 EQUIPMENT.
Grinding and texturing shall be done utilizing diamond blades, mounted on a self propelled machine that has been designed for grinding and texturing of concrete surfaces. The equipment shall be such that it will not cause strain or damage to the underlying pavement or bridge deck. Grinding and texturing equipment that causes excessive ravels, aggregate fractures, spalls, or disturbance of the transverse and/or longitudinal joints will not be permitted.

Grinding equipment shall have a minimum effective head width of 36 inches (900 mm).

01067.03 CONSTRUCTION.
Pavement surface repair (diamond grinding) shall consist of grinding and texturing the concrete surface in a longitudinal direction.

The ground surface shall be of uniform texture. When more than one grinding machine is used in the same travel lane, the blade segment thicknesses, blade spacings, and blade diameter shall be similar so that the texture of the ground surface is reasonably uniform across the lane.

Both the land area and the texture depth must be within the specified ranges to be in compliance. It may be necessary to adjust the blade spacing during a project to stay within specified ranges.

For multiple passes, the equipment shall be carefully controlled to minimize the overlap. Overlaps shall not exceed ~~approximately~~ 1 inch (25 mm).

The transverse slope of the ground concrete surface shall be uniform to a degree that there are no depressions or misalignment of slope greater than 1/4 inch in 12 feet (6 mm in 3.6 m) when tested by stringline or straightedge placed perpendicular to the center line.

The Contractor shall be responsible for quality control of the texture. The Engineer will conduct random Quality Assurance inspections.

A. PCC Pavement.

Substantially the entire surface area of the pavement shall be ground and textured until the pavement surface on both sides of the transverse joints and all cracks are in the same plane and meet the smoothness required. In each lane, at least 95% of the area in each 100 foot (30 m) section shall have a newly ground surface. ~~Except at joints and cracks, grinding shall not exceed 1/2 inch (15 mm) in depth. At joints and cracks, grinding shall not exceed 3/4 inch (20 mm) in depth.~~

Grinding shall be performed in a longitudinal direction. ~~Grinding shall progress in the direction against normal traffic in the lane being ground unless otherwise specified by the Engineer.~~ All construction traffic entering or leaving the work area shall move in the direction of traffic of the open lane. Grinding shall begin and end at lines normal to the pavement center line within any one ground area and at the project limits. This will not be required at the end of each shift. ~~Normally, the grinding should proceed from the center line (or lane line) across the lane to the pavement edge with each pass cut at least as deep as the previous pass, so there is good transverse drainage.~~ Good transverse drainage shall be maintained at all times.

The grinding head should be assembled to produce the following tolerances on pavements with the indicated coarse aggregates:

(ENGLISH)	Limestone	Gravel
Blade segment thickness Land area between grooves*	0.130" maximum 0.100" to ~~0.125"~~ 0.135"	0.130" maximum 0.080" to 0.110"
Texture depth**	Target of 1/16" with average between 1/32" to 3/32"	

(METRIC)	Limestone	Gravel
Blade segment thickness Land area between grooves*	3.30 mm maximum 2.5 mm to 3 mm	3.30 mm maximum 2 mm to 2.75 mm
Texture depth**	Target of 2 mm with average between 1 mm to 2.5 mm	

* Based on an average of a minimum of ten measurements across the ground width for one pass.
** Based on an average of a minimum of six measurements across the ground width for one pass.

~~Prior to enforcement of the tolerances listed above, a 5000 square yard (5000 m^2) test area will be allowed for a new head that has been restacked,~~ A test area 500 feet in length and the width of the grinding head will be allowed for each new or restacked head, provided a surface texture in reasonable conformance with the specification is being produced.

B. Bridge Deck.
The entire surface of the bridge deck shall be ground and textured except the area within approximately 2 foot (0.6 m) of the railing. No areas greater than 2 feet (0.6 m) in length shall be left without texture. The total depth of concrete surface ground shall not exceed 1/4 inch (6 mm).

The grinding head should be assembled to produce the following tolerances on bridge decks:

(ENGLISH)	Limestone
Blade segment thickness Land area between grooves*	0.130" maximum 0.100" to 0.125"
Texture depth**	Target: 1/8" ± 1/32"

(METRIC)	Limestone
Blade segment thickness Land area between grooves*	3.30 mm maximum 2.5 mm to 3 mm
Texture depth**	Target: 3 mm ± 1 mm

* Based on an average of a minimum of ten measurements across the ground width for one pass.
** Based on an average of a minimum of six measurements across the ground width for one pass.

01067.04 SMOOTHNESS.

A. PCC Pavement.
The pavement shall be partly profiled on the initial trace by the Engineer using the procedure described in Article 2316.02 of the Standard Specifications. The average profile index for each area ~~may~~ will be shown in the contract documents. The bidder is also advised that all profilograph information is available for inspection at the Office of Contracts, by a request to the Contracts Engineer. After the contract is awarded, the profilograph information will be available from the Engineer. This information represents a summary of conditions found to exist at the time the survey was made. The availability of this information will not constitute a guarantee that a profile other than that indicated will not be encountered at the time of grinding.

The Contractor shall provide a control profilograph trace as described in Article 2316.02 of the Standard Specifications prior to performing any grinding work. This control trace will be used to identify the required smoothness for the project. Each segment of the finished ground surface shall have a final profile index of ~~35% of the control profilograph trace or~~ 10 inches per mile (160 mm/km) or less, ~~whichever is greater,~~ and shall not include any bumps exceeding 0.5 inches in 25 feet (13 mm in 8 m). ~~Depressed pavement areas due to subsidence or other localized causes, and areas where the maximum cut at mid-panel or a fault restricts further grinding will be excluded from testing with the profilograph when approved by the Engineer.~~ Prior to diamond grinding, the Contractor shall identify depressed pavement areas and localized areas with excess faulting greater than 1 inch (25 mm). The Contractor and Engineer shall review those areas to determine the limits for exclusion from the profile index calculation.

~~Profilograph testing shall end 15 feet (5 m) prior to excluded areas and shall resume 15 feet (5 m) following excluded areas.~~

The ground surface shall be tested and evaluated in accordance with Section 2316 of the Standard Specifications.~~, with the following modifications:~~

1. The test is to be run and the profilograph is to be evaluated using the same procedure as for the control trace.

2. Each segment for which continuous grinding is designated will be evaluated individually, and it shall meet the smoothness and bump requirements specified above, regardless of its length. The Engineer may require removal of unbroken fins, such as by tight blading, at the Contractor's expense.

3. In excluded areas, smoothness requirements will be modified or may be waived by the Engineer.

4. The Contractor shall certify smoothness of the finished surface in accordance with Article 2316.03.

5. The Engineer may test for smoothness and bumps near the center line and at other spot locations where compliance is questioned. Additional grinding may be required.

6. The original and final profilograph trace shall not be used to determine grinding depth.

B. Bridge Deck.
For bridge decks the smoothness requirements of Section 2317 of the Standard Specifications shall be met prior to performing the texturing. After texturing, the bridge deck shall be tested again in accordance with Article 2317.03 of the Standard Specifications and the resulting profile index shall not exceed the corrected profile index prior to the texturing.

01067.05 LIMITATIONS.
Nighttime work will be allowed. For such work, appropriate lighting and traffic control will be required of the Contractor at no extra cost. When nighttime work is required, lighting shall be included at each work area. Lighting shall not glare into oncoming motorists.

Removal of all slurry or residue resulting from the grinding operations shall be continuous and shall not be deposited on the slab or shoulder. Pavement and paved shoulders must be left in a clean condition. Residue from grinding operations should not be permitted to flow across lanes occupied by public traffic or to flow into gutters or other drainage facilities. This residue may be spread on the foreslope or removed in accordance with Article 1104.08 of the Standard Specifications.

A. PCC Pavement.
Lane closures necessary to accomplish this work shall be as shown in the contract documents, or as directed by the Engineer. The entire roadbed shall be opened to traffic at the end of the working period. Uncompleted sections may be opened to traffic without completion of grinding across an entire lane.

Traffic control for nighttime work shall be installed and removed during daylight hours. During nighttime work, the Contractor shall not grind at or next to the center line or a lane line. Except for nighttime work, the work schedule shall be adjusted so that all barricades and equipment are removed from the roadbed from sunset to sunrise. Work will not be permitted on Sundays or holidays described in Article 1108.03. Article 1107.08 and Article 1107.09 shall apply.

During nighttime operations, grinding shall progress in the direction with normal traffic in the lane being ground.

When the following work is included in the contract, the operations shall be sequenced in the following order:

1. undersealing
2. longitudinal subdrains

3. patching
4. ~~diamond grinding~~ installation of retrofit load transfer
5. ~~installation of retrofit load transfer~~ diamond grinding
6. crack and joint sealing

B. Bridge Deck.
Work under this specification shall be completed and smoothness requirements met prior to opening to traffic.

~~**2532.06 PAVEMENT MARKINGS.**~~
~~The pavement shall be marked in accordance with Section 2527; however, permanent marking of edge lines on Interstate pavement may be delayed up to 24 hours, after the lane is opened to traffic. No marking will be allowed on Sundays or holidays, unless otherwise approved by the Engineer.~~

01067.06 METHOD OF MEASUREMENT.

A. PCC Pavement.
The quantity of pavement ground, in square yards (square meters), will be the quantity of Pavement Surface Repair, of the type specified, shown in the contract documents.

Adjacent areas of a paved shoulder ground to minimize vertical projections will not be measured for payment.

B. Bridge Deck.
The quantity of bridge deck ground and textured, in square yards (square meters), will be the quantity of Pavement Surface Repair, of the type specified, shown in the contract documents.

01067.07 BASIS OF PAYMENT.
For the number of square yards (square meters) of Pavement Surface Repair, (Grinding Limestone) or (Grinding Gravel), completed and measured as provided above, the Contractor will be paid the contract unit price per square yard (square meter). This payment shall be full compensation for furnishing all equipment, materials, and labor to grind the concrete surface and test for smoothness according to the contract documents, including removal of slurry and residue from this operation.