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Diamond  
Grinding  
of Portland  
Cement  
Concrete  
Pavements



# Diamond Grinding of Portland Cement Concrete Pavements Checklist

This checklist is one in a series created to guide State and local highway preservation/maintenance and inspection staff on the use of innovative pavement preservation techniques.

FHWA uses its partnerships with different pavement preservation organizations including American Association of State Highway and Transportation Officials, and State and local transportation agencies to promote pavement preservation.

To obtain other checklists or to find out more about pavement preservation, contact your local FHWA division office or check the following FHWA Web page:

[www.fhwa.dot.gov/pavement/preservation/resources.cfm](http://www.fhwa.dot.gov/pavement/preservation/resources.cfm)

Other valuable resources on pavement preservation:

- [www.acpa.org](http://www.acpa.org)
- [www.cement.org](http://www.cement.org)
- [www.cptechcenter.org](http://www.cptechcenter.org)
- [www.igga.net](http://www.igga.net)

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# Preliminary Responsibilities

## Document Review

- Bid/project specifications and design
- Special provisions
- Traffic control plan
- Slurry disposal requirements
- See sources

## Project Review

- Verify that pavement conditions have not significantly changed since the project was designed.
- Ensure broken or rocking slabs are repaired/replaced prior to diamond grinding.
- Verify that other pavement repairs are conducted prior to diamond grinding, except for joint sealing and partial depth repairs using elastomeric-based concrete, which should be completed after grinding.
- If elastomeric partial depth patching material is to be used for partial depth repairs, it may be necessary to install the repairs after diamond grinding.

## Equipment Inspections

### Diamond-Grinding Machine

- Verify that the diamond-grinding machine meets requirements of the contract documents for weight, horsepower, blade configuration, and effective wheel base.
- Verify that the equipment has a positive means of vacuuming the grinding residue from the pavement surface, leaving the surface in a clean, near-dry condition.
- Verify that the blade spacing on the diamond grinding cutting head meets requirements of the contract documents and can produce the desired corduroy texture.

### Inertial Profiling Equipment

- Ensure that profile measurement equipment is acceptable for measuring diamond-ground textures.
- Verify who will be conducting profile measurements and when it will be conducted.
- Verify that the unit has been calibrated in accordance with manufacturer's recommendations and contract documents; calibration should be conducted on a diamond-ground texture.
- Verify that the profiler operator meets requirements of the contract documents for training/certification.

## Weather Requirements

- Air and/or surface temperature should meet minimum agency requirements (typically 35°F and rising) for diamond-grinding operations in accordance with contract documents.
- Diamond grinding shall not proceed if icy weather conditions are imminent.

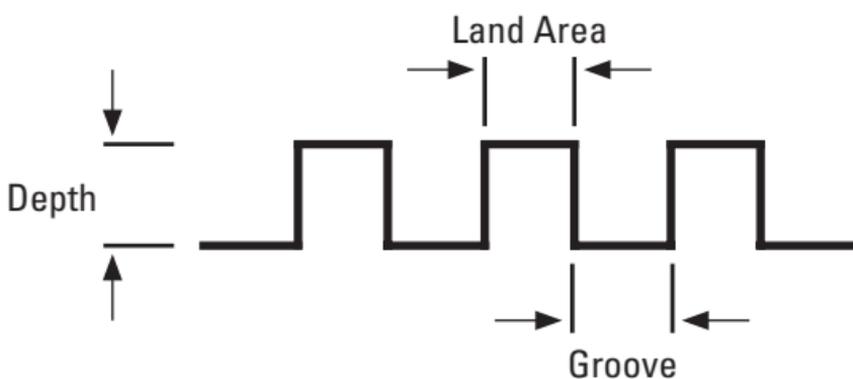
## Traffic Control

- Verify that signs and devices conform to the traffic control plan presented in the contract documents.
- Verify that the setup complies with the *Manual on Uniform Traffic Control Devices* (MUTCD) or local agency traffic control procedures.
- Verify that the repaired pavement is not opened to traffic until all equipment and personnel have been removed from the work zone and the repairs are capable of sustaining traffic.
- Verify that signs are removed or covered when they are no longer needed.
- Verify that any unsafe conditions are reported to a supervisor (contractor or agency).

## Project Inspection Responsibilities

- Ensure that diamond grinding proceeds in a direction parallel with the pavement centerline, beginning and ending at lines normal to the pavement centerline.
- Verify that diamond grinding results in a corduroy texture extending across the full lane width and the texture is in accordance with contract requirements.
- Verify that the grinding equipment does not cause raveling, aggregate fractures, or disturbance to the joints.
- Verify that the construction operation proceeds in a manner that produces a neat, uniform finished surface.
- Verify that the shoulder, auxiliary, or ramp lane grinding shall transition from the edge of the mainline as required to provide drainage leaving no more than a  $\frac{3}{16}$  in. ridge and an acceptable riding surface.
- Verify that each application of the diamond-ground texture overlaps the previous application by no more than the amount designated in the contract documents, typically, 1 in.

- Verify that each application of the diamond-ground texture does not exceed the depth of the previous application by more than the amount permitted in the contract documents, typically  $\frac{1}{8}$  in.
- Verify that the finished cross slope shall mirror the pre-grind cross slope and shall have no depressions or misalignment of slope greater than  $\frac{1}{4}$  in. in 12 ft when measured with a 12 ft straightedge placed perpendicular to the centerline.
- Verify that lateral drainage is achieved by maintaining a constant cross slope between grinding extremities in each lane.
- Verify that the diamond-grinding operation conforms to project requirements.
- Verify that concrete slurry is adequately vacuumed from the pavement surface and is not allowed to flow into adjacent traffic lanes.



*Figure 1. Diamond grinding and grooving terminology*

- Verify that the grinding residue is not discharged into a waterway, a roadway slope within 100 ft of any natural stream or lake, or within 3 ft of a water-filled ditch. Typically, effort should be taken to restrict the spreading operation to above the high water level of the ditch. Concrete slurry from the grinding operation is collected and discharged at a disposal area designated in the contract document.

## Common Problems and Solutions

### **(Problem: Solution)**

#### **Concrete Fins Fail to Break Off:**

- Reduce the spacing between the blades.

#### **Resulting Texture Is Not a Uniform Corduroy Surface:**

- Check for damaged or incorrect size blades.

#### **Texture Is Shallow Where Passes Overlap:**

- Minimize overlap between passes to 1 in. or less.

### **Light Vehicles and Motorcycles Experience Vehicle Tracking:**

- Reduce the spacing between the blades or wait and see if fin reduction through traffic wear eliminates problem.

### **Some Areas Are Left Without Diamond-Ground Texture:**

- If the untextured area exceeds project specifications, regrind it.
- Consult engineer before regrinding to make sure grinding to remove low spots does not jeopardize structure.

### **Large Amounts of Concrete Slurry Are Left on Pavement Surface:**

- Stop grinding operations and check the vacuum unit and skirt surrounding the cutting head.

## **Web-Based Training**

- NHI-134207C Proper Diamond Grinding Techniques for Pavement Preservation

## Sources

Information in this checklist is based on or refers to the following sources:

*Concrete Pavement Preservation Guide, Second Edition*. Pub. No. FHWA-HIF-14-004. 2014. Ames, IA: Iowa State University, National Concrete Pavement Technology Center. Available at [https://intrans.iastate.edu/app/uploads/2018/08/preservation\\_guide\\_2nd\\_ed\\_508\\_final.pdf](https://intrans.iastate.edu/app/uploads/2018/08/preservation_guide_2nd_ed_508_final.pdf).

*Concrete Pavement Rehabilitation: Guide for Diamond Grinding*. Pub. No. FHWA-SRC 1/10-01(5M). 2001. Atlanta, GA: Federal Highway Administration, Southern Resource Center. Available at [www.fhwa.dot.gov/pavement/concrete/diamond.cfm](http://www.fhwa.dot.gov/pavement/concrete/diamond.cfm).

Darter, M. 2017. *Concrete Repair Best Practices: A Series of Case Studies / Diamond Grinding Tech Brief*. Missouri Department of Transportation, Jefferson City, MO.

*The Effectiveness of Diamond Grinding Concrete Pavements in California*. May 2005. Sacramento, CA: California Department of Transportation (Caltrans), Division of Engineering Services.

*Longevity and Performance of Diamond Ground Pavements*. Pub. No. IS522P. 2002. Skokie, IL: American Concrete Pavement Association. Available at [www.pavement.com](http://www.pavement.com).

*Manual on Uniform Traffic Control Devices*. 2009, Revised May 2012. Washington, DC: Federal Highway Administration. Available at <http://mutcd.fhwa.dot.gov>.

*Proper Diamond Grinding Techniques for Pavement Preservation, Web Based Training (WBT)*. NHI-134207C. Washington, DC: Federal Highway Administration, National Highway Institute.

**For more information on the Pavement Preservation Checklist Series, contact:**

Construction Management Team, HICP-30  
Office of Preconstruction, Construction,  
and Pavements  
Federal Highway Administration  
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