

19**PROJECT SPECIAL PROVISIONS****ROADWAY****DIAMOND GRINDING CONCRETE PAVEMENT:****Description**

Perform the work covered by this provision including but not limited to diamond grinding and regrinding concrete pavement to meet final surface testing requirements detailed in Article 710-7, evaluating existing concrete pavement and aggregate properties, selecting diamond tipped saw blades and configuration of cutting head; continual removal of residual slurry from pavement and disposal off-site; furnishing all labor, materials, supplies, tools, equipment and incidentals as necessary. Perform this work at locations indicated in the plans or as directed by the engineer.

Equipment

Use equipment with diamond tipped saw blades gang mounted on a power driven self propelled machine with a minimum wheel base length of 15 feet (4.6 meter) that is specifically designed to smooth and texture Portland Cement Concrete pavement. Utilize equipment that does not cause ravels; aggregate fracture; spalls or disturbance to the longitudinal or transverse joints; or damage and/or strain to the underlying surface of the pavement. Should any of the above problems occur immediately suspend operations.

Provide a minimum 3 feet (1 meter) wide grinding head with 50 (164) to 60 (200) evenly spaced grooves per foot (meter). Prior to designing the grinding head, evaluate the aggregate hardness of the concrete pavement and select the appropriate diamond size, diamond concentration and bond hardness for the individual saw blades.

Provide vacuuming equipment to continuously remove slurry residue and excess water from the pavement as part of the grinding operation. Transport slurry material off-site and dispose of this material appropriately. Do not allow the slurry material to flow into a travel lane occupied by traffic or into any drainage facility.

Construction

Grind the pavement surface to a uniform appearance with a high skid resistant longitudinal corduroy type texture. Provide grooves between 0.09 (2.28mm) and 0.15 (3.81mm) inches wide with the land area between the grooves between 0.06 (1.52mm) and 0.13 (3.30mm) inches wide. Ensure a ridge peak of approximately 0.0625 inches (1.59mm) higher than the bottom of the grooves.

Begin and end diamond grinding at lines normal to the pavement centerline. Grind only in the longitudinal direction. All grooves and adjacent passes shall be parallel to each other with no variation. Completely lap adjacent passes with no unground surface remaining between passes and no overlap of more than 1½ inches (35 mm). Adjacent passes shall be within 1/8 inch (10 mm) of the same height as measured with a 3 foot (0.914 meter) straightedge. Maintain positive cross-slope drainage for the duration of the grinding operation.

Grind all travel lanes to include auxiliary lanes, ramps and loops with not less than 98 percent of the specified surface being textured by grinding. Grinding of the bridge decks and concrete shoulders will not be required. Remove a minimum 0.0625 inches at all locations except dips. Extra grinding to eliminate minor depressions is not required. It is anticipated that extra grinding will be required on the high side of existing faults in the pavement. There shall be no ridge between lanes. In a separate operation, transition the grinding of any remaining ridges greater than 1/8 inch (10mm) in height on the outside edge next to the shoulder or at a tie to an existing facility to the satisfaction of the Engineer.

Measurement and Payment

The quantity of Diamond Grinding PCC Pavement to be paid for at the contract unit price will be the actual number of square yards of pavement diamond ground in accordance with the requirements of this provision. In measuring this quantity, the length will be the actual length diamond ground measured along the pavement surface. The width will be the width required by the plans or directed, measured along the pavement surface. No separate payment will be made for any overlapping.

Payment is full compensation for the work and includes but is not limited to grinding, disposal of slurry off-site, furnishing all materials, equipment, labor and all incidentals necessary to complete the work satisfactorily.

Payment will be made under:

| Pay Item | Pay Unit |
|-------------------------------|-----------------|
| Diamond Grinding PCC Pavement | Square Yard |

REPAIR OF JOINTED CONCRETE PAVEMENT SLABS:

Description:

The work covered by this provision consists of the removal and satisfactory disposal of the existing damaged jointed concrete pavement slabs, furnishing and placing new jointed concrete pavement slabs as shown in the plans or as directed by the Engineer.

Materials:

Refer to Divisions 6, 7, and 10 of the Standard Specifications.

| Item | Section |
|-------------------------------|---------|
| Portland Cement Concrete | 1000 |
| Curing Agents | 1026 |
| Water | 1024-4 |
| Select Material, Class IV | 1016 |
| Dowels and Tie Bars | 1070-6 |
| Fabric for Soil Stabilization | 270 |

Use Select Material, Class IV for Class IV Subgrade Stabilization. If Class IV Subgrade Stabilization does not meet the requirements of Article 1010-2 of the *Standard Specifications*, the Engineer, at his discretion, may consider the material reasonably acceptable in accordance with Article 105-3 of the *Standard Specifications*.

Methods of Production:

The repair of jointed concrete pavement slabs shall meet the applicable requirements of Section 700 of the Standard Specifications and the following provisions:

The concrete shall meet the requirements given in the Special Provision Titled “Very High Early Strength Concrete for Concrete Pavement Repair”.

The repair of jointed concrete pavement slabs shall be conducted in one lane at a time. The work shall be accomplished with other operations in progress in the same area.

In all cases of slab removal, the Contractor shall remove the entire 12 ft width and a minimum of 6 ft in the travel direction. Any remaining portion of a slab that is removed shall not be less than 6 ft in the travel direction.

As a result of the full depth sawing of the existing pavement to remove the distressed area, saw cuts that extend into the adjacent pavement shall be filled with epoxy prior to placing traffic on the new area. The epoxy shall meet the requirements of Section 1081 Type 3 of the Standard Specifications.

The Contractor shall take necessary measures to protect the exposed subgrade and base from damage resulting from surface water and/or rain during the period between the pavement removal and replacement. The Contractor shall submit his plan for removing the pavement areas to the Engineer for approval. The removal method shall minimize damage to the subgrade and to adjacent pavement and shoulders.

At locations as directed by the Engineer, the Contractor shall:

- 1) Remove unsuitable aggregate base material and backfill with Class IV Subgrade Stabilization as directed by the Engineer; or

- 2) Remove unsuitable aggregate base material, undercut the subgrade, place Fabric for Soil Stabilization, and backfill with Class IV Subgrade Stabilization as directed by the Engineer.

The Fabric for Soil Stabilization shall conform to the requirements of Section 270 of the Standard Specifications.

The Engineer will direct which method of repair is to be used at each location.

The Contractor shall thoroughly tamp any loosened subgrade or base material to the satisfaction of the Engineer before the pavement is replaced. New pavement shall be cast to match the thickness of the adjacent slabs.

Pneumatic or hydraulic drills and bits that will drill a hole in the existing concrete faces for placement of the dowels at location specified on the Plans shall be used. The equipment shall be operated so as to prevent damage to the pavement being drilled. The drilling procedure shall be approved by the Engineer. The drilled holes shall be thoroughly cleaned of all contaminants and the dowels of specified type and size shall then be set into the hardened concrete face of the existing pavement with an epoxy bonding compound meeting the requirements of a Type 3A epoxy detailed in Section 1081 of the Standard Specifications. The specified dowels shall be placed at locations noted on Plan details with one-half of dowel protruding beyond the hardened face of existing pavement and placed at correct horizontal and vertical alignment with misalignment not to exceed 0.4 inches in the vertical or oblique plane. The epoxy shall be allowed to harden sufficiently prior to placing concrete to prevent any movement of the dowels during the placement of the concrete. A sufficient amount of epoxy must be placed in the back of the hole so that the entire cavity around the dowel is completely filled upon insertion of the dowel bars. Any excess epoxy shall be removed. The epoxy adhesive must be packaged in a cartridge with a mixing nozzle that thoroughly mixes the two components as they are dispensed (the mixing nozzle must be a minimum of 8 inches long) or may be placed with a machine which mixes the two components thoroughly and to the proper ratio as the material is being placed.

Use dowels of the type, size, spacing, and at the location specified in Standard Drawing 700.01 Sheet 1 of 2. At no time shall dowels be driven into a dowel hole with sledge hammers or other devices. In all cases, any dowel which cannot be freely inserted into a dowel hole will be rejected for use.

Prior to placing concrete, the vertical exposed faces of the existing slabs shall be thoroughly cleaned of contaminants using wire brushing or other methods approved by the Engineer. Extra care must be taken to remove all existing silicone or other joint sealant from the exposed concrete faces.

The concrete shall be deposited within the slab replacement area in such manner as to require as little re-handing as possible, to prevent segregation of the mix. Hand spreading shall be minimized as much as possible, but where necessary, shall be done with shovels, not rakes. Workers will not be allowed to walk in the fresh concrete with shoes coated with earth or other foreign substances. The replaced slab area shall be filled with concrete and thoroughly consolidated by rodding, spading, and sufficient vibration to form a dense homogeneous mass throughout the area. The final surface area shall be uniform in appearance and free of irregularities and porous areas.

The finished surface, including joints, shall meet a surface tolerance of 1/8 inch in 10 feet in any direction. Any necessary corrections shall be done by grinding. Any replaced slab which is low in relation to adjacent slabs may be ordered replaced by the Engineer. Replacement of such a slab would generally be required if, in the opinion of the Engineer, excessive grinding of the adjacent pavement is necessary to match the profile of the full depth slab replacement or if a drainage problem would be created by grinding the adjacent pavement.

The surface finish of the proposed concrete pavement shall be a burlap drag finish and conform to the cross-section of adjacent pavement. The method of finishing shall be approved by the Engineer. Immediately after finishing operations have been completed and surface water has disappeared, all exposed surfaces of the pavement shall be cured in accordance with the applicable provisions of Section 700-9 "Curing" and Section 1026 "Curing Agents for Concrete" of the Standard Specifications.

Measurement and Payment:

The quantity of Jointed Concrete Pavement Slab repair to be paid for at the unit price established herein will be the actual number of square yards of jointed concrete pavement with dowels which has been completed and accepted. In measuring this quantity, the width of the repair will be measured perpendicular to the centerline of the lane. The length will be the actual length constructed, measured along the centerline of the pavement

The unit price for Repair of Jointed Concrete Pavement Slabs will be full compensation for all work covered by this provision, and applicable sections of the Standard Specifications for furnishing all labor, materials, tools, equipment, and incidentals for doing all work involved in placement of the concrete including but not limited to furnishing placing, and curing concrete; dowel bars; sawing and removing concrete; and filling saw cuts around the pavement repair.

The quantity of Class IV Subgrade Stabilization to be paid for at the unit price established herein will be the actual number of tons of aggregate which has been incorporated into the completed and accepted work. The aggregate will be measured by being weighed in trucks on certified platform scales or other certified weighing devices. No deductions will be made for any moisture contained in the aggregate at the time of weighing.

The unit price for Class IV Subgrade Stabilization will be full compensation for all work covered by this provision and the Standard Specifications including but not limited to removing of existing aggregate base course and backfilling with Class IV Subgrade Stabilization.

The quantity of material removed from beneath the base course will be measured and paid for in accordance with Section 225 of the Standard Specifications for "*Undercut Excavation*"

The quantity of Fabric for Soil Stabilization furnished and placed as directed will be measured and paid for in accordance with Section 270 of the Standard Specifications for "*Fabric for Soil Stabilization*"

Payment will be made under:

| <u>Pay Item</u> | <u>Pay Unit</u> |
|--|-----------------|
| Repair of Jointed Concrete Pavement Slabs..... | Square Yard |
| Class IV Subgrade Stabilization..... | Ton |
| Undercut Excavation..... | Cubic Yard |
| Fabric for Soil Stabilization..... | Square Yard |

**VERY HIGH EARLY STRENGTH CONCRETE
FOR CONCRETE PAVEMENT REPAIR:**

March 21, 2007

SPI

Submit mix designs for Very High Early Strength Concrete for Concrete Pavement Repair in terms of saturated surface dry weights on M & T Form 312U for acceptance at least 30 days before proposed use.

Use a mix sufficient to obtain at least a flexural strength of 400 psi at 4 hours. Entrain 5% ± 1.5% air in the freshly mixed concrete. Produce the mix with a maximum slump of 1.5" for placement by a fully mechanized paving train and a maximum slump of 3" for hand placement.

Use cement, fine aggregate, coarse aggregate, admixtures and, optionally, pozzolan as shown on the Department's approved list.

Submit 4 hour flexural strength results of at least 6 beams made and tested in accordance with AASHTO T126 and T97 with M & T Form 312U. In addition, submit 4 hour compressive strength results of at least six 4" by 8" or 6" by 12" cylinders and maturity test results of the mix. With permission of the Engineer, compressive strength testing and maturity testing may be used in lieu of or concurrent with flexural strength testing to determine the acceptability of the concrete in the field.

Design and produce the mix in accordance with BASF Chemical Company's 4 X 4 Concrete system or a comparable proprietary system. The timing of the addition of hydration control admixtures is critical to the performance of this concrete; therefore, an admixture representative shall be present on the job when Very High Early Strength Concrete is batched.

UNDERDRAIN REPAIR:

Description:

The work covered by this provision consists of repairing the underdrain damaged as a result of the slab replacement operation. Work shall include the removal and satisfactory disposal of the existing damaged underdrain, and furnishing and placing new underdrain and subdrain fine aggregate material as directed by the Engineer.

Materials:

Refer to Division 10:

| Item | Section |
|--------------------------------------|----------------|
| Corrugated Plastic Pipe and Fittings | Article 1044-6 |
| Subdrain Fine Aggregate | Article 1044-1 |

Construction Methods:

Install the pipe and filter material in accordance with Section 815 of the *Standard Specifications*.

Measurement and Payment:

Payment for the work of **Underdrain Repair** will be made for each location at which the work is to be completed as directed by the Engineer. Such payment will be full compensation for all excavation, hauling and satisfactory disposal of existing pipe and subdrain fine aggregate material, as well as all materials necessary to complete the work.

Payment will be made under:

| Pay Item | Pay Unit |
|-------------------|-----------------|
| Underdrain Repair | EA |

BORROW EXCAVATION AND SHPO DOCUMENTATION FOR BORROW/WASTE

SITES:

(12-18-07)(4-15-08)

R8 R02

Revise the *2006 Standard Specifications* as follows:

Division 2 Earthwork

Page 2-16, Subarticle 230-1(D), add the words: *The Contractor specifically waives* as the first words of the sentence.

Page 2-17, Article 230-4(B) Contractor Furnished Sources, first paragraph, first sentence replace with the following:

Prior to the approval of any borrow sources developed for use on any project, obtain certification from the State Historic Preservation Officer of the State Department of Cultural Resources certifying that the removal of the borrow material from the borrow sources(s) will have no effect on any known district, site building, structure, or object, architectural and/or archaeological that is included or eligible for inclusion in the National Register of Historic Places.

Division 8 Incidentals**Page 8-9, Article 802-2 General Requirements, add the following as the 1st paragraph:**

Prior to the removal of any waste from any project, obtain certification from the State Historic Preservation Officer of the State Department of Cultural Resources certifying that the deposition of the waste material to the proposed waste area will have no effect on any known district, site building, structure, or object, architectural and/or archaeological that is included or eligible for inclusion in the National Register of Historic Places. Furnish a copy of this certification to the Engineer prior to performing any work in the proposed waste site.

Page 8-10, Article 802-2, General Requirements, 4th paragraph, add the following as the 2nd sentence:

The Department's borrow and waste site reclamation procedures for contracted projects is available on the NCDOT website and shall be used for all borrow and waste sites on this project.

CONCRETE BRICK AND BLOCK PRODUCTION:

(11-20-01) (Rev. 11-21-06)

R10 R10

Provide concrete brick and block from a producer who uses the current Solid Concrete Masonry Brick/Unit Quality Control/Quality Assurance Program that is in effect on the date that material is received on the project.

No price adjustment is allowed to contractors or producers who use the program. Participation in the program does not relieve the producer of the responsibility of complying with all requirements of the *2006 Standard Specifications*. Copies of this procedure are available upon request from the Materials and Test Unit.

PORTLAND CEMENT CONCRETE (Alkali-Silica Reaction):

2-20-07

R10 R16

Revise the *2006 Standard Specifications* as follows:

Article 1024-1(A), replace the 2nd paragraph with the following:

Certain combinations of cement and aggregate exhibit an adverse alkali-silica reaction. The alkalinity of any cement, expressed as sodium-oxide equivalent, shall not exceed 1.0 percent. For mix designs that contain non-reactive aggregates and cement with an alkali content less than 0.6%, straight cement or a combination of cement and fly ash, cement and ground granulated blast furnace slag or cement and microsilica may be used. The pozzolan quantity shall not exceed the amount shown in Table 1024-1. For mixes that contain cement with an alkali content between 0.6% and 1.0%, and for mixes that contain a reactive aggregate documented by the Department, regardless of the alkali content of the cement, use a pozzolan in the amount shown in Table 1024-1.

Obtain the list of reactive aggregates documented by the Department at:<http://www.ncdot.org/doh/operations/materials/pdf/quarryasrprob.pdf>

| Table 1024-1 | |
|--|--|
| Pozzolans for Use in Portland Cement Concrete | |
| <i>Pozzolan</i> | <i>Rate</i> |
| Class F Fly Ash | 20% by weight of required cement content, with 1.2 lbs Class F fly ash per lb of cement replaced |
| Ground Granulated Blast Furnace Slag | 35%-50% by weight of required cement content with 1 lb slag per lb of cement replaced |
| Microsilica | 4%-8% by weight of required cement content, with 1 lb microsilica per lb of cement replaced |

GLASS BEADS:

(7-18-06)

R10 R35

Revise the 2006 Standard Specifications as follows:

Page 10-223, 1087-4(C) Gradation & Roundness

Replace the second sentence of the first paragraph with the following:

All Drop-On and Intermixed Glass Beads shall be tested in accordance with ASTM D1155.

Delete the last paragraph.

ENGINEERING FABRICS TABLE 1056-1:

(7-18-06)

R10 R40

Revise the 2006 Standard Specifications as follows:

Page 10-100, Table 1056-1, replace the values for Trapezoidal Tear Strength with the following:

| Physical Property | ASTM Test Method | Type 1 | Type 2 | Type 3 | | Type 4 |
|---------------------------|------------------|----------------|--------------|---------------------------------|---------|--------------------|
| Typical Applications | | Shoulder Drain | Under Riprap | Class A Temporary Silt Fence | Class B | Soil Stabilization |
| Trapezoidal Tear Strength | D4533 | 45 lb | 75 lb | -- | -- | 75 lb |

27-A

SAWING AND SEALING EXISTING CONCRETE PAVEMENT JOINTS:

4-15-08

SPI

Description

Saw existing sawed joints and clean and seal joints with Low Modulus Silicone in accordance with the detail in the plans..

Materials

Meet the requirements of Section 1028-4(A) of the *Standard Specifications* for Low Modulus Silicone Sealant.

Construction

Saw and seal joints at locations as directed by the Engineer.

Equip air compressors for cleaning joints with suitable traps capable of removing all surplus water and oil in the compressed air. The Engineer will check the compressed air daily for contamination. Do not use contaminated air.

Cleaning and sealing shall be as follows:

(A) Cleaning Freshly Cut Sawed Joints

Immediately after sawing the joint, completely remove the resulting slurry from the joint and the immediate area by flushing with a jet of water under pressure, and other tools as necessary. After flushing, blow out the joint with compressed air. After the surfaces are thoroughly clean and dry and just before the joint sealer is placed, blow out the joint with compressed air having a pressure of at least 90 psi and remove all traces of dust. If freshly cut sawed joints becomes contaminated before they are sealed, clean as many times as necessary by one of the optional methods below or other methods of cleaning as approved by the Engineer.

(B) Installing Backup Material

When required, install closed cell, expanded polyethylene foam rod type backup material in a manner that will produce the shape factor specified. If the sealant bonds to the backup material, a bond-breaking type may be required.

(C) Taping Expansion Joints

When the joints have been cleaned and are thoroughly dry, place bond-breaking adhesive tape on top of the joint material or backup material to prevent any bonding action between the bottom of the joint sealer and the top of underlying material. The tape shall completely cover the top of the underlying material, but at no place shall the tape be allowed to adhere to the sides of the joint.

27-B

(D) Sealing Joints Requirements

- (1) Do not place silicone joint sealer when the air temperature near the joint is less than 50°F or is 50°F and falling or between October 15 and May 1, unless otherwise directed by the Engineer.
- (2) Filling the Joint: Do not seal a joint until the seal is thoroughly clean and dry, and properly taped, if taping is required. Place the sealer in reasonably close conformity with dimensions shown on the plans. The joints will be rejected for any unreasonable deviation until satisfactory corrective measures are taken.

Apply the joint sealer by an approved mechanical device or by manual pouring or troweling, depending upon the consistency used. When applied mechanically or by pouring, a nozzle or pouring spout shall be shaped to fit inside the joint to introduce the sealer from inside the joint. Pouring consistency shall be used in horizontal joints, and troweling consistency shall be used in vertical joints, unless the pouring consistency is such that it can be satisfactorily placed in vertical joints.

Recess the joint sealer below the adjacent surface as shown in the plans.

If the joint material fails in either adhesion or cohesion, the joint shall be repaired to the Engineer's satisfaction at the Contractor's expense.

- (3) Special Requirements for Installation of Low Modulus Silicone Sealant: The sealant shall be tooled to provide the required recess. The sealant shall be tooled or applied in a manner which causes it to wet the joint faces.
- (4) Cleaning Pavement: Promptly remove surplus joint sealer on the pavement after a joint has been sealed so that the joint sealer is not exposed to direct contact with traffic.

(E) Opening to Traffic

Do not permit traffic over sealed joints without the approval of the Engineer.

Measurement and Payment

Sealing Existing Concrete Pavement Joints will be measured along the completed joint of the actual linear feet of joints that have been sawed and sealed and accepted and paid for at the contract unit price per linear foot..

The above price and payment will be full compensation for all work covered by this provision for furnishing all labor, materials, tools, equipment, backer rods, and incidentals for doing all work involved in sawing, cleaning and sealing joints.

27-C

Payment will be made under:

Pay Item

Sealing Existing Concrete Pavement Joints

Pay Unit

Linear Foot

REMOVAL OF EXISTING PAVEMENT MARKERS:

Remove existing pavement markers in preparation for diamond grinding. Patch all locations where existing pavement markers are removed and repair any pavement damage due to existing pavement marker removal. Complete this work prior to opening lane to traffic. Patching and pavement repair of these areas shall be accomplished with Fibrecrete or approved equal. The Fibrecrete or approved equal is to be installed in accordance with Manufacturers recommendations and installation instructions. Dispose of existing pavement markers as directed by the Engineer. No direct payment will be made for this work. All labor, equipment and materials necessary to complete this work will be considered incidental to the diamond grinding operation.

CHANGEABLE MESSAGE SIGNS

(11-21-06)

R11 R11

Revise the *2006 Standard Specifications* as follows:

Page 11-9, Article 1120-3, Replace the 3rd sentence with the following:

Sign operator will adjust flash rate so that no more than two messages will be displayed and be legible to a driver when approaching the sign at the posted speed.

PAVEMENT MARKING LINES:

(11-21-06) (Rev. 9-18-07)

R12 R01

Revise the *2006 Standard Specifications* as follows:

Page 12-2, 1205-3(D) Time Limitations for Replacement, add the following at the beginning of the chart:

| Facility Type | Marking Type | Replacement Deadline |
|--|--------------------------------|---|
| Full-control-of-access multi-lane roadway (4 or more total lanes) and ramps, including Interstates | All markings including symbols | By the end of each workday's operation if the lane is opened to traffic |

Page 12-14, Subarticle 1205-10, Measurement and Payment, delete the first sentence of the first paragraph and replace with the following:

Pavement Marking Lines will be measured and paid for as the actual number of linear feet of pavement marking lines per application that has been satisfactorily placed and accepted by the Engineer.