SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, riding characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition sufficient equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Accomplish grinding in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Transition auxiliary or ramp lane grinding as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall roughness within the limits specified, and texture the majority of the pavement surface. The Engineer will not require extra grinding to eliminate minor depressions in order to provide texturing for 100% of the pavement surface, but the Contractor shall ensure that minor depressions are not excessive. Grind sufficiently to avoid having excessive minor depressions. Continue grinding if accumulated total area of minor depressions exceed 30% of the total area of a 0.1 mile [0.1-km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval of a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. However, in rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other open bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Produce ground areas that are neat rectangular areas of uniform surface appearance having a constant lateral offset from the nearest parallel lane line or pavement edge and beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for pavement surface smoothness by either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph (as specified

below). For pavement surfaces not meeting the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. In addition, use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Provide and operate the 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm].

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with the straightedge, ensure that the finished pavement profile provides a uniform surface having no deviation greater than 1/8 inch [3 mm]. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] centers, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: a longitudinal profile testing apparatus used to measure a pavement's surface deviations.

b. Profile Trace: a line followed along the pavement's surface by a profile testing apparatus such as a profilograph.

c. Profilogram: a record (printed report) of an individual profile trace, a graphic chart of the measurements of a pavement's surface deviations.

d. Profile Index (PI): “inches per mile [millimeters per kilometers] in excess of the 0.2 inch [5 mm] blanking band (as shown on a profilogram)” but is simply called a Profile Index.

e. Blanking Band: the 0.2 inch [5 mm] wide scale on a profilogram not considered when calculating a Profile Index.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device as described below.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test for a California Type Profilograph (Electronic Model), Designation: FM 5-558.

The California Profilograph (Electronic Model) is specified due to its ability to perform computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement which is being joined.

Take at least two pavement profile traces. Locate the position of the profiles in the traffic wheel paths. Take the profiles parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review for determining which sections meet or do not meet these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies or provide copies (when the profilograms may be referred to frequently) to the Contractor for his use in correcting section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement so tested meets the following Profile Index requirements and is applicable to the profilogram for each profile trace run:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 7 inches per mile [110 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 9 inches per mile [140 mm/km] or less.

c. In addition to the above Profile Index requirements, paragraphs (1) and (2), ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual high points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the requirements specified.

Do not perform pavement surface smoothness testing with a California Type Profilograph on bridges. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-6 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
PI = 7 inches/mile	PI = 9 inches/mile	
PI ≤ 3	PI ≤ 5	103
3 < PI ≤ 4	5 < PI ≤ 6	102
4 < PI ≤ 5	6 < PI ≤ 7	101
5 < PI ≤ 6	7 < PI ≤ 8	100
6 < PI < 7	8 < PI < 9	99
PI = 7	PI = 9	98
PI > 7	PI > 9	Corrective work required

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
PI = 110 mm/km	PI = 140 mm/km	
PI ≤ 45	PI ≤ 80	103
45 < PI ≤ 60	80 < PI ≤ 95	102
60 < PI ≤ 80	95 < PI ≤ 110	101
80 < PI ≤ 95	110 < PI ≤ 125	100
95 < PI < 110	125 < PI < 140	99
PI = 110	PI = 140	98
PI > 110	PI > 140	Corrective work required

Pay (Price) Adjustments for Incentives/Disincentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the planned thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1-km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.