

SECTION 352

GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride 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 all necessary 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. Grind transition, auxiliary or ramp lane 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 smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas 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. 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 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 with a 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].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for pavement surface smoothness using either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(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. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 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] in 10 foot length.

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 and operate 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 a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, 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 profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

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

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

The electronic model of a California Type Profilograph performs 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 with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and 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 to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct 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 tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

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 5 inches per mile [80 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 7 inches per mile [110 mm/km] or less.

c. 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 points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, 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 specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. 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
Curvature Radius $\geq 2,000$ ft	$1,000 \text{ ft} \leq \text{Curvature Radius} < 2000 \text{ ft}$	
$\text{PI} \leq 2$	$\text{PI} \leq 4$	103
$2 < \text{PI} \leq 5$	$4 < \text{PI} \leq 7$	100
$\text{PI} > 5$	$\text{PI} > 7$	Corrective work required

SI Units	
$\text{PI} = 80 \text{ mm/km}$	$\text{PI} = 110 \text{ mm/km}$
$\text{PI} \leq 30$	$\text{PI} \leq 65$
$30 < \text{PI} \leq 80$	$65 < \text{PI} \leq 110$
$\text{PI} > 80$	$\text{PI} > 110$

Pay (Price) Adjustments for Incentives 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 plan 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:

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| Item No. 352- 70- | Grinding Concrete Pavement - per square yard. |
| Item No. 2352- 70- | Grinding Concrete Pavement - per square meter. |