

## 503 - PORTLAND CEMENT CONCRETE PAVEMENT SMOOTHNESS

### SECTION 503

#### PORTLAND CEMENT CONCRETE PAVEMENT SMOOTHNESS

##### 503.1 DESCRIPTION

Determine the smoothness of the pavement surface. Correct the smoothness deficiencies discovered in the pavement surface.

##### BID ITEM

Concrete Pavement Smoothness

##### UNITS

Lump Sum

##### 503.2 MATERIALS - None specified.

##### 503.3 CONSTRUCTION REQUIREMENTS

**a. General.** Determine the pavement smoothness by profiling the pavement surface of through traffic lanes and ramps. Excluded from profilograph testing, and not eligible for pay adjustments, on all projects are:

- bridge decks;
- acceleration and deceleration lanes of at-grade intersections;
- turning lanes;
- shoulders;
- pavement on horizontal curves with centerline radius of curvature of less than 1000 feet, and pavement within the superelevation transition of such curves;
- individual sections of pavement less than 50 feet in length;
- sideroads less than 250 feet in length; and
- the first (or last) 15 feet of a pavement section where the Contractor is not responsible for the adjoining surface

**b. Equipment.** Use a California type profilograph to determine the pavement profile. Other types of profilographs that produce results compatible to the California type profilograph may be used if approved by the Bureau of Materials and Research. For profilographs with a mechanical recorder, provide and use a ProScan electronic scanner with motorized paper transport to reduce the trace. (the Bureau of Materials and Research can provide the information necessary for the Contractor to obtain a ProScan electronic scanner.) Other types of automated trace reduction equipment may be used if approved by the Bureau of Materials and Research.

Profilographs with a computerized recorder may be evaluated without further reduction.

**c. Profilograph Operation.** Provide a profilograph operator certified according to KT-46, Part V.

Determine the pavement profiles for each lane according to the procedures for 1 lane shown in KT-46, Part V (2 traces per lane required). Additional profiles may be taken only to define the limits of an out-of-tolerance surface variation. The Engineer may use a 10 foot straightedge (or other means) to detect irregularities outside the required trace paths. The Engineer may also use the straightedge to delineate the areas requiring corrective action.

Determine a profile index (in./mi.) for each pavement section of finished pavement. A pavement section is a continuous area of pavement surface 0.1 mile long by 1 lane wide (12 feet nominal). A partial pavement section resulting from an interruption (such as a bridge) of the continuous pavement surface is subject to the same testing and evaluation as a whole section.

During the initial paving operations (and after long shutdown periods), profile the pavement as soon as the concrete has cured sufficiently to permit testing. The Engineer and the Contractor will use the results of the initial testing to evaluate the paving methods and equipment. If the initial paving operation produces acceptable results, the Contractor may continue paving. Repair or replace any PCCP curing medium that is damaged or removed during the testing.

On surfaces excluded from profilograph testing, the Engineer will determine the pavement smoothness using a 10 foot straightedge. The Engineer will select the locations to be tested. The variation of the surface from

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the testing edge of the straightedge shall not exceed 1/8 inch between any 2 contacts, longitudinal or transverse. Correct all irregularities exceeding the specified tolerance. After the irregularities are corrected, the Engineer will retest the area to verify compliance with the specified tolerance.

**d. Profilograph Evaluation and Corrective Actions.** Evaluate the profilograph results according to KT-46. Provide the Engineer with the profilograms and their evaluation within 2 working days after placement of the pavement.

Determine and evaluate the profile index (in./mi.) for each trace and the average profile index (in./mi.) for each section to identify required corrective action.

Determine the daily average profile index (in./mi.) for each day's paving operation. A day's paving operation is the pavement placed in a day (a minimum of 1 pavement section).

- If less than 1 pavement section is placed in a day, the day's production is grouped with the next day's production.
- If the production of the last day of project paving is less than 1 pavement section, it is grouped with the previous day's production.
- If the Contractor opts to profilograph the final portion of a day's paving the next working day that paving is continued in the same lane, those results (the final portion of the previous day's paving) are grouped with the day's paving as the lane is continued.

Take the required corrective actions according to **TABLE 503-1**.

<b>TABLE 503-1: PCCP SURFACE CORRECTIONS</b>		
<b>Pavement Surface Tolerances (in./mi.)</b>		<b>Required Corrective Action</b>
<b>Through Lanes Speed Limit Greater than 45 mph<sup>1</sup></b>	<b>Through Lanes Speed Limit 45 mph or Less<sup>2</sup></b>	
Average Profile Index per Section of 30 or less	Average Profile Index per Section of 45 or less	Correct all bumps <sup>3</sup>
Profile Index per Section of between 30.1 and 65 for an individual trace		Correct the Profile Index of each individual trace to 25 or less per section <sup>3</sup>
	Profile Index per Section of between 45.1 and 65 for an individual trace	Correct the Profile Index of each individual trace to 45 or less per section <sup>3</sup>
Profile Index per Section of 65.1 or greater for an individual trace		Correct the Profile Index of each individual trace to 25 or less per section, or replace the section (Contractor's option) <sup>3</sup>
	Profile Index per Section of 65.1 or greater for an individual trace	Correct the Profile Index of each individual trace to 45 or less per section, or replace the section (Contractor's option) <sup>3</sup>
Daily Average Profile Index greater than 40	Daily Average Profile Index greater than 65	Suspend the paving operations until corrective actions are taken to improve the paving operations

<sup>1</sup>Excluding acceleration/deceleration lanes and ramps.

<sup>2</sup>Including all acceleration/deceleration lanes and ramps, regardless of the speed limit. Acceleration/Deceleration lanes include the taper. Acceleration lanes that become through lanes are limited to 500 feet from the nose of the ramp. Ramps are from the nose to the intersection of the adjoining road.

<sup>3</sup>Correct all areas within each section having high points (bumps) with deviations in excess of 0.3 inches in a length of 25 feet or less regardless of the profile index value.

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Use the following methods for corrections:

- Diamond grinding or other profiling devices approved by the Engineer,
- Remove and replace the entire pavement thickness

Apply the corrective measure to the full lane width of the pavement. The corrected areas shall have uniform texture and appearance. The beginning and ending of the corrected areas shall be squared normal to centerline of the paved surface. Transverse grooves are not required in corrected areas.

After pavement sections are corrected, re-profile the pavement surface to verify compliance with the specified pavement smoothness. Provide the Engineer with the profilograms and their evaluation within 2 working days after correcting the pavement surface.

Make the required corrections for pavement smoothness before making the pavement thickness determinations.

The Engineer may perform profilograph testing on the pavement surface for monitoring and comparison purposes. If the Engineer determines that the Contractor's certified test results are inaccurate, the Engineer may choose to test the entire project length. The Engineer will charge the Contractor for such testing at the rate of \$500 per mile per profile track, with a minimum charge of \$1000.00. Providing inaccurate test results may result in de-certification of the Contractor's certified operator.

### 503.4 MEASUREMENT AND PAYMENT

The Engineer will base the pay adjustment for payment smoothness on the initial average profile index of the pavement section before any corrective work is performed. If the Contractor elects to remove and replace pavement section, the Engineer will base the pay adjustment for payment smoothness on the initial average profile index of the pavement section after the replacement.

The Engineer will apply the contract price adjustment according to **TABLE 503-2**, unless the Contract Documents indicate the project is Urban Type. If the project is Urban Type, the Engineer will apply the contract price adjustment according to **TABLE 503-3**.

<b>TABLE 503-2: PCCP SMOOTHNESS PRICE ADJUSTMENT</b>		
Average Profile Index Inch per mile per 0.1 mile section (Greater than 45 mph)	Average Profile Index Inch per mile per 0.1 mile section (45 mph or less & ramps)	Contract Price Adjustment Per 0.1 mile section per lane
6.0 or less		+ \$2000.00
6.0 to 10.0	15.0 or less	+ \$1670.00
10.1 to 15.0		+ \$1250.00
	15.1 to 25.0	+ \$830.00
15.1 to 18.0		+ \$620.00
18.1 to 30.0	25.1 to 45.0	0.00
30.1 to 40.0	45.1 to 65.0	0.00*
40.1 or more	65.1 or more	- \$1250.00*

\*Correct to 25.0 inch/mile (45.0 inch/mile for 45 mph or less & ramps)

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<b>TABLE 503-3: PCCP SMOOTHNESS PRICE ADJUSTMENT (URBAN TYPE PROJECTS)</b>		
Average Profile Index Inch per mile per 0.1 mile section (Greater than 45 mph)	Average Profile Index Inch per mile per 0.1 mile section (45 mph or less & ramps)	Contract Price Adjustment Per 0.1 mile section per lane
10.0 or less	15.0 or less	+ \$2820.00
10.1 to 15.0		+ \$2100.00
	15.1 to 25.0	+ \$1400.00
15.1 to 18.0		+ \$1050.00
18.1 to 30.0	25.1 to 45.0	0.00
30.1 to 45.0	45.1 to 65.0	0.00*
45.1 or more	65.1 or more	- \$1770.00*

\*Correct to 30.0 inch/mile (45.0 inch/mile for 45 mph & ramps)

Payments made for "Concrete Pavement Smoothness" will be shown as an added item to the contract.