

**KANSAS DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION TO THE
STANDARD SPECIFICATIONS, 1990 EDITION**

DIVISION 600

Create a new subsection in Division 600:

**FLEXIBLE PAVEMENT
(Pavement Smoothness)**

1.0 DESCRIPTION

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

2.0 MATERIALS - None specified

3.0 CONSTRUCTION REQUIREMENTS

a. Profilograph Testing. 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 (305 m), and pavement within the superelevation transition of such curves
- individual sections of pavement less than 50 feet (15.2 m) in length
- the first (or last) 15 feet (4.6 m) of a pavement section where the Contractor is not responsible for the adjoining surface
- side roads less than 1 section (528 feet) in length
- county secondary projects
- Federal aid urban projects with posted speeds of 40 mph or less, unless specified otherwise in the Contract Documents
- projects (excluding bridge lengths) less than ½ mile (½ km) in length
- existing roadways that are surfaced with less than 4 inches (102 mm) of virgin or hot recycled asphalt pavement that is placed in 1 lift

The following roadways must be profiled, and corrected if necessary, but are not eligible for pay adjustments:

- existing roadways that are milled, then surfaced with less than 4 inches (102 mm) of virgin or hot recycled asphalt pavement
- existing roadways that are surfaced with less than 4 inches (102 mm) of virgin or hot recycled asphalt pavement that is placed in 2 or more lifts
- existing roadways that are cold recycled, then surfaced with less than 4 inches (102 mm) of virgin or hot recycled asphalt pavement
- existing roadways that are hot in place recycled with a plan depth of 2 inches (51 mm) or more, then surfaced with Ultrathin Bonded Bituminous Surface or less than 4 inches (102 mm) of virgin or hot recycled bituminous pavement.

b. Equipment. Use a California type profilograph to determine the pavement profile. If approved by KDOT's Bureau of Materials and Research, other types of profilographs that produce results compatible to the California type profilograph may be used.

If the profilograph has a mechanical recorder, provide a ProScan electronic scanner with motorized paper transport to reduce the trace. Use the motorized paper transport when scanning the profilograph traces. KDOT's Bureau of Materials and Research can provide the information necessary for the Contractor to obtain a ProScan electronic scanner. If approved by the KDOT's Bureau of Materials and Research, other types of automated trace reduction equipment may be used.

If the profilograph has a computerized recorder, the trace produced is evaluated without further reduction.

c. Profilograph Operation. Provide an operator for the profilograph certified according to KT-46, Part V.

Determine the pavement profiles for each lane according to the procedures for one lane shown in Kansas Test Method KT-46. Additional profiles may be taken only to define the limits of an out-of-tolerance surface variation. The Engineer may use a 10 foot (3 m) straightedge (or other means) to detect irregularities outside the required trace paths. The Engineer may also use the straightedge to delineate the areas that require corrective action.

Determine a profile index (in./mi. (mm/km)) for each pavement section of finished pavement. A pavement section is a continuous area of pavement surface 0.1 mile (0.1 km) long by one lane wide (12 feet (3.7 m) 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.

Profile the pavement after final rolling, and before the surface is opened to traffic. If the Contractor elects to test intermediate lifts with the profilograph, make the profilograms available to the Engineer to review for evaluating the paving methods and equipment.

On surfaces excluded from profilograph testing, the Engineer will determine the pavement smoothness using a 10 foot (3 m) straightedge. The Engineer will select the locations to be tested. The variation of the surface from the testing edge of the straightedge must not exceed $\frac{1}{8}$ inch (3 mm) between any 2 contacts, longitudinal or transverse. Correct all irregularities exceeding the specified tolerance using equipment and methods approved by the Engineer. 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 the first working day after placement of the pavement.

Determine and evaluate the profile index (in./mi. (mm/km)) for each trace and the average profile index (in./mi. (mm/km)) for each section to identify where corrective action is needed.

Determine the daily average profile index (in./mi. (mm/km)) 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. The Contractor has the option of profiling the final portion of a day's production (not to exceed 5 sections) the first working day that paving is continued in the same lane. 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 1**.

TABLE 1: ASPHALT PAVEMENT		
Pavement Surface Tolerances in./mi. (mm/km)		Required Corrective Action
Through Lanes	Acceleration Lanes Deceleration Lanes Ramps ⁽¹⁾	
Average Profile Index per Section of 30 (476) or less	Average Profile Index per Section of 40 (630) or less	correct all bumps and dips ⁽²⁾
Profile Index per Section greater than 30 (476) for an individual trace		correct the Profile Index of each individual trace to 30 (476) or less per section ⁽²⁾
	Profile Index per Section greater than 40 (630) for an individual trace ¹	correct the Profile Index of each individual trace to 40 (630) or less per section ⁽²⁾
Daily Average Profile Index greater than 40 (630)		suspend the paving operations until corrective actions are taken to improve the paving operations

⁽¹⁾ 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.

⁽²⁾ Correct all areas within each section having high or low points (bumps or dips) with deviations in excess of 0.40 inches in a length of 25 feet (10 mm in a length of 7.6 m) or less regardless of the profile index value.

Use these methods for corrections:

- diamond grinding or other profiling devices approved by the Engineer
- remove and replace the entire pavement thickness
- remove the surface by milling, and replace the specified surface course
- overlay (not patch) with the specified surface course
- other methods that are approved by the Engineer

Apply the corrective measure to the full-lane width of the pavement. The corrected areas must have uniform texture and appearance. The beginning and ending of the corrected areas must be squared normal to centerline of the paved surface.

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 \$400 per mile (km) per profile track, with a minimum charge of \$800. Providing inaccurate test results may result in de-certification of the Contractor's certified operator.

4.0 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 2**. Payments for "Asphalt Pavement Smoothness" are an added item to the Contract.

Average Profile Index (in./mi. per lane per 0.1 mi. section)	Contract Price Adjustment (per 0.1 mi. section per lane)	Average Profile Index (mm/km per lane per 0.1 km section)	Contract Price Adjustment (per 0.1 km section per lane)
7.0 or less	+\$152.00	110 or less	+\$100.00
7.1 to 10.0	+\$76.00	111 to 160	+\$50.00
10.1 to 30.0	0.00	161 to 475	0.00
30.1 to 40.0	0.00*	476 to 630	0.00*
40.1 or more	-\$203.00*	631 or more	-\$120.00*
*Correct to 30.0 in./mi. (40.0 in./mi. as noted in TABLE 1).		*Correct to 475 mm/km (630 mm/km as noted in TABLE 1).	