

**Standard Method of Test for  
Test Method for Determining Rideability  
with the Rainhart Profilograph**

**SCDOT Designation: SC-T-121 (7/09)**

**1. SCOPE**

This method outlines a procedure for determining the rideability (expressed as Profile Index) of a bridge deck or concrete pavement with the Rainhart Profilograph.

**2. REFERENCED DOCUMENTS**

2.1 ASTM Standard  
E 1274 Standard Test Method for Measuring Pavement Roughness  
Using a Profilograph

2.2 Rainhart's "Profilograph Operating Manual"

**3. APPARATUS**

3.1 Rainhart Profilograph

3.1.1 Major and minor truss system

3.1.2 Chart recorder

3.1.3 Direct measuring wheel

3.1.4 Averaging wheels

3.2 Tape measure

3.3 Traffic paint or lumber crayon

3.4 Profile Index measuring equipment

3.4.1 Engineer's scale (metric or standard)

3.4.2 Blanking band (clear plastic scale 2.5 inches (64 mm) wide and 10.0 inches (254 mm) long with the center 0.2 inch (5 mm) "blacked out", having 0.1 inch (2 mm) vertical graduations)

**4. TEST SPECIMENS**

4.1 Concrete bridge decks or concrete pavements as specified in contracts

4.2 Areas of interest

**5. PROCEDURE**

- 5.1 Bridge deck or concrete pavements
  - 5.1.1 Bridge deck or concrete pavement preparation (surface must be free of debris)
    - 5.1.1.1 Verify beginning of bridge or roadway or termini of roadway.
    - 5.1.1.2 Verify width of concrete and establish centerline with traffic paint or lumber crayon.
    - 5.1.1.3 Measure three (3) feet (915 mm) from the each side of the established centerline to establish wheelpath number two (2) with traffic paint or lumber crayon at sufficient intervals to maintain proper wheelpath alignment.
    - 5.1.1.4 Measure six (6) feet (1829 mm) towards the shoulder from each wheelpath number two (2) to establish wheelpath number one (1) with traffic paint or lumber crayon at sufficient intervals to maintain proper wheelpath alignment.
    - 5.1.1.5 Repeat section 5 as necessary for multilane bridges and roads.
  - 5.1.2 Profilograph pretest check and assembly
    - 5.1.2.1 Attach the two (2) removable minor trusses.
    - 5.1.2.2 Attach drive chain to the chart recorder.
    - 5.1.2.3 Attach chart recorder to major truss and direct measuring wheel.
    - 5.1.2.4 Check all truss joints and measuring wheels.
    - 5.1.2.5 Load and properly align chart recorder paper (Rainhart Cat. No. 1006).
    - 5.1.2.6 Load and properly align two (2) fine line plastic point pens in the chart recorder.
    - 5.1.2.7 Select proper scale gear on chart recorder (one inch equals ten feet (1"=10')).
  - 5.1.3 Make project notes on chart recorder paper.
    - 5.1.3.1 Road or bridge identification
    - 5.1.3.2 Lane
    - 5.1.3.3 Direction
    - 5.1.3.4 Date
    - 5.1.3.5 File number
    - 5.1.3.6 Operators

- 5.1.4 Align direct measuring wheel of Profilograph with wheel path number one (1) in traffic direction at the beginning of the bridge or roadway and reset distance counter to 0.
- 5.1.5 Lower chart recorder pens.
- 5.1.6 Push Profilograph in established wheelpaths.
- 5.1.7 Make necessary notes (i.e. joints, etc.).
- 5.1.8 Record distance tested, as measured by the distance counter, on chart recorder paper.
- 5.1.9 Repeat steps 5.1.3 through 5.1.8 as necessary for each wheelpath
- 5.2 Areas of interest
- 5.2.1 Conduct all tests on areas of interest as outlined by the requester.

## 6. CALCULATIONS

Profile Index - Sum the scallops (bumps) that exceed above and below the two tenth inch (0.2) (5 mm) blanking band on the profilogram of scale one inch equals ten feet (1"=10'). Multiply the results by the length factor [one (1) mile (in feet) (kilometer in meters) divided by the length of the test section (feet or meters)].

$$\text{Factor} = \frac{\text{one (1) mile (feet) (km (m))}}{\text{length of test section (feet or meters)}}$$

$$\text{Profile Index} = \text{Summation of scallops} \times \text{factor}$$

- 6.1 From the starting point, place the blanking band in such a way as to "blank out" as much of the profile as possible. When this is done properly, the scallops should be approximately balanced above and below.
- 6.2 Mark the beginning and the end of the blanking band.
- 6.3 Starting from the beginning, measure and record on the profilogram the height of all of the scallops projecting at least 0.03 inch (.75 mm) above and below the blanking band and 0.20 inch (5mm) long. Each scallop is to be measured to the nearest 0.05 inch (1 mm).
- 6.4 Move the scale to the end of the first blanking band section and repeat steps 6.2 and 6.3 as necessary until complete.
- 6.5 Record data on "Profilograph Data" worksheet.
  - 6.5.1 Project notes (section 5.1.3)
  - 6.5.2 Resident Construction Engineer

6.5.3 Contractor

6.5.4 Test section length

6.5.5 Factor

6.5.6 Scallop measurements

6.5.7 Summation of scallops

6.5.8 Profile Index

6.5.9 Notes (section 5.1.7)

## **7. REPORT**

7.1 Test results are reported on Lab Form PE 121 with a cover memorandum. Data and calculations are recorded on worksheet PE 121 WA and PE 121 WB.

7.2 Report areas of interest as requested.