

EVALUATION OF PROFILES

(A Modification of California Test 526)

1. SCOPE

1.1 This method describes the procedure for determining the Profile Index (PI) from profilograms of pavements made with a California type profilograph. Also described is the procedure used to locate individual high areas in excess of 0.3 inches when their reduction is required by the contract documents.

1.2 This test method may involve hazardous material, operations, or equipment. This test method does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user to consult and establish appropriate safety and health practices and determine the applicability of any regulatory limitations prior to use.

1.3 See Appendix A1 of the Materials Testing Manual for information regarding the procedure to be used for rounding numbers to the required degree of accuracy.

1.4 See the archived ARIZ 801a for information regarding mechanical recording, determination of profile index by the manual method, or determination of high points by the manual method.

2. APPARATUS

2.1 The California Profilograph consists of a frame 25 feet in length supported upon wheels at both ends. The California Profilograph is fabricated with a truss structure for stability. Beams or other systems are not permitted.

The profilograph records the roadway surface profile from the vertical movement of a wheel attached to the frame at mid-point (profile wheel) and is in reference to the mean elevation of the points of contact with the roadway surface established by the support wheels.

The profilograph shall use an electronic recording device.

2.2 Electronic recorder – The record of the roadway surface is recorded on a scale of 1 inch = 25 feet longitudinally and 1 inch = 1 inch vertically (full scale). Data is

collected by means of a digital response resulting from the vertical movement of the profile wheel.

3. CALIBRATION

- 3.1 The profilograph must be calibrated both horizontally and vertically per the manufacturer's recommendations. These calibrations and the profilograph repeatability should be evaluated prior to use in the project, weekly during use, and at any time verification may be necessary.
- 3.2 Vertical calibration is required after every profile wheel change and each reassembly of the profilograph. The air pressure of the profile wheel shall be checked daily to make sure it is within the manufacturer's recommendation.
- 3.3 The following records shall be maintained:
 - 3.3.1 Vertical and horizontal calibration following assembly and prior to use, weekly during use, and any other time vertical and horizontal calibration data is obtained.
 - 3.3.2 Daily tire pressure checks and the associated calibration information if tire pressure changed beyond the manufacturer's recommendation.
- 3.4 Horizontal calibration shall be performed on a straight, flat roadway test section at least 528 feet (0.1 mile) long measured accurately to within 1 foot (or 0.2%) of the length. The roadway test section shall be verified by a measuring tape or wheel.
- 3.5 Vertical calibration shall be performed on a flat, level area. Use vertical deflection standards that are flat plates of known thickness or a single device with graduated thickness. The thickness of the initial plate or initial step of the graduated device must not exceed 1.0 inch.
 - 3.5.1 Raise the profile wheel and place it on the initial plate or initial step of the graduated device. Ensure that the initial plate or graduated device is firmly seated. This will place the profile wheel on a flat surface and establish a baseline value from which to measure subsequent elevations. Record the elevation displayed on the electronic profilograph.
 - 3.5.2 Raise the profile wheel again and insert another plate on top of the initial baseline plate or slide the graduated device to the next elevation. Ensure that

the graduated device is firmly seated. Record the displayed elevation from the electronic profilograph. Perform this step for at least a 1 inch and 2 inch change in elevation from the initial elevation.

Note: Recorded elevations shall be accurate within 0.01 inches of the known thickness of the plates or graduations.

- 3.5.3 Reverse the process by removing the two individual plates one at a time or stepping down the graduated device and recording the change in elevation after the removal of each successive plate.
- 3.5.4 The calibration is considered complete if the recorded elevation returns to within 0.03 inches of the original starting position.
- 3.6 Adjust chart deviations in excess of 0.03 inches according to the manufacturer's recommendations.
- 3.7 The profilograph must be able to demonstrate acceptable repeatability. Acceptable repeatability is defined as "after three tests, the difference in the measured PI must not exceed a PI of one between any two tests." The pavement surface used for the repeatability test must have a PI value of 15 or less.

4. PROCEDURE

- 4.1 The profilograph shall be operated in accordance with the manufacturer's instructions.
- 4.2 The instructions for assembling the profilograph are contained in a booklet supplied for each unit by the manufacturer.
- 4.3 Clear the intended profilograph path of all loose material and foreign objects.
- 4.4 If possible, move the profilograph about 30 feet forward to the starting point. Once there, initialize the recorder and make beginning notations.
- 4.5 The profilograph shall be moved at a speed no greater than a walk, approximately 2 to 3 mph, to eliminate as much bounce as possible. Higher speeds can result in a profilogram with excessive spikes (chatter) that is difficult to evaluate.

- 4.6. Steer the profilograph to stay within the prescribed testing path. Pertinent observation about surveyed location or unusual conditions may be made on the record only as they occur. Observe the recorder for any unusual operation.
- 4.7. Upon completion of a sampling path, make ending notations and review the recording. Repeat the procedure for successive sampling paths.

5. CALCULATION

- 5.1. PI is defined as – inches per 0.1 miles in excess of a zero (null) blanking band.
- 5.2. Zero (null) blanking band is defined as – a reference line that balances the profile above and below it. The blanking band shall be 0.2 inches unless otherwise specified.
- 5.3. The PI can be determined from the data collected by a profilograph using an electronic recording device capable of creating a profile trace (profilogram). The profilogram indicates the PI for the required distance as well as the location of all scallops.
- 5.4. The PI from an electronic profilograph shall be with a software program capable of generating a computerized profile trace from the collected data. The computer software shall be set with the following data filter settings:
 - 5.4.1. The PI from an electronic profilograph is calculated according to the instructions in the software program.
 - 5.4.2. Determination of high points in excess of 0.3 inches using an electronic profilograph will be automatic according to the instructions in the software program.

6. REPORT

- 6.1. Height of the blanking band to the nearest 0.05 inches
- 6.2. Cutoff height to the nearest 0.05 inches (for example 0.3 inches)
- 6.3. Profilograph make and model
- 6.4. Length of each segment for which the profile index is calculated