
Standard Practice for Determining Pavement Deformation Parameters and Cross Slope from Collected Transverse Profiles

AASHTO Designation: R 87-18 (2022)¹

Technically Revised: 2018

Reviewed but Not Updated: 2022

Technical Subcommittee 5a: Pavement Measurement



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Determining Pavement Deformation Parameters and Cross Slope from Collected Transverse Profiles

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1. SCOPE

- 1.1. This practice outlines a method for deriving pavement deformation parameters such as rut depth and cross slope in pavement surfaces utilizing a transverse profile. Detailed specifications are not included for equipment or software used to make the calculations. According to this standard, any approach that can be adequately validated to meet the functionality stipulated herein is considered acceptable. The goal is to achieve a significant level of standardization that will contribute to the production of consistent pavement condition estimates without unduly restricting innovative methods.
- 1.2. The data will typically be processed utilizing a collection of algorithms in a computer.
- 1.3. *This practice does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations related to and prior to its use.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standard:*
- [R 88](#), Collecting the Transverse Pavement Profile

3. TERMINOLOGY

- 3.1. *Definitions:*
- 3.1.1. *cross slope*—the average transverse slope of the pavement surface expressed in percent.
- 3.1.2. *inside wheel path*—a longitudinal strip of pavement 1.0 m (39 in.) wide and centered 0.875 m (35 in.) to the left of the centerline of the lane in the direction of travel.
- 3.1.3. *lane*—the traveled surface between the inside edge of the left pavement marking and the outside lane edge or, in the absence of markings, an equivalent portion of the pavement surface.

- 3.1.4. *outside lane edge*—a line 100 mm (4 in.) beyond the outside limit of the edge pavement marking. In the absence of an edge pavement marking, it is a user-defined distance from the left edge marking or pavement centerline.
- 3.1.5. *outside wheel path*—a longitudinal strip of pavement 1.0 m (39 in.) wide and centered 0.875 m (35 in.) to the right of the centerline of the lane in the direction of travel.
- 3.1.6. *percent deformation*—the difference between the straight-line length and the profile length of a section of pavement divided by the straight-line length multiplied by 100.
- 3.1.7. *rut*—a broad longitudinal depression in the wheel path of the pavement surface with a depth of at least 2 mm (0.080 in.), a width of at least 0.3 m (1.0 ft), and with a longitudinal length of at least 30 m (100 ft).
- 3.1.8. *summary section*—a longitudinal length of a pavement lane over which the data are summarized.
- 3.1.9. *transverse profile*—the vertical deviations of the pavement surface from a horizontal reference perpendicular to the lane direction.
- 3.1.10. *lane center*—a location halfway between the inside edges of the pavement edge markings. If no markings are present, a location 22 percent of the total pavement width from the pavement middle on two-lane roads and a location at the middle of the road on one-lane roads.

4. SIGNIFICANCE AND USE

- 4.1. The method outlines a set of procedures to calculate several measures of pavement deformation related to the transverse profile. The adoption of these procedures will help produce consistent data for pavement analysis.
- 4.2. This method reflects a balance between extreme calculation complexity and resultant accuracy. It is not expected to give the correct values for each individual deformation condition but to provide data that, taken in aggregate, will provide an accurate picture of the deformation involved. Likewise, there will be unusual transverse contours that will not calculate correctly. It is expected, however, that their occurrence will be minimal.

5. DATA COLLECTION

- 5.1. Typically, the transverse profile is to be collected according to [R 88](#). Other collection protocols may be followed if the data requirements of [R 88](#) are met or exceeded.

6. DATA REDUCTION

- 6.1. All calculations are made for each transverse profile reported. For network-level data, the processed profiles should not be more than 3 m (10 ft) apart and for project level, no farther apart than 0.5 m (1.5 ft).
- 6.2. The raw transverse profile data should be processed to first remove outlier values, and then to smooth the data. An example of smoothing involves the application of an approximately 50-mm (2-in.) moving average filter. The resultant profile is used for all subsequent calculations.
- 6.3. A system should be established to determine the lane location and width within each profile and correlate this information with the profile data.