
Standard Practice for Quantifying Cracks in Asphalt Pavement Surfaces from Collected Pavement Images Utilizing Automated Methods

AASHTO Designation: R 85-18 (2022)¹

Technically Revised: 2018

Reviewed but Not Updated: 2022

Technical Subcommittee: 5a, Pavement Measurement



**American Association of State Highway and Transportation Officials
555 12th Street NW, Suite 1000
Washington, DC 20004**

Quantifying Cracks in Asphalt Pavement Surfaces from Collected Pavement Images Utilizing Automated Methods

AASHTO Designation: R 85-18 (2022)¹



Technically Revised: 2018

Reviewed but Not Updated: 2022

Technical Subcommittee: 5a, Pavement Measurement

1. SCOPE

- 1.1. This practice outlines the procedures for quantifying cracking distress at the network level in asphalt pavement surfaces utilizing automated methods. Detailed specifications are not included for equipment, instruments, or the associated software used to process the images. According to these specifications, any equipment that can be adequately validated to meet the functionality stipulated herein is considered acceptable. The goal is to achieve a significant level of standardization, which will contribute to the production of consistent pavement condition estimates while not unduly limiting innovation.
- 1.2. The automation level covered by this standard involves minimal human intervention in the process. It is understood that the current level of technology requires significant human review of the automation process to verify performance of the system. It is anticipated that the required level of human intervention will decline over the next few years.
- 1.3. Collect the pavement images to be processed according to [R 86](#).
- 1.4. Sampling of pavement images from the data collection standard process is acceptable before proceeding with the analysis process in this standard. The data sample is to be large enough to provide the confidence level required by the agency. Sample size and spacing will depend on construction practices and numerous other factors that impact pavement continuity. A 100 percent sample is recommended until a sampling method can be supported by statistical analysis.
- 1.5. *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 86](#), Collecting Images of Pavement Surfaces for Distress Detection

3. TERMINOLOGY

- 3.1. *crack*—a fissure of the pavement material at the surface with minimum dimensions of 1-mm (0.04-in.) width and 25-mm (1-in.) length.

- 3.2. *crack length*—the length measured along the crack path using all available data points between crack termini.
- 3.3. *crack orientation*—the angular measurement in degrees between the direction of travel and a line drawn between the crack termini as measured within the measurement zone of interest.
- 3.4. *crack position*—the coordinates of the midpoint of the crack measured perpendicular to the shoulder edge of the pavement and the longitudinal location relative to the starting collection point.
- 3.5. *crack terminus*—the point at which the crack width goes below and remains less than 1 mm (0.04 in.) for a 10-mm (0.4-in.) length, or the intersection with another crack, or the end of a summary section.
- 3.6. *crack width*—the average gap in millimeters (inches) between the two edges of a crack measured at points along the crack with a spacing between 1 mm (0.04 in.) and 10 mm (0.4 in.).
- 3.7. *extent of cracking*—the sum of the lengths in meters (feet) of all cracks in the summary section and zone where appropriate.
Note 1—For pattern cracking, agencies have the option to report extent by area as the sum of the areas in square meters (square feet) of all pattern areas for each zone within the summary section.
- 3.8. *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.
- 3.9. *lane*—the traveled surface between the inside edge of the pavement markings. In the absence of markings, an equivalent portion of the pavement surface.
Note 2—Where cracks (or the paved surface edge) exist beyond the pavement markings, but within 0.3 m (1 ft) of the pavement markings, agencies have the option to move the lane edges so that the lateral extent of the lane is increased to include the new boundary.
- 3.10. *longitudinal crack*—a crack at least 0.3 m (12 in.) long and with a crack orientation between and including +20 and –20 degrees relative to the lane centerline.
- 3.11. *measurement zone*—one of the five strips of pavement created by the wheel paths and the areas between and outside the wheel paths.
- 3.12. *other crack*—all cracks not identified as longitudinal, pattern, or transverse.
- 3.13. *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.
- 3.14. *pattern crack*—a crack that is part of a network of cracks that form an identifiable area or grouping of cracks.
Note 3—An identifiable area or grouping of cracks may be determined by interconnecting cracks with a length of less than 0.3 m (12 in.) or through a process designed to separate independent cracks from cracks that due to their proximity are likely related. The process could be based on machine learning or other artificial intelligence techniques. One method currently being evaluated establishes 150 mm (6 in.) buffers around each crack and computes how much of the buffer area is shared with the buffer areas for other cracks. A crack sharing less than a threshold of its area (50%) with other cracks is considered independent and not part of a pattern.
- 3.15. *pavement image*—a representation of the pavement that describes a characteristic (gray scale, color, temperature, elevation, etc.) of a matrix of points (pixels) on the pavement surface.