



Designation: D 4695 – 96

Standard Guide for General Pavement Deflection Measurements¹

This standard is issued under the fixed designation D 4695; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide provides recommendations for measuring pavement deflections resulting from the application of a known transient load, a steady-state dynamic load, or an impulse load applied by a nondestructive deflection testing (NDT) device. Deflections are measured with sensors that monitor the vertical movement of the pavement surface. This guide describes the general information that should be obtained regardless of the type of testing device used.

1.2 This guide is applicable for deflection measurements made on flexible (asphalt concrete (AC)), rigid (Portland Cement Concrete (PCC) or continuously reinforced concrete (CRCP)), or composite (AC/PCC) pavements.

1.3 This guide provides general information that is required for three suggested levels of testing effort, as follows:

1.3.1 *Level I*—a general overview of pavement condition for network analysis.

1.3.2 *Level II*—a routine analysis of the pavement for purposes such as overlay or rehabilitation design projects.

1.3.3 *Level III*—a detailed or specific analysis of the pavement, such as the evaluation of joint efficiency or foundation support for PCC slabs.

1.4 The values stated in SI units are to be regarded as standard. Inch-pound units given in parentheses are for information purposes only.

1.5 *This standard may involve hazardous materials, operations, and equipment. This standard 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 prior to use.*

2. Referenced Documents

2.1 *AASHTO Standard*:²

T256—Standard Recommended Practice for Pavement Deflection Measurements

¹ This guide is under the jurisdiction of Committee D-4 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.39 on Non-Destructive Testing of Pavement Structures.

Current edition approved Feb. 10, 1996. Published April 1996. Last previous edition D 4695 – 87. Originally published as D 4695 – 87.

² Available from the American Association of State Highway and Transportation Officials, 444 N. Capitol St., NW, Washington, DC 20001.

3. Summary of Guide

3.1 This guide consists of recommendations for measuring vertical or normal pavement surface deflections, directly under or at locations radially outward (offset), or both, from the load center. Several offset deflection measurements at a specific test location describe what is called a deflection “basin”. Each NDT device is operated according to the standard operating procedure applicable to the device.

3.2 Recommendations for collection of general information such as ambient temperature, pavement temperature, equipment calibration, number of tests, and test location pertain to all devices.

4. Significance and Use

4.1 The nondestructive measurement of pavement deflections provides information that can be used for the structural analysis of the pavement system. The series of measured deflections or deflection basins may serve as inputs for models that estimate the overall stiffness of the pavement system, the effective or apparent modulus of elasticity of individual pavement layers (also known as “backcalculation”), or an equivalent thickness of a reference material. Either the effective modulus of elasticity or equivalent thickness may be used for mechanistic pavement evaluation and overlay design.

5. Apparatus

5.1 The apparatus used in this guide shall be one of the deflection measuring devices given in 5.2 and shall consist of some type of probe or surface contact sensor to measure normal pavement movements when subjected to a given load type.

5.2 *Deflection Measuring Devices*:

5.2.1 *Noncontinuous Static Device*,³ that operates on a single lever-arm principle. This device should have a minimum 2.5 m (8 ft) long probe and the extension of the probe should depress a dial gage or electronic sensor that measures maximum pavement deflection with a resolution of 0.025 mm (0.001 in.) or better. The vehicle used with the static deflection device should be a truck carrying an 80 kN (18 000 lb) test load on a single rear axle. The rear axle should have dual 280 by 570

³ An example of this instrument is the Soiltest Benkelman Beam, manufactured by Soiltest Inc., Materials Testing Div., 2205 Lee St., Evanston, IL 60202.