Standard Practice for

Calibrating the Load Cell and Deflection Sensors for a Falling Weight Deflectometer

AASHTO Designation: R 32-20[1]

Technical Subcommittee: 5a, Pavement Measurement

Release: Group 1 (April)

AASHTO

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

Standard Practice for

Calibrating the Load Cell and Deflection Sensors for a Falling Weight Deflectometer

AASHTO Designation: R 32-20[1]

Technical Subcommittee: 5a, Pavement Measurement

Release: Group 1 (April)

1. SCOPE

1.1. This standard practice covers the annual calibration of the load cell and the deflection sensors and monthly relative calibration of the deflection sensors of a falling weight deflectometer (FWD) or a heavy weight deflectometer (HWD). It is used to establish calibration factors for correcting FWD and HWD measurements. For this practice, the term `FWD_ also refers to an HWD unless otherwise noted.

1.2. This procedure is not applicable to the calibration of lightweight deflectometers or of cyclic loading and other types of pavement deflection testing equipment.

1.3. A reference calibration is performed once per year or after the load cell has been replaced on the FWD. It shall be performed by a certified technician (Note 1).

1.4. Monthly relative calibration is performed on the deflection sensors at least once per month and immediately after a deflection sensor is replaced. A certified technician is not required (Note 1).

Note 1´ For more information on certification for FWD calibration center operators, visit www.aashtoresource.org.

1.5. Calibration procedures may vary slightly among FWD types. This procedure can be used for all types of FWDs with minor modifications within the limits of the reference calibration equipment.

1.6. The values stated in SI units are to be regarded as standard. U.S. Customary units given in parentheses are for information purposes only.

1.7. *This standard practice may involve hazardous materials, operations, and equipment. It does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this standard practice to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- R 33, Calibrating the Reference Load Cell Used for Reference Calibrations for a Falling Weight Deflectometer

2.2. *Other Document*:

- FHWA-HRT-07-040, FWD Calibration Center and Operational Improvements: Redevelopment of the Calibration Protocol and Equipment

3. TERMINOLOGY

3.1. *Definitions of Terms Specific to This Standard*:

3.1.1. *certified technician´* an individual who has demonstrated proficiency at performing FWD calibrations during a quality assurance review and is issued certification as an FWD calibration center operator.[2] The individual shall be re-certified every 2 yr. The certification procedure is described in detail in Report No. FHWA-HRT-07-040.[3]

3.1.2. *data acquisition system´* the signal conditioner, data acquisition board, data acquisition software, computer, and cabling. It is connected to either the reference load cell or the accelerometer.

3.1.3. *drop sequence´* the sequence of replicate drops at one or more load levels used during reference or relative calibration.

3.1.4. *final gain factor´* the calibration factor for a load or deflection sensor at the end of the calibration procedure.

3.1.5. *FWD*—falling weight deflectometer; pulse loading device for measuring pavement structural response. The peak load is adjustable over a range from 13 kN (3000 lb) to 125 kN (28,000 lb).

3.1.6. *FWD deflection sensor´* device used to measure the pavement deflection response for a given load (e.g., geophones, seismometers, accelerometers, or other devices).

3.1.7. *FWD load cell´* device located under the loading mechanism in an FWD that measures the load response of the FWD system.

3.1.8. *HWD*—heavy weight deflectometer; pulse loading device for measuring pavement structural response. The peak load is adjustable over a range from 27 kN (6000 lb) to 270 kN (60,000 lb).

3.1.9. *initial gain factor´* the calibration factor for a load or deflection sensor that was present in the FWD operating program before the start of calibration.

3.1.10. *interim gain factor´* the calibration factor for a deflection sensor resulting from averaging all trials of reference calibration.

3.1.11. *Pavement Deflection Data Exchange (PDDX)´* the file format required by *WinFWDCal*. This format is described in Report No. FHWA-HRT-07-040.

3.1.12. *reference calibration´* the calibration of either the FWD load cell or deflection sensors against a separate reference measuring system. For load cell calibration, the reference system is a custom-made reference load cell, and for deflection sensors, it is a precision accelerometer.

3.1.13. *reference gain factor´* the calibration factor for a load or deflection sensor determined by one trial during reference calibration.

3.1.14. *relative calibration´* a calibration procedure in which the deflection sensors are calibrated relative to one another. No outside reference system is used.

3.1.15. *relative gain factor´* the calibration factor for a deflection sensor determined by one trial during relative calibration.