Colorado Procedure 78-18

Standard Practice for

Certification of High Speed Profilers

1. SCOPE

1.1 This test method describes the procedures for certifying high speed profilers for use on CDOT projects.

2. REFERENCED DOCUMENTS

2.1 International Cybernetics Corp. SurPRO 3500 User's Manual.

2.2 *AASHTO Standards:*

M 328-10 Standard Equipment Specification for Inertial Profiler

3. EQUIPMENT

3.1 International Cybernetics Corporation's SurPRO 3500.

3.2 High Speed Profiler

3.2.1 The High Speed Profiler (HSP) shall meet the specifications of AASHTO M 328 except that profilers used to measure the smoothness on concrete pavement shall use approved line lasers with at least a three inch wide foot print.

3.2.2 The HSP shall use the following operation parameters:

3.2.2.1 The height sensor spacing shall be 70 +/- 1 inch.

3.2.2.2 The sample interval at which relative profile elevations are reported shall be less than or equal to one inch.

3.2.2.3 The algorithm for filtering the profile data shall use a cutoff wavelength of 300 feet.

3.2.2.4 The HSP shall be capable of using automated triggering to start & stop data collection.

4. OPERATOR REQUIREMENTS

4.1 The Operator shall be proficient in the operation of their profiler. It is recommended that the operator have a current LabCAT Level S Certification.

5. REFERENCE SITE SELECTION

5.1 The Colorado Department of Transportation will select a site to perform the HSP Certification with the following requirements:

5.1.1 Shall be relatively strait, level and smooth.

5.1.2 Shall have a sufficient distance for three consecutive 0.1mile sections and sufficient distance to safely start & stop with a 300 foot lead-in.

5.1.3 The 0.1 mile sections shall have an average IRI value between 30 & 90 in/mile.

5.1.4 Shall be on a surface where surface texture will have a minimal impact on data collection.

5.1.5 Shall be free of cracks in the traveled wheel paths.

5.1.6 Shall be on a relatively stable base with minimal traffic.

6. REFERENCE VALUE DETERMINATION

6.1 The device for determining the reference values shall be an ICC SurPRO 3500.

6.2 The reference site will be painted with a dot at least every 10 feet in the wheel paths.

6.3 The reference device will perform three closed loop data collection runs for each wheel path in the intended direction of travel.

6.4 ProVAL will be used to determine the cross correlation value for the closed loop run in each wheelpath. A minimum cross correlation

value of 0.95 will be required to accept each wheelpath.

6.5 If the cross correlation values for a wheelpath are less than 0.95 it shall be retested according to Subsection 6.3.

6.6 The IRI from the third run for each 0.1 mile section for each wheel path will be used as the reference values for the HSP certification. These values will not be shared with the participants.

7. CERTIFICATION PROCEDURE

7.1 Prior to the HSP collecting certification data, the HSP's distance measuring instrument shall be calibrated following the manufacturer's procedures.

7.2 The HSP operator shall perform ten runs in the intended direction of travel.

7.3 The HSP operator shall provide the Department the raw data files for ICC profilers or data files that can be opened in ProVAL for the other manufactures.

7.4 Data files for the ten runs shall be submitted to the Department on electronic media, such as a thumb drive or compact disk immediately after the completion of the ten runs. The media will not be returned to the operator.

7.4.1 Filenames shall be in the following format:

COMPANYNAME_Run_XX.ERD

7.5 The data files will be analyzed by the Department.

8. ACCEPTANCE DETERMINATION

8.1 Repeatability of the profiler will be evaluated using ProVAL. ProVAL will determine the cross correlation value for the 10 runs in each wheelpath. A minimum cross correlation value of 0.92 will be required to pass.

8.2 Accuracy of the profiler will be evaluated using ProVAL. Each of the 10 runs will be compared to the reference profile for each wheelpath. The accuracy score for each run in each wheelpath will be averaged. Both wheelpaths shall have an average accuracy score of at least 0.90

8.3 Passing the repeatability and accuracy requirements is required to pass the certification criteria.

9. CERTIFICATION

9.1 After a HSP is determined to be acceptable, a Certificate will be issued listing:

- HSP serial number
- HSP VIN number
- HSP Make & Model
- Height sensor serial numbers
- Accelerometer serial numbers
- Certification Date
- Expiration Date

9.2 The certification will expire on May 31st of the following year.

9.3 A list of certified profilers is posted on CDOT's web site under Certified Pavement Smoothness Testing Devices at: https://www.codot.gov/business/designsupport/materials-and-geotechnical/pave-smooth-testing

10. SUSPENSION OF CERTIFICATION

NOTE 1: This Section is used when a Contractor's profiler fails to meet the Smoothness Verification Testing acceptance criteria.

10.1 The Contractor's profiler shall make three repeat runs at a site chosen by the Department. The site will meet the requirements of Section 5.

10.2 CDOT's profiler will make three runs of the site.

10.3 The data files for the three runs shall be submitted to the Department on electronic media, such as a thumb drive or compact disk. The media will not be returned to the Contractor.

10.4 The Department will determine an average MRI for each 0.1 mile section using the Department's profiler's results.

10.5 The Contractor's Profiler's results will be compared to the Department's results.

10.6 The Contractor's Profiler will retain its certification if the average MRI for each 0.1 mile section does not vary from the Department's MRI values by more than 6.0 in/mile.

10.7 If the Contractor's profiler fails to meet the criteria in Subsection 10.6, the Contractor's profiler will be allowed to make three additional runs and then it will be re-evaluated.

10.8 If the Contractor's profiler fails to meet the criteria in Subsection 10.6 a second time, the Contractor's profiler's Certification will be suspended.

10.9 The Contractor's profiler shall be repaired and/or adjusted/calibrated by the manufacturer.

10.10 If the Contractor wants to have his profiler recertified after repairs have been made prior to the next annual certification, all costs associated with the recertification shall be borne by the Contractor.

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