LONG TERM PAVEMENT PERFORMANCE PROGRAM DIRECTIVE

For The Technical Direction Of The LTPP Program

Program Area: Monitoring **Directive Number:** D-8

Date: April 22, 1996 **Supersedes:** n/a

Subject: Automated Dipstick Transverse Profile Measurement Procedure

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Introduction

The following procedure for transverse profile measurements on LTPP test sections, using automated Dipsticks. These procedures should be used on all test sections requiring manual measurement of the transverse profile where the automated devices are available. These instructions supplement the procedures contained in the "Distress Identification Manual for the Long-Term Performance Project" SHRP-P-338 dated May 1993, Appendix B.

The FACE Dipstick model 2000 has been purchased by FHWA and provided to the LTPP Regional Coordination Contractors (RCOC) to supplement data collection efforts. This device is essentially identical in operation to the devices currently in use by the RCOC's, with several exceptions:

> The model 2000 allows for an automatic zeroing of the device with no mechanical adjustment required.
>
> Rechargeable batteries are housed in the handle and must be recharged using the charging unit supplied with the device.
>
> The unit may be used in a manual mode similar to that currently used or the operator may choose the automatic recording mode using the supplied PC compatible palm-top computer. The automatic mode allows for single operator data collection and eliminates the need for paper data forms and additional manual data entry.

The software provided with the model 2000 Dipstick allows for automated sectioning of the data to provide individual transverse profiles for each station. Specifically, the output file

generated after completing data collection provides, for each profile location, distance from the edge of pavement ("X") and differential elevation relative to the start point ("Y"), along with some identification or "header" type data. This "X,Y" data provided by the software should be checked to assess bias but no bias correction is to be applied. If the data is within the $\pm$ 0.003 inch tolerance then it is acceptable. The output file only provides the readings obtained for the first leg of any loop; return readings are not used.

Manuals provided with the equipment do not reflect the LTPP-specific features in the data collection software. However, the procedures for transferring files between the palm-top computer and other computers contained in the manuals are not affected by the LTPP features. All other instructions contained in the equipment manuals shall be followed; e.g., setup, maintenance.

The LTPP-specific data collection software is contained on the diskette "Road Data Collection Program 3.1.0" provided by FACE Construction Technologies, Inc. Two programs are among the files on this diskette; "RFDESK.EXE" and "DIPSTICK.EXE". The "RFDESK" program and all other files except "DIPSTICK.EXE" should be copied to any computer which is to receive file transfers from the palm-top. Program "DIPSTICK" must be copied to the palm-top computer. (This version of the program supersedes the version supplied with the Dipstick and is executed by another program "COLLECT.BAT" that is already on the palm-top.)

Operation

The pavement must be clear of ice, snow, and puddles of water before profile measurements can be taken as such conditions can affect the profile measurements. The pools of water can possibly damage the electronics in the dipstick and must be avoided either through adjusting the schedule of profiling trips, or by delaying actual measurements until acceptable conditions exist. If good conditions are present then proceed as follows.

Layout and mark (using a chalk line) eleven (11) straight lines for transverse profile measurements. The lines shall be perpendicular to the edge of the pavement at 15.25 m (50 foot) intervals, starting at station 0+00 and ending at station 152+50 (5+00). Transverse profile measurements are not required for rigid pavements, and cases where recent PASCO cross-profile data is available. Line locations should be adjusted to avoid raised pavement markings and similar anomalies.

Prior to arrival at the test section, the operator should check the equipment and perform the following tasks.

Check condition of footpads (replace if necessary with extra set in the dipstick case). Clean and lubricate the ball and socket joints on the footpads to insure smooth pivoting of the instrument. When the joint becomes dirty it will stick pivoting becomes difficult, and slippage of the footpad can occur. A cleaning agent like WD-40 and a light oil for lubrication will work for the ball and socket joint.

Install a fresh set of batteries in the palm-top computer if the low battery indication is observed. Spare batteries for the computer should be available at all times. Batteries for the Dipstick (located in the handle) should be fully charged prior to arriving at the site.

On arrival at the site the operator should:

Assemble the equipment in accordance with the manufacturer's instructions

Perform a Zero Check and a Calibration Check (described below)

Zero Check. A zeroing shall be performed prior to any field data collection. The device should be fully assembled, turned on, and allowed to warm up for several minutes prior to performing the zero check. The check should be accomplished in a smooth clean stable location (the carrying case for the dipstick, or a flat board will suffice) where the instrument can be properly positioned. Circles shall be drawn around the two footpads and the CAL button depressed once. The instrument should then be rotated 180 degrees and the two footpads placed in the circles drawn earlier. The CAL button should again be depressed once. The display will indicate "CAL" three times after which the error is automatically stripped out of the readings. No physical adjustments should be made. Zero can only be performed once. If the check is not successful the Dipstick must be turned off and turned back on and the zeroing repeated. After data collection the zero will be verified by comparing the readings obtained by rotating the device 180 degrees but without depressing the CAL button. If this check fails the data shall be discarded and the survey repeated.

Calibration Check. Calibration verification should be accomplished before and after each use of the instrument. After the zero check the calibration is checked as follows: Place the 3.175 mm (0.125 inch) shim under one of the dipstick footpads. The reading displayed minus 0.125 should equal the previous reading ± 0.003. If the answer is not within this tolerance an FHWA-LTPP major maintenance report should be filed and Face Construction Technologies, Inc. should be contacted through the RCO office. The calibration check shall be performed again, immediately after data collection and prior to shutting off the device.

The pre-operation and post-operation checks shall be documented on form DS-1

Data Collection

Some LTPP-specific procedures to follow in setting up the data collection software and the steps required for consistent data collection and reduction are as follows:

1.) Under the bar menu item **Database**, select **New**; the "Database Name" should consist of the RCOC and year:

Example - "NCRCO96"

2.) Under bar menu item **Settings**, select **Hardware**; the Trigger MUST be enabled (no automatic recording), the units must be S.I. and the foot spacing must be 305 mm.

3.) Under bar menu item **Collect**, select **New**; "Run Name" should consist of the section ID (State Code + SHRP ID) and year:

Example - "42162796"

4.) The test section is laid out as in current procedures, .e. chalk lines are snapped at the default station locations; 0+00, 0+50, 1+00 ... 5+00

5.) Begin taking measurements at Sta 0+00. When the Reading has stabilized the trigger should be pressed, then turn the Dipstick to obtain the next reading. Continue taking readings in accordance with the existing procedures for transverse profile measurement. On closing back at the starting point (after closure reading is accepted by pressing the trigger) press the <F12> key on the computer. (this signifies the end of a transverse closed loop)

Pick up the Dipstick and move to the next station. With the "Start End" facing pavement centerline and rear footpad on the starting point, obtain the first reading on that line by pressing the trigger and continue the loop (across and back). On accepting the last reading in this loop, again press <F12>. Continue this process for all measurement stations.

After the final reading of the final profile loop press ENTER to complete the Run. **Do Not** press <F12> for the final reading in a Run.

Note: Using the <F12> key causes a specific comment to be inserted in the data record notes which is then used as a marker by the software to section the run into the proper number of transverse profiles (one per station) and perform calculations of distance from the edge of pavement and differential elevation for each loop. The operator can edit the output file to correct for cases where the actual measurement station is different from default stationing.

6. Using the bar menu item **Database** the operator chooses **Process Data**. Under Edit. select Bias. This will produce the error check which should be no greater than 0.003

7.) On the palm-top the operator should generate the report for the test section surveyed Under bar menu item **Database** the operator chooses **Process Data**. This presents a new bar menu. From this menu under **Output**, select **Destination** and choose "fle" t indicate the report should be written to a file. Under bar menu item **Report** and sele **LTPP-Trans**. Choose the run name to be reported and when prompted enter the filename the report should be saved as.

8.) When the report has been generated the database and report files should be copied to the RCOC designated computer as soon as possible. The report file may then be read by the PROQUAL software to create the appropriate file for entry into the IMS. In order to prevent possible loss of data, the databases for any LTPP test sections surveyed shall be transferred from the palm-top computers and backup copies retained at the RCOC office.

Data are recorded, stored, and handled electronically. Data sheet DS-10 is used to record site identification information, survey date, time, operator, file names used, and any comments describing site anomalies which would possibly effect data collection.

Any questions regarding this directive should be submitted to the FHWA Pavement Performance Division with a copy to the LTPP Technical Assistance Contractor (TAC).

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Approved by

LTPP Team Leader,
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LTPP Automated Dipstick Data Collection Transverse Profile Form DS-10 Measurement Information and Error Check	State Code [__ __] LTPP Section [__ __ __ __] Date (dd/mmm/yy) __ __ / __ __ __ / __ __

Operator: _____ Database Name _____

Employer: _____ Run Name _____

Dipstick Serial Number:

Start Time (military): Stop Time (military):

Weather: _____

Closure Error:

Comments:

LTPP Automated Dipstick Data Collection Transverse Profile Form DS-11 Zero and Calibration Checks	State Code [__ __] LTPP Section ID [__ __ __ __] Date (dd/mmm/yy) [__ __ /__ __ __ /__ __]

Operator: _____ Employer: _____

Dipstick Serial Number: _____

Pre Measurement Checks

(military): __ __ . __

Automatic Zero Performed:

Calibration

Calibration Check	
Measurement	Reading (inches)
First Reading	
Second Reading on Calibration Block	
Second Reading - 0.125 - First Reading	

Reading 2 - Reading 1 must equal 0.125 with a tolerance of 0.003. If not, notify the RCOC office and contact Face Technologies for repair.

Post Measurement Checks

Time (military):

Zero Check Acceptable:

Calibration Check	
Measurement	Reading (inches)
First Reading	
Second Reading on Calibration Block	
Second Reading - 0.125 - First Reading	

Reading 2 - Reading 1 must equal 0.125 with a tolerance of 0.003. If not, notify the RCOC office and contact Face Technologies for repair.

Comments