

Mn/DOT Pavement Smoothness Measuring Device Certification Program 2002

1. Introduction

Smoothness measuring devices shall be certified, as required by the contract, before evaluating final mainline smoothness on Mn/DOT Bituminous and Concrete paving projects.

The Profile Index is used for the measurement of pavement smoothness and for acceptance and payment of most asphalt and concrete paving projects. Profile Index will be calculated according to California Test Method 526.

Certification does not eliminate the need for daily calibration of the smoothness device on the project site (i.e. vertical, horizontal).

2. Associated Documents and requirements

Minnesota Standard Specifications for Construction 2000 edition

Year 2002: Specification - 2350 Plant Mixed Asphalt Pavement

Year 2002: Specification - 2360 Superpave Hot Mix Asphalt (Type SP)

Year 2000: Specification - 2301.3P1 Concrete Pavement

Profilographs shall meet the requirements set forth in ASTM E1274-88 (Reapproved 1993)

Lightweight non-contact profiler (LWP) shall meet the Class I requirements of ASTM E950.

3. General Information/ Expectations

The Pavement Smoothness Measuring Device Certification program is not a training program. It is expected that all participating operators be well versed in the operation of the smoothness measuring device to be certified. Mn/DOT staff will serve as technical experts, may provide guidance during the certification process, but will not be responsible or accountable for the training of smoothness operators.

Mn/DOT staff will not make any corrections or modifications to devices. It is not the role of Mn/DOT to repair, maintain, or calibrate smoothness devices. If repairs or modifications are necessary, the owner of the device must contact the manufacturer. Mn/DOT will not initiate contact with any manufacturer on behalf of a smoothness device owner/operator.

The owner of the smoothness measuring device will be responsible for the transport of the device to the certification site and assuring the device is in proper working condition. The owner of the smoothness measuring device is responsible to have their machine(s) in proper working order at the test site.

The owner/operator of the smoothness measuring device shall make all repairs and adjustments as needed before taking measurements at the test site. The operator of the smoothness measuring device shall have all tools and components necessary to adjust and operate the smoothness measuring device according to the manufacturer's instructions and recommendations. All equipment manufacturer specifications and manuals must accompany the smoothness measuring device to be certified.

The operator of the smoothness measuring device will be allowed to make minor adjustments to the equipment without having to complete the re-certification process as long as the adjustments allow the equipment to fulfill the certification process.

Minor adjustments to the system include but are not limited to the following: inspecting, re-soldering, or replacing connectors; cleaning components, normal adjustments to voltage levels as required by the manufacturer; and setting software parameters and/or scale factors as required by the manufacturer.

4. Scheduling

Mn/DOT will designate one week, in the spring of each year, to perform the Pavement Smoothness Device Certification testing. Mn/DOT will attempt to inform/notify in writing all contractors with a smoothness measuring device when the certification testing will take place. Also, any manufacturers, vendors, or consultants that Mn/DOT is aware of will also be notified. However, it is the responsibility of the owner of the smoothness measuring device to contact Mn/DOT for scheduling.

5. Site Location

Certification testing will take place at the Mn/Road Research facility near Albertville, Minnesota. When scheduled for a certification, please report to the Mn/Road main building. A Mn/DOT employee must be present as an escort at all times when a visitor is at the Mn/DOT facility.

6. Test Section

Two test sections (one concrete and one bituminous) will be established, designated and maintained by Mn/DOT for the purpose of certifying smoothness measuring devices.

Mn/DOT will determine zero blanking band reference Profile Index and respective International Roughness Index (I.R.I.) values for the test sections. The Australian Road Research Board (ARRB) walking profiler results will serve as the baseline.

7. Procedures/Checklist

All smoothness measuring devices will be required to follow the designated path through each test section. Smoothness measuring devices will be tested on both concrete and bituminous surfaces.

Cones and/or other appropriate material will be used to define the start and stopping locations of data gathering.

California type 25 foot profilographs will be required to provide Profile Index test results using both the zero blanking band and 0.2" blanking band. 0.2" blanking band values are for informational purposes only. Certification is based zero blanking band values.

In addition to the requirements for California type 25 foot profilographs, lightweight profilers will be required to provide test results in I.R.I. values. I.R.I. values are for information purposes only. Certification is based on zero blanking band values.

Mn/DOT will assure that the intended test path is clear of loose material and foreign objects.

Owners are required to perform all necessary start up procedures as specified by the manufacturer.

Check all tire pressures and verify that equipment manufacturer specifications are met.

Perform all distance sensor calibration procedures, as per equipment manufacturer specifications.

Perform all necessary profile system (sensors and accelerometers) calibration procedures, as per equipment manufacturer specifications. Ensure that distance measurement equipment, sensors, accelerometers, etc. are functioning correctly.

Check filter settings

8. Filter and filter settings

The operator of the smoothness measuring device shall have the filter settings set at the correct values per the manufacturer's recommendation to produce a zero blanking band California type profile index.

9. Pavement passes

Five pavement profiles (passes) must be taken on each test section. For each required pass, perform the following:

Position the smoothness device at a point from which testing speed can be reached before testing is to begin. Check that all software and hardware are ready to collect data.

Lightweight profilers are required to collect 200 feet of data before the actual test section and 200 feet of data after the actual test section to eliminate all error through filtering in the report program.

Collect data through the test section.

Provide summary printouts for all runs through the test sections.

Provide graphical printouts for runs that are closest to the average zero blanking band P.I for both the bituminous and concrete sections. Provide profile index values in English units.

10. Acceptance Criteria Profile Index

All test units will be in English.

The smoothness measuring device will be required to make five passes over each test section. The computerized calculated profile index average of the five runs must be within 15% (plus or minus) of the reference zero blanking band P.I. value.

Graphical printouts (one bituminous and one concrete) of the profile trace (at the proper scales) closest to the average value shall be given to a Mn/DOT representative before leaving the test facility.

The standard deviation of five passes on the same pavement type shall be no larger than 1.0 inch per mile using a zero blanking band profile index. The range of zero blanking band values for five passes on the same pavement type shall be no larger than 3.0 inches per mile using a zero blanking band profile index.

11. Acceptance Criteria - Distance Measurement

The smoothness measuring device will be required to make three passes over a one thousand foot pavement section. The average value of the three measurements shall compute to a distance of 1000.0 \pm 1.0 ft.

No single measurement of the one thousand foot distance shall be outside of the range of 1000.0 \pm 2.0 ft.

12. Required minimum test data reporting

Reporting for each pass: As a minimum, the following information must be printed.

- 1) Date and time of day
- 2) Operator and equipment identification
- 3) Weather conditions: temperature, cloud cover, and wind
- 4) Surface description: type of pavement and condition
- 5) Location and description of section: Job ID, lane, wheelpath, beginning and ending stationing, and direction measured
- 5) Software origin and version
- 7) Data filter setting(s)
- 8) High-pass filter setting
- 9) Low-pass filter setting
- 10) Profile Index (0.2" blanking band and zero blanking band) and I.R.I. (where required) values

13. Results from Mn/DOT

Mn/DOT will notify the owner of the smoothness measuring device whether their device passed or failed within one calendar week of the test date.

14. If a smoothness device has a major component failure on a project

The Project Engineer will decide if a formal Mn/ROAD recertification is required or it is acceptable to temporarily allow a smoothness device that has a major component failure to continue on a project. If a major component has failed, repair(s) must be completed before any further profiling is allowed.

Recognizing that there may not be adequate time to schedule a formal Mn/ROAD recertification, it is recommended that a 528 foot test strip that will not have traffic on it should be set-up on or for the project. It is recommended that the test strip be on the project, however, if this not possible then a location off the project that is acceptable to the Project Engineer can be designated.

The same smoothness measuring device that is planned for use on the project shall record the test strip zero blanking band profile index. Prior to any profiling on the project, the Project Engineer shall be given a printed trace (graphical representative) of test strip with the zero blanking band profile index value recorded on it.

In the event that a major component of a smoothness measuring device is replaced during the project, the test strip shall be re-run by the same smoothness measuring device. In order to continue using the repaired smoothness device, the re-run zero blanking band profile index value must be within 5% (either plus or minus) of the initial recorded value.

Before use on a subsequent Mn/DOT project, the smoothness measuring device must be recertified at the MnRoad facility.

15. If the initial certification period is missed

Mn/DOT will perform additional or subsequent certifications on a case by case basis. Mn/DOT will schedule an appointment within two weeks of written notification by the smoothness measuring device owner (Send written requests to Joe Thomas, Assistant Bituminous Engineer, Minnesota Department of Transportation, 1400 Gervais Avenue, Maplewood, Minnesota 55109). Reasons for the additional or subsequent certifications include but are not limited to:

1. Smoothness devices acquired after the annually designated period
2. Smoothness devices that have had major component repairs (major component repairs or replacement include but are not limited to the accelerometer and its associated hardware; the non-contact height sensor and its associated hardware; and any printed circuit board necessary for the collection of raw sensor data or the processing of profiles; any change in the software version).
3. Smoothness devices requested to be recertified by Mn/DOT Project Engineers, due to questionable results and/or practices on a Mn/DOT project.

16. Length of Certification

Regardless of when a smoothness device is certified, the certification will only be valid for the remainder of the same calendar year.

Certifications will not be performed during the winter season; reference values for the site may not be accurate during this time. Mn/DOT will determine new reference values each year prior to the start of the springtime certification period; these reference values will be checked through the summer and fall as necessary.

17. Decals

All smoothness devices with acceptable test results will be furnished a decal. The date of acceptance, unique identification number, the device's make, and the operational system software version will be denoted on the decal. The decal must be displayed on the smoothness measuring device in an obvious location at all times that the device is present on a Mn/DOT construction project.

If for any reason, the smoothness device is re-certified during the same year, an updated decal will be issued.

If for any reason, a smoothness device acceptance is revoked, the decal shall be removed.

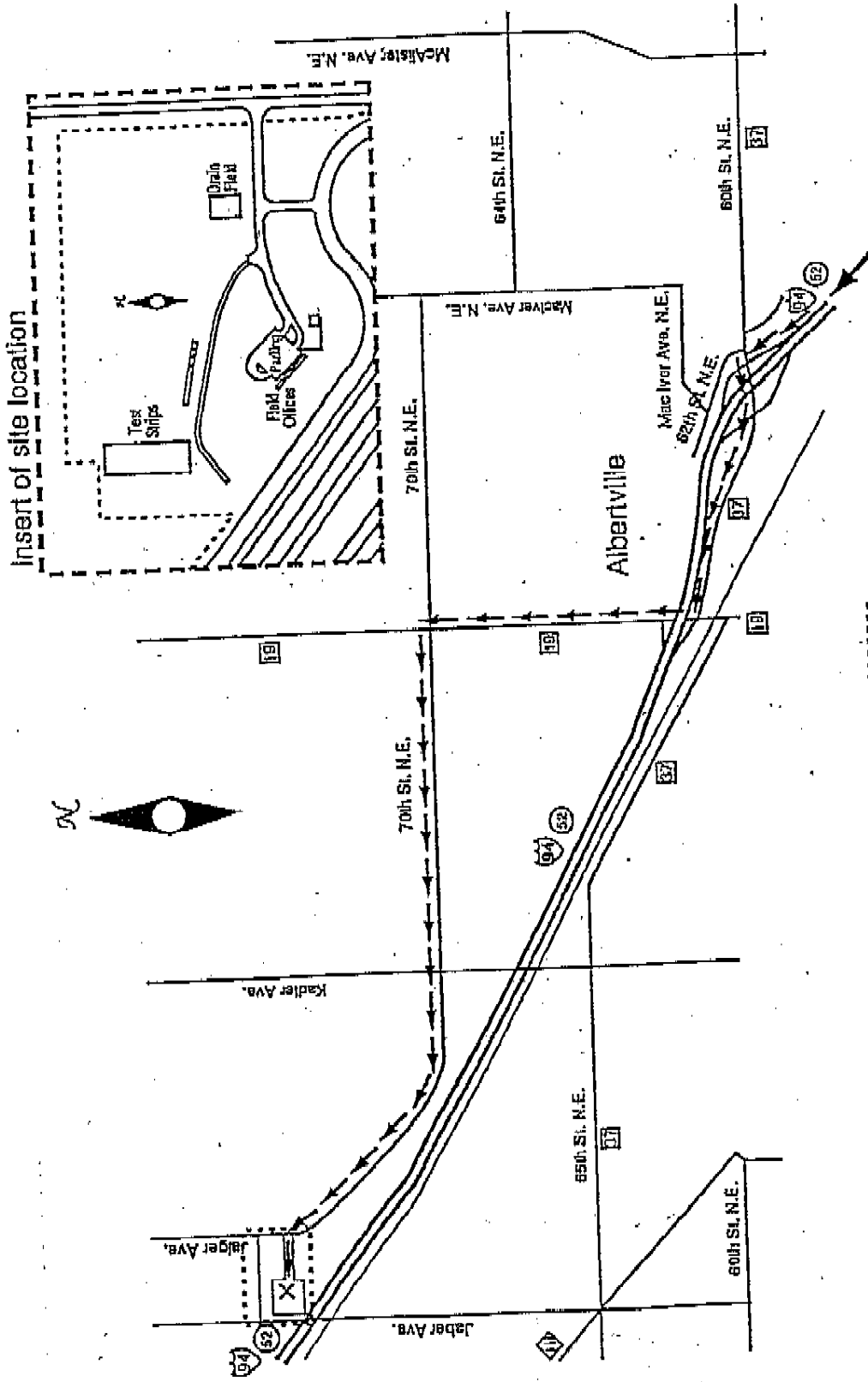
18. Records

Mn/DOT will maintain records of the results of the certification program. The owner, unique identification number, make of device, software version and the date of acceptance or failure will be included in these records.

19. Department Contacts

The Pavement Smoothness Measuring Device Certification Program is directed and administered by the Minnesota Department of Transportation, Office of Materials and Road Research, located in Maplewood, Minnesota.

If more information is needed regarding this program or to schedule a smoothness certification testing date, contact Joe Thomas (Bituminous @ 651-779-5619) or Maria Radermacher (Concrete @ 651-779-5572).



Take Albertville Exit #202 and Follow Signs To Mn/ROAD Site

To Mn/ROAD from Twin Cities:
 Take I-94 to Albertville exit #202, turn left at stop sign on C.R. 37, go to C.R. 19 and turn right, at 70th St. N.E. turn left and follow to entrance of parking lot.

