

DIVISION V SURFACINGS AND PAVEMENTS

36 GENERAL

04-20-18

Replace section 36-3 with:

07-21-17

36-3 PAVEMENT SMOOTHNESS

36-3.01 GENERAL

36-3.01A Summary

Section 36-3 includes specifications for measuring the smoothness of pavement surfaces.

36-3.01B Definitions

area of localized roughness: Moving average of the International Roughness Index values for each wheel path using a 25-foot continuous interval and a 250-mm filter.

Mean Roughness Index: Average of the International Roughness Index values for the left and right wheel paths for the same traffic lane using a fixed interval and a 250-mm filter.

wheel paths: Pair of lines 3 feet from and parallel to the edges of a traffic lane. Left and right wheel paths are based on the direction of travel.

36-3.01C Submittals

36-3.01C(1) General

Reserved

36-3.01C(2) Inertial Profiler Certification

At least 5 business days before starting initial profiling or changing the inertial profiler or operator, submit:

1. Inertial profiler certification issued by the Department
2. Operator certification for the inertial profiler issued by the Department
3. Manufacturer's instructions and test procedures for calibration and verification of the inertial profiler

Within 2 business days after cross-correlation testing, submit a ProVAL profiler certification analysis report for the test results to the Engineer and to the electronic mailbox address smoothness@dot.ca.gov.

36-3.01C(3) Inertial Profiler Data

36-3.01C(3)(a) General

04-20-18

At least 15 days before inertial profiling, you must register with the Department's secure file sharing system. To obtain information on the registration process, send an e-mail with your contact information to smoothness@dot.ca.gov.

Within 2 business days after each day of profiling, submit the profile information to the Engineer and to the Department's secure file sharing system. After submitting the profile information to the Department's file sharing system, send a notification of your electronic submittal to the Engineer and to the above electronic mailbox address with the names of the files submitted.

For each surface with inertial profile smoothness requirements, the profiling information must include:

1. Raw profile data for each lane
2. ProVAL ride quality analysis report for the Mean Roughness Index of each lane in a PDF file. Report the following:
 - 2.1. Listing of Mean Roughness Index values for 0.1-mile segments or portions thereof
 - 2.2. Inputs, including the specified Mean Roughness Index threshold and fixed segment length
 - 2.3. Raw profile data name selections
 - 2.4. Areas exempt from inertial profile smoothness
3. ProVAL ride quality analysis report for the International Roughness Index of the left and right wheel paths of each lane in a PDF file. Report the following:
 - 3.1. Listing of areas of localized roughness

- 3.2. Inputs, including the specified area of the localized roughness threshold and continuous segment length
- 3.3. Raw profile data name selections
- 3.4. Areas exempt from inertial profile smoothness
4. GPS data file for each lane. Submit the data file in GPS eXchange file format.
5. Manufacturer's recommended calibration and verification test results for the inertial profiler.
6. Inertial profiler's calibration and verification test results, including results for bounce, block, and the distance measurement instrument.
7. Completed Pavement Smoothness Inertial Profiler Submittal Record.

Submit Asphalt Concrete Pavement Smoothness Corrections Information or Concrete Pavement Smoothness Corrections Information with your final profiling information submittal.

Submit the raw profile data in an unfiltered electronic pavement profile file format. Use the following file-naming convention:

YYYYMMDD_TTCCRRR_EA_D_L_W_B_E_X_PT.PPF

where:

YYYY = year

MM = month, leading zero

DD = day of month, leading zero

TT = district, leading zero

CCC = county, 2- or 3-letter abbreviation as shown in section 1-1.08

RRR = route number with no leading zeros

EA = Contract number, excluding the district identification number, expressed as 6 characters

D = traffic direction, *NB*, *SB*, *WB*, or *EB*

L = lane number from left to right in the direction of travel

W = wheel path, *L* for left, *R* for right, or *B* for both

B = beginning station to the nearest foot, such as 10+20, or beginning post mile to the nearest hundredth, such as 25.06 with no leading zero

E = ending station to the nearest foot, such as 14+20, or ending post mile to the nearest hundredth, such as 28.06 with no leading zero

X = profile operation, *EXIST* for existing pavement, *INTER* for after prepaving smoothness correction, *MILL* for after milling, *PAVE* for after paving, and *CORR* for after final surface pavement correction, and *FINAL* for completed pavement documentation of compliance.

PT = type of pavement surface profiled, such as Type A HMA, RHMA-G, OGFC, JPCP, or CRCP

If you are submitting multiple inertial profiler data files, compress the files into a .ZIP file format and submit them using the file-naming convention TT_EA_X_YYYYMMDD.zip.

07-21-17

36-3.01C(3)(b) Smoothness Corrective Grinding Plan

At least 2 business days before performing corrective grinding for areas of localized roughness or areas exceeding the specified thresholds for the Mean Roughness Index, submit a corrective grinding plan as an informational submittal.

The corrective grinding plan must include:

1. Grinder manufacturer make and model

2. Grinder wheelbase in feet, measured from the front centerline to the back centerline of the single wheel or tandem wheel spread
3. Grinder head position in feet, measured relative to the centerline of the front single wheel or the front tandem wheel spread
4. Tandem wheel spreads in feet, for rear and front wheels as applicable
5. Tabular listing of the planned corrective grinding, including:
 - 5.1. Start and stop locations in stationing to the nearest foot
 - 5.2. Width of grind, such as left half lane, right half lane, or full width lane
 - 5.3. Corresponding grinder head depths to the nearest 0.01 inch
 - 5.4. Direction of grind, up to 2 passes per grind location, such as forward, reverse, forward-forward, reverse-reverse, forward-reverse, reverse-forward
 - 5.5. Distance from start or stop locations to the nearest semipermanent reference point
6. Forecasted improvement in terms of the Mean Roughness Index and area of localized roughness values

36-3.01C(4) Straightedge Measurements

Within 2 business days of measuring smoothness with a straightedge, submit a list of the areas requiring smoothness correction or a report stating there are no areas requiring smoothness correction. Identify the areas requiring smoothness correction by:

1. Location number
2. District-County-Route
3. Beginning station or post mile to the nearest 0.01 mile
4. For correction areas within a traffic lane:
 - 4.1. Lane direction, *NB*, *SB*, *EB*, or *WB*
 - 4.2. Lane number from left to right in the direction of travel
 - 4.3. Wheel path, *L* for left, *R* for right, or *B* for both
5. For correction areas not within a traffic lane:
 - 5.1. Identify the pavement area, such as shoulder, weigh station, or turnout
 - 5.2. Direction and distance from the centerline, *L* for left or *R* for right
6. Estimated size of correction area

36-3.01D Quality Assurance

36-3.01D(1) General

Reserved

36-3.01D(2) Certifications

The inertial profiler must display a current certification decal showing the expiration date.

The operator must be certified for each model of inertial profiler operated.

The certifications issued by the Department for the inertial profiler and operator must not be more than 12 months old.

36-3.01D(3) Quality Control

36-3.01D(3)(a) General

Reserved

36-3.01D(3)(b) Smoothness

36-3.01D(3)(b)(i) General

Test pavement smoothness using an inertial profiler except use a 12-foot straightedge for the pavement at:

1. Traffic lanes less than 1,000 feet in length, including ramps, turn lanes, and acceleration and deceleration lanes
2. Horizontal curves with a centerline radius less than the following and within the superelevation transition of such curves:
 - 2.1. 150 feet for asphalt concrete pavements
 - 2.2. 300 feet for Portland cement concrete pavements

3. Areas within 12.5 feet of manholes
4. Shoulders
5. Weigh-in-motion areas
6. Miscellaneous areas such as medians, gore areas, turnouts, and maintenance pullouts

Where inertial profiler testing is required:

1. Determine the pavement smoothness for each traffic lane by obtaining the International Roughness Index for the left and right wheel paths in an individual lane
2. Determine the Mean Roughness Index and areas of localized roughness using FHWA's engineering software ProVAL

Where OGFC is required, test the pavement smoothness of the final HMA or concrete pavement surface before placing OGFC and after placing OGFC.

36-3.01D(3)(b)(ii) Inertial Profiler Calibration and Verification Tests

Notify the Engineer at least 2 business days before performing calibration and verification testing of the inertial profiler.

Conduct the following calibration and verification tests in the Engineer's presence each day before profiling:

1. Block test to verify the accuracy of the height sensor under California Test 387
2. Bounce test to verify the combined accuracy of the height sensor and accelerometer under California Test 387
3. Distance measurement instrument test to verify the accuracy of the distance measuring instrument under California Test 387
4. Manufacturer's recommended tests

Conduct a cross-correlation verification test of the inertial profiler in the Engineer's presence before performing the initial profiling. A verification test must be performed at least annually. Conduct 5 repeat runs of the inertial profiler on an authorized test section. The test section must be a 0.1-mile segment of existing concrete pavement if you are measuring new concrete pavement or existing asphalt concrete pavement if you are measuring new asphalt concrete pavement. Where micro-milled asphalt concrete surfaces are to be measured, the cross-correlation verification test may be performed on the initial 0.1-mile section of milled asphalt concrete surface. Calculate a cross-correlation to determine the repeatability of your device under California Test 387 using a ProVAL profiler certification analysis with a 3-foot maximum offset. The cross-correlation must be a minimum of 0.92.

36-3.01D(3)(b)(iii) Performing, Analyzing, and Collecting Data

Operate the inertial profiler under the manufacturer's instructions and AASHTO R 57 at 1-inch recording intervals using a minimum 4-inch line laser sensor.

Establish semipermanent reference points for aligning inertial profiler runs and locating potential corrective grinding. Place semipermanent reference points at a frequency of 0.5 mile or less along the edge of the traffic lane or roadway. Maintain semipermanent reference points until Department acceptance testing is completed.

Collect profiling data under AASHTO R 57 and analyze it using 250 mm and International Roughness Index filters.

While collecting the profile data to determine the International Roughness Index values, record semipermanent reference points and the beginning and end of the following locations in the raw profile data:

1. Bridge approach slabs
2. Bridges
3. Culverts visible on the roadway surface
4. Railroad crossings
5. At-grade intersections
6. Project limits

