

## Section 36 Surfacing and Pavements—General

### 4-3601 General

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## Section 36 Surfacing and Pavements—General

### 4-3601 General

Section 36, “General,” of the *Standard Specifications* includes general requirements for sections within Division V, “Surfacings and Pavements” of the *Standard Specifications*.

This section provides general guidelines for preconstruction meetings and pavement smoothness. Refer to the sections listed in Table 4-36.1., “Additional Information for Surfacing and Pavements,” of this manual.

Table 4-36.1. Additional Information for Surfacing and Pavements

Section Title	<i>Standard Specification</i> Section	<i>Construction Manual</i> Section
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This section also includes inspection guidelines for base bond breaker that is applied between a base and concrete pavement.

### 4-3602 Before Work Begins

#### 4-3602A Preconstruction Meetings

Hold a preconstruction meeting to discuss the surfacing and paving operation work a minimum of 3 business days before the start of the work. This meeting is specific to the surfacing or paving work and is not the same meeting as required in Section 8-1.03, “Preconstruction Conference,” of the *Standard Specifications* and as described in Section 5-003, “Preconstruction Conference with the Contractor,” of this manual. For preconstruction meetings under this section, discuss specifications and processes for producing materials and constructing the surfacing or pavement. Refer to Section 36-1.01D(2), “Preconstruction Meetings,” of the *Standard Specifications* for a list of topics to include in the meeting. Review the applicable specification section for additional items that must be discussed in this preconstruction meeting.

Caltrans staff at this preconstruction meeting must include the resident engineer, principal assistants, material sampling and testing staff, and other key personnel.

Refer to Section 36-1.01D(2), “Preconstruction Meetings,” of the *Standard Specifications* for the list of contractor personnel that are required to attend. Make sure the contractor also includes:

- For seal coats, the emulsion and binder suppliers
- For hot mix asphalt using a warm mix asphalt additive technology, the technical representative for the warm mix asphalt technology
- For individual slab replacement with rapid strength concrete, the concrete plant inspectors and personnel performing saw-cutting and joint sealing

Do not allow placement of the trial slabs, construction of test strips, or paving to start until the required personnel have attended the preconstruction meeting.

#### 4-3602B Base Bond Breaker

Before work on the base bond breaker begins, do the following:

- Review the contractor’s proposed base bond breaker to verify that it meets the requirements for the type of base it is being placed over.

#### 4-3602C Pavement Smoothness

Before work begins, take the following steps:

- Set up an electronic file structure for the smoothness submittals. You will receive numerous files from various lanes. It is recommended to have at least one folder for each route and direction. The PPF, PVP and XLSM file names are long, so abbreviate the folder names to the extent possible. This allows the electronic smoothness submittals from the contractor to be organized and prevent exceeding maximum file path name warnings.
- At least 15 days before measuring pavement smoothness with an inertial profiler, contractors must register with the Caltrans’ secure file transfer system. If contractors need to obtain information on the registration process, have them send an email request with their contact information to:
  - [Asphalt.Smoothness@dot.ca.gov](mailto:Asphalt.Smoothness@dot.ca.gov) for asphalt
  - [Concrete.Smoothness@dot.ca.gov](mailto:Concrete.Smoothness@dot.ca.gov) for concrete surfaces
- Review Section 36-3.01D(3)(b)(i), “General,” of the *Standard Specifications* and determine which portions of new pavement will be subject to inertial profiler requirements and which portions will be subject to straightedge requirements.
- Discuss pavement smoothness requirements at the preconstruction meeting for the surfacing or pavement operation. Include the following items in the discussion:
  - Requirements for the smoothness quality control plan.
  - Specified naming conventions on all submitted profiles. All bridge approach slabs, bridges, and culverts visible on the roadway surface and at grade intersections must be included in the raw inertial profile data.

- Contactor-marked locations of the beginning and ending stations and leave-outs in order for the engineer to verify final acceptance profiles.

Discuss that a written smoothness quality control plan must be submitted by the contractor to the resident engineer at or before the preconstruction meeting. The plan must incorporate the following elements:

1. Organization: Contact names, organizational chart, telephone numbers, current certifications, titles, roles, and the responsibilities of personnel monitoring smoothness, collecting profile data, submitting data, requesting pay adjustments and reports, and implementing corrective actions.
2. Inertial profiler and operator certification requirements: Inertial profiler certification issued by Caltrans within the past 12 months.
  - a. Manufacturer's instructions and test procedures for calibration and verification of the inertial profiler
  - b. Operator certification for the inertial profiler issued by Caltrans within the past 12 months
3. Schedule: The methods and timing used for monitoring and testing ride quality throughout the placement operation process. An indication of the approximate timing of acceptance testing for the profile operations defined in Section 36-3.01C (3), "Smoothness Corrective Grinding Plan," of the *Standard Specifications*, in relation to placement operations and stages of construction.
4. Layout plan: Includes the following elements:
  - a. Semi-permanent reference points at the beginning and end of the project based on the plans.
  - b. For each profile run, define additional semipermanent reference points for the beginning and ending positions of each run.
  - c. List the position and name of each semipermanent reference point. These reference points must be outside the traveled way, perpendicular to the starting position of each lane. Where starting positions are adjacent to each other but staggered, there must be separate starting positions. An example of this would be staggered starting positions caused by bridge abutment skew angles.
  - d. The semi-permanent reference points used to establish the beginning position of a profile must be based on the EXIST profile run for HMA and grind existing concrete pavement, and the PAVE profile for new concrete pavement. This requires the EXIST profile to be run, semipermanent reference points marked and tied to the EXIST inertial profile distance measurement instrumentation (DMI) stationing before submitting the smoothness quality control plan. When the EXIST profile run delays the preconstruction meeting, the DMI stationing of the semipermanent reference points may be estimated, if the layout plan is updated after completing the EXIST profile run. The semipermanent reference points from the EXIST

profile must be labeled in the field and in the pavement profiles using the following naming convention:

XXX-D-L-STA-VAL

In which:

**XXX** = “Beg” for the beginning of each profile run, “End” for the end of each profile run, “ExB” for the beginning point of the areas excluded from inertial profiler testing, and “ExE” for the end point of the areas excluded from inertial profiler testing.

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

**L** = lane number from left to right in the direction of travel, such as “1,” “2,” or “3.”

**STA**= station to the nearest foot, such as 10+20. Do not use postmiles. For HMA and grind existing concrete plans, the station is based on the DMI reading from the EXIST inertial profile. For new concrete pavement, the station is based on the DMI reading from the PAVE profile.

**VAL**= use “INC” where the value of stationing in the pavement profile data file (\*.PPF) will increase in the direction of travel. Use “DEC” where the absolute value of the stationing in the pavement profile data file (\*.PPF) will decrease in the direction of travel.

Use the same label name regardless of the stage of the profile.

- For each semi-permanent reference point, include a KMZ file with:
  - Color photographs clearly displaying the physical label used to define the semi-permanent reference points.
  - Listing of GPS coordinates.
- Semi-permanent reference points, where possible, must be recorded by inertial profilers using electronic eye readings or reflectors.
- Within 12 hours or on the same day of completing smoothness measurement, the contractor is required to submit the raw profile data as a PPF file on an authorized data storage device, along with a coordinated video or images taken at intervals no greater than 52.8 feet for the existing and baseline profiles. Also, submit a hard copy or a PDF file listing the following:
  1. Profile data collection time and date
  2. Data collection software version used
  3. Sensor serial number
  4. Low- and high-pass filter used
  5. 0.1-mile mean roughness index (MRI) values
- Within 2 business days after each profiling, the contractor must submit the profile information to the engineer and to Caltrans’ file sharing system. Refer to Section

4-3603, “During the Course of Work,” of this manual for more specific details of what is required in each submittal.

- After submitting the profile information to Caltrans’ file sharing system, the contractor must also send a notification to the engineer and to:
  - [Asphalt.Smoothness@dot.ca.gov](mailto:Asphalt.Smoothness@dot.ca.gov) for asphalt projects
  - [Concrete.Smoothness@dot.ca.gov](mailto:Concrete.Smoothness@dot.ca.gov) for concrete pavement projects.
- Failure to submit profile information within prescribed timeframes is subject to progress payment withholds specified in Section 9-1.16E(3), “Performance Failure Withholds,” of the *Standard Specifications*. Refer to Section 3-906F (2), “Performance Failure Withholds,” of this manual.
- All bridge approach slabs, bridges, and culverts visible on the roadway surface and at-grade intersections must be recorded in the raw inertial profile data.
- The contractor must mark beginning and ending stationing of contractor profiles so the engineer may verify final acceptance profiles. Lack of beginning and ending station markings on shoulders may delay the engineer’s validation profiles and acceptance.

#### 4-3602D ProVAL Training

In advance of the contractor’s start of surfacing or paving operations, verify that project staff is trained and knowledgeable in the use of ProVAL computer software. ProVAL is used to view and analyze raw profile data, as well as to review and generate PDF reports. ProVAL is on Caltrans’ Approved Software List, and online training is available for Caltrans employees at:

<https://maintenance.onramp.dot.ca.gov/paveprogram/pavement-smoothness>

Step-by-step videos on the steps the contractor takes to complete the smoothness payment adjustment request are available at:

<https://dot.ca.gov/programs/construction/pavement-smoothness>

### **4-3603 During the Course of Work**

#### 4-3603A Base Bond Breaker

During the base bond breaker work, take the following steps:

- Make sure contractor submits a certificate of compliance for each shipment of base bond breaker material delivered.
- Make sure base material is free of any foreign and loose materials and the base is cured before base bond breaker is applied.
- Verify that the base bond breaker used is specified for the type of base it is covering.
- Verify that the base bond breaker is paved over within 72 hours of placing base bond breaker.

- Verify that the base bond breaker is applied in accordance with the specifications.

#### 4-3603B Pavement Smoothness

During the pavement smoothness work, take the following steps:

Verify that the contractor plans and measures smoothness profiles based on the type of work using Table 4-36.2., “Profiles Needed by Smoothness.” These inertial profiles are required in accordance with the specification to determine acceptance and any payment adjustments.

Table 4-36.2. Profiles Needed by Smoothness

<b>Profile</b>	<b>Asphalt Target 55 Percent Improvement</b>	<b>Concrete Target 60/67.5/75</b>	<b>Grind Existing Concrete Percent improvement</b>
EXISTING	X		X
BASELINE	X		X
PAVE	X	X	
FINAL	X	X	X

For asphalt concrete pavement, smoothness measurements are required from the contractor for the following:

- Existing asphalt concrete surface before performing any work on the surface. The contractor must provide the engineer the result labeled as the "EXIST" inertial profiler data file and notify the engineer if the MRI results vary by more than 10 percent from the MRI information provided by Caltrans at the time of advertisement. For projects suspended longer than 30 days, the contractor must measure the smoothness of the existing surface that has not received an HMA overlay and provide the engineer the result labeled as "EXISTR" inertial profiler data file. The contractor will use the EXISTR profile as the EXIST profile.
- Existing pavement segments if structural repairs, such as remove and replace asphalt concrete or leveling courses, are made. The contractor must provide the engineer the result labeled as "BASELINE" inertial profiler data file.
- Pavement segments exclusive of an open-graded friction course (OGFC) on new HMA before performing any HMA smoothness corrections. The contractor must provide the engineer the result labeled as "PAVE" inertial profiler data file.
- Pavement segments exclusive of OGFC on new HMA after performing any HMA smoothness corrective work. The contractor must provide the engineer the results labeled as "FINAL" inertial profiler data file. If there is no corrective work in the segment, the contractor will use the "PAVE" inertial profiler data as the "FINAL" inertial profiler data.



- Pavement segments of OGFC before performing any OGFC smoothness correction. The contractor must profile the sections and provide the engineer the result labeled as "PAVE" inertial profiler data file.
- Pavement segments of OGFC after performing any OGFC smoothness corrective work. The contractor must provide the engineer the result labeled as "FINAL" inertial profiler data file. If no corrective work in the segment is performed, the contractor must use the "PAVE" inertial profiler data file as the "FINAL" inertial profiler data file.

For concrete pavement, smoothness measurements must be taken by the contractor during the following scenarios:

- For new concrete pavement, measure profile:
  - After placing concrete, but before performing any smoothness corrections to calculate pavement MRI. The contractor must provide the engineer the results labeled as "PAVE" inertial profiler data file.
  - After performing any smoothness correction to calculate final MRI. The contractor must provide the engineer the results labeled as "FINAL" inertial profiler data file. If there is no corrective work in the segment, the contractor will use the "PAVE" inertial profiler data as the "FINAL" inertial profiler data.
- For grinding existing pavement project type, measure profile:
  - Before any work is performed to calculate existing MRI. The contractor must provide the engineer the result labeled as the "EXIST" inertial profiler data file.
  - After any work is performed but before grinding to calculate baseline MRI. This profile is required for informational purposes only. The contractor must provide the engineer the result labeled as "BASELINE" inertial profiler data file.
  - After the contractor's grinding achieves 60 MRI or 40 percent improvement, calculate final MRI. The contractor must provide the engineer the results labeled as "FINAL" inertial profiler data file.
- Verify that the inertial profiler displays a current certification. Both the left and right accelerometers must have a Caltrans-issued decal indicating the date the certification expires.

Confirm that the inertial profiler operator has a current Caltrans-issued certificate for each model of inertial profiler operated. Verify that the certificate covers the model of the certified inertial profiler. The following website includes a current list of inertial profilers and operators:

<https://dot.ca.gov/programs/engineering-services/inertial-profiler-certification-program>

Make sure the contractor marks the beginning and ending stations on the pavement shoulder. When stationing is covered by additional surfacing, pavement, or removed by cold planing, make sure markings are transferred to the next surface and display the same stationing. Before running verification tests, verify that the beginning and

ending stations are still clearly marked and that Caltrans' inertial profiler operator uses the same stationing as the contractor.

At locations requiring pavement smoothness testing using an inertial profiler:

- The engineer must witness inertial profiler calibration and verification tests including contractor inertial profile smoothness measurements.
- The contractor must notify the engineer at least 2 business days before performing calibration and verification testing of the inertial profiler.

Before each day of profiling and in the presence of the engineer:

- The contractor must conduct the following calibration and verification tests:
  1. Block test to verify the accuracy of the height sensor using California Test 387, "Method of Test for Operation, Calibration and Operator Certification of Inertial Profilers."
  2. Bounce test to verify the combined accuracy of the height sensor and accelerometer using California Test 387.
  3. Distance measurement instrument (DMI) to verify the accuracy of the distance measuring instrument using California Test 387.
  4. Manufacturer's recommended tests.

At least annually, the contractor must conduct a cross-correlation verification.

Caltrans inertial profile operators performing verification testing must also perform the block, bounce, and DMI test daily. To reduce variability between the contractor's and Caltrans' DMI readings, the Caltrans inertial profiler operator should use the same 528-foot test section the contractor used when performing the daily DMI test, but only after confirming the length of the contractor's 528-foot test section.

At locations requiring pavement smoothness testing using an inertial profiler:

- Make sure the contractor tests areas for smoothness using a 12-foot straightedge. After testing, check that the contractor submits a list of areas that require correction. Verify that each area is identified by size and location as required by the *Standard Specifications*.
- Confirm that a follow-up acceptance test with a straightedge is performed to verify that the contractor's list is complete. If the area was measured using an inertial profiler, consider using the ProVAL Rolling Straightedge module to help identify locations that should be manually checked with the straightedge.
- Verify that the contractor submits pavement smoothness data in compliance with the current pavement smoothness requirements.
- Contractors must submit an electronic copy of the raw profile data as a PPF file on an authorized data storage device within 12 hours or on the same day of completing smoothness measurement. The PPF file must be submitted with either a coordinated video or photographs taken at intervals no greater than 52.8

feet for the EXIST and BASELINE profiles. Contractors are also required to submit a printout or a PDF file listing the following:

- Profile data collection time and date
- Data collection software version used
- Sensor serial number
- Low- and high-pass filter used
- 0.1-MRI values

After a contractor submits the profile information to Caltrans' file sharing system, the contractor must also send a notification of their electronic submittal to the resident engineer and to either [Asphalt.Smoothness@dot.ca.gov](mailto:Asphalt.Smoothness@dot.ca.gov) or [Concrete.Smoothness@dot.ca.gov](mailto:Concrete.Smoothness@dot.ca.gov) with the names of the files submitted.

For each surface subject to inertial profile smoothness requirements, the profile data information must include:

1. Raw profile data for each lane in PPF files.
2. ProVAL ride quality analysis report for the MRI of each lane in a PDF file. Report the following, using the ProVAL Ride Quality Fixed Interval MRI Report:
  - a. Listing of MRI values for 0.1-mile segments or portions thereof.
  - b. Input data including the specified MRI threshold and fixed segment length. The MRI threshold value shown in the report must correspond to the value that requires mandatory corrective action. The percent improvement MRI thresholds will vary, and these do not need to be shown in the report.
  - c. Raw profile data name selections.
  - d. Areas exempt from inertial profile smoothness requirements.
3. ProVAL ride quality analysis report for the international roughness index (IRI) of the left and right wheel paths of each lane in a PDF file. Report the following using the ProVAL ride quality continuous IRI report:
  - a. Listing of areas of localized roughness (ALR)
  - b. Input data including the specified ALR threshold and continuous segment length
  - c. Raw profile data name selections
  - d. Areas exempt from inertial profile smoothness
4. GPS data file for each lane. Submit the data file in GPS exchange file format, which has a suffix of \*.GPX.
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.

Require the contractor to submit the raw profile data in an unfiltered pavement profile standard (PPF) file format. Reject any files that do not use the following file naming convention:

**YYYYMMDD\_TTCCRRR\_EA\_D\_L\_W\_B\_E\_X\_PT.EXT**

Where:

YYYY = year

MM = month, leading zero

DD = day of the month, leading zero

TT = district, leading zero

CCC = county, 2- or 3-letter abbreviation

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 postmile 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 postmile to the nearest hundredth, such as 28.06 with no leading zero

X = profile operation, EXIST for existing pavement, BASELINE for existing pavement after performing repairs, PAVE for after paving, and FINAL for completed pavement documentation of compliance

PT = type of pavement surface profiled, such as:

- Type A HMA (hot mix asphalt)
- RHMA-G (rubberized hot mix asphalt-gap graded)
- OGFC (open-graded friction course)
- JPCP (jointed plain concrete pavement)
- CRCP (continuously reinforced concrete pavement)

EXT = "PPF" for raw profile data file extension

Multiple inertial profiler data files should be compressed into a .ZIP file format and submitted using the file-naming convention TT\_EA\_X\_YYYYMMDD.zip.

The contractor must submit a grinding plan as an informational submittal at least 2 business days before performing corrective grinding for areas that do not meet the smoothness requirements.

Review the smoothness corrective grinding plan to verify that only necessary grinding is performed for HMA pavement. The contractor may not grind into incentive pay for HMA pavement. The payment adjustment worksheet accounts for this automatically by analyzing the adjustments planned for the PAVE uncorrected surface and the FINAL corrected surface. A contractor must only develop grinds to address ALR and to reduce disincentives because of excessive MRI values for HMA pavement.

For concrete pavement, grinding into incentive pay is an option available to the contractor. Grinding must not reduce pavement thickness below minimums in section 40-1.01D(8)(c)(iv), "Thickness," of the *Standard Specifications*.

The corrective grinding plan must include:

1. Grinder make and model:
  - a. Grinder wheelbase in feet, measured from the front centerline to the back centerline of the single wheel or tandem wheel spread.
  - b. Grinder head position in feet, measured relative to the centerline of the front single wheel or the front tandem wheel spread.
2. Tandem wheel spreads in feet.
3. Tabular listing of the planned corrective grinding, including:
  - a. Start and end locations in stationing to the nearest foot
  - b. Width of grind, such as left half-lane, right-half lane, or full-width lane
  - c. Corresponding grinder head depths to the nearest 0.01 inch
  - d. Direction of grind such as forward, reverse, forward-forward, reverse-reverse, forward-reverse, or reverse-forward
4. Anticipated improvement in the MRI and ALR values.

After each inertial profiling by the contractor, verify that the inertial profiles and other required files for contract compliance, include but are not limited, to the following:

- PPF files and PDF report that are submitted on an electronic storage device and received within 12 hours or on the same day of completing the smoothness measurement.
- Submittals for EXIST and BASELINE profiles include a coordinated video or photographs taken at a minimum of 52.8 feet.
- File naming convention meets the specification requirement.
- Stationing conforms with smoothness quality control plan.
- Each PPF file is required to have a printout or PDF produced by the inertial profiler, not ProVAL. Check the following:

- Profile data collection time and date matches the date the engineer witnessed the profile.
- Data collection software version used matches that used during inertial profiler certification.
- Sensor serial number on the inertial profilers match those used during inertial profiler certification.
- Low- and high-pass filters are set to zero. If they are not, request a new printout. Low- and high-pass filters smooth out the profile, which can result in lower smoothness values and higher pay adjustments.
- 0.1-MRI values are listed. These MRI values are calculated by the profilers' software, not by ProVAL. The average of these numbers will be similar to the smoothness values entered into the profile summary worksheets submitted at a later date as part of the smoothness payment adjustment request submitted by the contractor.

Upon receipt of the contractor's inertial profiles proposed for acceptance, review the FINAL profile data file and the two ride-quality reports. Carefully review the submittals to confirm:

- All listed leave-outs meet the requirements for the contract.
- The ride-quality analysis report for IRI indicates no locations where short continuous roughness exceeds the established specification limit for ALR.

On the ride-quality analysis report for MRI, where 0.05-mile to 0.10-mile fixed increments are indicated, all MRI values must not exceed the maximum MRI noted in the contract. Partial fixed increments 0.00 to 0.05-miles in length are not required to meet an MRI threshold but are required to meet ALR threshold.

#### 4-3603C Profile Verification

After reviewing the contractor's profiles proposed for acceptance, request that Caltrans' inertial profile be run. Include a copy of the contractor's raw data file. Before submitting the request, confirm the contractor's semi-permanent reference points for the beginning and ending stationing locations are still clearly visible as described in the smoothness quality control plan. Caltrans must use the same stationing and semi-permanent reference points for verification profiles. This allows both files to be simultaneously loaded in ProVAL and compared for differences.

Verification testing will be performed using Caltrans' inertial profiler. The engineer must notify the contractor of Caltrans' intention to perform verification testing:

- Acceptance test results will be used for incentive or disincentive payments if the contractor's overall MRI is within 10 percent of Caltrans' overall MRI from the same project length.
- If the acceptance test results are not considered acceptable, Caltrans' MRI values will be used in the calculation for incentive and disincentive payments for

that evaluated length. Caltrans will have 15 days to complete an evaluation of both profiler certifications.

- The contractor and the resident engineer must work together to resolve disputes regarding test result discrepancies in accordance with Section 36-3.01D(4)(b) “Profile Verification,” of the *Standard Specifications*.
- Contractors must notify the resident engineer within 5 business days of receiving the verification test result if they intend to dispute it:
  - An independent third party will perform referee testing over the same project length. Before the third party participates in a dispute resolution, their profiler and operator must be certified under Caltrans’ “Profiler Certification Program.” The independent third party must have no previous direct involvement with this contract and no current direct involvement with the contractor. The MRI value closest to the independent third party’s MRI value will be used to calculate incentive and disincentive payment. The party with the MRI value furthest from that of the independent third party’s will pay for the referee testing.
- At locations not requiring pavement smoothness testing using an inertial profiler, pavement smoothness is determined using a 12-foot straightedge and must not vary from the lower edge of the straightedge by more than:
  - 0.01 foot when the straightedge is laid parallel with the traffic lane centerline.
  - 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane.
  - 0.02 foot when the straightedge is laid within 24 feet of a pavement conform.
- The specifications require a physical check with a 12-foot straightedge to determine if the surface meets specification. The ProVAL software has a “rolling straightedge” module to assist with determining compliance and identify where to physically check locations with a 12-foot straightedge.

#### 4-3603D Payment adjustment

The contractor must submit a payment adjustment spreadsheet with their data. The spreadsheet is available from:

<https://dot.ca.gov/programs/construction/pavement-smoothness>

The engineer uses this spreadsheet for payment purposes only after taking the following steps to verify that:

1. No MRI values are in the “must correct” range.
2. The contractor certified that all ALR issues were resolved.
3. The contractor’s profiles used in the payment adjustment spreadsheet are aligned within tolerance.
4. The contractor’s MRI data is directly from ProVAL.
5. Caltrans’ verification profiles are within 10 percent of the contractor profiles.

6. The profiles used in the PVP are from the same PPF files received the day the profiles were run.

The front worksheet in the spreadsheet titled “PayAdj” will highlight locations that do not meet requirements. Noncompliant areas are noted in red on this worksheet; immediately reject the payment adjustment spreadsheet with a description of the issues.

After successfully verifying the payment adjustment spreadsheet, make the applicable payment adjustment in the Extra Work Billing System with a change order that encumbers the supplemental fund allotment for the smoothness adjustment incentives.

Training videos for the contractors on how to complete the HMA pavement smoothness payment adjustment spreadsheets, and training videos for the resident engineers on how to review and approve contractor submitted HMA pavement smoothness payment adjustment spreadsheets, are available at:

<https://dot.ca.gov/programs/construction/pavement-smoothness/smoothness-adjustment-spreadsheet-training-videos>

Resident engineers must submit the hot mix asphalt pavement or concrete pavement smoothness pay adjustment spreadsheet file used to determine acceptance and the applicable payment adjustments for each lane, as well as the accompanying ProVAL project data files.

Submit these files to the email address for hot mix asphalt pavement or concrete pavement within 10 business days of including the smoothness payment adjustment in the progress estimate. Submit the same files to the email address within 10 business days of approving a contractor’s smoothness acceptance request for grinding existing concrete pavement.

For hot mix asphalt pavement, submit the files to:

[Asphalt.Smoothness@dot.ca.gov](mailto:Asphalt.Smoothness@dot.ca.gov)

For concrete pavement, submit the files to:

[Concrete.Smoothness@dot.ca.gov](mailto:Concrete.Smoothness@dot.ca.gov)

If the contractor’s test results are not within 10 percent of the Caltrans’ MRI value, the resident engineer and the contractor must attempt to resolve the differences. If the parties cannot agree, the specifications require using Caltrans’ MRI values to determine the applicable adjustment. If the contractor disputes Caltrans’ MRI values, the contractor can follow steps in the dispute resolution process. The contractor’s remaining profile values that do not have a corresponding engineer verification profile or are within 10 percent of the MRI will be used to calculate the incentive and disincentive payments.

Section 36-3.01D(4)(b), “Profile Verification,” of the *Standard Specifications* describes the dispute resolution process. This section requires independent third-party referee testing of the disputed sections of pavement. The MRI value used for the smoothness adjustment will be from the party whose mean MRI value is closer



to the independent third party's. The other party pays for the independent third-party testing.

If, after reviewing internally at Caltrans and reviewing with the contractor, the discrepancies are confirmed, the resident engineer must send a notice to the contractor of the discrepancies and Caltrans' intent to use its MRI values to calculate the incentive and disincentive.

The resident engineer is encouraged to request assistance from the district's smoothness expert and Headquarters Construction.

To assist in gathering pavement smoothness information and pavement smoothness data files, promote the use of data collection forms. Pavement smoothness forms are available at:

<https://dot.ca.gov/programs/construction/forms>

These forms include:

- Form CEM-3736, "Pavement Smoothness Inertial Profiler Submittal Record," is a checklist to review the completeness of submittals of inertial profiler data files, reports, and calibration information. This form should be used for both HMA and concrete pavements.
- Forms CEM-3736AC, "Asphalt Concrete Pavement Smoothness Corrections Information," and CEM-3736C, "Concrete Pavement Smoothness Corrections Information," provide information on pavement smoothness corrections made by contractors. The information collected on these forms will be used by Caltrans to help determine if improvements to the Caltrans pavement smoothness specifications are required. These forms should be completed by the contractor and submitted to the resident engineer and the appropriate pavement smoothness email address.

For hot mix asphalt pavement, submit the forms to: [Asphalt.Smoothness@dot.ca.gov](mailto:Asphalt.Smoothness@dot.ca.gov)

For concrete pavement, submit the forms to: [Concrete.Smoothness@dot.ca.gov](mailto:Concrete.Smoothness@dot.ca.gov)

#### **4-3604 Level of Inspection**

##### 4-3604A Base Bond Breaker

- Benchmark inspection of the existing base material to verify it is free of any foreign or loose material, and base has fully cured before application of the base bond breaker.
- Intermittent inspection of the application of the base bond breaker to verify it meets the requirements

##### 4-3604B Pavement Smoothness

- Intermittent inspection to assure inertial profiler and operator certifications are current.

- Intermittent inspection to assure beginning and ending stationing of inertial profiler runs are marked on the shoulder, and correctly transferred to subsequent lifts when necessary.
- Intermittent inspection of submitted inertial profile submittals to verify that they meet the contractual requirements.
- Benchmark inspection of contractor’s final “corrected” inertial profiles to verify that they meet the requirements for pavement smoothness, including that they are within 10 percent of Caltrans’ International Roughness Index values for each 0.1-mile section.

#### **4-3605 Quality Control**

##### 4-3605A Base Bond Breaker

- Make sure contractor submits a certificate of compliance for each delivery of base bond breaker material.

##### 4-3605B Pavement Smoothness

- Verify that contractor has current certifications for inertial profiler and its operator.

#### **4-3606 Payment**

##### 4-3606A Base Bond Breaker

- Measure and pay for base bond breaker where shown on the plans. Do not include any quantity for overlap.
- If performance grade asphalt binder is used as a base bond breaker, determine its weight in accordance with the Section 92-1.04, “Payment,” of the *Standard Specifications*. Make any adjustments in accordance with Section 9-1.07, “Payment Adjustments for Price Index Fluctuations,” of the *Standard Specifications*. Do not include the weight of the asphalt binder used for base bond breaker in any other payment item.

##### 4-3606B Pavement Smoothness

- Payment for pavement smoothness is included in bid item covering the pavement being placed. If the contractor fails to submit required pavement smoothness submittals within the specified time, withhold from the next progress payment in accordance with Section 9-1.16E(3), “Performance Failure Withholds,” of the *Standard Specifications*.
- During each progress payment, estimate the cost to correct smoothness on final surfaces that were constructed during the previous estimate period and apply an equivalent reduction in the corresponding pavement item pay quantities for incomplete work.