

# ORIGINAL

## Pavement Coatings Co.

### FIRST AMENDMENT TO AGREEMENT FOR MAINTENANCE SERVICES #4083

**THIS FIRST AMENDMENT** to that Agreement for Maintenance Services #4083 made and entered into by and between the County of El Dorado, a political subdivision of the State of California (hereinafter referred to as "County"), and Pavement Coatings Co., a corporation duly qualified to conduct business in the State of California, whose principal place of business is 10240 San Sevaire Way, Jurupa Valley, California 91752 and whose local address is 2150 Bell Avenue, Suite 125, Sacramento, California 95838 (hereinafter referred to as "Contractor");

### RECITALS

**WHEREAS**, Contractor has been engaged by County to provide various types of road surface treatments on an as-needed basis for the Department of Transportation pursuant to Agreement for Maintenance Services #4083, dated August 6, 2019, incorporated herein and made by reference a part hereof (hereinafter referred to as "Agreement");

**WHEREAS**, the parties hereto desire to amend the Agreement to update the scope of work to include micro-milling, amending **ARTICLE 2, The Work**, and replacing **Exhibit A**, marked "**Surface Treatment Specifications**," with **Amended Exhibit A**, marked "**Amended Surface Treatment Specifications**";

**NOW, THEREFORE**, in consideration of the foregoing and the mutual promises and covenants hereinafter contained, County and Contractor mutually agree to amend the terms of the Agreement in this First Amendment to Agreement on the following terms and conditions:

- I. All references to Exhibit A, "Surface Treatment Specifications," shall read Amended Exhibit A, "Amended Surface Treatment Specifications."

Except as herein amended, all other parts and sections of Agreement for Services #4083 shall remain unchanged and in full force and effect.

**Requesting Contract Administrator Concurrence:**


By:  Dated: 2/12/2020  
Brian Mullens  
Deputy Director  
Maintenance and Operations Division  
Department of Transportation

**Requesting Department Concurrence:**

By:  Dated: 2/12/2020  
Rafael Martinez  
Director  
Department of Transportation

IN WITNESS WHEREOF, the parties hereto have executed this First Amendment to Agreement for Services #4083 on the dates indicated below.

-- COUNTY OF EL DORADO --

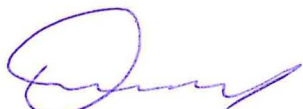
By:  Dated: 02/05/20

Board of Supervisors  
"County"

Attest:  
Kim Dawson  
Clerk of the Board of Supervisors

By:  Dated: 02/05/20  
Deputy Clerk

-- PAVEMENT COATINGS CO. --

By:  Dated: 2-7-2020  
Doug Ford  
President  
"Contractor"

By:  Dated: 2-6-20  
Tom Mucenski  
Corporate Secretary

# **Pavement Coatings Co.**

## **Amended Exhibit A**

### **Amended Surface Treatment Specifications**

#### **RUBBER MODIFIED ASPHALT CHIP SEAL SPECIFICATIONS**

##### **1. General**

###### **1.1. Scope**

This work consists of constructing a chip seal with rubber modified asphalt binder.

###### **1.2. Definitions**

Scrap tire crumb rubber:

Any combination of:

1. Automobile tires
2. Truck tires
3. Tire buffing

###### **1.3. Submittals**

Contractor shall comply with all federal, state, and local environmental laws, rules, regulations, and ordinances including, but not limited to, air quality requirements.

At least five (5) days before use, Contractor shall submit to County, the permit issued by the local air district for rubber modified binder application equipment. If an air quality permit is not required by the local air district for applying rubber modified binder, Contractor shall submit verification, from the local air district, that an air quality permit is not required.

At least ten (10) days before starting any rubber modified asphalt chip seal activities, Contractor shall submit to County, the name of an authorized laboratory to perform Quality Control (QC) testing. The authorized laboratory shall comply with the Caltrans Independent Assurance Program or possess current American Association of State Highway and Transportation Officials (AASHTO) Material Reference Laboratory (AMRL) accreditation for all American Society for Testing and Materials (ASTM) and AASHTO tests required in Section 2.

Contractor shall submit a certified volume or weight slip for each delivery of rubber modified asphalt binder.

At least fourteen (14) days before use, Contractor shall submit:

1. Four (4) each one-quart cans of rubber modified rubber modified asphalt binder
2. Safety Data Sheets (SDS) for each hazardous material
3. Rubber modified asphalt binder formulation, including:
  - 3.1. Each source and type of crumb rubber modifier
  - 3.2. Percentage of crumb rubber modifier by total weight of rubber modified asphalt binder
4. Test results
  - 4.1. Certificate of Compliance showing the rubber modified asphalt binder is the required Performance Grade (PG)
  - 4.2. Certificate of Compliance showing each source of crumb rubber modifier is derived from automobile and/or truck tires

4.3. Test results showing the screenings meets the requirements in Tables 1 and 2

**1.4. Quality Control Program**

Contractor shall develop, implement, and maintain a QC program.

Contractor shall prepare and maintain QC records, including:

1. Names and qualifications of:
  - 1.1. Samplers
  - 1.2. Testers
  - 1.3. Inspectors
2. Testing laboratories
3. Testing equipment calibrations and certifications
4. Construction inspection reports
5. Sampling and testing records organized by date and type of material
6. Test results with comparison of quality characteristic requirements
7. Test results in relation to action and any suspension limits
8. Records of corrective actions and suspensions

Within twenty-four (24) hours, Contractor shall notify County's Contract Administrator of any noncompliance issues identified by the QC program.

Within ten (10) days of beginning the modified binder seal coat operation, Contractor's independent testing laboratory shall conduct the Vialit Test Method for aggregate in Chip Seals French Chip for the retention requirement and submit a signed copy of a test results report to County's Contract Administrator. The report shall not be considered for acceptability testing. The Vialit Test Method can be reviewed at: <http://www.dot.ca.gov/hq/esc/ctms/index.html>

**1.5. Quality Control Manager**

Contractor shall assign a QC manager before the start of the affected work. The QC manager shall receive, review, and approve all correspondence, submittals, and reports relating to the QC of materials before they are submitted to County's Contract Administrator. The QC manager shall be the sole individual responsible for:

1. Signing the QC plan
2. Implementing the QC plan
3. Maintaining the QC records

The QC manager shall be Contractor's employee or shall be hired by a subcontractor providing only QC services. The QC manager shall not be employed or compensated by a subcontractor or by any other persons or entities hired by subcontractors who will provide services or material for the project.

**2. Materials**

**2.1. Rubber Modified Asphalt Binder**

Unless County and Contractor determine a different rubber modified asphalt binder would work better for the road condition, or would better advance the objectives of Streets and Highway Code Section 2030, the Rubber modified asphalt binder shall be PG 64-16 M with a minimum of eighteen percent (18%) scrap tire rubber that meets the requirements in Section 92 of the current Caltrans Standard Specifications. The solubility requirement is waived if the Dynamic Shear Rheometer test on original binder result ( $G^*/\sin(\delta)$ ) at 64° C is less than or equal to 2.00 kPa.

**2.2. Screenings**

Screenings for rubber modified asphalt chip seal shall comply with the screenings gradation requirements shown in Table 1.

**Table 1: Rubber Modified Asphalt Chip Seal Screenings Gradation**

Percentage passing by weight	
Sieve Size	Medium
3/4 inch	100
1/2 inch	95-100
3/8 inch	70-85
No. 4	0-15
No. 8	0-5
No. 16	---
No. 200	0-1

The screenings shall also comply with the requirements shown in Table 2.

**Table 2: Rubber Modified Asphalt Chip Seal Screenings Requirements**

Quality Characteristic	Test Method	Requirement
Cleanness Value (min)	California Test 227	80
Durability (min)	California Test 229	52
Los Angeles Rattler Loss (100 Revolutions, %, max)	ASTM C 131	10
Los Angeles Rattler Loss (500 Revolutions, %, max)		40
Film Stripping (%, max)	California Test 302	25

**3. Quality Control**

**3.1. Rubber Modified Asphalt Binder**

Contractor shall submit to County, a Certificate of Compliance for each truckload of rubber modified asphalt binder delivered to the jobsite.

**3.2. Screenings**

Contractor shall sample and test each stockpile of uncoated screenings. Contractor shall make all stockpiles available to County for quality assurance testing and notify County’s Contract Administrator a minimum of one (1) full working day prior to pre-coating. Contractor shall maintain discrete stockpiles at the asphalt plant.

Contractor shall test the quality characteristics of screenings under the test methods and frequencies shown in Table 3.

**Table 3: Screenings QC Testing**

Quality Characteristics	Test Method	Frequency
Gradation	ASTM C 136	One (1) per day per stockpile <sup>a</sup>
Cleanness value	California Test 227	
Durability	California Test 229	

<sup>a</sup> Contractor is required to test the stockpiles from which the screenings for that day’s work are being taken from.

**4. Construction**

**4.1. Equipment**

**4.1.1.Placing/Finishing Rubber Modified Asphalt Chip Seal**

Self-propelled distributor truck for applying rubber modified asphalt binder shall have the following features:

1. Heating unit
2. Internal mixing unit
3. Pumps that spray rubber modified asphalt binder within 0.05 gal/sq yd of the specified rate
4. Fully circulating spray bar that applies rubber modified asphalt binder uniformly
5. Tachometer
6. Pressure gauges
7. Volume measuring devices
8. Thermometer
9. Observation platform on the rear of the truck for an observer on the platform to see the nozzles and unplug them if needed.

Contractor shall use self-propelled power brooms that clean the existing pavement and remove loose screenings without dislodging screenings set in the rubber modified asphalt binder.

Pneumatic tire rollers shall be self-propelled and reversible. Pneumatic tires shall be of equal size, diameter, type, and ply. The roller shall carry at least 1,500 lbs. of load on each wheel, and each tire shall have an air pressure of  $100 \pm 5$  psi. Steel wheel rollers shall be self-propelled and reversible. The roller shall be operated in stated mode at all times and shall not exceed ten (10) tons in weight.

The screenings haul trucks shall have tailgates that discharge screenings and devices to allow locking onto the rear screenings spreader hitch. The dump beds shall not push down on the spreader when fully raised. Dump beds shall not spill screenings on the roadway when transferred to the spreader hopper. All haul trucks shall have tarpaulins to cover precoated screenings.

The self-propelled screenings spreader shall have a screenings hopper in the rear, belt conveyors that carry the screenings to the front, and a spreading hopper capable of providing a uniform screening spread rate over the entire width of the traffic lane in one (1) application.

#### **4.2. Surface Preparation**

Contractor shall furnish, place, maintain, and remove temporary pavement delineation in accordance with provisions in Section 12 of the current Caltrans Standard Specifications and Special Provisions. Nothing in the Special Provisions shall be construed as to reduce the minimum standards specified in the "Manual of Uniform Traffic Control Devices," and the California Supplement or as relieving Contractor from its responsibility, as provided in Section 7-1.04, "Public Safety," of the Caltrans Standard Specifications.

Contractor shall remove any existing traffic stripes, markings, crosswalks, stop bars, legends, and raised pavement markers in areas to receive rubber modified asphalt chip seal as required by the plans or project specifications. Removal shall be done by grinding and disposing of by Contractor. Grinding operations shall be conducted to keep all removed pavement material from entering the storm drain system.

Existing pavement striping, markings, or markers which are outside the work area and not to be removed, shall be protected by Contractor. Any striping, markings, or markers damaged or rendered useless by Contractor's operations shall be restored by Contractor to County's satisfaction and at Contractor's expense.

Before applying rubber modified asphalt binder, Contractor shall cover manholes, valve and monument covers, grates, or other exposed facilities located within the area of application with plastic or oil-resistant construction paper secured by tape or adhesive to the facility being covered. Contractor shall reference the covered facilities with enough control points to locate the facilities after the application of the rubber modified asphalt chip seal. Contractor shall remove coverings promptly to return the facilities to service prior to the end of the same shift the seal coat is placed.

Immediately before applying the rubber modified asphalt binder, Contractor shall clean and completely dry the pavement surface. Contractor shall perform sweeping, flushing, or other means necessary to remove all loose particles of paving, all dirt, and all extraneous material. Contractor shall clean all streets from face of curb to face of curb in the project area as necessary to ensure the pavement surface is sufficiently cleaned to provide for a bond between the existing pavement surface and seal coat. Any cleaning of the pavement surface immediately before placing rubber modified asphalt chip seal shall be performed without water. The application of rubber modified asphalt binder on any street shall not proceed until County has approved the street cleaning.

In the event that a scheduled street should become wet due to fog, rain, or any other reason, the placement of rubber modified asphalt chip seal shall be suspended until the surface has completely dried, as determined by County.

Contractor shall remove all vegetation material growing in the street or on the interface of the asphalt surface with the lip of concrete gutter prior to placing rubber modified asphalt binder.

The removal of all existing pavement markings and traffic stripes shall occur no sooner than two (2) calendar days prior to the day that the rubber modified chip seal is to be placed.

If Contractor uses sweeping equipment to clean the streets, Contractor shall perform a minimum of two (2) complete passes over all pavement surfaces. In the event County determines that two (2) passes are not adequate, Contractor shall re-sweep designated areas as necessary to achieve the appropriate level of pavement cleaning. Completion of sweeping shall be evidence by the absence of all loose particles of paving, all dirt, sand, gravel, leaves, and all other extraneous material. Street sweeping equipment shall be a vacuum sweeper, or approved equal, in a sufficiently maintained condition to accomplish the sweeping goals of the project. Pavement surfaces missed by or inaccessible to broom sweepers shall be swept clean by other methods that are approved by County. Contractor shall provide flushing, compressed air, or other cleaning methods necessary to remove all dirt, vegetation, and loose material from the pavement.

Prior to the application of the rubber modified asphalt chip seal, Contractor shall completely remove all grease and oil spots deposited by parked cars in the area of work. Grease build up greater than 1/32 of an inch shall be removed by scrapping or other mechanical methods. The application of rubber modified asphalt binder on any street shall not proceed until County has approved the removal of all grease and oil spots.

#### **4.3. Precoating Screenings**

Precoating of screenings is required. Precoating of screenings shall be performed at a central mixing plant.



Contractor shall not recombine fine materials collected in dust control systems except from primary dust collection devices such as cyclone collectors or knock-out boxes with any other aggregate used in the production of screenings.

For rubber modified asphalt chip seal, screenings shall be preheated from 260 to 325 degrees Fahrenheit (F). Contractor shall coat with any of the asphalts specified in the table titled, "Performance Graded Asphalt Binder," in Section 92 of the current Caltrans Standard Specifications. The asphalt shall be one (1.0) percent by weight of dry screenings.

Do not stockpile preheated and/or precoated screenings.

#### **4.4. Rubber Modified Asphalt Binder Application**

The rubber modified asphalt binder may only be applied if:

1. The pavement temperature is above 55 degrees F.
2. The ambient temperature is from 60 to 105 degrees F.
3. The pavement is clean and dry.
4. Wind conditions are such that uniform rubber modified asphalt binder coverage can be achieved.
5. Rain is not imminent.

Contractor shall apply the rubber modified asphalt binder when the temperature of the preheated rubber modified asphalt binder is between 330 and 375 degrees F, or in accordance with the spray temperature curve provided by binder supplier. Contractor shall prevent vehicles from driving on rubber modified asphalt binder before spreading screenings.

Contractor shall not apply rubber modified asphalt binder during high wind conditions. If authorized, Contractor may adjust the distributor bar height and distribution speed and use shielding equipment during high wind conditions. However, if the weather conditions do not allow for uniform placement of the rubber modified asphalt binder, County may decide to suspend construction activities by Contractor at no cost to County. Contractor may not resume construction activities until receiving approval from County.

In the course of construction where the rubber modified asphalt binder distributor truck creates a joint by stopping at some point along the length of the roadway, the screenings spreader shall stop short of this joint, leaving a small strip of uncovered rubber modified asphalt binder. This is to prevent an overlapping double thickness joint from being created once work resumes. Transverse joints of this type shall be constructed by spraying the rubber modified asphalt binder on the uncovered rubber modified asphalt binder from the area before the work stopped and proceed along the roadway. All reasonable precautions shall be taken to avoid skips and overlaps at joints. Any defects shall be corrected at Contractor's expense by use of a shovel and/or broom prior to continuing operations. Contractor shall plan its operations to minimize transverse joints.

The longitudinal joint between adjacent applications of screenings shall coincide with the line between designated traffic lanes. Contractor shall overlap longitudinal joints. The overlap shall be from two (2) to four (4) inches. At longitudinal joints with screenings, Contractor shall broom back and blend the edge to eliminate the differences in elevation. The joints shall be free from ridges and depressions and shall have a uniform appearance consistent with the adjacent sealed surface. Defects shall be corrected at Contractor's expense.

Joints between areas of rubber modified binder without screenings shall be made by Contractor overlapping the rubber modified binder distributions. Contractor shall disperse the excess material by spreading it with a squeegee or rake over a larger area of freshly applied rubber modified binder.

If the rubber modified asphalt chip seal will be applied in a cul-de-sac, Contractor shall submit plans for the construction methods in these areas. Contractor shall submit plans that include, but are not limited to, diagrams showing how the distributor truck and screenings spreader shall move through the work area. Contractor shall submit plans at least five (5) days before any rubber modified asphalt chip seal may be placed in cul-de-sac areas in order to minimize overlapping of the binder. When placing rubber modified asphalt chip seals in the cul-de-sac, Contractor shall cover rubber modified asphalt in screenings within five (5) minutes of application and initial rolling of the screenings shall begin within three (3) minutes after spreading.

The application of rubber modified binder to areas not accessible with the distributor bar on the distributor truck shall be accomplished by Contractor using handheld squeegees or other means approved by County. If Contractor uses County-approved methods, Contractor shall apply the rubber modified asphalt binder at a comparable rate and uniformly as the distributor truck allows in these areas. Contractor shall take care to apply screenings while the binder is still hot enough to allow proper embedment.

Contractor shall apply the rubber modified asphalt binder at the following rates:

For Medium Screenings, from 0.55-0.65 gallons per square yard.

The exact rate shall be determined by the inspector. Contractor shall apply binder to within ten (10) percent of the determined application rate.

All areas of the existing pavement surface that have patching shall be tack coated with conventional emulsion or paving-grade asphalt binder prior to the full application of the rubber modified asphalt chip seal. These areas will be identified by County and Contractor shall tack coat the areas with rubber modified asphalt binder one (1) hour before full application of the rubber modified asphalt chip seal begins.

#### **4.5. Screenings Application**

During transit, Contractor shall cover precoated screenings for rubber modified binder chip seal with tarpaulins, which are fully secured, at all times.

Contractor shall prevent vehicles from driving on rubber modified asphalt binder before spreading screenings.

At the time of application, precoated screenings for rubber modified binder chip seal shall be preheated from 225 to 325 degrees F.

Contractor shall spread screenings at a uniform rate over the full lane width in one (1) application. Contractor shall operate the spreader at speeds slow enough to prevent screenings from rolling over after dropping. If the spreader is not moving, screenings shall not drop. If the spreader stops and screenings drop, Contractor shall remove the excess screenings before resuming activities.

The screenings spreader shall be at an appropriate distance behind the rubber modified asphalt binder distribution truck such that screenings are applied to the rubber modified asphalt binder

within one (1) minute. The screenings spreader shall be within a maximum of two hundred (200) feet from the distribution truck at all times.

Spread screenings at the following rates:

For Medium Screenings, from twenty-eight (28) to thirty-two (32) per square yard.

The exact rate shall be determined by the inspector. Contractor shall spread screenings to within ten (10) percent of the determined application rate. The application of the finished rubber modified binder chip seal shall be uniform in appearance and free of defects.

#### **4.6. Rolling and Sweeping**

Contractor shall perform initial rolling within ninety (90) seconds of spreading screenings. Contractor shall not spread screenings more than a maximum of two hundred (200) feet ahead of the initial rolling.

Coverage shall consist of the number of passes a roller needs to cover the width. A pass shall be one (1) roller movement parallel to the rubber modified binder chip seal application in either direction. Overlapping passes are part of the coverage being made and are not part of a subsequent coverage. Contractor shall not start a coverage until completing the previous coverage.

Initial rolling of the rubber modified binder chip seal shall consist of a minimum of one (1) coverage with pneumatic tire rollers. After the initial rolling, a minimum of three (3) coverages with pneumatic tire rollers, shall be made by Contractor on the rubber modified binder chip seal.

After completion of rolling with pneumatic tire rollers, only one (1) coverage shall be performed by Contractor with a steel-wheeled roller, not to exceed ten (10) tons in weight. Contractor's use of steel-wheeled roller shall be immediately discontinued if it fractures the aggregate screenings.

Sweeping shall be a multi-step operation following final rolling of the screenings. Contractor shall perform initial sweepings and remove loose screenings without dislodging the screenings set in the rubber modified binder, prior to acceptance.

Three (3) additional sweepings shall be performed. One (1) calendar day after placement of the rubber modified binder chip seal, Contractor shall perform the first sweeping. The second sweeping shall be performed two (2) calendar days after placement of the rubber modified binder chip seal, and the final sweeping shall occur from five (5) to seven (7) calendar days after placement of the rubber modified binder chip seal. The second and third sweeping will be performed by County.

Contractor shall remove all loose chips from the street surface by sweeping the chips off of the roadway. Contractor shall remove excess screenings before uncontrolled traffic is permitted on the completed rubber modified seal coat. If a broom sweeper is not able to remove excess chips in areas where chips cannot be swept off the roadway, such as a cul-de-sac and areas with curb and gutter, Contractor shall be responsible for removing these chips through the use of a vacuum sweeper or other acceptable means as approved by County.

Contractor shall discontinue immediately, the use of any sweeper that causes damage to the rubber modified binder chip seal coat. Any voids caused by automobile tires, poor adhesion of chips to rubber modified asphalt binder, or any other cause shall be Contractor's responsibility to patch prior to removing traffic control devices, and at no additional cost to County.

Contractor's failure to provide adequate sweeping shall result in County performing said work at Contractor's sole expense, which shall be deducted from any monies due to Contractor. Sweeping by County forces shall not relieve Contractor of any liability arising from its failure to comply with these specifications.

#### **5. County Acceptance**

County reserves the right to refuse to permit the use of material solely on the basis of a Certificate of Compliance. Contractor shall allow County or its designee access to observe any QC testing being performed. Contractor shall inform County or its designee of the time and location that the QC testing shall be performed.

County will use Contractor's QC test results to determine if the materials used for the rubber modified chip seal meet the quality characteristic requirements that are specified herein. Contractor shall deliver samples of materials used to County or permit County or its designee access to obtain samples from any stockpiles or facilities used to store or produce materials used in the rubber modified chip seal, upon request at any time during construction. County reserves the right to have such materials tested by an independent laboratory for compliance with the requirements in Section 2, for verification and acceptance purposes. Contractor may examine the records and test reports that County performs.

County will accept the completed in-place rubber modified chip seal, if the final product is uniform in appearance, free from all visible defects, bumps, areas of poor chip retention, and has been swept to remove all loose chips.

#### **6. Payment**

The payment quantity for rubber modified asphalt chip seal is square yard, and such price shall include full compensation for specified surface preparation, removals, sweeping, and sanding if necessary, and for performing all of the work and providing the materials involved in constructing the rubber modified asphalt chip seal completely in place.

Contractor shall submit CalRecycle Form 739-TRP certifying the use of California tires (<http://www.calrecycle.ca.gov/Funding/Forms/Tires/CalRecycle739TRP.pdf>).

### **SLURRY SEAL SPECIFICATIONS**

#### **1. Application**

Application of a Type II / Latex Modified Slurry Seal independent of the other surface applications described herein. All materials and application methods shall be in conformance with current Caltrans Standard Specifications, including any amendments thereto. Traffic Control measures shall be adequate for the application of surfacing materials until surfacing materials have sufficiently cured to allow traffic access to resurfaced areas.

#### **2. Surface Preparation**

Contractor shall furnish, place, maintain, and remove temporary pavement delineation in accordance with provisions in Section 12 of the current Caltrans Standard Specifications and Special Provisions. Nothing in the Special Provisions shall be construed as to reduce the minimum standards specified in the "Manual of Uniform Traffic Control Devices" and the California Supplement or as relieving Contractor from its responsibility, as provided in Section 7-1.04, "Public Safety," of the Caltrans Standard Specifications.

Contractor shall remove any existing traffic stripes, markings, crosswalks, stop bars, legends, and raised pavement markers in areas to receive rubber modified asphalt chip seal as required by the plans

or project specifications. Removal shall be done by grinding and disposing of by Contractor. Grinding operations shall be conducted to keep all removed pavement material from entering the storm drain system.

Existing pavement striping, markings, or markers which are outside the work area and not to be removed, shall be protected by Contractor. Any striping, markings, or markers damaged or rendered useless by Contractor's operations shall be restored by Contractor to County's satisfaction and at Contractor's expense.

Before applying Type II / Latex Modified Slurry Seal, Contractor shall cover manholes, valve and monument covers, grates, or other exposed facilities located within the area of application with plastic or oil-resistant construction paper secured by tape or adhesive to the facility being covered. Contractor shall reference the covered facilities with enough control points to locate the facilities after the application of the Type II / Latex Modified Slurry Seal and shall remove coverings promptly to return the facilities to service prior to the end of the same shift the seal coat is placed.

Immediately before applying the Type II / Latex Modified Slurry Seal, Contractor shall clean and completely dry the surface. Cleaning shall be performed by a vacuum sweeper, flushing, or other means necessary to remove all loose particles of paving, all dirt, and all extraneous material. Contractor shall clean all streets from face of curb to face of curb in the project area as necessary to ensure the pavement surface is sufficiently cleaned to provide for a bond between the existing pavement surface and seal coat. Any cleaning of the pavement surface immediately before placing Type II / Latex Modified Slurry Seal shall be performed without water. The application Type II / Latex Modified Slurry Seal on any street shall not proceed until County has approved the street cleaning.

In the event that a scheduled street should become wet due to fog, rain, or any other reason, the placement of Type II / Latex Modified Slurry Seal shall be suspended until the surface has completely dried, as determined by County.

**3. Testing**

Contractor shall furnish test reports for aggregate and emulsion used in conjunction with the work to County's Contract Administrator at the time the work is completed.

**4. Spoils**

Spoils shall be disposed of off-site at no additional cost to County.

**5. Sweeping**

One (1) additional sweeping shall be performed one (1) calendar day after the application of the Type II/Latex Modified Slurry Seal.

Contractor's failure to provide adequate sweeping shall result in County performing said work at Contractor's sole expense, which shall be deducted from any monies due to Contractor. Sweeping by County forces shall not relieve Contractor of any liability arising from its failure to comply with these specifications.

**MICRO SEAL SPECIFICATIONS**

**1. Application**

Application of a Type II or Type III emulsified asphalt slurry seal is independent of the above surface applications. All materials and application methods shall be in conformance with current Caltrans

Standard Specifications, including any amendments thereto. Traffic Control measures shall be adequate for the application of surfacing materials until surfacing materials have sufficiently cured to allow traffic access to resurfaced areas.

## **2. Surface Preparation**

Contractor shall furnish, place, maintain, and remove temporary pavement delineation in accordance with provisions in Section 12 of the current Caltrans Standard Specifications and Special Provisions. Nothing in the Special Provisions shall be construed as to reduce the minimum standards specified in the "Manual of Uniform Traffic Control Devices," and the California Supplement or as relieving Contractor from its responsibility, as provided in Section 7-1.04, "Public Safety," of the Caltrans Standard Specifications.

Contractor shall remove any existing traffic stripes, markings, crosswalks, stop bars, legends, and raised pavement markers in areas to receive rubber modified asphalt chip seal as required by the plans or project specifications. Removal shall be done by grinding and disposing of by Contractor. Grinding operations shall be conducted to keep all removed pavement material from entering the storm drain system.

Existing pavement striping, markings, or markers which are outside the work area and not to be removed, shall be protected by Contractor. Any striping, markings, or markers damaged or rendered useless by Contractor's operations shall be restored by Contractor to County's satisfaction and at Contractor's expense.

Before applying Type II or Type III emulsified asphalt slurry seal, Contractor shall cover manholes, valve and monument covers, grates, or other exposed facilities located within the area of application with plastic or oil-resistant construction paper secured by tape or adhesive to the facility being covered. Contractor shall reference the covered facilities with enough control points to locate the facilities after the application of the Type II or Type III emulsified asphalt slurry seal and shall remove coverings promptly to return the facilities to service prior to the end of the same shift the seal coat is placed.

Immediately before applying the Type II or Type III emulsified asphalt slurry seal, Contractor shall clean and completely dry the surface. Cleaning shall be performed by a vacuum sweeper, flushing, or other means necessary to remove all loose particles of paving, all dirt, and all out extraneous material. Contractor shall clean all streets from face of curb to face of curb in the project area as necessary to ensure the pavement surface is sufficiently cleaned to provide for a bond between the existing pavement surface and seal coat. Any cleaning of the pavement surface immediately before placing Type II or Type III emulsified asphalt slurry seal shall be performed without water. The application of Type II or Type III emulsified asphalt slurry seal on any street shall not proceed until County has approved the street cleaning.

In the event that a scheduled street should become wet due to fog, rain, or any other reason, the placement of Type II or Type III emulsified asphalt slurry seal shall be suspended until the surface has completely dried as determined by County.

## **3. Testing**

Contractor shall furnish test reports for aggregate and emulsion used in conjunction with the work to County's Contract Administrator at the time the work is completed.

## **4. Spoils**

Spoils shall be disposed of off-site at no additional cost to County.

## **5. Sweeping**

One (1) additional sweeping shall be performed one (1) calendar day after the application of the Type II or Type III emulsified asphalt slurry seal.

Contractor's failure to provide adequate sweeping shall result in County performing said work at Contractor's sole expense, which shall be deducted from any monies due to Contractor. Sweeping by County forces shall not relieve Contractor of any liability arising from its failure to comply with these specifications.

## **TRAFFIC STRIPES AND PAVEMENT MARKINGS**

### **1. General**

#### **1.1 Scope**

This work consists of applying traffic stripes and pavement markings.

#### **1.2 Definitions**

Pavement marking: Transverse marking such as (1) a limit line, (2) a stop line, or (3) a word, symbol, shoulder, parking stall, or railroad-grade-crossing marking.

Traffic stripe: Longitudinal centerline or lane line used for separating traffic lanes in the same direction of travel or in the opposing direction of travel or a longitudinal edge line marking the edge of the traveled way or the edge of a lane at a gore area separating traffic at an exit or entrance ramp. A traffic stripe is shown as a traffic line.

#### **1.3 Submittals**

For each lot or batch of thermoplastic, paint, and glass beads, submit:

1. Certificate of compliance, including the product name, lot or batch number, and manufacture date
2. Materials Engineering and Testing Services (METS) notification letter stating that the material is authorized for use
3. Safety Data Sheet

For glass beads used in drop-on applications and in thermoplastic formulations, submit a certificate of compliance and test results for each lot of beads specifying the Environmental Protection Agency (EPA) test methods used and tracing the lot to the specific test sample. The testing for lead and arsenic content must be performed by an independent testing laboratory.

Submit retro reflectivity readings for traffic stripes and pavement markings at locations with deficient retro reflectivity determined by the Engineer.

#### **1.4 Quality Assurance**

Before starting permanent application of two-component painted traffic stripes or markings, apply a test stripe of the paint on roofing felt or other suitable material in the presence of County's Engineer. The test section must be at least fifty (50) feet in length.

Test each lot of glass beads for arsenic and lead under EPA Test Method 3052 and 6010B or 6010C.

County's Engineer will perform a nighttime, drive-through, visual inspection of the retro reflectivity of the traffic stripes and pavement markings and notify you of any locations with deficient retro reflectivity. Measure the retro reflectivity of the deficient areas using a retro reflectometer under ASTM E1710 and the sampling protocol specified in ASTM D7585.

## 2. Materials

### 2.1 General

Traffic stripes and pavement markings must be retroreflective. Within thirty (30) days of applying traffic stripes and pavement markings, the retro reflectivity of the stripes and markings must be a minimum of 250 mcd·m<sup>-2</sup>·lx<sup>-1</sup> for white and 125 mcd·m<sup>-2</sup>·lx<sup>-1</sup> for yellow when measured under ASTM E1710.

### 2.2 Thermoplastic

Thermoplastic must comply with State Specification PTH-02SPRAY, PTH-02HYDRO, or PTH-02ALKYD.

For recessed thermoplastic stripes and pavement markings, mark packages of thermoplastic with the words "For Recessed Application."

### 2.3 Paint

The paint for traffic stripes and pavement markings must comply with the specifications for the paint type and color shown in following table:

<b>Paint Specifications</b>		
Paint type	Color	Specification
Waterborne traffic line	White, yellow, and black	State Specification PTWB-01R2
Acetone-base	White, yellow, and black	State Specification PT-150VOC(A)
Waterborne traffic line for the international symbol of accessibility and other curb markings	Blue, red, and green	Federal Specification TT-P-1952E

The color of painted traffic stripes and pavement markings must comply with ASTM D6628.

### 2.4 Glass Beads

Glass beads applied to paint must comply with State Specification 8010-004.

Glass beads applied to molten thermoplastic material must be Type 2 beads complying with AASHTO M247. The glass beads must have a coating that promotes adhesion of the beads to thermoplastic.

At least seventy-five (75) percent of the beads by count must be true spheres that are colorless and do not exhibit dark spots, air inclusions, or surface scratches when viewed under 20X magnification.

Each lot of glass beads used in pavement markings must contain less than two hundred (200) parts per million each of arsenic and lead when tested under EPA Test Methods 3052 and 6010B or 6010C.

### 2.5 Thermoplastic Traffic Stripes and Pavement Markings with Enhanced Wet-Night

#### Visibility

A thermoplastic traffic stripe or pavement marking with enhanced wet-night visibility consists of a single uniform layer of thermoplastic and two (2) layers of glass beads.

The 1st layer of glass beads must be on the Authorized Material List for high-performance glass beads. The color of the glass beads must match the color of the stripe or marking to which they are being applied.



The 2nd layer of glass beads must comply with AASHTO M 247, Type 2.

The glass beads used in both layers must be surface treated for use with thermoplastic under the bead manufacturer's instructions.

Within fourteen (14) days of applying a thermoplastic traffic stripe or pavement marking with enhanced wet-night visibility, the retro reflectivity must be a minimum of 700 mcd·m<sup>-2</sup>·lx<sup>-1</sup> for white stripes and markings and 500 mcd·m<sup>-2</sup>·lx<sup>-1</sup> for yellow stripes and markings when measured under ASTM E1710.

## **2.6 Two-Component Painted Traffic Stripes and Pavement Markings**

A two-component painted traffic stripe or pavement marking consists of one (1) coat of paint and two (2) applications of retroreflective glass beads of two (2) gradations.

The large-gradation glass beads must be on the Authorized Material List for two-component traffic striping paints and large-gradation retroreflective glass beads.

The small-gradation glass beads must comply with AASHTO M 247, Type 1.

The glass beads must have an adhesion-promoting and water-repellant coating complying with the paint manufacturer's instructions.

You may use alternative types of glass beads recommended by the paint manufacturer if authorized.

The daytime and nighttime color of the painted traffic stripes and pavement markings must comply with ASTM D6628.

## **3. CONSTRUCTION**

### **3.1 General**

Establish the alignment for traffic stripes and the layouts for pavement markings with a device or method that will not conflict with other traffic control devices.

Protect existing retroreflective pavement markers during work activities.

Remove existing pavement markers that are coated or damaged by work activities and replace each with an equivalent marker on the Authorized Material List for signing and delineation materials.

1. Have clean, well-defined edges without running or deformation
2. Be uniform
3. Be straight on a tangent alignment and on a true arc on a curved alignment

The width of a completed traffic stripe must not deviate from the width shown by more than 1/4 inch on a tangent alignment and 1/2 inch on a curved alignment.

The length of the gaps and individual stripes that form a broken traffic stripe must not deviate by more than two (2) inches from the lengths shown. The gaps and stripes must be uniform throughout the entire length of each section of broken traffic stripe so that a normal striping machine can repeat the pattern and superimpose successive coats on the applied traffic stripe.

A completed pavement marking must have well-defined edges without running or deformation.

A completed thermoplastic traffic stripe or thermoplastic pavement marking must be free from runs, bubbles, craters, drag marks, stretch marks, and debris.

Protect newly placed traffic stripes and pavement markings from traffic and other deleterious activities until the paint is thoroughly dry or the thermoplastic is hard enough to bear traffic.

### **3.2 Surface Preparation**

Use mechanical wire brushing to remove dirt, contaminants, and loose material from the pavement surface that is to receive the traffic stripe or pavement marking.

Use abrasive blast cleaning to remove laitance and curing compound from the surface of new concrete pavement that is to receive the traffic stripe or pavement marking.

### **3.3 Application of Stripes and Markings**

#### **3.3.1 General**

Apply thermoplastic for a pavement marking with a stencil or a preformed marking.

Apply paint for a pavement marking by hand with a stencil and spray equipment.

You may use permanent tape for a traffic stripe or a pavement marking instead of paint or thermoplastic. The permanent tape must be on the Authorized Material List for signing and delineation materials. Apply the tape under the manufacturer's instructions.

Immediately remove drips, overspray, improper markings, paint, and thermoplastic tracked by traffic with an authorized method.

Apply a traffic stripe or a pavement marking only to a dry surface during a period of favorable weather when the pavement surface is above 50 degrees F.

The glass beads must be embedded in the coat of paint or thermoplastic to a depth of 1/2 their diameters.

Verify the rate of application of the glass beads by stabbing the glass bead tank with a calibrated rod.

Where a new broken traffic stripe joins an existing broken traffic stripe, allow enough overlap distance between the new and existing striping patterns to ensure continuity at the beginning and end of the transition.

#### **3.3.2 Thermoplastic Traffic Stripes and Pavement Markings**

##### **3.3.2.1 General**

Do not thin the primer. Apply the primer under the manufacturer's instructions:

1. To asphaltic surfaces over six (6) months old and to all concrete surfaces
2. Immediately before and concurrently with the application of the thermoplastic
3. At the manufacturer's instructed rate:

Use preheaters with mixers having a 360-degree rotation to preheat the thermoplastic material.

Apply the thermoplastic in a single uniform layer by spray or extrusion methods.

Completely coat and fill voids in the pavement surface with the thermoplastic.

### **3.3.2.2 Extruded Thermoplastic Traffic Stripes and Pavement Markings**

Apply extruded thermoplastic at a temperature from 400 to 425 degrees F unless a different temperature is recommended by the manufacturer.

Apply extruded thermoplastic for a traffic stripe at a rate of at least 0.20 lb of thermoplastic per foot of four (4) inch wide solid stripe. The applied thermoplastic traffic stripe must be at least 0.060 inch thick.

An applied thermoplastic pavement marking must be from 0.100 to 0.150 inch thick.

Apply glass beads to the surface of the molten thermoplastic at a rate of at least 8 lb of beads per 100 sq ft.

### **3.3.2.3 Sprayable Thermoplastic Traffic Stripes and Pavement Markings**

Apply sprayable thermoplastic under State Specification PTH-02SPRAY at a temperature from 350 to 400 degrees F.

Apply sprayable thermoplastic at a rate of at least 0.13 lb of thermoplastic per foot of four (4) inch wide solid stripe.

The applied sprayable thermoplastic material must be at least 0.040 inch thick.

### **3.3.2.4 Recessed Thermoplastic Traffic Stripes and Pavement Markings**

Construct recesses for double traffic stripes in a single pass.

Keep the recesses dry and free from debris. Apply primer to the recesses.

After constructing the recesses, apply the thermoplastic traffic stripes and pavement markings before the end of the same work shift.

### **3.3.2.5 Thermoplastic Traffic Stripes and Pavement Markings with Enhanced Wet-Night Visibility**

Use a ribbon-extrusion or screed-type applicator to apply thermoplastic traffic stripes with enhanced wetnight visibility. Operate the striping machine at a speed of eight (8) mph or slower during the application of the stripe and glass beads.

Apply the stripe at a rate of at least 0.38 lb of thermoplastic per foot of four (4) inch wide solid stripe. The applied thermoplastic traffic stripe must be at least 0.090 inch thick.

Apply thermoplastic pavement marking at a rate of at least 1.06 lb of thermoplastic per square foot of marking. The applied thermoplastic pavement marking must be at least 0.100 inch thick.

Apply thermoplastic traffic stripe and both types of glass beads in a single pass. First apply the thermoplastic, followed immediately by consecutive applications of high-performance glass beads and then AASHTO M 247, Type 2, glass beads. Use a separate applicator gun for each type of glass bead.

You may apply glass beads by hand on pavement markings.

Uniformly distribute glass beads on traffic stripes and pavement markings. Apply high-performance glass beads at a rate of at least 6 lb of glass beads per 100 sq ft of stripe or marking. Apply AASHTO M 247, Type 2, glass beads at a rate of at least 8 lb of glass beads per 100 sq ft of stripe or marking. The combined weight of the two (2) types of glass beads must be greater than 14 lb of glass beads per 100 sq ft of stripe or marking.

### **3.3.3 Painted Traffic Stripes and Pavement Markings**

#### **3.3.3.1 General**

Do not thin paint for traffic stripes and pavement markings. Mix the paint by mechanical means until it is homogeneous. Thoroughly agitate the paint during its application.

Use mechanical means to paint traffic stripes and pavement markings and to apply glass beads for traffic stripes.

The striping machine must be capable of superimposing successive coats of paint on the 1st coat and on existing stripes at a speed of at least five (5) mph.

The striping machine must:

1. Have rubber tires
2. Be maneuverable enough to produce straight lines and normal curves in true arcs
3. Be capable of applying traffic paint and glass beads at the specified rates
4. Be equipped with:
  - 4.1. Pointer or sighting device at least five (5) feet long extending from the front of the machine
  - 4.2. Pointer or sighting device extending from the side of the machine to determine the distance from the centerline for painting shoulder stripes
  - 4.3. Positive acting cutoff device to prevent depositing paint in gaps of broken stripes
  - 4.4. Shields or an adjustable air curtain for line control
  - 4.5. Pressure regulators and gauges that are in full view of the operator for a pneumatically operated machine
  - 4.6. Paint strainer in the paint supply line
  - 4.7. Paint storage tank with a mechanical agitator that operates continuously during painting activities
  - 4.8. Glass bead dispenser located behind the paint applicator nozzle that is controlled simultaneously with the paint applicator nozzle
  - 4.9. Calibrated rods for measuring the volumes of paint and glass beads in the paint and glass bead tanks

Air-atomized spray equipment must:

1. Be equipped with oil and water extractors and pressure regulators
2. Have adequate air volume and compressor recovery capacity
3. Have properly sized orifices and needle assemblies for the spray gun tip

Where the configuration or location of a traffic stripe is such that the use of a striping machine is not practicable, you may apply the traffic paint and glass beads by other methods and equipment if authorized. County Engineer determines if the striping machine is not practicable for a particular use.

For an existing surface, apply traffic stripes and pavement markings in one (1) coat.

For a new surface, except for the black stripe between the two (2) yellow stripes of a double traffic stripe, apply traffic stripes and pavement markings in two (2) coats. The 1st coat of paint must be dry before applying the 2nd coat.

Paint one (1) coat, three (3) inch wide black stripe between the two (2) four (4) inch wide yellow stripes of a double traffic stripe.

If the two (2) four (4) inch wide yellow stripes are applied in two (2) coats, apply the black stripe concurrently with the 2nd coat of the yellow stripes.

Apply each coat of paint for any traffic stripe in one (1) pass of the striping machine, including the glass beads, regardless of the number, width, and pattern of the individual stripes. Do not paint traffic stripes and pavement markings if:

1. Freshly painted surfaces could become damaged by rain, fog, or condensation
2. Atmospheric temperature could drop below 40 degrees F for acetone-based paint and 50 degrees F for waterborne paint during the drying period

On 2-lane highways:

1. If the 1st coat of the centerline stripe is applied in the same direction as increasing post miles, use the right-hand spray gun of the three (3) spray guns used to apply the double yellow stripe to apply a single yellow stripe.
2. If the 1st coat of the centerline stripe is applied in the same direction as decreasing post miles, use the left-hand spray gun of the three (3) spray guns used to apply the double yellow stripe to apply a single yellow stripe.
3. Apply the 2nd coat of centerline striping in the opposite direction of the 1st coat.

Apply 1-coat paint at an approximate rate of 107 sq ft/gal.

Apply 2-coat paint at the approximate rate shown in the following table:

Two-Coat Paint Application Rates

Paint Type	Coverage (sq ft/gal)	
	1 <sup>st</sup> coat	2 <sup>nd</sup> coat
Waterborne paint	215	215
Acetone-based paint	360	150

Apply glass beads at an approximate rate of 5 lb of beads per gallon of paint.

County's Engineer determines the exact application rate of the paint and glass beads.

Verify the application rate of paint by stabbing the paint tank with a calibrated rod. If the striping machine has paint gauges, County's Engineer may measure the volume of paint using the gauges instead of stabbing the paint tank with a calibrated rod.

### 3.3.3.2 Two-Component Painted Traffic Stripes and Pavement Markings

Do not apply paint for two-component painted traffic stripes and pavement markings until authorized.

Apply the paint only to clean, completely dry surfaces when the pavement surface temperature is above 39 degrees F and the ambient temperature is above 36 degrees F.

Comply with the paint manufacturer's instructions for the temperature of the paint during its application.

The striping machine must not travel faster than ten (10) mph when applying the paint and glass beads.

Apply the paint and glass beads in one (1) pass in the following order:

1. Paint
2. Large-gradation glass beads
3. Small-gradation glass beads

Apply the glass beads with two (2) separate applicator guns.

Uniformly distribute the glass beads on traffic stripes and pavement markings.

You may apply the glass beads by hand methods on pavement markings.

Apply the large-gradation glass beads at a minimum rate of 11.7 lb of beads per gallon of paint.

Apply the small-gradation glass beads at a minimum rate of 8.3 lb of beads per gallon of paint.

## **MICRO-MILLING**

### **1. General**

#### **1.1. Scope**

Micro-milling shall consist of the cold milling of existing asphalt concrete pavement with a milling machine equipped with a cutting drum specifically designed and constructed for micro-milling.

#### **1.2. Definitions**

**Area of Localized Roughness:** Moving average of the International Roughness Index values for each wheel path using a twenty-five (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 three (3) feet from and parallel to the edges of a traffic lane. Left and right wheel paths are based on the direction of travel.

#### **1.3. Submittals**

Contractor shall comply with all federal, state, and local environmental laws, rules, regulations, and ordinances including, but not limited to, air quality requirements.

At least five (5) business days before starting initial profiling or changing the inertial profiler or operator, Contractor shall submit to County an inertial profiler certification and operator certification for the inertial profiler. Within two (2) business days after cross-correlation testing, Contractor shall submit to County a ProVAL profiler certification analysis report for test results to the County's Contract Administrator, or designee.

At least two (two) business days before performing corrective grinding for areas of localized roughness or areas exceeding the specified thresholds for the Mean Roughness Index, Contractor shall submit to County 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 passes per grind location, such as forward, reverse, forward-forward, reverse-reverse, reverse-forward
  - 5.5 Distance from start or stop locations to the nearest semi-permanent reference point
6. Forecasted improvement in terms of the Mean Roughness Index and area of localized roughness values

Within two (2) days of measuring smoothness with a straightedge, Contractor shall submit to County a list of the areas requiring smoothness correction or a report stating there are no areas requiring smoothness correction. Areas requiring smoothness correction shall be identified by:

1. Location number
2. Road Name
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 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

## **2. Profiling**

### **2.1. Submittals**

Within two (2) business days after each day of profiling, Contractor shall submit to County the profile information to County's Contract Administrator, or designee.

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 PDF format. 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 PDF format. 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

Contractor shall submit to County's Contract Administrator, or designee, Asphalt Concrete Pavement Smoothness Corrections Information or Concrete Pavement Smoothness Corrections Information with the final profiling information submittal.

Submit the raw profile data in an unfiltered electronic pavement profile file format.

## **2.2. Inertial Profiler Certifications**

At all times, the inertial profiler must display a current certification decal displaying the expiration date. The operator shall be certified for each model of inertial profiler operated. The certification for the inertial profiler and operator shall not be more than twelve (12) months old.

## **2.3 Inertial Profiler Calibration and Verification Tests**

Notify County's Contract Administrator at least two (2) business days before performing calibration and verification testing of the inertial profiler.

Contractor shall conduct the following calibration and verification tests 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

Contractor shall 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 five (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 the device under California Test 387 using a ProVAL profiler certification analysis with a three (3) foot maximum offset. The cross-correlation must be a minimum of 0.92.

## **2.4 Performing, Analyzing and Collecting Data**

Contractor shall operate the inertial profiler under the manufacturer's instructions and AASHTO R 57 at one (1) inch recording intervals using a minimum four (4) inch line laser sensor. Establish semi-permanent reference points for aligning inertial profiler runs and locating potential corrective grinding. Place semi-permanent reference points at a frequency of 0.5 mile



or less along the edge of the traffic lane or roadway. Maintain semi-permanent reference points until County 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 semi-permanent 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
7. Change in pavement type

Profile the left and right wheel paths of each lane.

Determine the Mean Roughness Index for 0.1-mile fixed sections using the ProVAL ride quality analysis with a 250 mm filter. Calculate the Mean Roughness Index of each lane. A partial section equal or less than 0.05-mile length is to be included with the previous or the subsequent segment forming up to a 0.15-mile length. A partial section greater than 0.05 mile, but less than 0.10 mile, is a separate segment.

Sections must comply with the Mean Roughness Index specifications for a full section. A weighted average calculation shall be used for those partial sections that have been combined with previous or subsequent segments.

Determine the areas of localized roughness using ProVAL with the average International Roughness Index values for each wheel path using a twenty-five (25) foot continuous interval and a 250 mm filter.

### **3. Construction**

#### **3.1. Equipment**

##### **3.1.1. Micro-Milling Machine Specifications**

The micro-milling machine shall be:

1. Equipped with a cutter head width that matches the width to be planed. If the cutter head width is wider than the cold plane area shown, submit to County's Contract Administrator, or designee, a request for using a wider cutter head. Do not cold plane unless County's Contract Administrator, or designee, approves the request.
2. Equipped with automatic controls for the longitudinal grade and transverse slope of the cutter head and:
  - 2.1 A ski device to be used, must be at least forty (40) feet long, rigid, and a one (1) piece unit. The entire length must be used in activating the seven (7) sensors on each side of the machine.
  - 2.2 If referencing from existing pavement, the cold planer (machine) must be controlled by a self-contained grade reference system. They system must be used at or near the centerline of the roadway. On the adjacent pass with the cold planer (machine), a joint-matching shoe may be used.
3. Drum shall be a minimum of 6.5' in width with a tungsten carbide tooth spacing of three (3) millimeters double wrapped drum.

4. Equipped with a drum scanner on both sides of the drum.
5. Equipped to effectively control dust generated by the cold planer's operation.
6. Micro-milling machine shall be operated so that no fumes or smoke is produced.
7. A new set of teeth shall be installed in the micro-milling machine prior to beginning the work. The grinding pattern shall always be within specified tolerances or the teeth shall be replaced to meet the required tolerances.

### **3.2. Milling Operations**

Contractor shall notify County's Contract Administrator, or designee, of the start location by station and start time at least two (2) business days before each day of profiling. Before profiling, Contractor shall remove foreign objects from the pavement surface and mark the beginning and ending station on the pavement shoulder. The stationing must be the same when profiling more than one (1) surface.

Milling operations shall progress from the low side of each roadway lane and progress towards the high side. Each successive pass of the milling machine shall meet the line and grade of the previous pass. The speed of the milling machine shall be maintained at a rate which results in a uniform pavement texture.

Micro-milling shall result in a grid-patterned textured pavement surface with longitudinal ridges approximately the same distance apart as the cutting teeth. The ridges shall be consistent in depth, width, and profile. The distance between the top of each ridge and the adjacent valleys shall not exceed 1/8 inch.

The resulting profile and cross slope of the milled pavement surface shall be such that a twelve (12) foot long straightedge laid perpendicular or parallel to the centerline shall not allow a shim with a width of one (1) inch and a thickness of 3/16 inch to pass under the straightedge at any point except breaks in profile grade or cross slope. Contractor shall test pavement smoothness using an inertial profiler with the exception of using a twelve (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 super-elevation transition of such curves:
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 on an individual basis.
2. Determine the Mean Roughness Index and areas of localized roughness using ProVAL

Where open-graded friction course (OGFC) is required, test the pavement smoothness of the final hot mixed asphalt or concrete pavement surface before placing OGFC and after placing OGFC.

Milled pavement surfaces which do not conform to the requirements above shall be corrected by Contractor. Contractor shall prepare and submit to County's Contract Administrator, or designee, for approval a correction plan prior to initiating corrective action.

During milling operations, the cutter teeth shall be regularly checked and replaced as necessary to maintain the required tolerances.

**3.3. Spoils**

Spoils shall be disposed of off-site at no additional cost to County.

**3.4. Sweeping**

A self-loading motorized street sweeper equipped with both brooms and a vacuum system, and a functional water spray system shall immediately follow the micro-milling machine. Sweeping shall continue until loose millings have been completely removed and as requested by County's Contract Administrator, or designee. Contractor shall maintain the micro-milled surface until the surface treatment is applied.

**4. County Acceptance**

County accepts pavement surface for smoothness based on compliance with the smoothness specifications for the type of pavement surface specified. For areas that require pavement smoothness determined using a twelve (12) foot straightedge, the pavement surface must not vary from the lower edge of the straightedge by more than:

1. 0.01 foot when the straightedge is laid parallel with the centerline
2. 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. 0.02 foot when the straightedge is laid within twenty-four (24) feet of pavement conforms

Pavement located within 12.5 feet of the ends of bridges, approach slabs, culverts visible on the roadway surface, railroad crossings, at-grade intersections, and transverse surface joints with existing pavement must comply with Mean Roughness Index and twelve (12) foot straightedge requirements. The requirements for areas of localized roughness do not apply to these areas.