

DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES

OFFICE ENGINEER

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January 30, 2013

02-Teh-36-55.2/67.5

02-4E9704

Project ID 0212000114

ACSTP-P036(094)E

Addendum No. 1

Dear Contractor:

This addendum is being issued to the contract for CONSTRUCTION ON STATE HIGHWAY IN TEHAMA COUNTY AT AND NEAR PAYNES CREEK FROM 0.1 MILE WEST OF MANTON ROAD TO 0.2 MILE EAST OF LATKA ROAD.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this addendum are an essential part of the contract.

Bids for this work will be opened on Tuesday, February 12, 2013.

This addendum is being issued to revise the Project Plans, the Notice to Bidders and Special Provisions, and the Bid book.

Project Plan Sheet 1 is revised. A copy of the revised sheet is attached for substitution for the like-numbered sheet.

Project Plan Sheets 5A and 5B are added. Copies of the added sheets are attached for addition to the project plans.

In the Notice to Bidders and Special Provisions, in the "STANDARD PLANS LIST," the following Standard Plans are deleted:

"T-13 and T-17."

In the Special Provisions, Section 37 BITUMINOUS SEALS is revised as attached.

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Page 2
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02-4E9704
Project ID 0212000114
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In the Bid book, in the "Bid Item List," Items 12 and 16 are revised as attached.

To Bid book holders:

Replace page 3 of the "Bid Item List" in the Bid book with the attached revised page 3 of the Bid Item List. The revised Bid Item List is to be used in the bid.

Inquiries or questions in regard to this addendum must be communicated as a bidder inquiry and must be made as noted in the Notice to Bidders section of the Notice to Bidders and Special Provisions.

Indicate receipt of this addendum by filling in the number of this addendum in the space provided on the signature page of the Bid book.

Submit bids in the Bid book you now possess. Holders who have already mailed their book will be contacted to arrange for the return of their book.

Inform subcontractors and suppliers as necessary.

This addendum and attachments are available for the Contractors' download on the Web site:

http://www.dot.ca.gov/hq/esc/oe/project_ads_addenda/02/02-4E9704

If you are not a Bid book holder, but request a book to bid on this project, you must comply with the requirements of this letter before submitting your bid.

Sincerely,



JOHN BULINSKI
District Director

Attachments

Add to section 37-2.01A:

Asphalt rubber seal coat includes applying heated asphalt rubber binder, followed by heated screenings precoated with asphalt binder, followed by a flush coat.

Asphalt rubber binder used for asphalt rubber seal coat must be Field Blend Asphalt Rubber Binder (Type II), except for test sections.

This project includes test sections as shown for the evaluation of asphalt rubber seal coats constructed with different asphalt rubber binder types including evaluation of sections with and without warm mix asphalt (WMA) additive technologies. The following asphalt rubber binder types will be evaluated on this project:

1. Field Blend Asphalt Rubber Binder (Type II) with WMA additive technology
2. Rubberized Asphalt Terminal Blend Binder
3. Rubberized Asphalt Terminal Blend Binder with WMA additive technology

The Department will not consider a VECP that eliminates the use of asphalt rubber binder types or WMA additive technology.

You must select WMA additive used in asphalt rubber binder from Department-approved WMA additive technologies. Not all Department-approved WMA technologies for HMA are appropriate for use in asphalt rubber binder for seal coats. For Department-approved WMA technologies, go to:

http://www.dot.ca.gov/hq/esc/approved_products_list/

For Laboratory Procedures, go to:

<http://www.dot.ca.gov/hq/esc/Translab/ofpm/fpmlab.htm>

For Vialit Test Method, go to:

<http://www.dot.ca.gov/hq/esc/ctms/index.html>

Replace section 37-2.01B with:

37-2.01B Definitions

crumb rubber modifier: Ground or granulated high natural crumb rubber and/or scrap tire crumb rubber.

descending viscosity reading: subsequent viscosity reading that must be at least 12 percent lower than the previous viscosity reading.

high natural crumb rubber: Material containing 40 to 48 percent natural rubber.

scrap tire crumb rubber: Any combination of:

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

Replace section 37-2.01C(5) with:

37-2.01C(5) Asphalt Rubber Seal Coat

37-2.01C(5)(a) General

For each delivery of asphalt rubber binder ingredients and asphalt rubber binder to the job site, submit a certificate of compliance and a copy of the specified test results.

Submit MSDS for each asphalt rubber binder ingredient and the asphalt rubber binder.

At least 15 days before use, submit:

1. Four 1-quart cans of mixed asphalt rubber binder
2. Samples of each asphalt rubber binder ingredient
3. Asphalt rubber binder formulation and data as follows:
 - 3.1. For asphalt binder, submit source and grade of asphalt binder
 - 3.2. For asphalt modifier, submit:
 - 3.2.1. Source and type of asphalt modifier
 - 3.2.2. Percentage of asphalt modifier by weight of asphalt binder
 - 3.2.3. Percentage of combined asphalt binder and asphalt modifier by weight of asphalt rubber binder
 - 3.2.4. Test results for the specified quality characteristics
 - 3.3. For crumb rubber modifier, submit:
 - 3.3.1. Each source and type of scrap tire crumb rubber and high natural rubber
 - 3.3.2. Test results for the specified quality characteristics
 - 3.4. For WMA additive technology, submit:
 - 3.4.1. Name of technology
 - 3.4.2. Percent admixture by weight of asphalt rubber binder as recommended by the manufacturer
 - 3.5. For asphalt rubber binder, submit:
 - 3.5.1. Test results for the specified quality characteristics
 - 3.5.2. Test results for AASHTO T 228. Report test results in pounds per gallon
 - 3.5.3. For field blend asphalt rubber binder:
 - 3.5.3.1. Minimum reaction time and temperature
 - 3.5.3.2. Percentage of scrap tire crumb rubber and high natural rubber by total weight of asphalt rubber binder
 - 3.5.4. For rubberized asphalt terminal blend binder, percentage of scrap tire crumb rubber by total weight of asphalt rubber binder
 - 3.6. Test result for Vialit Test Method for aggregate in Chip Seals, French Chip
 - 3.7. For precoated screenings, submit:
 - 3.7.1. Name of proposed aggregate source
 - 3.7.2. California mine number
 - 3.7.3. SMARA identification number
 - 3.7.4. Aggregate test results performed within past 60 days for:
 - 3.7.4.1. California Test 202
 - 3.7.4.2. California Test 211
 - 3.7.4.3. California Test 302
 - 3.7.4.4. California Test 227
 - 3.7.4.5. California Test 229
 - 3.7.5. Name of HMA plant producing precoated screenings
 - 3.7.6. Asphalt binder grade for coating
 - 3.7.7. Precoated screenings asphalt binder coating percentage by weight of dry screenings
 - 3.8. For asphalt rubber seal coat, submit the proposed:
 - 3.8.1. Asphalt rubber binder temperature range
 - 3.8.2. Asphalt rubber binder application rate
 - 3.8.3. Precoated screenings spread rate

At least 5 business days before use, submit the permit issued by the local air quality agency for asphalt rubber binder:

1. Field blending equipment
2. Application equipment

For each delivery of asphalt rubber binder ingredients, submit:

1. A certified volume or weight slip
2. Certificate of compliance with manufactures test results for the specified quality characteristics

Submit for each delivery of asphalt rubber binder:

1. A certified volume or weight slip
2. Percentage of crumb rubber modifier by weight of asphalt rubber binder
3. Certificate of compliance for the specified quality characteristics

37-2.01C(5)(b) Prepaving Conference

Submit a list of names participating in the prepaving conference. Identify each participant's name, employer, title, and role in the production and placement of asphalt rubber seal coat.

37-2.01C(5)(c) Tests and Samples

At least 10 days before starting seal coat activities, submit the name of an independent testing laboratory that participates in the AASHTO Materials Reference Laboratory (AMRL) program and the Department's Independent Assurance Program.

The independent testing laboratory must submit asphalt rubber seal coat tests results to the Engineer.

Submit a certificate of compliance and accuracy verification of test results for viscometers.

Upon request, submit notification 15 minutes before each viscosity test or submit a schedule of testing times.

37-2.01C(5)(d) Daily Production Log

Submit log of production data daily and upon request.

Submit log of asphalt rubber binder production viscosity test results each day of asphalt rubber seal coat work.

Replace "Reserved" in section 37-2.01D(1) with:

Equipment used in producing field blend asphalt rubber binder must be permitted for use by local air quality agency. If an air quality permit is not required by local air quality agency for producing asphalt rubber binder, submit project specific verification from the local air quality agency that an air quality permit is not required.

Equipment used in spreading asphalt rubber binder must be permitted for use by local air quality agency. If an air quality permit is not required by local air quality agency for spray applying asphalt rubber binder, submit project specific verification from the local air quality agency that an air quality permit is not required.

Replace section 37-2.01D(4) with:

37-2.01D(4) Asphalt Rubber Seal Coat

37-2.01D(4)(a) General

Not Used

37-2.01D(4)(b) Technical Representatives

37-2.01D(4)(b)(i) General

Technical representatives for the following must participate in the prepaving conference and be present during placement of the portion of the seal coat related to the product they represent:

1. Field Blend Asphalt Rubber Binder Producer
2. Rubberized Asphalt Terminal Blend Binder Producer
3. WMA Additive Technology Supplier

37-2.01D(4)(b)(ii) Field Blend Asphalt Rubber Binder Producer

A technical representative from the field blend asphalt rubber binder producer must be present during the production and placement of asphalt rubber seal coat using field blend asphalt rubber binder. The technical representative may advise you and the Engineer during the asphalt rubber seal coat application as it relates to the field blend asphalt rubber binder including asphalt rubber binder placement temperature, asphalt rubber binder application rate and other placement issues.

37-2.01D(4)(b)(iii) Rubberized Asphalt Terminal Blend Binder Producer

A technical representative from the rubberized asphalt terminal blend binder producer must be present during the placement of asphalt rubber seal coat using rubberized asphalt terminal blend binder. The technical representative may advise you and the Engineer during the asphalt rubber seal coat application as it relates to the rubberized asphalt terminal blend binder including placement temperature, asphalt rubber binder application rate, and other placement issues.

37-2.01D(4)(b)(iv) WMA Additive Technology Supplier

A technical representative from the WMA technology supplier must be present during the production and placement of asphalt rubber seal coat with WMA additives. The technical representative may advise you, the Engineer, and the asphalt rubber binder producer. The technical representative may advise the asphalt rubber binder mix operation as it relates to the WMA technology. The WMA technology representative may advise you of placement temperature and potential placement issues.

The technical representative for WMA technology may advise the asphalt rubber binder producer regarding asphalt rubber binder plant and asphalt rubber binder plant process-controller modifications necessary for integrating WMA additive technology equipment with asphalt rubber binder plant. Asphalt rubber binder plant modifications and WMA technology equipment, scales, and meters must comply with Department's Materials Plant Quality Program (MPQP).

37-2.01D(4)(c) Prepaving Conference

Schedule a prepaving conference with the Engineer at a mutually agreed time and place. Make arrangements for the conference facility. Be prepared to discuss:

1. Asphalt rubber seal coat production and placement
2. Method for incorporating WMA technology and any impacts on asphalt rubber binder production and asphalt rubber seal coat placement including requirements for compaction, sweeping, and workmanship
3. Proposed application rates for asphalt rubber binder and precoated screenings and who in the field has authority to adjust application rates and how adjustments are documented
4. When initial sweeping will be done, including any issues when WMA additives are used, and schedule for maintenance sweepings
5. Opening to traffic requirements including any concerns when WMA additives are used
6. Quality control testing
7. Contingency plan for material deliveries, equipment breakdowns, and traffic handling

The following personnel must attend the prepaving conference:

1. Project manager
2. Superintendent
3. Technical representative for WMA additive technology
4. Technical representative for field blend asphalt rubber binder producer
5. Field blend asphalt rubber binder plant operators
6. Technical representative for rubberized asphalt terminal blend binder producer

37-2.01D(4)(d) Quality Control Testing

37-2.01D(4)(d)(i) General

The independent testing laboratory must conduct quality control testing on asphalt rubber binder ingredients at the following frequencies:

1. For crumb rubber modifier except for grading, one per 250 tons. Samples of scrap tire crumb rubber and high natural crumb rubber must be sampled and tested separately. Test each delivery of crumb rubber modifier for grading.
2. For asphalt modifier, one per 25 tons of asphalt modifier.

Scrap tire crumb rubber and high natural crumb rubber must be delivered to the asphalt rubber production site in separate bags.

37-2.01D(4)(d)(ii) Field Blend Asphalt Rubber Binder

For field blend asphalt rubber binder with WMA additives, test asphalt rubber binder before the addition of the WMA additive and with the WMA additive. The quality control test results for asphalt rubber binder with WMA additive are report only.

The independent testing laboratory must take viscosity readings of asphalt rubber binder under ASTM D7741 during asphalt rubber binder production. Begin taking viscosity readings of samples taken from the reaction vessel at least 45 minutes after adding crumb rubber modifier and continue taking viscosity readings every 15 minutes until two consecutive descending viscosity readings have been obtained. After meeting the two descending viscosity readings requirement, continue to take viscosity readings hourly and before use. Log the test results, including time of testing and temperature of the asphalt rubber binder.

For field blend asphalt rubber binder, the independent testing laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

Field Blend Asphalt Rubber Binder

Quality characteristic	Test method	Minimum sampling and testing frequency	Requirement	Sampling location	Maximum reporting time allowance
Original binder					
Flash point, min, °C	AASHTO T 48	1 per 100 tons	Report Only	Spray bar sampling port ^a	3 business days
Solubility, min, %	AASHTO T 44 or ASTM D 5546		Report Only		
Viscosity at 135°C, max, Pa·s	AASHTO T 316		Report Only		
Dynamic shear, test temperature at 10 rad/s, °C min. G*/sin(delta), kPa	AASHTO T 315		Report Only Report Only		
RTFO test ^c , mass loss, max, %	AASHTO T 240 or ASTM D 2872		Report Only		
Cone penetration at 25 °C, 1/10 mm min max	ASTM D 217		25 60		
Resilience at 25 °C, percent rebound min max	ASTM D 5329		18 50		
Softening point, °C min max	ASTM D 36		55 88		
Viscosity at 375°F, Pa · s (x10-3)	ASTM D 7741		1500 - 2500		

RTFO test aged binder					
Dynamic shear, test temperature at 10 rad/s, °C min, G*/sin(delta), kPa	AASHTO T 315	1 per 100 tons	Report Only Report Only	Spray bar sampling port ^a	3 business days
Dynamic shear, test temperature at 10 rad/s, °C, Phase Angle, %	AASHTO T 315		Report Only Report Only		
Elastic recovery, test temperature, °C min recovery, %	AASHTO T 301		Report Only Report Only		
PAV aging, temperature, °C	AASHTO R 28		Report Only		
RTFO test and PAV aged binder					
Dynamic shear, test temperature at 10 rad/s, °C max G* sin(delta), kPa	AASHTO T 315	1 per 100 tons	Report Only Report Only	Spray bar sampling port ^a	3 business days
Creep stiffness, test temperature, °C max S-value, MPa min M-value	AASHTO T 313		Report Only Report Only Report Only		

^a For field blend asphalt rubber binder with WMA additives, you may sample asphalt rubber binder before the addition of the WMA additive from the reaction vessel.

37-2.01D(4)(d)(iii) Rubberized Asphalt Terminal Blend Binder

Asphalt rubber binder must comply with the Department's *Certification Program for Suppliers of Asphalt*. For program requirements, procedures, and a list of authorized material sources, go to the METS Web site.

For rubberized asphalt terminal blend binder with WMA additives, test asphalt rubber binder before the addition of the WMA additive and with the WMA additive. The quality control test results for asphalt rubber binder with WMA additive are report only.

Before the application of rubberized asphalt terminal blend binder, sample asphalt rubber binder from spray bar sampling port and test for viscosity under ASTM D7741. Take at least 1 viscosity reading for each distributor truck load at the project site. Log the test results, including time of testing and temperature of the asphalt rubber binder.

For rubberized asphalt terminal blend binder, the independent testing laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

Rubberized Asphalt Terminal Blend Binder for Hot Applied Seal Coat Applications

Quality characteristic	Test method	Minimum sampling and testing frequency	Requirement	Sampling location	Maximum reporting time allowance
			Binder grade PG 76-22 R		
Original binder					
Flash point, min, °C	AASHTO T 48	1 per 100 tons	230	Spray bar sampling port ^e	3 business days
Solubility, min, %	AASHTO T 44 or ASTM D 5546		97.5		
Viscosity at 135°C, max, Pa·s	AASHTO T 316		3.0		
Dynamic shear, Test temperature at 10 rad/s, °C min, G*/sin(delta), kPa	AASHTO T 315		76		
			1.00		
RTFO test ^a , mass loss, max, %	AASHTO T 240 or ASTM D 2872		1.00		
Cone penetration at 25 °C, 1/10 mm min max	ASTM D 217		25		
			60		
Resilience at 25 °C, percent rebound min max	ASTM D 5329		18		
			50		
Softening point, °C min max	ASTM D 36	55			
		88			
Viscosity at 375°F, Pa·s (x10-3)	ASTM D 7741	Report Only			

RTFO test aged binder					
Dynamic shear, test temperature at 10 rad/s, °C min $G^*/\sin(\delta)$, kPa	AASHTO T 315	1 per 100 tons	76 2.20	Spray bar sampling port ^e	3 business days
Dynamic shear, test temperature at 10 rad/s, °C max (δ) , %	AASHTO T 315		Note b 80		
Elastic recovery ^c , test temperature, °C min recovery, %	AASHTO T 301		25 65		
PAV ^d Aging, temperature, °C	AASHTO R 28		110		
RTFO test and PAV aged binder					
Dynamic shear, test temperature at 10 rad/s, °C max $G^*\sin(\delta)$, kPa	AASHTO T 315	1 per 100 tons	31 5000	Spray bar sampling port ^e	3 business days
Creep stiffness, test temperature, °C max S-value, MPa min M-value, MPa	AASHTO T 313		-12 300 0.300		

^a"RTFO" means the asphaltic residue obtained using the Rolling Thin Film Oven Test. The residue from mass change determination may be used for other tests.

^bTest temperature is the temperature at which $G^*/\sin(\delta)$ is 2.2 kPa. A graph of $\log G^*/\sin(\delta)$ plotted against temperature may be used to determine the test temperature when $G^*/\sin(\delta)$ is 2.2 kPa. A graph of (δ) versus temperature may be used to determine δ at the temperature when $G^*/\sin(\delta)$ is 2.2 kPa. The Engineer also accepts direct measurement of (δ) at the temperature when $G^*/\sin(\delta)$ is 2.2 kPa.

^cTests without a force ductility clamp may be performed.

^d"PAV" means Pressure Aging Vessel

^e For rubberized asphalt terminal blend binder with WMA additives, sample asphalt rubber binder before the addition of the WMA additive at sampling location you choose and the engineer authorizes.

37-2.01D(4)(d)(iv) Precoated Screenings

For precoated screenings, the independent testing laboratory must perform sampling and testing at the specified frequency and location for the following quality characteristics. All tests, except the film stripping, must be performed on uncoated screenings.

Minimum Quality Control

Quality characteristic	Test method	Minimum sampling and testing frequency	Requirement	Location of sampling	Maximum reporting time allowance
Los Angeles Rattler Loss, %, max Loss at 100 revolutions Loss at 500 revolutions	California Test 211	1st day of production	10 40	See California Test 125	48 hours
Gradation, percentage passing	California Test 202	2 per day	Asphalt Rubber Seal Coat Screenings Gradation table under Materials	See California Test 125	24 hours
Film stripping, %, max	California Test 302	1st day of production	25	See California Test 125	48 hours
Cleanness value, min	California Test 227	2 per day	80	See California Test 125	24 hours
Durability, min	California Test 229	1st day of production	52	See California Test 125	48 hours

37-2.01D(4)(d)(v) Asphalt Rubber Seal Coat

For asphalt rubber seal coat, the independent testing laboratory must perform sampling and testing at the specified frequency and location for the following quality characteristics:

Minimum Quality Control

Quality characteristic	Test method	Minimum sampling and testing frequency	Requirement	Location of sampling	Maximum reporting time allowance
Asphalt binder spread rate, gal/sq yd	California Test 339	2 per day	Target value ± 0.05 gal/sq yd	Pavement surface	24 hours
Chip retention, %	Vialit test method for aggregate in chip seals, French chip (modified)	1 per day	95	Pavement surface after chip application and rolling	48 hours

For field testing asphalt rubber seal coat chip retention the Vialit Test Method for Aggregate in Chip seals, French Chip is modified as follows:

1. Use a 20 cm x 20 cm galvanized plate 2.0 mm thick and determine the tare weight of the galvanized plate.
2. Place the plate on the existing pavement surface before placing chip seal. After finish rolling the asphalt rubber seal coat and initial surface sweeping, remove the specimen. Place the specimen in a plastic bag.
3. Cure the specimen, except cure at 100 degree F for the first 2 hours.
4. Condition the specimen.
5. Weigh the test specimen and any loose chips in the sample bag.
6. Perform the Vialit test and reweight the test specimen.
7. Calculate the binder weight as follows:

Binder weight = BAR (gallons/sq yd) X 0.0478 (sq yd) X SG_{ARB} (lbs per gallon)

Where:

BAR = binder application rate in gallons per square yard

Plate dimension = 20 cm X 20 cm = 0.0478 sq yd

SG_{ARB} = specific gravity of asphalt rubber binder determined under ASSHTO T 228

8. Calculate the chip retention by weight as follows:

Percent retention = $[SW_{\text{initial}} - (BW + TW)] / [SW_{\text{final}} - (BW + TW)]$

Where:

SW_{initial} = initial specimen weight

SW_{final} = final specimen weight

BW = binder weight

TW = tare weight

Add section 37-2.01D(5):

37-2.01D(5) Acceptance Criteria

Asphalt rubber seal coat acceptance is based on:

1. Visual inspection for the following:
 - 1.1. Uniform surface texture throughout the work limits.
 - 1.2. Raveling consists of the separation of the aggregate from the binder.
 - 1.3. Flushing consists of the occurrence of a film of bituminous material on the surface of the asphalt-rubber seal coat.
 - 1.4. Streaking consists of alternating longitudinal bands of binder without uniform aggregate retention, approximately parallel with the lane line.
2. For field blend asphalt rubber binder, acceptance is based on the Department's sampling and testing for compliance with the requirements for the quality characteristics shown in section 37-2.02G with the following table titles:
 - 2.1. Field Blend Asphalt Rubber Binder for Hot Applied Seal Coat Applications, except asphalt rubber binder with WMA additives acceptance is based on asphalt rubber binder sampled before the addition of WMA additive
 - 2.2. Asphalt Modifier for Asphalt Rubber Binder
 - 2.3. Crumb Rubber Modifier
 - 2.4. Scrap Tire Crumb Rubber Gradation
 - 2.5. High Natural Crumb Rubber Gradation
3. For rubberized asphalt terminal blend binder, acceptance is based on the Department's sampling and testing for compliance with the requirements for the quality characteristics shown in table titled "Rubberized Asphalt Terminal Blend Binder for Hot Applied Seal Coat Applications" in section 37-2.02G, except asphalt rubber binder with WMA additives acceptance is based on asphalt rubber binder sampled before the addition of WMA additive.
4. Compliance with the table titled "Asphalt Rubber Seal Coat Acceptance Criteria Testing Precoated Screenings."

**Asphalt Rubber Seal Coat Acceptance Criteria Testing
Precoated Screenings**

Quality Characteristic	Test Method	Requirements
Los Angeles Rattler Loss, %, max Loss at 100 revolutions Loss at 500 revolutions	California Test 211	10 40
Gradation	California Test 202	Asphalt Rubber Seal Coat Screenings Gradation table under Materials
Film stripping, %, max	California Test 302	25
Cleanness value, min	California Test 227	80
Durability, min	California Test 229	52

Replace section 37-2.02G with:

37-2.02G Asphalt Rubber Binder

37-2.02G(1) General

Asphalt rubber binder includes field blend asphalt rubber binder and rubberized asphalt terminal blend binder.

37-2.02G(2) Field Blend Asphalt Rubber Binder

37-2.02G(2)(a) General

The blending equipment must allow the determination of weight percentages of each asphalt rubber binder ingredient.

Field blend asphalt rubber binder must be 79 ± 1 percent by weight asphalt binder and 21 ± 1 percent by weight crumb rubber modifier. The minimum percentage of crumb rubber modifier must be 20.0 percent and lower values must not be rounded up.

37-2.02G(2)(b) Field Blend Asphalt Rubber Binder (Type II)

Field blend asphalt rubber binder (Type II) must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. Crumb rubber modifier

Crumb rubber modifier must be 76 ± 2 percent by weight scrap tire crumb rubber and 24 ± 2 percent by weight high natural crumb rubber.

37-2.02G(2)(c) Field Blend Asphalt Rubber Binder Production

Asphalt modifier and asphalt binder must be blended at the production site. Asphalt modifier must be from 2.5 to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder. The asphalt rubber binder producer determines the exact percentage.

When blended, the asphalt binder must be from 375 to 440 degrees F when asphalt modifier is added and the mixture must circulate for at least 20 minutes.

The asphalt binder or blend of asphalt binder and asphalt modifier must be combined with crumb rubber modifier at the asphalt rubber binder production site. The asphalt binder or asphalt binder and asphalt modifier blend must be from 375 to 440 degrees F when crumb rubber modifier is added. Asphalt binder, asphalt modifier, and crumb rubber modifier may be proportioned and combined simultaneously. Combined ingredients must be allowed to react at least 45 minutes at temperatures from 375 to 425 degrees F except the temperature must be at least 10 degrees F below the flash point of the asphalt rubber binder.

After reacting, the asphalt rubber binder must have the values for the quality characteristics shown in the following table:

Field Blend Asphalt Rubber Binder for Hot Applied Seal Coat Applications		
Quality characteristic	Test method	Requirement
		Field Blend Asphalt Rubber
Original binder		
Flash point, min, °C	AASHTO T 48	Report Only
Solubility, min, %	AASHTO T 44 or ASTM D 5546	Report Only
Viscosity at 135°C, max, Pa·s	AASHTO T 316	Report Only
Dynamic shear ^a , test temperature at 10 rad/s, °C min. G*/sin(delta), kPa	AASHTO T 315	Report Only ^b
RTFO test ^c , mass loss, max, %	AASHTO T 240 or ASTM D 2872	Report Only
Cone penetration at 25 °C, 1/10 mm min max	ASTM D 217	25 60
Resilience at 25 °C, percent rebound min max	ASTM D 5329	18 50
Softening point, °C min max	ASTM D 36	55 88
Viscosity at 375 °F, centipoises	ASTM D 7741	1500 - 2500
RTFO test aged binder		
Dynamic shear, test temperature at 10 rad/s, °C min, G*/sin(delta), kPa	AASHTO T 315	Report Only ^b Report Only
Dynamic shear, test temperature at 10 rad/s, °C, Phase Angle,%	AASHTO T 315	Report Only ^d Report Only
Elastic recovery, test temperature, °C min recovery, %	AASHTO T 301	Report Only Report Only
PAV ^e aging, temperature, °C	AASHTO R 28	Report Only
RTFO test and PAV aged binder		
Dynamic shear, test temperature at 10 rad/s, °C max G*/sin(delta), kPa	AASHTO T 315	Report Only ^f Report Only
Creep stiffness, test temperature, °C max S-value, MPa min M-value	AASHTO T 313	Report Only ^g Report Only Report Only

^aTest original binder and RTFO aged binder on the DSR using 25mm plates and a 3mm gap. Test the PAV aged binder using 8mm plates and a 3mm gap. All samples are trimmed at 3.15mm. Ensure that the DSR software allows for the 3mm gap in its calculations.

^bAASHTO R29 can be used as a guideline for Grade Determination. Report G*/sin(delta) for the initial fail temperature and the passing temperature one grade below the initial fail temperature.

^c"RTFO" means the asphaltic residue obtained using the rolling thin film oven test. The residue from mass change determination may be used for other tests.

^dReport the phase angle measured at both the pass and fail temperature of the RTFO aged binder.

^e"PAV" means pressure aging vessel.

¹AASHTO R29 can be used as a guideline for Grade Determination. Report $G^* \sin(\delta)$ for the initial fail temperature and the passing temperature one grade below the initial fail temperature.

⁹AASHTO R29 can be used as a guideline for Grade Determination. Report stiffness S and m -value for the initial fail temperature and the passing temperature one grade below the initial fail temperature.

Maintain asphalt rubber binder at a temperature from 375 to 415 degrees F.

Stop heating unused asphalt rubber binder 4 hours after two descending viscosity readings have been obtained. Reheating asphalt rubber binder that cools below 375 degrees F is considered a reheat cycle. Do not exceed 2 reheat cycles. If reheating, asphalt rubber binder must be from 375 to 415 degrees F before use.

During reheating, you may add scrap tire crumb rubber. Scrap tire crumb rubber must not exceed 10 percent by weight of the asphalt rubber binder. Allow added scrap tire crumb rubber to react for at least 45 minutes. Reheated asphalt rubber binder must comply with the specifications for asphalt rubber binder.

37-2.02G(3) Rubberized Asphalt Terminal Blend Binder

Rubberized Asphalt Terminal Blend Binder must be a combination of:

1. Asphalt binder
2. Crumb rubber modifier

Crumb rubber modifier must be scrap tire crumb rubber.

Rubberized asphalt terminal blend binder must be 80 ± 2 percent by weight asphalt binder and 20 ± 2 percent by weight crumb rubber modifier. Rubberized asphalt terminal blend binder must have the values for the quality characteristics shown in the following table:

Quality characteristic	Test method	Requirements
		Binder grade PG 76-22 R ^{a,b}
Original binder		
Flash point, min, °C	AASHTO T 48	230
Solubility, min, %	AASHTO T 44 or ASTM D 5546	97.5
Viscosity at 135°C, max, Pa·s	AASHTO T 316	3.0
Dynamic shear, test temperature at 10 rad/s, °C min. G*/sin(delta), kPa	AASHTO T 315	76 1.00
RTFO test ^c , mass loss, max, %	AASHTO T 240 or ASTM D 2872	1.00
Cone penetration at 25 °C, 1/10 mm min max	ASTM D 217	25 60
Resilience at 25 °C, percent rebound min max	ASTM D 5329	18 50
Softening point, °C min max	ASTM D 36	55 88
RTFO test aged binder		
Dynamic shear, test temperature at 10 rad/s, °C min, G*/sin(delta), kPa	AASHTO T 315	76 2.20
Dynamic shear, test temperature at 10 rad/s, °C max (delta), %	AASHTO T 315	Note d 80
Elastic recovery ^e , test temperature, °C min recovery, %	AASHTO T 301	25 65
PAV ^f aging, temperature, °C	AASHTO R 28	110
RTFO test and PAV aged binder		
Dynamic shear, test temperature at 10 rad/s, °C max G*/sin(delta), kPa	AASHTO T 315	31 5000
Creep stiffness, test temperature, °C max S-value, MPa min M-value	AASHTO T 313	-12 300 0.300

^aDo not modify binder using polyphosphoric acid modification. Report type and dosage if any acid modification other than polyphosphoric acid modification is used.

^bSupplier is required to certify asphalt rubber binder contains 20 ± 2 percent by weight crumb rubber modifier.

^c"RTFO" means the asphaltic residue obtained using the rolling thin film oven test. The residue from mass change determination may be used for other tests.

^dTest temperature is the temperature at which $G^*/\sin(\delta)$ is 2.2 kPa. A graph of $\log G^*/\sin(\delta)$ plotted against temperature may be used to determine the test temperature when $G^*/\sin(\delta)$ is 2.2 kPa. A graph of (δ) versus temperature may be used to determine δ at the temperature when $G^*/\sin(\delta)$ is 2.2 kPa. The Engineer also accepts direct measurement of (δ) at the temperature when $G^*/\sin(\delta)$ is 2.2 kPa.

^eTests without a force ductility clamp may be performed.

^f"PAV" means pressure aging vessel

37-2.02G(4) Asphalt Binder

Asphalt binder for field blend asphalt rubber binder seal coat must be Grade PG 64-16. Do not modify asphalt binder with polymer.

Asphalt binder for rubberized asphalt terminal blend binder seal coat must be Grade PG 76-22 R.

37-2.02G(5) Asphalt Modifier

Asphalt modifier must be a resinous, high flash point, and aromatic hydrocarbon. Asphalt modifier must have the values for the quality characteristics shown in the following table:

Asphalt Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Requirements
Viscosity, m^2/s ($\times 10^{-6}$) at 100 °C	ASTM D 445	$X \pm 3^a$
Flash point, C.L.O.C., °C	ASTM D 92	207 min
Molecular analysis		
Asphaltenes, percent by mass	ASTM D 2007	0.1 max
Aromatics, percent by mass	ASTM D 2007	55 min

^a "X" denotes the proposed asphalt modifier viscosity from 19 to 36. A change in "X" requires a new asphalt rubber binder submittal.

Asphalt modifier must be sampled and tested for compliance with the specifications by the manufacturer.

37-2.02G(6) Crumb Rubber Modifier

Crumb rubber modifier must be ground or granulated at ambient temperature.

Scrap tire crumb rubber and high natural crumb rubber must be delivered to the asphalt rubber binder production site in separate bags.

Steel and fiber must be separated. If steel and fiber are cryogenically separated, the separation must occur before grinding and granulating. Cryogenically-produced crumb rubber modifier particles must be large enough to be ground or granulated.

Crumb rubber modifier must be free of contaminants except wire and fabric. Determine the percent weight of wire and fabric under Laboratory Procedure LP-10. Contaminants percentage by weight of crumb rubber modifier must not exceed:

1. 0.01 percent wire
2. 0.05 percent fabric

The length of an individual crumb rubber modifier particle must not exceed 3/16 inch.

Crumb rubber modifier must be dry, free-flowing particles that do not stick together. A maximum of 3 percent calcium carbonate or talc by weight of crumb rubber modifier may be added. Crumb rubber modifier must not cause foaming when combined with the asphalt binder and asphalt modifier.

Specific gravity of crumb rubber modifier must be from 1.1 to 1.2 determined under California Test 208.

Crumb rubber modifier must comply with the requirements for quality characteristics shown in the following table:

Crumb Rubber Modifier					
Quality characteristic	Test method	Requirements			
		Scrap tire crumb rubber		High natural crumb rubber	
		Min	Max	Min	Max
Acetone extract, %	ASTM D 297	6.0	16.0	4.0	16.0
Rubber hydrocarbon, %		42.0	65.0	50.0	--
Natural rubber content, %		22.0	39.0	40.0	48.0
Carbon black content, %		28.0	38.0	--	--
Ash content, %		--	8.0	--	--

Scrap tire crumb rubber must have the gradation requirements shown in the following table:

Scrap Tire Crumb Rubber Gradation			
Percentage passing			
Sieve size	Gradation requirement	Operating range	Contract compliance
No. 8	100	100	100
No. 10	98-100	95-100	90-100
No. 16	45-75	35-85	32-88
No. 30	2-20	2-25	1-30
No. 50	0-6	0-10	0-15
No. 100	0-2	0-5	0-10
No. 200	0	0-2	0-5

NOTE: Determine gradation under Laboratory Procedure LP-10.

High natural crumb rubber must comply with the gradation requirements shown in the following table:

High Natural Crumb Rubber Gradation			
Percentage passing			
Sieve size	Gradation requirement	Operating range	Contract compliance
No. 10	100	100	100
No. 16	95-100	92-100	85-100
No. 30	35-85	25-95	20-98
No. 50	10-30	6-35	2-40
No. 100	0-4	0-7	0-10
No. 200	0-1	0-3	0-5

NOTE: Determine gradation under Laboratory Procedure LP-10.

The scrap tire crumb rubber and high natural crumb rubber gradations requirements do not apply to rubberized asphalt terminal blend binder.

Each asphalt rubber binder ingredient must be sampled and tested for compliance with the specifications by the manufacturer.

37-2.02G(7) Warm Mix Asphalt Additive Technology

WMA additive technology must be on the Department’s-approved WMA technologies list. Approved WMA additive technologies are for Hot Mix Asphalt and you must choose WMA additive technology appropriate for use in asphalt rubber binder for asphalt rubber seal coat.

Percent WMA additive by weight of asphalt rubber binder used in asphalt rubber binder must be as recommended by the manufacturer.

37-2.02G(8) Asphalt Rubber Seal Coat

The independent testing laboratory must conduct testing using the proposed asphalt rubber binders, including asphalt rubber binder with and without WMA, and aggregate for compliance with the design requirements shown in the following table:

Quality characteristic	Test method	Requirement
Chip retention, %	Vialit test method for aggregate in chip seals, French chip (Modified) ^a	95

^a Cure the specimen, except cure at 100 degree F for the first 2 hours.

For the Vialit test, the asphalt rubber binders must be placed within the proposed asphalt rubber binder placement temperature range.

Replace section 37-2.02H(4) with:

37-2.02H(4) Asphalt Rubber Seal Coat

Before precoating with asphalt binder and when tested under California Test 202, screenings for asphalt rubber seal coat must have the gradation shown in the following table:

Asphalt Rubber Seal Coat Screenings Gradation

Sieve sizes	Percentage passing		
	Coarse 1/2" max	Medium 1/2" max	Fine 3/8" max
3/4"	100	100	100
1/2"	75–90	85–90	95–100
3/8"	0–20	0–30	70–85
No. 4	0–2	0–5	0–15
No. 8	--	--	0–5
No. 200	0–1	0–1	0–1

Screenings must have the values for the quality characteristics shown in the following table:

Seal Coat Screenings		
Quality Characteristic	Test method	Requirement
Los Angeles Rattler Loss, %, max	California Test 211	
Loss at 100 revolutions		10
Loss at 500 revolutions		40
Film stripping, %, max	California Test 302	25
Cleanness value, min	California Test 227	80
Durability, min	California Test 229	52

Screenings for asphalt rubber seal coat must comply with the 3/8-inch grading.

Add to section 37-2.03A:

Remove pavement markers before applying seal coat.

Add item 1.5 to the list in section 37-2.03B(1):

- 1.5. Tarpaulins to cover precoated screenings when haul distance exceeds 30 minutes or ambient temperature is less than 65 degrees F.

Replace section 37-2.03B(2) with:

37-2.03B(2) Asphalt Rubber Seal Coat

37-2.03B(2)(a) General

Field blend asphalt rubber binder production plants must comply with the Materials Plant Quality Program (MPQP) starting July 1, 2013.

Rubberized asphalt terminal blend binder manufacturing facility for PG 76-22R must comply with the MPQP.

37-2.03B(2)(b) Field Blend Asphalt Rubber Binder without Warm Mix Asphalt Additive Technology

Equipment for field blend asphalt rubber binder without WMA additive technology must include and comply with the following:

1. Tank to heat and maintain the temperature of blended asphalt binder and asphalt modifier before adding crumb rubber modifier. The tank must have a thermostatic heat control device and a temperature reading device accurate to within 5 degrees F. The heat control device must be the recording type.
2. Mechanical mixer for complete, homogeneous blending of asphalt binder, asphalt modifier, and crumb rubber modifier. Asphalt binder and asphalt modifier must be introduced into the mixer through meters. The blending system must vary the rate of delivery for asphalt binder and asphalt modifier proportionate to crumb rubber modifier delivery. The mixer must not allow the temperature of asphalt binder and asphalt modifier to vary more than 25 degrees F. Each ingredient feed must be equipped with a rate-of-feed indicator for determining the amount delivered during production. The meters used to proportion each liquid ingredient must be equipped with rate-of-flow indicators with resettable totalizers so that the total amount can be determined. Feed liquid and dry ingredients directly into the mixer at a uniform and controlled rate. Reduce the quantity of ingredients in the mixer if dead areas occur. The reaction vessel must have a safe sampling device that delivers completed asphalt rubber binder in the quantity needed for testing.
3. Storage tank for asphalt rubber binder. The storage tank must have a heating system to maintain the temperature and an internal mixing device to prevent separation.

4. Under supports for scale bearing points for scale structures where the total load, the live load plus dead load is less than 17 tons, must be constructed as follows:
 - 4.1. Use 4 legs. Total load on any leg may not exceed 14.5 psi.
 - 4.2. Use structural grade steel with a minimum cross sectional dimension of 20 inches and a minimum thickness of 1.5 inches.
 - 4.3. Construct under supports in a way that they do not move or deflect during production operations.
 - 4.4. Install mechanical indicating elements level, plumb, and rigidly mounted on the under supports.
 - 4.5. Prevent saturation of the ground under the scale with adequate drainage and provide support of 14.5 psi at each support.
 - 4.6. Scale structure may be installed using concrete under supports and comply with Section 9.

37-2.03B(2)(c) Field Blend Asphalt Rubber Binder with Warm Mix Asphalt Additive Technology

Equipment for field blend asphalt rubber binder with WMA additive technology must be produced at a stand-alone plant unit.

Perform all asphalt rubber binder proportioning at the asphalt rubber binder production site.

Asphalt rubber binder proportioning must either be accomplished by proportioning all ingredients simultaneously or must be proportioned using the 3-stage process as follows:

1. Stage 1 must proportion asphalt modifier with paving grade asphalt.
2. Stage 2 must proportion scrap tire crumb rubber and high natural rubber.
3. Stage 3 must proportion the preblended liquids, combine with the proportioned ground rubbers, and mix further for the specified time and temperatures.

When the asphalt and asphalt modifier are preblended, provide an asphalt heating tank equipped to maintain the blended ingredients at the necessary temperature before blending with the dry ingredients.

The method and equipment for combining the liquid and dry ingredients must be such that the Engineer can readily determine compliance with proportioning requirements for each material and the completed asphalt rubber binder. All required equipment must be authorized before use.

The plant process controller must assure that combined liquids and combined dry ingredients have been proportioned to within their own ratio limits before proportioning the final liquid and dry mixtures for asphalt rubber binder.

The plant process controller must assign a lot number to each volume of asphalt rubber binder moved from the initial mixing chamber to reaction storage. The product volume represented by each lot must be the amount set aside for the reaction period. Leftovers and portions of lots may be combined and assigned a new nonrepeating lot number. Reassigned lots must include all electronic data captured for the previous original lots used to generate the new lot.

Feed the liquid and dry ingredients directly into the mixer at a uniform rate. Asphalt rubber binder must be mechanically mixed to provide for the complete blending of liquid and dry ingredients in a controlled fashion.

Produce asphalt rubber binder by either a batch or continuous method. Regardless of production method, proportion all ingredients by weight. Proportion liquid ingredients with a meter that complies with Chapter 2, Section IC, "Liquid Ingredient Measurement," of the MPQP.

37-2.03B(2)(c)(i) Asphalt Rubber Binder Additives

Asphalt rubber binder additives include those used for anti-strip and warm mix properties and may be either in a liquid or dry state. Dry additive ingredients must be measured by weight. Liquid additives must be measured with a mass-flow meter. Additives must be added at least 30 minutes before end use to facilitate mixing.

The asphalt rubber binder plant must have a sampling device in the feed line connecting the additive storage to the additive metering system. The additive sampling equipment must meet the requirements of California Test 125 and section 92-1.01D(3).

37-2.03B(2)(c)(i)(a) Batch Method Proportioning

Use a plant process controller complying with Chapter 2, Section IIF, "Batch Mixing HMA Plants," of the MPQP. The plant process controller must proportion all ingredients used in the production of the asphalt rubber binder.

The hopper scale system must include interlocks which prevent filling the hopper while drawing ingredients from the same hopper.

The zero tolerance for dry ingredient scales must be 0.5 percent of the total draft being weighed.

The indicated weight of material drawn from storage must not vary from the preselected target weight setting by more than 1.0 percent of the total draft target.

37-2.03B(2)(c)(i)(b) Continuous Method Proportioning

Proportion dry ingredients with a conveyor scale or a loss-weight meter. Continuous proportioning must be fully automatic. This automatic system must proportion total asphalt binder to total rubber to within 0.5 percent of the target rate.

37-2.03B(2)(c)(ii) Asphalt Rubber Binder Transportation

During transportation between the asphalt rubber binder production location and the end-use facility or project site, the mixture must comply with all requirements for agitation, temperature control, and data log.

37-2.03B(2)(c)(iii) Asphalt Rubber Binder Storage

During the proportioning and blending of the liquid ingredients, maintain the temperature of asphalt and the asphalt modifier to within 25 degrees F of the specified temperature. Asphalt rubber binder mixing and temperature control must be continuous from initial ingredient blending until the product end use.

When asphalt rubber binder is produced at a site remote from the end-use plant site, the receiving tank at the end-use site must comply with all agitation, heating, temperature, and data-reporting requirements.

Provide a safe sampling device capable of delivering a representative sample of the completed asphalt rubber binder. The device must meet the requirements of California Test 125 and section 92-1.01D(3).

37-2.03B(2)(c)(iv) Ingredient and Asphalt Rubber Binder Temperatures

During production, use automatic and continuous temperature sensing and recording equipment to control and document asphalt rubber binder and liquid asphalt rubber binder ingredient temperatures accurately. Continuous recording occurs when production temperature data are collected electronically at intervals of 1 minute or less. Temperature-sensing devices must be accurate to within 5 degrees F.

Place temperature-sensing points at each liquid feed line where the blend is reacted and at each storage tank for completed asphalt rubber binder.

Install and maintain temperature indicators at the point where the asphalt rubber binder proportioning operation is controlled.

37-2.03B(2)(c)(v) Asphalt Rubber Binder Production Data Log

Subsequent to the lot number designation, correlate all captured data to the lot number. The plant process controller used for asphalt rubber binder production must produce a log of production data consisting of a series of snapshots captured at a maximum of 1-minute intervals throughout the period of daily production. Each snapshot of production data must be a register of production activity at the time and not a summation of the data over the preceding interval to the previous snapshot. The amount of material represented by each snapshot is the amount produced during the 0.5-minute interval before and the 0.5-minute interval after the capture time.

Asphalt rubber binder temperature need not be captured during periods where the product temperature is below 370 degrees F.

When asphalt rubber binder proportioning is used, the following data must be captured:

1. Date of production.
2. Production location.
3. Time of day the data is captured.
4. Assigned, non-repeating lot number.
5. Certification of compliance numbers for dry and liquid ingredients currently used in the production process. Input liquid ingredients certificate numbers to the nearest 25-ton increment.
6. Viscosity test results including sampling time.
7. Asphalt rubber binder temperature at each required sensing point.
8. Ratio A—The high natural rubber to scrap tire crumb rubber ratio calculated from metered ingredient output.
9. Ratio B—The asphalt modifier to asphalt ratio calculated from metered ingredient output.
10. Ratio C—The total dry ingredient to total liquid ingredient ratio calculated from metered ingredient output.
11. Total reacting time and the reaction ending time.
12. Asphalt rubber binder additive type and asphalt rubber binder to additive target ratio.
13. Asphalt rubber binder to additive ratio calculated from individual metered output.

When a batch type proportioning system is used, capture the following data:

1. Batch weight for each dry ingredient as determined by its scale system.
2. Batch weight for each liquid ingredient as determined by its meter.

When a continuous type proportioning system is used, capture the rate of flow for each dry and liquid ingredient determined by its metering system.

37-2.03B(2)(c)(vi) Asphalt Rubber Binder Production Data Reports

Make as-collected raw data available to the Engineer during production.

Submit the production report generated from data collected at remote end-use sites to the Engineer within 7 days of production date. A remote end-use site is one at a distance greater than 5 miles from the asphalt rubber binder production location.

Submit the report generated from production data for non-remote production sites to the Engineer daily.

37-2.03B(2)(c)(vii) Electronic Media

Present the electronic media in a comma-separated values (CSV) format. Captured data for the ingredients represented by production snapshots must have allowances for sufficient fields to satisfy the amount of data required and include data titles at least once per report. The Engineer must approve report formats.

Collect and hold data for the duration of the contract. All collected data must be submitted as electronic media. No handwritten reports or data will be accepted.

37-2.03B(2)(d) Rubberized Asphalt Terminal Blend Binder

When WMA additives are added to the asphalt rubber binder in the field the additives may be either in a liquid or dry state. Dry additive ingredients must be measured by weight. Liquid additives must be measured with a mass-flow meter. Additives must be added at least 30 minutes before end use to facilitate mixing or as recommended by the WMA additive manufacturer. If WMA additives are added at refinery, the proportioning must comply with the MPQP requirement.

The feed line connecting the WMA additive storage to the additive metering system must have a sampling device. The additive sampling equipment must meet the requirements of California Test 125 and section 92-1.01D(3).

Asphalt rubber binder must be mechanically mixed to provide for the complete blending of liquid or dry ingredients in a controlled fashion.

The tank used for mixing asphalt rubber binder and WMA additive must have a sampling device. The sampling equipment must meet the requirements of California Test 125 and section 92-1.01D(3).

37-2.03B(2)(e) Distributor Trucks for Placing Asphalt Rubber Binder

Distributor truck for spreading asphalt rubber binder must have the following features:

1. Be self-propelled
2. Heating unit
3. Internal mixing unit, except for rubberized asphalt terminal blend binder
4. Pumps that spray asphalt rubber binder within 0.03 gal/sq yd of the specified rate
5. Fully circulating spray bar that applies asphalt rubber binder uniformly
6. Tachometer
7. Pressure gages
8. Volume measuring devices
9. Thermometer
10. Observation platform on the rear of the truck for an observer on the platform to see the nozzles and unplug them if needed, except for rubberized asphalt terminal blend binder

Replace section 37-2.03E with:

37-2.03E Precoating Screenings

For asphalt rubber seal coat, screenings must be preheated from 260 to 325 degrees F. Coat with any of the asphalts specified in the table titled "Performance Graded Asphalt Binder" in section 92. Coat at a central mixing plant. The asphalt must be from 0.5 to 1.0 percent by weight of dry screenings.

Plant must be authorized under the Department's MPQP.

Do not stockpile preheated or precoated screenings.

Replace section 37-2.03F with:

37-2.03F Applying Asphalt Rubber Binder

37-2.03F(1) General

For areas not accessible to a truck's distributor bar, apply the asphalt rubber binder with a squeegee, rake, or other authorized means.

Prevent spray on existing pavement not intended for seal coat or on previously applied seal coat. Use a material such as building paper and remove the material after use. At longitudinal joints, you may overlap the asphalt rubber binder applications before application of screenings if the overlap is dispersed with squeegees or rakes.

Align longitudinal joints between seal coat applications with designated traffic lanes. Overlap longitudinal joints by not more than 4 inches. If the Engineer authorizes your request, the overlap may be up to 8 inches.

Do not apply the asphalt rubber binder unless there are sufficient precoated screenings at the job site to cover the asphalt rubber binder.

Discontinue the application of asphalt rubber binder early enough to comply with lane closure specifications and darkness. Apply to 1 lane at a time and cover the lane entirely in 1 operation.

37-2.03F(2) Asphalt Rubber Binder

For field blend asphalt rubber binder without WMA additive technology, at the time of application, the temperature of asphalt rubber binder must be from 385 to 415 degrees F. For field blend asphalt rubber binder with WMA additive technology, at the time of application, the temperature of asphalt rubber binder must be from 330 to 375 degrees F.

For rubberized asphalt terminal blend binder with and without WMA additive technology, at the time of application, the temperature of asphalt rubber binder must be from 330 to 375 degrees F.

For field blend asphalt rubber binder, determine the asphalt rubber binder application rate from 0.55 to 0.65 gal/sq yd. For rubberized asphalt terminal blend binder, determine the asphalt rubber binder application rate from 0.40 to 0.65 gal/sq yd. If you use a variable application rate apparatus the asphalt rubber binder application rate in the wheel paths may be reduced by 0.05 gal/sq yd.

Apply asphalt rubber binder when the atmospheric temperature is from 60 to 105 degrees F and the pavement surface temperature is at least 55 degrees F.

Do not apply asphalt rubber binder unless there are sufficient precoated screenings available to cover the asphalt rubber binder within 2 minutes. Asphalt rubber binder applied at intersections, turn lanes, gore points, and irregular areas must be covered with precoated screenings within 15 minutes.

Do not apply asphalt rubber binder when weather or road conditions are unsuitable, including high wind or when the pavement is damp. In windy conditions you may adjust the distributor bar height and distribution speed, and use shielding equipment, if authorized.

Replace the 1st paragraph of section 37-2.03G(1) with:

Prevent vehicles from driving on asphalt rubber binder before spreading precoated screenings.

Replace section 37-2.03G(4) with:

37-2.03G(4) Asphalt Rubber Seal Coat

During transit, cover precoated screenings for asphalt rubber seal coat with tarpaulins if the ambient air temperature is below 65 degrees F or the haul time exceeds 30 minutes.

At the time of application, precoated screenings for asphalt rubber seal coat must be from 225 to 325 degrees F.

Spread precoated screenings at a rate from 25 to 40 lb/sq yd. Spread to within 10 percent of the determined rate.

Replace section 37-2.03H(2) with:

37-2.03H(2) Asphalt Rubber Seal Coat

Perform initial rolling within 90 seconds of spreading precoated screenings. Do not spread precoated screenings more than 200 feet ahead of the initial rolling.

For final rolling, you may request use of a steel-wheeled roller weighing from 8 to 10 tons, static mode only.

Perform a final sweeping before Contract acceptance. The final sweeping must not dislodge screenings.

Remove collected seal coat screenings from paved shoulders, drain inlets, other drainage areas, curbs, dikes and sidewalks. You may stockpile collected material at the jobsite. Remove and dispose of collected material.

Add to section 37-2.04:

Screenings for asphalt rubber seal coat are measured by coated weight after they are preheated and precoated with asphalt binder.

Screenings for asphalt rubber seal coat is paid for as screenings (hot-applied).

Asphalt-rubber binder is measured under the specifications for asphalts.

Deductions for crumb rubber gradations are taken based on:

1. Each gradation test for scrap tire crumb rubber represents 10,000 lbs or the amount used in that day's production, whichever is less.
2. Each gradation test for high natural crumb rubber represents 3,400 lbs or the amount used in that day's production, whichever is less.

For each gradation test, the following pay deductions will be taken for noncompliant material:

Gradation Test		
Material	Test result^a	Deduction
Scrap tire crumb rubber	Operating range < TR < Contract compliance	\$250
Scrap tire crumb rubber	TR > Contract compliance	\$1,100
High natural crumb rubber	Operating range < TR < Contract compliance	\$250
High natural crumb rubber	TR > Contract compliance	\$600

^aTest Result = TR

BID ITEM LIST
02-4E9704

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
1	070030	LEAD COMPLIANCE PLAN	LS	LUMP SUM	LUMP SUM	
2	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM	LUMP SUM	
3	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM	LUMP SUM	
4	130100	JOB SITE MANAGEMENT	LS	LUMP SUM	LUMP SUM	
5	130200	PREPARE WATER POLLUTION CONTROL PROGRAM	LS	LUMP SUM	LUMP SUM	
6	150715	REMOVE THERMOPLASTIC PAVEMENT MARKING	SQFT	360		
7	370001	SAND COVER (SEAL)	TON	490		
8	370120	ASPHALT-RUBBER BINDER	TON	410		
9	025188	ASPHALT-RUBBER BINDER, WMA ADDITIVE	TON	50		
10	025189	ASPHALT-RUBBER BINDER, TERMINAL BLEND	TON	45		
11	025190	ASPHALT-RUBBER BINDER, TERMINAL BLEND, WMA ADDITIVE	TON	44		
12	374004	ASPHALTIC EMULSION (FLUSH COAT)	TON	61		
13	375030	SCREENINGS (HOT-APPLIED)	TON	3,610		
14	840515	THERMOPLASTIC PAVEMENT MARKING	SQFT	810		
15	840560	THERMOPLASTIC TRAFFIC STRIPE (SPRAYABLE)	LF	130,000		
16	025191	THERMOPLASTIC TRAFFIC STRIPE (SPRAYABLE 2-COAT)	LF	63,100		

TOTAL BID:

\$
