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**** WARNING ** WARNING ** WARNING ** WARNING ****
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November 13, 2006

07-LA-1-46.2/47.7
07-1661A4

Addendum No. 3

Dear Contractor:

This addendum is being issued to the contract for construction on State highway in LOS ANGELES COUNTY IN LOS ANGELES FROM LA TIJERA BOULEVARD TO 0.9 KM SOUTH OF LMU DRIVE.

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 November 16, 2006.

This addendum is being issued to revise the Notice to Contractors and Special Provisions and the Proposal and Contract.

In the Special Provisions, Section 10-1.29, "ASPHALT CONCRETE," is revised as attached.

In the Special Provisions, Section 10-1.30, "LIME TREATED AGGREGATES," is replaced with Section 10-1.30, "LIME TREATMENT OF ASPHALT CONCRETE AGGREGATES LIME-SLURRY METHOD," as attached.

In the Special Provisions, Section 10-1.301, "LIME TREATMENT OF ASPHALT CONCRETE AGGREGATES-DRY LIME METHOD," is added as attached.

In the Special Provisions, Section 10-1.302, "LIQUID ANTI-STRIP TREATMENT OF ASPHALT BINDER," is added as attached.

To Proposal and Contract book holders:

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 CONTRACTORS section of the Notice to Contractors 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 proposal.

Submit bids in the Proposal and Contract 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.

07-LA-1-46.2/47.7
07-1661A4

This office is sending this addendum by confirmed facsimile all book holders to ensure that each receives it. A copy of this addendum is available for the contractor's use on the Internet Site:

http://www.dot.ca.gov/hq/esc/oe/weekly_ads/addendum_page.html

If you are not a Proposal and Contract 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,

ORIGINAL SIGNED BY

REBECCA D. HARNAGEL, Chief
Office of Plans, Specifications & Estimates
Office Engineer

Attachments

10-1.29 ASPHALT CONCRETE

GENERAL

Asphalt concrete shall be Type B and shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

The grade of asphalt binder to be mixed with aggregate for Type B asphalt concrete shall be Grade PG 64-10 conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications.

The asphalt content of the asphalt mixture will be determined in conformance with the requirements in California Test 379, or in conformance with the requirements in California Test 382.

The asphalt concrete mixture, composed of the aggregate proposed for use and the optimum amount of asphalt determined by California Test 367, shall meet a minimum tensile strength ratio (TSR) of 70 based on California Test 371. The Contractor shall treat the asphalt concrete mixture with one of the following treatments if the untreated mix has a TSR of less than 70:

a. Liquid anti-strip (LAS) in conformance with these special provisions.
b. Lime slurry with marination (LSM) in conformance with these special provisions.
c. Dry hydrated lime with no marination (DHL) in conformance with these special provisions.
d. Dry hydrated lime with marination (DHLM) in conformance with these special provisions.

The Contractor shall determine the Plasticity Index of the aggregates. The Contractor shall take the following actions based on the results of CT204:

CT204 Test Result	Action
PI ≤ 4	No Marination Required
4 < PI < 10	Marination Required
PI ≥ 10	Aggregate Mix Not Acceptable

If the PI result is within the range that requires marination the Contractor shall marinate the aggregates per the procedure outlined under LSM or DHLM of these specifications.

At the time of the mix design submittal the contractor shall submit the TSR results of the untreated asphalt concrete and, if needed, the treated mixture. California Test 371 shall be performed by a laboratory certified by the Department to perform the California Test 371. In addition, the contractor shall submit sufficient quantities of aggregate, mineral filler, asphalt binder and anti-strip additive for the Engineer to test the final mix. The Engineer's test results will be for information only and will not be considered for contract compliance.

During the first 454 tonnes of production and at a location as directed by the Engineer, the contractor shall obtain an asphalt concrete sample for testing CT 371. The Contractor shall submit the sample to the Engineer. Tests will be for information only and will not be considered for contract compliance.

RECLAIMED ASPHALT PAVEMENT

The Contractor may produce asphalt concrete using reclaimed asphalt pavement (RAP). Asphalt concrete produced using RAP shall conform to the provisions for asphalt concrete in this section, "Asphalt Concrete," and these special provisions. The Contractor may substitute RAP for a portion of the virgin aggregate in asphalt concrete in an amount not exceeding 15 percent of the asphalt concrete dry aggregate mass.

RAP shall be processed from asphalt concrete removed from pavement surfaces. RAP shall be stored in stockpiles on smooth surfaces free of debris and organic material. RAP stockpiles shall consist only of homogeneous RAP. The Contractor may process and stockpile RAP throughout the project's life. Processing and stockpiling operations shall prevent material contamination and segregation.

The Contractor shall determine the amount of asphalt binder to be mixed with the combined virgin aggregate and RAP in conformance with the requirements in California Test 367 amended by Lab Procedure-9 (LP-9), "Asphalt Concrete Using Up To 15% Reclaimed Asphalt Pavement (RAP)." LP-9 is available at:

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

At least 21 days before starting production of asphalt concrete using RAP, the Contractor shall submit a proposed asphalt concrete mix design in writing to the Engineer. The mix design submittal shall consist of the following:

A. RAP:

1. Processed stockpile locations.
2. LP-9 test results.
3. Correlation factor for aggregate gradations from California Test 382 and LP-9.
4. Three 32-kg samples of processed RAP representing the material to be used. The three samples shall be split from the sample the Contractor uses to determine the mix design. The Contractor shall obtain and split the samples in conformance with the requirements in California Test 125 and LP-9.
5. The substitution rate for virgin aggregate and percent RAP.

B. Virgin aggregate and supplemental fine aggregate blend:

1. Percent passing values for each sieve size.
2. Aggregate quality tests results.
3. Each aggregate source to be used including producer, location, and California Mine Identification number.
4. Percentage of each aggregate stockpile, cold feed, and hot bin to be used.
5. Gradation of each aggregate stockpile, cold feed, and hot bin to be used.

C. Asphalt binder:

1. Source.
2. Material Safety Data Sheets.

D. Antistrip additives**,** if used:

1. Name of product.
2. Name of manufacturer.
3. Manufacturer's designation and proposed rate.
4. Location and method of addition.
5. Material Safety Data Sheets.

E. Asphalt concrete:

1. A completed mix design that reflects the percent of RAP to be used including the electronic worksheet identified in LP-9.
2. In graphical format, stability and air voids versus asphalt binder percentage of asphalt in conformance with the requirements in CTM 367.

Asphalt concrete production using RAP shall not begin until the Engineer approves the mix design. If the Engineer fails to review the mix design in 21 days, and if, in the opinion of the Engineer, work completion is delayed as a result of the failure to review, the Engineer will adjust payment and contract time in conformance with the requirements in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

If proposing a change in the RAP substitution rate, the Contractor shall notify the Engineer. If the substitution rate changes more than 5 percent by dry aggregate mass in the asphalt concrete mixture, the Contractor shall submit a new mix design.

The aggregate gradation for the asphalt concrete produced with RAP shall be calculated based on the mathematical combination of the virgin aggregate gradation during production and the daily RAP gradation. RAP shall be sampled and gradation shall be determined in conformance with the requirements in LP-9. RAP gradations shall be:

A. Determined daily by the Contractor.
B. Used for the mathematical combination of that day's asphalt concrete production.
C. Reported to the Engineer.

The Contractor shall perform quality control testing of the RAP source each day asphalt concrete using RAP is produced.

The Contractor shall perform quality control testing of the aggregates and the asphalt concrete mixture at least once for every 1000 tonnes of asphalt concrete using RAP produced, but not less than 2 tests per day.

Daily, the Contractor shall submit to the Engineer:

A. Results for RAP gradation and the asphalt binder content in RAP determined in conformance with the requirements in LP-9. The Contractor shall sample RAP from the weighhopper or pugmill.
B. Mathematical calculation of the gradation of the virgin aggregate and RAP aggregate blend.
C. Correlation factor for RAP burn-off determined in conformance with the requirements in LP-9.

RAP proportioning shall conform to the provisions for aggregate proportioning specified in Section 39-3.03, "Proportioning," of the Standard Specifications and these special provisions. The Contractor's mixing equipment shall have a device that safely provides a sample representative of the virgin aggregate and RAP incorporated into the asphalt concrete. The Contractor shall sample in conformance with the requirements in California Test 125 and LP-9.

The temperature of asphalt concrete using RAP shall not exceed 165°C.

If batch mixing is used, RAP shall be kept separate from the virgin aggregate until both ingredients enter the weighhopper or pugmill. After introduction to the pugmill and before asphalt binder is added, the mixing time for the virgin aggregate and RAP shall not be less than 5 seconds. After asphalt binder is added, the mixing time shall not be less than 30 seconds.

If continuous mixing is used, the RAP shall be protected from direct contact with the burner flame with a device such as a shield, separator, or second drum.

PAINT BINDER (TACK COAT)

Paint binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer.

Paint binder (tack coat) shall be, at the option of the Contractor, either slow-setting asphaltic emulsion, rapid-setting asphaltic emulsion or paving asphalt. Slow-setting asphaltic emulsion and rapid-setting asphaltic emulsion shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications. When paving asphalt is used for paint binder, the grade will be determined by the Engineer. Paving asphalt shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 92, "Asphalts," of the Standard Specifications.

Paint binder (tack coat) shall be applied in the liter per square meter range limits specified for the surfaces to receive asphalt concrete in the tables below. The exact application rate within the range will be determined by the Engineer.

Application Rates for Asphaltic Emulsion Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP)		
Type of surface to receive paint binder (tack coat)	Slow-Setting Asphaltic Emulsion L/m^2(Note A)	Rapid-Setting Asphaltic Emulsion L/m^2(Note B)
Dense, compact surfaces, between layers, and on PCCP	0.20 – 0.35	0.10 – 0.20
Open textured, or dry, aged surfaces	0.35 – 0.90	0.20 – 0.40

Note A: Slow-setting asphaltic emulsion is asphaltic emulsion diluted with additional water. Water shall be added and mixed with the asphaltic emulsion (containing up to 43 percent water) so the resulting mixture contains one part asphaltic emulsion and not more than one part added water. The water shall be added by the emulsion producer or at a facility that has the capability to mix or agitate the combined blend.

Note B: Undiluted rapid-setting asphaltic emulsion.

Application Rates for Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP)	
Type of surface to receive paint binder (tack coat)	Paving Asphalt L/m^2
Dense, compact surfaces, between layers, and on PCCP	0.05 – 0.10
Open textured, or dry, aged surfaces	0.10 – 0.25

When asphaltic emulsion is used as paint binder (tack coat), asphalt concrete shall not be placed until the applied asphaltic emulsion has completely changed color from brown to black.

LONGITUDINAL JOINTS

At the Contractor's option longitudinal joints may be constructed using a device attached to the screed that will form a tapered notched wedge in a single pass. Longitudinal joints constructed with a tapered notched wedge shall be compacted to a minimum relative compaction of 93 percent. If longitudinal joints are constructed in this manner, the Contractor shall conduct quality control testing in conformance with the provisions in Section 6-3.02, "Testing By Contractor," of the Standard Specifications, and provide results that include the following:

A. Relative compaction values of the completed longitudinal joints tested using a nuclear gauge which has been calibrated and correlated with core densities in conformance with the requirements in California Test 375 Parts 1 and 2.
B. Nuclear density values taken at the rate of one test for each 200-meter section along the completed longitudinal joint. The Contractor shall select random locations for testing within each 200-meter section.
C. Nuclear density values taken at the centerline of the completed longitudinal joint, 150 mm from the upper vertical notch after the adjacent lane is placed and before opening the pavement to traffic.
D. Maximum density test results.
E. Relative compaction values of the longitudinal joint determined as the ratio of the average of the nuclear density values taken from each 200-meter section and the maximum density test results.

Relative compaction values shall be determined each day the joint is completed and delivered to the Engineer within 24 hours of testing. If the relative compaction of one day's production is less than 90 percent, placement of the tapered notched wedge shall not continue until the Contractor has notified the Engineer of the adjustment that will be made in order to meet the specified relative compaction. If the relative compaction for 3 day's production is less than 90 percent, the Contractor shall notify the Engineer and suspend use of the tapered notched wedge device.

The Engineer will determine relative compaction values for the completed longitudinal joint at the completion of paving as follows:

A. The Engineer will determine relative compaction by using 150-mm diameter cores obtained within the 0.3-m section of pavement at the completed longitudinal joint.
B. The Contractor shall obtain two 150-mm diameter cores taken 150 mm from the upper vertical notch of the completed longitudinal joint for every 1000 m along the completed longitudinal joint at locations designated by the Engineer. Cores shall be obtained after the adjacent lane is placed and before opening the pavement to traffic. Cores shall be obtained in the presence of the Engineer and shall be marked to identify the test sites.
C. The Contractor shall deliver the cores to the Engineer. One core will be used for determination of the relative density and one core will be used for dispute resolution.
D. The Engineer will determine the bulk specific gravity of the cores in conformance with the requirements of California Test 308, Method A.
E. Relative compaction will be calculated as the ratio of the average of the core densities from each day's production to the maximum density test value determined in conformance with the requirements in California Test 375, Part 6.

Quantities of asphalt concrete placed in the completed longitudinal joint that fail to meet the relative compaction requirements of these special provisions will be subject to reduced compensation. The reduction in compensation shall be determined as follows:

A. Quantity = 0.3 m x 1000 m x (thickness of the layer placed) x (maximum density test value) x (relative compaction value).
B. Reduction in compensation = Quantity x (reduction factor) x (contract item price).
C. The reduction factor will be determined using the following table:

Relative Compaction (Percent)	Reduced Compensation Factor	Relative Compaction (Percent)	Reduced Compensation Factor
93.0	0.000	91.4	0.062
92.9	0.002	91.3	0.068
92.8	0.004	91.2	0.075
92.7	0.006	91.1	0.082
92.6	0.009	91.0	0.090
92.5	0.012	90.9	0.098
92.4	0.015	90.8	0.108
92.3	0.018	90.7	0.118
92.2	0.022	90.6	0.129
92.1	0.026	90.5	0.142
92.0	0.030	90.4	0.157
91.9	0.034	90.3	0.175
91.8	0.039	90.2	0.196
91.7	0.044	90.1	0.225
91.6	0.050	90.0	0.300
91.5	0.056		

Quantities of asphalt concrete placed in the completed longitudinal joint that meet the relative compaction requirements of these special provisions will not be measured as part of the quantity of asphalt concrete placed in the paved lane and will not be subject to reduced compensation or removal as determined by the relative compaction of the lane widths involved.

In addition to the cores taken every 1000 m along the completed longitudinal joint, the Contractor shall take 150-mm diameter cores every 3000 m approximately 0.9-m and 2.7 m perpendicular from the 1000 m core test sites. Cores may be taken on either side of the completed longitudinal joint. The Contractor shall mark core samples to identify the test sites. The Contractor shall determine the bulk specific gravity of each core in conformance with California Test 308, Method A and relative compaction as specified in these special provisions. Results of this testing shall be for reporting only.

If the Contractor selects the batch mixing method, asphalt concrete shall be produced by the automatic batch mixing method in conformance with the provisions in Section 39-3.03A(2), "Automatic Proportioning," of the Standard Specifications.

If the finished surface of the asphalt concrete on Route 1 traffic lanes does not meet the specified surface tolerances, the surfacing shall be brought within tolerance by either (1) abrasive grinding (with fog seal coat on the areas which have been ground), (2) removal and replacement or (3) placing an overlay of asphalt concrete. The method will be selected by the Engineer. The corrective work shall be at the Contractor's expense.

If abrasive grinding is used to bring the finished surface to the specified surface tolerances, additional grinding shall be performed, as necessary, to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to, the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within any ground area. Ground areas shall be neat rectangular areas of uniform surface appearance. Abrasive grinding shall conform to the provisions in the first paragraph and the last 4 paragraphs in Section 42-2.02, "Construction," of the Standard Specifications.

The aggregate from each separate bin used for asphalt concrete, Type B, except for the bin containing the fine material, shall have a Cleanness Value of 57 minimum for contract compliance and a value of 65 minimum for operating range as determined by California Test 227, modified as follows:

A. Tests will be performed on the material retained on the 2.36-mm sieve from each bin and will not be a combined or averaged result.
B. Each test specimen will be prepared by hand shaking for 30 seconds, a single loading of the entire sample on a 305-mm diameter, 4.75-mm sieve, nested on top of a 305-mm diameter, 2.36-mm sieve.
C. Where a coarse aggregate bin contains material which will pass the maximum size specified and is retained on a 9.5-mm sieve, the test specimen mass and volume of wash water specified for 25-mm x 4.75-mm aggregate size will be used.
D. Samples will be obtained from the weigh box area during or immediately after discharge from each bin of the batching plant or immediately prior to mixing with asphalt in the case of continuous mixers.
E. The Cleanness Value of the test sample from each of the bins will be separately computed and reported.

At drier-drum and continuous plants with cold feed control, Cleanness Value test samples will be obtained from the discharge of each coarse aggregate storage. An aggregate sampling device shall be provided which will provide a 25-kg sample of each coarse aggregate.

If the results of the Cleanness Value tests do not meet the requirements specified for operating range but meet the contract compliance requirements, placement of the material may be continued for the remainder of that day. However, another day's work may not be started until tests, or other information, indicate to the satisfaction of the Engineer that the next material to be used in the work will comply with the requirements specified for operating range.

If the results of the Cleanness Value tests do not meet the requirements specified for contract compliance, the material which is represented by these tests shall be removed. However, if requested by the Contractor and approved by the Engineer, material having a Cleanness Value of 48 or greater may remain in place and accepted on the basis of a reduced payment for material left in place.

Asphalt concrete that is accepted on the basis of reduced payment will be paid for at the contract prices for the items of asphalt concrete involved multiplied by the following factors:

Test Value	Pay Factor
56	0.90
55	0.85
54	0.80
53	0.75
52	0.70
51	0.65
50	0.60
49	0.55
48	0.50

If asphalt concrete is accepted on the basis of reduced payment due to a Cleanness Value of 48 to 56 and also accepted on the basis of aggregate grading or Sand Equivalent tests not meeting the contract compliance requirements, the reduced payment for Cleanness Value shall apply and payment by the Contractor to the State for asphalt concrete not meeting the contract compliance requirements for aggregate grading or Sand Equivalent shall not apply.

10-1.30 LIME TREATMENT OF ASPHALT CONCRETE AGGREGATES – LIME SLURRY METHOD

GENERAL

The Contractor shall treat asphalt concrete aggregates with lime slurry and place the aggregates in stockpiles to marinate in conformance with these special provisions.

MATERIALS

High-calcium hydrated lime and water for mixing with aggregate and lime shall conform to the provisions in Section 24-1.02, "Materials," of the Standard Specifications.

The Contractor shall add lime to the aggregate as slurry. To make the slurry, the Contractor shall mix dry lime and water at a ratio of one part lime to between 2 and 3 parts water by mass. The slurry shall completely coat the aggregate.

Before the Contractor treats aggregate for Type B asphalt concrete with lime slurry, the aggregate shall conform to the aggregate quality requirement provisions in Section 39, "Asphalt Concrete," of the Standard Specifications.

The Engineer will determine the combined aggregate gradation during asphalt concrete production after the Contractor has treated aggregate with lime slurry and marinated.

The lime ratio is the kilograms of dry hydrated lime per 100 kilograms of dry aggregate expressed as a percent. Water content of slurry or untreated aggregate shall not affect the lime ratio.

The combined aggregate lime ratio shall be between 0.8 percent and 1.5 percent. The combined aggregate lime ratio shall not vary by more than ±0.2 percent of the approved lime ratio when the Contractor combines the individual sizes of aggregate in the proportions used in the mix design.

The Contractor shall lime treat and marinate coarse and fine aggregates separately. The Contractor shall add lime to the separate sizes of aggregate in the following proportions:

	Stockpile Gradations	Lime Ratio
Coarse	> 50% retained on the No. 4 sieve	0.4 to 1.0
Fine	≤ 50% retained on No. 4 sieve	1.5 to 2.0

The Contractor shall determine the exact lime proportions and the aggregate gradation in conformance with the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications.

The lime ratio for individual aggregate sizes shall not vary by more than ±0.2 percent from the approved lime ratio.

At the time of mixing lime slurry with aggregate, the aggregate's moisture content shall allow complete slurry coating. The Contractor shall dry and drain aggregate. Water shall not visibly separate from aggregate.

Lime slurry treated aggregate shall be free of lime balls and clods.

The Contractor shall only coat aggregate with lime slurry once.

PROPORTIONING

General

Weighing and measuring devices used for ingredient proportioning, except continuous weigh belts, shall be type-approved by the Division of Measurement Standards, Department of Food and Agriculture, State of California. The Contractor shall test weighing and measuring devices used in slurry proportioning in conformance with the requirements in California Test 109.

Scales used to calibrate proportioning devices used in lime slurry production or the lime slurry treatment of aggregate shall conform to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications and the requirements in California Test 109.

The Contractor shall proportion dry lime and water slurry by mass. The Contractor shall proportion lime and water with a continuous or a batch-type operation.

Lime Slurry Proportioning by Continuous Mixing

If the Contractor uses a continuous proportioning operation for slurry production, the proportioning device shall determine each production rate's exact water to lime ratio using the following methods:

A. The proportioning device shall weigh dry lime with a belt scale. When operating between 30 percent and 100 percent of production capacity, the belt scale shall not yield an average mass difference of 0.5-percent between the indicated material mass delivered and the actual mass delivered for 3 individual runs. For any of the 3 individual runs, the indicated material mass delivered shall not vary from the actual mass delivered by more than one percent of the actual mass. Each test shall be for at least 0.50-tonne of dry lime. The Contractor shall run tests using hydrated lime and shall weigh the samples on a platform scale located at the slurry proportioning plant. The platform scale shall have a maximum capacity not exceeding 2.50 tonnes with a maximum graduation size of 0.5 kilograms. The platform scale shall be type-approved by the California Department of Food and Agriculture, Division of Measurement Standards, before its use and shall be error-tested within 4 hours of the dry lime proportioning device's calibration.
B. The Contractor shall measure water to be used in the slurry with a meter. When operating between 50 percent and 100 percent of production capacity, the meter will not yield a difference exceeding one percent between the indicated mass of water delivered and the actual mass delivered for 3 individual runs. The Contractor shall weigh samples on a platform scale located at the slurry proportioning plant. The platform scale shall have a maximum capacity not exceeding 2.50 tonnes with a maximum graduation size of 0.5 kilograms. Each test shall be for at least 1136 liters. The platform scale shall have been type-approved by the California Department of Food and Agriculture, Division of Measurement Standards, before its use, and shall be error tested within 4 hours of the lime slurry proportioning device's calibration.
C. The dry lime belt scale and the water meter shall be interlocked so that the dry lime and water feed rates are adjusted automatically at each production rate to maintain the approved lime to water ratio. If compared directly, rate-of-flow indicators and totalizers for like-materials shall be accurate within 0.5-percent. Meters and scales used for the continuous proportioning of dry lime and water shall be equipped with:

    1. Rate-of-flow indicators showing the delivery rates of dry lime and water.
    2. Resettable totalizers determining the total amounts of dry lime and water introduced into slurry storage tank.

Lime Slurry Proportioning by Batch Mixing

If the Contractor uses a batch-type proportioning operation for lime slurry production, the Contractor shall use the following methods:

A. The Contractor shall proportion dry lime by mass. The Contractor shall weigh dry lime at the slurry production site. The scale shall be appropriate for the lime draft amount used. If the dry lime draft is less than 10 tonnes, the Contractor shall utilize an automatic batch controller. Automatic batch controllers used for lime slurry aggregate treatment shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications.
B. The Contractor shall shall measure water to be used in the slurry with a meter. When operating between 50 percent and 100 percent of production capacity, the meter shall not yield a difference exceeding 1.5 percent between the indicated water mass delivered and the actual mass delivered for 3 individual runs. The Contractor shall weigh samples on a platform scale located at the slurry proportioning plant. The platform scale shall have a maximum capacity not exceeding 2.50 tonnes with a maximum graduation size of 0.5 kilograms. Each test shall be for at least1136 liters. The platform scale shall have been type-approved by the California Department of Food and Agriculture, Division of Measurement Standards, before its use, and shall be error tested within 4 hours of the lime slurry proportioning device's calibration.
C. The water meter shall be equipped with a resettable totalizer. If the Contractor uses an automatic controller to batch the dry lime, it shall also control the water proportioning. If the Contractor uses an automatic controller to proportion the water, the indicated water draft shall be within one percent of its total draft mass.

Proportioning for Continuous Lime Slurry Treated Aggregate Production

The Contractor shall use continuous lime slurry and aggregate proportioning.

The Contractor shall introduce slurry into the mixer with a meter conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The meter shall be the mass flow Coriolis effect type. The meter shall be capable of varying the slurry delivery rate proportional to the aggregate delivery.

If operated at rates commensurate with aggregate delivery, the meter shall not yield an average mass difference of 0.5-percent between the indicated material delivered mass and the actual material delivered mass for 3 runs of 1136 liters. For any of the 3 individual runs, the indicated material delivered mass shall not vary from the actual material delivered mass by more than one percent of the actual mass. The Contractor shall weigh samples on a platform scale located at the slurry proportioning plant. The platform scale shall have a maximum capacity not exceeding 2.50 tonnes with a maximum graduation size of 0.5 kilograms. Each test shall be for at least 1136 liters. The platform scale shall have been type-approved by the California Department of Food and Agriculture, Division of Measurement Standards, before its use, and shall be error tested within 4 hours of the lime slurry proportioning device's calibration.

The Contractor shall weigh aggregate using a belt scale. When the plant is operating between 30 percent and 100 percent of belt capacity, the belt scale shall not yield an average mass difference exceeding one percent between the indicated material delivered mass and the actual material delivered mass for 3 individual 3-minute runs. For any of the 3 individual 3-minute runs, the indicated material delivered mass shall not vary from the actual material delivered mass by more than 2 percent of the actual mass. A vehicle scale conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications shall determine the actual material delivered mass for aggregate belt scale calibrations. The vehicle scale shall be located at the plant site and the Contractor shall error-check it within 8 hours of checking the plant's proportioning devices.

The meters and belt scales used for proportioning aggregates and slurry shall be equipped to facilitate accuracy checks. The Contractor shall perform accuracy checks before production begins and at other times determined by the Engineer.

The belt scale for the aggregate and the slurry meter shall be interlocked so that the rates of feed of the aggregates and slurry are adjusted automatically at all production rates and production rate changes to maintain the approved lime ratio. The plant shall not be operated unless this automatic system is operating and in good working condition.

The slurry meter and the aggregate feeder shall be equipped with devices by which the rate of feed can be determined while the plant is in full operation. Meters and belt scales used for proportioning aggregates and slurry shall be equipped with rate-of-flow indicators to show the rates of delivery of slurry and aggregate, and resettable totalizers so that the total amounts of slurry and aggregate introduced into the mixer can be determined. Rate-of-flow indicators and totalizers for like materials shall be accurate to within 0.5-percent when compared directly. The slurry totalizer shall not register when the slurry metering system is not delivering material to the mixer.

The Contractor shall locate a monitoring device either in the aggregate stream feed or where the device will monitor belt movement by detecting tail pulley revolutions on the belt feeder. The device for monitoring no flow or belt movement shall stop the slurry and aggregate proportioning automatically and immediately when there is no flow.

MIXING AND STORAGE

The Contractor shall store lime slurry in a central mixing tank equipped with an agitator that both mixes and keeps the lime in suspension until applied to the aggregate. Agitation shall be continuous while the slurry is in storage and the storage time shall not exceed 24 hours. Agitation shall prevent a consolidated lime build-up on the storage tank's bottom or sides. The storage tank for slurry shall be equipped with a liquid level measuring device that will automatically and immediately stop the slurry and aggregate proportioning when the pump suction line is exposed.

The feed rate to the continuous mixer used for lime treated aggregate production shall not permit incomplete material mixing. If material does not move in the mixer or is not sufficiently agitated, the Contractor shall reduce the material volume or use other adjustments. The mixer shall be equipped with paddles and arrangement that provide sufficient mixing action and mixture movement. The mixer shall produce a homogeneous mixture of coated aggregates at mixer discharge.

After adding slurry to the aggregate, the Contractor shall place lime treated aggregate in stockpiles and cured between 24 hours and 60 days before using it in the asphalt concrete. The Contractor shall not use lime treated aggregate stored in excess of 60 days.

PRODUCTION DATA COLLECTION

The device that controls the slurry proportioning to aggregate shall produce a production data log. The production data log shall consist of a series of data sets captured at 10-minute intervals throughout the daily production period. Each production data set shall be a register of production activity at that time and not a data summation over the preceding 10 minutes. The amount of material represented by each data set shall be that amount produced for the period from 5 minutes before and 5 minutes after the capture time. The plant control device shall hold the collected data in storage for the contract's duration. The Contractor shall submit the daily log to the Engineer, in electronic and printed media, at the end of each shift. If requested by the Engineer, the daily log shall include the following items in the following order:

A. Production date.
B. Time of day the data is captured.
C. Aggregate size being treated.
D. Wet aggregate flow rate collected directly from the aggregate weigh belt.
E. Moisture content of the aggregate about to be treated, expressed as a percent of the dry aggregate mass.
F. Dry aggregate glow rate calculated from the wet aggregate flow rate.
G. Lime slurry flow rate measured by the slurry meter.
H. Dry lime flow rate calculated from the slurry meter output.
I. Approved lime ration for the individual aggregate size being treated.
J. Actual lime ratio calculated from the aggregate weigh belt and the slurry meter output, expressed as a percent of the dry aggregate mass.
K. Calculated difference between the approved lime ratio and the actual lime ratio.
L. Portions of dry lime and water as proportioned at the slurry production time.

The Contractor shall present the electronic media containing recorded production data in a tab delimited format on a removable CD-ROM storage disk. Each continuous production data set shall be line feed carriage return (LFCR), one line, separate record with allowances for sufficient fields to satisfy the amount of data required by these specifications. The reported data shall include data titles at least once per report.

CONTRACTOR QUALITY CONTROL

The Contractor shall control the lime treatment operation. If the Contractor does not have control of the process, aggregate lime treatment shall stop until the Contractor identifies and corrects the problem. Evidence that the Contractor is not controlling the production shall include:

A. Data has not been submitted to the Engineer.
B. Collected data has not been complete, timely, or in the correct format.
C. The Contractor has not taken successful or timely corrective actions.
D. Plant production has not been stopped when proportioning tolerances have been exceeded.
E. Any of the devices used for the production of lime treated aggregates has failed to function during production.

The Contractor shall determine the moisture content of the aggregate at least once during each 2 hours of production. Aggregate moisture content determinations shall be representative of the amount of moisture in the aggregate being treated. The Contractor shall calculate moisture content in conformance with California Test 226 or 370 and report the calculation as a percent of dry aggregate mass. The Engineer will use the same California Test for the verification of moisture content.

The following actions shall be taken by the Contractor:

A. When 3 consecutive sets of recorded production data indicates deviation greater than 0.2-percent above or below the approved lime ratio, production of lime treated aggregates shall cease.
B. When a set of recorded production data indicates a deviation of greater than 0.4 percent above or below the approved lime ratio, production of lime treated aggregates shall cease and the material represented by that set of data shall not be used for the manufacture of asphalt concrete.
C. When 20 percent or more of the total daily production indicates deviation of greater than 0.2-percent above or below the approved lime ratio, production shall cease and the total day's production shall not be used for the manufacture of asphalt concrete.

When production is stopped for failure to conform to these special provisions, the Contractor shall implement corrective measures, shall notify the Engineer before proceeding, and shall conduct a successful 15-minute test run prior to resuming production.

PAYMENT

Full compensation for lime treated aggregates for use in the manufacture of asphalt concrete (Type B) shall be considered as included in the contract price paid per tonne for asphalt concrete (Type B) and no separate payment will be made therefor.

10-1.301 LIME TREATMENT OF ASPHALT CONCRETE AGGREGATES – DRY LIME METHOD

GENERAL

The Contractor shall treat damp aggregates with dry hydrated lime with or without marination in conformance with these special provisions.

MATERIALS

High-calcium hydrated lime and water for mixing the aggregate and lime shall conform to the provisions in Section 24-1.02, "Materials," of the Standard Specifications.

Before the Contractor treats aggregate for Type B asphalt concrete with lime slurry, the aggregate shall conform to the aggregate quality requirement provisions in Section 39, "Asphalt Concrete," of the Standard Specifications.

The Contractor shall determine the coarse and fine aggregate absorption capacity in conformance with the requirements in California Test 206 and California Test 207.

The Engineer will determine the combined aggregate gradation during asphalt concrete production after the Contractor has treated aggregate with dry lime.

The lime ratio is the kilograms of dry hydrated lime per 100 kilograms of dry aggregate expressed as a percent. Water content of slurry or untreated aggregate shall not affect the lime ratio.

The combined aggregate lime ratio shall be between 0.8 percent and 1.5 percent. The combined aggregate lime ratio shall not vary by more than ±0.2 percent of the approved lime ratio when the Contractor combines the individual sizes of aggregate in the proportions used in the mix design.

The Contractor shall lime treat and marinate coarse and fine aggregates separately. The Contractor shall add lime to the separate sizes of aggregate in the following proportions:

	Stockpile Gradations	Lime Ratio
Coarse	> 50% retained on the No. 4 sieve	0.4 to 1.0
Fine	≤ 50% retained on No. 4 sieve	1.5 to 2.0

The Contractor shall determine the exact lime proportions and the aggregate gradation in conformance with the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications.

The lime ratio for individual aggregate sizes shall not vary by more than ±0.2 percent from the approved lime ratio.

Lime treated aggregate shall be free of lime balls and clods.

The Contractor shall only coat aggregate with dry lime and stockpile for marination once.

PROPORTIONING

General

The lime treatment of asphalt concrete aggregates shall be an operation that is separate and distinct from asphalt concrete production activities. The aggregate weighbelt used for aggregate proportioning for the lime treatment of asphalt concrete aggregates shall conform to the calibration provisions for continuous mixing asphalt concrete plants in Section 39, "Asphalt Concrete," of the Standard Specifications and the requirements in California Test 109.

Proportioning for Batch Mixing

The Contractor shall treat aggregates to be used at batch type asphalt concrete plants in conformance with the following:

A. Aggregate moisture content shall be calculated in conformance with California Test 226 or California Test 370. If the moisture content is less than the absorption capacity of the aggregate being treated, the Contractor shall add 2 percent water by dry mass of aggregate to the aggregate before the pugmill. If the moisture content is greater than the absorption capacity of the aggregate, the Contractor shall add additional water to establish a minimum moisture content of 2 percent above the absorption capacity.
B. The Contractor shall control proportioning in conformance with the requirements for continuous mixing plants. For aggregate to be used at batch-type asphalt concrete plants, the Contractor shall use a separate lime treatment operation including:

    1. A pugmill mixer:
    2. Controller.
    3. Weigh belt for the lime.
    4. Weighbelt for the aggregate.

Proportioning for Continuous Mixing

Material to be lime treated and used at continuous mixing type AC plants shall conform to the following:

A. The Contractor shall proportion lime by mass. When operating between 30 percent and 100 percent of production capacity, the proportioning device shall not yield an average difference exceeding 0.7 percent between the indicated material delivered mass and the actual material delivered for 3 individual runs. For any of the 3 individual runs, the indicated material delivered mass shall not vary from the actual material delivered mass by more than one percent of the actual mass. Each test shall be for at least 0.50-tonne of lime. The Contractor shall weigh samples on a platform scale located at the production facility. The platform scale shall have a maximum capacity not exceeding 2.50 tonnes with a maximum graduation size of 0.5 kilogram. The platform scale shall have been type-approved by the California Department of Food and Agriculture, Division of Measurement Standards, before its use, and shall be error tested within 4 hours of the dry lime proportioning device's calibration.
B. The Contractor shall calculate moisture content in conformance with California Test 226 or 370. If the combined aggregate moisture content is less than the combined aggregate's absorption capacity, the Contractor shall add 2 percent water by dry mass of aggregate to the combined aggregate before the pugmill. If the combined aggregate moisture content is greater than the combined aggregate absorption capacity, the Contractor shall add water to establish a minimum moisture content of 2 percent above the absorption capacity.
C. The Contractor shall control the lime treatment of asphalt concrete aggregates with a controller that captures the blended aggregate mass after additional water has been added to the mixture. The controller shall determine the added lime amount to the aggregate from the aggregate weigh belt input in connection with the manually input total aggregate moisture, the manually input target lime content, and the output of the lime proportioning system. The Contractor shall use a continuous aggregate weigh belt and pugmill-type mixer for the lime treatment operation in addition to the weighbelt required for the proportioning of the aggregate to asphalt binder in the asphalt concrete plant operation. If the Contractor uses a water meter for moisture control for lime treatment, the meter shall have been type-approved by the California Department of Food and Agriculture, Division of Measurement Standards and shall conform to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications and the requirements in California Test 109.

The Contractor shall interlock lime delivery to each aggregate feeder's flow. Each aggregate feeder shall be equipped with low-flow, no-flow devices that conform to the provisions in Section 39-3.03B "Proportioning for Continuous Mixing."

The Contractor shall determine the aggregate moisture content at the point of mass determination at the weigh belt. The maximum interval for moisture determination shall be 2 hours in conformance with the requirements in California Test 370.

The asphalt concrete plant shall be equipped with a bag house dust system. Material collected in the dust system shall be returned to the mix. Wet tube or other dust system where any part of the collected fines are wasted shall not be used. The proportioning of bag house collected fines shall be as required by Section 39 of the Standard Specifications for the plant type used for production.

The belt scale for the combined aggregate and dry lime will be adjusted automatically (at all production rates and production rate changes) to maintain the lime ratio (kilograms of dry lime per 100 kilograms of dry aggregate, including supplemental fine aggregate, if used). The plant shall not be operated unless this automatic system is functional and in good working condition.

Mixing for Aggregate Treated with DHL

A continuous pugmill-type mixer with twin shafts shall be used to mix the aggregate, water and dry lime. Aggregate shall have been dried or drained such that no visible separation of water from the aggregate will take place. Dry lime to be added to aggregates without marination shall be fed from a storage facility in which the lime is agitated by air or other means to keep it in a uniform free flowing condition. The lime shall be added in a continuous operation to the aggregate in an enclosed pugmill immediately after leaving the aggregate cold feed and just prior to being proportioned across a weigh belt, and being introduced into the dryer drum or aggregate dryer. Lime shall be added to the aggregate in such a manner that loss of lime is prevented.

Mixing and Storage for Aggregate Treated with DHLM

A continuous pugmill-type mixer with twin shafts shall be used to mix the aggregate, water and dry lime. Aggregate shall have been dried or drained such that no visible separation of water from the aggregate will take place. Dry lime to be added to aggregates and stockpiled for marination shall be fed from a storage facility in which the lime is agitated by air or other means to keep it in a uniform free flowing condition. The lime shall be added in a continuous operation to the aggregate in an enclosed pugmill. Lime shall be added to the aggregate in such a manner that loss of lime is prevented. After the dry lime has been added to the aggregate, the lime treated aggregate shall be placed in stockpiles and cured for not less than 24 hours but not more than 60 days before being incorporated into the asphalt concrete. Lime treated aggregate stored in excess of 60 days shall not be used in the work or in production of asphalt concrete.

The rate of feed to the continuous pugmill-type mixer used for production of the lime treated aggregate shall not exceed the rate of feed that will permit complete mixing of all the material. Dead areas in the pugmill mixer, in which the material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments. The mixer shall be equipped with paddles of a type and arrangement that provides sufficient mixing action and movement to the mixture. The pugmill-type mixer shall produce a homogeneous mixture of thoroughly and uniformly lime-coated aggregates at discharge from the mixer.

When the aggregate treatment operation is stopped for a period of time in excess of one hour the treatment operation shall be cleaned of partially treated aggregates and lime.

PRODUCTION DATA COLLECTION

The device that controls the proportioning of lime treatment of AC aggregates shall produce a log of production data. The log of production data shall consist of a series of sets of data captured at 10 minute intervals throughout the period of daily production. Each set of production data shall be a register of production activity at that time and not a summation of the data over the preceding 10 minutes. The amount of material represented by each set of data shall be that amount produced for the period of time from 5 minutes before and 5 minutes after the capture time. Collected data shall be held in storage by the plant control device for the duration of the contract. The daily log shall be submitted to the Engineer, in electronic and printed media approved by the Engineer, at the end of each shift, or as requested by the Engineer, and shall include the following:

A. Date of production.
B. Time of day the data is captured.
C. Aggregate size being treated (for DHLM).
D. Mix size and type (for DHLM).
E. Rate of flow of the wet aggregate, collected directly from the aggregate weigh belt.
F. Moisture content of the aggregate about to be treated, expressed as a percent of the dry aggregate mass.
G. Rate of flow of the water added to the aggregate to obtain specified moisture percentages.
H. Rate of flow of the dry aggregate calculated from the wet aggregate flow rate.
I. Rate of flow of dry lime, collected from the dry lime metering device.
J. Approved lime ratio for the individual aggregate size being treated (for DHLM).
K. Approved lime ratio of the combined aggregate (for DHLM).
L. The actual lime ratio calculated from the aggregate weighbelt output, the aggregate moisture input and the dry lime proportioning output, expressed as a percent of the dry aggregate mass.
M. Calculated difference between the approved lime ratio and the actual lime ratio.

Electronic media containing recorded production data shall be presented in a tab delimited format. Each set of continuous production data shall be LFCR (line feed carriage return, one line, separate record) with allowances for sufficient fields to satisfy the amount of data required by these specifications. The reported data shall be in the above order and shall include data titles at least once per report.

CONTRACTOR QUALITY CONTROL

The Contractor shall control the lime treatment operation. If the Contractor does not have control of the process, lime treatment of aggregates for the contract shall cease until the problem is identified and corrected. Evidence that the Contractor is not controlling the production shall include, but not be limited to, the following:

A. Data has not been submitted to the Engineer.
B. Collected data has not been complete, timely or in the correct format.
C. The Contractor has not taken corrective actions when necessary.
D. Corrective actions taken have not been successful or timely.
E. Plant production has not been stopped when proportioning tolerances have been exceeded.
F. Any of the devices used for the production of lime treated aggregates has failed to function during production.

The following actions shall be taken by the Contractor:

A. When 3 consecutive sets of recorded production data indicates deviation greater than 0.2-percent above or below the approved lime ratio, the production of lime treated aggregates shall cease.
B. When a set of recorded production data indicates a deviation of greater than 0.4-percent above or below the approved lime ratio, production of lime treated aggregates shall cease and the material represented by that set of data shall not be used for the manufacture of asphalt concrete.

When production is stopped for failure to conform to these special provisions, the Contractor shall implement corrective measures, shall notify the Engineer before proceeding, and shall conduct a successful 15-minute test run prior to resuming production.

PAYMENT

Full compensation for lime treated aggregates for use in the manufacture of asphalt concrete (Type B) shall be considered as included in the contract price paid per tonne for asphalt concrete (Type B) and no separate payment will be made therefor.

10-1.302 LIQUID ANTI-STRIP TREATMENT OF ASPHALT BINDER

This work shall consist of furnishing liquid anti-strip (LAS) and treating asphalt binder with LAS in conformance with these special provisions.

MATERIALS

LAS shall conform to the following:

A. Total amine value shall be 325 minimum determined in conformance with the requirements in ASTM Designation: D 2074.
B. LAS-treated asphalt binder at the proposed rate shall conform to the provisions for asphalt binder in Section 39, "Asphalt Concrete," of the Standard Specifications.

At least 3 weeks prior to their intended use the Contractor shall furnish the Engineer the following:

A. Material Safety Data Sheet (MSDS) for LAS;
B. One 1-liter sample of the proposed LAS; and
C. Infrared analysis including copy of absorption spectra.

The Contractor shall submit a certified copy of tests and a Materials Safety Data Sheet representing each lot of LAS.

The Contractor shall submit a Certificate of Compliance with each shipment of LAS conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate shall include the shipment number, type of material, specific gravity of the material, refinery, consignee, destination, quantity, contract or purchase order number, and date of shipment. The Certificate shall state that the material complies with the specifications and shall be signed by the Contractor.

The Contractor shall add LAS to asphalt binder at a rate of between 0.5-percent and 1.0 percent by mass of asphalt binder.

The exact proportions of LAS and asphalt binder for Type B asphalt concrete shall be determined by the Contractor in conformance with the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications.

LAS added to the mix shall not be a substitute for asphalt binder.

LAS shall be of only one type or brand at any one time during production. LAS of more than one type or more than one brand shall not be mixed. A change of brand or type of LAS or asphalt binder shall require a new mix design and testing of the LAS and LAS treated asphalt binder for conformance to Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

LAS shall be stored and introduced into the asphalt concrete at the plant in conformance with the manufacturer's recommendations and these specifications. LAS shall be stored at or below the temperatures recommended by the manufacturer.

The asphalt concrete plant shall have a suitable sampling device provided in the feed lines connecting LAS storage to the LAS metering system. The sampling device shall consist of a valve with a nominal diameter between 9.5-mm and 12.5-mm, constructed so a sample may be withdrawn slowly at any time during plant operations. The valve shall be maintained in good condition. The sampling device shall be readily accessible and in an area free of obstructions. A drainage receptacle shall be provided for flushing the device prior to sampling.

The Contractor shall obtain one 0.24-liter sample of LAS as new supplies arrive on the project with a minimum of one sample per project. The sample container shall be labeled with the type of LAS, application rate, sample date, and contract number. The Contractor shall send the LAS sample, accompanied by a completed Sample Identification Card (Form TL-101), to the Transportation Laboratory at 5900 Folsom Boulevard, Sacramento, CA 95819 the same day LAS is sampled. A copy of Form TL-101 and appropriate shipping documents shall be submitted to the Engineer.

For continuous mixing type operations, asphalt binder shall be sampled at a point prior to and after the addition of LAS. The point of sampling for the combined asphalt and LAS shall be a minimum of 1.52 meters downstream from the introduction of LAS and after the in-line static mixer. For batch mixing type operations, asphalt binder shall be sampled at a point prior to the addition of LAS.

PROPORTIONING

The asphalt concrete proportioning operation where LAS is utilized shall be of the batch type or continuous mixing type.

Proportioning for Batch Mixing

LAS shall be proportioned by mass at batch type plants. Proportioning shall be by either a mass flow meter or a container scale. The dispensing of LAS into the batch shall be arranged to flow into the stream of asphalt as the asphalt binder enters the pugmill so that the LAS is well dispersed throughout the batch. The meter or container scale used shall have been type-approved by the California Department of Food and Agriculture, Division of Measurement Standards and shall be of appropriate size for the intended delivery rate.

The batching devices shall be interlocked so that no new batch may be started until weigh hoppers are empty, the scales are at zero, the discharge gates are closed and the LAS meter, if used is at zero. Proportioning devices shall be interlocked so that the weighing or metering cycle will be interrupted whenever the amount of material drawn from storage varies from the pre-selected amount by more than the tolerances specified herein. Whenever the weighing or metering cycle is interrupted, that specific batch shall not be used in the work unless it can be manually adjusted to meet its specified tolerances. When partial batches are batched, the interlock tolerances, except the zero tolerance, shall apply to the total mass of asphalt binder in the partial batch. The zero tolerance for LAS scale shall be 0.01 percent of the total batch mass of the asphalt binder. The indicated mass of LAS drawn from storage shall not vary from the preselected scale setting as defined by target values of the approved mix design by more than the 0.02 percent of the total batch mass of the asphalt binder.

The controller utilized for the proportioning of LAS and other ingredients in the production of asphalt concrete shall be automatic in operation. This automatic weighing system shall be designed so that all proportions required may be set on the batch controller at the same time. The proportioning devices shall be automatic to the extent that the only manual operation required for proportioning all of the ingredients for one batch of asphalt concrete shall be a single operation of a switch or a starter.

Proportioning devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to ensure their accuracy. Calibrations shall be in accordance with California Test 109 and these specifications.

Mass flow meter

The meter utilized shall be a mass flow meter of the Coriolis effect type. The meter shall be of the appropriate size for the intended flow. The meter shall measure the amount of LAS desired for each asphalt concrete batch being produced. The controller for the meter shall be located and maintained at the point where the asphalt concrete proportioning operations are controlled. The meter controller shall be equipped to display the meter set points at any time during asphalt concrete production or device calibration.

Mass flow meter when used shall be calibrated in accordance with California Test 109 unless otherwise modified in these specifications.

Mass flow meter calibration

Determine the percent of LAS required per batch of asphalt binder from an approved mix design. Determine the maximum asphalt binder batch size for the AC plant. The LAS meter must be tested at multiple set points; the set points shall be calculated for 25, 50, 75 and 100 percent of the maximum asphalt binder batch size. Draw two LAS batches each at 25, 50, 75 and 100 percent of maximum batch capacity. Quantities shall be set and batched from the batch controller. Each indicated mass of LAS drawn from storage shall not vary by more than 0.02 percent of the total required batch mass of asphalt binder. The acceptable calibration tolerance for each set of two calibration runs shall be ±1 percent of the mean of those test runs. The indicated mass of LAS drawn from storage shall not vary from the preselected scale setting as defined by target values of the approved mix design by more than the 0.02 percent of the total batch mass of the asphalt binder.

Weight scale

LAS shall be weighed in an individual container scale and shall be kept separate from all other ingredients until combined with the asphalt binder. The scale and weigh container for LAS shall be separate and distinct from the weighing equipment for other ingredients in the batch. Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant.

The container scale used for batching LAS shall have a maximum capacity of no greater than 200% of the maximum draft of LAS used. Each scale graduation shall be no greater than 0.001 of the scale capacity or indicate a mass that is larger than the maximum proportioning tolerance specified herein.

Proportioning for Continuous Mixing

LAS shall be proportioned by mass. LAS shall be added to the asphalt at a point in the production stream after the proportioning of the asphalt but before the asphalt is added to the aggregate. In addition, the LAS and asphalt mixture shall pass through an in-line static mixer prior to entering the pugmill. LAS shall be proportioned with a mass flow meter of the Coriolis effect type. The meter shall have been Type-approved by the California Department of Food and Agriculture, Division of Measurement Standards, prior to its use. The meter shall be of the appropriate size for the flow intended. The primary controller for the meter shall be located and maintained at the point where the asphalt concrete proportioning operations are controlled. The meter controller shall display the meter set points at any time during asphalt concrete production or device calibration.

The belt scale for the combined aggregate, the proportioning devices for supplemental fine aggregate, if used, the asphalt proportioning meter and the meter for LAS shall be interlocked so that the rates of feed of the aggregates and asphalt will be adjusted automatically (at all production rates and production rate changes) to maintain the asphalt ratio (kilograms of asphalt per 100 kilograms of dry aggregate including supplemental fine aggregate, if used) and the LAS ratio (kilograms of LAS per kilograms of asphalt binder) designated in the approved mix design. The plant shall not be operated unless this automatic system is functioning and in good working condition. During production of asphalt concrete the actual LAS ratio shall not vary by more than 2.0 percent above or below the prescribed amount.

The meter used for proportioning LAS shall be equipped with a rate-of-flow indicator to show the rate of delivery, and a resettable totalizer so that the total amount of LAS introduced into the mixture can be determined. The LAS totalizer shall not register when the metering system is not delivering LAS to the mixer.

The meter used for proportioning LAS shall perform with such accuracy that, when operating between 30 percent and 100 percent of production capacity, the average difference between the indicated mass of material delivered and the actual mass delivered will not exceed 0.5-percent of the actual mass for 3 individual test runs. For any of the 3 individual test runs, the indicated mass of the material delivered shall not vary from the actual mass delivered by more then 1 percent of the actual mass. Test run duration shall be for a minimum of 36.3 kilograms of LAS. Test run material shall be LAS and shall be weighed on a platform scale located at the asphalt concrete plant. The platform scale shall have a maximum capacity not exceeding 250 kilograms and shall have a maximum graduation size of 0.025 kilogram. The platform scale shall have been Type-approved by the California Department of Food and Agriculture, Division of Measurement Standards, prior to its use, and shall be error tested within 4 hours of LAS system calibration.

The storage for LAS shall be equipped with a device for automatic plant cut-off when the level of the liquid is lowered sufficiently to expose the pump suction line.

The belt scale for the combined aggregate, the proportioning devices for supplemental fine aggregate, if used, the asphalt proportioning meter and the LAS proportioning meter shall be interlocked so that the rates of feed of the aggregates, asphalt, and LAS will be adjusted automatically (at all production rates and production rate changes) to maintain individual ingredient ratios. The plant shall not be operated unless this automatic system is operating and in good working condition.

PRODUCTION DATA COLLECTION

During the production of asphalt concrete the following information shall be captured by the plant controller system.

Batch Mixing Type Operation

The device which controls the proportioning of asphalt concrete shall produce a log of batching data. The log shall consist of the actual net masses for each ingredient in the batch throughout the period of production. Collected data shall be held in storage by the plant controller, or a computer memory storage device for the duration of the contract. The log shall be submitted to the Engineer daily, in electronic and printed media approved by the Engineer, at the end of each production shift or as requested by the Engineer. Each set of captured data shall be a register of production activity for one batch and shall include the following:

A. Date of production,
B. Time of day the batch is completed,
C. Mix size and type,
D. Actual, net mass of ingredients used in each batch,
E. Actual asphalt binder ratio – calculated from the aggregate masses, and the asphalt binder mass, expressed as a percent of the dry aggregate mass.
F. Actual LAS ratio – calculated from the asphalt binder mass and the LAS mass expressed as a percent of the actual asphalt binder mass.

Continuous Mixing Type Operation

The device that controls the proportioning of asphalt concrete ingredients shall produce a log of production data. The log of production data shall consist of a series of sets of data captured at 10 minute intervals throughout the period of daily production. Each set of captured data shall be a register of production activity at that time and not a summation of the data over the preceding 10 minutes. The amount of material represented by each set of data shall be that amount produced for the period of time from 5 minutes before and 5 minutes after the capture time. Collected data shall be held in storage by the plant controller, or a computer memory storage device for the duration of the contract. The daily log shall be submitted to the Engineer, in electronic and printed media approved by the Engineer, at the end of each production shift, or as requested by the Engineer, and shall include the following:

A. Date or production.
B. Time of day the data is captured.
C. Mix size and type.
D. Rate of flow of the wet aggregate, collected directly from the aggregate weigh belt.
E. Moisture content of the aggregate, expressed as a percent of the dry aggregate mass.
F. Rate of flow of the asphalt binder, collected from the asphalt binder meter.
G. Rate of flow of LAS, collected from the LAS metering device.
H. Actual asphalt binder ratio – calculated from the aggregate weigh belt output, the aggregate moisture input and the asphalt binder meter output, expressed as a percent of the dry aggregate mass.
I. Actual LAS ratio – calculated from the asphalt binder meter output and the LAS meter output expressed as a percent of the asphalt binder mass.

Electronic media containing recorded production data shall be presented in a tab delimited format. Each set of continuous production data shall be LFCR (line feed carriage return, one line, separate record) with allowances for sufficient fields to satisfy the amount of data required by these specifications. The reported data shall be in the above order and shall include data titles at least once per report.

CONTRACTOR QUALITY CONTROL

The Contractor shall control the proportioning operation. If the Contractor does not have control of the process, asphalt concrete production for the contract shall cease until such time as the problem is identified and corrected. Evidence that the Contractor is not controlling the production shall include, but not be limited to, the following:

A. Data has not been submitted to the Engineer.
B. Collected data has not been complete, timely, or in the correct format.
C. The Contractor has not taken corrective actions when necessary.
D. Corrective actions taken have not been successful or timely.
E. Plant production has not been stopped when proportioning tolerances have been exceeded.
F. Any of the devices used for the proportioning of asphalt concrete have failed to function during production.

When production is stopped for failure to conform to these special provisions, the Contractor shall implement corrective measures and shall notify the Engineer prior to resuming production.

The Contractor shall take the following actions:

A. When 3 consecutive sets of recorded production data indicate deviation greater than 1.0-percent above or below the approved LAS prescribed mass, production shall cease.
B. When a set of recorded production data indicates a deviation of greater than 2.0 percent above or below the approved LAS prescribed mass, production shall cease and the material represented by that set of data shall not be used if the anti-strip product exceeds 1.2% by mass of the asphalt binder.

PAYMENT

Full compensation for furnishing and treating aggregates with LAS for use in the manufacture of asphalt concrete (Type B) shall be considered as included in the contract price paid per tonne for asphalt concrete (Type B) and no separate payment will be made therefor.