STATE OF CALIFORNIA-CALIFORNIA STATE TRANSPORTATION AGENCY

EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
OFFICE ENGINEER
1727 30th Street MS-43
P.O. BOX 168041
SACRAMENTO, CA 95816-8041
FAX (916) 227-6214
www.dot.ca.gov/hq/esc/oe

Serious Drought.
Help save water!

April 20, 2015

05-SBt-25-38.2/44.2
05-1F8504
Project ID 0514000068

Addendum No. 4

Dear Contractor:

This addendum is being issued to the contract for CONSTRUCTION ON STATE HIGHWAY IN SAN BENITO COUNTY NEAR TRES PINOS FROM 0.2 MILE SOUTH OF CIENEGA ROAD TO 0.4 MILE NORTH OF BOLADO 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 Thursday, April 23, 2015.

This addendum is being issued to revise the *Notice to Bidders and Special Provisions* and *Information Handout*.

In the Special Provisions, Section 2-1.06B, in the Supplemental Project Information Table, Item 6 is added as follows:

"6. Ride Quality Analysis"

In the Special Provisions, Section 30-5, "COLD IN-PLACE RECYCLING," is replaced as attached.

The *Information Handout* "Ride Quality Analysis" is added as attached.

05-SBt-25-38.2/44.2
05-1F8504
Project ID 0514000068

To *Bid* 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 Bidders* section of the *Notice to Bidders and Special Provisions.*

Submit the *Bid* book as described in the *Electronic Bidding Guide* at the Bidders' Exchange website.

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

Inform subcontractors and suppliers as necessary.

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

http://www.dot.ca.gov/hq/esc/oe/project_ads_addenda/05/05-1F8504

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,

SHARRI BENDER EHLERT
District Director
District 6 Central Region

Attachments

Replace section 30-5 with:

30-5 COLD IN-PLACE RECYCLING

30-5.01 GENERAL

30-5.01A Summary

Section 30-5 includes specifications for constructing the pavement using cold in-place recycling (CIR).

CIR consists of:

1. Cold planing the existing asphalt concrete pavement to the depth shown
2. Mixing the cold-planed material with an emulsified recycling agent (ERA) and cement
3. Spreading and compacting the mixture
4. Applying asphaltic emulsion and sand cover

30-5.01B Definitions

lot: 3000 sq yd or fraction thereof of CIR pavement constructed in the same day.

break-over point: Maximum density of the CIR section achieved when nuclear density tests do not show an increase in density after additional compaction passes.

30-5.01C Submittals

30-5.01C(1) General

At least 20 days before starting CIR work, submit the following:

1. QC Plan
2. Mix Design
3. Contingency Plan

Contingency plan must include actions you will take to ensure the roadway will be open to traffic at the end of each work shift. The contingency plan must include provisions for constructing a temporary structural section and reopening the roadway to traffic.

30-5.01C(2) Quality Control Plan

The QC plan must describe the organization, responsible parties, and procedures you will use to perform the following:

1. Control quality including sampling, testing, and reporting
2. Determine action limits when corrective actions are needed
3. Implement corrective actions
4. Ensure CIR cold planing, mixing, placing, compacting and finishing activities are coordinated

The QC plan must contain copies of the forms that will be used to provide the required inspection records and sampling and testing results.

The QC plan must include the name of your authorized laboratory.

If QC procedures, personnel, tester qualifications, or lab accreditation status change, submit a QC plan supplement at least 3 business days before implementing proposed changes.

30-5.01C(3) Mix Design

Submit separate mix designs based on RAP material qualities for each location shown on the following table:

Mix Design	
Location No.	Post mile to post mile
1	38.2/44.2

For each CIR mix design, submit:

1. Mix design documentation on the Contractor Cold in Place Recycling Mix Design form, including all raw test data and calculations. The mix design submittal must be signed and sealed by an Engineer who is registered as a civil engineer in the State of California.
2. JMF on the Contractor Cold in Place Recycling Job Mix Formula form
3. MSDS for:
   - 3.1. Emulsified recycling agent
   - 3.2. Cement:
   - 3.3. Rejuvenator (if applicable)
4. Process for incorporating cement to be used into the CIR mixture.

30-5.01C(4) Quality Control Reporting

For each lot, submit a report daily that includes the following items:

1. General Information:
   - 1.1. Lot number
   - 1.2. Location description
   - 1.3. Beginning and ending station
   - 1.4. Lane number and offset from centerline
   - 1.5. Temperature:
     - 1.5.1. Ambient air temperature before beginning daily CIR activities including time of temperature reading
     - 1.5.2. Road surface temperatures before beginning daily CIR activities including time of temperature reading
2. For ERA:
   - 2.1. Weight in tons
   - 2.2. Percentage by weight of dry RAP
3. For cement:
   - 3.1. Application rate by lb/sqyd, if you spread cement directly to the existing pavement, take surface area measurements to calculate applied spread rate and submit with the quantity of cement used, area covered, and certified weight tickets.
   - 3.2. Total weight in tons
   - 3.3. Percentage by weight of dry RAP
4. Water application rate by theoretical percent dry weight of CIR from the controller
5. For CIR processing:
   - 5.1. Length, width, depth of cut at each end of the milling drum at least every 300 feet along the cut length
   - 5.2. Average forward speed
   - 5.3. Calculated weight in tons of material processed
   - 5.4. Break-over point density used for relative compaction calculation
6. Straightedge measurement locations and the following:
   - 6.1. Variance measured from the lower edge of a 12-foot straightedge placed parallel with the centerline
   - 6.2. Variance measured from the lower edge of a 12-foot straightedge placed transverse

7. CIR quality control test results for:
   7.1. Wet field gradation for material passing the 1-inch, 3/4-inch, and No. 4 sieves
   7.2. In-place wet density
   7.3. Relative compaction
8. For asphaltic emulsion used on finished CIR surface:
   8.1. Emulsion type
   8.2. Emulsion application rate in gal/sqyd
   8.3. Emulsion dilution as the weight ratio of added water to asphaltic emulsion
9. Rate of sand cover application
10. Note on the daily report postmile or station limits of any:
    10.1. Changes to ERA application rate, including application rate change and reasons for change
    10.2. Changes to water application rate, including application rate change and reasons for change
    10.3. Unsuitable materials locations and when the Engineer was notified

Update each day's submitted report within 24 hours of obtaining test results. Consolidate all of the lots completed in a day onto one report with each lot reported separately.

For each test strip, and days production submit your break over density results on the *Contractors Establishment of Break Over Density form.*

During CIR activities, submit the following items daily

1. Square yards recycled.
2. Tons ERA utilized.
3. Tons ERA to be carried over to next production day.
4. Tons cement utilized and spread rate.
5. Tons cement to be carried over to next production day.

30-5.01C(5) Certificates

Submit certificates of compliance for the cement and ERA with each delivery. Include the manufacturer's test results for the ERA with your certificate of compliance. The test results must be from material tested within 30 days prior to delivery.

Submit a certified copy of each delivery's weight for ERA, cement, asphaltic emulsion, and sand.

30-5.01C(6) Asphaltic Emulsion

Each time you dilute the asphaltic emulsion, submit:

1. Weight ratio of water to bituminous material in the original asphaltic emulsion
2. Weight of asphaltic emulsion before diluting
3. Weight of added water
4. Final dilution weight ratio of water to asphaltic emulsion

30-5.01D Quality Control and Assurance

30-5.01D(1) General

Provide a testing laboratory and personnel for quality control testing. The laboratory for testing and preparing the mix design and JMF must be qualified under AASHTO Materials Reference Laboratory program and the Department's Independent Assurance Program. Testing personnel for QC must be qualified under the Department's Independent Assurance Program.

If you adjust the application rate of CIR components, record the adjustments and document the reasons for the adjustments in your daily submittal to the Engineer.

30-5.01D(2) Quality Control Plan

The QC plan must describe the organization and procedures for:

1. Controlling CIR quality characteristics
2. Obtaining samples, including sampling locations
3. Establishing, implementing, and maintaining QC
4. Determining when corrective actions are needed
5. Implementing corrective actions
6. Taking samples, including location of sampling

The QC plan must address the elements affecting CIR quality including:

1. RAP
2. Emulsified recycling agent
3. Cement
4. Production
5. Paving
6. Compaction
7. Smoothness

The Engineer reviews the QC plan within 5 business days from the submittal. Do not start CIR production until the Engineer authorizes the plan.

If a change is needed in your QC plan, do not implement the change without authorization.

For any lot including the test strip, stop CIR activities and immediately notify the Engineer whenever any test result does not comply with the requirements shown in the table titled "Quality Control Requirements" in section 30-5.01D(4), or your quality control plan. If CIR activities are stopped for noncompliance, before resuming activities:

1. Notify the Engineer of the adjustments you will make
2. Reprocess, remedy, or replace the noncompliant lot

30-5.01D(3) Prepaving Conference

At least 10 days before starting CIR activities, meet with the Engineer at a prepaving conference at a mutually agreed time and place. Discuss the QC plan and the methods of performing production and placement.

The following personnel must attend the prepaving conference:

1. Project manager
2. Project superintendent
3. QC manager
4. Workers and your subcontractor's workers, including:
   - 4.1. Foremen
   - 4.2. Ground supervisors
   - 4.3. Representative from testing lab
   - 4.4. Representative from the ERA supplier

30-5.01D(4) Quality Control Sampling and Testing

30-5.01D(4)(a) General

Take samples under California Test 125.

During CIR activities, take two 0.5-gal samples of ERA from each load delivered to the job site in the presence of the Engineer. Use 1 sample for QC testing and submit 1 sample to the Engineer.

Store ERA samples in clean, dry, and sealed 0.5-gal plastic containers at a temperature between 40 to 100 degrees F.

30-5.01D(4)(b) Test Strip

On the 1st day of CIR activities and within the pavement area to receive CIR, construct a test strip. The test strip must be a single lane width and at least 1,500 feet in length. The test strip must show:

1. How the equipment, materials, and processes proposed can produce and place the CIR mixture
2. How varying the forward speed and drum rotation rate of the cold-planing machine affect the consistency of the mixture
3. Optimum rates for ERA, cement, and water
4. Rolling pattern needed to reach the break-over point
5. Application rates of asphaltic emulsion and sand cover

Document the rolling pattern on *Contractors Establishment of Break Over Density form.*

The Engineer evaluates the test strip under section 30-5.01D(5). For smoothness, only the straightedge requirements apply for test strip authorization. Retest the test strip smoothness under section 30-5.01D(4)(d). Rework and recompact or remove and replace test strip if it does not comply with the specifications. Do not proceed with CIR activities until the Engineer notifies you that the test strip is authorized.

After curing is completed per Section 30-5.03G, re-compact the test strip and determine what rolling pattern will establish a new break-over point. Document the supplemental rolling pattern on *Contractors Establishment of Break Over Density form.* Use this rolling pattern during supplemental compaction.

30-5.01D(4)(c) Quality Control Testing

For emulsified recycling agent, the testing laboratory must perform quality control sampling and testing at the specified frequency and location for the following quality characteristics:

Emulsified Recycling Agent Quality Control Requirements

Property	Test method	Minimum sampling and testing frequency	Requirement		Sampling Location	Maximum reporting time allowance
			Minimum	Maximum		
Test on emulsion:						
Sieve test, % of weight sample	AASHTO T 59	Each tanker load	--	0.1	Tanker	10 business days
Residue by evaporation, %	California Test 330		63	70		
Test on residue by evaporation:						
Penetration at 25 °C, 100 g/ 5 sec	AASHTO T 49	Each tanker load	40	120	Tanker	10 business days
Ductility at 25 °C and 50 mm/minute, mm	AASHTO T 51		400	--		
Creep stiffness, Test temperature, °C max S-value, MPa min M-value	AASHTO T 313		Note a			

[a]Must comply with the requirements for the PG binder specified.

Perform sampling and testing at the specified frequency and location for the following quality characteristics:

Quality Control Requirements

Quality Characteristic	Test method	Minimum sampling and testing frequency	Requirement	Sampling location	Maximum reporting time allowance
Water sulfates[a] (ppm, max)	California Test 417	1 per source	1,300	Source	Before work starts
Water chlorides[a] (ppm, max)	California Test 422	1 per source	650	Source	
Wet gradation (% passing) Sieve Size 1 inch	California Test 202	Test strip and 1 per lot	100	Loose RAP before adding ERA	24 hours
Wet field gradation (% passing) Sieve size 1-inch 3/4-inch No. 4	California Test 202	Test strip and every 3rd lot	Report only		5 business days
Dry gradation (% passing) Sieve size 1-inch 3/4-inch No. 4 No. 30 No. 200	California Test 202	Test strip and 1 per day	Report only		
Air voids[c] %	California Test 308	Test strip and 2 per day	Report only		
Theoretical maximum density[c]	California Test 309	Test strip and 2 per day	Report only		
Relative compaction[b], (%, min)	California Test 375[d]	Test strip and 2 per lot	95	Compacted mix	24 hours

[a]Only required for non-potable water sources.
[b]The relative compaction is based on the break-over point.
[c]Verify break over density once per day of production
[d]Take and split a sample of the loose RAP and CIR mixture daily at a location determined by the Engineer. Split the RAP and CIR samples into 2 parts and label the containers with location and station. Submit 1 split part and use 1 part for your testing. Determine maximum theoretical density of the CIR sample under California Test 309. Use the maximum theoretical density and calculate air voids under California Test 308 for each compaction test site and the average of the lot. Report air voids ratio on daily quality control inspection records. The Department does not use your California Test 309 test results and air voids to determine specification compliance.

30-5.01D(4)(d) Smoothness

Straightedge and record surface smoothness at least once every 1000 feet along the cut length.

Stop milling activities and immediately inform the Engineer whenever:

1. Variance of more than 0.03 foot measured from the lower edge of a 12-foot straightedge placed parallel with the centerline
2. Transverse slope variance of more than 0.02 foot measured from the lower edge of a 12-foot straightedge
3. Visual inspection shows evidence of
   3.1. Raveling
   3.2. Loose material
   3.3. Non-uniform surface texture

After completing CIR activities, determine surface smoothness under section 39-1.01D(8)(j).

Correct MRI greater than 75 in/mi for a 0.1-mile section and areas of localized roughness greater than 180 in/mi.

The final HMA surface MRI must be 60 in/mi or less for each 0.1-mile section and areas of localized roughness not greater than 160 in/mi.

30-5.01D(5) Acceptance Criteria

The Engineer samples materials for testing under California Test 125.

CIR acceptance is based on:

1. Visual inspection for the following:
   1.1. Segregation, raveling, rutting, humps, depressions, roller marks, and loose material.
   1.2. Uniform surface texture throughout the work limits.
2. Compliance with smoothness requirements under 30-5.01D(4)(d).
3. For ERA acceptance is based on the Department's sampling and testing for compliance with the requirements for the quality characteristics shown in table in 30-5.02E.

4. Compliance with quality requirements in the following table:

Quality Characteristic	Test method	Requirement	Sampling location
Wet gradation (% passing) Sieve Size 1 inch	California Test 202	100	Loose RAP before adding ERA
Dry gradation (% passing) Sieve size 1-inch 3/4-inch No. 4 No. 30 No. 200	California Test 202	Report only	
Relative compaction (%, min)	California Test 375[a]	95	Compacted mix
Thickness (inch)[b] Each Core Average thickness of cores	Core measurements	±0.75 inch of the thickness shown ≥ thickness shown	Compacted mix

Notes:
[a] In-place density and relative compaction under California Test 375 except the break-over point is used instead of maximum density under California Test 216. Relative compaction of each individual location must be greater than or equal to 95 percent and less than or equal to 105 percent of the break-over point obtained in the test strip. The average relative compaction must be greater than or equal to 97 percent or less than or equal to 103 percent of the break-over point in the test strip.
[b] Take 4- or 6-inch core from three random locations per lot as determined by the Engineer.. Coring at more than 3 locations per lot is change order work. Submit cores to the Engineer for measurement immediately after coring.

If the Engineer orders you to stop CIR activities for noncompliance, before resuming activities:

1. Notify the Engineer of the adjustments you will make
2. Reprocess, remedy, or replace the noncompliant lot
4. Obtain the Engineer's authorization

30-5.01D(6) Dispute Resolution

You and the Engineer must work together to avoid potential conflicts and to resolve disputes regarding test result and visual inspection discrepancies. Notify the Engineer within 5 business days of receiving a test result if you dispute the test result.

If you or the Engineer dispute each other's test results, submit quality control test results and copies of paperwork including worksheets used to determine the disputed test results. An independent third party (ITP) performs referee testing. Before the ITP participates in a dispute resolution, the ITP must be qualified under AASHTO Materials Reference Laboratory program (AMRL), and the Department's Independent Assurance Program. The ITP must be independent of the project. By mutual agreement, the ITP for referee testing is chosen from:

1. A Department laboratory
2. A Department laboratory in a district or region not in the district or region the project is located
3. The Transportation Laboratory
4. A laboratory not currently employed by you or your CIR producer

If split QC or acceptance samples are not available, the ITP uses any available material representing the disputed CIR for evaluation.

If you or the Engineer dispute each other's visual inspection findings, submit copies of your visual inspection findings. An independent third party (ITP) consisting of a Department expert and a CIR industry or Academia expert will perform a joint visual inspection. The ITP must be independent of the project. The ITP is chosen by mutual agreement.

30-5.02 MATERIALS

30-5.02A General

A summary of existing material investigations is available in the *Information Handout* as supplemental project information.

30-5.02B Water

If a water source other than potable water is used, test water for chlorides and sulfates.

30-5.02C Cement

Cement must comply with section 90-1.02B(2).

30-5.02D Reclaimed Asphalt Pavement

Cold plane existing asphalt pavement and process to produce RAP. RAP must be processed by mechanical means to pass the 1-inch sieve.

Separate RAP larger than 1 inch by screenings or other means and dispose of or reprocess RAP larger than 1-inch.

30-5.02E Emulsified Recycling Agent

Use PG 64-10 as the asphalt binder in the ERA.

The ERA must comply with the values shown in the following table:

Emulsified Recycling Agent Requirements

Property	Test method	Requirement	
		Minimum	Maximum
Test on emulsion:			
Sieve test, % of weight sample	AASHTO T 59	--	0.1
Residue by evaporation, %	California Test 330	63	70
Test on residue by evaporation:			
Penetration at 25 °C, 100 g/ 5 sec	AASHTO T 49	40	120
Ductility at 25 °C and 50 mm/minute, mm	AASHTO T 51	400	--
Creep stiffness, Test temperature, °C max S-value, MPa min M-value	AASHTO T 313	Note a	

[a]Must comply with the requirements for the PG binder specified.

30-5.02F CIR Mix Design

The mix design must include RAP from the job site, ERA, cement, and water.

The mix design must comply with Lab Procedure LP-8 and the requirements shown in the following table:

Mix Design Requirements

Quality Characteristic	Test Method	Requirement
RAP asphalt content, %	ASTM D 2172, Method B	Report only
Bulk specific gravity of compacted samples[a, b]	AASHTO T 275	Report only
Maximum theoretical specific gravity[b]	AASHTO T 209	Report only
Air voids of compacted and cured specimens[b], %	AASHTO T 269	Report only
Marshall Stability, cured specimen[b] at 104 °F, lbs min	AASHTO T 245	1250
Marshall retained stability[b, c] at 104 °F based on moisture conditioning on cured specimen, % min	AASHTO T 245	70
Ratio of emulsion residue to cement	--	3.0
Raveling test at 50 °F, % max	Lab Procedure LP-8, Section 9	7
RAP coating Test, %	AASHTO T 59	95

[a]-inch diameter mold compaction based on gyratory compactor at 30 gyrations.
[b]Test specimens after 140 °F curing to constant weight between 16 hours and 48 hours.
[c]Vacuum saturation from 55 percent to 75 percent. Water bath at 77 °F for 23 hours, with the last 30 minutes to 40 minutes in 104 °F water bath.
[d]If the saturated Marshall Stability is at least 1500 lbs, the Marshall Retained Stability ratio may be reduced to 60 percent.

Cement must be at least 0.25 but not more than 1.0 percent of the dry weight of RAP.

You may add water to facilitate mixing ERA and RAP uniformly. The added water must not exceed 4.0 percent by weight of the dry RAP. Do not reduce the amount of ERA due to the added water.

If additional mix designs are required, their design and submittal are change order work.

30-5.02G Temporary Structural Section

Use HMA Type A to construct a temporary structural section.

The HMA Type A for the temporary structural section must include:

1. 1/2-inch aggregate grading.
2. Asphalt binder grade PG 64-10, PG 64-16, or the binder grade specified for the HMA layer on the CIR surface
3. Method construction process as specified in section 39-2.01D(5)

The bituminous material for the temporary structural section must:

1. Contain aggregate using 1/2-inch HMA grading
2. Use liquid asphalt, Grade SC-800

30-5.02H Asphaltic Emulsion

Asphaltic emulsion must be Grade SS1h or Grade CSS1h. If ERA meets the specification requirements for Grade SS1h or Grade CSS1h emulsion, it may be used as the asphaltic emulsion.

Notify the Engineer if you dilute the asphaltic emulsion with water. The ratio by weight of added water to asphaltic emulsion must not exceed 1 to 1.

Measure added water weight.

30-5.02I Sand Cover

Sand used for sand cover must comply with the material specifications for fine aggregate in section 90-1.02C. Sand must not contain more than 2 percent moisture by dry weight of sand.

30-5.03 CONSTRUCTION

30-5.03A General

Do not disturb or damage the underlying materials during cold-planing activities. Do not use a heating device to soften the pavement.

Before starting CIR activities, provide 200 tons of commercial quality bituminous surfacing material onsite for maintenance and protection of the completed CIR surface. Use liquid asphalt SC-800 in compliance with section 93 for the commercial quality bituminous surfacing material.

Use the same equipment, materials, rolling pattern and construction methods that were used for the authorized test strip for the remainder of the CIR work. Any adjustments must be authorized.

If the equipment or process fail to meet the specifications, stop CIR activities and notify the Engineer.

30-5.03B Surface Preparation

Before starting CIR activities, prepare the existing roadway by:

1. Removing loose material from the roadway width including:
   1.1. Dirt
   1.2. Vegetation
   1.3. Standing water
   1.4. Combustible materials
   1.5. Oils
   1.6. Pavement markers and underlying adhesive.
2. Accurately referencing the existing pavement's profile and cross slope.
3. Accurately marking the proposed longitudinal cut lines on the existing roadway surface.

30-5.03C Cold In-Place Recycling Equipment

30-5.03C(1) General

The equipment for CIR must consist of recycling train for:

1. Cold planing
2. Pulverizing, crushing, or sizing
3. Mixing and proportioning
4. Water storage and supply
5. Cement storage and supply
6. Cement mixing and spreading
7. CIR mixture spreading
8. Compacting
9. Applying asphaltic emulsion to the surface
10. Spreading sand cover

Use equipment that:

1. Cold planes, crushes, and sizes the existing asphalt pavement
2. Mixes the RAP with the ERA and cement into a homogeneous and uniformly coated mixture
3. Places the CIR mixture to the lines, grades, and specifications

Pulverizing, crushing, or sizing equipment must produce uniform material to the specified size before mixing RAP with ERA.

30-5.03C(2) Cold-Planing Equipment

The cold-planing machine must:

1. Be self-propelled
2. Have a 12-foot minimum wide cutter that can remove the existing pavement to the specified depths
3. Be equipped with automatic depth and cross slope controls capable of maintaining the cutting depth to within 0.25 inch of the shown depth.
4. Be equipped with ski devices for longitudinal profile. The ski devises maybe conventional contact ski or noncontact laser or sonar devise.

A cold-planing machine with a cutter narrower than 12 feet wide may be used for shoulders and miscellaneous areas.

30-5.03C(3) Mixing Chamber or Pugmill

Provide a continuous mixing chamber or pugmill mixing machine as part of the recycle train with either a belt scale or an integrated microprocessor control system to control:

1. RAP delivered to the mixing chamber or pugmill
2. Amount of ERA being delivered

Equip the mixing chamber or pugmill with paddles or other suitable mixing device arranged to mix the RAP, ERA, and cement to produce the specified CIR mixture. Feed RAP from the pulverizing, crushing, or sizing equipment to the mixer at a uniform and controlled rate.

The paver's loading equipment must pick up the CIR mixture and deposit it in the paving machine without waste. If the paving screed is directly attached to the CIR equipment, feed the CIR mixture directly to the paving screed.

30-5.03C(4) Mixing and Proportioning Equipment

30-5.03C(4)(a) General

Use a mass flow, Coriolis Effect type meter with a visible readout display and printing capabilities.

The weighing and measuring devices for the ERA and cement must comply with the requirements of the Material Plant Quality Program (MPQP). You may use equipment that has successfully passed the calibration requirements of MPQP within the past 6 months.

30-5.03C(4)(b) Cement Continuous Mixing Equipment

For continuous mixing of cement slurry, the proportioning device must be capable of determining the exact ratio of water to dry cement at each production rate.

Rate-of-flow indicators and totalizers for similar materials must be accurate within 0.5 percent of each other.

The cement continuous mixing equipment must include:

1. Belt scale for weighing cement. The belt scale must operate between 30 to 100 percent of production capacity. The average difference between the indicated and actual material weight must not exceed 0.5 percent of the actual material weight for 3 individual runs. For each run, the indicated weight must not vary from the actual material weight by more than 1 percent of the actual weight. Test for belt scale accuracy must be for at least 0.5 tons of cement. Actual material weight must be verified on a certified scale.
2. Water meter for measuring water used in cement slurry. The meter must operate between 50 to 100 percent of production capacity. The average difference between the indicated and actual water weight must not exceed 1 percent of the actual weight for 3 individual runs. Test for water meter accuracy must be for at least 300 gallons of water.

Meters and scales must be equipped with:

1. Rate-of-flow indicators that show the delivery rates of cement and water
2. Resettable totalizers that indicate the total amount of cement and water introduced into the slurry storage tank

Feeds for water and cement must be equipped with no-flow devices that stop slurry production when the individual ingredients are not being delivered to the cement slurry storage tank.

30-5.03C(4)(c) Cement Batch Mixing Equipment

For batch-type mixing of cement slurry, the proportioning equipment must include:

1. Certified weight scale.
2. Water meter equipped with a resettable totalizer. Test for water meter accuracy must be for at least 300 gallons of water.

If an automatic controller is used to batch the cement, the controller must also control the water proportioning.

If an automatic controller is used to proportion the water, the indicated draft of the water must be within 1 percent of its total draft weight.

The meter must operate between 50 to 100 percent of production capacity. The average difference between the indicated and actual water weight must not exceed 1 percent of the actual weight for 3 individual runs.

30-5.03C(5) Water Storage and Supply Equipment

As part of the recycle train, provide an independent supplemental water source separate from the water added to the mill to cool the teeth. Interlock the supplemental water with the RAP weighing device or microprocessor to properly disperse the ERA.

The water source for the ERA must be independent of the cement slurry and be capable of maintaining a consistent water supply of 0.5 to 4.0 percent by weight of the RAP.

30-5.03C(6) Cement Storage and Supply Equipment

Provide cement slurry storage and supply equipment with agitators or similar equipment to keep the cement slurry in suspension while held in the slurry feed tank.

If cement is spread dry to the existing pavement, use a spreader capable of spreading the cement at the required weight per unit area. The spreader must have working scales and distance measuring devices to control the spread rate.

30-5.02C(7) Spreading Equipment

Spreading equipment must comply with section 39-1.03B.

Spreading equipment must be equipped with ski devices for longitudinal profile. The ski devises maybe a conventional contact ski or noncontact laser or sonar devise.

30-5.03C(8) Compacting Equipment

Compacting equipment must comply with sections 39-1.03B and 39-1.03B(3). Provide a minimum of 1 pneumatic-tired roller weighing at least 25 tons and 1 double drum vibratory steel-wheeled roller weighing at least 10 tons. Rollers must be at least 5.5 foot wide. Each roller must have a working water spray system.

30-5.03D Cold In-Place Recycling

30-5.03D(1) General

Do not perform CIR activities under the following conditions:

1. Pavement surface is wet due to rain.
2. Rain is forecasted within 24 hours of the scheduled work.
3. Pavement temperature is less than 60 degrees F.
4. Ambient temperature is less than 50 degrees F.
5. 30 minutes before sunset.

Use the existing pavement profile and cross slope to establish the CIR finished profile and cross slope. You may adjust the recycling depth by +/- 0.75 inch from the depth shown to achieve uniform pavement profile, cross slope, and surface smoothness. The average recycled depth determined by cores must be equal to or greater than the depth shown.

30-5.03D(2) Cold Planing

Do not leave gaps of unrecycled material between successive cuts along the same longitudinal cut line. Do not leave untreated wedges created by the entry of the milling drum into the existing pavement. Longitudinal joints between successive cuts must overlap by 4 inches minimum.

During cold-planing of existing pavement use automatic controls for profile and cross slope. The cutting head nearest the centerline must be controlled by a sensor activated by a ski device not less than 20 feet long. The end of the cutting head farthest from centerline must be controlled by:

1. A sensor activated by a similar ski device if adjacent to a lane or paved shoulder.
2. An automatic transverse slope device set to reproduce the existing pavement cross slope if adjacent to an unpaved shoulder or no shoulder

When cold-planing adjacent to previously completed CIR lanes use automatic controls for profile and cross slope. The end of the cutting head adjacent to the CIR lane must be controlled by a sensor that responds to the grade of the previously completed CIR surface and will reproduce the grade within a 0.01-foot tolerance. The end of the cutting head farthest from the previously completed CIR surface must be controlled in the same way it was controlled during initial cold-planing.

30-5.03D(3) Unsuitable Conditions

If you encounter unsuitable subgrade material you will:

1. Notify and meet with the Engineer immediately.
2. Clearly define the unsuitable material areas and depth.
3. Excavate and dispose of any unsuitable subgrade material encountered.
4. Unless otherwise ordered, backfill the excavated area with Class 2 AB as specified in section 26.
5. Submit within 24 hours of defining unsuitable material the following:
   - 5.1. Unsuitable areas including station or postmile, length, width, depth and centerline offset
   - 5.2. Remediation taken, including quantities of materials used.

Top the Class 2 AB with HMA Type A or a premixed bituminous material equivalent in thickness to the existing asphalt concrete layer adjacent to the excavation. If premixed bituminous material is used, remove and replace it with HMA Type A prior to placing final surfacing. Place HMA in layers and compact until the level of the CIR surface is reached.

Excavating and disposing of unsuitable material and replacing with AB and surfacing material is change order work.

30-5.03D(4) Cement

Add the cement into the recycling process by one of the following methods:

1. Add at the mill head as a slurry
2. Add directly in the pugmill as a slurry
3. Spread on the existing pavement surface ahead of the recycling train in a dry form

If you spread the cement directly to the existing pavement, do not spread more than 100 feet ahead of the recycling train. Do not spread under windy conditions and employ dust control measures to minimize fugitive dust.

Do not allow spread cement to remain exposed at the end of the work shift. Do not allow traffic other than the recycling equipment to pass over the spread cement.

30-5.03D(5) Proportioning

Using the mass flow, Coriolis Effect type meter, measure the cement slurry and ERA before adding them into the RAP. The amount of cement slurry and ERA must match the amount reported in the JMF or the amount as adjusted and authorized.

Keep cement slurry in suspension during transport using agitator equipment. Keep dry cement in dry cement spreader trucks, pneumatic trailers, or silos.

30-5.03D(6) Spreading and Initial Compacting

Remove any visible oversized crack treatment material larger than 1 inch measured at any dimension in the RAP or in the CIR mixture before placement and compaction.

When placing the initial mat of CIR, the end of the screed nearest the centerline must be controlled by a sensor activated by a ski device not less than 20 feet long. The end of the screed farthest from centerline must be controlled by:

1. A sensor activated by a similar ski device if adjacent to a lane or paved shoulder.
2. An automatic transverse slope device set to reproduce the existing pavement cross slope if adjacent to an unpaved shoulder or no shoulder.

When paving contiguously with previously placed CIR, the end of the screed adjacent to the previously placed CIR must be controlled by a sensor that responds to the grade of the previously placed CIR surface and will reproduce the grade in the new CIR within a 0.01-foot tolerance. The end of the screed farthest from centerline must be controlled by:

1. A sensor activated by a ski device if adjacent to a lane or paved shoulder.
2. An automatic transverse slope device set to reproduce the existing pavement cross slope if adjacent to an unpaved shoulder or no shoulder

You may vary the depth of the CIR to achieve uniform CIR pavement profile, cross slope, and surface smoothness.

Do not allow segregation, tearing, or scarring of the compacted surface.

Determine the time interval between spreading and compacting CIR mixture. Establish the time interval based on ambient temperatures, weather, and type of ERA. Record the time intervals in the daily quality control records. Avoid starting or stopping rolling on uncompacted material.

Compact the CIR mixture by implementing the same compaction rolling pattern established in the authorized test strip.

Establish a new rolling pattern and a new maximum density if any of the following occur:

1. Relative compaction of any of the 10 individual locations is less than 95 percent of the break-over point density
2. Average relative compaction of the lot is less than 95 percent of the break-over point density
3. Changes in RAP or proportions
4. Changes in equipment or procedures
5. Change in temperature or weather conditions affecting mixing and compaction temperatures of the placed mixture
6. Visible displacement or cracking occurs

Perform final rolling with a double-drum vibratory steel-wheel roller operating in static or vibratory mode.

The compacted CIR surface must be free from raveling, segregation, rutting, humps, depressions, roller marks, or irregularities. Rework, recompact, or remove and replace CIR that shows raveling, segregation, rutting, humps, depressions, roller marks, or irregularities.

30-5.03E Asphaltic Emulsion and Sand Cover

After initial compaction and before opening the CIR surface to traffic, apply a coat of asphaltic emulsion followed by sand cover to the CIR surface. Apply asphaltic emulsion and sand cover under section 37-2.03C

Remove excess sand from the pavement surface by sweeping before opening to traffic.

30-5.03F Temporary Structural Section

Place a temporary structural section to the level of the CIR surface if:

1. You are unable to complete the CIR before opening to roadway to traffic
2. CIR fails during the maintaining period by raveling or rutting

If a bituminous material is used, remove and replace it with HMA Type A. Place HMA in layers and compact until the level of the CIR surface is reached.

30-5.03G Maintain, Cure and Protect Surface

Do not re-compact the CIR or place the HMA layer until the CIR surface is in place for at least one of the following conditions:

1. 3 days and until less than 2.0 percent moisture is measured at mid-depth of the CIR pavement
2. 10 days without rainfall

Immediately repair any damage or defects by:

1. Reworking and re-compacting the CIR surface
2. Replacing any damaged area with the same depth of cold bituminous surfacing material or HMA

30-5.03H Supplemental Compaction

Re-compact the CIR surface:

1. After curing is completed per section 30-5.03G, within 15 days.
2. Before smoothness testing
3. Before placing the HMA surfacing

Use the same equipment and rolling pattern used for re-compacting the authorized test strip. Adjustments must be authorized.

30-5.04 PAYMENT

Test strips are paid for as CIR.

The Department does not adjust the unit price for an increase or decrease in the quantity for:

1. Cement (cold in-place recycling)
2. Emulsified recycling agent (cold in-place recycling)
3. Asphaltic emulsion (cold in-place recycling)
4. Sand cover (cold in-place recycling)