

PROJECT SPECIAL PROVISIONS

Project specific amendments to the

2015 Standard Specifications for Public Works Construction "Greenbook"

and

City of San Marcos Standard Special Provisions

The City of San Marcos hereby requires that these Project Special Provisions be used with the RANCHO SANTA FE ROAD PAVEMENT RESTORATION PROJECT (ST014) and Agreement to which they are attached. The modifications, additions, or deletions shall take precedence as indicated in the Section 2-5.2 of the Standard Special Provisions. All work performed will be done in accordance with the Contract Documents.

Isaac Etchamendy, City Engineer

R.C.E No. 81294, Expires 09-30-2025

Date:

PART 1- GENERAL PROVISIONS

2-1.3 SCOPE OF WORK

The scope of work consists of replacement of twelve curb ramps, asphalt pavement removal and replacement, and four traffic signal modifications and several utility adjustments all in accordance with the Plans and these Special Provisions.

The items are to be constructed, finished, and installed in a complete and satisfactory manner in accordance with City Standard Specifications, Vallecitos Water District Specifications, Caltrans Standard Specification and these Special Provisions.

STANDARD SPECIFICATIONS AND STANDARD DRAWINGS:

- City of San Marcos Municipal Code
- Standard Specifications for Public Works Construction, 2015 Edition (“Greenbook”)
- San Diego Regional Standard Drawings (“SDRSD”), dated September 2012
- City of San Marcos Standard Special Provisions
- 2014 California Manual on Uniform Traffic Control Devices, Revision 6 (“MUTCD”)
- California Code of Regulations (CCR)
 - a. Title 19, Public Safety Title
 - b. 24, California Building Standards Code
 - c. 28 CCR Part 35
 - d. 36 CCR Part 1191
- Uniform Mechanical Code
- Uniform Plumbing Code
- Uniform Fire Code
- American National Standards Institute (ANSI)
- American Society of Mechanical Engineers (ASME)
- American Water Works Association (AWWA)
- American Welding Society (AWS)
- American Iron and Steel Institute (AISI)
- National Fire Protection Association (NFPA)

All provisions applicable to the work to be performed in accordance with these drawings and Special Provisions of this project shall apply whether specifically referred to herein or not. References to these various standards have been made in these Special Provisions. These references apply directly to the work the Contractor is to perform.

PART 2 – CONSTRUCTION MATERIALS
SECTION 203 – BITUMINOUS MATERIALS

ADD THE FOLLOWING SECTION

203-16 POLYMER MODIFIED ASPHALT CONCRETE (PMAC)

203-16.1 GENERAL

PMAC shall be the product of mixing mineral aggregate and up to 20 percent reclaimed asphalt pavement (RAP) with polymer modified paving asphalt at a central mixing plant.

203-16.2 MATERIALS

203-16.2.1 POLYMER MODIFIED PAVING ASPHALT

Polymer modified paving asphalt shall consist of paving asphalt containing polymer. The polymer shall be incorporated into the paving asphalt such that a smooth and homogeneous composition results. Polymer modified paving asphalt shall be performance graded as PG 64-28PM and shall conform to the requirements for the respective performance grade shown in Table 203-14.2.1 (B) except for the recycled whole scrap tire rubber content.

The Contractor shall submit a Certificate of Compliance conforming to 4-5 for each performance grade used in the Work.

203-16.2.2 AGGREGATE

Aggregate shall conform to 203-6.4.3.

203-16.2.3 MINERAL FILLER

Mineral filler shall conform to 203-6.2.4.

203-16.2.4 RECLAIMED ASPHALT PAVEMENT (RAP)

RAP shall conform to 203-6.2.5.

203-16.3 JOB MIX FORMULAS AND MIX DESIGNS

Job Mix Formulas and Mix Designs shall conform to 203-6.3 using the superpave PMAC mix design as described in MS-2 Asphalt Mix Design Methods by the Asphalt Institute.

203-16.4 PMAC MIXTURES

203-16.4.1 CLASS AND GRADE

PMAC shall be specified by class of combined aggregate gradation and performance grade of polymer modified paving asphalt.

The class and grade shall be as shown on the Plans or specified in the Special Provisions.

203-16.4.2 COMBINED AGGREGATES AND RAP

Combined aggregates and RAP shall conform to 203-6.4.3. Up to 20% RAP is allowed in the mixture.

203-16.4.3 COMPOSITION AND GRADING

Composition and grading shall conform to 203-6.4.3.

203-16.5 PRODUCTION

Production shall conform to 203-6.7.

203-16.6 STORAGE

Storage shall conform to 203-6.8.

203-16.7 TRANSPORTATION

Transportation shall conform to 203-6.9.

203-16.8 SAMPLING

Sampling shall conform to 203-6.10.

203-16.9 ACCEPTANCE

Acceptance will be based upon conformance to the gradation, asphalt binder content, and minimum stability requirements shown in Table 203-6.4.4. The asphalt binder content shall be within +/- 0.5 percent of that shown on the respective job mix formula or mix design. Air voids will not be used as an acceptance criterion.

Should plant gradation test results be unavailable, gradation may be determined in accordance with ASTM D2172 or by AASHTO T 308 with adherence to the aggregate correction factor therein. In the case of a continued dispute, final acceptance of plant produced mixtures may be based upon binder content and stability.

When dissimilar surface course mix characteristics are the result of production and delivery from multiple plants, the Engineer may require production and delivery from only one plant during any one Day of production.

PART 3 – CONSTRUCTION METHODS

SECTION 300 – EARTHWORK

300-1 CLEARING AND GRUBBING

300-1.1 GENERAL

ADD THE FOLLOWING

Clearing and Grubbing shall also include, but is not limited to, the following items:

- All **“Sawcut”** (asphalt concrete and Portland cement concrete pavement).
- Removal and disposal of pavement fabrics as noted in the geotechnical report. This Work is incidental to the Work and shall be considered included in the various bid items of Work, and no separate or additional compensation will be allowed therefor.
- Removal and disposal of concrete (sidewalk, curb and gutter, cross gutters and curb ramps) under bid items **“Concrete Removal (Curb and Curb & Gutter)”** and **“Concrete Removal (Sidewalk, Curb Ramp, Cross Gutter and Spandrel).”**
- Removal of vegetation within the project footprint. This Work is incidental to the Work and shall be considered included in the various bid items of Work, and no separate or additional compensation will be allowed therefor.
- Removal and replacement of crushed aggregate. This Work is incidental to the Work and shall be considered included in the various bid items of Work, and no separate or additional compensation will be allowed therefor.
- Utility adjustment and relocations (water valves, water meter, sewer manholes, storm drain manholes) under bid items **“Double Adjust to Finish Grade Water Valve (first adjustment to minimum 6” below finish surface),”** **“Double Adjust to Finish Grade Sewer Manhole (first adjustment to minimum 6” below finish surface),”** **“Double Adjust to Finish Grade Storm Drain Manhole (first adjustment to minimum 6” below finish surface),”** and **“Double Adjust to Finish Grade Water Meter (first adjustment to minimum 6” below finish surface).”**
- Dust control throughout the duration of the project conforming to Section 3-12.2, Air Pollution Control, of the Standard Specification. This Work is incidental to the Work and shall be considered included in the various bid items of Work, and no separate or additional compensation will be allowed therefor.
- Survey Monument adjustments under **“Double Adjust to Finish Grade Survey Monument (first adjustment to minimum 6” below finish surface),”**
- **“Furnish and Install Lid and Valve Box Frame per VWD STD W-14 (first adjustment to minimum 6” below finish surface).”**
- Removal of all items necessary to complete the work within the project footprint including items not specifically shown on the construction drawing plans but discoverable through site visit or other reasonable means at time of bid. The Engineer shall have sole discretion in determining what items were “discoverable” but will generally be defined as items that could be seen, measured, and/or otherwise identified through surface investigation. This Work is incidental to the Work and shall be considered included in the various bid items of Work, and no separate or additional compensation will be allowed therefor.

300-1.4 PAYMENT

DELETE AND REPLACE WITH

Measurement for the various items of work under this section 300-1 (**CLEARING AND GRUBBING**) shall be measured in accordance with the units indicated in the bid schedule and as specified in the various sections of these Special Provisions.

Payment for **CLEARING AND GRUBBING** Work under this section shall be made at the contract unit prices paid for the various bid items, all Work within the Project Site and at stockpile locations and shall include full compensation for all labor, materials, tools, and equipment as indicated in the Specifications and as directed by the Engineer, and no additional payment will be made therefor. The unit prices paid shall include full compensation for removal and disposal of all the resulting materials.

300-2 UNCLASSIFIED EXCAVATION

300-2.1 GENERAL

DELETE AND REPLACE WITH

Unclassified Excavation shall consist of making all cuts and fills to the lines and grades as shown in the plans, stockpiling of suitable material, transport of stockpiled material to its ultimate location, all mixing, moisture conditioning, and compaction of stockpile and fill material, and export of excess material to approved areas.

Unclassified Excavation shall also include removal of any soil within the project footprint, imported borrow from site of suitable material in accordance with Section 300-4 Unclassified Fill and Section 300-5 Borrow Excavation of the Standard Special Provisions, if necessary, moisture conditioning and compaction to 95 percent relative compaction within roadway. The Contractor shall ensure that the finish grade shall be smoothly feathered into the existing surrounding line and grade outside the roadway footprint excavation.

ADD THE FOLLOWING

300-2.9 PAYMENT

Payment for "**Unclassified Excavation**" shall be paid for at the Contract unit price as shown in the bid and shall include full compensation for all permits, labor, import borrow, unclassified fills, materials, tools and equipment for doing all work involved in removal of soil, moisture conditioning, compaction and exporting of excess soil to other fill areas within the park and as specified in these Special Provisions and as directed by the Engineer, and no additional payment will be made therefor.

SECTION 301 – SUBGRADE PREPARATION, TREATED MATERIALS AND PLACEMENT OF BASE MATERIALS

301-2 UNTREATED BASE

301-2.4 MEASUREMENT AND PAYMENT

ADD THE FOLLOWING

Payment for "**Class II Aggregate Base**" shall be made at the contract unit price per cubic yard (CY) based on the volumetric quantity shown on the plans and shall include full compensation for furnishing all labor, materials, equipment, tools, and incidentals, for doing all work involved in the subgrade preparation unless included in other bid items, spreading, compaction to 95 percent relative compaction and installation of the aggregate complete in place and to correct grade, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the City, and no additional payment shall be made therefor.

302-5 ASPHALT CONCRETE PAVEMENT

ADD THE FOLLOWING SECTION

302-14 POLYMER MODIFIED ASPHALT CONCRETE (PMAC) PAVEMENT

302-14.1 GENERAL

PMAC shall conform to 203-16.

302-14.2 TACK COAT

Tack coat shall conform to 302-5.4.

302-14.3 DISTRIBUTION AND SPREADING

Distribution and spreading shall conform to 302-5.5.

ADD THE FOLLOWING

No AC windrows will be allowed during the top 2" of paving. Only a surge volume/remix material transfer vehicle (MTV) is allowed to receive the AC from the haul trucks and place it in the self-propelled mechanical spreading and finishing machine. If the Engineer determines the use of the MTV is not practical for a portion of the project, the Engineer may waive its requirements for that portion.

If work is performed without written approval it may, at the discretion of the Engineer, result in forfeiture of payment.

302-14.4 ROLLING

Rolling shall conform to 302-5.6.

302-14.5 JOINTS

Joints shall conform to 302-5.7. Longitudinal joints shall align with the proposed longitudinal striping. If multiple lifts are placed, joints shall be offset a minimum of 6" between lifts, with longitudinal joints of the surface course aligning with the proposed longitudinal striping.

302-14.6 MANHOLES (AND OTHER STRUCTURES)

Manholes and other structures shall conform to 403-3.

302-14.7 MEASUREMENT AND PAYMENT

Payment for "**Asphalt Concrete Pavement (C2-PG 64-28PM)**" shall be at the contract unit price per ton (Ton) and shall include full compensation for furnishing all labor, materials, equipment and incidentals necessary to perform the work complete in place, including tack coat application to existing surfaces; subgrade preparation, stockpiling, overlaying, compaction, permits, disposal fees, etc., as specified in the Standard Specifications, these Special Provisions and as directed by the City, and no additional payment shall be made therefor.

The Contractor shall furnish to the Engineer at the time of delivery to the Work site, a legible copy of a licensed weighmaster certificate showing gross, tare, and net weights of each truckload of PMAC. When an automatic batching system is used, the certificate may show only the net weight of PMAC in the truckload.

Failure of the Contractor to provide a licensed weighmaster certificate to the Engineer by the end of the day on which the PMAC represented by such certificate was delivered to the Work site may, at the discretion of the Engineer, result in forfeiture of payment.

SECTION 303 – CONCRETE MASONRY CONSTRUCTION

303-5 CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS, ACCESS RAMPS, AN DRIVEWAYS

303-5.9 MEASUREMENT AND PAYMENT

DELETE THIRD PARAGRAPH AND ADD THE FOLLOWING

Measurement for the various items of work under Portland Cement Concrete (P.C.C.) Construction shall be measured in accordance with the units indicated in the bid schedule and as specified in the various sections of these Special Provisions.

Full compensation for Portland Cement Concrete construction is considered included in the unit or lump sum prices paid for the various concrete bid items and no additional compensation will be allowed therefor. The unit or lump sum prices paid for the items of work shall include full compensation for furnishing all labor, materials, reinforcement, tools, equipment, transportation, joints, joint sealant, structure excavation and backfill, forms, finishing, curing, scoring, steel reinforcement, joints, and incidentals necessary for a complete installation, Complete-In-Place, and no additional compensation will be allowed therefor.

Concrete bid items include, but are not limited to:

- **Construct 6" Type G Curb and Gutter per SDRSD G-2**
- **Construct 4" PCC Sidewalk per SDRSD G-7, G-9, G-10, G-11**
- **Construct Curb Ramp per Plan (All Types) Modified per Plans**
- **Concrete Cross Gutter and Spandrel per SDRSD G-12**
- **Furnish and Install Mortared Cobble**
- **Construct Modified Curb Outlet Type B per SDRSD D-25B**

SECTION 314 – TRAFFIC STRIPING, CURB AND PAVEMENT MARKING, AND PAVEMENT MARKERS

314-4 APPLICATION OF TRAFFIC STRIPING AND CURB AND PAVEMENT MARKINGS

DELETE SECTION AND REPLACE WITH

314-4.3.7 PAYMENT

DELETE SECTION AND REPLACE WITH

Payment for “**Traffic Signing and Striping**” shall be made at the lump sum (LS) unit price and shall include full compensation for furnishing all labor, materials, equipment, tools, and incidentals, for doing all work involved in the removal, application of traffic striping, curb and pavement markings, thermoplastic markings, all new and relocated signs, posts and appurtenances as specified in the Plans, Standard Specifications, these Special Provisions, and as directed by the City and no additional payment shall be made therefor.

The Contractor shall provide the Schedule of Values for Traffic Signing and Striping to the Agency at the pre-construction meeting for review and approval by the Engineer in accordance with Section 9-2.1 Schedule of Values of the City of San Marcos Standard Special Provisions. Schedule of values will also be used for payment of additional items above the original estimate.

ADD THE FOLLOWING

314-6 TEMPORARY TRAFFIC STRIPING AND PAVEMENT MARKINGS.

314-6.1 General. Unless otherwise specified in the Special Provisions or shown on the TCP, temporary traffic striping and pavement markings shall consist of one coat of paint and glass beads (except black stripes). Glass beads shall conform to 214-3. Paint shall conform to 214-4.

314-6.2 Application. Unless otherwise specified, application of temporary traffic striping and pavement markings shall conform to 314-4 and the following:

- a) Yellow lines shall separate traffic flow in opposing directions.
- b) White lines shall separate traffic flow in the same direction.
- c) Broken lines shall be permissive.
- d) Solid lines shall be restrictive.
- e) Line widths indicate degree of emphasis.
- f) Double lines indicate maximum restriction.
- g) Centerlines shall be used to separate opposing traffic.
- h) Traffic striping shall not project into or across a street intersection.

314-6.3 Removal. Removal shall conform to 314-2.

314-6.4 Measurement and Payment. No separate measurement or payment will be made for Temporary Traffic Striping and Pavement Markings. Full compensation for Temporary Striping and Pavement Markings shall be considered included in the various items of Work and no additional compensation will be allowed therefor.

ADD THE FOLLOWING

315 PORTABLE CHANGEABLE MESSAGE SIGNS.

The Contractor shall place at least one Portable Changeable Message Sign (PCMS) near each end of the Project limits, and at all legs of the intersection of Rancho Santa Fe Road and Melrose Drive. The PCMS shall warn motorists of the construction activities 7 days prior to start of construction and shall remain for the entire duration of the work. Contractor shall include the location of each PCMS and associated traffic control devices necessary to protect the public and the PCMSs in each Stage Traffic Control Plan to assure that the PCMSs do not conflict with the Stage Traffic Control.

No separate measurement or payment will be made for providing Portable Changeable Message Signs in accordance with this section. Full compensation for PCMSs shall be considered included in the bid item "**Public Convenience, Safety, and Traffic Control**" and no additional compensation will be allowed therefor.

PART 7 – ELECTRICAL SYSTEMS

DELETE PART 7 AND REPLACE WITH SECTION 86, "ELECTRICAL SYSTEMS", EXCLUDING SECTIONS 86-7 THROUGH 86-8, OF THE CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS) 2010 REVISED STANDARD SPECIFICATIONS AS MODIFIED HEREIN.

SECTION 86 – LIGHTING AND SIGNAL SYSTEMS

Where Greenbook refers to Section 700 refer Section 86.

ADD THE FOLLOWING

86-1.06B MAINTAINING EXISTING TRAFFIC SIGNAL SYSTEM ELEMENTS DURING CONSTRUCTION

The Contractor shall maintain traffic signals in full working order, including vehicle detection and bicycle detection (if present), at all times. Where existing traffic signal detector loops are damaged or removed from service, either intentionally or unintentionally, during the course of construction, the Contractor shall install temporary video detection cameras to maintain full intersection operations. Installation shall include, but is not limited to, the provision of temporary video detection cameras and associated equipment, controller cards, mounting hardware, wiring, and programming. Full compensation for providing and installing temporary video detection cameras within the limits of work, including all intersection legs, shall be considered included in the lump sum prices paid for traffic signal modifications, and no additional compensation will be allowed therefor.

ADD THE FOLLOWING

86-2.07 PAYMENT

The contract lump sum price paid for "**Traffic Signal Modification (Meadowlark Ranch Rd/Boulderidge Dr)**", "**Traffic Signal Modification (Via Cancion/Via Allondra)**", "**Traffic Signal Modification (Redwing St)**", "**Traffic Signal Modification (Island Dr)**" and "**Traffic Signal Modification (Lake Ridge Dr)**" shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals including, but not limited to, pull boxes, conduit and wiring, trenching and backfill, testing, pavement, , painting, retouching, removal and salvaging of existing push buttons, filling holes on existing traffic signals, clean-up, temporary traffic signal measures (including but not limited to provision and installation of temporary video detection cameras and associated equipment, controller cards, mounting hardware, wiring, and programming), reconnection of existing traffic

signal systems, installation of new traffic signal equipment, reinstallation of traffic signal loops, all connections, concrete encasement as required, grounding conductors, and for doing all the work involved in traffic signal modifications as shown on the Plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

The Contractor shall provide the Schedule of Values for the Traffic Signal Modifications to the Agency at the pre-construction meeting for review and approval by the Engineer in accordance with Section 9-2.1 Schedule of Values of the City of San Marcos Standard Special Provisions. Schedule of values will also be used for payment of additional items above the original estimate.

PART 8 – LANDSCAPING AND IRRIGATION

SECTION 800 – MATERIALS

800-1 LANDSCAPING MATERIALS

ADD THE FOLLOWING SUBSECTION

Landscape materials called out on the plans to be protected that are damaged during construction shall be replaced in-kind. Substitutions are not allowed without written approval from the City of San Marcos.

800-1.2.6 PRE-EMERGENT HERBICIDE

At the completion of construction activities, all exposed non-vegetated areas Prior to placing mulch the Contractor will apply a pre-emergent herbicide application. Pre-emergent herbicide shall be applied by a licensed applicator.

SECTION 801 – INSTALLATION

801-4 PLANTING

801-4.1 GENERAL.

ADD THE FOLLOWING

The Contractor shall restore plant material and irrigation equipment damaged during construction in accordance with locally accepted horticultural practice and as approved by the Engineer. No planting shall be done in any area until it has been satisfactorily prepared. All plant material shall meet the minimum standards set by the American Association of Nurseryman and these specifications.

DELETE THE FOLLOWING SECTIONS

801-1.7 MEASUREMENT

801-1.8 PAYMENT

REPLACE WITH THE FOLLOWING

801-1.7 MEASUREMENT AND PAYMENT

Payment for "**Landscape and Irrigation Restoration**" shall be made at the contract lump sum (LS) price and shall include full compensation for all labor, materials, tools, equipment, incidentals, and for doing all work involved in cutting, capping, adjusting, pre-emergent herbicide and application, plant replacement, complete in place, as shown on the Plans, as specified in these Special Provisions, and as directed by the Engineer and no additional payment shall be made therefor.

ADD THE FOLLOWING:

SECTION 1000 – COLD-IN-PLACE RECYCLING USING EMULSIFIED RECYCLING AGENT (CIR-ERA)

(Source: Standard Specifications for Public Works Construction, 2024 Edition)

1000-1 GENERAL. CIR-ERA shall consist of crushed and screened 100 percent reclaimed asphalt pavement (RAP), emulsified recycling agent, and additive(s) mixed in a traveling cold recycling plant, placed, compacted, and cured in such a manner that the in-place mixture forms a dense, uniform mass conforming to the lines, grades, and cross sections shown on the Plans.

1000-2 SUBMITTALS. The Contractor shall submit the following in accordance with 3-8.4:

- a) Mix design (job mix formula).
- b) Two, 2-quart samples of emulsified recycling agent with the mix design submittal.
- c) Quality Control Plan per 1000-6.2.

The Contractor shall submit the following to the Engineer during production and placement:

- d) Test results and Certificates of Compliance conforming to 4-5 for the ERA and each additive with each delivery to the Work site. Test results may represent a batch or a day of production. The testing shall be performed by a laboratory accredited by AASHTO resource, <http://www.aashtoresource.org>,
- e) Certified weighmaster certificates showing the net weight of each load of ERA, additive(s), emulsified asphalt (for fog seal coat), and sand (for sand cover) delivered to the Work site.
- f) On a daily basis during production and placement:
 - 1) Quality control inspection records, sampling and test results.
 - 2) One, 2-quart sample of ERA from each load delivered to the Work site no later than 1 hour after samples are taken.
 - 3) Batch logs for cement or lime slurry production.
 - 4) Dilution data for emulsified asphalt.
- g) During supplemental compaction, quality control inspection records, and sampling and test results.

1000-3 MATERIALS.

1000-3.1 General. Materials include RAP generated from cold milling the asphalt concrete pavement to be recycled, ERA, additive(s), and water.

1000-3.2 Reclaimed Asphalt Pavement (RAP). RAP shall be produced by cold milling the existing asphalt concrete pavement on roadways within the limits of the Work as shown on the Plans. RAP shall be crushed and screened in accordance with 1000-8.5.

1000-3.3 Emulsified Recycling Agent (ERA). ERA shall conform to 203-4.

1000-3.4 Water. Water added shall be potable, clean, and free of deleterious concentrations of acids, alkalis, salts, sugar and other organic or chemical substances.

1000-3.5 Additives.

1000-3.5.1 General. Additives, if specified in the approved mix design, shall be Portland cement, lime, or both. Unless otherwise approved, only Portland cement shall be used.

1000-3.5.2 Portland Cement. Portland cement shall be Type II conforming to 201-1.2.1.

1000-3.5.3 Lime. Lime shall conform to the chemical requirements in ASTM C977 except have a minimum of 90 percent available calcium oxide. Hydrated lime (dry or slurry), air slaked, by-product or waste lime will not be accepted. Quicklime shall be supplied from a single source, protected from moisture until application, and sufficiently dry to flow freely when handled.

Lime slurry shall be produced at the Work site.

1000-3.6 Emulsified Asphalt. Emulsified asphalt for fog seal coat shall be CSS-1h or CQS-1h conforming to 203-3.

1000-3.7 Sand. Sand for sand cover shall conform to 200-1.5.2.

1000-4 MIX DESIGNS.

1000-4.1 General. Unless otherwise specified, the Contractor shall prepare and submit the mix design(s). Cores shall be considered as part of the mix design process unless otherwise specified.

1000-4.2 Cores.

1000-4.2.1 General. Unless otherwise specified, the Contractor shall perform the coring necessary for preparation of the mix design.

1000-4.2.2 Contractor-Performed Coring. Core samples shall be obtained in accordance with California Test 315. A minimum of one core sample per half-lane-mile shall be obtained. Cores shall be cut to the depth of CIR shown on the Plans.

If cores show significant differences in various areas, such as different type or thickness of layers between cores, then separate mix designs will be performed for each of these pavement segments.

1000-4.2.3 Agency-Performed Coring. Not used.

1000-4.3 Contractor-Prepared Mix Designs. The Contractor shall prepare and submit a mix design(s) in accordance with 3-8.4 and 1000-4.5.

The mix design(s) shall be prepared by a laboratory accredited by AASHTO resource, <http://www.aashtoresource.org>, and be signed and stamped by a State of California Registered Civil Engineer. The component materials used in the mix design(s) must be the same materials that will be used during CIR-ERA production and placement.

Based on the characteristics of the RAP taken from the Work site, more than one mix design may be required.

1000-4.4 Agency-Prepared Mix Designs. Not used.

1000-4.5 Requirements. The mix design(s) shall be prepared in accordance with California Test 315 and conform to the requirements shown in Table 1000-4.5.

TABLE 1000-4.5

| Quality Characteristic | Test Method | Requirement |
|---|-----------------------|-------------|
| RAP asphalt content (%) | ASTM D 2172, Method B | report only |
| Bulk specific gravity of compacted samples ^{1, 2} | AASHTO T 269 | report only |
| Maximum theoretical specific gravity ² | AASHTO T 209 | report only |
| Air voids of compacted and cured specimens ² , (%) | AASHTO T 269 | report only |
| Marshall Stability, cured specimen ^{2, 5} at 104°F (40°C) with cement (min, lbs) | AASHTO T 245 | 1500 |
| Marshall retained stability ^{2, 3, 4, 5} based on moisture conditioning on cured specimen at 104°F (40°C) with cement (min, %) | AASHTO T 245 | 70 |
| Indirect dry tensile strength (psi) | AASHTO T 283 | report only |
| Indirect wet tensile strength (min, psi) | AASHTO T 283 | 35 |
| Maximum density (lb/cu ft) | California Test 216 | report only |
| Ratio of asphalt binder to cement ⁵ (min, %) | -- | 2.5:1 |
| Raveling test at 50°F (10°C) (max, %) ⁴ | ASTM D7196 | 7 |
| RAP coating Test for PDR EA (%) | AASHTO T 59 | 95 |

1. 4-inch diameter mold compaction based on gyratory compactor at 30 gyrations.
2. Test specimens after 140 degrees F (60°C) curing to constant weight between 16 hours and 48 hours.
3. If the saturated Marshall Stability is at least 1500 lbs, the Marshall Retained Stability ratio may be reduced to 60 percent.
4. Requirements are report only.
5. If cement is used.

Cement shall be a minimum of 0.50 and a maximum of 1.0 percent of the dry weight of the CIR-ERA mixture in-place.

1000-5 EQUIPMENT.

1000-5.1 General. The Contractor shall use a recycling train of equipment capable of producing and placing CIR-ERA that conforms to the Specifications. Equipment composing the recycling train shall conform to the following.

1000-5.2 Cold Milling Machines. Cold milling machines shall conform to 402-1.2 except the cutting drum shall be a minimum of 12 feet wide and machines shall be equipped with automatic depth and cross slope controls capable of maintaining the cutting depth to within 1/4 inch (6 mm) of the depth shown on the Plans.

1000-5.3 Crushing and Screening Equipment. Crushing and screening equipment shall be capable of producing RAP of the specified size (1-inch (25 mm) minus) before mixing with the ERA, and of routing all oversize material through the crusher and re-screening to the specified size.

1000-5.4 Mixing and Proportioning Unit.

1000-5.4.1 General. The mixing and proportioning unit shall be capable of dispensing the required quantities of ERA, water, and additive(s) and producing a homogenous mixture of thoroughly and uniformly-coated RAP of unchanging appearance.

The mixing unit shall be equipped with a belt scale for the continuous weighing of the RAP and a coupled/interlocked computer-controlled liquid metering device. The mixing unit shall be an on-board, completely self-contained counter rotating twin shaft pugmill appropriately rated by the manufacturer for the level of production.

The liquid metering device shall be capable of automatically adjusting the flow of ERA to compensate for any variation in the weight of the RAP introduced into the pugmill. ERA shall be

metered by weight of RAP using a mass flow, Coriolis-effect-type meter capable of measuring the amount to within 0.5 percent of the amount required by the approved mix design or as adjusted during production and approved by the Engineer.

Additive(s), and water as required, shall be controlled and metered based on the weight of RAP introduced into the pugmill.

Automatic digital readings shall be displayed for both the flow rate and the total amount of RAP, ERA, cement, and other additives in units of weight and time.

Proof of calibration shall be submitted not less than 5 Working Days prior to the start of production. Calibration shall have been performed in accordance with California Test 109.

1000-5.4.2 Pugmill. The pugmill shall:

- a) operate continuously using an integrated microprocessor control system to control the weight of RAP being delivered to the mixing chamber;
- b) have automatic controls;
- c) be equipped with paddles of a type and arrangement to provide sufficient mixing and movement of RAP, emulsified recycling agent, and additives; and
- d) be configured such that no build-up of fines or other segregated material develops, and all materials entering at the feed end of the mixing chamber exit uniformly at the discharge end without clumping or resulting in a non-uniformly mixed mixture.

1000-5.5 Water Storage and Supply Equipment. Water storage and supply equipment shall be capable of providing an independent, supplemental water source separate from the source of water for the cold milling machine. The independent, supplemental water system shall be interlocked with the RAP control microprocessor.

The water source for the water added to facilitate mixing shall be independent of the water source for the production of lime slurry.

1000-5.6 Lime Slurry Storage and Supply Equipment. Lime slurry storage and supply equipment shall be equipped with agitators capable of keeping the material in suspension during transport or when held in a slurry feed tank.

Meters and scales used shall be equipped with rate-of-flow indicators that show the delivery rates of lime and water and resettable totalizers that indicate the total amounts of lime and water introduced into the slurry storage tank. Individual feeds for water and cement or lime shall be equipped with no-flow devices that stop slurry production when either of the individual ingredients is not being delivered to the slurry storage tank.

The water meter shall be equipped with a resettable totalizer. If an automatic controller is used to batch the lime it shall also control the water proportioning.

1000-5.7 Paving Machine. Distribution and spreading shall be performed by operation of a self-propelled, track-equipped, 170 minimum horsepower, paving machine conforming to 302-5.5 and coupled to a windrow elevator.

The track paver shall be equipped with a fully-automatic screed control system which shall be in operation at all times during placement. The system shall be either a contact (skid) or non-contact (sonic averaging) system. The skid shall be a minimum of 30-feet long, mounted on the side of the spreading and finishing machine which will receive the next mat of material, and placed in contact with the pavement surface. The sonic averaging system shall have a ski, a minimum of 24 feet long, mounted on the side of the spreading and finishing machine which will receive the next mat of material.

The integral track paver/windrow elevator shall be capable of forward progress at a rate consistent with that of the windrow of CIR-ERA mixture produced by the pugmill; completely picking up the windrow of mixture; and conveying and depositing the mixture directly into the hopper of the paving machine.

1000-5.8 Rollers. Rollers shall conform to 302-5.6 and the following.

A minimum of one pneumatic-tired roller weighing 25 tons and one vibratory, double steel drum roller weighing at least 10 tons shall be on the Work site and operated during placement. Rollers shall not be less than 5-1/2 feet wide. Each roller shall have a working water spray system and working scrapers. The number of rollers used shall be consistent with the rate of recycled material being processed and placed.

1000-6 QUALITY CONTROL PROGRAM.

1000-6.1 General. The Contractor shall implement a quality control program throughout the production and placement of CIR-ERA. The quality control program shall consist of the preparation and implementation of a quality control plan, and quality control inspection, sampling, testing, and reporting.

1000-6.2 Quality Control Plan (QCP). The Contractor shall prepare and submit in accordance with 3-8.4 and 1000-2 a QCP which includes the following:

- a) Name(s) of personnel responsible for quality control and their qualifications.
- b) Name(s) and qualifications of the independent testing laboratory and staff personnel to be assigned.
- c) Specific procedures to be following during production and placement.
- d) The organization, responsible parties, and procedures to address quality control issues, the conditions when corrective actions are needed, and implementation of corrective actions when required.
- e) The quality control inspection, sampling, testing, and reporting requirements specified in 1000-6.3.
- f) A contingency plan for actions that will be taken to ensure that the Work site will be opened to traffic at the end of each Working Day or at the scheduled or specified time of re-opening.
- g) Equipment list, including manufacturer, model, and evidence of compliance with the requirements of 1000-5.

The QCP shall include a contingency plan describing corrective action to be taken in the event of equipment breakdown or other delays. Corrective actions shall include repairing the roadway using hot mix asphalt concrete pavement in accordance with 302-5 and reopening the roadway to traffic at the end of the specified working hours. Hot mix asphalt concrete pavement, when required, shall be C2-PG 64-10 conforming to 203-6.

The QCP shall contain copies of the forms that will be used to provide all required inspection records and sampling and testing results.

The QCP must be approved by the Agency prior to the start of production and placement.

1000-6.3 Quality Control Inspection, Sampling, Testing, and Reporting.

1000-6.3.1 General. The Contractor shall be responsible for quality control inspection, sampling, testing, and reporting as part of its Quality Control Program. The Contractor shall retain an independent testing laboratory to perform quality control inspection, sampling, testing, and reporting. The testing laboratory must be accredited by Caltrans, and its personnel must be certified by Caltrans for the test to be performed, as evidenced by listing on the Statewide Independent Assurance Database, <https://sia.dot.ca.gov/index.php>.

Quality control inspection, sampling, and testing shall be performed at the minimum frequencies specified in 1000-6.3.2 or greater sufficient to ensure that the CIR-ERA mixture, placement, compaction and finish surface conform to the Specifications.

1000-6.3.2 Basis of Reporting. The basis of reporting shall be a Lot. A Lot shall be defined as 3,000 square yards or fraction thereof of CIR-ERA constructed during the same day. The CIR-ERA mix design information shall be included on the form used to record and report the quality control measurements and calculations.

For each Lot, the Contractor shall measure or calculate, record, and report to the Engineer each Day the following:

- a) The actual recycle depth at each end of the milling drum at least once every 300 feet along the cut length.
- b) Length, width, depth of cut and calculated weight in tons of material processed.
- c) Weight of emulsified recycling agent added in tons.

- d) Percentage of added ERA by weight of the CIR-ERA mixture. The amount of ERA shall be within 0.5 percent of the value established in the approved mix design. The percent shall be determined based on the ratio of ERA used to the theoretical dry weight of the RAP processed.
- e) Maximum particle size of the sized RAP prior to the addition of the ERA. If the RAP does not meet the allowable maximum particle size, the test results shall be reported immediately to the Engineer. The material shall be re-processed or other corrective action taken to attain conformance.
- f) Wet field gradation test results for material passing the 1 inch through No. 4 sieves on the first and every fourth sample. The sieved sample shall be compared to the gradation band determined from the approved mix design and the rate of ERA adjusted as needed.
- g) Maximum obtainable density used for relative compaction calculation.
- h) Nuclear gauge in-place density and relative compaction testing within each Lot at 10 random locations. Relative compaction of the Lot shall be the average of the 10 locations divided by maximum obtainable density obtained in the test strip (as percent). Relative compaction of each of the 10 individual locations must be greater than or equal to 95 percent and less than or equal to 105 percent of the maximum obtainable density obtained in the test strip. Relative compaction of the Lot must be greater than or equal to 97 percent and less than or equal to 103 percent of the maximum obtainable density obtained in the test strip. Any lot not in conformance shall be re-worked.
- i) Ambient and compacted recycled pavement surface temperatures.
- j) 12-foot straightedge measurements, both initial and after corrections.
- k) Rate of fog seal coat application.
- l) Rate of sand cover application.

The Contractor shall adjust the rate of ERA, additive(s) and water as necessary based on the coating, compaction and breaking properties of the ERA. For any changes made by the Contractor from one Lot to the next, the Contractor shall document the reason for the change and identify each Lot where such changes were made.

The Contractor shall maintain complete and accurate records of all tests it performs as part of its Quality Control Program and shall make these records available to the Engineer upon request. The Engineer shall have unrestricted access to all resulting information.

The Contractor shall submit copies of all quality control tests performed and the respective results to the Engineer.

1000-7 JUST-IN-TIME TRAINING (JITT).

1000-7.1 General. JITT is a formal joint training class on materials, equipment, placement, compaction methods and quality control. JITT may be conducted as an extension of the pre-paving conference at the Contractor's option.

CIR-ERA operations shall not begin until the Contractor's personnel have completed the mandatory training.

1000-7.2 Class Requirements.

1000-7.2.1 General. The JITT class shall be:

- a) At least 2 hours long.
- b) Completed within 7 Days before beginning production and placement.
- c) Conducted during normal working hours.

The following Contractor personnel shall complete JITT:

- d) The Contractor's project manager.
- e) The Contractor's Representative.
- f) The Contractor's paving foreman.
- g) The Contractor's paving equipment operators.
- h) Quality Control Manager and staff.

The following personnel will also be in attendance:

- i) The Engineer and other Agency staff.

Personnel which have attended JITT in the last 12 months must submit certificates of completion when requesting exemption from attendance.

The JITT instructor shall be provided by the Contractor, and shall be experienced in the construction methods, materials, and test methods associated with the construction of CIR-ERA and CCPR-ERA.

The JITT instructor shall not be an employee of the Contractor, any Subcontractor, or of the Agency, unless otherwise specified or approved by the Engineer. Upon completion of JITT, the instructor shall issue a certificate of completion to the participants.

The Contractor and the Engineer will mutually agree to the course instructor, course content, and training site.

JITT shall not relieve the Contractor of responsibility under the Contract for completion of the Work in conformance with the requirements of the Contract Documents.

1000-7.2.2 Submittals. The Contractor shall submit the following a minimum of 21 Days prior to the scheduled date of the JITT:

- a) Name(s) of instructor(s) and their qualifications and work experience.
- b) Copy of course syllabus, handouts, and presentation materials.
- c) JITT facility location.
- d) Staff name, title, duties/assignment of those who will attend the JITT.

1000-8 PRODUCTION AND PLACEMENT.

1000-8.1 General. Production and placement shall neither be started nor be performed during periods of rain, fog, standing water on the existing pavement, or other wet conditions as determined by the Engineer, or if rain or cold weather (less than 50°F (10°C)) are forecast within a 48-hour period by the National Weather Service for the most representative and nearest location to the Work listed.

The forecast ambient temperature shall be a minimum of 60°F (15.5°C) and rising throughout the duration of production and placement operations until initial compaction and protection operations have been completed for that day. Operations shall cease if the actual ambient temperature drops below 60°F (15.5°C) any time after an initial 3-hour window following start-up.

Production and placement operations, including compaction, shall be completed at least 2 hours before sunset.

Longitudinal joints between successive cuts shall overlap a minimum of 4 inches (100 mm).

1000-8.2 Sequence of Work. The general sequence of work shall be as follows:

- a) Surface preparation
- b) Milling, crushing, and sizing
- c) Mixing and proportioning
- d) Test strip
- e) Mixture placement and initial compaction
- f) Fog seal coat and sand cover
- g) Curing
- h) Supplemental compaction
- i) Protection and maintenance

1000-8.3 Pre-Paving Conference. A minimum of 5 Working Days prior to the scheduled start of CIR-ERA production and placement, the Engineer will arrange a meeting with the Contractor's Representative, the Contractor's paving foreman, the CIR-ERA Subcontractor, materials suppliers, and representatives of the Agency. The following will be discussed:

- a) CIR-ERA placement plan
- b) Equipment

- c) Rate of delivery/placement
- d) Implementation of the Contractor Quality Control Program
- e) Agency quality assurance inspection
- f) Traffic control
- g) Other topics as may be proposed

1000-8.4 Roadway Surface Preparation. Prior to the start of CIR-ERA operations, the Contractor shall prepare the roadway surface by:

- a) Removing any dirt, vegetation, standing water, combustible materials, oils, raised pavement markers, and objectionable materials.
- b) Referencing the existing pavement profile and cross slope as shown on the Plans.
- c) Marking the proposed longitudinal cold milling cut lines on the existing roadway surface.

1000-8.5 Cold Milling, Crushing, and Screening. The existing asphalt concrete pavement shall be cold milled to the depth shown on the Plans. Cold milling shall conform to 404.

Cold milling, crushing, and screening shall result in production of RAP 1-inch (25 mm) maximum in size which is free of dirt, base material, concrete or other deleterious materials.

Paving fabric, if present in the crushed and screened RAP, shall not exceed 2 inches (50 mm) in any dimension. Oversized pieces of paving fabric shall be removed and disposed of.

Inductive loop detector wires, pavement markers, rubberized crack filler and sealer materials, thermoplastic striping and pavement marking materials, concrete, and other incompatible materials shall be removed from the RAP.

1000-8.6 Mixing and Proportioning. A mass flow centrifugal-type meter shall be used to measure and weigh the ERA and the additive(s).

The Contractor shall verify the amount of each additive against the amount specified in the approved mix design or the adjusted amount approved by the Engineer. Water to facilitate uniform mixing may be added by use of the water source for the cold milling machine. Water added shall be measured and the rate of added water shall be between 0.5 and 3.0 percent by weight of the CIR-ERA mixture in accordance with the approved mix design. The quantity of residual asphalt in the recycling agent incorporated into the CIR-ERA mixture shall not vary due to the addition of water.

1000-8.7 Mixing and Spreading of Cement and Lime.

1000-8.7.1 Portland Cement. Cement shall be added in dry form only.

Dry Portland cement shall be spread upon the existing asphalt concrete surface ahead of the recycling train at the rate specified in the approved mix design. Cement shall not be spread a distance greater than 50 feet in front of the cold milling machine.

Dry Portland cement shall neither blow off the surface to which it is applied nor remain exposed at the end of each day.

No traffic other than the recycling train shall be allowed to pass over spread Portland cement.

1000-8.7.2 Lime Slurry.

1000-8.7.2.1 General. Lime, if approved, shall be added in the form of lime slurry only.

Proportioning of lime slurry shall be by either continuous mixing or batch mixing. The Contractor shall submit daily batch logs to the Engineer.

Lime slurry shall be introduced directly into the pugmill or sprayed over the cutting teeth of the cold milling machine at the rate specified in the approved mix design.

1000-8.7.2.2 Continuous Mixing. The proportioning device must determine the exact ratio of water to dry lime or cement at each production rate. Rate-of-flow indicators and totalizers for like materials must be accurate within 0.5 percent of each other. The following method shall be used:

- a) A belt scale shall be used to weigh dry lime. When the belt scale operates between 30 percent and 100 percent of production capacity, the average difference between the indicated material weight and the

actual material weight shall not exceed 0.5 percent of the actual material weight for 3 individual runs. For any of the 3 individual runs, the indicated material weight shall not vary from the actual material weight by more than one percent of the actual material weight. Tests for belt scale accuracy must be for at least 0.5 tons of lime. Actual material mass shall be weighed on a certified scale.

- b) A meter shall be used to measure water in the slurry. When the meter operates between 50 percent and 100 percent of production capacity, the average difference between the indicated water weight and the actual water weight shall not exceed one percent of the actual weight for 3 individual runs. Tests for water meter accuracy must be for at least 300 gallons of water. Actual mass shall be weighed on a certified scale.

1000-8.7.2.3 Batch Mixing. Batch mixing shall conform to the following:

- a) Dry lime shall be weighed with a certified scale.
- b) If an automatic controller is used to proportion the water the indicated draft of the water must be within one percent of its total draft weight. The water meter shall be tested for accuracy at least as often as 300 gallons of water used.
- c) When the meter operates between 50 percent and 100 percent of production capacity, the average difference between the indicated water weight and the actual water weight shall not exceed one percent of the actual water weight for 3 individual runs.

1000-8.8 Mixture Placement. The CIR-ERA mixture may be placed in a windrow or deposited directly into the hopper of the track paver.

Immediately upon completion of mixing and proportioning, the mixture shall be placed in one continuous pass and conform to the lines, grades, and cross sections shown on the Plans.

A single lift thickness shall be a minimum compacted depth of 3 inches (75 mm) and not exceed a maximum compacted depth of 4.5 inches (113 mm).

1000-8.9 Initial Compaction.

1000-8.9.1 General. Initial compaction shall begin immediately after placement. Areas inaccessible to rollers shall be compacted to the required density by other equipment approved by the Engineer.

Initial compaction operations shall start no more than 15 minutes behind the track paver unless otherwise approved. Based on the ambient temperatures, weather conditions, and ERA used, the Contractor shall determine and record the time intervals between placement and initial compaction. The Contractor shall measure the time intervals between placement and initial compaction and record in the daily quality control documents.

The Contractor shall perform quality control compaction testing as part of its Quality Control Plan. The Agency will perform such quality assurance compaction testing as the Engineer deems necessary to correlate to and verify the Contractor's testing.

Rolling shall neither start nor stop on CIR-ERA material which has not been fully compacted.

Aggregate from the CIR-ERA mixture shall not be allowed to stick to the drums or tires of the rollers. Each roller shall be equipped with an operational mechanical scraper. Water shall be uniformly applied to the drums and tires by an automatic, mechanical system. Sufficient water shall be applied to keep drums and tires clean, but not so much that water pools or ponds on the CIR-ERA mixture surface.

Rolling which results in cracking, displacement and/or any other type of pavement distress shall be discontinued until such time as the problem can be resolved. Discontinuation and commencement of rolling operations shall be at the discretion of the Engineer.

The Contractor shall continuously observe the CIR-ERA mat during compaction. If moisture cracking occurs while a roller is operating in the vibratory compaction mode, the vibrators shall be turned off and only static steel drum rolling performed. If moisture cracking continues under static steel drum rolling, compaction shall cease, the mat allowed to further cure, and pneumatic-tired rolling commenced, followed by static steel drum rolling. This procedure shall be followed until displacement of the mat is no longer observed.

Corrected areas must be uniform rectangles with edges that are parallel to the nearest pavement edge or lane line; or perpendicular to the pavement centerline.

The surface of the CIR-ERA mixture, after initial compaction, shall conform to the depth, lines, grades, and cross sections shown on the Plans and shall be free of ruts, bumps, indentations, raveling, irregularities, or segregation.

1000-8.9.2 Rolling Pattern. The rolling pattern determined in accordance with 1000-9 shall be followed unless changes in the CIR-ERA mixture or placement conditions occur and a new rolling pattern is established.

1000-8.10 Smoothness. Smoothness of the finished surface shall be checked regularly during placement and compaction using a 12-foot-long straightedge. Areas that vary from the lower edge by more than 0.01 foot (30 mm) when the straight edge is laid parallel with the centerline, or more than 0.02 foot (60 mm) when the straightedge is laid perpendicular to the centerline and extended from edge to edge of a traffic lane, shall be corrected by reworking, re-compaction, or removal and replacement. The correction method chosen by the Contractor shall be approved by the Engineer before starting any corrective work.

1000-9 TEST STRIP.

1000-9.1 General. The Contractor shall construct a test strip a single lane in width and a minimum of 1,500 feet in length located within the limits of the CIR-ERA work on the first Working Day of CIR-ERA operations. The test strip shall:

- a) Demonstrate that the equipment, materials, processes, and approved mix design are capable of producing and constructing a CIR-ERA mixture that conforms to the Specifications;
- b) Establish the optimal rates for the ERA, additive(s), and water;
- c) Establish a compaction rolling pattern which results in the maximum density obtainable. A compaction rolling pattern shall be defined as that sequence and type of compaction equipment and equipment operation which produces no increase in density on successive nuclear density tests for any additional passes of the compaction equipment once the maximum density pattern has been identified ("break-over point"). The Contractor shall prepare a rolling vs. density chart that shows the progress of densification from initial lay down through maximum obtainable density at the break-over point.
- d) The Contractor shall determine relative compaction within the test strip by performing tests in accordance with ASTM D2950. If the relative compaction within the test strip does not conform to the density requirements, the Contractor shall construct additional test strips as necessary to determine the maximum density obtainable.

Upon completion of the test strip, the Contractor shall submit a report which includes the following:

- e) Length, width, and depth of milling and calculated weight in tons of material processed.
- f) Weight of emulsified recycling agent added in tons.
- g) Percentage of added emulsified recycling agent in the CIR mixture by weight.
- h) Percentage of recycling additive in the CIR mixture by weight.
- i) Maximum particle size of the RAP before the addition of the emulsified recycling agent.
- j) Maximum obtainable density used for relative compaction calculations.
- k) Nuclear gauge in-place density and relative compaction at 10 random locations.
- l) Compaction rolling pattern.
- m) A rolling vs. density.
- n) Ambient and compacted CIR-ERA surface temperatures.

1000-9.2 Approval. CIR operations shall not proceed further until the test strip has been approved by the Engineer.

Test strips that fail, or do not demonstrate conformance to the specifications shall be re-worked, re-compacted, or removed and replaced. The Contractor shall determine the corrective actions to be taken, discuss the adjustments or changes with the Engineer, and obtain approval from the Engineer before proceeding. If adjustments are made, the Contractor shall construct a new test strip to define the maximum density.

The Contractor shall use the same equipment, materials, and construction methods for the remainder of CIR-ERA operations, unless adjustments are made by the Contractor and approved by the Engineer.

1000-9.3 New Rolling Pattern and Density. A new rolling pattern and a new maximum obtainable density shall be established if any of the following occurs:

- a) Relative compaction of any of the 10 individual locations is less than 95 percent or greater than 105 percent of the maximum obtainable density obtained in the test strip.
- b) Relative compaction of the Lot is less than 97 percent or greater than 103 percent of the maximum obtainable density obtained in the test strip.
- c) A change in RAP proportions, or the CIR-ERA mixture proportions.
- d) A change in placement equipment or procedures.
- e) A change in temperature, weather, or other environmental conditions which affect the CIR-ERA mixture performance or compaction.
- f) The established rolling pattern results in pumping, shoving, or cracking. Should, after a change in the rolling pattern or additional rolling, the required relative compaction requirements still not be achieved, additional test strips shall be constructed to determine the maximum obtainable density for the CIR-ERA mixture being produced.

1000-10 FOG SEAL COAT AND SAND COVER. After initial compaction has been achieved, and prior to opening to traffic, the Contractor shall apply a fog seal coat and sand cover to CIR-ERA mixture surface.

The fog seal coat shall be composed of emulsified asphalt conforming to 1000-3.6 diluted with water at a ratio not to exceed 1:1 unless otherwise approved by the Engineer. The application rate shall be between 0.08 and 0.12 gallon per square yard.

Immediately following application of the fog seal, the surface shall be covered with sand conforming to 1000-3.7 at a rate of 1.0 to 2.0 pounds per square yard. The exact rate will be determined by the Contractor. Excess sand shall be removed from the surface by sweeping.

1000-11 CURING. CIR-ERA shall cure in-place until the start of supplemental compaction. The start of supplemental compaction shall be determined in accordance with the following:

- a) Prior to the start of cold milling, the Contractor shall: 1) record the moisture content of the existing asphalt concrete every 2,500 feet of each lane to be recycled using a nuclear gauge and 2) mark the adjacent curb or shoulder where each reading was taken.
- b) During recycling, the Contractor shall calculate the percentage of hydrocarbons in the moisture content for each location where a reading was taken by logging the percentage of engineered emulsion used in the CIR-ERA mixture and subtracting out the percentage of water in the engineered emulsion.
- c) After a minimum of 3 Days without rainfall, the Contractor shall record the moisture content of the CIR-ERA at each marked location using the same nuclear gauge.
- d) If the reading obtained in "c" above is less than the sum of the following, supplemental compaction may commence:
 1. Moisture content percentage recorded in "a" above plus the percentage of hydrocarbons in the moisture content determined in "b" above, plus 2 percent.
- e) After 10 Days without rainfall.

1000-12 SUPPLEMENTAL COMPACTION. Supplemental compaction shall be performed after the CIR-ERA asphalt concrete surface course. During supplemental compaction operations, the basis of reporting compaction test results to the Engineer shall be by Lot in accordance with 1000-6.

The Contractor shall construct a test strip on the first day of supplemental compaction operations. The test strip shall be a single lane in width and at least 1,500 feet in length. The test strip must demonstrate the sequence and methods of rolling necessary to determine the maximum obtainable density. A rolling pattern for supplemental compaction shall be defined as that which produces no increase in density on successive nuclear

density tests for any additional passes of the compaction equipment once the maximum density pattern has been determined (“break over point”).

For each Lot, compaction testing shall be performed at 10 random locations and the in-place density and relative compaction obtained and recorded. The relative compaction of the Lot using the average of the in-place density of the 10 locations and the maximum obtainable density from the supplemental compaction test strip shall be determined and recorded.

Relative compaction of each of the 10 individual locations shall be greater than or equal to 95 percent and less than or equal to 105 percent of the maximum obtainable density obtained in the test strip. Relative compaction of the Lot must be greater than or equal to 97 percent and less than or equal to 103 percent of the maximum obtainable density obtained in the test strip. Nuclear density testing shall be repeated throughout the time supplemental compaction is being completed to verify that the required maximum obtainable density is being achieved.

The laboratory retained by the Contractor shall have a technician on-site observing all supplemental compaction operations, monitoring density gauge readings, and designating areas which have reached the required density.

For each Lot, the Contractor shall measure or calculate and record the following information:

- a) Length and width
- b) Maximum theoretical density used for compaction calculation
- c) Supplemental compaction rolling pattern
- d) Nuclear gauge in-place density and relative compaction at 10 random locations.
- e) Relative compaction for the Lot.
- f) Ambient temperature and surface temperature of the compacted CIR-ERA mixture.
- g) Average in-place density and relative compaction.

If the relative compaction does not conform to the aforementioned requirements, the Contractor shall construct additional test strips as necessary to determine the maximum obtainable density for the in-place CIR-ERA mixture.

The Contractor shall measure or calculate and record the following information:

- h) Length and width of CIR-ERA surface processed.
- i) Maximum obtainable density.
- j) Nuclear gauge in-place density and relative compaction at 10 random locations.
- k) A rolling vs. density chart that shows the progress of densification through maximum obtainable density at the break-over point.

Upon approval of the test strip by the Engineer, the supplemental compaction may begin.

Compaction shall cease if the equipment and process fail to meet the requirements for a test strip. If the test strip fails, the Contractor shall re-work, re-compact, or remove and replace the test strip and discuss and document corrective actions to be taken with the Engineer before proceeding.

The final compacted surface shall be free of ruts, bumps, indentations, raveling, irregularities, or segregation and conform to the smoothness requirements specified in 1000-8.5.

1000-13 PROTECTION AND MAINTENANCE. The Contractor shall protect and maintain the CIR free from nuisance water, other deleterious substances, and/or any other damage from the time of placement through the completion of the surface course. Damaged areas shall be excavated to the depth directed by the Engineer and/or filled and compacted with new C2-PG 64-10 asphalt concrete conforming to 203-6. Damaged areas shall be repaired and loose particles on the surface removed by sweeping prior to the placement of the asphalt concrete surface course or seal coat.

1000-14 MEASUREMENT.

1000-14.1 Contractor-Prepared Cold-in-Place Recycling Mix Design(s). The Contractor-prepared cold-in-place recycling mix design(s) will be measured as a lump sum and shall include all cores necessary to establish mix design requirements.

1000-14.2 Cold In-Place Recycling (CIR). CIR will be measured by the square yard of finished surface for each thickness shown on the Plans and in the bid schedule. CIR outside the limits shown on the Plans will not be measured for payment. Test strips conforming to 1000-9 will be included in the quantity measured for payment.

1000-14.3 Emulsified Recycling Agent (ERA). ERA will be measured by the ton.

The basis of payment shall be the net weight of ERA used to produce CIR-ERA complete and in-place. The Contractor shall furnish the Engineer with certified weighmaster certificates showing the weight of each load delivered to the Work site and the weight of ERA remaining on the Work site after the completion of production and placement. Payment will be made for the difference between the total weight delivered to the Work site and the weight of the remaining.

The provisions of 7-3.5.2 and 7-3.5.3 shall not apply to this Bid Item.

1000-14.4 Additives. Portland cement and lime will be measured by the ton.

The basis of payment shall be the net weight of each additive used to produce CIR-ERA complete and in-place. The Contractor shall furnish the Engineer with certified weighmaster certificates showing the weight of each load delivered to the Work site and the weight of each additive remaining on the Work site after the completion of production and placement. Payment will be made for the difference between the total weight delivered to the Work site and the weight of the remaining.

The provisions of 7-3.5.2 and 7-3.5.3 shall not apply to this Bid Item.

1000-15 PAYMENT.

1000-15.1 Contractor-Prepared Cold-in-Place Recycling Mix Design(s). Payment for Contractor preparation of "Cold-in-Place Recycling Mix Design(s)," including all cores necessary to establish mix design requirements, will be made at the Contract Lump Sum Price in the Bid. The Contract Lump Sum Bid price shall be considered as including:

1000-15.1.1. Cores

- a) traffic control,
- b) core drilling and extraction,
- c) transportation to the laboratory,
- d) backfilling and compacting each core hole with temporary asphalt concrete pavement (D2-SC 800) or trench backfill slurry, and
- e) all other associated costs.

1000-15.1.2 Sampling, Testing, and Mix Design(s)

- a) sampling,
- b) testing,
- c) preparation and submittal of the mix design(s), and
- d) all other associated costs.

1000-15.2 Cold In-Place Recycling (CIR). Payment for CIR will be made at the Contract Unit Price per square yard for each thickness shown on the Plans and in the bid schedule. The Contract Unit Price shall be considered as including:

- a) preparing and implementing a quality control program,
- b) JITT including payment for the instructor and training materials,
- c) producing and placing CIR-ERA,
- d) constructing and reconstructing test strips,
- e) re-working material in overlapping adjacent milled widths,
- f) fog seal and sand cover,

- g) protection, maintenance, and curing,
- h) supplemental compaction, and
- i) all other incidental and appurtenant work for which no separate Bid item is listed in the Bid.

No payment will be made for test strips which have been rejected or for removal of rejected test strips.

No separate payment will be made for any corrective actions to repair the roadway using hot mix asphalt concrete pavement in the event of equipment breakdown.

1000-15.3 Emulsified Recycling Agent (ERA). Payment for ERA will be made at the Contract Unit Price per ton.

1000-15.4 Additive(s). Payment for Portland cement and lime will be made at the Contract Unit Price per ton.