Sample Specifications
Cold Foam In-Place Recycling

39-7.1 Mix Design

A minimum 30 days prior to starting the Cold in Place Recycling the contractor will take samples of the existing pavement, prepare, and submit a mix design for the Engineers approval. The mix design shall be prepared in a lab certified to perform the tests specified. The mix design shall be performed in accordance to the Wirtgen Cold Recycling Manual, ED 2010, or other method approved by the Engineer.

Minimum criteria used for acceptance of the proposed mix design will be:

Dry Indirect Tensile Strength	>250 kPa (37 psi)
Minimum Wet Strength	225 kPa (33 psi)

The design submittal must indicate the following information:

- Cold in Place Recycling CIR equipment and method proposed
- Grain Size Distribution Report
- Bitumen Grade
- Bitumen Content
- Bitumen Source
- Water Content
- Cement or Lime Content
- Cement or Lime Source
- Cement or Lime Grade
- Any other additives
- Results of Mix Design indicating strength
- Bitumen Foaming Half-life vs. Expansion
- Optimum Foaming Water Content Required (to produce a half-life of 12 seconds and an expansion ratio of 10:1)
- Maximum Density per Cal 216
- Bulk density of recommended oil content
- Test results of the Mix Design

39-7.2 Quality Control and Assurance

Provide a quality control plan (QCP) that describes the organization, responsible parties, and procedures you will use to:

1. Control quality
2. Determine when corrective actions are needed (action limits)
3. Implement corrective actions

The QCP must contain copies of the forms that will be used to provide all required inspection records and sampling and testing results. On the form used to record and report the quality control measurements, also show the job mix formula information.

As part of the QCP the contractor will provide a contingency plan that describes the corrective actions you will take in the event of equipment break down or material out of compliance.

39-7.2.1 Contingency Plan

The contingency plan must include any corrective actions including repairing and reopening the roadway to traffic using hot mix asphalt in compliance with Section 39, "Hot Mix Asphalt," of the City of San Jose Standard Specifications (Standard Specifications) or temporary bituminous surfacing in compliance with these special provisions.

Hot mix asphalt must:

1. Be hot mix asphalt (Type A)
2. Use 1/2-inch aggregate grading
3. Use asphalt binder grade PG 64-10 or PG 64-16

Temporary bituminous surfacing must:

1. Be commercial quality bituminous material
2. Contain aggregate using 1/2-inch HMA grading in compliance with Section 39-1.02E, "Aggregate," of the Standard Specifications.
3. Use liquid asphalt SC-800 in compliance with Section 93, "Liquid Asphalts," of the Standard Specifications.

Meet with the Engineer at least 7 days before starting cold-in-place recycling work to review the QCP and contingency plan.

39-7.2.2 QC Laboratory

Provide a certified testing laboratory and personnel to perform quality control inspection, sampling and testing.

Provide the Engineer with unrestricted access to the laboratory, sampling and testing sites, and all information resulting from job mix formula and quality control inspection and testing activities. Proficiency of testing laboratories and sampling and testing personnel must be reviewed, qualified, and accredited by Caltrans Independent Assurance Program before starting cold-in-place recycling work.

Perform inspection, sampling and testing at a rate sufficient to ensure that cold-in-place recycling mixture, placement, compaction and finishing complies with the specifications.

39-7.2.3 Production

Divide the project into 3,000-square yard lots. For each lot:

1. Determine the actual recycle depth at each end of the milling drum at least once every 300 feet along the cut length
2. Take and split a sample of the CIR mixture from a location approved by the Engineer. Split the samples into 2 parts and label the containers with location and station. Submit 1 split part to the Engineer and use 1 part for your testing. Briquettes samples shall be prepared within three (3) hours.
3. On every third sample taken, perform a field gradation for material passing the 1-inch through No. 4 sieves.
4. Determine in place density and relative compaction of 10 random locations per Cal 231. Use the submitted Job Mix density as the basis of comparison for initial test. Perform a confirmation maximum density per lot or when material type changes.

For each day measure or calculate and record the following information:

1. Length, width, depth of cut and calculated weight in tons of material processed
2. Weight of recycling agent added in tons
3. Percentage of added recycling agent in the lot's CIR mixture by weight
4. Weight of recycling additive used in tons (if used)
5. Percentage of recycling additive in the lot's CIR mixture by weight (if used)
6. Ambient and compacted recycled pavement surface temperatures
7. Rate off of seal coat application
8. Rate of sand cover application
9. Half-life and Expansion Ratio of Foamed Bitumen.

Once per working day measure and record the half-life and expansion ratio of the bitumen to be used during recycle. The bitumen sample must be taken from a test nozzle that is controlled by the recycler. Bitumen must provide an expansion ratio of at least 10:1 and a half-life of at least 12 seconds.

Any time the bitumen temperature drops below 160 degrees Celsius the half-life and expansion must be tested for each lot at the beginning of each lot.

If the bitumen cannot achieve the required half-life and expansion properties recycling shall be suspended until a satisfactory result is achieved.

Make adjustments during CIR operations for optimum quality. If adjustments are made, document the reason for the change and identify on the daily quality control inspection records and sampling and test results.

The Contractor shall be responsible for the quality of construction and materials incorporated into the Project. The Contractor's QC measures shall ensure that operational techniques and activities provide integral and finished material of acceptable quality.

Contractor sampling and test shall be performed to control the processes and ensure material compliance with the requirements of the Contract.

The Contractor shall perform all Quality Control testing and sampling for the project. All QC sampling and testing shall be performed by technicians certified by the State of California for that particular material and all laboratory testing shall be performed by laboratories accredited by AASHTO Materials Reference Laboratory (AMRL) and Cement and Concrete Reference Laboratory (CCRL) for the test methods required.

Contractor shall furnish copies of all test results to the Engineer or other authorized Department representative within 24 hours of completing the test of the acquired sample or the next day of business.

39-7.3 Placement

CIR shall be to a depth as stated on the project plans within the lines and grades of the project plans and specifications or as directed by the Engineer.

Placement of the CIR materials will be in accordance with Section 39 of these specifications.

39-7.3.1 Fog Seal and Sand Spreading

If directed by the Engineer at the end of each days production the contractor shall apply a uniform fog seal to the surface at a rate of 0.12 gal/sy and shall meet SS1H "Fog Seal' Cut 50. If directed by the Engineer, sand shall be spread at a rate of 1.0 to 2.0 pounds per square yard. Exact spread rate shall be determined by the Engineer. Remove excess sand from the CIR surface. Sand cover shall be spread by means of a self-propelled spreader equipped with a mechanical device that will spread the sand at a uniform rate over the CIR surface. The area treated shall be capable of holding traffic at the end of each day's production without any deformation or damage to the surface.

The Contractor will use their knowledge and expertise to deliver a product that meets the requirements of this section and contract.

39-7.4 Acceptance

The project shall be divided into lots 2500 linear feet long and 12 feet wide, or 3,000 square yards, extending along the lane lines of the road way. If one day's production will be less than 2500 linear feet that day's production shall be a lot. If one day's production is one lot plus an additional amount, the additional work shall be a separate lot. The Engineer will sample and test each lot prior to acceptance. Frequency of testing will be at the Engineers discretion.

Acceptance will be based on the following criteria:

A. Dry Indirect Tensile Strength >250 kPa (37 psi); Minimum Wet Strength 225 kPa (33 psi)

B. The average Relative compaction of a lot shall be a minimum of 98% of the maximum wet density as measured by Cal 216. No single test shall be less than 96% relative compaction.

For lots outside of the acceptance criteria the Engineer determines a deduction for each test result outside the specifications using the reduced payment factors shown in the following tables:

A- ITS Test Results

% of Minimum Wet Strength (225 kPa)	Pay Factor
> 100%	100%
> 99%	95%
> 98%	90%
> 97%	85%
> 96%	80%
> 95%	75%
< 95%	Remove at Engineers Sole Discretion

B- Compaction

% of Relative Compaction as Measured By Cal 216 Average Density Per Lot	Pay Factor
> 98%	100%
> 97%	90%
> 96%	80%
> 95%	70%
> 94%	Remove at Engineers Sole Discretion

In the event a lot is subject to both pay factors, they will be cumulative. (I.E. An 80% pay factor for ITS and a 70% pay factor for Compaction equals a 56% cumulative pay factor. .80 X .70 = .56)

39-7.5 Method of Measurement

The unit of measurement for Cold In-Place Pavement Recycling shall be per square yard for the depth specified in the contract. The area to be paid shall be the length measured along the centerline of the roadway multiplied by the average perpendicular width.

Additional excavation/recycling performed by the Contractor outside the lines provided in the Plans shall not be measured and compensated by the Department without approval by the Engineer.

39-7.6 Basis of Payment

Cold In-Place Pavement Recycling shall be paid for at the contract unit price per square yard adjusted by the pay factor. This amount shall be full compensation for all work necessary within the dimensions shown on the Plans or specified herein, including but not limited to pulverizing existing pavements, additional materials, stabilizing agent(s), mineral filler, water, grading, compaction, sampling, testing and for all materials, labor, tools, equipment, hauling permits, mobilization and any incidentals necessary to complete the work.