

**NOTICE TO BIDDERS  
ADDENDUM NO. 1**

This Addendum changes the terms of the Bid Proposal and/or plans associated with the Monroe County Road Commission project indicated below. By submitting a bid, any and all changes included in this Addendum are made a part of the contract.

**MCRC Project No.:** 459-021-189026  
**Project Description:** 2018 Cold In Place Recycling  
**Bid Date:** Thursday, December 14, 2017 at 10:00 a.m.  
**Addendum Date:** 12/11/2017

DESCRIPTION OF CHANGES:

**Proposal** 1) **Add** the following section to page 7 of the proposal

ALTERNATE CONSTRUCTION METHOD FOR RECYCLING PAVEMENT

Cold Central Plant Recycling (CCPR) is an allowable alternate construction method for recycling the existing pavement surface on Carleton West Road. If the Contractor elects to utilize CCPR, the work shall be in accordance with the Special Provision for Cold Central Plant Recycling except that the work described in the special provision will be measured and paid for as **Cold In Place Recycling, 4 inch**.

If the CCPR method is utilized to recycle the existing pavement surface, Carleton West Road may be closed to through traffic for five (5) consecutive calendar days. Liquidated damages in the amount of **\$2,000** per day will be assessed for each calendar day, or part thereof, that Carleton West Road remains closed beyond five (5) calendar days.

**Proposal** 2) **Add** the Special Provision for Cold Central Plant Recycling

COMMUNICATIONS

Any questions regarding this addendum shall be directed to the person listed below:

Name: Michael Smith  
Phone: 734-240-5103  
Email: [MSmith@mcrc-mi.org](mailto:MSmith@mcrc-mi.org)

ACKNOWLEDGEMENT

Acknowledge receipt of this addendum by completing the information below and returning the addendum to the Monroe County Road Commission via email to [CHerron@mcrc-mi.org](mailto:CHerron@mcrc-mi.org) or by fax to 734-240-5131.

Company: \_\_\_\_\_  
By: \_\_\_\_\_  
Date: \_\_\_\_\_

The Contractor shall also acknowledge any and all addendums in the space provided on page 8 of the proposal prior to submitting the bid.

MONROE COUNTY ROAD COMMISSION

SPECIAL PROVISION  
FOR  
COLD CENTRAL PLANT RECYCLING

MCRC:MLS

1 of 12

12-10-17

**a. Description.** This work consists of cold milling the existing asphalt pavement; stockpiling the reclaimed asphalt pavement (RAP) in the general vicinity of the project; processing the reclaimed asphalt pavement (RAP) and mixing with emulsified asphalt, water and additives; and placing and compacting the emulsified RAP mixture into a stabilized asphalt base. This work also includes sampling and testing the existing HMA pavement, performing a mix design for the emulsified RAP mixture, and quality control testing to ensure the completed emulsified RAP mixture is consistent with the mix design and compaction requirements specified herein.

**b. Materials.** Use materials as specified herein.

1. Asphalt Emulsion. Provide an engineered asphalt emulsion of the type and grade as determined by the Contractor's mixture design and as specified in Table 1. Furnish emulsified asphalt having a penetration within  $\pm 25\%$  of the emulsified asphalt selected for the mix design, but not outside the range specified in Table 1. Deliver the asphalt emulsion to the job site at a temperature no greater than 120°F. Provide a representative from the asphalt emulsion supplier at the job site for a minimum of the first full day of emulsion treatment, and available throughout the recycling process to monitor the characteristics and performance of the asphalt emulsion, make adjustments to the asphalt emulsion formulation as required, and to resolve any emulsion related problems with the cold in place recycling process.

<b>Test</b>	<b>Method</b>	<b>Minimum</b>	<b>Maximum</b>
Distillation Test, Residue from distillation to 177°C, %	AASHTO T59	63	
Oil distillate by volume, %	AASHTO T59		1.0
Sieve Test, Retained on No. 20 (0.85 mm), %	AASHTO T59		0.1
Penetration, 25°C, 100g, 5 s, dmm	AASHTO T49	75	200

2. Reclaimed Asphalt Pavement. The stockpile of reclaimed asphalt pavement (RAP) shall be crushed and screened as necessary to conform to the gradation requirements in Table 2 prior to the addition of the emulsified asphalt recycling agent.

The screening process shall remove rubberized crack filler, pavement markers, loop wires, thermoplastic markers, fabric and other like materials that may be incorporated into the RAP as it is removed from the roadway. A minor amount of residual materials that cannot be completely removed from the processed RAP may be incorporated into the recycled mix if the Contractor can demonstrate that those added materials will not adversely affect the performance of the cold central plant recycled asphalt pavement. Any such materials

retained in the mix shall be appropriately sized and blended so as not to adversely affect the appearance or strength of the recycled pavement.

Crushed and screened RAP shall not be stockpiled for longer than 10 days or in stockpiles greater than 15 feet in height that may, through the weight of the stockpile, reconsolidate the crushed and screened RAP. Water may be added to the RAP as it is crushed and screened abate dust and mitigate reconsolidation.

<b>Table 2 – Reclaimed Asphalt Pavement Gradation</b>		
<b>Sieve Size</b>	<b>Percent Passing</b>	
	<b>Ideal</b>	<b>Acceptable</b>
1 1/2 in	100	
1 1/4 in	87 – 100	
1 in	77 – 100	100
3/4 in	66 – 99	99 – 100
1/2 in	67 – 87	87 – 100
3/8 in	49 – 74	74 – 100
No. 4	35 – 56	56 – 95
No. 8	25 – 42	42 – 78
No. 16	18 – 33	33 – 65
No. 50	10 – 24	24 – 43
No. 200	4 – 10	10 – 20

3. Water. Water may be added to facilitate the uniform mixing of the emulsified asphalt recycling agent and the processed RAP. Water added to the recycling asphalt concrete shall be potable, clean and free from deleterious concentrations of acids, alkalis, salts, sugar and other organic or chemical substances. The water shall not contain an amount of impurities that will cause a reduction in the strength of the recycled asphalt concrete pavement. If the water is of questionable quality, it shall be tested in accordance with AASHTO T26.

**c. Mix Design.** A mix design shall be submitted by the Contractor using representative samples of the asphalt concrete pavement to be recycled from the project. The mix design shall be performed by a laboratory that possesses a current and valid AASHTO R18 accreditation in both aggregate and HMA, at a minimum. This mix design shall meet or exceed all requirement set forth in Table 3. No work shall start until the Engineer has approved the mix design in writing. The mix design shall be based on using materials that will be recycled, in-situ material and new materials, which were obtained directly from the roadway and/or material supplier.

<b>Table 3 – Mix Design Performance Requirements</b>		
<b>Test Method</b>	<b>Criteria</b>	<b>Test Purpose</b>
Superpave Gyratory Compaction, 1.25° angle, 600 kPa	30 gyrations at 4 inches (100 mm) <sup>1</sup>	Laboratory Density Indicator
Design Moisture Content	Report	Dispersion of Emulsion
Bulk Specific Gravity (Density), ASTM D 6752 or ASTM D2726	Report	Laboratory Density Indicator
Rice (Maximum Theoretical) Specific Gravity, ASTM D2041	Report	Laboratory Density Indicator
Air Voids	Report	Laboratory Density Indicator
Marshall Stability, ASTM D 1559, lbs	1,250 minimum <sup>1</sup>	Stability Indicator
Retained Stability	70% minimum	Moisture Damage Resistance
Raveling Test, ASTM D 7196	2% maximum	Raveling Resistance
Gradation for Design Millings, AASHTO T 27	Report	
Additional Additive(s) <sup>2</sup> Coarse Aggregate Fine Aggregate RAP Fly Ash Cement	Report Report Report Report 1.0% maximum	
Emulsified Asphalt <sup>2</sup> Distillation Residue, % Residue Penetration, dmm Optimum Emulsion Content, % Residual Asphalt to Cement Content Ratio	Report Report Report 3:1 minimum	

<sup>1</sup> 6 inch samples may be used; however, if 6 inch samples are used, the Marshall Stability is required to be 2,500 lbs minimum.

<sup>2</sup> Report shall include type/gradation and producer/supplier.

**d. Construction.** Perform all work according to the Michigan Department of Transportation 2012 Standard Specifications for Construction, except as modified herein.

1. Cold Milling. Cold mill the existing HMA surface to the depth and width shown on the plans. Immediately after cold milling, clean the surface. Stockpile the removed material at the cold central plant location.
2. Bleeder Drains. If required, excavate for and maintain bleeder drains in the aggregate shoulders to drain runoff water from the milled surface.
3. Temporary Ramps at Cross Roads and Driveways. Install temporary ramps using aggregate or asphalt millings at cross roads and driveways within the project limits.

Remove the temporary ramps prior to placing the cold central plant recycled asphalt pavement mixture.

4. **Crushing and Screening Reclaimed Asphalt Pavement.** Crush and screen the reclaimed asphalt pavement (RAP) to conform to the gradation requirements in Table 2.
5. **Contractor Responsibility.** The Contractor shall perform process and quality control sampling and testing and exercise management control to ensure that cold central plant recycling and placement conforms to these Specifications. The Contractor shall provide an experienced and qualified technician to perform process and quality control sampling and testing during the cold central plant recycling processing, placement, compaction and finishing. Throughout the job the qualified technician shall be available to monitor the mixing, placement and compaction of the recycled cold mix asphalt and make adjustments to the emulsified asphalt recycling agent content as required to improve coating, increase or decrease moisture content to aid in compaction or adjust breaking properties if an emulsified asphalt recycling agent is used. The Contractor shall submit documentation to verify the proficiency of the qualified technician and associated testing laboratory. This documentation shall be submitted to the Engineer for review and approval at the preconstruction meeting. The Engineer shall be given 14 days to review and comment or approve the qualified technician.

Sampling and testing shall be performed at a rate sufficient to ensure that cold central plant recycling processing, placement, compaction and finishing conforms to these specifications. The Engineer shall have unrestricted access to the laboratory, sampling, testing sites and all information resulting from mix design and quality control activities. All quality control testing results shall be submitted to the Engineer on a daily basis.

6. **Test Strip and Start up Procedures.** The first day of operations, the Contractor shall construct within the limits to be cold recycled a test strip of a single pass width and no more than 500 feet in length. The test strip section shall:
  - A. Demonstrate that the equipment, materials and processed proposed can produce a recycled cold mix asphalt pavement material layer that conforms to the requirements of these special provisions;
  - B. Determine the optimal rates for emulsified asphalt recycling agent and water recommended for the recycled cold mix asphalt pavement;
  - C. Determine the optimum time to begin paving and/or compaction dependent on cloud cover, temperature and relative humidity with adjustments made later during the day as the temperature changes;
  - D. Determine the sequence and manner of rolling necessary to obtain the maximum compaction by establishing a rolling vs. density chart that shows the progress of densification from initial laydown through maximum obtainable density at the "break over point." The maximum density and relative compaction of the test strip shall be determined by measuring nuclear gage density generally following the procedures for ASTM D 2950 at random locations using a random sampling plan and computing the relative compaction.

During in place density testing of the compacted recycled cold mix asphalt pavement, the nuclear gauge will be set to the recycled section thickness. The average in-place density will be used to calculate the relative compaction for the test strip. The average relative compaction will not be less than 97 percent or greater than 103 percent of the maximum density obtained. No individual test will be less than 95 percent or greater than 105 percent of the maximum density obtained in the test strip.

Determine the field wet sieve by sampling the processed RAP prior to the addition of the emulsified asphalt recycling agent to verify that the reclaimed asphalt pavement meets the allowable 1-1/2 inch maximum particle size and to determine the wet field gradation for material passing the 1-inch through the No. 4 sieves. The sieve results shall be compared to the gradation band from the mix design so that the emulsified asphalt recycling agent may be adjusted as needed.

Cold recycling operations may continue through the first day, unless the Contractor's equipment and process fail to meet the requirements for successful completion of cold recycling operations in conformance with these special provisions. If the relative compaction within the test strip does not meet the density requirements of these special provisions, the Contractor shall construct additional test strips to determine the maximum density obtainable for the recycled cold mix asphalt material being produced and site conditions. Test strips that do not conform to the special provisions shall be reworked, recompacted, or removed and replaced at the Contractor's expense.

Upon acceptance of the test strip by the Engineer, the Contractor shall use the same equipment, materials and construction methods for the remainder of recycling operations, unless adjustments made by the Contractor are approved by the Engineer. If adjustments are made, the Contractor will produce a new test strip to define the maximum density.

7. Quality Control. After verification of the test strip, cold recycling operations may continue through the first day using the same equipment and methods established during the test strip. The project shall be divided into lots not greater than 3,000 square yards. The cold recycling operation shall be controlled as follows:
  - A. The amount of emulsified asphalt recycling agent shall be within 0.5 percent of the job mix formula percentage established in the mix design for the recycled cold mix asphalt mixture. The percent of emulsified asphalt recycling agent shall be determined based on the ratio of emulsified asphalt recycling agent used to the theoretical dry weight of the millings processed. Emulsified asphalt recycling agent content shall be checked from the belt scale totalizer and asphalt pump totalizer, verified by the delivery weight tickets. Emulsified asphalt recycling agent content changes shall be made if coating and adequate dispersion is not being achieved and if the mix design indicates the CCPR pavement will be stable.
  - B. Two (2) 1-quart minimum size samples of emulsified asphalt recycling agent from each load delivered to the project shall be obtained. One sample shall be used for the Contractor's quality control testing. The remaining sample shall be delivered to the Engineer at the end of each working day. Emulsified asphalt recycling agent shall be sampled in containers that are clean, dry and sealed. Each sample shall

be labeled with the date and time sampled and the bill of lading number from the delivery vehicle. Samples shall be retained and protected from damage or contamination by the Contractor until the project is accepted. A Certificate of Compliance from the emulsified asphalt recycling agent supplier shall accompany each shipment to the project.

- C. The amount of water added to facilitate the uniform mixing of the emulsified asphalt recycling agent and processed RAP material shall be between 0.5 and 5.0 percent of the weight of the RAP mixture per the approved mix design unless a greater variation is determined necessary.
- D. The in-place density and relative compaction for each lot shall be determined using a nuclear moisture-density gauge generally following the procedures outlined in ASTM D 2950 at random locations using a random sampling plan. During in-place density testing of the compacted recycled cold mix asphalt pavement, the nuclear gauge shall be set to the recycled section thickness. The average in-place density shall be used to calculate the relative compaction for each lot. The average relative compaction shall not be less than 97 percent or greater than 103 percent of the maximum density obtained in the test strip or a new test strip maximum density shall be determined. No individual test shall be less than 95 percent or greater than 105 percent of the maximum density obtained in the test strip. Any lot not meeting the requirements of these specifications shall be reworked or reprocessed.
- E. A sample of RAP prior to the addition of the emulsified asphalt recycling agent shall be taken for each lot to verify the maximum particle size requirement is being met. The first sample and every third sample thereafter shall be compared to the gradation band determined during the mix design by performing a wet field gradation for material passing the 1-inch to No. 4 sieves. The CCPR Contractor shall adjust the emulsified asphalt recycling agent as needed.

Some sections of the pavement being recycled may require field adjustment for optimum results. The Contractor shall document the reason for the any changes and identify when and where such changes were made.

- 8. Weather Limitations. Recycling and placement operations shall not be performed during wet conditions or if rain or cold conditions (less than 45°F) are imminent or predicted to exist at any time. "Imminent or predicted" is defined as being forecasted within a 48-hour period on the National Weather Service Web Site <http://www.wrh.noaa.gov> for the most representative and nearest location listed where recycling is to begin and end.

Recycling and placement operations shall not be performed unless the ambient temperature is a minimum of 45°F and unless the National Weather Service Web Site forecasts that the ambient temperature will be a minimum of 60°F within 3 hours after the start of placement operations and will remain above 60°F throughout the recycling operation until all initial compaction and protection efforts have been completed for that day's run.

Recycling mixing operations shall be ceased if actual ambient temperatures drop below 60°F any time after the initial 3-hour window following start-up. In the event CCPR

pavement is placed and weather conditions deteriorate soon after, it is then a requirement that all traffic stay off the recycled mat until weather conditions improve (temperature rises and humidity drops) and the recycled section has "cured" sufficiently for secondary compaction to take place in accordance with the Cure and Maintenance requirements of this specification. The Contractor shall be responsible for maintaining and protecting the recycled surface. Any recycled asphalt surfacing damaged by inclement weather shall be replaced by the Contractor at the Contractor's expense as directed by the Engineer.

All CCPR mixing and paving operations shall be completed a minimum of 2 hours before sunset to allow for compaction and protection operations.

9. Subgrade and Surface Preparation. Prior to placing recycled pavement the subgrade soils/base shall be properly prepared, moisture treated and compacted to a minimum of 95 percent relative compaction based upon ASTM D 1557 so as to create an evenly graded, unyielding surface. If the recycled pavement is to be placed on an existing milled pavement surface it shall be verified that the milled surface is firm and unyielding and there are no subgrade failure areas beneath the milled surface that might compromise the integrity of the recycled pavement. When CCPR pavement is placed on a milled surface or adjacent to structures such as curbs, concrete gutters, swales, planters, etc. these contact surfaces shall be swept of all loose material to create a dry clean surface. A tack coat of SS-1h emulsion, emulsified asphalt recycling agent or equivalent (0.05 gallon per square yard minimum) shall be applied to all surface areas prior to placing the recycled pavement. Successive layers of recycled pavement may be paved without milling but each layer shall be fully cured and compacted before placing the overlay section. See the Placement requirements in this specification.
10. Mixing and Proportioning. The recycled material shall be processed through a material sizing unit having screening and crushing capabilities to reduce the RAP to the maximum size of 1-1/2 inch prior to mixing with the emulsified asphalt recycling agent.

After crushing and sizing, the recycled material shall be processed in a mixing unit capable of processing the sized RAP, emulsified asphalt recycling agent and water to a homogeneous mixture to produce cold central plant recycled asphalt. The mixing unit shall be equipped with a minimum of a 175 horsepower.

The mixing unit shall have, as a minimum, two 6-cubic yard capacity hoppers with oversize screening and vibrators on the hopper walls to assist the free flow of materials. The proportioning of materials shall be controlled by means of mechanically adjustable gate valves at the point of discharge to a variable speed belt conveyor, equipped with a belt scale for continuous weighing of the RAP. The RAP belt scale shall be coupled/interlocked with two microprocessor-controlled systems, complete with two independent pumping systems and spray bars, to regulate the application of emulsified asphalt recycling agent separate from water that is used to increase the moisture content for compaction. The two spray bars shall be fitted with self-cleaning nozzles at a maximum spacing of one nozzle for each 6-inch width of the mixing chamber.

The mixing unit shall be an on-board completely self-contained counter rotating twin shaft pugmill. A metering device shall be capable of automatically adjusting the flow of emulsified asphalt recycling agent to compensate for any variation in the weight of the



RAP introduced into the pugmill. Emulsified asphalt recycling agent shall be metered by weight of RAP using a mass flow, Coriolis Effect, type meter that will accurately measure the amount to within 0.5 percent of the amount required by the mix design or as adjusted in the field.

Control of the plant shall be fully automatic via the microprocessors. Control functions shall include: batch production, automatic plant startup, monitoring of the individual drive systems, warning signals in case of material shortages, monitoring of filling levels, temperatures and pressures, pre-selection of tonnage, automatic plant shut down. Cement shall be controlled using the weight of RAP introduced into the pugmill. Additives may be introduced volumetrically or by weight per the mix design. Automatic digital readings shall be displayed for both the flow rate and total; amount of RAP, emulsified asphalt recycling agent, water and cement added in appropriate units of weight and time. A current setting of the mixing plant shall be continuously displayed.

The emulsified asphalt recycling agent, water and cement shall be incorporated into the graded RAP at the initial rate determined by the mix design and approved by the Engineer. The total water content will include that amount present in the stockpile and additional water at the pugmill if required. Adjustments in the rate of emulsified asphalt recycling, cement and water shall be determined by the Qualified Technician and made as necessary based on the field observed changes in the RAP and/or condition of the recycled mat. Sampling variations and mix design may determine the necessity of different levels of emulsified asphalt recycling agent and/or cement in various sections of the project.

When a paving fabric is encountered during the cold milling operation, the CCPR Contractor shall make the necessary changes in equipment or operation so that incorporation of the shredded fabric in the recycled material does not affect the performance of the recycled asphalt concrete, or inhibit placing or compaction of the cold central plant recycled asphalt pavement. No fabric piece incorporated into the recycled section shall have any dimension exceeding a length of 2 inches. The Contractor shall be required to remove and properly dispose of oversized pieces of paving fabric as directed by the Engineer. Similarly, loop wire, pavement markers, rubberized crack fill materials, thermoplastic marking materials, milled concrete, and other materials that may be incorporated into the RAP through the milling process shall be removed from the recycled material unless the Contractor can demonstrate that minor amounts of residual materials that remain will not compromise the integrity of the recycled asphalt concrete.

11. Transportation. Trucks with smooth clean beds shall be used to haul the recycled cold mix asphalt mixture to the placement area. The loaded trucks shall deliver the blended material into the paver within 1 hour of mixing or before an emulsified asphalt recycling agent begins to break and set, whichever time is earlier.

The lay down operation shall progress in such a manner that trucks hauling the mixture shall not travel over newly laid surface until after the fog seal has been applied as outlined in the Cure and Maintenance requirements of this specification or approval is received from the Engineer.

12. Placement. Cold central plant recycled asphalt pavement shall be spread using a self-propelled paver having electronic grade and cross slope control for the screed. The equipment shall be of sufficient size and power (minimum 170 hp) to spread the recycled material in one continuous pass, without segregation, to the lines and grades established by the Contractor and according to the Plans. Heating of the paver screed is not permitted.

Cold central plant recycled asphalt pavement shall be placed to the finished thickness as specified by the Engineer. A single lift thickness shall be at a minimum compacted depth of 2 inches. Before placing any additional lifts, the recycled surface shall be allowed to cure until the moisture of the material is reduced to 2.0 percent or less or has remained in place for a minimum of 10 days without rainfall upon the Engineer's approval. Compaction of the first layer and any subsequent layers to be overlaid shall be performed and verified per the Compaction and Cure and Maintenance requirements of this specification. Prior to installing and additional lifts, contact surfaces shall be carefully swept of all loose material to create a dry clean surface. A tack coat of SS-1h emulsion, emulsified asphalt recycling agent or equivalent (0.05 gallons per square yard minimum) shall be applied to all surface areas prior to placing any additional lifts.

Handwork of cold central plant recycled asphalt pavement shall be minimized and care shall be taken to prevent segregation. The wings of the paver shall be emptied regularly to prevent buildup and to minimize segregation.

13. Compaction. Compaction of the recycled mix shall be completed using self-propelled rollers, complete with properly operating scrapers and water spray systems. Double drum vibratory and pneumatic tire rollers shall be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the mixture. The number, weight and types of rollers shall be as necessary to obtain the required compaction. At a minimum the following rollers shall be used:

- A. At least one pneumatic tire roller with a minimum gross operating weight of not less than 25 tons. Tires on the pneumatic roller shall be evenly inflated and matched in size and profile so as to maximize compactive effort.
- B. At least one double drum vibratory roller with a gross operating weight of not less than 10 tons with a minimum drum diameter of at least 60 inches.

The rolling pattern shall be established in the field by the Contractor and verified by the Engineer to achieve a maximum density determined by nuclear density testing. A rolling pattern for compaction shall be determined such that increase in density is shown on successive nuclear density tests (per ASTM D 2950) for any additional passes of the compaction equipment once the maximum density pattern has been identified (break over point). Nuclear density testing shall be repeated throughout the time compaction is being completed to continuously verify the compaction is achieving maximum density results by establishing a rolling vs. density chart that shows the progress of densification from initial breakdown compaction through maximum obtainable density at the break over point.

Care shall be taken not to over compact the mat. The minimum rolling pattern shall be as follows:

- A. Two complete coverages with the double drum vibratory roller immediately after the recycled mix is placed. The first coverage shall be made without the vibratory unit turned on and the second with the vibratory unit operating.
- B. Two complete coverages with the pneumatic tire roller shall be made after the initial passes of the steel drum roller.
- C. Final rolling, before cure, to eliminate pneumatic tire marks and to achieve maximum density shall be done by the double drum vibratory roller, either operating in a static or vibratory mode.

Nuclear density testing shall be repeated throughout the time compaction is being completed to continuously verify that the minimum required compaction is being achieved. The Qualified Technician shall be on site and observing all compaction efforts, monitoring density gauge readings and approving areas as they reach minimum relative compaction. The recycled mat shall be continuously observed during compaction efforts. If moisture cracking occurs under the vibratory compaction mode, the vibrators shall be turned off and static rolling only applied. If moisture cracking of the mat continues under static drum rolling, steel drum compaction shall cease, the mat shall be allowed to cure for a time in order for some of the moisture to escape and pneumatic rolling commenced, followed by steel drum rolling to iron out irregularities from the pneumatic tire roller. This procedure shall be followed until there is no longer any displacement of the mat observed by the roller action on the recycled surface.

The selected rolling pattern shall be followed unless changes in the recycled mix or placement conditions occur and a new rolling pattern is established at that time. Rolling that causes cracking, major displacement, or any other type of pavement distress shall be discontinued until the problem can be resolved. Discontinuation and commencement of rolling operations shall be at the discretion of the Engineer.

Extra care shall be taken to ensure that aggregate from the recycled mixture does not stick to the drums or wheels of the rollers. Water shall be uniformly applied to the wheels and drums, along with mechanical means to keep aggregate from sticking. Sufficient water shall be applied to keep rollers and tires clean, but not so much that water pools or ponds on the recycled surface.

Rollers shall not be started or stopped on uncompacted recycled material. Rolling patterns shall be established so that starting and stopping shall be on previously compacted material or the adjacent existing surface.

14. Cure and Maintenance. After the completion of compaction of the recycled material, no traffic, including that of the Contractor, shall be permitted on the material for at least two hours. This may be reduced if sufficient care is established for traffic that will not initiate raveling. A fog seal of dilute (40% to 50%) SS-1h emulsion, emulsified asphalt recycling agent or equivalent (0.08 to 0.12 gallon per square yard) shall be applied after initial compaction. To prevent pickup of the fog seal, the recycled pavement surface shall be covered with sand at a rate 1.0 to 2.0 pounds per square yard. Excess sand shall be removed from the pavement surface by careful sweeping. Sand shall be free from clay or organic material. Fog sealing and/or sanding shall be initiated at the Engineer's direction.

After opening to traffic, the surface of the recycled pavement shall be maintained in a condition suitable for the safe movement of traffic. Before placing the final surfacing, the recycled surface shall remain in-place:

- A. For a minimum of 2 days and until there is less than 2.0 percent moisture remaining in the mixture; or
- B. The moisture in the recycled mat has stabilized for 3 consecutive days; or
- C. A minimum of 10 days without rainfall.

The Contractor shall protect and maintain the recycled surface from nuisance water, other deleterious substances, and any other damage. Any damage to the completed recycled material shall be repaired by the Contractor prior to the placement of new asphalt concrete or final surface sealing. Areas damaged shall be excavated to the depth directed by the Engineer and/or filled with hot mix asphalt. All loose particles that may develop on the pavement surface shall be removed prior to the final surface course. No direct payment will be made and costs shall be included elsewhere for protection and maintenance of the recycled cold mix asphalt pavement.

Prior to any overlay with asphalt concrete, the recycled pavement should be carefully swept of all loose material to create a dry clean surface. A tack coat of SS-1h emulsion, emulsified asphalt recycling agent or equivalent (0.05 gallons per square yard minimum) shall be applied to all surface areas.

15. Smoothness. The finished surface and grade of the recycled material shall be checked regularly during placement using a straight edge. The smoothness shall not vary more than 3/8 inch from a 12 foot straight edge placed on the surface. The Contractor shall correct humps or depressions exceeding this tolerance. High points may be corrected by trimming, cold milling, micro milling, or abrasive grinding as approved by the Engineer.

**g. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit prices using the following pay items:

<b>Pay Item</b>	<b>Pay Unit</b>
Cold Central Plant Recycled Asphalt, __ inch.....	Square Yard
Asphalt Emulsion, Engineered.....	Ton

The Engineer will measure **Cold Central Plant Recycled Asphalt**, of the thickness specified, longitudinally along the pavement surface and will use the transverse dimension shown on the plans. The unit price for **Cold Central Plant Recycled Asphalt** includes the cost of the following:

1. Sampling the existing pavement and preparing a mix design;
2. Cold milling the existing pavement, hauling and stockpiling the reclaimed asphalt pavement, and cleaning the milled surface;
3. Excavating for and maintaining bleeder drains in the aggregate shoulders, if required;

4. Installing temporary ramps with aggregate or asphalt millings at cross roads and driveways and removing the temporary ramps prior to placing the processed RAP mixture;
5. Repairing damages to the milled surface related the Contractor's construction procedures;
6. Crushing and screening the reclaimed asphalt pavement;
7. Processing the reclaimed asphalt pavement with water, engineered asphalt emulsion and other additives consistent with the mix design requirements;
8. Hauling and placing the processed RAP mixture with a self-propelled paver;
9. Compacting the processed RAP mixture;
10. Performing quality control sampling and testing, and providing the Engineer with reports;  
and
11. Performing any corrective measures necessary to meet the specified profile requirements.

Maintenance and/or repairs to the recycled pavement surface related to the Contractor's construction procedures or quality of work are included in the payment for **Cold Central Plant Recycled Asphalt** and will not be paid for separately.

The Engineer will measure **Asphalt Emulsion, Engineered** by the scale weight of the material.