MIDLAND COUNTY ROAD COMMISSION

BID FORM

Sealed Proposals will be received at the office of the Board of Road Commissioners, County of Midland, at 2334 N. Meridian Road, Sanford, Michigan, 48657, until:

DATE: Friday, March 3, 2017, at 9:00 a.m.

Item No. 13
COLD IN PLACE RECYCLING
Estimated Quantity **17,600 - 35,200** SYDS

ITEM:

COLD IN PLACE RECYCLING……$_____/SYD

ASPHALT EMULSION, ENGINEERED……$_____/TON

DESCRIPTION:

To provide a complete Cold In Place Recycling process to a section of road to be determined by the Engineer. Shall follow the MDOT 2012 Standard Specifications for Constructions and MCRC Special Provision as attached. All work to begin no earlier than June 15th and must be completed on or before September 1st. Traffic control to be provided by MCRC.

COMPANY BIDDING_____

CONTACT PERSON_____

ADDRESS_____

PHONE/FAX_____

_____
AUTHORIZED SIGNATURE TITLE

INDICATE ON ENVELOPE: Company Name, Item Number, Bid Item, Time and Date

MIDLAND COUNTY ROAD COMMISSION

SPECIAL PROVISION

FOR

COLD IN PLACE RECYCLING

a. Description. This work consists of cold milling and pulverizing the existing asphalt pavement to the dimensions specified on the plans, processing the reclaimed asphalt pavement (RAP) and mixing with emulsified asphalt, water and additives, then paver placing/spreading and compacting the emulsified RAP mixture into a stabilized asphalt base. This work includes sampling and testing existing HMA pavement, performing a mixture design for the emulsified RAP mixture, and quality control testing to ensure the completed emulsified RAP base layer is consistent with the mix design and compaction requirements specified herein. Perform all work according to the Michigan Department of Transportation 2012 Standard Specifications for Construction, except as modified herein.

b. Materials.

1. Asphalt Emulsion. Provide an engineered asphalt emulsion of the type and grade as determined by the Contractor's mixture design in order to meet the requirements in Table 3 and as specified in Table 1, below. Furnish emulsified asphalt having a penetration within ± 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 120ºF. 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.

Table 1. Engineered Asphalt Emulsion Requirements

Test	Method	Minimum	Maximum
Viscosity, Saybolt Furol, at 77°F (25°C), SFS	AASHTO T59 (ASTM D244)	20	100
Sieve Test, Retained on #20 (0.85 mm), %	AASHTO T59 (ASTM D244)		0.1
Storage Stability Test, 24 hr, %	AASHTO T59 (ASTM D244)		1.0
Distillation Test, Residue from distillation to 177°C, %	AASHTO T59 (ASTM D244)[1]	64.0	
Oil distillate by volume, %	AASHTO T59 (ASTM D244)[1]		1.0
Penetration (TBD[2]), 25°C, 100g, 5 s, dmm	AASHTO T49	75	200

[1] Modified AASHTO T59 procedure – distillation temperature of 177 °C with a 20 minute hold.

[2] TBD – Penetration value To Be Determined by the Mix Design Requirements in Table 3.

2. Pulverized/Crushed Existing HMA Pavement. Produce a uniform mixture of pulverized material from the existing HMA pavement surface prior to the addition of the asphalt emulsion. Process crushed material with the specified equipment to meet the gradation requirements below:

Table 2. COLD PULVERIZED MATERIAL GRADATIONS		
Gradation	Sieve Size and Percent Passing	
	1½ in. (37.5 mm)	1 in. (25 mm)
PM 1	100	
PM 2[1]		100

[1]Use PM 2 only when a finer gradation of RAP is required by the mix design.

3. Additional Aggregate. Where specified on the plans or required by the approved mix design, furnish reclaimed asphalt pavement (RAP) from an off-site source or furnish aggregate of the specified gradation. Furnish aggregate only from approved sources. Use the same aggregate source and gradation for the mix design that will be used on the project.

4. Fog Seal Emulsion. If required, provide SS-1h per Section 904 or approved equal.

5. Water. Provide water according to Section 911. Include sugar with the injurious substances listed in Section 911.01.

6. Other Additives. Use common commercially available asphalt additives as necessary to meet the requirements in Table 3. Detail all additives, including the type, amount, and tolerances (percent) in the submitted mix design.

c. Mix Design. Using the performance requirements in Table 3 below, submit a mix design for each distinct pavement section from a design laboratory possessing a current and valid AASHTO R18 accreditation in both aggregates and HMA. Base the mix design on the actual materials that will be recycled, obtained directly from the project site and the actual source(s) for additional aggregate. Prior to sampling existing pavement for the mix design, furnish the proposed sampling plan for the Engineer's approval, including proposed traffic control and patching method. Perform pavement sampling according to the approved plan. Similar recycled material samples may be combined to provide a single mix design for the combined sample. Provide a separate mix design for recycled materials when the variability of samples indicates that the specified criteria would likely be appreciably affected.

Table 3. MIX DESIGN PERFORMANCE REQUIREMENTS		
Test Method	CIR	Test Purpose
Gradation for Design Millings, AASHTO T 27	Report	
Modified Proctor, ASTM D1557, Method C	Report	Optimum Moisture Content for Density and Compaction
Design Moisture Content	Report	Dispersion of Emulsion
Superpave Gyratory Compaction, 1.25° angle, 600 kPa	30 gyrations at 4 in (100 mm) [1]	Laboratory Density Indicator
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 [1]	Stability Indicator
Retained Stability	70% minimum	Moisture Damage Resistance
Raveling Test, ASTM D 7196	2% maximum	Raveling Resistance
Additional Additive(s) [2] Coarse Aggregate Fine Aggregate RAP Fly Ash Cement	 Report Report Report Report 1.0% maximum	
Emulsified Asphalt [2] Distillation Residue, % Residue Penetration, dmm Optimum Emulsion Content, % Residual Asphalt to Cement Content Ratio	 Report Report Report 3:1 minimum	

[1] 6 inch samples may be used; however, if 6 inch samples are used, the Marshall Stability is required to be 2,500 lbs minimum.

[2] Report shall include type/gradation and producer/supplier.

d. Equipment. Furnish equipment according to section 501 and as specified herein. Perform the necessary processes for cold-in-place recycling (CIPR) using a single unit recycler or multi-unit recycling train.

1. Multi-Unit Recycling Train.

A. Furnish a self-propelled milling machine that is capable of pulverizing the existing bituminous pavement to the depth shown on the plans and to a minimum full lane width (±12 ft) in a single pass, with automatic depth controls to maintain the cutting depth to within ± ¼ inch of that shown on the plans, and a positive means for controlling cross slope elevations. Do not use a heating device to soften the pavement.

B. Furnish a material sizing unit having screening and crushing capabilities to reduce the cold pulverized material to the maximum size requirements as specified, utilizing a screening and crushing unit with a closed circuit system capable of continuously returning oversized material to the crusher.

C. Furnish a mixing unit consisting of an on-board, completely self-contained pug mill, equipped with a belt scale for the continuous weighing of the pulverized and sized bituminous material and a coupled/interlocked computer controlled liquid metering device capable of automatically adjusting the flow of emulsified asphalt to compensate for any variation in the weight of pulverized material coming into the mixer. Use the metering device to deliver the amount of emulsified asphalt to within ± 0.2 percent of the required amount by weight of pulverized bituminous material (for example, if the design requires 3.0 percent, adjust the metering device to maintain 2.8 percent to 3.2 percent emulsion). Equip the mixer with an emulsified asphalt pump of sufficient capacity to allow emulsion contents up to 3.5% by weight of pulverized bituminous material. Display automatic digital readings for both the flow rate and total amount of pulverized bituminous material and emulsified asphalt in appropriate units of weight and time.

2. Single Unit Recycler. Furnish a single unit recycler consisting of a self-propelled cold milling/recycling machine with a down-cutting drum head, having sufficient power and suitable configuration to pulverize and recycle the existing hot-mix asphalt pavement to a maximum depth of 5 inches and incorporate the prescribed amounts of emulsified asphalt and water to produce a homogeneous asphalt base material, and capable of pulverizing and recycling a full lane width (±12 ft) in each pass. Equip the machine with separate systems for adding emulsified asphalt and water, with each system having a full width spray bar with a positive displacement pump interlocked to the machine's ground speed to insure that the amount of emulsified asphalt and water being added is automatically adjusted with changes to the machine's ground speed; each additive system spray bar fitted with 2 nozzles per foot of spray bar, capable of incorporating up to 7 gallons per square yard of emulsified asphalt and/or water, with individual valves on the spray bars capable of being turned off as necessary to minimize emulsion and water overlap on subsequent passes.

3. Additive Distributors. Control additives such as water, lime slurry, etc. introduced at the mill head or mixing unit with liquid metering devices capable of automatically adjusting for the variation in the weight of the pulverized material going into the mixing unit. Provide metering devices capable of delivering the amount of additive to within +/- 0.2 percent of the required amount by weight of the pulverized bituminous material.

Furnish a water distribution system capable of adding up to 5% water by weight of pulverized bituminous material, if necessary based on environmental and material requirements. Metering of water added at the milling machine to control dust in the screens, belts, or crusher/material sizing unit is not required.

4. Elevator. Use a pick-up machine capable of removing the entire windrow of processed RAP down to the milled HMA surface.

5. Paver. Use a separate self-propelled paving machine with independent slope control to distribute and place the recycled pavement material.

6. Rollers. Furnish self-propelled pneumatic-tired roller(s) with a gross weight (mass) of not less than 25 tons. Furnish double drum vibratory roller(s) with a gross operating weight of not less than 10 tons and a minimum width of 78 inches.

7. Power-Broom. Furnish a power broom to sweep the completed recycled pavement to maintain the surface prior placing the HMA wearing course.

e. Construction Methods.

1. Grading. Prior to performing CIPR operations, perform grading or other suitable means to remove grass and other vegetation from the edge of the existing (adjacent) roadbed shoulder areas to prevent contamination of the CIPR base. Excavate or trench shoulders (paid for separately) according to the plans and Standard Specifications. Remove trenched shoulder, material or form a windrow for re-grading of shoulders after CIPR operations, per the plans. Grading work is not applicable where there is existing curb and gutter.

2. Profile Milling. Cold mill the existing pavement to the required depth, width, and/or cross slope as shown on the plans (paid for separately). Cold millings shall be salvaged for use in shoulders for incorporation into the CIPR material. Millings shall be placed and compacted in the shoulder to a depth, width, and grade prior to CIPR operations. The millings in the shoulder shall be incorporated into the CIPR operation. The final CIPR operation shall include both the mainline (travel lane) and the shoulder, constructed in a single pass (no cold joint between the lane and the shoulder). Payment for profile milling will be paid for separately.

3. Weather Restrictions. Perform the CIPR work only when atmospheric temperature in the shade and away from artificial heat is 50°F (10°C) and rising, with dry (no rain or fog) conditions, and forecast temperatures above freezing within 48 hours after completion of recycled pavement in any portion of the project. The Engineer may restrict work when the heat index is greater than 100°F (38°C).

4. Recycling. Pulverize the profiled pavement by cold milling to the depth and width shown on the plans. Do not disturb the underlying material in the existing roadway. Conduct the pulverizing operation so that the amount of fines occurring along the vertical faces of the cut will not prevent bonding of the cold recycled materials.

Pulverize/cold mill the existing pavement to the depth necessary to achieve the compacted thickness shown on the plans, ± ¼ inch. Adjust the pulverizing depth as necessary following depth checks per paragraph f.3.B. below to achieve the specified compacted depth.

If a paving fabric is encountered during the CIPR operation, make the necessary adjustments in equipment or operations so that at least ninety percent (90%) of the shredded fabric in the recycled material is no more than 5 in^2, with no fabric piece of any dimension exceeding 4 inches. Adjustments may include, but not be limited to, adjusting the milling rate and adding or removing screens in order to obtain a specification recycled material. Dispose of material containing over-sized pieces of paving fabric as directed by the Engineer. Extra work to handle paving fabric will not be paid for separately, provided the paving fabric is shown or noted on the plans.

5. Mixing. Determine the appropriate amounts of emulsified asphalt and water at various portions of the project through the sampling and mix design process. Thoroughly mix pulverized material, emulsified asphalt and any additives within the pug mill to produce a homogeneous mixture of recycled asphalt stabilized base material. Incorporate the emulsified asphalt into the pulverized asphalt pavement material at an initial rate according to the approved mix design(s). Make field adjustments to the additive application rates between project segments (with different mix designs) and also as necessary within any mix design segment to account for in-situ material and ambient weather condition variations.

6. Spreading and Finishing. Spread the homogeneous asphalt mixture using a self-propelled HMA paver. Use a pick-up machine to transfer the windrowed material into the hopper of the paver. Maintain a maximum distance of 150 feet between the recycler and the paver. Using the paver, spread and finish the mixture without segregation to the lines and grades established by the plans (with adjustments as directed by the Engineer) in one continuous pass.

7. Compaction. Develop a density growth curve within the first half mile of production for each mix design, consisting of a plot of unit weight (lb/ft^3) vs. number of roller passes with the project breakdown roller. Maintain consistent roller speed during the growth curve testing as during the normal paving operation. Establish this curve with a nuclear density gauge. Take nuclear density measurements after each roller pass until a maximum density is achieved. Discontinue the breakdown roller passes after the measured density is confirmed to have passed the peak density (i.e. a second consecutive reduction in density following an incremental roller

pass. Use the peak density measured as the target maximum density (TMD). If a peak density is not achieved, furnish a larger breakdown roller such that the peak density can be developed.

The Engineer reserves the right to request an additional growth curve if any of the following conditions apply:

A. field adjustment(s) are made to the mix design;

B. significant changes in ambient moisture and temperature occur during the day;

C. the recycled mix is experiencing major displacement or cracking;

D. the measured densities consistently exceed 102% of the target maximum.

Develop a new growth curve if the breakdown roller used on the initial growth curve is replaced with a different production roller. Use the target density only to the specific gauge used to develop the growth curve. If additional gauges are to be used to determine density specification compliance, establish a unique minimum allowable target density for each gauge from the peak density location of the growth curve.

Use a vibratory roller operating in a static or vibratory mode for breakdown rolling. Use vibratory mode only if it is shown to not damage the pavement. Continue intermediate rolling using self-propelled pneumatic roller(s) until no displacement is observed and a minimum required density of 97% of the TMD is achieved. Complete final rolling with one or more double drum steel rollers

operating in static mode to eliminate pneumatic tire marks and to produce a uniform, smooth recycled pavement surface.

hour after recycling is completed. Whenever possible, start and stop rolling on previously compacted material or existing pavement.

8. Opening to Traffic. After compaction of the recycled pavement, do not allow public or Contractor traffic for at least two (2) hours. Open the recycled pavement to rolling traffic upon approval of the Engineer, following sufficient curing of the finished surface to resist traffic induced raveling or permanent deformation.

9. Maintenance. After opening to traffic, maintain the surface of the recycled pavement surface in a condition suitable for the safe movement of traffic. Power-broom the surface as directed to remove all loose particles that may develop on the recycled pavement surface under traffic, and otherwise maintain the recycled pavement surface in a manner satisfactory to the Engineer until the HMA wearing course has been constructed.

10. Curing. Before placing the HMA wearing course, allow the recycled pavement surface to cure until the moisture content is reduced to 2.0 percent or less. Place the leveling course within ten days of the final curing of the recycled pavement, but not later than November 1, unless otherwise approved by the Engineer. Place SS-1h tack coat on the recycled surface immediately prior to paving the HMA wearing course (included with payment for HMA item).

If the recycled pavement is to be left unsurfaced for more than seven (7) days, place a fog coat surface seal. Apply fog seal at a rate of ±0.20 gallons per square yard. If fog seal is placed, the paving tack coat may be omitted, as approved by the Engineer.

11. Surface Requirements. Furnish a 16 foot straightedge at the project site and test the completed recycled pavement for smoothness in the wheel paths by checking for surface variations in excess of 3/8 inch. Correct areas that exceed the 3/8 inch tolerance with a cold milling machine. Power-broom the loose material from profile milling prior to opening to traffic.

f. Quality Control. Perform quality control sampling and testing as specified herein.

1. Quality Control by the Contractor. Perform (or subcontract) the inspection and tests required to assure conformance to contract requirements. Control includes the recognition of obvious defects and their immediate correction. This may require increased testing, expedited communication of test results to the job site (including the Engineer), modification of operations, suspension of the work, or other actions as appropriate.

Immediately notify the Engineer any failing tests and subsequent remedial action. Report passing tests to the Engineer no later than the start of the next work day.

2. Quality Assurance by the Engineer. The Engineer will conduct independent assurance tests on split samples taken by the Contractor for quality control testing. In addition, the Engineer will witness the sampling and splitting of these samples and will immediately retain witnessed split samples for quality assurance testing.

3. Tests Methods and Frequency.

A. Pulverized Material Sizing and Gradation. Obtain a sample before emulsion addition and screened using a 1.5 in. (37.5mm) sieve (or smaller sieve if required) to determine if meeting the maximum particle size requirement. Perform gradation testing on the moist millings each day using the following sieves: 1.5 inch, 1.0 inch, ¾ inch, ½ inch, 3/8 inch, No.4, No.8, No.16, and No.30. Compare the resulting gradation to the mix design gradations to determine any necessary changes to emulsion content.

B. Depth of Compacted Recycled Pavement. Measure the nominal depth at the centerline and midpoint of the outside lane. Check the depth any time depth changes are made or equipment is idle.

Obtain samples according to ASTM D979 or AASHTO T168. When the Engineer determines the location for a gradation sample, cease addition of the asphalt emulsion and mark the location, continuing to pulverize the hot-mix asphalt pavement until the Engineer is satisfied with the length of material pulverized without the addition of the emulsified asphalt (100 feet maximum). After obtaining gradation samples, back up the recycling machine location where the asphalt emulsion was discontinued, then re-pulverize this material adding the required amount of emulsified asphalt to the pulverized material.

C. Emulsified Asphalt Content. Furnish a one-gallon sample per day of production to the Engineer. Notify the Engineer any time emulsified asphalt content is changed. Check and record the emulsified asphalt content for each segment in which the percentage is changed. Make changes to the emulsified asphalt content according to the approved mix designs or as otherwise directed by the Engineer. Check the emulsified asphalt content from the belt scale totalizer or asphalt pump totalizer.

D. Water Content. Notify the Engineer any time the water content is changed. Check and record the water content at the milling head for each segment in which the percentage is changed. Gather this information from the water metering device, which can be checked from the belt scale totalizer to verify daily quantities used. Make water content changes as approved, based on mixture consistency, coating, and dispersion of the recycled materials.

E. Compacted Density. Determine wet density using a nuclear moisture-density gauge generally following the procedures for ASTM D2950, backscatter measurement. Compare this measurement to the target density obtained by the growth curve. Where the measured density is less than the minimum specified (97% of TMD), immediately take appropriate steps to increase the in-place density to meet the specified minimum.

F. Frequency. Perform quality control testing according to the frequency shown in the table below, however, the Engineer may increase the testing frequency if the construction process is experiencing problems or unforeseen conditions are encountered.

QC/QA TESTING FREQUENCY		
Test	QC Frequency [1]	QA Frequency [1]
Depth of Pulverization	1 per 500 feet	1 per 1000 feet
Pulverized Material Sizing and Gradation	1 per ½ day production	1 per day
Emulsified Asphalt Content	1 per 500 ft	1 per 1000 ft
Water Content	1 per 500 ft	1 per 1000 ft
Compacted Density	1 per ¼ mile	1 per mile

[1.] Perform all quality control tests within the first 500 ft (75 m) after startup or any change in the mix. The Engineer will also run the split samples at these locations.

g. Measurement and Payment. The completed work as measured will be paid for at the contract unit price for the following contract items (pay items):

Contract Items (Pay Items) Pay Unit

Cold in Place Recycling ..... Square Yard
Asphalt Emulsion, Engineered..... Ton

The work for ***Cold in Place Recycling*** as described herein will be measured in place by the square yard to the limits and depth shown on the typical cross sections. Payment for ***Cold in Place Recycling*** includes all tools, equipment, labor, and materials necessary to complete the work as described herein, including mix design, profile milling, pulverizing/crushing and processing existing HMA pavement with water, engineered asphalt emulsion (and other additives consistent with the mix design requirements), paver placing processed RAP, compacting the recycled surface, performing the required quality control procedures, processes, and reporting, and all corrective grading necessary to meet the specified profile requirements.

Maintenance and/or repairs to the recycled pavement surface related to contractor construction procedures or quality of work, will be included with payment for not be paid for ***Cold in Place Recycling***, and will not be paid for separately.
Asphalt Emulsion, Engineered will be measured by weight and paid for separately by the Ton.