



MONROE COUNTY
R O A D
COMMISSION

840 S. Telegraph Road • Monroe, Michigan 48161 • Phone: (734) 240-5102 • Fax: (734) 240-5101

PROPOSAL

FOR

2018 COLD IN PLACE RECYCLING

BID OPENING:

Thursday, December 14, 2017 at 10:00 a.m.

BOARD OF COUNTY ROAD COMMISSIONERS
OF THE COUNTY OF MONROE

Paul Iacoangeli, Chairman
Dan Minton, Vice Chairman
Stephen J. Pace, Member
Charles A. Londo, Member
Greg W. Stewart, Member

**MONROE COUNTY ROAD COMMISSION
INVITATION TO BID**

Sealed bids will be received by the Board of County Road Commissioners of the County of Monroe until **10:00 a.m.** local time on **Thursday, December 14, 2017** at their office located at 840 South Telegraph Road, Monroe, Michigan, 48161 for the following:

- 2018 Cold In Place Recycling
- 2018-2020 Roadside Mowing

Bids will be publicly opened and read aloud by the Bid Committee at 10:00 a.m. Proposals may be downloaded from the Road Commission's website at www.mcrc-mi.org/bids.html.

BOARD OF COUNTY ROAD COMMISSIONERS
OF THE COUNTY OF MONROE, MICHIGAN

**MONROE COUNTY ROAD COMMISSION
PROPOSAL
2018 COLD IN PLACE RECYCLING**

TO: The Board of County Road Commissioners of the County of Monroe, Michigan

FOR: 2.37 miles of cold in place recycling, traffic control and pavement markings on Carleton West Road from Maxwell Road to Colf Road in Ash Township, Monroe County, Michigan

Ladies and Gentlemen:

The undersigned bidder hereby affirms that:

1. The proposal is in all respects fair and without any collusion or fraud.
2. The undersigned have examined the site of the proposed project and have made a personal investigation and estimate of quantities.
3. The undersigned will contract to furnish all labor, equipment, tools, material and traffic control devices necessary at the unit prices stated on the attached bid forms and to complete the work in the time specified to the satisfaction of the Board of County Road Commissioners of the County of Monroe, Michigan.

Company: _____

Address: _____

City, State, ZIP: _____

Telephone: _____

By: _____

Title: _____

Date: _____

Notes:

1. If the bidder is a partnership, each member must sign the proposal.
2. Corporations must execute the proposal by duly authorized officers in accordance with the Articles of Incorporation.

INSTRUCTIONS TO BIDDERS
and
GENERAL CONDITIONS

The Michigan Department of Transportation 2012 Standard Specifications for Construction are incorporated as part of these bidding documents and shall govern except as provided in the Invitation to Bid, Instructions to Bidders and General Conditions, and Proposal. Reference to the Department or Commission in the Michigan Department of Transportation 2012 Standard Specifications for Construction shall for this project mean the Board of County Road Commissioners of the County of Monroe, hereinafter referred to as "Board", unless otherwise specified.

OWNER

The owner of the project is the Board of County Road Commissioners of the County of Monroe, also referred to as the "Board."

ENGINEER

The Engineer is the County Highway Engineer or the individual assigned by the County Highway Engineer to be in charge of the Contract. The person assigned as the Engineer may be an employee of the Board, a consultant or an outside contractor hired by the Board.

BIDDER

The Bidder is one who submits a signed bid with the required documentation directly to the Board at the time and place specified.

BID FORMS

Sealed proposals must be submitted on the bid forms furnished by the Board. The proposal shall be submitted in its entirety (pages 1 through 11) with no modifications or changes except as authorized by an addendum and with no pages removed. All proposals must be filled out in ink or typewritten and shall be legibly signed, giving the complete name and address of the Bidder.

All bids must be in a sealed envelope and clearly marked "**Bid for 2018 Cold In Place Recycling.**"

BIDDER'S SURETY

The proposal must be accompanied by a cashier's check, certified check or a bid bond made payable to the Board of County Road Commissioners of Monroe County, Michigan in the sum of five percent (5%) of the amount of the bid. Upon awarding and signing of a contract, or in the event of bid rejection, such bid surety will be returned to the Bidder. Bids may be held for a period of forty (40) days.

INTERPRETATION AND ADDENDA

All questions about the meaning or intent of the Bidding Documents are to be directed to the Engineer. Interpretation or clarification considered necessary by the Engineer to such questions will be issued by Addenda delivered to all parties recorded by the Engineer as having received the Bidding Documents. Questions received less than seven days prior to the date for opening the bids may not be answered. Only questions answered by formal written Addenda are binding. Oral and other interpretations or clarifications will be without legal effect.

OPENING OF BIDS

Bids will be received by the Board at 840 S. Telegraph Road, Monroe, Michigan, 48161 until **10:00 a.m.** local time on **Thursday, December 14, 2017** at which time they will be publicly opened and read aloud.

REJECTION OF BIDS

The Board reserves the right to reject any or all bids, including without limitation the right to reject any or all nonconforming, nonresponsive, unbalanced, or conditional bids and to reject the bid of any Bidder if the Board believes that it would not be in the best interest of the project to make an award to that Bidder, whether because the bid is not responsive or if the Bidder is unqualified or of doubtful financial ability or fails to meet any pertinent standards or criteria established by the Board. The Board also reserves the right to waive all informalities in any bid should it be deemed in the best interest of the Road Commission

to do so. Discrepancies between the multiplication of units of work and the unit prices will be resolved in favor of the unit price. Discrepancies between the indicated sum of any column of figures and the correct sum will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of words.

TITLE VI ASSURANCE

The Monroe County Road Commission, in accordance with Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC 2000d to 2000d-4) and Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, hereby notifies all bidders that it assures that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin, gender, age, or disability in consideration for an award.

PROHIBITION OF DISCRIMINATION

In accordance with Act No. 453, Public Acts of 1976, the Contractor and subcontractors hereby agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex, height, weight, or marital status. Further, in accordance with Act No. 220, Public Acts of 1976 as amended by Act No. 478, Public Acts of 1980, the Contractor and subcontractors hereby agree not to discriminate against an employee or applicant for employment tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of a disability that is unrelated to the individual's ability to perform the duties of a particular job or position. A breach of the above covenants shall be regarded as a material breach of this contract.

CONTRACT EXECUTION

The Bidder to whom the Contract is awarded shall, within ten (10) calendar days after notice of award, enter into a written contract with the Board and furnish proof of insurance as hereinafter specified. Failure to execute the contract or furnish satisfactory proof of insurance will be considered cause for annulment of award.

PERFORMANCE AND LIEN BONDS

The successful Bidder to whom the contract is awarded shall furnish two (2) surety bonds as follows:

Performance Bond - To the Board of County Road Commissioners of the County of Monroe, Michigan for the faithful fulfillment of the terms of the contract in the amount of one-hundred (100) percent of the contract amount

Lien Bond - To the Board of County Road Commissioners of the County of Monroe, Michigan for the payment of all labor and materials used in the work in the amount of one-hundred (100) percent of the contract amount

INCREASED OR DECREASED QUANTITIES

The Board reserves the right to increase or decrease quantities from those originally estimated and such changes will be paid for at the unit price bid so long as the total contract amount is not changed more than ten (10) percent. Changes in excess of that amount will be individually negotiated.

SAFETY REQUIREMENTS

The Contractor is responsible for protecting the life and health of all personnel on the project; the safety and health of the public; and property during the construction of the project in accordance with subsection 104.07.B of the Michigan Department of Transportation 2012 Standard Specifications for Construction. Prior to the commencement of work, the Contractor must submit a written "Construction Safety Program" that outlines the plan and procedures for preventing and mitigating accidents on the project and meeting all health and safety requirements of the contract.

PROGRESS SCHEDULE

In no case shall any work be commenced prior to receipt of formal notice of award by the Board.

The low Bidder for the work covered by this proposal will be required to meet with the Board's representative to review the Contractor's proposed work schedule. The schedule for this meeting will be set within one (1) week after the low bidder is determined.

The Board's representative will arrange the time and place for the meeting.

TIME OF COMPLETION

All contract work shall be completed on or before **August 25, 2018**.

FAILURE TO COMPLETE ON TIME

Liquidated damages in the amount of **\$600** per day will be assessed for each calendar day that the work remains incomplete beyond the completion date.

PAYMENTS TO CONTRACTOR

The Contractor shall invoice the Monroe County Road Commission for their work on the contract. Each invoice shall contain, at a minimum, the following information: road name and limits, pay items, quantities of work completed, and the contract unit prices

FINAL INSPECTION, ACCEPTANCE AND FINAL PAYMENT

The Engineer or their designated representative will make an inspection of all work included in the contract and notify the Contractor of defects to be remedied prior to acceptance and payment.

DISPUTES

The Engineer's written decision on any question arising under the contract between the Board and Contractor shall be final and binding upon both the Board and the Contractor in the absence of fraud, bad faith, or abuse of discretion.

ASSIGNMENT CLAUSE

The contract between the Board and the Contractor may not be assigned to a third party without the written consent of the Board.

TAXES

The Contractor shall include, and will be deemed to have included, in its base bid and contract price all applicable Michigan Sales and Use taxes which have been enacted into law as of the date the bid is submitted.

BOARD RESPONSIBILITY

The Board shall not supervise, direct or have control or authority over, nor be responsible for, the Contractor's means, methods, techniques, sequences or procedures of construction or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with laws and regulations applicable to the furnishing or performance of the work unless otherwise specified in the Special Provisions. The Board will not be responsible for the Contractor's failure to perform or furnish the work in accordance with the Contract Documents.

INDEMNIFICATION, DAMAGE LIABILITY AND INSURANCE

- A. Indemnification. The Contractor must hold harmless, indemnify, defend and represent the Board and its officers, agents and employees against any and all claims for bodily injury or property damage, or any other claim arising out of performance of the work on this contract. The Contractor will not be responsible for claims that result from the sole negligence or willful acts of said indemnitee.
- B. Workers' Compensation Insurance. The Contractor must carry the necessary Workers' Compensation Insurance and submit a certification that it carries Workers' Compensation to the Board.
- C. Bodily Injury and Property Damage. The Contractor must carry adequate insurance, satisfactory to the Board, to afford protection against all claims for damage to public or private property and

injuries to persons arising out of performance of the work. Copies of completed certificates must be submitted to the Board.

1. General Liability, Bodily Injury and Property Damage. The Contractor must provide the following minimum limits of property damage and bodily injury liability:

Bodily Injury and Property Damage Liability:	
Each Occurrence	\$1,000,000
Aggregate	\$2,000,000

2. Automobile Liability, Bodily Injury and Property Damage. The Contractor must provide the following minimum limits of property damage and bodily injury liability:

Bodily Injury Liability:	
Each Person	\$500,000
Each Occurrence	\$1,000,000

Property Damage Liability:	
Each Occurrence	\$1,000,000

Combined Single Limit for Bodily Injury and Property Damage Liability:	
Each Occurrence	\$2,000,000

3. Umbrella Policy. The Contractor may meet the requirements of above minimum limits of bodily injury and property damage liability through an umbrella policy.

- D. Additional Insured. The Bodily Injury and Property Damage Policy must include the following endorsements, verbatim:

“Additional Insured: The Board of County Road Commissioners of the County of Monroe, the Monroe County Road Commission and its officers, agents and employees.”

“Provide written notice ten (10) days prior to cancellation, expiration, termination or reduction in coverage for nonpayment of the premium and written notice thirty (30) days prior to cancellation, expiration, termination or reduction in coverage for all other reasons.”

- E. Per Project Aggregate. The Bodily Injury and Property Damage Policy must be endorsed with an endorsement that provides the General Aggregate Limit to each designated construction project.

- F. Notice. The Contractor must ensure that all insurance policies and binders include an endorsement by which the insurer agrees to notify the Department in writing at least 30 days before there is a cancellation or material change in coverage. The Contractor must stop operations if any insurance is canceled or reduced, and must not resume operations until new issuance is in force.

- G. Reports. The Contractor or insurance carrier shall report to the Board any claims received, inspections made and the disposition of claims. The Board will withhold final payment release until either the Contractor pays the claim or until final disposition of the claim by the Contractor's insurance company has been received by the Board.

MAINTENANCE OF TRAFFIC

Maintain traffic in accordance with sections 104.07, 104.11, 812 and 922 of the Michigan Department of Transportation 2012 Standard Specifications for Construction and the Michigan Manual of Uniform Traffic Control Devices (MMUTCD).

The Contractor shall be responsible for the protection of vehicular and pedestrian traffic, work in progress and construction workers in the work zone through the implementation of procedures as described in this

proposal, the MMUTCD, the Standard Specifications for Construction, and other applicable state and federal requirements.

The Contractor shall coordinate this work with any other contractors or maintenance agencies performing work within the work zone or adjoining areas to avoid conflicts in the maintenance of traffic, construction signing and the orderly progress of contract work.

Carleton West Road shall be closed to through traffic during the cold in place recycling operation utilizing Type III barricades and Road Closed to Thru Traffic (R11-4) signs.

Local traffic shall be maintained at all times during the cold in place recycling operation utilizing traffic regulators at the POB, POE and each intersecting street.

The Contractor shall notify the Engineer a minimum of three (3) business days prior to the implementation of the road closure.

All work shall be conducted during normal daytime hours unless otherwise approved by the Engineer. Normal daytime hours are considered to be Monday through Saturday from 7 a.m. to 7 p.m.

No work shall be performed during the Memorial Day or Independence Day holiday weekends as defined by the Engineer.

SPECIFICATIONS

All work not otherwise specified shall be completed in accordance with the Michigan Department of Transportation 2012 Standard Specifications for Construction. Within these specifications all references to the Michigan Department of Transportation shall mean the Board.

MATERIALS

All materials shall be in accordance with the Michigan Department of Transportation 2012 Standard Specifications for Construction.

ITEMS OF WORK

Following are descriptions of the items of work on this contract:

Cold In Place Recycling, 4 inch (Square Yard) – The Cold In Place Recycling, 4 inch item of work shall be in accordance with the Special Provision for Cold In Place Recycling. This item of work will be used for recycling the existing hot mix asphalt pavement surface on Carleton West Road from Maxwell Road to Colf Road to a depth of four (4) inches. The existing pavement surface on Carleton West Road varies in width from 21.6 feet to 22.8 feet, and the plan quantity for Cold In Place Recycling, 4 inch based on an average pavement width of 22.5 feet. A fog seal on the recycled pavement surface will not be required, and the recycled pavement surface will resurfaced with hot mix asphalt under a separate contract.

Asphalt Emulsion, Engineered (Ton) – The Asphalt Emulsion, Engineered item of work shall be in accordance with the Special Provision for Cold In Place Recycling. The plan quantity for the engineered asphalt emulsion is based on an estimated rate of 1.3 gallons per square yard.

Pavt Mrkg, Waterborne, 4 inch, Yellow (Feet) – The Pavt Mrkg, Waterborne, 4 inch, Yellow item of work shall be in accordance with section 811 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for reapplying the centerline pavement markings on the recycled pavement surface prior to reopening the road to traffic. The Engineer will witness, log and lay out the centerline markings to replace in kind.

Barricade, Type III, High Intensity, Double Sided, Lighted, Furn (Each) and Barricade, Type III, High Intensity, Double Sided, Lighted, Oper (Each) – The Barricade, Type III, High Intensity, Double Sided, Lighted Furn and Barricade, Type III, High Intensity, Double Sided, Lighted, Oper items of work shall be in accordance with section 812 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for installing, maintaining and removing Type III barricades at the following locations:

Location	Quantity	Unit
Carleton West Road at Maxwell Road	1	Ea
Carleton West Road at Burns Road (south)	2	Ea
Carleton West Road at Burns Road (north)	2	Ea
Carleton West Road at Exeter Road (south)	2	Ea
Carleton West Road at Exeter Road (north)	2	Ea
Carleton West Road at Fay Road	2	Ea
Carleton West Road at Colf Road	1	Ea
Carleton West Road at Newburg Road	1	Ea
Total	13	Ea

Minor Traf Devices (Lump Sum) – The Minor Traf Devices item of work shall be in accordance with section 812 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for providing, installing, maintaining, relocating and removing traffic cones and other traffic devices not paid for separately with other contract items of work.

Sign, Type B, Temp, Prismatic, Furn (Square Feet) and Sign Type B, Temp, Prismatic, Oper (Square Feet) – The Sign, Type B, Temp, Prismatic, Furn and Sign Type B, Temp, Prismatic, Oper items of work shall be in accordance with section 812 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for installing, maintaining and removing temporary signs. The estimated temporary signing quantities are based on placing a Road Closed to Thru Traffic (R11-4) sign at each Type III barricade, Road Work Ahead (W20-1) signs on Exeter Road and Burns Road, and Road Closed Ahead (W20-3) signs on southbound Carleton West Road and Fay Road.

Sign	Description	Size	Quantity	Type B Area (Sft)
R11-4	Road Closed to Thru Traffic	60" x 30"	13	163
W20-1	Road Work Ahead	48" x 48"	4	64
W20-3	Road Closed Ahead	48" x 48"	2	32
Totals				259

Traf Regulator Control (Lump Sum) – The Traf Regulator Control item of work shall be in accordance with section 812 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for providing, installing, maintaining, relocating and removing traffic control and other traffic devices not paid for separately with other contract items of work.

COMMUNICATIONS

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

Name: Michael Smith
Phone: 734-240-5103
Email: MSmith@mcrc-mi.org

**MONROE COUNTY ROAD COMMISSION
UNIT PRICE CONTRACT
2018 COLD IN PLACE RECYCLING**

TO: Board of County Road Commissioners of Monroe County, Michigan

The undersigned, having full knowledge of the proposal and specifications for the **2018 Cold In Place Recycling** contract including Bidders' Addenda _____ and the conditions of these Contract Documents, hereby agrees to furnish all labor, equipment, materials, transportation and incidentals necessary to perform the Work as specified in the Instructions to Bidders and General Provisions at the unit price named below:

Item Description	Estimated Quantity	Unit	Unit Price	Bid Amount
Cold In Place Recycling, 4 inch	31,400	Syd	\$	\$
Asphalt Emulsion, Engineered	175	Ton	\$	\$
Pavt Mrkg, Waterborne, 4 inch, Yellow	13,900	Ft	\$	\$
Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	13	Ea	\$	\$
Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	13	Ea	\$	\$
Minor Traf Devices	1	LS	\$	\$
Sign, Type B, Temp, Prismatic, Furn	259	Sft	\$	\$
Sign, Type B, Temp, Prismatic, Oper	259	Sft	\$	\$
Traf Regulator Control	1	LS	\$	\$
Total Bid				\$

Contractor Signature: _____

Printed Name and Title: _____

Quantities are not guaranteed. Final payment will be based on actual quantities.

Bidder agrees that the work will be completed and ready for final payment in accordance with the General Conditions. Work on the **2018 Cold In Place Recycling** contract is to be completed by **August 25, 2018** as detailed in the Time of Completion section above.

Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the work on time.

The following documents are attached to and made a condition of this Bid:

Required Bid Security in the form of either:

Certified Check or a Bidder's Bond in the amount of:

_____ Dollars (\$ _____)

Communications concerning this Bid shall be addressed to the Bidder's representative.

Name of Representative: _____

Address: _____

City, State, ZIP: _____

Telephone Number: _____

Fax Number: _____

E-Mail Address: _____

The terms used in this Bid, which are defined in subsection 101.03 of the Michigan Department of Transportation 2012 Standard Specifications of the Construction, have the meanings assigned to them in the Standard Specifications for Construction.

SUBMITTED on: _____, 2017

If Bidder is:

An Individual

By: _____ (SEAL)
Individual's Name

Doing Business As: _____

Business Address: _____

Phone No: _____

A Partnership

By: _____ (SEAL)
Firm Name

General Partner

Business Address: _____

Phone No.: _____

A Corporation

By: _____ (Corporate SEAL)
Corporate Seal

State of Incorporation

By: _____
Name of Person Authorized to Sign

Title

Business Address: _____

Phone No.: _____

A Joint Venture

By: _____
Name

Business Address: _____

Phone No.: _____

By: _____
Name

Business Address: _____

Phone No.: _____

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above.)

2018 COLD IN PLACE RECYCLING

PROPOSAL ATTACHMENTS

1. Special Provision for Cold In Place Recycling

MONROE COUNTY ROAD COMMISSION

**SPECIAL PROVISION
FOR
COLD IN PLACE RECYCLING**

MCRC:MLS

1 of 9

11-22-17

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; 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 base layer 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 in order to meet the requirements in Table 3 and as specified in Table 1, below. 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.

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	
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 Gradation		
Gradation	Sieve Size and Percent Passing	
	1 ½ inch (37.5 mm)	1 inch (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 off-site source(s) with a target asphalt content of 5% (-0.5% tolerance) or furnish aggregate of the specified gradation. Furnish RAP and aggregates 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 Gyrotory Compaction, 1.25° angle, 600 kPa	30 gyrations at 4 inches (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 in accordance with Section 501 and as specified herein. Perform the necessary processes for cold-in-place recycling (CIPR) utilizing a multi-unit recycling train or single unit recycler.

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 $\pm \frac{1}{4}$ 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 or up-cutting drum head having sufficient power and suitable configuration to pulverize and recycle the existing hot-mix asphalt pavement to a depth of 4 inches and incorporate the prescribed amounts of emulsified asphalt and water to produce a homogeneous asphalt base material. The recycler shall have a minimum cutting drum width of eighty (80) inches. The recycler shall be equipped 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 shall be 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. Windrow Elevator. Use a pickup machine capable of removing the entire windrow of processed RAP mixture down to the milled HMA surface.
5. Paver. Use a separate self-propelled paving machine with automatic grade and slope control to distribute and place the processed RAP mixture to profile and grade. A separate paving machine will not be required if a paving screed is attached to the rear of the single unit recycler.
6. Paving Screed. In lieu of an elevator and separate paving machine, the single unit recycler may be equipped with a vibrating paving screed with automatic grade and slope control for placing the processed RAP mixture to profile and grade.
7. 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.
8. Power Broom. Furnish a power broom to sweep the completed recycled pavement to maintain the surface prior placing the HMA wearing course.

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

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.
2. 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).
3. 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, $\pm \frac{1}{4}$ 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 in², 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.

4. **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.
5. **Spreading and Finishing.** Spread the homogeneous asphalt mixture using either a self-propelled HMA paver or a paving screed attached to the rear of the single unit recycler. When using a self-propelled paver, use a pickup 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. 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.
6. **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/ft³) 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; or
- 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.

Start rolling no more than 30 minutes behind the paver. Complete finish rolling no later than one hour after recycling is completed. Whenever possible, start and stop rolling on previously compacted material or existing pavement.

7. **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.
8. **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 Seal, Single Chip has been constructed.
9. **Curing.** Before placing the top course, allow the recycled pavement surface to cure until the moisture content is reduced to 2.5 percent or less. Place the top course within ten days of the final curing of the recycled pavement, unless otherwise approved by the Engineer.

If the recycled pavement is to be left unsurfaced for more than seven (7) days, place a fog coat surface seal. Apply the fog seal at a rate of ± 0.20 gallons per square yard.

10. **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 any loose material from the milled surface 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 ½ inch (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 ½ inch, 1 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 Table 4; however, the Engineer may increase the testing frequency if the construction process is experiencing problems or unforeseen conditions are encountered.

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 feet	1 per 1000 feet
Water Content	1 per 500 feet	1 per 1000 feet
Compacted Density	1 per ¼ mile	1 per mile

¹ Perform all quality control tests within the first 500 feet (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 Item (Pay Item)	Pay Unit
Cold in Place Recycling, __ inch.....	Square Yard
Asphalt Emulsion, Engineered.....	Ton

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

1. Sampling the existing pavement and preparing a mix design;
2. Profile milling, pulverizing and processing the existing HMA pavement with water, engineered asphalt emulsion and other additives consistent with the mix design requirements;
3. Placing the processed RAP mixture with a self-propelled paver or with a paving screed attached to the rear of the single unit recycler;
4. Compacting the processed RAP mixture;
5. Performing quality control sampling and testing, and providing the Engineer with reports; and
6. 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 in Place Recycling** and will not be paid for separately.

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