SECTION 32 01 06 – PAVEMENT REHABILITATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Infrared seamless patching.
   2. Grinding (milling) and removal of existing asphaltic concrete.
   3. Pulverizing of existing asphaltic concrete
   4. Seal coating of existing asphaltic concrete.
   5. Crack filling of existing asphaltic concrete.

1.2 REFERENCES

A. Asphalt Institute

B. Asphalt Recycling and Reclaiming Association

C. ASTM International

D. AASHTO

E. State of Wisconsin Department of Transportation

1.3 SUBMITTALS

A. Section 01 33 00 - Submittals: Requirements for submittals.

B. Product Data: Submit data on asphalt rejuvenating agent, seal coat, and crack filling materials as applicable.

C. Mix Design: Submit mix design proposed.

D. Equipment: Submit list of equipment intended for use on the Work.

E. Procedures: Submit schedule of intended work.

1.4 QUALITY ASSURANCE

A. Perform Work according to ARRA ARS 5-HR, and AI MS-20, if recycling hot-mix asphalt.

B. Perform Work according to State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction.

1.5 QUALIFICATIONS

A. Company specializing in performing the Work of this section with minimum five years' documented experience.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not perform Work when weather conditions will not permit successful completion of the Work.

B. When ambient air temperature is below 60ºF, obtain Engineer's approval prior to proceeding with the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Recycled Material: Existing in-place asphaltic concrete.

B. Virgin Mix Materials: Furnish according to State of Wisconsin Department of Transportation standards.

C. Asphalt Rejuvenating Agent: Hydrocarbon products, liquid form, physical and chemical properties, according to Asphalt Recycling and Reclaiming Association - Proven Guidelines for Hot-Mix Recycling.

D. Material for Infrared Seamless Patching
   1. New bituminous concrete material for patching shall be equal to Wisconsin Department of Transportation specifications gradation 3 or 4 Asphalt cement grade 120- 150, is desirable.
   2. A minimum of 20% of new virgin material shall be added to all patched areas. Additional material shall be added as needed and as directed by the Engineer.
   3. Cold mix asphalt is not allowed

E. Asphalt Binder for Seal Coating
   1. The asphaltic material for seal coat shall be cationic CRS-2P, Polymer modified. This asphaltic material shall be rapid set emulsion that has elastic properties and shall comply with AASHTO M316, meeting the applicable requirements of the State of Wisconsin Department of Transportation (WisDOT) Standard Specifications for Highway and Structure Construction, latest version, as set forth on the Department of Transportation website.

F. Aggregate for Seal Coating
   1. $^{3}/_{8}$-Inch Crushed Aggregate Chips - The crushed aggregate material for $^{3}/_{8}$-inch seal coat cover shall be hard, durable particles of crushed stone meeting the requirements of the latest version of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, as set forth on the Department of

Transportation website. The percentage of wear, as determined by the AASHTO T 96 test, shall not exceed 40 after 500 revolutions. At least 60%, by count, of the number of particles retained on the No. 4 sieve shall have at least one fractured face. Aggregates retained on the No. 4 sieve shall have 10%, by weight, or less flat and elongated pieces based on a 5:1 ratio. This aggregate shall conform to the following gradation requirements:

Sieve Size	Percent Passing, by Weight
½-Inch	100
⅜-Inch	95 - 100
No. 4	0 - 60
No. 16	0 - 5

2. Granite Chips (FA2) – The aggregate for "granite" seal coating consists of hard durable particles of a washed crushed granite stone classified as Class A aggregates. Gradation requirements for the granite material shall conform to the following:

Sieve Size	Percent Passing, by Weight
3/8-inch	100
¼-inch	100
½-inch	100
No. 4	0-100
No. 8	0-15
No. 16	0-15
No. 50	0-7
No. 100	0-4
No. 200	0-2

3. Black Boiler Slag – The aggregate for the "SLAG" seal coating shall consist of hard durable particles of BLACK BOILER SLAG (byproduct of coal). Gradation requirements for the slag material shall conform to the following.

Sieve Size	Percent Passing, by Weight
3/8-inch	100
¼-inch	95-100
No. 4	90-100
No. 8	45-75
No. 16	20-35
No. 30	05-10
No. 50	0-04
No. 100	0-02
No. 200	0-01

4. A sample is required before the start of the project.
5. Materials may be stockpiled no more than two weeks prior to start of the project. This may be amended with the consent of the Owner. Erosion control measures shall be put in place by Contractor to the satisfaction of the Owner to assure materials are contained to the

stockpile area. The storage areas shall be cleaned and swept by the contactor within one week of completion of the project to the satisfaction of the Owner.

G. Joint Sealer

1. The material used shall be a premium quality rubber asphalt joint sealer. The sealer must exceed the minimum ASTM D 6690 specification for Hot Pour Rubber Asphalt Joint Sealants and contain a minimum of 38% rubber content. The sealant shall be in manufacturer's original sealed containers. Each container shall have the manufacturer's name, batch number, and manufacturer's recommendation for melting and application.

2.2 EQUIPMENT

A. For infrared seamless patching:

1. Pavement Restoration Vehicle (PRV) shall be a truck mounted, self-contained pavement maintenance heating system equipped with a fuel system and a heated chamber capable of maintaining the fresh virgin bituminous concrete materials at a temperature of 275º or higher. Any material with a laying temperature less than 265º shall be discarded. Any material not used within 48 hours shall be discarded.
2. The adjustable height infrared heating unit will be truck mounted to the PRV. The heating unit shall be equipped with a heating chamber or chambers capable of heating the existing bituminous pavement to a workable condition without oxidation or burning. There shall be no flame in direct contact with the existing bituminous surface.
3. Compaction shall be achieved with a self-propelled vibratory roller of sufficient size to provide complete compaction to the full heated depth of the patched area. The new surface shall match the elevation of the adjacent pavement. Compaction methods shall be subject to the approval of the Engineer.

B. Milling Unit: Type for intended purpose as follows:

1. Equipment used for this work shall include a power-operated self-propelled grinding machine which will result in chips of asphaltic material 1½ inches, or less in the widest dimension. This machine shall be equipped with a pressurized watering system for dust control. It shall be suitable for efficiently grinding the pavement and for pulverizing all loosened material. The grinding equipment shall also be capable of grinding and removing concrete utility patches and loosely cemented concrete pavements. The grinding equipment shall also be equipped with a spray bar to allow addition of water to the pulverized material and with electronic devices which can provide accurate depth, grade and slope control.
2. For grinding and removal operations, cuttings removal shall be achieved by a belt loader, an end loader and/or a power sweeper.

C. For pulverizing, and for grinding and reprocessing of asphalt for base course equipment shall also include a paver, grader and rollers meeting the requirements of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, latest version.

D. For seal coating, the Contractor shall have available on the site and use as appropriate equipment to heat and distribute the asphalt, an aggregate spreader, steel wheel and pneumatic-tire rollers, and a power broom. The variation in the longitudinal spread of the distributor shall not be more than 10%. Use steel wheel rollers (6 to 8 tons) or pneumatic-tire rollers with tires on one axle arranged to cover the spaces between tires on the other axle. Rollers with a combination of pneumatic tires and steel drums are not allowed. Ensure that all tires are the same size and

uniformly inflated. The pneumatic-tired rollers shall be self-propelled, smooth-tread rollers. Rollers shall not crush the aggregate particle during roller operation. Ensure that the wheel load and tire contact pressure is 30 psi or greater. If the engineer requests, furnish manufacturer documentation showing the contact areas and contact pressures for various wheel loadings and tire inflation pressures. All rollers and brooms shall be equipped with flashing amber lights visible from the front and rear.

E. For crack filling, a minimum of two routers will be required. The routers must be a minimum of 24 H.P. using star wheel carbide tipped router blades attached to a main cutting head. Routers must have in-line wheels and cutting heads capable of following random cracks. Routers must have an automatic depth control to insure consistent and accurate routing depths. Two (2) air compressors will be required. They must be of sufficient size to maintain air pressure of 120 PSI and provide moisture and oil free compressed air. One (1) compressor shall be used with an air wand to blow out the crack and clean off the road. The second shall be used with the heat lance. (One compressor is not of sufficient size to run both air wand and heat lance at the same time.) The kettle used for heating the sealant must be an oil jacketed double boiler type melting unit, which is equipped with both agitation and recirculation systems. It must have separate temperature thermometers for both the oil bath and melting vat to insure proper temperature for the sealant. It must be equipped with a pump to pressure fill cracks with a wand applicator.

2.3 RECYCLED MIX

A. Remove random samples of existing pavement material; record sample location and perform testing.

B. Establish mix design from test sample materials.

C. Identify asphalt content, aggregate gradation curve, penetration value, viscosity of residual asphalt, and density.

D. Establish recycling agent demand ratios; determine maximum stability curve to support demand ratios.

E. Maintain minimum moisture content of 3%.

PART 3 - EXECUTION

3.1 PREPARATION

A. Mechanically sweep pavement surfaces immediately prior to commencement of Work. Clean pavement surfaces of loose foreign matter. Verify surfaces are dry.

B. Protect existing improvements, overhanging trees, and plant life from heat damage by individual shielding.

3.2 INFRARED SEAMLESS PATCHING

A. The areas to be patched shall be marked on the pavement and measured by the Engineer and the contractor. The contractor shall determine the starting point of the work and the sequence to the heater application so as to accomplish all the work as specified.

B. The infrared heating unit shall be lowered to within six inches of the existing pavement. The heated area must extend at least six inches outside the area to repair.

C. Apply heat to the area continuously until the surface is heated to a depth of approximately 1½ inches. The depth of heat penetration through an existing bituminous overlay or surface course shall be the thickness of the surface course or approximately 1½ inches, whichever is less. When the surface can be worked with a rake, proper heat penetration has been achieved.

D. Etch an outline of the perimeter of the repair area with the back of a rake at least three inches beyond the edges of the repair area. Scarify the existing bituminous surface with the repair area to the full heated depth.

E. Remove enough existing bituminous material (as required by adjacent grades) to allow for the addition of 20% new virgin bituminous mix to achieve a blend of 20% new / 80% existing heated material within the area of the patch.

F. If the patch area is already low, less existing material need be removed prior to the addition of the new virgin mix. Remove only the old oxidized surface in low areas.

G. Reshape patched area by hand with rake and lute to match grade of existing adjacent pavement.

H. Compact new paving with the specified roller to the full depth of the heated patch. Compacted surface shall be smooth, in texture and shall have positive drainage, matching the slope of the existing adjacent pavement.

I. Clean-up site after paving. Remove all debris resulting from patching operation to the satisfaction of the Engineer.

3.3 PULVERIZING EXISTING ASPHALT PAVEMENTS AND REUSE AS BASE COURSE

A. The existing asphaltic surface shall be ground and pulverized for the full depth of the asphaltic pavement, replaced on the street, compacted and fine graded in preparation for placement of new hot-mix asphalt pavement, all in accordance with the Wisconsin Department of Transportation Standard Specification for Highway and Structure Construction, latest edition available on the Department of Transportation website as of the date of bidding. Grinding around obstructions, such as utility castings, which can be observed from the surface shall be incidental to the unit bid price. Such obstructions will be included in the area measured for payment.

B. Fine grading shall create a minimum of 2% and a maximum of 4% transverse slope from the crown of the road to the edge. Excess materials shall be removed at no extra cost.

C. Immediately following the grading a vibratory padfoot roller or a rubber tired roller shall compact the surface. Following compaction by the first roller a vibratory steel roller shall be used to provide additional consolidation of the milled bituminous layer. The surface shall be rolled to

the degree that no appreciable displacement occurs, either laterally or longitudinally, under the action of the compaction equipment. The Contractor shall compact the milled bituminous layer to 95% of maximum density as determined by AASHTO Designation, T99, Method C, with replacement of the fraction of material retained on the ¾-inch sieve with No. 4 to ¾-inch material. The Contractor shall have a water wagon available should additional water be necessary to achieve the desired degree of compaction.

D. The Contractor shall, to as great a degree as practical, prevent traffic from travelling the finished reprocessed bituminous base course. Prior to paving any rutted sections shall be recompacted, loose stone shall be removed from the base course surface, and the entire surface shall be rerolled.

3.4 GRINDING AND REMOVAL OF EXISTING ASPHALT PAVEMENTS

A. Grinding around obstructions, such as utility castings, which can be observed from the surface shall be incidental to the unit bid price. Such obstructions will be included in the area measured for payment, but otherwise shall be considered incidental to the unit price.

B. Any alternatives chosen by the Contractor to grinding around obstructions, such as total removal and replacement of the asphaltic layers, shall be made using vertical sawcuts and shall be incidental to the unit bid price.

C. The Contractor shall collect, load and dispose of the asphaltic chips or other residues resulting from the grinding process as an integral part of the grinding procedure. All depressions not reached by a power broom shall be cleaned by hand brooming. Residues shall not be allowed to collect upon and remain upon the surface for any period beyond the day in which they were created. If the milled surface must remain for more than two days before the tack coat is applied the surface shall be re-swept and cleaned. No washing of ground material or residues into storm drainage systems will be allowed. The Contractor shall take whatever measures may be necessary, including, but not limited to storm inlet protection and/or silt fence construction, to prevent the entry of sediment into surface watercourses. Disposal of the collected residues shall be the sole responsibility of the Contractor and shall be incidental to the unit bid price for the grinding.

D. The surface produced by the grinding shall have a uniform grooved or ridged finish and shall be resistant to ravelling or traffic displacement. The grooves or ridges shall be ¼-inch in depth, plus or minus ⅛-inch.

3.5 SEAL COATING

A. Existing pavements to receive seal coat shall be cleaned over the full width to be treated immediately prior to the application of the asphalt binder. Particular care shall be taken to thoroughly clean the outer edges of the pavement to be treated. The Contractor shall remove all loose material, silt spots, vegetation and other objectionable material from the street surface prior to applying a seal coat. Owner or Engineer shall verify roads are ready for seal coating prior to beginning work. The Contractor shall locate and protect all inlets, manhole covers, and valves boxes prior to applying seal materials. If during the Contractor's operations these castings are covered by any sealing materials, the Contractor will be responsible for cleaning or replacing castings at their own expense. All protection measures shall be removed within 2 weeks of completion of the final sweeping by the Contractor.

B. The asphalt binder layer shall be applied at a rate of 0.28 to 0.32 gallons per square yard for 3/8-inch chip sealing and granite sealing. The application rate shall be 0.37 to 0.39 gallons per square yard for black boiler slag sealing.

C. The temperature of the asphaltic emulsion at the time of application shall not be less than 150° or more than 180°, and shall be applied only when the air temperature is 60ºF, or higher, and when the surface is dry. Application shall not take place when rains are known or believed to be impending. The surface area treated with binder shall be limited to the amount which can be properly covered with aggregate and rolled in that same day, but no greater than 500 feet ahead of initial rolling operations. The surface which has been treated shall be closed to traffic until the aggregate is applied and rolled.

D. Aggregate shall be spread in accordance with the equipment requirements and methods specified in the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, as set forth on the Department of Transportation website. When the desired stage of tackiness of the applied asphalt binder is attained the aggregate shall be spread uniformly over the treated surface at an average rate of 25 to 27 pounds per square yard for 3/8-inch aggregate and black boiler slag seal coating and 18 to 22 pounds per square yard for granite seal coating. The aggregate shall be damp to surface dry and, if necessary, it shall be moistened with water to reduce the dust coating which might affect its bond to the asphalt binder. Immediately after the aggregate is spread the surface shall be rolled. Rolling shall start at the edges and shall continue to the center, lapping one-half the roller width on each successive trip. Rolling shall be continue until the aggregate for seal coat cover is thoroughly embedded and the surface is smooth and uniform in texture. In no case shall there be less than two complete rollings. The surface shall then be lightly broomed to remove excess aggregate. Traffic signs shall then be erected to limit speeds to 20 miles per hour for the next 24 hours.

E. Following the seal coating process, the Contractor is responsible for the sweeping of the aggregate material within 48 hours after the seal process. All street, roads, and avenues shall be swept with a sweeper that picks up loose material. Owner shall be notified within 48 hours of this sweeping process being completed.

3.6 CRACK SEALING

A. All cracks and joints must be routed to a minimum of a 1:1 ratio width versus depth when the regulated speed limit is less than 45 mph and 2:1 ratio when 45 mph or greater. Cracks shall be blown out with 120 PSI compressed air. The road surface shall also be blown off at this time to clear it of any routed debris. The second compressor shall be used to blow out the cracks with a heat lance.

B. All cracks shall be pressure filled by a wand applicator from the bottom up. They shall be slightly over-filled and squeeged to create an overband 1-inch wide on each side of the routed reservoir. The cracks shall then have a release agent applied, as approved by the Owner or Engineer, to prevent any material from tracking. Application of toilet paper will not be allowed.

3.7 PROTECTION OF FINISHED WORK

1. Section 01 70 00 - Execution Requirements and Project Closeout: Protecting finished work.
2. Do not permit traffic over surface for 2 hours.

3.8 WARRANTY

A. The Contractor shall warranty the materials and workmanship for a period of one year following acceptance of the work, as signified by final payment. Any defects in materials and workmanship found within the warranty period shall be repaired by the Contractor or the affected areas shall be re-treated, as no cost to the Owner.

END OF SECTION 32 01 06