CONTRACT DOCUMENTS

FOR

Chip Seal

Various Locations

CONTRACT D25-1

BID NO. ####-##

DEPARTMENT OF PUBLIC WORKS AND PARKS
CITY OF WORCESTER, MASSACHUSETTS

March 2025

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BID PREPARED BY: _____

E. TIKO LOCKHART

Assistant Civil Engineer

BID REVIEWED BY:

_____

RAY DAVIS JR.

Assistant Director of Engineering

BID APPROVED BY:

_____

Jason Mello

Director of Engineering

BID ADMINISTERED BY:

_____

CHRIS J. GAGLIASTRO

Purchasing Agent

D25-1 - Chip Seal

THE BIDDER MUST FILL IN THESE UNIT PRICES. Also carry out all extensions and fill in "Computed Totals."
In case of error or discrepancies, UNIT PRICES govern and written works take precedence over figures.

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
235.0000	CATCH BASIN FRAME & GRATE		
	_____ Dollars ($ _____) EA	8.00	$ _____
236.0000	MANHOLE FRAME & COVER		
	_____ Dollars ($ _____) EA	20.00	$ _____
244.1000	REBUILD EXISTING CATCH BASIN		
	_____ Dollars ($ _____) VF	5.00	$ _____
252.1000	MANHOLE ADJUSTMENT 12 INCH OR LESS GRAVEL		
	_____ Dollars ($ _____) EA	76.00	$ _____
254.1000	CATCH BASIN ADJUST TO LINE AND/OR GRADE 12 INCH OR LESS, GRAVEL		
	_____ Dollars ($ _____) EA	35.00	$ _____
304.0400	REPLACING 4" - 12" GATE VALVE BOX, GRAVEL BASE		
	_____ Dollars ($ _____) EA	14.00	$ _____
304.0800	WATER BOX ADJUST TO GRADE, GRAVEL BASE		
	_____ Dollars ($ _____) EA	46.00	$ _____
422.1000	SUPERPAVE 9.5 MM LEVEL 2		
	_____ Dollars ($ _____) TN	750.00	$ _____
428.0000	BITUMINOUS CONCRETE ROADWAY REPAIR		
	_____ Dollars ($ _____) SY	4,825.00	$ _____

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
483.0000	REPLACING GAS BOX, GRAVEL BASE		
	Dollars	5.00	$
	($) EA		
490.0000	POLYMER AND CRUMB RUBBER MODIFIED ASPHALT CRACK SEALANT COMPOUND WITH REINFORCING FIBERS		
	Dollars	3,300.00	$
	($) Gal.		
491.2000	RUBBERIZED CHIP SEAL - 1/2 INCH		
	Dollars	211,200.00	$
	($) SY		
502.0000	4 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)		
	Dollars	1,360.00	$
	($) LF		
503.0000	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)		
	Dollars	4,860.00	$
	($) LF		
504.5000	PAVEMENT MARKING REMOVAL		
	Dollars	5,300.00	$
	($) SF		
900.0000	Lump Sum Reserve		
	one hundred ninety thousand and xx / 100 Dollars		$ 190,000.00

TOTAL BID PRICE INCLUDING CONTINGENCY

_____Dollars and _____Cents
(amount in words)

$ _____
(amount in figures)

This proposal is based on provisions of the following addenda:

No. _____ No. _____

No. _____ No. _____

All amounts and totals given above will be subject to verification by the City. In case of variation between Unit Bid Price and Totals shown by the Bidder, the Unit Price written in words will be considered to be the bid.

The City reserves the right to reject any and all bids, wholly or in part, and to make awards in a manner deemed in the best interests of the City.

The above estimated quantities form an approximate statement of the extent of the work to be done, based upon the estimate of the Contracting Officer. The City does not expressly or by implication agree that the actual quantity of work will correspond therewith, but reserves the right to increase or decrease the quantity of any class or portion of the work, as may be deemed necessary by the Contracting Officer.

LUMP SUM RESERVE

The Contractor is advised that the lump sum reserve for contingency work shall be utilized, as required by the City of Worcester for additional work that may be required by the City and agreed to by the Contractor. This reserve will also be used for the City to compensate directly for flag men (when Police are unavailable) and testing as determined by the contracting officer. Any reserve balance remaining at the end of the contract will be returned to the City of Worcester.

The City reserves the right to reject any bid, wholly or in part, and to make awards in a manner deemed in the best interests of the City.

The above estimated quantities form an approximate statement of the extent of the work to be done, based upon the estimate of the Contracting Officer. The City does not expressly or by implication agree that the actual quantity of work will correspond therewith but reserves the right to increase or decrease the quantity of any class or portion of the work, as may be deemed necessary by the Contracting Officer.

TIME FOR PERFORMANCE

Locations listed in this contract shall be substantially completed no later than October 18th, 2025. Completion of the Work for this Contract shall be no later than 30 days after the date of substantial completion for any location.

INFORMATION FOR BIDDERS

GENERAL DESCRIPTION

This bid consists of work in approximate quantities as listed in the Proposal Forms, which state the location and description of the work to be done and the materials to be furnished.

This Contract shall adhere to the City of Worcester's Standard Specification and Details dated August 29, 2024.

The plans and specifications, proposal and addenda shall form part of this contract.

SCOPE OF WORK

The work to be done under this Contract consists of the construction of various roadway improvements along the following streets within the City of Worcester:

Street	Limits	Length (ft)	Width (ft)	Method	Level 9.5mm	Top 12.5mm
See Appendix A						

The work to be performed will include excavation, pavement reclamation, paving with hot mix asphalt, asphalt berm, granite curb, concrete and asphalt sidewalks, drainage structures, and other incidental work as required.

Work under this Contract shall be paid for at the contract unit bid prices, which shall constitute full compensation for all material, labor, equipment, etc., required to satisfactorily complete the work.

ALL WORK PERFORMED UNDER THIS CONTRACT SHALL BE IN CONFORMANCE WITH THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION'S STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 2023, THE 2017

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION CONSTRUCTION STANDARD DETAILS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, THE 2009 MANUAL OF UNIFORM CONTROL DEVICES, THE 2022 MASSACHUSETTS AMENDMENTS TO THE MANUAL OF UNIFORM CONTROL DEVICES, THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK, THE PLANS, AND THESE SPECIAL PROVISIONS.

ADDENDA

The bidder is required to acknowledge receipt of any Addenda issued to this contract by inserting the Addendum number in the space provided on the proposal form.

CHANGES IN SCOPE

The City of Worcester reserves the right to increase or reduce the amount of this contract. Changes in scope may be ordered at any time up to project acceptance at the contract unit bid prices.

BID PRICE ADJUSTMENTS

This Contract contains a price adjustment for bituminous concrete mixtures. The base price for liquid asphalt on this project is $572.5 per ton.

This Contract contains price adjustments for diesel fuel and gasoline. The base price for diesel fuel on this project is $2.986 per gallon and for gasoline $2.404 per gallon.

This Contract contains price adjustments for Portland cement. The base price for Portland cement on this project is $425.53 per ton.

EQUIPMENT

Each bidder shall state in his bid the character, make and amount of equipment that he proposes to employ on the work. After bids are opened any bidder may be required to show that he owns, controls by firm option, or can procure the equipment necessary for commencing, prosecuting, and completing the work as required by the specifications.

EXPERIENCE

Each bidder shall state in his bid whether he is now or ever has been engaged on any other contract or other work similar to that proposed, giving the year in which it was done and the manner of its execution and shall submit such other information as will tend to show his ability to prosecute vigorously the work required in these specifications. A successful bidder will be required to employ an organization thoroughly experienced and skilled in the type of work to be done. After the opening of bids any bidder may be required to submit satisfactory evidence that the specific organization which he proposes to employ on this contract has successfully executed work of the nature and quality indicated herein.

INVESTIGATION OF CONDITIONS

Bidders are expected to visit the locality of the work and acquaint themselves with all available information concerning local conditions. They are also expected to make their own estimates of the facilities needed and difficulties attending the execution of the proposed contract including local conditions, availability of labor, uncertainties of weather and other contingencies. In no event will the City assume any responsibility whatever for an interpretation, deduction or conclusion drawn from the inspection of the site. Failure to acquaint himself with all available information concerning these conditions will not relieve the successful bidder from responsibility for estimating the difference and costs of successfully performing the complete work.

PRE-BID CONFERENCE

A Pre-Bid Conference will be held at 20 East Worcester Street, Worcester, MA 01604, in the first-floor conference room 4/16/2025, 11am.

QUANTITIES

All bids will be compared on the total estimate of quantities of work to be done, as shown in the proposal.

These quantities are approximate only, being given as a basis for the comparison of bids to determine the approximate amount of the consideration of the contract. The bidder will be required to complete the work specified or as shown on the drawings, within the required performance period, whether the required quantities are more or less than the amounts herein estimated without any change in the contract unit price. The final payment will not be made until the work is so completed.

The unit price bid for each item must allow for all collateral, incidental, or indirect costs connected with it.

SIMILAR CONSTRUCTION IN OTHER LOCATIONS

Construction of similar work may be needed in other locations and may be included in this Contract by agreement between the City and the Contractor. Any such work is to be paid for on a unit price basis at the prices bid under this Contract. Extra Work Orders will be given to the Contractor for any such work on a unit price basis at the prices bid in the Contract. The purpose of this provision is to permit the inclusion of any emergency or rush projects that may arise.

SPECIAL PROVISIONS

ASPHALT JOINTS

Hot poured rubberized asphalt shall be used in the sealing of transverse and longitudinal Butt joints as specified in Section 460 of the Massachusetts Department of Transportation's Supplemental Specifications. Additionally, tack coat and stone dust shall be applied to all other joints composed of hot mix asphalt immediately after paving, or as required by the Contracting Officer.

Hot poured rubberized asphalt will be paid for under Item 435, whereas tack coat and stone dust shall be considered incidental and compensation shall be included in the contract bid price for the respective hot mix asphalt items.

BARRICADES AND WARNING SIGNS

Prior to start of any work the Contractor will be required to supply and install construction safety signing on each approach to the work zone as directed by the Contracting Officer. Signing shall read "STREET UNDER CONSTRUCTION" or "ROAD WORK AHEAD" or as directed by the Contracting Officer. Signing shall conform to applicable provisions of Section 850 of the Massachusetts Standard Specifications for Highways and Bridges latest edition.

CASTINGS

The Contractor will be required to return all excess drain, water, or sewer castings that were replaced or abandoned during the work to the City yard at 1065 Millbury Street This work will be performed as a subsidiary obligation by the Contractor and no additional payment will be made by the City.

Water service curb stops encountered in the sidewalk area requiring final adjustment and not meeting criteria for payment under Item 304.03 shall be set to final grade by the Contractor as a subsidiary obligation and no additional payment for this work will be made by the City.

Gas, electric, and telecommunications castings and structures will be adjusted by the owning agency. The Contractor is responsible for notifying all relevant private utilities of the

work being performing and coordinating the adjustment of all gas, electric, and telecommunications castings and structures.

Final adjustment to grade of castings within the roadway must be made after leveling course or binder course has been laid or as directed by the Contracting Officer.

Raised castings must be marked with high visibility paint at the end of day and remarked before the weekend. Castings can be raised for a maximum of 10 days before final paving.

COLD WEATHER PAVING

Paving operations will only be allowed when the air and ground temperature is minimum 40 degrees (F) and rising. Paving will not be allowed after November 15th, 2025, without authorization from the Contracting Officer.

COMPACTION TESTING

Where required by the Contracting Officer, compaction testing will be done by the City of Worcester. The backfill shall be placed in suitable layers necessary to accomplish a minimum of 95% compaction which shall be achieved by mechanical or vibratory compaction equipment. The testing will apply to all areas of construction.

The portion of materials passing the No. 40 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 6. The reclaimed pavement borrow shall be compacted to a minimum of 95% of AASHTO T 180 proctor density. Liquid limits shall be determined by AASHTO T 90. If a location fails to meet the above compaction standards, this requirement may be waived at the discretion of the Engineer. Waiver of this requirement shall only be applicable for locations at which, in the opinion of the Engineer, the composition, nature, and/or physical characteristics of the existing underlying material are such that achieving 95% compaction would have a negative impact on the stability and/or structural integrity of the roadway. Waivers of the compaction requirement shall be issued on a location specific basis. Issuance of a

waiver for one testing location does not extend the waiver of testing requirements to other locations along the same roadway. If a location is granted, Contractor shall compact sub-base to the satisfaction of Engineer.

Reclaimed pavement borrow material shall be processed by mechanical means and blended to form a homogeneous material. The equipment for producing crushed material shall be of adequate size and have sufficient adjustments to produce the desired materials. Blended materials that are stockpiled for more than 3 months shall be reworked to a uniform material and retested prior to use however, the Engineer may require additional testing any time the materials appear excessively hard, wet and/or segregated. The processed materials shall be stockpiled in such a manner as to minimize segregation of particle sizes. All reclaimed pavements borrow material shall come from approved sources and stockpiles. The amount of combined crushed asphalt pavement and crushed cement concrete shall not exceed 50% by volume as determined by visual inspection, and/or by laboratory tests required by the Engineer

CONCRETE COLLARS

Concrete collars, as per the standard construction details, shall be placed around drainage and sewer and telephone structures, water service boxes, and utility boxes that are in pavement areas on residential streets, streets with low traffic volumes or as directed by the Engineer.

Arterials or streets with high traffic volumes shall be covered under item 424. The Contractor will excavate around manhole structures a minimum 6-foot diameter donut (allowing a minimum width of 20 inches, from the casting. Compaction shall be completed using a compactor weighing a minimum of 250 pounds) to a depth of 8 inches, the masonry shall be removed to such depth as directed by the Contracting Officer and new masonry shall be constructed to conform to the proposed design. Material from this excavation will be satisfactorily disposed of by the Contractor. The excavated area will then be filled with SUPERPAVE 12.5 mm Level 2 bituminous concrete binder course placed in two lifts and thoroughly compacted with a plate compactor. Payment for this work shall be covered under the contract price bid for Item 424.

Arterials or streets with high traffic volumes shall be covered under item 424. The Contractor will excavate around catch basins a minimum of 18" wide to a depth of 8 inches, the masonry shall be removed to such a depth as directed by the Contracting Officer and new masonry shall be constructed to conform to the proposed design. Material from this excavation will be satisfactorily disposed of by the Contractor. The excavated area will then be filled with SUPERPAVE 12.5 mm Level 2 bituminous concrete binder

course placed in two lifts and thoroughly compacted with a plate compactor. Payment for this work shall be covered under the contract price bid for Item 424.

Collars must be placed on all raised castings on Arterials or as directed by the Engineer

COOPERATION BY CONTRACTOR

Attention is directed to the provisions relating to rights of public corporations and municipal departments to enter the site of the improvement and alter, replace, and/or install facilities at such times when the Contractor will be prosecuting other required work contiguous thereto.

CONTRACTOR RESPONSIBILITY

The contractor must care for, replace, and restore to good condition to the satisfaction of the Commissioner of Public Works & Parks any utilities, fences, sidewalks, posts, poles or other structures damaged by or interfered with by the contractor outside the scope of work. The contractor shall perform any necessary replacement, reparation or restoration at no additional compensation.

Damage resulting from the operation of the contractor to any structure in the street or ground near or within the scope of work (and not required to be changed under the contract) shall be replaced, repaired or restored by the contractor at no additional compensation.

The contractor shall have no grounds for additional compensation because of expenses due to encountering existing pipes, conduits or structures.

The contractor shall cooperate with all other contractors or other forces within the limits of the work specified. The contractor shall allow the necessary access to the site to other contractors and utility companies and their agents. The contractor shall be responsible for preventing damage by others to the work performed under this contract or for having damage repaired, either by the party responsible or at his own expense.

DEFINITIONS

Except for specific reference to Department Standards and Operations, the usage of the term Contracting Officer shall mean the City of Worcester Commissioner of Public Works or their duly authorized Agent. Engineer shall mean the City of Worcester Director of Engineering or their duly authorized agent. Contractor shall mean the business entity awarded and contractually obligated to perform the work described in the contract documents.

DEWATERING

Where excavations become inundated with water, whether from groundwater or surface runoff, the Contractor shall be responsible for dewatering the excavation prior to installing structures and/or pipes and backfill. Dewatering activities shall be performed in such a manner as to prevent the transport of any sediment downstream. Locations of materials and methods used for dewatering shall be approved by the Engineer prior to use. Costs associated with dewatering activities shall be considered incidental to the overall project, and no additional compensation shall be made.

DISPOSAL, HANDLING, AND OWENERSHIP OF SURPLUS EXCAVATED MATERIALS / GRINDINGS

The grindings generated from the Contractor's milling operations may become the property of the City. If directed, the milled grindings shall be provided and transported to the City material drop off yard at 1065 Millbury Street by the Contractor, as directed by the Engineer.

As directed by the Engineer, any excess material generated from pulverization activities occurring under this contract and needed for reuse as sub-base in other locations of this contract shall be made available to the City. Said material shall be provided and transported to the location by the Contractor at no additional cost to the City.

All surplus excavated, milled, or pulverized material not required or suitable for reuse on the project, or otherwise not wanted by the City, shall become the property of the Contractor and removed and disposed of outside and away from the limits of the project at no additional cost to the City in accordance with all local rules and the approval of local governmental authorities having jurisdiction over the disposal of such materials. Any excess material that the City decides to keep shall be transported to and stored at the City material drop off yard at 1065 Millbury Street by the Contractor, as directed by the Contracting Officer. Loading, transporting, and unloading shall be done by the Contractor without additional compensation. Payment for this work shall be included in the unit price under the applicable item from which the material was obtained.

DISTURBANCE OF EXISTING BOUNDS

Where existing bounds are disturbed by the Contractor's activities, they shall be reset by a Registered Land Surveyor at the Contractor's expense. A certification by the Registered Land Surveyor performing the work shall be made and submitted to the Engineer for all bounds reset.

DUST CONTROL

The Contractor is responsible for dust control throughout construction as required by the Engineer. The use of water or calcium chloride, as a means of controlling dust may be required to minimize airborne dust. The cost of which is to be incidental to the contract.

EMERGENCY CONTACT

The Contractor shall provide the name of the person to be notified for repairs or emergencies as well as a phone number at which this individual can be contacted 24-hours a day. Failure to respond to emergencies will necessitate the actuation of City crews at the Contractor's expense.

ESTABLISHMEMT OF GRASS

The contractor will be responsible for the healthy growth of all grass seed placed until it is established, free of weeds, including watering. Any required replacement will be at no cost to the City. All required work, including excavation and re-loam and seeding, will be done at the contractor's expense. A component of any street being considered complete is the grass being fully established and healthy.

FINAL CLEAN-UP

Upon completion of the work and before acceptance and final payment, the Contractor shall remove and dispose of in an approved manner at his own expense, from the right-of-way, construction site, dredging site, and adjoining property, all temporary structures and all surplus materials and rubbish which the Contractor may have accumulated during the prosecution of the work, and shall leave the areas in a neat and orderly condition. No equipment or material shall be left within any of the aforementioned areas after acceptance of the Contract without the written permission of the Engineer. The Contractor shall not abandon any material at or near the site regardless of whether or not it has any value. All removed material must be disposed of in accordance with all Local, State, and Federal laws and regulations.

HOURS OF WORK

The City will permit the Contractor to work Monday thru Friday between the hours of 7:00 A.M. and 3:30 P.M., except as otherwise permitted by the Contracting Officer. All construction work shall be completed or suspended for the winter season by November 15th ,2024 unless a specific waiver is granted by the Contracting Officer.

INSPECTION OF WORK

The Contractor is advised that the City of Worcester will be provided with a schedule of operations and will at various times during the construction of the project be on-site to inspect procedures and give directions. For the purpose of observing work that affects their respective properties, inspectors for public agencies and utility companies shall be permitted access to the work, but all official orders and directives to the Contractor will be issued by the City of Worcester Engineer or his duly authorized agent.

IRON CASTINGS AND PIPE

All new iron castings and pipe used on this project shall be North American made.

METHOD OR SEQUENCE OF CONSTRUCTION

The Contractor shall obtain approval for his proposed method and sequence of construction, including procedures for maintaining traffic, from the City of Worcester Engineer or his duly authorized agent, prior to performing the work.

NIGHTTIME WORK ZONE ILLUMINATION

Illumination of work zones during nighttime hours shall be the responsibility of the Contractor. Nighttime hours are defined as one-half hour before sunrise to one-half hour after sunset. All nighttime work shall require prior written approval by the Engineer. Work zones shall be illuminated to levels that provide adequate light to perform all anticipated work activities, complete thorough inspection of the work, and allow for work to be executed in a safe manner. The table below details the required illumination for work activities during nighttime hours.

Illumination Level	**Required Minimum Illuminance (ft-candles [lux])**	**Work Types**
I*	5 ft-candles [54 lux]	• Work zone and traffic control set up, Staging, Layout and measurement, Excavation, Sweeping, Cleaning, Landscaping, Truck clean out areas • Required in the area of lane and/or road closures and tapers and continuously throughout the closure/taper • Required a minimum of 400 feet ahead and 800 feet behind a paving or milling machine. This area shall be extended as necessary to incorporate all vehicle and equipment operations associated with the paving operation. An exception to this requirement shall be made for finish rollers can work beyond the area of Level I illumination using floodlights mounted on the roller.
II	10 ft-candles [108 lux]	• Application of roadway markings, Immediate area of asphalt paving, milling, and concrete placement and/or removal operations, including bridge decks • Required 50 feet ahead of and 100 feet behind a paving or milling machine.
III	20 ft-candles [215 lux]	• Crack sealing of asphalt pavement including pre-application clearing of cracks, Asphalt pavement or concrete joint repair, structural crack filling, and patching and repairs, Installation of signal equipment or other electrical/mechanical equipment, Tasks involving fine details or intricate parts and equipment.

*Minimum acceptable level for all areas within the work zone

At the request of the Engineer, the Contractor shall provide a work zone lighting plan including a description of the work zone, location and type of lighting, descriptions and technical specifications of illumination and energy generation sources, and calculations confirming adherence with the above illumination requirements. For the purposes of this provision, head lamps, hand-held lighting, or lighting installed on vehicles for the purpose of driving shall not be considered appropriate illumination sources.

All lighting shall be planned, installed, and operated as to avoid glare that affects traffic on the roadway or that causes annoyance or discomfort for residences adjacent to the work zone. The Contractor shall locate and aim lighting fixtures to provide the required level of illumination and uniformity in the work zone without the creation of objectionable glare. To the maximum extent practicable, the Contractor shall eliminate spillage of light from the work zone to adjacent residences. Determination of when glare or spillage exceeds acceptable levels, either for traffic or for adjacent residences, shall be the discretion of the Engineer.

The Contractor shall be responsible for providing all personnel, equipment, energy generation/storage, and materials necessary to illuminate nighttime work zones to the levels prescribed in this provision. Work zone illumination shall be considered incidental to this contract and no separate compensation shall be provided.

NOTICE TO OWNERS OF UTILITIES AND PUBLIC SERVICE DEPARTMENTS:

Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of Public or Private Utilities and Departments of his intentions to commence operations affecting such utilities and Departments at least one (1) week in advance of the start of such operations and the Contractor shall at the same time file a copy of said notice with the Engineer.

The names of the principal City Departments and Utilities which may be affected will be provided to the Contractor at the pre-construction meeting.

The Contractor shall notify "Massachusetts DIG SAFE" and procure a DIG SAFE number 72 hours prior to disturbing existing ground in any way.

DIG SAFE Call Center - 1-888-344-7233.

Before the Contractor begins any work on operations which might result in damage to utility pipes or structures the Contractor shall verify the locations of existing overhead and

subsurface utilities in the vicinity of the work with the listed Departments and Utility Companies and conduct his operations so as to avoid any damage to them.

NOTICE TO PROCEED

The Bidder must agree to commence work on or before the date specified in the written "Notice to Proceed" issued by the City, and/or Engineer acting on behalf of the City, and to fully complete the project within the time specified in the contract.

STREET OPENINNG

The contractor shall request notification flyers from the Engineer 5 business days prior construction/opening for each street under this contract.

NO new street openings after October 15, 2025, or as directed by the Contracting Officer.

OSHA REQUIREMENTS

The work to be performed under this Contract by the General Contractor and all subcontractors is to be performed in compliance with the Occupational Safety and Health Act of 1970, including all amendments thereto.

OVERLOADED TRUCKS

Materials delivered to the project in motor vehicles or semi-trailer units that exceed the legal maximum gross weight allowed for the particular class as specified in Section 19A of Chapter 90 of the General Laws of Massachusetts will not be accepted.

PEDESTRIAN ACCESS

An ADA compliant pedestrian walkway must be continuously maintained throughout the construction process. This can be accomplished by excavating one side of the roadway sidewalk, leaving the other side untouched until the excavated sidewalk is complete. If the Contractor wishes to excavate the sidewalks on both sides of the roadway simultaneously, an ADA compliant temporary pedestrian walkway must be constructed. The temporary walkway will include such items as roadway barriers, signage and signals, temporary striping, etc. Access to properties must be continuously maintained at all times during the construction process. No section of sidewalk is to remain unpaved for more than 7 days from date of excavation, unless otherwise directed by the contracting officer in writing. Any sidewalk section open for more than 7 days is to be temporary paved, at no additional cost to the City. No allowance will be granted for weekends or holidays.

PERMITS

Prior to commencement of work, the Contractor shall be responsible for obtaining all necessary construction permits. Distinct permits are required for each work location. Permit necessary for the work may include, but are not limited to, Trench Permits and Street Opening Permits. Permits can be obtained from the DPW&P Engineering Division located at 20 East Worcester Street, Worcester, Massachusetts or online at https://worcesterma.viewpointcloud.com.

POLICE PROTECTION

The City of Worcester will furnish and pay for police when and where the City decides police protection is necessary. The Contractor shall notify the Engineer of the anticipated requirements as the work progresses, so that each day's protection can be scheduled not later than the preceding day.

PORTABLE CHANGEABLE MESSAGE SIGN

The Contractor shall supply two portable changeable message signs for said contract. Signs will be directed to use by the Contracting Officer.

PRE-CONSTRUCTION PHOTOGRAPHS

The Contractor shall, prior to beginning work on the project, submit to the City's Contracting Officer photographs, in an appropriate format of the road and sidewalk condition of all streets to be excavated. Post construction photographs shall also be submitted after final restoration. Said photographs shall be supplied to the City as a subsidiary obligation by the Contractor

PRECAUTIONS UNDER ELECTRIC LINES

The bidders attention is directed to the AASHTO Guide on Occupational Safety on Highway Construction Projects, Subpart N, 1926.550, relating to construction equipment clearances at overhead electric lines, which states in part "... the minimum clearance between the lines and any part of the crane or load must be at least 10 feet from lines rated 50 KV or below, and greater distances for high voltage ...".

For the protection of personnel and equipment, the Contractor should be aware of this regulation especially during paving operations using large semi-trailer vehicles.

PROCEDURES FOR SHOP DRAWING SUBMITTALS

The following procedure shall be followed when making shop drawing submittals for this project:

1. The Prime Contractor shall submit four (4) sets of drawings directly to the Engineer for preliminary review.
2. The Engineer will send a written reply, returning two (2) sets to the Prime Contractor within seven (7) working days of receipt of the drawings.
3. If the Engineer's reply indicates rejection or advises corrections or additions to the drawings, steps 1 and 2 are repeated until the Engineer indicates that approval will be given.

4. The Contractor shall then submit four (4) sets of drawings to the Engineer for approval and distribution by the Engineer per the standard operating procedures of the Department.

5. The Contractor shall take care that every separate document in each set of every submittal shall carry the following identifying information:

    Information Required

    a. Project No.
    b. Identifying Item Number from proposal, if applicable
    c. Locations where material is proposed to be used, if applicable
    d. Name of submitting contractor
    e. Personal signature and title of an official of the Prime Contractor authorized to make shop drawings submittals

    f. Date of signature or submittal

The Contractor shall not receive payment for, nor will he be allowed to install any item or materials which require shop drawing approval unless and until he receives shop drawing approval for that item.

Within 15 days after receipt of an approved shop drawing for any item, the Contractor shall provide the Engineer written proof that he has ordered such approved materials required on the subject contract and a written confirmation on such order and delivery schedule from the manufacturer of the item. This delivery schedule shall be appropriate for timely completion of this project.

PROJECT SUPERINTENDENT

The Contractor shall be required to have on site at all times during the course construction activities a full-time superintendent whom will be in responsible charge of this project. This individual will be the exclusive agent for the Contractor maintaining continuous correspondence with the Engineer. The Contractor will notify the Engineer in writing whenever a change of superintendent is warranted.

PROPER NOTIFICATION

The Contractor will be required to provide at least 48 hours notice to the Contracting Officer before locating in work sites previously unoccupied under this contract or before proceeding with paving operations.

PROTECTION OF EXISTING TREES

Trees and shrubs that are not designated on the plans, or by the Engineer, to be cut, removed, destroyed or trimmed shall be saved from harm and injury. The Contractor shall provide measures to prevent any harm and injury caused during construction operations.

PROTECTION OF EXISTING UTILITIES AND STRUCTURES

Excavation and backfill operations shall be carried out in a manner that will prevent cave-in of excavations or the undermining, damage or disturbing of existing utilities and structures or of new work.

Any excavations improperly backfilled, or where settlement occurs, shall be reopened to the depth required, then refilled with new materials and compacted, and the surface restored to the required grade and condition at no additional expense to the Owner.

Any damage due to excavation, backfilling or settlement of the backfill, or injury to persons or damage to property occurring as a result of such damage, shall be the responsibility of the Contractor. All costs to repair such damage, in a manner satisfactory to the Owner, shall be borne by the Contractor at no additional expense to the Owner.

Where existing subsurface utilities or other facilities adjacent to or crossing through the excavation require temporary support or protection, such temporary support or protection shall be satisfactorily provided by the Contractor at no additional expense to the Owner. All necessary measures shall be taken by the Contractor to prevent lateral movement or settlement of existing facilities or of work in progress.

The plans indicate the approximate location of existing overhead and subsurface utilities in the vicinity of the work and the bidders are advised to verify this information, as its accuracy and completeness are not guaranteed by the Owner or Engineer.

PROTECTION OF UTILITIES AND PROPERTIES

The Contractor's attention is directed to the location of underground utilities in the existing and proposed roadways.

The Contract Drawings indicate the approximate location in plan of existing overhead and subsurface utilities in the vicinity of the work. Whatever measures are necessary to protect these lines during the work shall be included in the contract unit price for the various items involved.

In case of damage to utilities, the Contractor shall promptly notify the Owner and shall, if requested, furnish manpower under the Owner's direction in getting access to the utility. Pipes or other structures damaged by the operation of the Contractor may be repaired by the Owner, the municipality, or the utility company. The cost of such repairs shall be borne by the Contractor without compensation therefore.

The work to be done under this contract may necessitate changes in the properties of utility companies or the municipality hereinbefore listed. Immediately after executing the contract, the Contractor shall confer with the owners of all utilities in order that relocations of mains or services may be made at times consistent with operations of the Contract.

PROVISIONS FOR TRAVEL AND PROSECUTION OF THE WORK

Access shall be maintained for all abutters so that they may use the driveways and approaches adjacent to their properties. Pedestrian access to abutting property and access for emergency vehicles shall be provided at all times.

Alternate one-way traffic may be maintained during working hours, however the Contractor will be required to provide two unobstructed lanes for two-way traffic during non-working hours.

All construction equipment, material and debris shall be removed from the traveled way at the end of each working day and shall be stored in such manner as not to interfere with the flow of driveway traffic or pedestrians.

The Contractor shall coordinate his work with the work to be done by other Contractors on the site, public utilities or other agencies, and he shall so schedule his operations as to cause the least interruption to the normal flow of all traffic types. Reasonable facilities shall be provided by the Contractor for the safe and convenient passage of pedestrians and vehicles through and within the project area.

Particular care shall be taken to establish and maintain methods and procedures which will not create unnecessary or unusual hazards to public safety. The placement of necessary devices will be for daily work periods and shall be removed after the completion of work operations. Signs having messages that are irrelevant to normal traffic conditions shall be removed or properly covered at the end of each work period. Signs are to be kept clean at all times and legends shall be distinctive and unmarred.

PUBLIC SAFETY AND CONVENIENCE

Vehicular and pedestrian traffic will be maintained on all streets located within and adjacent to the project unless permission is received in writing from the Commissioner of Public Works or his representative to close the street.

The Contractor shall take every measure necessary for the protection of personnel and property. Where construction operations are such that a hazard exists to the public, all safety precautions shall be maintained.

Trenches shall not be excavated in traveled ways until all materials and equipment required for such work are at the site and available for immediate use. When work is not in progress, trenches in areas subject to public travel shall be covered with steel plates capable of safely sustaining a 36.5-ton truckload with impact without additional compensation. The work in each trench shall be practically continuous, with the placing of pipe, backfilling, and paving of the roadway surfaces closely following each preceding operation. Payment for steel plates will be included under the unit bid price for the respective item for which the work is being performed, regardless of width of trench.

The Contractor shall at all times, until written acceptance of the physical work by the Owner, be responsible for the protection of the work and shall take all precautions for preventing injuries to persons or damage to property on or about the project.

RESPONSIBILITY FOR DAMAGE CLAIMS

The Contractor shall indemnify, defend and save harmless the Municipality and all of its or their offices, agents and employees against all suits, claims or liability of every name and nature, for or on account of any injuries to persons or damage to property arising out of or inconsequence of the acts of the Contractor in the performance of the work covered by the Contract or failure to comply with the terms and conditions of said Contract, whether by himself or his employees or Subcontractors, but only in respect of such injuries

or damages sustained during the performance and prior to the completion and acceptance of the work covered by the contract.

The Contractor will be held responsible for any and all claims for damage to underground structures such as, but not restricted to, water or gas mains, pipes, conduits, manholes or catch basins, due to his operation or to the operations of any of his Subcontractors.

RIGID ROAD BASE

Where rigid base exists the Contractor will be required to remove said base from around manholes, catch basins and water boxes and replace with superpave12.5mm level 2 binder course thoroughly compacted in 2 lifts with a plate compactor. Superpave 12.5mm level 2 binder will be paid for under Item #424 Bituminous Concrete Drives and Various Areas for manholes and catch basins. The superpave12.5mm level 2 binder course collar at water gate boxes will be a subsidiary obligation of the Contractor.

SAW CUTTING

Sawcuts shall be made in existing pavements to provide a neat, square edge at limits of excavation and to provide a clean joint where new pavement and sidewalks are to match existing. Sawcuts shall also be made where shown on the Contract Drawings, or otherwise directed by the Engineer. Sawcuts shall be made to the depth directed and shall be clean and even. All cuts shall be made using an approved power-driven saw. All sawcuts, regardless of depth or material cut into, shall be considered incidental and compensation will be included in the contract bid prices for the related work items.

SCHEDULE OF WORK

The Contractor shall submit to and for the comments of the Contracting Officer, a schedule of operations within ten (10) days after the mailing of the executed Contract to the Contractor. The schedule shall show the proposed methods of construction, sequence of

work, and the time the Contractor proposed to complete the various items of work within the performance period specified in the contract. No permits will be issued until these schedules are submitted and approved by the Engineer. Revised construction schedules and schedule of values may be requested by the Engineer, with a frequency of no less than 30 days between submissions.

At no time shall the Contractor conduct construction operations on more than 5 street locations or ½ mile of streets or unless otherwise directed by the Engineer. A street is deemed to be in construction if any items for that location remain unfinished, such as sign erection/replacement, permanent pavement marking, etc.

STAKEOUT

The Contractor shall be responsible for setting grade stakes for grading purposes and for re-establishing edges of pavement after reclamation or excavation operations, or as otherwise required by the Engineer.

STEEL PLATES IN CONSTRUCTION ZONES

At the end of each working day where trenches in areas of public travel are covered with steel plates, each edge of such plates shall be pinned and either beveled or protected by a slope of 2-feet horizontally to 1-inch vertically. Temporary bituminous concrete patching material shall be used to construct the ramps. The cost of necessary materials and their maintenance and removal will be considered incidental to the item involved with no separate payment.

STREET LIGHTING

Street lighting must be maintained during all phases of construction by operation of the existing street lighting infrastructure, or a substitute approved by the Contracting Officer. If street lighting is damage during construction, the contractor shall be responsible for installing 2” electrical conduit and 12”x12” pull boxes where needed. Payment for this work shall be under Item 806.2 and Item 810.4.

STREET SWEEPING

The Contractor shall be responsible for street sweeping by mechanical street sweeper vehicle to clear the paved surface of all debris, to the extent as determined by the Engineer. The timing of the street sweeping operation should be such that the road remains sufficiently clean between the completion of the sweeping and the start of any reclamation and/or paving. Should the Engineer decide that the road surface requires additional sweeping, no additional compensation shall be offered the Contractor to complete this process. No additional compensation will be allowed when street sweeping operations are used as a means of clearing off and/or exposing areas of pavement covered with vegetation or debris.

There shall be no separate payment for street sweeping. Payment for such work shall be included in the various cold planning, reclaiming, and hot mix asphalt items. All material collected from the street sweeping process shall be disposed of by the Contractor outside and away from the limits of the project in accordance with all local rules and regulations with no additional measurement or payment to be made.

SIGNS & POLES

The Contractor will be required to return any or all excess signs and poles that were replaced or abandoned to the DPW&P Sign Shop at 26 Albany Street, unless otherwise directed by the Contracting Officer. This work will be performed as a subsidiary obligation by the Contractor and no additional payment will be made by the City.

TEMPORARY SIGNAGE

When stop and yield signs are removed during construction, temporary stop and yield signs must be place immediately until permanent signs are placed.

TIME OF COMPLETION

The bidder shall complete all the work of this contract by November 15th, 2025.

TRAFFIC MANAGEMENT PLAN

The Contractor shall prepare and submit a traffic management plan to the Engineer for review and approval by the Engineer and the Worcester Police Department. The Traffic Management Plan shall be prepared for all streets in the contract, unless specifically directed otherwise by the Engineer. The Traffic Management Plan shall contain information on proposed detour routes if requested, location and type of detour and warning signs, barricades and other safety and traffic control means and devices to ensure a safe, orderly flow of vehicular and pedestrian traffic.

Traffic safety signage (STOP signs, DO NOT ENTER signs, ONE WAY signs, etc.) shall be maintained for the duration of construction, in all locations. The Contractor is fully responsible for the maintenance of any temporary signage.

All temporary and permanent signs, traffic control devices, and pavement markings shall conform to the latest relevant sections of the Manual on Uniform Traffic Control Devices (MUTCD), and the Massachusetts Standard Specifications for Highways and Bridges.

The Traffic Management plan shall be submitted for review at least seven (7) days prior to any work being performed on the project roadways. No work would be allowed until the Traffic Management Plan is approved by the Engineer and implemented by the Contractor.

Temporary pavement markings and other traffic control devices shall be provided in accordance with the Contractor's Traffic Management Plan and as directed by the Engineer.

The cost of preparing the traffic management plan and providing and maintaining temporary traffic control devices shall be borne by the Contractor.

USE OF CITY SUPPLIED MATERIAL TO REPLACE UNSUITABLES

If existing material excavated during construction is deemed unsuitable for backfill, at the City's discretion the City may supply additional material to be used as backfill, otherwise gravel borrow (M1.03.0 Type b) may be required. If the City supplies additional material to be used as backfill to replace unsuitable materials, no extra payment will be made.

VEHICULAR SAFETY

All automotive equipment not protected by traffic cones or flares that is working on the project in areas open to traffic shall have one amber flashing or strobe warning light mounted on the cab roof or on the highest practical point of the machinery. These lights shall be in operation whenever the equipment is working or traveling in the project work area at a speed less than 25 M.P.H. Flashers must be visible to both oncoming and overtaking vehicular traffic and shall have a light source of 32 minimum candlepower and a flashing frequency of 50-60 times per minute.

All personnel who are working in areas open to traffic shall wear MHD approved safety vests.

All vehicles except passenger cars which are assigned to the project which operate at speeds of 25 MPH or less shall have an official SLOW MOVING VEHICLE emblem displayed in accordance with the provisions of Section 7 of Chapter 90 of the General Laws as amended by Chapter 684 of the Acts of 1970.

WINTER SHUTDOWN

Any incomplete construction shall be stabilized for the winter on, or before November 15th, 2025. The stabilization shall allow the streets and sidewalks to be fully accessible throughout the winter. The contractor will be responsible for repairing any deficiencies to the stabilized areas. The final construction of any incomplete areas shall take place the following season, at no additional cost to the City.

MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES ENGLISH AND METRIC UNITS

Document 00811
Revised: 07/08/2016

This provision applies to all projects using greater than 100 tons (91 megagrams) of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.
Price Adjustments will be based on the variance in price, for the liquid asphalt component only, between the Base Price and the Period Price. They shall not include transportation or other charges. Price Adjustments will occur on a monthly basis.

Base Price

The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined by the Department at the time of the bid using the same method as the determination of the Period Price detailed below. The Base Price shall be used in all bids.

Period Price

The Period Price is the price of liquid asphalt for each monthly period as determined by the Department using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. The Department will post this Period Price on its website at http://www.mhd.state.ma.us/ within two (2) business days following its receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted the Department the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor. This method of period price determination was formerly called the New Asphalt Period Price Method. Separate website postings using both the New Asphalt Period Price Method and the Old Asphalt Period Price Method were discontinued after June 2013.

Price Adjustment Determination, Calculation and Payment

The Contract Price of the HMA mixture will be paid under the respective item in the Contract. Price Adjustments, as herein provided, either upwards or downwards, will be made after the work has been performed using the monthly period price for the month during which the work was performed.
Price Adjustments will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.
The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Standard Specifications for

Highways and Bridges, Division III, Section M3.11.03. Price Adjustments will be separate payment items. Price Adjustments will be calculated using the following equation:

Price Adjustment = Tons of HMA Placed X Liquid Asphalt Content % X RAP Factor X (Period Price - Base Price)

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE – ENGLISH UNITS

Document 00812

Revised: 01/26/2009

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the City, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Contract Documents.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchased made during each month.

This adjustment will be effected only if the variance from the base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	FUEL FACTORS	
	Diesel	Gasoline
Excavation and Borrow Work: Items 116, 118, 120, 121, 122, 124, 125, 126, 128 (Both Factors Used)	0.29 Gallons/CY	0.15 Gallons/CY
Surfacing Work: All Items containing Hot Mix	2.90 Gallons/Ton	Does Not Apply

PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

Document 00814

January 12, 2009

This provision applies to all projects using greater than 100 Cubic yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Information to Bidders section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the contracting officer by using the same method as for the determination of the Period Price (see below) and found in the Information to Bidders.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website http://www.enr.com under **Construction Economics**. The Period Price will be posted on the MassDOT website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deductions of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is an approved extension of time.

RUBBERIZED CHIP SEAL (SY)

A. GENERAL

Worked performed under this item shall conform to all relevant provisions of MassDOT Standard Specification Division II Section 400, MassDOT Standard Specification Division III Section M3 and the following:

Work under this Item shall consist of furnishing all personnel, labor, equipment, and materials necessary to perform application of 20% asphalt rubber chip seal surface treatment on bituminous asphalt roadways including mechanical sweeping to prepare work areas, blending and reacting the asphalt rubber mixture, applying the asphalt rubber mixture and aggregate to the roadway surfaces to be treated, compaction and rolling activities, final sweeping, and transportation and disposal of material generated during all mechanical sweeping operations. The bid quantity for this item is approximate and for comparative purposes only. Payment shall be for actual quantities applied to roadways. Measurements of roadways to be treated shall be made by the Contractor and the Director or their Designee prior to beginning work and confirmed by the same parties at the completion of work.

B. LOCATION OF WORK

A list of locations for the work described in this specification is provided in Attachment A.

The awarding authority shall provide a staging area for equipment and materials to be used on the project. The Contractor and Director or his/her Designee shall mutually review and agree that the location is of adequate size and condition to allow for safe and secure usage for the required operation(s).

C. MATERIALS

1) Asphalt Cement

   Asphalt cement for the asphalt-rubber mixture shall be PG 58-28 or PG 64-28, whichever is appropriate as per the requirements of MassDOT and City of Worcester Standard Specifications, and shall meet AASHTO M320. Blending of asphalt cement with the prescribed amount of rubber shall result in a product which conforms with ASTM D 6114 Type II (modified). The grade selected shall be based on laboratory testing performed by the asphalt-rubber supplier.

2) Anti-stripping Agent

   If required by the job-mix formula to produce appropriate water resistance, a heat-stable antistripping agent approved for use by the City shall be incorporated into the asphalt-rubber material at the dosage required by the job-mix formula (up to 1.0% by weight of

asphalt). The anti-stripping agent shall be added to the asphalt cement prior to blending with granulated rubber.

3) Rubber

Granulated rubber utilized in the work shall be vulcanized rubber product obtained from ambient temperature mechanical processing of scrap pneumatic tires. Granulated rubber material shall not be obtained from operations which utilize heat and/or chemical processes. The use of rubber from multiple sources is acceptable provided the overall blend of rubber meets the gradation requirements of this specification. Rubber shall be free of loose fabric, wire and other contaminants. Calcium carbonate or talc equaling a maximum of four percent (4%) by weight of the rubber may be added to prevent caking or sticking of the particles together. The ground rubber shall be sufficiently dry so as to be free flowing and not produce foaming when blended with the hot PG binder.

The specific gravity of reclaimed vulcanized ground rubber shall be not less than 1.10 and not greater than 1.20. The length of individual rubber particles shall not exceed 2 mm. Granulated rubber shall meet the following gradation:

SIEVE SIZE	% PASSING
#10 (2.00 mm)	100
#16 (1.18 mm)	90 – 100
#30 (0.60 mm)	25 – 75
#80	0 – 20

Substitutions or modifications to the above gradation are not acceptable and will not be approved by the City. Rubber utilized in the execution of this work shall have written, producer provided certification that the material to be used meets the requirements of this specification.

4) Aggregate

Aggregate shall conform to the requirements of relevant MassDOT and City of Worcester specifications for crushed stone. Crushed gravel stone is not acceptable and shall not be used. The percentage of wear of the aggregate material as determined by the Los Angeles Abrasion Test (AASHTO-T96) shall be a maximum of 30. There shall be no more than 10% flat and elongated particles by weight when tested to a 5:1 ratio. Aggregate shall be pre-heated to a temperature between 250˚F and 300˚F (121˚C and 149˚C) and be pre-coated with 0.4% to 0.8% (by weight of aggregate) M320 asphalt cement prior to application. Aggregate gradation selected for use shall be based on average annual daily traffic (AADT) volumes. Roads with an AADT of less than 1,000 vehicles shall have 3/8” chip seal applied while roads with an AADT of 1,000 vehicles or greater shall have ½” chip seal applied. The gradation of the aggregate material shall meet the following requirements:

SIEVE SIZE	AADT >1,000	AADT < 1,000
	% PASSING – NOMINAL SIZE	
	3/8" CHIP SEAL (9.5 mm)	1/2" CHIP SEAL (12.5 mm)
5/8" (15.8 mm)	100	100
1/2" (12.5 mm)	100	85 – 100
3/8" (9.5 mm)	85 – 100	15 – 45
#4 (4.75 mm)	0 – 8	0 – 25
#8 (2.36 mm)	0 – 4	0 – 5
#50 (0.30 mm)	0 – 2	0 – 2
#200 (0.075 mm)	0 – 2	0 – 2

D. TESTING/CERTIFICATION

1) Sampling

The materials shall be sampled once per lot at the point of manufacture, tested and certified by an AASHTO accredited laboratory which is approved for asphalt rubber binder testing. The laboratory shall certify that the material meets the requirements of ASTM D 6114 type II specifications as modified and presented below. A lot shall be defined as each batch produced, but not to exceed the volume of the manufacturer's dedicated asphalt rubber reaction/storage tank.

Parameter	Acceptable Range
D2196 Apparent Viscosity	300 to 1500 mPa-s
D36 Softening Point	Min. 130° F
D5329 Resilience	Min. 20%
D5 Penetration	25 to 75 mm
AASHTO T315 (Original Binder 2mm DSR @ 82)	G*/sin (d) > 1.00 kPa

All data collected during sampling and laboratory certification shall be reported to the awarding authority.

2) Reporting

Prior to starting the project, the contractor shall submit a quality control plan from the asphalt rubber supplier meeting the requirements of AASHTO R-26 format.
The contractor shall submit a weekly manufacturer's report for each lot of asphalt rubber produced that includes the following as a minimum:

- All data collected through material sampling and laboratory certification
- Total quantity of asphalt binder in tons
- Tons and percentage of ground rubber based on total asphalt rubber binder
- Modified ASTM D 6114 certified test results

E. EQUIPMENT

1) Mechanical Sweepers

The Contractor shall utilize self-propelled, rotary pick-up sweepers to prepare the roadway surface for the application of the rubberized chip seal material and to remove excess aggregate material from the roadway following compaction operations. A minimum of two (2) mechanical sweepers shall be utilized to perform the work under this specification. The mechanical sweepers have a minimum main broom width of 10 feet (3.05 meters) and a minimum hopper volume of 3.5 cubic yards (2.7 cubic meters). To capture debris in the gutter line, mechanical sweepers shall feature side brooms which extend beyond the outside edge of the sweeper tires. All brooms shall be variable speed. Mechanical sweepers shall feature filtration systems for the purpose of capturing dust and other particles generated during sweeping operations. The operation of mechanical sweepers shall produce no dust and no emissions of PM2.5 particles. All sweeping shall be performed dry.

2) Hauling Equipment

Trucks for hauling aggregate material shall be rear discharge conveyor-fed or "live bottom" trucks and shall be equipped with a device to lock onto the hitch at the rear of the chip spreader to prevent aggregate spillage. The Contractor shall utilize a quantity of hauling vehicles sufficient to ensure continuous operation of the distributor and chip spreader.

3) Mechanical Blender

The Contractor shall utilize a mechanical blender for proper proportioning and thorough mixing of the asphalt cement and granulated rubber. This unit shall be equipped with an asphalt totaling meter (reading in gallons), a flow rate meter (reading in gallons per minute), a positive displacement auger capable of feeding the rubber to mixing chamber at the specified rate, and a static motionless mixer. In order to meet varying project conditions, the blender rate shall be adjustable. To maximize production, the blender shall have a separate asphalt cement feed pump and finished product pump. The blender shall be capable of providing a 100% proportional mix at any given time during the blending cycle and documentation from the manufacturer supporting this shall be submitted to the City.

4) Distributor Truck

The Contractor shall utilize a pressure-type bituminous distributor truck to apply the asphalt-rubber mixture to the roadway. On projects exceeding 35 tons (31.8 metric tons) of liquid asphalt rubber, at least two (2) trucks in good working order shall be required. The distributor shall be equipped with an internal heating device capable of heating the material uniformly to a temperature of up to 425˚ (218˚C), an internal mixing unit capable of maintaining the prescribed mixture of asphalt cement and granulated rubber, a pump with adequate capacity to maintain a high rate of circulation within the tank and to spray the

asphalt-rubber at a viscosity of 1,500 to 5,000 centipoise, and sufficient pressure devices and appropriate manifolds to provide constant positive cut-off to prevent dripping from the distributor nozzles. The distributor shall be equipped with an electronically controlled computerized compensation unit for controlling application rates at various width and speed changes. The application unit shall have electronic controls and a digital read out installed in and operated from the inside of the cab of the distributor. The distribution bar on the distributor shall be fully circulating. Any distributor that produces a streaked or irregular distribution of the material shall be promptly removed from use and repaired.

Ancillary distributor equipment shall include a tachometer, pressure gauges, volume measuring devices, and a thermometer for reading the temperature of the tank contents. Spray bar controls, including controls for width and rate of product application, shall be located inside the cab of distributor. The distributor shall function in such a fashion that uniform applications may be made at the specified rate per square meter with a tolerance of plus or minus 0.05 gallons per square yard (0.2 liters per square meter).

A "bootman" shall accompany the distributor and ride in a position so that all spray bar nozzles are in his full view and readily accessible for unplugging.

5) Aggregate Spreader

A mechanical aggregate spreader shall be utilized to cast aggregate across the asphalt-rubber mixture applied to the work area. The aggregate spreader shall be hydrostatically driven and self-propelled. The aggregate spreader shall be equipped with a hydraulically controlled, variable, adjustable head that is capable of spreading stone in widths from 4.5 to 18 feet (1.4 to 5.4 meters). The aggregate spreader shall be mounted on pneumatic tires and shall apply the stone on the roadway surface in a manner that ensures that the tires do not contact the roadway surface until after the stone has been applied. The aggregate spreader shall be equipped with an electronic radar type sensor used to measure ground speed and automatically adjust the stone application rate depending on the prescribed width of application and speed of chip spreader. The aggregate spreader shall have the capability to apply stone on any grade from 0 - 8%. The aggregate spreader shall be equipped with an integral hopper with a minimum capacity of 5 tons (4.5 metric tons) of stone. The aggregate spreader shall be filled by hauling trucks in a manner such that the hauling truck tires do not come in contact with asphalt-rubber mixture treated road surfaces until the stone has been properly applied. To maintain continuous stone application, a self-locking truck hitch will permit towing of hauling trucks without stopping the aggregate spreader. The aggregate spreader shall be capable of maintaining positive engagement over irregular terrain.

6) Pneumatic Tire Roller

Three (3) self-propelled, multiple-wheel, pneumatic tire rollers shall be utilized to compact the aggregate into the asphalt-rubber mixture. The pneumatic tire rollers shall weigh

between 12 and 18 tons (10.9 and 16.3 metric tons). The pneumatic tire rollers shall have a minimum total compacting width of at least 4.67 feet (1.4 meters), a minimum tire pressure of 60 psi (414 kPa), and be equipped with a watering system.

F. EXECUTION OF WORK

1) Seasonal and Weather Limitations

Chip sealing operations shall not be performed when weather conditions are unfavorable to obtaining a uniform spread of material. Chip seal operations shall proceed only when the roadway surface and atmospheric temperature are at least 50˚F (10˚C) and rising. Chip sealing operations shall not be performed on wet roadways or roadways with standing water present.

2) Traffic Control

Unless otherwise specified by the Director, roadways being treated shall be kept open to traffic at all times, with traffic discontinued on the lane being surface treated. Controlled traffic may be permitted as soon as the final layer is applied and rolled. A maximum speed of 20 mph (30km/h) should be maintained for a period of a minimum four (4) hours following completion of rolling and compacting operations.

3) Preparation of Work Area

Potholes, other areas of pavement failure, and major depressions in the existing roadway surface shall be repaired by the City prior to chip sealing operations. If required, the roadway surfaces to be treated shall also be crack sealed by the City prior to chip seal application. Roadway markings shall also be removed prior to chip seal operations.

The Contractor shall be responsible for all measures required to provide a thoroughly clean and dry pavement surface for chip seal application including vegetation removal and mechanical sweeping of the work area prior to the start of chip seal application. Preparation of the work area shall be performed immediately prior to the start of asphalt rubber mixture application for any given work area. All work areas shall be thoroughly cleaned via mechanical sweeping. Any areas within or adjacent to the work area that a mechanical sweeper cannot access shall be cleaned of debris material and excess aggregate through the use of a backpack style leaf blower. The Contractor shall assume ownership of all materials generated during preparation and sweeping activities and shall be responsible for removing such material from the project locations as well as its offsite disposal.

The Contractor shall be responsible for covering all utility castings prior to application of the asphalt rubber mixture as well as uncovering all castings after the aggregate is spread and completely compacted.

4) Asphalt Rubber Mixing and Reaction

a. Blending and Reaction

The percent of rubber in the asphalt rubber mixture shall be 20% (+/- 3%) by weight of total mixture (equal to the total weight of asphalt cement plus granulated rubber), as indicated by the mixture design for specific project requirements. The exact granulated rubber content shall be determined by the mix design submitted by the asphalt-rubber supplier and shall be based on laboratory testing performed by the supplier. The asphalt and rubber shall be combined and mixed together in a blender unit and reacted in the distributor for a period of time as required by the mix design. The temperature of the asphalt shall be between 350˚F and 425˚F (177˚C and 218˚C) at the time of addition of the granulated vulcanized rubber. The temperature of the asphalt-rubber mixture shall be maintained above 325˚F (163˚C) during the reaction period.

b. Delays

If a job delay occurs after full reaction of the asphalt rubber material, the material may be allowed to gradually cool as influenced by the local atmospheric temperature. If the material is to be utilized later in the workday, the cooled asphalt rubber mixture shall be slowly reheated to a temperature equal to or below 375˚F (191˚C) immediately prior to application. An additional quantity of granulated rubber or additive not exceeding 3% by volume of the hot asphalt-rubber mixture may be added after reheating. Material mixed and reacted during a prior workday shall not be permitted for use.

c. Viscosity Confirmation

The viscosity of each blended load of asphalt rubber material shall be analyzed in the field by the Contractor using a Haake-type field viscometer. The viscosity of the final product immediately prior to application shall be in the range of 1,500 to 5,000 centipoise.

5) Test Strip

A test strip shall be constructed on the first 500 feet of the project to verify the design and application. Adjustments to the mixture formula shall be permitted provided they do not exceed the values stated in the mix design. The Director or his/her Designee will witness the control strip application and will approve commencement of the project application.

6) Asphalt Rubber Mixture Application

The asphalt rubber mixture shall be applied at a temperature of 375˚F (191˚C) and rate of 0.55 to 0.65 gallons per square yard (2.5 to 2.9 liters per square meter). The exact

application rate shall be determined by the aggregate gradation, traffic volume, and pavement condition. Variations in material quantities due to fluctuations in application rates shall be made without adjustment to contract unit price.

All longitude joints created as part of the work shall be reasonably straight and parallel to the roadway centerline. Where any construction joint occurs, the joint edges shall be broomed back and blended so there no gaps between edges, all adjacent edge elevations are the equal, and the edges are free from ridges and depressions. Longitudinal joints shall be overlapped by 4 to 6 inches (10.2 to 15.2 centimeters).

During application, the Contractor shall take adequate measures to prevent marring and discoloration of adjacent pavements, structures, vehicles, foliage, or private property.

7) Aggregate Application

Aggregate application shall follow as close as possible behind the application of the hot asphalt rubber mixture. The asphalt rubber mixture shall not be spread further in advance of the aggregate spreader than can be immediately covered. Construction equipment or other vehicles shall not drive on the uncovered asphalt rubber mixture prior to aggregate application. The hot, pre-coated aggregate shall be spread uniformly across the applied asphalt rubber mixture by a self-propelled aggregate spreader at a rate of spread determined to be appropriate by the Contractor. The aggregate spread rate shall in the range of 30 to 40 pounds per square yard (16.3 to 21.7 kilograms per square meter). Any areas with insufficient aggregate shall be covered with additional material as necessary to satisfactorily complete the work.

8) Compaction and Rolling

Compaction and rolling operations shall commence immediately following the spread of aggregate. The Contractor shall utilize a minimum of three (3) pneumatic tire rollers to compact the aggregate into the hot asphalt rubber mixture. In order to embed the aggregate particles properly and firmly into the asphalt rubber mixture, the pneumatic-tired rollers shall perform a minimum of three coverages across the entirety of the work surface on which chip seal material was applied. A coverage shall be as many passes as are necessary to cover the entire roadway width being treated, with a pass being one movement of a roller in either direction. Water shall be applied to the tires or wheels as required to limit sticking of the asphalt-rubber and aggregate to the rollers.

9) Sweeping

Following the completion of compaction and rolling activities and adequate cooling of the roadway surface on which chip seal material was applied, all loose material shall be mechanically swept or otherwise removed. Mechanical sweeping will be done at a time and in a manner as to not displace, remove, loosen, or otherwise damage or degrade the

embedded aggregate or the asphalt rubber mixture. The Contractor shall be responsible for all roadway sweeping prior and subsequent to chip seal application operations. Contractor shall also provide a laborer work to work in conjunction with sweeping operations to ensure all sidewalks, curb, wheelchair ramps, driveway aprons, and lawns are clear of loose material resulting from chip seal application. Any areas within or adjacent to the work area that a mechanical sweeper cannot access shall be cleaned of debris material and excess aggregate through the use of a backpack style leaf blower. The Contractor shall assume ownership of all materials generated during preparation and sweeping activities and shall be responsible for removing such material from the project locations as well as its offsite disposal.

G. MEASUREMENT AND PAYMENT

Payment for work under this item shall be made at the unit contract price per square yard of chip seal material applied. The quantity of chip seal material actually applied during work activities shall be measured, verified, and recorded daily by the Director or their Designee and Contractor. Payment for work under this item shall be full compensation for furnishing all necessary personnel, labor, equipment, and materials required to satisfactorily complete the work including mechanical sweeping to prepare work areas, blending and reacting the asphalt rubber mixture, applying the asphalt rubber mixture and aggregate to the roadway surfaces to be treated, compaction and rolling activities, final sweeping, and transportation and disposal of material generated during all sweeping operations.

ATTACHMENT A –

WORK LOCATIONS

Agate Ave - Coburn Ave to Anna St
Almont Ave - Hamilton St to Plantation St
Ascadilla Rd - Burncoat St to Quinapoxet Ln
Ascadilla Rd - Burncoat Street to Quinapoxet Lane
Benham St - Carlstad St to Greenwood St
Benham St - Grafton St to Lorenzo St
Benson St - Massasoit Rd to End
Benson St - Massasoit Rd to End of Public
Brewster rd - Limits:
Brewster Rd - Prouty Ln to End
Brighton Rd - Burncoat Street to Bay State Road
Brigton Rd - Burncoat St to Bay State Rd
Carlstad St - Whipple St to Kosta St
Charlton St - Main St to Beacon St
Christine St - Fraternal Ave to Marmion Ave
Conger Rd - Bailey St to Sunny Hill Dr
Conger Rd - Baily st to sunny hill dr
Crystal St - Main to Illinois
Crystal St - Main St to Illinois St
Dennis Dr - Burncoat Street to Mary Ann Drive
Dennis Drive - Burncoat St to Mary Ann Drive
Dustin St - Belmont St to Wigwam St
Eastern Ave - Prospect St to Belmont St
Ekman St - Carlstad St to Greenwood St
Elliot St - Edward St to Gage St
Elliott St - Edward St to Gage St
Fairmont Ave - Hamilton St to Grafton St
Fairmont Ave - Hamilton St to Plantation St
Frank St - Belmont St to Wigwam St
Garrison Ave - Quinapoxet Lane to end of public
Glen Ellen - Prouty Ln to end
Halmstad St - Carlstad St to Greenwood St
Jaques Ave - Main to Illinois
Jaques Ave - Wellington St to King St
Kosta St - Carlstad St to Greenwood St
Lagrange St - Main to Illinois
Lagrange St - Main St to Beacon St
Lawton St - Massasoit Rd to Somerville Rd
Maplewood - Colonial rd to chamberlain pkwy
Maplewood Rd - Colonial Rd to Chamberlain Pkwy
Marjorie St - Grafton St to end
Marjorie St - Grafton St to End of Public
Mary Ann Dr - Burncoat Street to Dennis Drive
Mary Ann Drive - Burncoat St to Dennis Dr
Oread St - Main to Illinois
Oread St - Main St to End
Puritan Ave - Hamilton St to Grafton St
Reeves St - Greenwood St to Whipple St
Richards St - Main to Illinois
Richards St - Main St to Illinois St
Rodney St - Belmont St to Breck St
Roxbury St - Highland St to Williams St
RoxburySt - Main to Illinois
Sever St - Main to Illinois
Sever St - Highland St to Williams St
Sherbrook Ave - Lake Ave to Anna St
Somerset St - Main to Illinois
Somerset St - Highland St to Williams St
South Lenox - Colonial rd to pkwy chamberlain
South Lenox St - Colonial Rd to Chamberlain Pkwy
Stanton St - Belmont St to Breck St
Sussex Ln - Tarrrytown Ln to Tarrytown Ln
Sussex Ln - Tarrytown ln to Tarrytown ln
Sycamore St - Main to Illinois
Sycamore St - Main St to Beacon St
Tahanto rd - Chamberlain pkwy to colonial rd
Tahanto Rd - Colonial Rd to Chamberlain Pkwy
Thornton Rd - Randolph Rd to Mary Ann Drive
Thornton Rd - Randolph Road to Mary Ann Drive
Trenton St - Massasoit Rd to end
Trenton St - Massasoit Rd to End of Public
Watson Ave - Barber Ave to Fraternal Ave
Wedgewood - Tarrytown ln to Westmoreland dr
Wedgewood Rd - Tarrytown Ln to Westmorland Dr
Westview Rd - Hadwen rd to Chamberlain pkwy
Wilkinson St - Fraternal Ave to Marmion Ave