



Supplemental Construction and Material Specifications

City of Moraine

Community Development

Engineering Division

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Alisha Burcham, PE, City Engineer

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Item M202 – Curb, Curb Ramp, Sidewalk, Bikepath, Pavement and Driveway Removed

M202.1 Description

M202.2 Method of Measurement

M202.3 Basis of Payment

M202.1 Description. This item shall consist of the removal and disposal of curb, combined curb and gutter, integral curb, curb ramp, sidewalk, bikepath, pavement, driveway of the thickness specified at the location indicated or as directed by the City Engineer. This item shall also include the removal of up to 4 inches of base material under concrete or pavement.

Areas of designated removal shall be sawed square and even. Saw cutting shall be full depth. Any damage and removal beyond the specified removal area shall be removed and restored at the contractor's expense, unless otherwise approved by the City Engineer. Any reinforcing bars or mesh encountered shall be removed. The reinforcing that remains shall be sawed flush with the existing concrete.

M202.2 Method of Measurement. The quantity of sidewalk, curb ramp, driveway, and pavement to be paid for will be the actual number of square feet of driveway, sidewalk and curb ramp removed and disposed of, as directed.

The quantity of bikepath and pavement to be paid for will be the actual number of square yards of bikepath and pavement removed and disposed of, as directed.

The quantity of curb and/or combined curb and gutter to be paid for will be the actual number of lineal feet of curb and necessary pavement (up to 42-inches measured from the back of curb) removed and disposed of as directed.

The quantity of integral curb (concrete panel streets) to be paid for will be the actual number of lineal feet of curb and necessary pavement (up to 30-inches measured from the back of curb) removed and disposed of as directed.

The quantity of reinforcing bars or mesh to be removed will be included with the respective item. All necessary sawing for the removal shall be incidental to the work. No separate payment will be made for this item.

M202.3 Basis of Payment. The price bid for this item shall include all labor, equipment and material necessary for the removal of the sidewalk, bikepath, curb ramp, pavement with integral curbs, curbs, combined curb and gutter, integral curbs, pavement and driveways, including necessary base material removal, excavation, sawing and removal of reinforcing and as directed by the Engineer.

Payment will be based on the unit price bid:

Item	Unit	Description
M202	Square Foot	Concrete Sidewalk Removed
M202	Square Foot	Curb Ramp Removed
M202	Square Foot	Asphalt Driveway Removed
M202	Square Foot	Concrete Driveway Removed, __”
M202	Square Yard	Pavement Removed, __”
M202	Linear Foot	Curb Removed
M202	Square Yard	Bikepath Removed, Asphalt, __”

Item M202 – Curb, Curb Ramp, Sidewalk, Bikepath, Pavement and Driveway Removed – revised January 2020

Item M202 - Removal of Concrete Pavement

M202.1 Description

M202.2 Method of Measurement

M202.3 Basis of Payment

M202.1 Description. This item shall consist of the removal and disposal of concrete pavement with or without integral curbs, curbs and integral curbs. This item shall also include the removal of up to 4 inches of base material under the concrete pavement item.

The edges of concrete to be left in place shall be sawed square and even. Any reinforcing bars or mesh encountered shall be removed. The reinforcing that remains shall be sawed flush with the existing concrete. The curb removed work item shall include adjacent full-depth pavement removal up to the limits of the saw cut line. This work shall be incidental to the curb removed item.

M202.2 Method of Measurement. The quantity of concrete pavement including integral curb to be paid for shall be the actual number of square yards, of the nominal thickness stipulated, removed and disposed of as directed. Where the thickness in an area is not reasonably uniform, the average thickness of the concrete removed shall be used to determine the nominal thickness.

The quantity of curb to be paid for will be the actual number of linear feet removed and disposed of as directed.

The quantity of integral curb to be paid for will be the actual number of linear feet of curb and necessary pavement (up to 30-inches measured from the back of curb) removed and disposed of as directed.

The quantity of reinforcing bars or mesh to be removed will be included with the respective item. No separate payment will be made for this item.

M202.3 Basis of Payment. The price bid for this item shall include all labor, equipment and material necessary for the removal of the sidewalks, pavement with integral curbs, curbs, combined curb and gutter, integral curbs and driveways, including necessary base material removal, sawing and removal of reinforcing and as directed by the Engineer.

Payment will be based on the unit price bid:

Item	Unit	Description
M202	Linear Feet	Curb Removed
M202	Square Yards	Concrete Pavement Removed

Item M203 – Undercutting

- M203.1 Description**
- M203.2 General**
- M203.3 Utilities**
- M203.4 Traffic Control**
- M203.5 Basis of Payment**

M203.1 Description. This item of work shall consist of removing poor sub-grade material beyond the 4 inches included in Items M252/M253/M255/M452/M608/M609, placement of geogrid, and replacement and compaction of suitable material in accordance with this specification and the details shown on the plan or established by the Engineer.

The work done shall conform to ODOT Item 203, Excavation and Embankment, of the Construction and Materials Manual, latest edition, and shall include the following supplemental specifications.

M203.2 General. All areas of suspect for undercutting shall be reported to the Engineer prior to continuation of work. The Engineer will then designate the limits of the areas to be repaired prior to the start of work. The unsuitable sub-grade material shall be removed to the depth specified beyond the 4 inches included in Items M252/M253/M255/M452/M608/M609 and in a manner that does not displace, undermine, or otherwise damage the abutting pavement. The exposed underlying material shall be shaped and compacted, using #2 stone or ODOT Item 304 Aggregate Base, as directed by the Engineer.

M203.3 Utilities. It is the Contractor's responsibility to have all manholes, valve boxes, underground utilities, etc. located prior to beginning the pavement repair operation. Under most circumstances, damage to any utility will be repaired at the Contractor's expense.

M203.4 Traffic Control. Traffic shall be maintained at all hours of the workday. Ingress and egress shall be provided for all driveways and at no time shall both sides of the street be blocked for pavement repair so as to prohibit vehicular traffic. Additionally access to and from businesses shall not be unnecessarily hampered. At no time shall a business be denied use of their driveway without consent of the business owner and the Engineer. Barricades, signs and warning lights shall be in accordance with the Ohio Manual of Uniform Traffic Control Devices. The Contractor shall be responsible for all traffic control.

M203.5 Basis of Payment. The price bid for this item shall include all labor, materials and equipment incidental to excavate, dispose of unsuitable materials, place #2 stone or ODOT Item 304, Aggregate Base, and compact new subgrade.

Payment will be based on the unit price bid:

Item	Unit	Description
M203	Cubic Yard	Undercutting

Item M203 - Undercutting - revised January 2020

Item M251 – Partial Depth Pavement Repair

M251.1	Description
M251.2	General
M251.3	Utilities
M251.4	Traffic Control
M251.5	Basis of Payment

M251.1 Description. This item of work consists of providing permanent, partial depth pavement repair. The work shall consist of removing existing asphalt concrete and/or portland cement concrete; shaping and compacting the exposed material; cleaning and preparation with tack coat; and placing and compacting asphalt concrete.

The work done shall conform to ODOT Item 251 of the ODOT Construction and Material Specifications, latest edition, and shall include the following supplemental specifications.

M251.2 General. The Engineer will designate the limits of the areas to be repaired prior to the start of work. The existing pavement shall be saw cut, full depth, at these limits as specified and as necessary to prevent disturbing the abutting pavement during removal.

The pavement shall then be removed to the level of failure in the pavement section. This work is to be performed in accordance with Item 202 and in a manner that does not displace or otherwise damage the abutting pavement. Should unsuitable pavement be found, additional pavement removal will be necessary and Item M253 – Flexible Pavement Repair, Item M252 Full Depth Rigid Pavement Removal and Flexible Replacement, or Item M255 Full Depth Rigid Pavement Removal and Rigid Replacement may become applicable.

Prior to placing asphalt concrete, all vertical faces shall be cleaned and coated with asphalt material in accordance with ODOT Item 401.14. Each lift shall be compacted thoroughly and uniformly as directed by the Engineer. The final lift shall be finished at least flush and not more than ¼ inch above the surface of the abutting pavement and all edges shall be sealed.

The asphalt concrete surface coarse is to be Item 441 (Type 1 (448), PG64-22, Medium Traffic) for local streets and Item 442 (12.5MM, Type A, (448), PG 70-22M) for arterial streets, unless otherwise specified. Each lift shall be compacted thoroughly and uniformly as directed by the Engineer. All joints shall be sealed with a 4-inch AC ribbon per Item M423.

M251.3 Utilities. It is the Contractor's responsibility to have all manholes, valve boxes, underground utilities, etc. located prior to beginning the pavement repair operation. Damage to any utility will be repaired at the Contractor's expense..

M251.4 Traffic Control. Traffic shall be maintained at all times, including to driveways. At no time shall both sides of the street be blocked for pavement repair so as to prohibit vehicular traffic. At no time shall a business be denied use of their driveway without

consent of the business owner and the Engineer. The Contractor shall be responsible for performing traffic control in accordance with the Ohio Manual of Traffic Control Devices.

M251.5 Basis of Payment. The price bid for this item shall include all labor, materials and equipment incidental to excavate or grind, dispose of the pavement and base, prepare and tack the surface, place and compact asphalt, and seal as shown on the plans or directed by the Engineer.

Payment will be based on the unit price bid:

Item	Unit	Description
M251	Square Yard	Partial Depth Pavement Repair, Arterial Street
M251	Square Yard	Partial Depth Pavement Repair, Local Street

Item M252 - Full Depth Rigid Pavement Removal and Flexible Replacement

- M252.1 Description**
- M252.2 General**
- M252.3 Utilities**
- M252.4 Traffic Control**
- M252.5 Basis of Payment**

M252.1 Description. This item of work shall consist of full depth removal of existing rigid pavement in areas exhibiting deterioration, correction of the sub-base, replacement with asphalt concrete, and restoration of shoulders in accordance with this specification and the details shown on the plan or established by the Engineer. When replacing/repairing pipe (Item M811), the restoration will be paid under Item M811, and not Item M252.

The work done shall conform to ODOT Item 252, Full Depth Pavement Removal and Flexible Replacement, of the Construction and Materials Manual, latest edition, and shall include the following supplemental specifications and/or exceptions.

M252.2 General. The Engineer will designate the limits of the areas to be repaired prior to the start of work. The existing pavement shall be saw cut full depth at these limits as specified and as necessary to prevent disturbing or undermining the abutting pavement during removal. The City shall provide the marking paint. The cost for full depth sawing shall be included in the unit price bid for this item.

Pavement in the areas shall then be removed completely to the depth specified in accordance with Item M202 and in a manner that does not displace, undermine, or otherwise damage the abutting pavement. The exposed underlying material shall be shaped and re-compacted as directed by the Engineer. Unsuitable sub-grade material shall be removed 4" below the asphalt/concrete base and replaced with 4" of Item 304 – Aggregate Base. Should unsuitable sub-grade materials be below 4 inches, payment for such removal and replacement shall be paid for under Item M203 - Undercutting.

The replacement material shall be per ODOT Item 301 (but paid as part of Item M252) and shall be placed in two lifts on the prepared sub-grade. Prior to placing asphalt concrete, all vertical faces shall be cleaned and coated with asphalt material in accordance with ODOT 401.14. Each lift shall be mechanically compacted thoroughly and uniformly as directed by the Engineer. The final lift shall be finished at least flush and not more than 1/4 inch above the surface of the abutting pavement and all edges shall be sealed with a 4" Item M423 crack sealing, Type II unless otherwise directed by the City Engineer.

Where there is an existing asphalt layer, the entire area is to be milled according to Item M254 prior to performing this item. Time is of the essence once the pavement has been milled and the underlying concrete surface exposed. The exposed concrete surface

must be protected from further deterioration during this base repair and until final paving.

M252.3 Utilities. It is the Contractor's responsibility to have all manholes, valve boxes, underground utilities, etc. located prior to beginning the pavement repair operation. Under most circumstances, damage to any utility will be repaired at the Contractor's expense.

M252.4 Traffic Control. Traffic shall be maintained at all hours of the workday. Ingress and egress shall be provided for all driveways and at no time shall both sides of the street be blocked for pavement repair so as to prohibit vehicular traffic. Additionally access to and from businesses shall not be unnecessarily hampered. At no time shall a business be denied use of their driveway without consent of the business owner and the Engineer. Barricades, signs and warning lights shall be in accordance with the Ohio Manual of Uniform Traffic Control Devices. The Contractor shall be responsible for all traffic control.

M252.5 Basis of Payment. The price bid for this item shall include all labor, materials and equipment incidental to perform saw cutting, pavement and subgrade removal and disposal, subgrade preparation, 4" of ODOT Item 304 Aggregate Base, flexible replacement, sealing, and restoration of shoulders as shown on the plans or directed by the Engineer.

Payment will be based on the unit price bid:

Item	Unit	Description
M252	Square Yard	Full-depth rigid pavement removal and flexible replacement

Item M253 – Flexible Pavement Repair

- M253.1 Description**
- M253.2 General**
- M253.3 Utilities**
- M253.4 Traffic Control**
- M253.5 Basis of Payment**

M253.1 Description. This item of work shall consist of removing existing asphalt pavement courses, shaping and compacting the exposed material, and placing new asphalt or aggregate and asphalt pavement courses in accordance with this specification and the details shown on the plan or established by the Engineer.

The work done shall conform to ODOT Item 253, Pavement Repair, of the Construction and Materials Manual, latest edition, and Item M441(448), Asphalt Concrete, and shall include the following supplemental specifications.

M253.2 General. The Engineer will designate the limits of the areas to be repaired prior to the start of work. The existing pavement shall be saw cut, full depth, at these limits as specified and as necessary to prevent disturbing or undermining the abutting pavement during removal.

Pavement in the areas shall be saw cut, full depth, and removed in a manner that does not displace, undermine, or otherwise damage the abutting pavement. The exposed underlying material shall be shaped and compacted as directed by the Engineer. As directed by the Engineer, up to 4 inches of underlying material may be removed and replaced with ODOT Item 304, Aggregate Base, if needed.

For streets to be resurfaced within 1 year, the replacement material shall be ODOT Item 301, Asphalt Concrete Base, and shall be placed in multiple lifts, as specified. For residential streets, Item 301 shall be a minimum of 6 inch thick or match existing pavement, whichever is greater. For arterial streets, Item 301, Asphalt Concrete Base, shall be 12 inch thick or match existing pavement, whichever is greater. Prior to placing asphalt concrete, all vertical faces shall be cleaned and coated with asphalt material in accordance with ODOT Item 401.14. Each lift shall be compacted thoroughly and uniformly as directed by the Engineer. The final lift shall be finished at least flush and not more than ¼ inch above the surface of the abutting pavement and all edges shall be sealed.

For streets that will not be resurfaced, the top 2 inches of ODOT Item 301, Asphalt Concrete Base, as above shall be replaced with 2 inches of Asphalt Concrete Surface Course placed in 2 lifts per Item M441. All joints shall be sealed with a 4-inch AC ribbon per Item M423.

Unsuitable sub-grade material beyond the above specified 4 inches shall be removed as directed by the City Engineer per Item M203 Undercutting and paid under that item.

M253.3 Utilities. It is the Contractor's responsibility to have all manholes, valve boxes, underground utilities, etc. located prior to beginning the pavement repair operation. Damage to any utility will be repaired at the Contractor's expense.

M253.4 Traffic Control. Traffic shall be maintained at all times, including to driveways. At no time shall both sides of the street be blocked for pavement repair so as to prohibit vehicular traffic. At no time shall a business be denied use of their driveway without consent of the business owner and the Engineer. The Contractor shall be responsible for performing traffic control in accordance with the Ohio Manual of Traffic Control Devices.

M253.5 Basis of Payment. The price bid for this item shall include all labor, materials and equipment incidental to excavate or grind, dispose and replace the pavement and aggregate base as shown on the plans or directed by the Engineer.

Payment will be based on the unit price bid:

Item	Unit	Description
M253	Square Yard	Full Depth Flexible Pavement Repair

Item M253 – Joint Milling and Repair

- M253.1 Description**
- M253.2 General**
- M253.3 Utilities**
- M253.4 Traffic Control**
- M253.5 Basis of Payment**

M253.1 Description. This item of work shall consist of removing existing asphalt, brick, Portland cement concrete or aggregate pavement courses, shaping and compacting the exposed material, and placing new asphalt or aggregate and asphalt pavement courses in accordance with this specification and the details shown on the plan or established by the Engineer.

The work done shall conform to ODOT Item 253, Pavement Repair, Asphalt Concrete, of the Construction and Materials Manual, latest edition, and Item M441(448), and shall include the following supplemental specifications.

M253.2 General. The Engineer will designate the limits of the areas to be repaired prior to the start of work. The existing pavement shall be cut at these limits as specified and as necessary to prevent disturbing the abutting pavement during removal. Pavement in the areas shall then be removed completely to the depth specified in accordance with Item 202 and in a manner that does not displace or otherwise damage the abutting pavement. The exposed underlying material shall be shaped as directed by the Engineer.

Concrete joint milling and repair shall consist of grinding a 12, 24 or 36 inch wide by 3 to 4 inch deep area parallel with a deteriorated concrete pavement joint, removing and disposing of all loose material, sealing the pavement joint, tacking the exposed concrete and filling the ground out area with ODOT Item 301 Asphalt Concrete Base.

The new joints created between the asphalt and concrete shall be sealed with a 4-inch AC ribbon.

M253.3 Utilities. It is the Contractor's responsibility to have all manholes, valve boxes, underground utilities, etc. located prior to beginning the pavement repair operation. Under most circumstances, damage to any utility will be repaired at the Contractor's expense.

M253.4 Traffic Control. Traffic shall be maintained at all hours of the workday. Ingress and egress shall be provided for all driveways and at no time shall both sides of the street be blocked for pavement repair so as to prohibit vehicular traffic. Additionally access to and from businesses shall not be unnecessarily hampered. At no time shall a business be denied use of their driveway without consent of the business owner and the Engineer. Barricades, signs and warning lights shall be in accordance with the Ohio Manual of Uniform Traffic Control Devices. The Contractor shall be responsible for all

traffic control.

M253.5 Basis of Payment. The price bid for this item shall include all labor, materials and equipment incidental to grind and dispose of existing pavement, seal, and replace with new pavement as shown on the plans or directed by the Engineer.

Payment will be based on the unit price bid:

Item	Unit	Description
M253	Linear Foot	Concrete Joint Milling and Repair, 12 inches wide
M253	Linear Foot	Concrete Joint Milling and Repair, 24 inches wide
M253	Linear Foot	Concrete Joint Milling and Repair, 36 inches wide

Item M254 - Pavement Planing

- M254.1 Description**
- M254.2 General**
- M254.3 Utilities**
- M254.4 Miscellaneous Repair**
- M254.5 Traffic Control**
- M254.6 Basis of Payment**

M254.1 Description. This work shall consist of planing the existing pavement and disposing of the cuttings in accordance with these specifications in areas designated on the plans or established by the City Engineer. The depth of planing shall be specified in the proposal or by the City Engineer. General depths range from 0" to 3".

The work done shall conform to ODOT Item 254, Pavement Planing, of the Construction and Materials manual and shall include the following supplemental specifications.

M254.2 General. Prior to beginning the planing operation, the Contractor shall meet with the City Engineer at the site so that there is a clear understanding of the work required.

Caution shall be used along the curb areas and around utilities. It will be the Contractor's responsibility to repair curbs or utilities unnecessarily damaged by the planing operation. All water valves and manholes shall be protected during the planing operations. Protective rings shall be placed around valves and manholes after pavement is planed until paving operations provide protection to the castings.

Where the asphalt overlay will end at an existing asphalt pavement, a minimum 3/4" butt joint shall be cut. The grinding of butt joints will be considered part of this Item and will not be paid for separately; however on streets with no major grinding, a butt joint may be required against existing asphalt pavement.

The entire street, including the curb and gutter sections, shall be thoroughly swept and cleaned of any and all debris before any and all paving. Planed material shall be removed from any grass areas, parking lots, driveways, etc. Care shall be taken to keep all planed materials out of catch basins, manholes, etc. Any planed material deposited in catch basins, manholes, etc. not picked up by the sweeping operation shall be removed before the contractor leaves the job site. The contractor shall provide street sweeping operations sufficient to keep the milled pavement area free of loose debris. All gravel and debris must be collected in sweeping operations before the contractor may move the sweeper to another location. This shall be considered incidental to the planing operations.

The planing operation depth shall be adjusted so that there are no delaminated areas remaining or gravel base exposed. All loose asphalt or sections of asphalt shall be

removed by the Contractor. It shall be the Contractor's responsibility to see that the planing is acceptable to the City before moving his equipment to another location.

The planing operation shall be done in coordination with the SAMI and asphalt paving operations. The City expects the SAMI and paving operations to follow closely after the planing operation is completed. Paving shall commence no more than 2 business days after planing operation.

The City reserves the right to the milled material if noted and may ask the Contractor to deliver this material to specified areas within the City.

M254.3 Utilities. It is the Contractor's responsibility to have all manholes, valve boxes, etc. located prior to beginning the planing operation. Damage to any utility will be repaired at the Contractor's expense.

M254.4 Miscellaneous Repair. Poor base material encountered, not caused by the planing operation, will be repaired by the Contractor as directed by the City Engineer under Item M252, M253 or M255. The Contractor will be responsible for traffic control and clean-up of any work being performed.

Asphalt or concrete ramps placed in the curb line by property owners shall be removed as part of this item, as directed by the City Engineer. Damage to existing driveways or curb, caused by the planing operation, shall be repaired at the Contractor's expense.

M254.5 Traffic Control. Traffic shall be maintained at all times, including to driveways. At no time shall both sides of the street be blocked so as to prohibit vehicular traffic. At no time shall a business be denied use of their driveway without consent of the business owner and the Engineer. The Contractor shall be responsible for performing traffic control in accordance with the Ohio Manual of Traffic Control Devices. On heavily traveled roads, work hours may be limited between the hours of 8:30 A.M and 3:30 P.M.

M254.6 Basis of Payment. The price bid for this item shall include all labor and equipment incidental to the construction of the planed surface as shown on the plans or as directed by the Engineer. Payment will be based on the unit price bid:

Item	Unit	Description
M254	Square Yard	Pavement Planing, ___”
M254	Square Foot	Pavement Planing, Asphalt for Butt Joints
M254	Square Foot	Pavement Planing, Variable Depth

Item M255 - Full Depth Pavement Removal and Rigid Replacement

- M255.1 Description**
- M255.2 General**
- M255.3 Utilities**
- M255.4 Traffic Control**
- M255.5 Basis of Payment**

M255.1 Description. This item of work shall consist of full depth removal of existing pavement in areas exhibiting deterioration, correction of the sub-base, replacement with Portland cement concrete, and restoration of shoulders in accordance with this specification and the details shown on the plan or established by the Engineer. When replacing/repairing pipe (Item M811), the restoration will be paid under Item M811, not Item M255.

The work done shall conform to ODOT Item 255, Full Depth Pavement Removal and Rigid Replacement, of the Construction and Materials Manual, latest edition, and shall include the following supplemental specifications and/or exceptions.

M255.2 General. The Engineer will designate the limits of the areas to be repaired prior to the start of work. The existing pavement shall be saw cut full depth at these limits as specified and as necessary to prevent disturbing or undermining the abutting pavement during removal. The City shall provide the marking paint. The cost for full depth sawing shall be included in the unit price bid for this item.

Pavement in the areas shall then be removed completely to the depth specified in accordance with Item M202 and in a manner that does not displace, undermine, or otherwise damage the abutting pavement. The exposed underlying material shall be shaped and re-compacted as directed by the Engineer. Unsuitable sub-grade material shall be removed 4" below the asphalt/concrete base and replaced with 4" of ODOT Item 304 Aggregate Base. Should unsuitable sub-grade materials be below 4 inches, payment for such removal and replacement shall be paid for under Item M203 – Undercutting.

The replacement material shall be per Item M452 (but paid as part of Item M255) and shall be placed on the prepared sub-grade. The surface shall be finished at least flush and not more than 1/4 inch above the surface of the abutting pavement and all edges shall be sealed per ODOT 451.16 sealing expansion joints.

Where there is an existing asphalt layer, the entire area is to be milled according to Item M254 prior to performing this item. Time is of the essence once the pavement has been milled and the underlying concrete surface exposed. The exposed concrete surface must be protected from further deterioration during this base repair and until final paving.

M255.3 Utilities. It is the Contractor's responsibility to have all manholes, valve boxes, underground utilities, etc. located prior to beginning the pavement repair operation. Under most circumstances, damage to any utility will be repaired at the

Contractor's expense.

M255.4 Traffic Control. Traffic shall be maintained at all hours of the workday. Ingress and egress shall be provided for all driveways and at no time shall both sides of the street be blocked for pavement repair so as to prohibit vehicular traffic. Additionally access to and from businesses shall not be unnecessarily hampered. At no time shall a business be denied use of their driveway without consent of the business owner and the Engineer. Barricades, signs and warning lights shall be in accordance with the Ohio Manual of Uniform Traffic Control Devices. The Contractor shall be responsible for all traffic control.

M255.5 Basis of Payment. The price bid for this item shall include all labor, materials and equipment incidental to perform saw cutting, pavement and subgrade removal and disposal, subgrade preparation, 4” of ODOT Item 304 Aggregate Base, rigid replacement, sealing, and restoration of shoulders as shown on the plans or directed by the Engineer.

Payment will be based on the unit price bid:

Item	Unit	Description
M255	Square Yard	Full-depth pavement removal and rigid replacement

Item M407 - Tack Coat

- M407.1 Description**
- M407.2 Material**
- M407.3 Equipment**
- M407.4 Preparation of Surface**
- M407.5 Application of Asphalt Material**
- M407.6 Basis of Payment**

M407.1 Description. This work shall consist of preparing and treating a paved surface with asphalt material, and cover aggregate if required, in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or established by the City Engineer.

M407.2 Material. The asphalt material shall meet the applicable requirements of ODOT Item 702 and shall be one of the following: 702.04 RS-1, SS-1, SS-1h, CRS-1, CSS-1 or CSS-1h.

Cover aggregate shall conform to ODOT Item 703.06.

M407.3 Equipment. Equipment shall consist of adequate cleaning equipment, spreader boxes, and asphalt distributors. Asphalt distributors shall be designed, equipped, maintained and operated so that asphalt material is applied at the specified rate per square yard with uniform pressure over the required width of application. The distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices or a calibrated tank. An accurate thermometer with a range covering the specified application temperature for asphalt material shall be mounted at approximately center height of the tank with the stem extending into the asphalt material. The distributor shall have a full-circulating system with a spray bar which is adjustable laterally and vertically. The spray bar shall be maintained at a constant height above the pavement under variable load conditions. Each distributor shall have suitable charts showing truck and pump speeds and other pertinent application data necessary to obtain the required results.

Distributors shall meet the following requirements: The actual application in gallons per square yard shall be determined by a check on the project. The application shall be considered satisfactory when the actual rate is within 10 percent (plus or minus) of the required rate and the material is applied uniformly with no visible evidence of streaking or ridging.

M407.4 Preparation of Surface. The surface shall be thoroughly clean and dry when the asphalt material is applied. Material cleaned from the surface shall be removed and disposed of as directed by the City Engineer.

M407.5 Application of Asphalt Material. The asphalt material shall be uniformly applied with an asphalt distributor. For irregular areas such as driveways and intersections, the method of application shall be approved by the City Engineer. The rate of application shall be as stated on the unit price proposal.

Application of the tack coat shall not occur more than 30 minutes before the actual start of placing the asphalt overlay. Once the tack coat is applied, flaggers shall direct all traffic around the work area, so as to offer the least inconvenience to the motorist and limit the amount of pickup or tracking. Care shall be exercised so as to keep the traveling public off of the tack. On heavily traveled roads, work hours may be limited between the hours of 8:30 A.M and 3:30 P.M. The asphalt material shall not be applied when the surface temperature is below the minimum placement temperature for the pavement course to be placed, as specified in ODOT Item 401.06.

The quantity, rate of application, temperature and areas to be treated, shall be approved prior to application. The tack coat application shall be limited to areas that will be covered by a pavement course during the same day.

M407.6 Basis of Payment. Asphalt material will be measured by the gallon. Cover aggregate, if required, shall be included in the bid price for the tack coat.

Payment for accepted quantities complete and in place will be made at the contract price for:

Item	Unit	Description
M407	Gallon	Tack Coat

Item M407 – Trackless Tack Coat

- M407.1 Description**
- M407.2 Material**
- M407.3 Equipment**
- M407.4 Preparation of Surface**
- M407.5 Application of Asphalt Material**
- M407.6 Basis of Payment**

M407.1 Description. This work shall consist of preparing and treating a paved surface with asphalt material in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or established by the City Engineer.

M407.2 Material. The asphalt material shall meet the applicable requirements of ODOT Item 702.12 Non Tracking Asphalt Emulsion.

M407.3 Equipment. Equipment shall consist of adequate cleaning equipment, spreader boxes, and asphalt distributors. Asphalt distributors shall be designed, equipped, maintained and operated so that asphalt material is applied at the specified rate per square yard with uniform pressure over the required width of application. The distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices or a calibrated tank. An accurate thermometer with a range covering the specified application temperature for asphalt material shall be mounted at approximately center height of the tank with the stem extending into the asphalt material. The distributor shall have a full-circulating system with a spray bar which is adjustable laterally and vertically. The spray bar shall be maintained at a constant height above the pavement under variable load conditions. Each distributor shall have suitable charts showing truck and pump speeds and other pertinent application data necessary to obtain the required results.

Distributors shall meet the following requirements: The actual application in gallons per square yard shall be determined by a check on the project. The application shall be considered satisfactory when the actual rate is within 10 percent (plus or minus) of the required rate and the material is applied uniformly with no visible evidence of streaking or ridging.

M407.4 Preparation of Surface. The surface shall be thoroughly clean and dry when the asphalt material is applied. Material cleaned from the surface shall be removed and disposed of as directed by the City Engineer.

M407.5 Application of Asphalt Material. The asphalt material shall be uniformly applied with an asphalt distributor. For irregular areas such as driveways and intersections, the method of application shall be approved by the City Engineer. The rate of application shall be as stated on the unit price proposal.

Application of the tack coat shall not occur more than 30 minutes before the actual start of placing the asphalt overlay. The asphalt material shall not be applied when the surface temperature is below the minimum placement temperature for the pavement course to be placed, as specified in ODOT Item 401.06.

The quantity, rate of application, temperature, weather conditions, and areas to be treated, shall be approved prior to application. The tack coat application shall be limited to areas that will be covered by a pavement course during the same day.

M407.6 Basis of Payment. Asphalt material will be measured by the gallon. Cover aggregate, if required, shall be included in the bid price for the tack coat.

Payment for accepted quantities complete and in place will be made at the contract price for:

Item	Unit	Description
M407	Gallon	Trackless Tack Coat (__ Gal/SY)

Item M422 (Special) - Stress Absorbing Membrane Interlayer (SAMI)

Item M422.1	Description
Item M422.2	Applicable Specifications and Materials
Item M422.2.1	Polymer Modified Asphalt Emulsion Binder
Item M422.2.2	Aggregate
Item M422.3	Equipment
Item M422.4	Pre-Paving Onsite Meeting
Item M422.5	Weather Limitations
Item M422.6	Construction
Item M422.7	Application of Asphalt Binder and Coarse Aggregate
Item M422.7.1	Asphalt Binder
Item M422.7.2	Application of Surface Cover Aggregate
Item M422.7.3	Material Application Rates
Item M422.8	Quality Control
Item M422.8.1	Asphalt Binder
Item M422.8.2	Surface Cover Aggregate
Item M422.9	Documentation
Item M422.10	Acceptance
Item M422.11	Placement of Asphalt Overlay
Item M422.12	Measurement and Payment

Item M422.1 Description. This item shall consist of furnishing all materials, equipment, labor, and preparation necessary for the application of Stress Absorbing Membrane Interlayer. The applied material shall completely seal the entire pavement surface and provide a uniform textured surface, suitable for placement of hot mixed asphalt overlays, micro-surfacing, or slurry surfacing overlays, or left intact as a finished pavement surface.

Item M422.2 Applicable Specifications and Materials

Item M422.2.1 Polymer Modified Asphalt Emulsion Binder

Table 2.1-1 Emulsion Property Method

Emulsion Property Method	Min.	Max.	Test Method
S.F. Viscosity, 50 C (sec)	50	400	ASTMD 244
Percent Solids (%)*	68	---	ASTMD 244
Storage Stability, 24hrs. (%)	---	1	ASTMD 244
Sieve Test, #20 mesh (%)	---	0.1	ASTMD 244

Table 2.1-2 Residue Property Method

Residue Property Method	Min.	Max.	Test Method
Penetration, 100g, 5 sec, 25 C (dmm)	70	100	ASTM D 5
Softening Point, Ring & Ball (C)	48.9	---	ASTM D 36
Elastic Recovery, 4 C, 10 cm (%) **	60	---	ASTM D 6084
Force Ductility, 4 C, 40 cm ***	20 lbs./sq.in.	---	ASTM D 113 ¹

¹Modified

*By distillation or evaporation

** The specimen is extended 10 cm. The extended area is severed in the middle using a pair of shears. After 1 hour, at the test temperature the severed ends are returned to contact and the ductilometer reading is made again. The sample must recover at least 70 percent of the original 10 cm distance.

*** ASTM D 113 as modified by the addition of a load cell to the standard ductility test apparatus. The load cell is calibrated in pounds per square centimeter. Reading is measured at 40 cm. Reading is multiplied by 6.45 to yield pounds per square inch force required to extend the test specimen.

The asphalt modifier shall be a SBS type polymer, Styrene-Butadiene-Styrene. The modifier shall be added to the asphalt cement prior to the emulsification process.

Item M422.2.2 Aggregate. The surface cover aggregate shall be 100% crushed material from quarried stone, natural gravel or other high quality aggregate and meet the following requirements:

Table 2.2-1 Aggregate Physical Requirements

Test	Description	Specification
AASHTO T96	L.A. Abrasion Test	40% max.
S1029*	Deleterious Material	1.0 max.
S1021*	Crushed Pieces	100%
AASHTO T104	Sodium Sulfate Soundness Test, 5 Cycle	15

Table 2.2-2 Aggregate Grading Requirements – ASTM C-117

Sieve Size		Total Percent Passing	
		Type 1	Type 2
1 inch	(25mm)	100	100
3/4 inch	(19mm)	100	90-100
1/2 inch	(12.5mm)	95-100	20-50
No. 4	(4.75mm)	5-25	0-10
No. 8	(2.36mm)	0-10	0-5
No. 200	(75µm)	2	2

Storage of Materials

Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work.

Stockpiles

Stockpiling and loading methods shall be such as to permit ready identification of the aggregate materials and to minimize segregation. Sites for stockpiles shall be clean prior to storing materials. Material shall not be removed from stockpiles within one foot of the ground until final clean-up of the worksite. Materials shall be handled in a manner such that moisture content shall be reasonably minimized and uniform for each days run.

Item M422.3 Equipment. Equipment shall be safe, environmentally acceptable, and capable of producing a consistent quality product

Pressurized Distributor Applicator

The pressure distributor shall have a computerized rate control that automatically adjusts the distributor's pump to the ground speed. The distributor shall be capable of heating and re-circulating the asphalt binder to the specified temperature. A number of nozzles shall be spaced longitudinally along the variable width spray bar from uniformly applying the asphalt material and shall include a means of controlling the operation of the nozzles. Interchangeable nozzles and sizes shall be used for the material and rate specified and shall be properly positioned and bar height adjusted so as to provide an overlapping pattern and a uniform rate of application across the desired pavement coverage width without ridges or streaking.

The unit shall include:

- A speed control used by the operator to control the travel speed and rate of product application.
- A method for the driver to control the product placement edge from either side of the unit.
- A digital speed/application readout that operates continuously and is located in the operators view.
- The asphalt application system capable of maintaining the specified application rate

within ± 0.02 gal/sq.yd.

Aggregate Spreader

The aggregate spreader shall be a variable width, self-propelled unit equipped so as to deliver a uniform distribution of aggregate particles across the desired pavement surface without ridges or laps at the specified rate. The aggregate spreader unit shall include:

- A ground speed control device interconnected with the aggregate applicator so as to provide a computerized application rate control of the aggregate that adjusts to the travel speed.
- A variable wide application box which is adjustable to maintain a uniform application rate of aggregate to cover exposed emulsion without ridges or laps.
- Capability to apply aggregate at an application rate range of 5 to 70 lbs./sq.yd.
- Spreading of aggregate in a manner such that the tires of the truck or spreader at no time contact the uncovered and newly applied asphalt material.

Compacting Equipment – Self-propelled pneumatic-tired roller(s), weighing not less than 8 tons shall be used.

Miscellaneous – All equipment including hand tools, thermometers, etc., shall be provided. All equipment used on the roadway shall be equipped with at least one approved flashing, rotating or oscillating amber light visible from all sides. All material storage tanks and material handling units shall be capable of heating and storing materials such as to not cause damage to the emulsion. The Contractor may use conventional chip seal equipment on project segments of less than 24,000 square yards or on spot repairs. Equipment shall conform to ODOT Item 407.03.

Item M422.4 Pre-Paving Onsite Meeting. A meeting between the Contractor and Engineer will be held at the project site prior to beginning work. The agenda for this meeting will include.

- Review of Contractors detailed work schedule
- Review of the traffic control plan
- Inspection of equipment
- Calibration and adjustment to equipment

Item M422.5 Weather Limitations. The stress absorbing membrane interlayer shall be placed when the pavement and atmospheric temperature is 50° F or above. Placement is not permitted if it is raining, the chance of rain is imminent or when the pavement surface condition is wet or when impending weather conditions are such that proper curing may not be obtained.

Item M422.6 Construction

The Contractor shall follow the construction methods as described.

1. The contractor shall establish stations, at 1000 foot intervals on the entire project, prior to placing the stress absorbing membrane. The stations shall be maintained until project completion.

2. Preparation of the surface shall be in accordance with ODOT Item 407.05. The surface shall be thoroughly cleaned by the contractor and shall be dry when the asphalt binder is applied. Materials cleaned from the surface shall be removed and disposed of as directed by the engineer. Removal of mud, clay, and other fine silts shall be accomplished by high pressure spray water, min. 6000 psi.
3. Asphalt SAM-CE emulsion shall be heated to a temperature within the specified range and applied using an approved pressurized distributor and at a uniform and consistent rate as approved for the design of the project surface to be treated.
4. The specified aggregate shall be spread uniformly onto the asphalt binder within 120 seconds of the asphalt spray and be in accordance with ODOT Item 422.08, except that three wheel rollers are not required.
5. Projects greater than 10,000 sy² shall use a minimum of two rollers. Rollers shall proceed at maximum speed of 5 mph. The entire surface shall receive a minimum of two roller passes. The first roller pass shall be performed within one minute of aggregate spreading.
6. Projects greater than 10,000 sy² shall use a minimum of two brooming machines. Brooming of the completed surface shall be accomplished prior to full opening to unrestricted use by traffic. The entire surface shall be clean of all loose material within 24 hours prior to the resurfacing with an asphalt mixture.
7. Before opening to traffic the contractor shall post loose stone signs and 25 mph speed plaque mounted below the sign. These signs shall be placed at the beginning of the work area and at one-mile intervals throughout the project. The loose stone signs shall be maintained until the completed surface is free of loose material.
8. The contractor shall protect all utility casting using tarpaper or other approved material. All covers shall be properly fitted to the casting and removed prior to sweeping.

Item M422.7 Application of Asphalt Binder and Coarse Aggregate. The asphalt binder shall be heated to specified temperature and uniformly placed to prevent ridges or streaks in the surface and shall be in accordance with ODOT Item 409.07 and Section 6 Item 3 above.

Item M422.7.1 Asphalt Binder. The asphalt binder shall be applied at a temperature of 150 F to 190 F, and at the rate specified \pm gallons/sq.yd. The supplier of (SAM-CE) binder is to design the application rate of the cover material and binder in relation to the surface condition to be treated. This rate shall be approved by the engineer prior to use.

Item M422.7.2 Application of Surface Cover Aggregate

- Stockpiling and loading methods shall permit ready identification of material and to minimize segregation and contamination of the aggregate.
- The moisture content of the coarse aggregate shall be below 4% and maintained throughout the project.
- Coarse aggregate shall be spread uniformly without ridges or gaps at the specified rates.
- Spreading of the aggregate shall be adjusted to produce a minimum of excess loose particles and shall provide complete coverage after rolling.
- The spreading operation shall be accomplished in such a manner that the tires of trucks or the spreader at no time comes into contact with the newly applied asphalt material.

Item M422.7.3 Material Application Rates. The binder's application rate is in gallons per square yard.

Table 7.3-1 Material Application Rates

Application Type	Type I	Type II	Tolerance
Finished Surface	0.40-0.45	N/A	+/- 0.2
Prior to Micro-Surfacing	0.45-0.50	N/A	+/- 0.2
Prior to 1 inch min. Overlay	0.50-0.55	0.65-0.70	+/- 0.2

Aggregate Application Rate – The aggregate application rate shall be as determined by the supplier of the SAMI binder and project design and shall produce a completed surface with no exposed binder.

The supplier of the SAMI emulsion shall determine the application rate for emulsion and aggregate, based on pavement condition, aggregate type, and aggregate size. This information shall be reported to the Engineer prior to beginning work and shall include an aggregate gradation on the job specific materials.

Item M422.8 Quality Control. The Contractor to measure compliance shall use the methods described in this section.

- Aggregate gradation
- Aggregate Moisture Content
- Yield Check on Asphalt Binder
- Temperature Check on Asphalt Binder

If the Contractor's test results exceed any of the identified quality control tolerances, the Engineer shall be immediately notified. The Engineer will review the explanation and the corrective action taken by the Contractor. Another test will be taken and if the results still exceed the quality control tolerance, placement shall stop. The Contractor shall immediately notify the Engineer, and identify the cause of the excessive deviation and detail corrective action necessary to bring the deficiency into compliance. The Engineer will give approval prior to resumption of work.

Item M422.8.1 Asphalt Binder. The application rate shall not exceed a tolerance of 0.02 gallons per square yard from the specified rate, and within the temperature range as specified in Sub-Section 7.1.

Item M422.8.2 Surface Cover Aggregate. The aggregate shall be clean and uniform, and shall be within the gradation range as specified in Sub-Section 2.3. Moisture content shall not exceed the tolerance as specified in Sub-Section 7.2.

Item M422.9 Documentation. The Contractor shall provide the Engineer a daily report with the following information:

- Control Section/Project Number/County/Route
- Date/Air Temperature/Pavement Temperature
- Asphalt Binder Temperature (3 per day)
- Station Location per Test
- Beginning and Ending Stations
- Yield Check on Asphalt Binder (3 per day)
- Aggregate Gradation & Moisture (1 per day)
- Length/Width/Total Area

Other required documentation shall include: Bill of lading on aggregate and asphalt binder, to be provided as requested or at project completion.

Item M422.10 Acceptance. The Contractor shall inspect the completed Stress Absorbing Membrane during the application process for any deficiencies. The deficiencies will be limited to surface flushing, surface patterns, and loss of stone retention.

Workmanship shall be inspected for the following:

- Untreated areas (missed)
- No overlap on longitudinal joints
- No overlap on construction joints

All corrective work shall be accomplished prior to resurfacing with asphalt materials, or within 24 hours. The Contractor shall furnish materials, equipment and labor to make corrections at no additional cost to the Contract. The Engineer shall give final approval on inspection and corrective work.

Item M422.11 Placement of Asphalt Overlay. If the SAMI application is used as an intermediate layer for an asphalt overlay, a period of 24 hours shall be observed prior to the placement of the asphalt surface coarse after placement of the SAMI material. This time limit may be increased or decreased by the Engineer dependent on ambient temperatures and conditions.

Item M422.12 Measurement and Payment. The completed work as measured will be paid for at the Contract unit price for the contract items below, and shall include all preparation, materials, equipment, labor, clean up, and incidentals necessary to complete the work as specified.

Payment will be based on the unit price bid:

Item	Unit	Description
M422	Square Yard	Stress Absorbing Membrane Interlayer, Type I
M422	Square Yard	Stress Absorbing Membrane Interlayer, Type II

Item M422 (Special) – Stress Absorbing Membrane Interlayer (SAMI) – revised January 2020

Item M423 - Crack Sealing (with recycle tire rubber)

- M423.1 Description**
- M423.2 General Requirements**
- M423.3 Materials and Composition**
 - M423.3.1 Asphalt**
 - M423.3.2 Polyester Fibers**
 - M423.3.3 Recycled Tire Rubber**
 - M423.3.4 Aggregate Sand**
- M423.4 Equipment**
- M423.5 Surface Preparation**
- M423.6 Application**
- M423.7 Traffic**
- M423.8 Weather Limitations**
- M423.9 Measurement and Payment**

M423.1 Description. This item shall consist of performing all operations and furnishing all labor, equipment and materials for cleaning and sealing longitudinal and transverse joints and miscellaneous cracks in the pavement with a job blended Type II hot-applied fiberized joint and crack sealant material modified with recycled tire rubber in accordance with this specification. Additionally a black sand aggregate shall be applied to the freshly applied material on all major thoroughfare streets, but not necessarily on streets to receive an asphalt overlay.

M423.2 General Requirements. The joints and cracks described above will be sealed using an asphalt sealant reinforced with polyester fiber and ground rubber to provide a stress absorbing membrane to prevent water penetration and to provide firm adherence to the existing pavement. The sealant shall be applied in a one-step operation in which a hot (350 degree F) sealant at high pressure (100 psi max.) is placed directly into and over the joint or crack. Joints and cracks and immediate adjacent pavement are to be cleaned by air blasting before application of the sealant. The aggregate sand shall be spread over the freshly applied material in a manner selected by the Contractor with final approval of the method by the City. Excess sand as well as all debris shall be cleaned from the street once the sealant has cured.

M423.3 Materials and Composition

M423.3.1 Asphalt

PG64-22 (standard paving grade liquid asphalt)

M423.3.2 Polyester Fibers

5.0% (plus or minus) 0.5% by weight of the asphalt

Table 3.2-1 Fiber Requirements

Material	Polyester Fibers
Denier (ASTM D 1557*)	3.0 to 6.0
Length, inch	0.25 (plus/minus) 0.02
Crimps (ASTM D 3937)	None
Tensile Strength, min psi (ASTM D 2256*)	70,000 psi
Specific Gravity	1.32 to 1.40
Min Melting Temperature	475F
Ignition Temperature	1000F min

Recycled fibers are not permitted.

*This data must be obtained prior to cutting of the fibers.

The manufacturer of the fiber shall furnish certified test data to the Laboratory, or at the request of the Laboratory. A letter of certification stating that the material complies with specification requirements shall be furnished with each shipment. The Contractor shall furnish the manufacturer's certification to the City.

The material shall be combined so that the fibers shall be 7 percent by total weight of the asphalt cement. The combined materials shall meet the following properties:

Strength (@ break)	at 72 F	350 psi min
	at 0 F	500 psi min.
Elongation (@ break)	at 72 F	50% of min.
	at 0 F	20% of min.

M423.3.3 Recycled Tire Rubber. 5.0 % (plus or minus) 0.5% by weight of asphalt.

Material shall be ground tire rubber, or approved equal, with 100 percent of the material passing the No. 20 sieve and 95-100 percent passing the No. 30 sieve. The rubber material shall be reasonably free of excess fabric, wire or other contaminating materials (total of 0.5 percent by weight) except that up to 4 percent calcium carbonate may be included to prevent the rubber particles from sticking together. Project blended rubber-asphalt mixture shall be approved by the Engineer prior to application.

The manufacture shall furnish certification that the recycled tire rubber furnished meets the above specification. The Contractor shall furnish this certification to the City.

M423.3.4 Aggregate Sand. To be spread over all applied material on major thoroughfares, but not necessarily on streets to receive an asphalt overlay.

Aggregate sand shall be a fused Ferro-Alumina-Silicate of complex composition (commonly termed as coal slag or wet bottom boiler slag). The material shall be free of clay and organic matter. The material shall be of a consistent chemistry and specific gravity to provide high breakdown resistance. The aggregate sand shall meet the following requirements:

Table 3.4-1 Aggregate Sand Specification

Particle Shape	Rough, Fractured and Angular
Free Silica	< 1%
Hardness	6 to 7 on the Mohs Scale
Color	Black
Moisture Content	< 0.5%

Table 3.4-2 Aggregate Material Size:

Sieve Size	Percent Passing
No. 4	100
No. 6	100-98
No. 8	100-85
No. 12	53-25
No. 16	90-65
No. 20	100-90

M423.4 Equipment. All equipment, tools, and machines used in the performance of this work shall be maintained in satisfactory working order at all times. The unit shall be equipped with all lights necessary for safe and legal operation on public roads.

The material shall be blended in a double walled oil-jacketed vat equipped with an agitator (reversing rotary auger action) and separate thermometers for the oil bath and the blending vat. A 2- inch re-circulating pump is required to provide circulation of the material when not applying crack sealant. The unit shall be capable of mixing 3000 pound minimum batches of material. The temperature of the material shall be maintained between 340 and 360 degrees F. Automatic temperature controls and an automatic safety shutoff system shall be used.

Dial-type temperature gauges shall be mounted so as to allow monitoring of the temperature of the product in the tank and the heating oil. The unit shall also be equipped with gauges that measure the volume of material in the vat. If the unit does not have gauges, the City will require weigh tickets to verify the amount of AC used so that the specified weights of fiber and ground tire rubber tire may be determined.

M423.5 Surface Preparation. The surface shall be thoroughly clean and dry when the sealant is applied. All cracks to be sealed shall be cleaned with compressed air and free of vegetation, loose dirt and moisture. The air compressor shall be able to deliver a minimum of 100 psi. Old sealant which protrudes above the pavement surface shall be removed. Cleaning work is to be done concurrently with the application process.

A propane fired hot air lance may be required when the cracks exhibit excessive oxidation of the surface, when there is moisture on the surface, or when cracks exhibit latent moisture.

Sealing shall be limited to cracks that are open enough to permit entry of the sealant. Tightly closed cracks (less than 1/4 inch) shall only be sealed if they show signs of raveling or spalling. Cracks greater than 1 inch shall be filled with hot-mix asphalt and then sealed as directed by the City Engineer.

M423.6 Application

1. After the fibers have been added to the PG64-22, it shall mix for a minimum of 5 minutes or until a uniform mix of fibers, ground rubber and PG64-22 is produced. Operating temperature shall be 340 to 360 degrees F in order to produce a smooth flowing mixture. At no time shall the operating temperature exceed the fibers melting temperature.

2. The sealant shall be applied centered over the crack. After compaction, the thickness of the membrane shall be 1/8" (plus/minus) 1/16" and the width shall meet the following requirements:

	Transverse	Longitudinal
Over Portland Cement Concrete	8"	6"
Over Asphalt Concrete	3-5"	3-4"

3. When traffic or temperature conditions dictate, wet the material with water and/ or dust the sealant with a light coat of aggregate sand to prevent tracking or pick-up.

4. Sealant shall be rolled with a water-wetted steel roller if the pavement is to be overlaid within two days. Any damage incurred before placement of the overlay is to be repaired to the satisfaction of the City Engineer.

5. The street shall be cleaned of any loose material blown out from the cracks and any excess sand or fine aggregate as directed by the City Engineer. Care shall be taken to keep any loose material from being deposited in yards or on drives.

6. If a tack coat is to be applied over the sealant, the tack coat must be allowed to cure completely before any paving operations commence. Use

of cutbacks for tack coat shall not be permitted.

7. It is the intent of the City that the crack seal be applied in such a manner that the end result is neat in appearance. The material is to be applied to the crack and pavement surface with specially designed applicator heads which are round and concave. The diameter of these heads shall be 4 inches. The applicator wand is to be equipped with a material shutoff control operated by the applicator. This control is necessary for a neat job and prevents excess material from being applied. The cost for this portion of work shall be included in the unit cost for the crack sealant.

M423.7 Traffic. Traffic shall be maintained at all times. One lane shall remain open to traffic while the remainder of the street is being sealed. On heavily traveled roads, work hours may be limited between the hours of 8:30 A.M and 3:30 P.M. Flaggers shall be employed to direct traffic around the work area. If at any time the traffic control becomes unacceptable, the City will stop the work until the deficiencies are corrected. All traffic control devices shall conform to the Ohio Manual of Uniform Traffic Control Devices, latest edition. Any damage to the uncured sealant shall be repaired by the Contractor at no cost to the City. Payment for traffic control shall be included in the price bid for the sealant.

M423.8 Weather Limitations. Sealing shall not be performed when the surface temperature is below 40 degrees F. No material shall be applied while the surface is wet nor when the impending weather conditions are such that proper curing may not be obtained.

M423.9 Measurement and Payment. The quantity of sealant, complete and accepted in place, will be measured in pounds. Final payment for the work will not be made until all load tickets and inventories are verified to assure that specification quantities have been applied. In the case of a dispute, the judgment of the City Engineer shall be final.

The price bid for this work shall include all labor, equipment and material necessary for the placing of the fiber reinforced crack sealant according to these specifications; cleaning the joints and cracks; cleaning the roadway of all loose materials created by the blowing out of the cracks or from dusting of the material with fine aggregate; repair of joints and cracks in excess of 1" in width as directed; and traffic control.

Payment for accepted quantities will be made at the contract price for:

Item	Unit	Description
M423	Pound	Crack Sealing
M423	Pound	Crack Sealing on major thoroughfare streets

Item M423 – Crack Sealing – revised January 2020

Item M441 - Asphalt Concrete

- M441.1 Description**
- M441.2 Material**
- M441.3 General**
- M441.4 Utilities**
- M441.5 Traffic Control**
- M441.6 Basis of Payment**

M441.1 Description. This work shall consist of constructing a surface course or intermediate course of aggregate and asphalt cement mixed in a central plant and spread and compacted on a prepared surface in accordance with ODOT Item 441 of the Construction and Materials Specifications Manual, ODOT Supplemental Specification 800, in reasonably close conformity with the lines, grades and typical sections shown on the plans or established by the City Engineer, and shall include the following supplemental specifications and/or exceptions. The Contractor will be required to supply a mix design to the City detailing the requirements of the specified asphalt concrete. It is the contractor's responsibility to have all manholes and valves located prior to commencing work, so that they may be adjusted as necessary.

M441.2 Material. Materials and compositions shall meet the requirements as set forth in ODOT Item 441 of the Construction and Materials Specifications Manual. Each asphalt ticket shall show the correct ODOT specification and AC content. The use of slag is not permitted.

M441.2.1 Use of Recycled Material. The Contractor may use a blend of new materials in combination with reclaimed asphalt according to ODOT Item 401.04. A maximum percentage of reclaimed materials may be used in accordance with ODOT Item 401.04-1 Method 1-Standard RAP/RAS limits.

M441.3 General. The resurfacing shall consist of a 2- inch thick course on all asphalt streets and a 2-inch thick course on all composite/concrete streets. Asphalt streets shall have a ¾- inch thick leveling course followed by a 1-1/4-inch thick final course. Concrete streets to be overlaid shall have a ¾-inch leveling course followed by a 1-1/4-inch, more or less, finish course. The entire leveling course shall be placed prior to the finish course. The cross slope of the finish course shall be 2% unless otherwise specified. The pavement joints are to be located at least 6" from pavement markings to avoid coverage by crack sealing.

The surface on which the asphalt is to be placed shall be cleaned and maintained free of accumulations of materials that would, in the judgment of the City Engineer, contaminate the mixture, prevent bonding or interfere with spreading or compacting operations. In addition to proper cleaning of the surface to be paved, all base repair, crack seal work and joint fabric placement shall be completed and inspected by the City Engineer. No asphalt shall be placed on any surface which has not been properly repaired, crack sealed and cleaned. Caution shall be used along curbs and around utilities. It will be the Contractor's responsibility to repair curbs or utilities unnecessarily damaged during the paving operation. Upon completion of final paving and edge sealing, any remaining construction debris shall be cleaned from the roadway.

Where the asphalt overlay will end at an existing asphalt pavement, a minimum ¾-inch butt joint is required as part of Item M254. The overlay shall create a joint as described in ODOT Item 401.17. Where the existing pavement is concrete, the end joint may be feathered to meet the existing grade. The last 8-inches of the feathered end shall be heavily sealed with AC and shall be covered with finely graded aggregate.

Prior to placing the asphalt overlay, all vertical faces shall be cleaned and coated with asphalt material in accordance with ODOT Item 401.14.

The new asphalt concrete surface shall be compacted uniformly using a combination of a steel wheel roller and a pneumatic tire roller in accordance with ODOT Items 401.13 and 401.16.

The limits of the new Item M441 surface shall be sealed with a 4-inch ribbon of AC, except as noted above in accordance with Item M423. A finely graded aggregate or sand shall be spread over the AC ribbon in front of driveways, handicap ramps and mailboxes as directed by the City Engineer.

Ragged edges will not be permitted. The Contractor shall exercise care so that the edges of the asphalt will be smooth and even.

Where reconstruction of an asphalt driveway is required, the price bid for this item shall include placement of up to 4" of ODOT Item 304 Aggregate Base, the construction of a 4 inch minimum thickness asphalt driveway (with the asphalt being placed in two layers) and all work required to provide a finished driveway to the property owner. Upon excavation, the driveway is to be re-opened for use as soon as possible. The contractor can use aggregate as a temporary driving surface if necessary, and this is incidental to the work.

M441.4 Traffic Control. Traffic shall be maintained at all hours of the workday. Ingress and egress shall be provided for all driveways. Barricades, signs and warning lights shall be in accordance with the Ohio Manual of Uniform Traffic Control Devices. The Contractor shall be responsible for all traffic control, except as noted in previous section. On heavily traveled roads, work hours may be limited between the hours of 8:30 A.M and 3:30 P.M.

M441.5 Method of Measurement. The quantity of asphalt to be paid for will be based on the actual number of cubic yards, complete and in place, as determined by actual square feet of asphalt rebuilt.

M441.6 Basis of Payment. The price bid for this item shall include all labor, equipment and material incidental to the construction of the asphalt concrete pavement according to these specifications, including temporary driving surface for driveway and roadway access.

Payment will be made at the unit price bid:

Item	Unit	Description
M441	Cubic Yard	Type 1, Asphalt Concrete Surface Course, PG64-22, Medium Traffic, 2 Inches Thick, Placed in 2 Lifts

M441 Square Foot (446 or 448 acceptance)
Type 1, Asphalt Concrete Surface Course, PG64-22,
Medium Traffic, Driveway 4" Thick, Placed in 2 Lifts
(448 acceptance)

Item M452 - Plain Portland Cement Concrete Pavement and Driveways

M452.1 Description

M452.2 Material and Construction

M452.3 Method of Measurement

M452.4 Basis of Payment

M452.1 Description. This item shall consist of the construction of a Portland cement concrete pavement, with integral curbs where specified, on a prepared sub-grade or sub-base course in accordance with ODOT Item 452 of the Construction and Materials Specifications Manual, in conformity with the lines, grades, thickness and typical cross-sections shown on the plans or established by the City Engineer, and shall include the following supplemental specifications and/or exceptions. Removal of existing concrete pavement, including concrete driveways, integral curb and base material shall be done in accordance with Item M202 and as directed by the Engineer.

M452.2 Material and Construction. Concrete shall meet the requirements of ODOT Item 499 of the Ohio Department of Transportation "Construction and Material Specifications Manual", latest edition.

The City will mark the areas to be removed prior to commencement of work. In some instances, the City will attempt to save the curb section or only reconstruct the curb section. In either case, a saw cut will be required a minimum of 30-inches from the back of curb and parallel to the curb.

On pavement widths greater than 28 feet, back-of-curb to back-of-curb, a contraction joint shall be required parallel to the curb and mid-way through the slab.

All joints shall be tooled in accordance with ODOT 451.08. All exposed concrete surfaces shall be cured.

Concrete driveway aprons shall be saw-cut and removed at the first joint back of the curb or saw-cut per the City Engineer's instruction. Tooled joints of the new concrete driveway apron shall generally meet the existing joint layout of the driveway, or as direct by the City Engineer. Concrete driveway aprons shall require 4 inches of ODOT Item 304, Aggregate Base, and a minimum of 6 inches of QC Misc. or QC 1 concrete.

M452.3 Method of Measurement. The quantity to be paid for shall be the actual number of square yards (or square feet) of concrete pavement, of the thickness specified, complete and in-place. All measurements will be made horizontally along the centerline of the concrete pavement. Catch basins, inlets and manhole aprons will be deducted from the square yards of pavement measured for payment.

M452.4 Basis of Payment. The price bid for this item shall include all labor, equipment and material incidental to the construction of the concrete pavement or driveway and shall include: placement of 4 inches of ODOT Item 304, Aggregate Base;

the construction of concrete pavement and integral curbs as specified; construction of joints; expansion material; dowels, hook bolts, tie rods and load transfer devices as required; curing materials; pre-molded joint material as specified; depressing curbs for driveways; providing curb openings for drain tile as directed; constructing thickened end sections or construction joints with dowel bars as directed; and restoration of the grassed areas and the existing street and driveway pavement. Removal and disposal of concrete pavement including integral curbs and up to 4 inches of base material shall be paid for under Item M202 - Removal of Concrete Pavement. Removal and replacement of unsuitable sub-grade material below 4 inches shall be paid for under Item M203 - Undercutting.

Payment will be based on the unit price bid:

Item	Unit	Description
M452	Square Yard	Concrete Pavement, _____" thick
M452	Square Foot	Concrete Driveway, _____" thick

Item M605 – Underdrains

M605.1 Description

M605.2 Material and Construction

M605.3 Restoration

M605.4 Method of Measurement

M605.5 Basis of Payment

M605.1 Description. This work shall consist of constructing pipe underdrains with granular filter material, filter fabric sock, and pipe in accordance with these specifications and in conformity with lines, grades and locations shown on the plans or established by the Engineer. This item shall include all necessary excavations and backfill, furnishing and placing pipe; furnishing and installing all necessary pipe bends, tees, reducers, branches, and caps of a type at least equal to the pipe of which they become a part; granular filter material; filter fabric sock; restoration with topsoil, seed and mulch in accordance with Item M659; and all other necessary materials to complete the designated drains; and the removal and disposal of all surplus excavation and discarded materials in accordance with Item 203.

The work done shall conform to ODOT Item 605, Underdrains, of the Construction and Materials Manual, latest edition, and shall include the following supplemental specifications.

M605.2 Material and Construction. Pipe to be installed back of curb in the grass area and through driveways shall be trench underdrain per ODOT Item 707.31. Sump outlet pipes encountered shall be connected to the new underdrain at the direction of the City Engineer. Yard drains and roof drains shall not be connected directly to the underdrain. They shall be connected to the gravel trench via a "showerhead". A City representative shall be notified as to the locations of all such connections and the location of each connection shall be marked on the curb. The trench excavation shall be a minimum of 18 inches wide so as not to cause damage to the adjacent curb.

In locations where underdrain is installed through an asphalt driveway approach, the asphalt shall be saw-cut 2 feet back of and parallel to the curb. At the completion of the underdrain installation, the driveway shall be repaired according to Item M441 (448) for Asphalt Driveway.

In locations where underdrain is installed through a concrete driveway approach, the concrete shall be saw-cut 2 feet back of and parallel to the curb or removed back to the first joint back of the curb as directed by the Engineer. Repair of the concrete drive shall be done according to Item M452, Concrete Driveway.

The bedding material shall be Size No. 8 - washed stone, unless otherwise directed by the Engineer.

All underdrains shall originate and outlet as directed by the Engineer. Typically the

outlet will be into a catch basin with the pipe mortared in place through the catch basin wall. Connection shall be stucco sealed on the inside and the outside of the catch basin.

M605.3 Restoration. Restoration of asphalt or concrete driveways shall be done in accordance with Item M441 (448) or M452, respectively. Restoration of the grassed areas shall be done with topsoil, seed and mulch in accordance with Item M659 or M660.

M605.4 Method of Measurement. The quantity to be paid for shall be the actual number of linear feet of underdrain, complete and in place. All measurements will be made from end to end of each run of pipe.

M605.5 Basis of Payment. The price bid for this item shall include all labor, equipment and material necessary for the excavation per Item 203; granular backfill placement; pipe installation with filter fabric sock, including bends and connections to existing sump pump outlets, etc.; connections into catch basins; and placement of topsoil, as directed by the Engineer. All driveway apron removal and restoration back of and parallel to the curb shall be paid for under Item M441 (448) or M452. All backfill, placement of topsoil shall be included in this item.

Payment will be based on the unit price bid:

Item	Unit	Description
M605	Linear Foot	___" Shallow Pipe Underdrain

Item M608 – Retrofit Detectable Warning Mat - Special

M608.1 Description

M608.2 Materials and Installation

M608.3 Measurement and Payment

M608.1 Description. Install retrofit Detectable Warning Mats on curb ramps at locations indicated.

M608.2 Materials and Installation. The approved mats (color to be red brick) are:

- Armor-Tile - Surface Applied Systems (rigid, www.armor-tile.com, 800-682-2525)
- ADA Solutions – Surface Applied Systems (rigid, www.adatile.com, 800-372-0519)

The mats shall be 24" long, with varying mat widths depending on the angle and width of the depressed curb. The mats shall be stored and installed according to manufacturer recommendations, especially the requirements relating to air and surface temperature, surface wetness, and surface cleanliness - before, during, and after installation.

Some curb ramps have joints or cracks. Mats should not be placed over joints, unless otherwise specified. If mats are placed over joints or cracks, a sealer material shall be used to ensure that water and debris cannot get under the mat. Contact the mat supplier for guidelines.

M608.3 Measurement and Payment. The unit price shall include all materials, equipment, and labor necessary for installation. Any damage to surrounding area must be rehabilitated at contractor's expense.

Payment will be based on the unit price bid:

Item	Unit	Description
M608	Each	Retrofit Detectable Warning Mats

Item M608 –Sidewalks and Curb Ramps

- M608.1 Description**
- M608.2 Material and Construction**
- M608.3 Excavation**
- M608.4 Method of Measurement**
- M608.5 Basis of Payment**

M608.1 Description. This item shall consist of the construction of sidewalk and curb ramp on a prepared subgrade or sub-base course in accordance with these specifications and in conformity with the lines, grades, thickness and typical cross-sections established by the City Engineer. The materials shall be Portland cement concrete. The sidewalk and ramp shall meet current ADA Guidelines, to the extent practical, as promulgated by the United States Access Board. Removal of existing sidewalk/ramp shall be done in accordance with Item M202 and as directed by the Engineer.

M608.2 Material and Construction. All labor, equipment and materials including aggregate base, concrete, expansion material, and curing compound shall be included. Concrete shall meet the requirements of ODOT Item 499 of the Ohio Department of Transportation "Construction and Material Specifications Manual", latest edition. Mix design shall be QC Misc or QC 1.

In areas of sidewalk/ramp reconstruction, the City will mark the limits to be removed and reconstructed, unless otherwise noted on plans. If curb is to be reconstructed to accommodate a sidewalk/ramp, the curb work will be done and paid under Items M202 and M609.

Expansion joint material shall be ½" inch thick, full-height vinyl and meet the requirements of ODOT Item 705.03. Expansion material shall be placed between curb and adjacent sidewalk/ramp (6- inch), joints between sidewalk and/or curb ramp (typically 4- inch), every 100 linear feet of sidewalk, and around catch basins, manholes, poles, foundations, pull boxes and boxouts. Six inch vinyl expansion shall be used adjacent to concrete driveways.

Unless otherwise specified, the back of the sidewalk shall be set at ½-inch per foot above the standard top of curb. Flexibility is permitted where:

- the sidewalk approaches a curb ramp, the sidewalk may drop relative to the curb to help achieve the required curb ramp slopes, and/or
 - the sidewalk will meet existing sidewalk or driveway aprons.
- **ADA guidelines shall be met in all cases

The sidewalk/ramp cross-slope shall range between 1/8-inch and ¼-inch per foot maximum. Deviations from these requirements shall be approved by the City Engineer.

Unless otherwise noted, concrete sidewalk shall be 4 inches in thickness and curb ramp shall be 6 inches in thickness.

Joints shall be tooled to a depth of one quarter the thickness of the sidewalk and extend the

entire width (or length) of the sidewalk/ramp. The outside edges and joints shall be re-traced. A light broom finish shall be placed on the sidewalk.

Cast-in-place, rigid, detectable warnings shall be installed in each ramp. See drawing for details. Unless otherwise specified, the same detectable warning product shall be used for the project.

The approved cast-in-place panels (color to be red brick) are:

- Armor-Tile (www.armor-tile.com, 800-682-2525)
- ADA Solutions (www.adatale.com, 800-372-0519)
- Armorcast (www.armorcastprod.com, 818-982-3600)

M608.3 Excavation. Unsuitable sub-grade material shall be removed as directed by the City Engineer and replaced with ODOT Item 304 Aggregate Base. Removal and replacement up to 4 inches of unsuitable material shall be included in the unit price of sidewalk or curb ramp installed. Should unsuitable sub-grade material be found below 4 inches, payment for such removal and replacement shall be paid for under Item M203 - Undercutting.

Where existing sidewalk or curb ramp is to be removed and replaced, removal shall be under of Item M202.

M608.4 Method of Measurement. The quantity to be paid shall be the actual number of square feet of concrete sidewalk, ramp, and detectable warning of the thickness specified, complete and in-place. All measurements will be made horizontally along the centerline of the concrete sidewalk/ramp.

M608.5 Traffic Control. Vehicular traffic shall be maintained at all times, including to driveways. At no time shall both sides of the street be blocked so as to prohibit vehicular traffic. At no time shall a business be denied use of their driveway without consent of the business owner and the Engineer. The Contractor shall be responsible for performing traffic control in accordance with the Ohio Manual of Uniform Traffic Control Devices. Pedestrian traffic will be maintained to the extent possible. Maintenance of pedestrian traffic shall be performed in accordance with the Ohio Manual of Uniform Traffic Control Devices and ADA guidelines, including providing alternative routes.

M608.5 Basis of Payment. The price bid for this item shall include all labor, equipment and material incidental to the construction of the concrete sidewalk/ramp and shall include: preparation of the sub-grade; placement of up to 4 inches of ODOT Item 304 Aggregate Base; the construction of concrete sidewalk/ramp; any backfill required; restoration of topsoil; tooling joints; curing materials; vinyl expansion joint material; and detectable warning devices. All turf restoration shall be included under Items M659 - Seeding & Mulching and/or M660 - Sodding.

Payment will be based on the unit price bid:

Item	Unit	Description
M608	Square Foot	Concrete Sidewalk
M608	Square Foot	Concrete Curb Ramp, Including Detectable Warning Device

Item M609 - Curbing

- M609.1 Description**
- M609.2 Material and Construction**
- M609.3 Excavation**
- M609.4 Restoration**
- M609.5 Method of Measurement**
- M609.6 Basis of Payment**

M609.1 Description. The work done shall conform to ODOT Item 609, Curbing, of the Construction and Materials Manual, latest edition, in conformance with the lines, grades and cross-sections shown on the plans or established by the City Engineer, and shall include the following supplemental specifications and/or exceptions.

This item shall include necessary saw cutting, excavation, 4-inches of Item 304 Aggregate Base, furnishing and installing joint materials, curing compound, restoration of grassed areas, existing street, and driveway pavement, and the disposal of surplus excavation and discarded materials in accordance with ODOT Item 203 - Excavation.

M609.2 Material and Construction. Concrete shall meet the requirements of ODOT Item 499 of the Ohio Department of Transportation "Construction and Material Specifications Manual", latest edition. Mix design shall be QC Misc or QC 1. The ratio and size of coarse aggregate shall be as ordered to secure a workable mix. Pea Gravel Mix shall not be allowed. Where existing curb or curb and gutter is to be replaced, the new curbing shall have the same dimensions and cross-section as the existing curb. Where curb or curb and gutter is replaced across an asphalt driveway approach, a 2 foot wide strip of the asphalt drive shall be removed. This 2 foot wide strip will allow compaction of new driveway materials, and shall comply with and be paid under Item M441 (448) Asphalt Driveways. See Item M441 Asphalt Concrete for restoration requirements. Concrete driveways shall not be disturbed unless directed by the City Engineer.

Full depth, ½" vinyl expansion material shall be placed at all curb sections greater than 10 feet in length that are part of isolated curb repair, every 100 feet for continuously machined curb, at intersection radius points, at both sides of a drive approach, and on each side of a catch basin. All vinyl expansion material shall be full depth and meet the requirements of ODOT Item 705.03. Curing compound shall be sprayed on all new exposed concrete surfaces. Curing compound shall conform to ASTM C309.

If an existing sump pump drain pipe extends through a curb section being replaced, the existing pipe shall be connected to the underdrain (if available) with a "showerhead", otherwise it shall be cut back 10 feet from the back of curb or 3 feet behind the back of existing sidewalk (if sidewalk is present) and a popup outlet installed, as directed by the City Engineer.

If an existing downspout or private trench drain outlet pipe extends through the curb

section being replaced, the existing pipe shall be cut back 10 feet from the back of curb or 3 feet behind the back of existing sidewalk (if sidewalk is present) and a popup outlet installed, as directed by the City Engineer. Sump pump “showerhead” connections and all popup outlets will be paid under Item M811.

Access to residential driveways shall be maintained to the extent possible. Temporary gravel restoration for driveway access or steel plating, as needed, shall be provided and included in the bid item cost for Item 614 Maintaining Traffic. Access to business driveways shall not be disturbed without prior approval from the business and the City Engineer. New concrete curb shall be protected from traffic for 7 days after it is placed. Driveway access shall be restored immediately upon completing the 7 day cure time.

M609.3 Excavation. Unsuitable sub-grade material shall be removed as directed by the City Engineer and replaced with ODOT Item 304 Aggregate Base. Removal and replacement up to 4 inches of unsuitable material shall be included in the unit price of curb. Should unsuitable sub-grade material be found below 4 inches, payment for such removal and replacement shall be paid for under Item M203 - Undercutting.

Where existing curb or curb and gutter is to be removed and replaced, removal shall be under of Item M202.

M609.4 Restoration. Prior to asphalt restoration, all vertical edges shall be cleaned and coated with asphalt material per ODOT 401.14. Any gutter to be overlaid shall also be coated per ODOT 401.14.

For continuous or isolated curb repair, restoration of the disturbed asphalt pavement at the face of the gutter plate or barrier curb shall be done by LSM 100 to 2-inches below the surface and Item M441 (448) placed to the surface. LSM restoration is to be a minimum of 3” wide and a maximum of 12” wide. Prior to final restoration of the existing street or driveway approach, the pavement shall be saw cut, full depth. Ragged edges and undermined pavement will not be permitted. An expansion joint shall be installed between the concrete curb and all concrete driveway approaches. Permanent restoration of drive approaches as well as temporary pavement restoration at all reconstructed curb shall be completed within two weeks of the curb reconstruction, including concrete curing time. If necessary, asphalt and/or gravel may be needed across the disturbed area in front of drive approaches to allow access until all grinding and paving takes place.

In the case of new barrier curb construction, restoration of disturbed asphalt pavement at the face of the curb shall be done by uniformly saw cutting any ragged pavement edge and placing ODOT Item 301 asphalt an elevation of 2 - inches below the finished pavement elevation (4-inch minimum thickness on residential streets, 10-inch minimum thickness on arterial streets) and 2-inches of Item M441 (448) to the surface. The area shall be of sufficient width to allow proper mechanical compaction. Additionally, backfill behind the new barrier curb shall be done with clean fill and

finished with 6-inches topsoil, seeding and mulching according to Item M659.

Restoration of the grassed areas shall be done with topsoil, seeding and mulching in accordance with Item M659.

M609.5 Method of Measurement. The curb measured for payment will be the actual number of linear feet of curb or curb and gutter, of the kind and type specified, complete and in place, measured along the front face of the curb section.

Curb within the limits of catch basins, inlets and manhole aprons will not be deducted from the length of curb measured for payment. No deductions will be made for depressed curb at driveways.

M609.6 Basis of Payment. The price bid for this item shall include all labor, equipment and material incidental to the construction of the curb and shall include expansion material, curing compound, sub-grade preparation, constructing openings in the curb for drain tile as directed, constructing joints, depressing curbs for driveways, 4-inches of ODOT Item 304 Aggregate Base, backfill, restoration of the grass areas, restoration of the existing street as described above, and sealing joints. Restoration of asphalt driveways will be paid under Item M441 (448) Asphalt Driveways.

Payment will be based on the unit price bid:

Item	Unit	Description
M609	Linear Foot	Curb, Type ____, Installed, Isolated
M609	Linear Foot	Curb, Type ____, Installed, Continuous

Item M659 - Seeding and Mulching

- M659.1 Description**
- M659.2 Preparation**
- M659.3 General**
- M659.4 Basis of Payment**

M659.1 Description. This work shall consist of seeding and mulching areas in accordance with the requirements of ODOT Item 659 of the State of Ohio, Construction and Materials Specifications manual, and shall include the following supplemental specifications. Fertilizer shall meet the requirements of Item 659 and be applied at the rate specified or as directed by the City Engineer.

M659.2 Preparation. Sub-grade preparations shall meet the requirements of section 659.02 and 659.03, except that all areas shall be free from rock or other foreign material of one (1) inch or greater in any dimension.

M659.3 General. The Contractor shall complete all restoration work (backfill, topsoil, seeding and mulching) within 2 weeks after work is completed at each site. The Contractor shall be responsible for the restoration until final acceptance of the project and shall repair or replace any damaged areas as directed by the City Engineer. The Contractor may be directed to perform additional seeding and mulching at the time the punch list items are completed. The grass seed mix shall be 10% perennial rye, 80% fescue (tall turf type and/or titan type) and 10% Kentucky Bluegrass. A grass seed accelerator, applied per manufacturer's recommendations, shall be used. All seed application shall be hydroseed. Straw mulch shall not be permitted unless otherwise approved by the City Engineer.

M659.4 Basis of Payment. Payment for this item shall be per square yard of turf area restored or by a lump sum, as specified by the Engineer. It shall include seeding and mulching using hydroseeding.

Payment will be based on the price bid:

Item	Unit	Description
M659	Lump Sum	Seeding and Mulching
M659	Square Yard	Seeding and Mulching

Item M660 - Sodding

- M660.1 Description**
- M660.2 Material and Construction**
- M660.3 Method of Measurement**
- M660.4 Basis of Payment**

M660.1 Description. This work shall consist of sodding areas in accordance with the requirements of ODOT Item 659 of the State of Ohio, Construction and Materials Specifications manual. Topsoil shall meet the requirements of ODOT Item 653.

M660.2 Preparation. Sub-grade preparations shall meet the requirements of section 660.04, except that all areas shall be free from rock or other foreign material of one (1) inch or greater in any dimension. Place 4" of topsoil according to Item M659.

M660.3 General. The Contractor shall complete all restoration work (backfill, topsoil, and sodding) within 2 weeks after the concrete work is completed on each street. The Contractor shall be responsible for the restoration until final acceptance of the project and shall repair or replace any damaged areas as directed by the City Engineer. The Contractor may be directed to perform additional sodding/seeding and mulching at the time the punch list items are completed. The sod furnished shall be well-rooted Kentucky Blue Grass containing a growth of not more than 30% of other grasses, and free from all noxious weeds and grasses. The Contractor shall be responsible to water the restored (seeded) area per the requirements of section 659.17.

M660.4 Basis of Payment.
Payment will be based on the price bid:

Item	Unit	Description
M660	Square Yard	Sodding including 4" Topsoil

Item M811 – Pipe Culverts, Sewers, Drains, and Drainage Structures

- M811.1 Description**
- M811.2 General Construction Methods**
- M811.3 Bedding and Backfill**
- M811.4 Conduits**
- M811.5 Drainage Structures**
- M811.6 Manholes**
 - M811.6.1 Adjustment to Grade**
 - M811.6.2 Minor Repair**
 - M811.6.3 Major Repair**
 - M811.6.4 Replacement of Casting**
 - M811.6.5 Installation/Replacement**
- M811.7 Catch Basins**
 - M811.7.1 Minor Repair**
 - M811.7.2 Major Repair**
 - M811.7.3 Replacement of Casting**
 - M811.7.4 Installation/Replacement**
- M811.8 Concrete Collar Repair.**
- M811.9 Restoration**
- M811.10 Basis of Payment**

M811.1 Description. This work consists of the construction, repair, replacement, or adjustment of conduits and drainage structures, as specified. The work done shall conform to ODOT Supplemental Specification 811, Conduit and Drainage Structures, dated January 18, 2013 and shall include the following Moraine supplemental specifications.

M811.2 General Construction Methods. Prior to beginning work, the contractor is to meet with the Engineer at the site so that there is a clear understanding of the work expected. It may be necessary for the contractor to excavate around the conduit or drainage structure so that the Engineer can determine the problem and direct work. Caution shall be used so as to not damage existing facilities. It will be the Contractor's responsibility to repair or replace any facilities damaged during the removal process.

M811.3 Bedding and Backfill. Furnish structural backfill for bedding and backfill only from natural gravel sources. Slag and recycled materials are not permitted. Low strength mortar/CFD/flowable fill is not to be used without prior permission from the City Engineer. The bedding is to be a minimum 6 inches below to 6 inches above the bottom of conduits and drainage structures. Bedding shall be #57 washed stone for concrete pipe and #57 crushed stone for plastic pipe. Backfill under drivable surfaces is to be ODOT 703.11 Type 1 or 2, well graded (no sand), placed and compacted in 6 inch lifts.

M811.4 Conduits. Unless otherwise directed, pipe within the Right of Way is to be reinforced concrete pipe per ODOT 706.02 (Class IV with proper cover). Outside of the Right of Way, pipe shall be ODOT Type B conduit. All pipes into or out of ponds shall be reinforced concrete pipe. Unless otherwise directed, an excavation is not to remain open for more than 24

hours.

Unless otherwise directed, the Contractor shall replace all pavement, sidewalk, grass or other surfaces disturbed to a condition equal to that existing before the work was started, furnishing all materials, labor, equipment, etc. as part of this item. All required excavation shall be included as a part of this item. Payment for restoration of grass will be made under Items M659 or M660, unless otherwise specified.

M811.5 Drainage Structures. All grates near a paved surface shall be "bicycle-friendly". Where applicable, vane grates are to be used. Patching and sealing is to be performed with a mix of Portland Cement, sand, and Type M mortar. Restoration of all disturbed areas shall be done with like materials (topsoil, asphalt, concrete, stone backfill, etc), and shall be included as part of this Item. The contractor is to take special care when working on manholes and catch basins not to cause damage, which would become the responsibility of the contractor to repair. An excavation is not to remain open for more than five days. Excavations in the roadway shall be plated at all times that work is not being performed, unless otherwise directed by the City Engineer.

M811.6 Manholes. Final height of cover or grate is to be flush (0"- ¼" below) with final asphalt surface.

All manhole lids shall be free for removal and shall not contain tack coat or asphaltic material that would hinder its removal. Lids will be removed by the City Engineer and inspected. Lids shall be cleaned and lids set in place and aligned properly.

M811.6.1 Manholes - Adjusted to Grade. (Either raising or lowering) shall be done by the following method:

Carefully remove and clean the existing frame, adjust the height of supporting walls as necessary and reset the frame in a bed of mortar or concrete. Any adjustment greater than 1 inch shall require brick and mortar or concrete adjustment rings. When using concrete adjustment rings, a maximum of two total rings may be used for a total of no more than 12 inches of rise from the top of the cone or flat top. Metal riser rings are not permitted, unless directed by the Engineer. The manhole shall be surrounded by ODOT Item 301, Asphalt Concrete Base, to a minimum of 6 inches deep on residential roads and 12 inches deep on arterial roads. The top of the ODOT Item 301 shall be a minimum of 2 inches below the final pavement surface, unless otherwise directed by Engineer, on roads to be immediately paved. For adjustments to be completed after final paving operations have been completed, Item M441, Asphalt Concrete Surface Course shall be placed 2 inches thick in two lifts to the surface, unless otherwise directed by the City Engineer, above the specified ODOT Item 301, Asphalt Concrete Base.

If a manhole is found to have a broken concrete ring, the contractor may be directed to remove the existing concrete ring and reset the existing frame as detailed above.

M811.6.2 Manholes - Minor repair of a manhole shall include all or any combination of the following: cleaning debris from the bottom of a manhole, patching and mortar finishing with

new concrete interior joints within the manhole, placing a new concrete bottom, channeling the flowline(s) as appropriate, and/or resetting the existing casting. All existing frames, grates and/or lids are to be re-used, unless otherwise directed by Engineer. The City may supply a new casting at no additional cost to the City, if necessary.

M811.6.3 Manholes - Major repair of a manhole shall be performed as directed by the Engineer and shall include all or any combination of the following: replacing or setting a new precast flat top, rebuilding/replacing the vertical wall/barrel section up to 4 feet (from the bottom of the casting to the crown of the pipe), patching and mortar finishing with concrete on all interior walls, setting the casting to grade, and proper backfill on rebuilt section. It will also include full restoration around manhole. All existing frames, grates and/or lids are to be re-used, unless otherwise directed by Engineer. The City may supply a new casting at no additional cost to the City, if necessary.

Pipe connections to manholes are included in this item. If the pipe entering a manhole is too short, collapsed or damaged, it is to be replaced to the first sound joint, unless otherwise directed. The City Engineer may allow a PVC pipe to be used as an extension to extend pipes that are too short, maximum of 6 inches (fully encased in concrete). Pipe work is to be performed and paid under Item M811.

M811.6.4 Manholes - Replacement of Casting shall be performed as directed by the City Engineer and shall include supplying and replacing the iron casting and patching and mortar finishing with new concrete interior joints within the manhole.

M811.6.5 Manholes - Installation/Replacement shall be performed as directed by the City Engineer and shall include any or all of the following: removal and disposal of the existing manhole including all spoils and metal (all metal castings in usable condition shall be returned to the City); installation of a new pre-cast manhole including the frame and/or grate; setting the casting to proposed grade, placement of a 6 inch PVC sleeve for future use (if directed by the Engineer), placing a new concrete bottom, channeling the flowline(s) as appropriate, connection of all pipes into the manhole including patching and mortar finishing with concrete all interior walls, applying concrete collars to the exterior of pipe connections, and backfill of all void space surrounding the new manhole. As directed by the City Engineer, the new manhole may need to be moved up to 5 feet in order to allow the existing pipes to be properly connected to the manhole.

Shop Drawings for pre-cast structures shall be submitted to the City Engineer and approved prior to ordering the structures.

Pipe connections to manholes are included in this item. If the pipe entering a manhole is too short, collapsed or damaged, it is to be replaced to the first sound joint, unless otherwise directed. The City Engineer may allow a PVC pipe to be used as an extension to extend pipes that are too short, maximum of 6 inches (not under pavement), and fully encased in concrete. Pipes under pavement must be RCP. Pipe work is to be performed and paid under Item M811.

M811.7 Catch Basins. All catch basins shall be pre-cast units unless the City Engineer permits the use of solid concrete block or cast in place concrete. The use of block is not permitted for catch basin bottoms. All pre-cast structures shall take into account the adjacent curb type to provide a smooth transition.

Concrete curb tie-ins and all backfill around the catch basin shall take place within five days of initial excavation. If necessary, gravel and/or temporary asphalt may be needed across the disturbed area in front of the catch basin until all asphalt work is complete.

Pipe connections to catch basins are included in this item. If the pipe entering a catch basin is too short, collapsed or damaged, it is to be replaced to the first sound joint, unless otherwise directed. The City Engineer may allow a PVC pipe to be used as an extension to extend pipes that are too short, maximum of 6 inches (fully encased in concrete). Pipes under pavement must be RCP. Pipe work is to be performed and paid under Item M811.

Type B catch basins require the use of a center support approved by the Engineer.

M811.7.1 Catch Basins - Minor Repair of a catch basin shall be performed as directed by the Engineer and shall include all of any combination of the following: removal of debris from catch basin, sealing all cracks and voids in the structure with City specified mortar mix, pour new concrete structure floor, resetting the casting to grade, and remove and/or replace concrete border around the hood of Type "D" (block only) box. All existing frames, grates and/or lids are to be re-used, unless otherwise directed by Engineer. The City may supply a new casting at no additional cost to the City.

M811.7.2 Catch Basins - Major Repair of a catch basin shall be performed as directed by the Engineer and shall include all or any combination of the following: resetting the pipe, replacing the apron; rebuilding up to 50 percent of walls; placing concrete for a new bottom; applying concrete collars to the exterior of pipe connections, and/or patching and mortar finishing with new concrete all interior walls of the catch basin. All existing frames, grates and lids are to be re-used, unless otherwise directed by Engineer. The City may supply a new casting at no additional cost to the City.

If curb is to be replaced through a catch basin throat but no work is to be conducted on the catch basin, itself, such work will be paid under Item M609 – Curbing. No payment will be made for a catch basin repair.

M811.7.3 Catch Basins - Replacement of Casting shall be performed as directed by the City Engineer and shall include supplying and replacing the iron casting (including pre-cast top if applicable) and patching and mortar finishing with new concrete all interior walls of the catch basin.

M811.7.4 Catch Basins - Installation/Replacement shall be performed as directed by the City Engineer and shall include any or all of the following: removal and disposal of the existing catch basin including all spoils and metal (all metal castings in usable condition shall be returned to the City); installation of a new pre-cast catch basin including the metal casting; placement of a

new concrete bottom, connection of all pipes into the basin including patching and mortar finishing with concrete all interior walls within the basin; apply concrete collars to the exterior of all pipe connections; and backfill of all void space surrounding the new catch basin. All apron work within the limits of the replaced catch basin shall be included in this Item. At the direction of the City Engineer, the new catch basin may need to be moved up to 5 feet in order to allow the existing pipes to be properly connected to the basin.

Shop Drawings for pre-cast structures shall be submitted to the City Engineer and approved prior to ordering the structures.

M811.8 Concrete Collar Repair. Offset joints, voids, and other deterioration of pipes and/or connections to shall be repaired by applying a concrete collar. Collar shall full encase the offset joint, fill all voids, and shall not be placed in such a way that would hinder the internal capacity of the pipe. Unless otherwise directed, the Contractor shall replace all pavement, sidewalk, grass, or other surfaces disturbed to a condition equal to that of existing before the work was started, furnishing all materials, labor, and equipment as a part of this item. All required excavation shall be included as a part of this item. Payment for restoration of grass will be made under Items M659 or M660.

M811.9 Conduit, Manhole and Catch Basin Restoration. Prior to asphalt restoration, all vertical edges shall be cleaned and coated with asphalt material per ODOT 401.14. Any gutter to be overlaid shall also be coated per ODOT 401.14.

On asphalt streets, restoration shall be 4 inches of ODOT Item 304, Aggregate Base and ODOT Item 301, Asphalt Concrete Base, minimum 6 inches for a residential street and 12 inches for an arterial street, unless otherwise directed, compacted in lifts. On residential streets that will not be resurfaced within 1 year, restoration shall be 4 inches of Item 301 and 2 inches of Item M441 Asphalt Surface Course. On arterial streets that will not be resurfaced, restoration shall be 10 inches of Item 301 and 2 inches of Item M441 Asphalt Surface Course. All surface joints are to be sealed with a 4 inch AC ribbon.

M811.10 Basis of Payment. The price bid for this item shall include all labor, equipment and materials necessary for the construction, repair, replacement, or adjustment of conduits and drainage structures according to these specifications, including all necessary restoration.

Payment for accepted quantities will be made at the unit price bid for:

Item	Unit	Description
M811	Linear Foot	___" Pipe, Type "___"
M811	Each	___" Pipe, Repaired with Concrete Collar
M811	Each	Manhole, Adjusted to Grade
M811	Each	Manhole, Minor Repair
M811	Each	Manhole, Major Repair
M811	Each	Manhole, Replacement of Casting
M811	Each	Manhole, Type "___"
M811	Each	Catch Basin, Minor Repair

M811	Each	Catch Basin, Major Repair
M811	Each	Catch Basin, Replacement of Casting
M811	Each	Catch Basin, Type " ____"

Item M826 - Asphalt Concrete with Fibers

- M826.1 General**
- M826.2 Fibers**
- M826.3 Composition**
- M826.4 Mixing**
- M826.5 Basis of Payment**

M826.1 General. This work consists of constructing a surface course and/or an intermediate course of aggregate, fiber and asphalt cement mixed in a central plant and spread and compacted on a prepared surface.

The requirements of ODOT Items 441, 442, 448 and Item M441 apply, except as modified by this specification.

M826.2 Fibers. Use fibers specifically manufactured and drawn for use in asphalt concrete mixes. Use the specified fiber type conforming to the following requirements:

Fiber Type	A	B	C
Material	polyester	polypropylene	aramid
Denier; ASTM D 1577*	4.5 ± 1.5	4 ± 1	n/a
Length, inch (mm)	0.25 ± 0.02 (6.35 ± 0.51)	0.39 ± 0.08 (9.91 ± 2.0)	0.75 ± 0.13 (19.0 ± 3.2)
Crimps; ASTM D 3937	None	None	None
Tensile strength, minimum, psi (Mpa); ASTM D 2256*	70,000(483)	40,000(276)	400,000(2760)
Specific gravity	1.36 ± 0.04	0.91 ± 0.04	1.44 ± 0.05
Melting temperature, minimum, °F (°C)	475(246)	320(160)	800(427)

*This data must be obtained prior to cutting the fibers.

Furnish fibers according to the ODOT Qualified Products List (QPL). Ensure Type A and B fibers have a uniform singular color of white to light gray. Furnish Type C fibers intended for use in asphalt concrete mixes. Ensure Type C fibers are blended with 3/4 inch (19 mm) fibrillated polyolefin fibers or wax coated to ensure proper distribution in the mix.

During production, the Contractor will obtain a random 0.5 pound (250 gram) sample of the finished fibers for each 24,000 pounds (11,000 kg) of fiber used. Forward the sample to the City's testing contractor.

M826.3 Composition. Design the mix in accordance with ODOT 441.02 or ODOT 442.02. Add Type A or B 6.0 pounds per ton (3.0 kg/metric ton) of total mix. Add Type C fibers at the rate of 1.8 to 4.0 ounces (60 to 113 g) of pure aramid fiber, not including the weight of any polyolefin fibers or coating, per ton (metric ton) of total mix.

Use no more than 10 percent reclaimed asphalt concrete pavement. Do not use recycled asphalt shingles.

M826.4 Mixing. Prior to the start of full production, produce a test batch of fiber asphalt concrete to demonstrate to City Testing how the fibers will be introduced and mixed into the asphalt concrete. Achieve satisfactory results before beginning full production. If during production an unsatisfactory mix is produced, cease production until a satisfactory test batch is produced.

When a batch type plant is used, add fibers according to the manufacturer's recommendation to the heated aggregate prior to introduction of the asphalt binder. Mix the aggregate and fibers dry for a minimum of 10 seconds after introduction of the fibers. The Laboratory may increase this mixing time if satisfactory results are not obtained.

When a drum mix type plant is used, introduce the fibers into the aggregates by the reclaimed material feed system or by an adjustable pipe near the asphalt feed pipe.

For Fiber Type B mixes, ensure the temperature of the aggregate and asphalt binder does not exceed 295 °F (146 °C) where the fiber is introduced.

Asphalt Concrete with Fibers QA/QC Requirements:

Furnish all materials, equipment, labor, and incidentals for mixing aramid fiber into HMA or WMA per ODOT Supplemental Specification 826 Type C fibers.

Additionally, aramid fibers must be treated to prevent them from becoming airborne during the mixing process, and the treatment must become soluble in the asphalt. Treated aramid fiber shall be continuously fed and mixed into HMA or WMA per dosage and mixing requirements of ODOT specification. A certified QA/QC mixing technician shall perform continuous feeding of the treated aramid fibers into the asphalt during plant mixing operations for all of the Fiber Reinforced HMA/WMA quantities required for the project, and a P.E. stamped certification report shall be submitted upon project completion.

M826.5 Basis of Payment. The price bid for this item shall include all labor and equipment incidental to the construction of the asphalt concrete pavement with fibers according to these specifications.

Payment will be made at the unit price bid:

Item	Unit	Description
M826	Cubic Yard (Cubic Meter)	Asphalt Concrete Surface Course, Type 1, (448), Fiber Type
M826	Cubic Yard (Cubic Meter)	Asphalt Concrete Intermediate Course Type 2, (448), Fiber Type
M826	Cubic Yard (Cubic Meter)	Asphalt Concrete Surface Course, 442 12.5mm, (448), Fiber Type
M826	Cubic Yard (Cubic Meter)	Asphalt Concrete Intermediate Course 442 19mm, (448), Fiber Type

Item M921 – Asphalt Pavement Rejuvenator

- M921.1 Description**
- M921.2 Materials**
- M921.3 Performance**
- M921.4 Product Standards and Alternates**
- M921.5 Temperature/Weather Limitations**
- M921.6 Applicator Experience**
- M921.7 Handling of Asphalt Rejuvenating Agent**
- M921.8 Application Equipment**
- M921.9 Application of Asphalt Rejuvenating Agent**
- M921.10 Street Sweeping**
- M921.11 Resident Notification**
- M921.12 Traffic Control**
- M921.13 Method of Measurement**
- M921.14 Basis of Payment**

M921.1 Description. This work shall consist of furnishing all labor, material, and equipment necessary to perform all operations for the application of an asphalt rejuvenating agent to asphaltic concrete surface courses. The rejuvenation of surface courses shall be by spray application of a cationic rejuvenating agent composed of petroleum oils and resins emulsified with water. All work shall be in accordance with the specifications, the applicable drawings, and subject to the terms and conditions of this contract.

M921.2 Materials. The asphalt rejuvenating agent shall be an emulsion composed of a petroleum resin oil base uniformly emulsified with water. Each bidder must submit with his bid a certified statement from the asphalt rejuvenator manufacturer showing that the asphalt rejuvenating emulsion conforms to the required physical and chemical requirements shown below.

Table 2.0-1 Tests on Emulsions

Test	ASTM	AASHTO	Minimum	Maximum
Viscosity @ 25°C, SFS	D-244	T-59	15	40
Residue, % W ¹	D-244 (Mod.)	T-59 (Mod.)	60	65
Miscibility Test ²	D-244 (Mod.)	T-59 (Mod.)	No Coagulation	---
Sieve Test, % W ³	D-244 (Mod.)	T-59 (Mod.)	---	0.1
Particle Charge Test	D-244	T-59	Positive	---
Percent Light Transmittance ⁴	GB	GB	---	30

Table 2.0-2 Test on Residue from Distillation

Test	ASTM	AASHTO	Minimum	Maximum
Flash Point, COC, °C	D-92	T-48	196	---
Viscosity @ 60°C, cSt	D-445	---	100	200
Asphaltenes, % w	D-2006-70	---	---	1.00
Maltene Dist. Ratio	D-2006-70	---	0.3	0.6
(PC+A ₁ ⁵)/(S+A ₂)				
PC/S Ratio ⁵	D-2006-70	---	0.5	---
Saturated Hydrocarbons, S ⁵	D-2006-70	---	21	28

¹ ASTM D-244 Modified Evaporation Test for percent of residue is made by heating 50 gram sample to 149 C (300° F) until foaming ceases, then cool immediately and calculate results.

² Test procedure identical with ASTM D-244-60 except that .02 Normal Calcium Chloride solution shall be used in place of distilled water.

³ Test procedure identical with ASTM D-244 except that distilled water shall be used in place of two percent sodium oleate solution.

⁴ Test procedure is attached.

⁵ Chemical composition by ASTM Method D-2006-70:

PC = Polar Compounds, A₁ = First Acidaffins
A₂ = Second Acidaffins, S = Saturated Hydrocarbons

M921.3 Performance. The rejuvenating agent shall have a record of at least five years of satisfactory service as an asphalt rejuvenating agent and in-depth sealer. Satisfactory service shall be based on the capability of the material to decrease the viscosity and increase the penetration value of the asphalt binder as follows. The viscosity shall be reduced by a minimum of 45 percent and the penetration value shall be increased by a minimum of 25 percent. Testing shall be performed on extracted asphalt cement from a pavement to a depth of three eighths inch (3/8"). In addition, the pavement shall be in-depth sealed to the intrusion of air and water.

The bidder must submit with his bid the manufacturer's certification that the material proposed for use is in compliance with the specified requirements. The bidder must submit with his bid previous use documentation and test data conclusively demonstrating that; the rejuvenating agent has been used successfully for a period of five years by government agencies such as cities, counties, etc.; and that the asphalt rejuvenating agent has been proven to perform, as heretofore required, through field testing by government agencies as to the required change in the asphalt binder viscosity and penetration number. Testing data shall be submitted indicating such product performance on a sufficient number of projects, each being tested for a minimum period of three years to insure reasonable longevity of the treatment, as well as produce consistency. RECLAMITE®, manufactured by Golden Bear Oil Corporation, is a product of known quality and accepted performance.

M921.4 Product Standards and Alternates. The product "Reclamite"® for the asphalt rejuvenating agent as manufactured by Witco Corporation or an approved equal is the standard for these specifications. The prices quoted on the bid sheet bid shall be for this standard. Should a bidder wish to submit a bid for alternates to the standard, said prices shall be entered on the bid sheet as the "alternate bid" for each item. In the event that the bidder submits no bid for the standard, only the "alternate bids" should be completed.

Bidders may offer an alternate for the standard specified in the specifications provided the bidder adheres to the following and submits same with the bid.

- a. List the proposed alternate on the bid sheet form giving the product name and price.
- b. Furnish complete specifications and descriptive literature for the alternate as well as a one-gallon sample of the material proposed for use. Such descriptive and detailed information shall be complete and at least equal in detail to the City's requirements for the standard item for which the alternate is offered.
- c. Submit a current Material Safety Data Sheet for the alternate materials.

The alternate will be given consideration by the City. The contractor may furnish only those alternate items included in his proposal and approved by the City prior to award of a contract.

If no alternate is indicated on the bid sheet, the contractor shall furnish the standard (brand) specified in the attached specifications.

Should the alternate offered be found unacceptable by the City based on the data submitted with the bid and no bid is entered on the bid sheet for the standard, then said bid will be considered non-responsive.

M921.5 Temperature/Weather Limitations. The temperature of the asphalt rejuvenating emulsion, at the time of application shall be as recommended by the manufacturer. The asphalt rejuvenating agent shall be applied only when the existing surface to be treated is thoroughly dry and when it is not threatening rain. The asphalt rejuvenating agent shall not be applied when the ambient temperature is below 40° F.

M921.6 Applicator Experience. The asphalt rejuvenating agent shall be applied by an experienced applicator of such material. The bidder shall have a minimum of three years experience in applying the product proposed for use. He must submit with his bid a list of five projects on which he applied said rejuvenator. He shall indicate the project dates, number of square yards treated in each and the name and phone number of the government official in charge of each project.

A project superintendent knowledgeable and experienced in application of the asphalt

rejuvenating agent must be in control of each day's work. The bidder shall submit a written experience outline of the project superintendent.

M921.7 Handling of Asphalt Rejuvenating Agent. Contents in tank cars or storage tanks shall be circulated at least forty-five minutes before withdrawing any material for application. When loading the distributor, the asphalt rejuvenating agent concentrate shall be loaded first and then the required amount of water shall be added. The water shall be added into the distributor with enough force to cause agitation and thorough mixing of the two materials. To prevent foaming, the discharge end of the water hose or pipe shall be kept below the surface of the material in the distributor which shall be used as a spreader. The distributor truck will be cleaned of all of its asphalt materials, and washed out to the extent that no discoloration of the emulsion may be perceptible. Cleanliness of the spreading equipment shall be subject to the approval and satisfaction of the Engineer.

M921.8 Application Equipment. The distributor for spreading the emulsion shall be self-propelled, and shall have pneumatic tires. The distributor shall be designed and equipped to distribute the asphalt rejuvenating agent uniformly on variable widths of surface at readily determined and controlled rates from 0.05 to 0.5 gallons per square yard of surface, and with an allowable variation from any specified rate not to exceed five (5) percent of the specified rate.

Distributor equipment shall include full circulation spray bars, pump tachometer, volume measuring device and a hand hose attachment suitable for application of the emulsion manually to cover areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the emulsion within the tank.

A check of distributor equipment as well as application rate accuracy and uniformity of distribution shall be made when directed by the engineer.

The truck used for sanding shall be equipped with a spreader that allows the sand to be uniformly distributed onto the pavement. The spreader shall be able to apply 1/2 pound to 3 pounds of sand per square yard in a single pass. The spreader shall be adjustable so as not to broadcast sand onto driveways or tree lawns.

The sand to be used shall be free flowing, without any leaves, dirt, stones, etc. Any wet sand shall be rejected from the job site.

Any equipment which is not maintained in full working order, or is proven inadequate to obtain the results prescribed, shall be repaired or replaced at the direction of the Engineer.

M921.9 Application of Asphalt Rejuvenating Agent. The asphalt rejuvenating agent shall be applied by a distributor truck at the temperature recommended by the manufacturer and at the pressure required for the proper distribution. The emulsion shall be so applied that uniform distribution is obtained at all points of the areas to be treated. Distribution shall be commenced with a running start to insure full rate of spread over the

entire area to be treated. Areas inadvertently missed shall receive additional treatment as may be required by hand sprayer application.

Application of asphalt rejuvenating agent shall be on one-half width of the pavement at a time. When the second half of the surface is treated, the distributor nozzle nearest the center of the road shall overlap the previous application by at least one-half the width of the nozzle spray. In any event the centerline construction joint of the pavement shall be treated in both application passes of the distributor truck.

Before spreading, the asphalt rejuvenating agent shall be blended with water at the rate of two (2) parts rejuvenating agent to one (1) part water, by volume or as specified by the manufacturer. The combined mixture of asphalt rejuvenating agent and water shall be spread at the rate of 0.05 to 0.10 gallons per square yard, or as approved by the Engineer following field testing.

Where more than one application is to be made, succeeding applications shall be made as soon as penetration of the preceding application has been completed and approval is granted for additional applications by the Engineer.

Grades or super elevations of surfaces that may cause excessive runoff, in the opinion of the Engineer, shall have the required amounts applied in two or more applications as directed. After the street has been treated, the area within one foot of the curb line on both sides of the road shall receive an additional treatment of the asphalt rejuvenating emulsion. Said treatment shall be uniformly applied by a method acceptable to the Engineer.

After the rejuvenating emulsion has penetrated, a coating of dry sand shall be applied to the surface in sufficient amount to protect the traveling public as required by the Engineer.

The contractor shall furnish a quality inspection report showing the source, manufacturer, and the date shipped, for each load of asphalt rejuvenating agent. When directed by the Engineer, the contractor shall take representative samples of material for testing.

M921.10 Street Sweeping. The contractor shall be responsible for sweeping and cleaning of the streets prior to, and after treatment.

Prior to treatment, the street will be cleaned of all standing water, dirt, leaves, foreign materials, etc. This work shall be accomplished by hand brooming, power blowing or other approved methods. If in the opinion of the Engineer the hand cleaning is not sufficient then a self-propelled street sweeper shall be used.

All sand used during the treatment must be removed not later than forty-eight (48) hours after treatment of the street. This shall be accomplished by a combination of hand and mechanical sweeping. All turnouts, cul-de-sacs, etc. must be cleaned of any material to the satisfaction of the Engineer. Street sweeping will be included in the price bid per square

yard for asphalt rejuvenating agent.

If, after sand is swept and in the opinion of the Engineer a hazardous condition exists on the roadway, the contractor must apply additional sand and sweep same no later than twenty-four (24) hours following reapplication.

No additional compensation will be allowed for reapplications and removal of sand.

M921.11 Resident Notification. The contractor shall distribute by hand, a typed notice to all residences and businesses on the street to be treated. The notice will be delivered no more than twenty-four (24) hours prior to the treatment of the road. The notice will have a local phone number that residents may call to ask questions. The notice shall be of the door hanger type which secures to the door handle of each dwelling. Unsecured notices will not be allowed. The contractor shall also place the notice on the windshield of any parked cars on the street. Hand distribution of this notice will be considered incidental to the contract.

M921.12 Traffic Control. The contractor shall schedule his operations and carry out the work in a manner to cause the least disturbance and/or interference with the normal flow of traffic over the areas to be treated. Treated portions of the pavement surfaces shall be kept closed and free from traffic until penetration, in the opinion of the Engineer, has become complete and the area is suitable for traffic.

When, in the opinion of the Engineer, traffic must be maintained at all times on a particular street, then the contractor shall apply an asphalt rejuvenating agent to one lane at a time. Traffic shall be maintained in the untreated lane until the traffic may be switched to the completed lane.

The contractor shall be responsible for all traffic control and signing required to permit safe travel. The contractor shall notify the Police and Fire departments as to the streets that are to be treated each day through the Engineering Department.

If, in the opinion of the Engineer, proper signing is not being used, the contractor shall stop all operations until safe signing and barricading is achieved.

M921.13 Method of Measurement. Asphalt rejuvenating agent will be measured by the square yard as provided for in the contract documents.

M921.14 Basis of Payment. The price bid for this item shall include all labor, equipment, and material incidental to the placement of the material according to these specifications.

Payment will be made at the unit price bid:

Item	Unit	Description
M921	Square Yard	Asphalt Pavement Rejuvenator

Item M921 - Asphalt Pavement Rejuvenator – revised January 2020