MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**METHYL METHACRYLATE POLYMER CONCRETE SIDEWALK OVERLAY**

BRG:JST 1 of 10 APPR:JAB:TES:10-24-23

**a. Description.** The work consists of furnishing and applying a high-performance methyl methacrylate-based seamless slurry wearing course with aggregate broadcast to the items shown on the plans. A 5 year performance warranty is required.

Furnish a system that has a total thickness of 3/8 inches composed of a primer, polymer overlay components and broadcast sand or aggregate, and a topcoat. Apply the system in accordance with the Manufacturer's recommendations and instructions.

1. Submittals. Submit the latest edition of the Manufacturer's literature including performance data and installation procedures.

A. Representative Samples. Submit three samples of the proposed system, with color, texture, and thickness representative of the overall appearance of the finished system. The samples must represent the full system including a similarly prepared steel substrate (minimum size of each sample must be 8 inches by 8 inches by 1/8 inch steel test plate prepared to *SSPC SP10*)

B. Mix and Application Procedure. Prepare and submit all applicable mixing, application, and repair procedures to the Engineer for approval prior to the preconstruction meeting. Do not begin ordering materials for application of the overlay until the mixing, application, and repair procedures are approved. Ensure all equipment and materials used in the mixing, application, and procedure are in accordance with the Manufacturer’s requirements.

2. Certifications. Ensure a certificate of conformity is issued by the Manufacturer with each delivery of materials to the site.

3. Packaging and Shipping. Deliver all components of the system to the site in the unopened Manufacturer's packaging, clearly identified with the product type and batch number.

The methyl methacrylate overlay performance warranty consists of satisfying the warranty requirements of the work contained in this special provision. This special provision establishes the common terms and definitions applied to the bridge deck surface requiring warranted work. The methyl methacrylate overlay performance warranty assures and protects the Department from specific defects found in the overlay surface.

The following definitions apply when used herein and on the plans.

**Acceptance Date of Warranted Work.** The date when the warranted work is complete and confirmed in writing on the initial acceptance document, by the Department, to be in compliance with the contract specifications and is open to traffic. This is the date of initial acceptance and constitutes the start date for the warranty period. There may be more than one acceptance date of construction for a project.

**Structure.** The entire bridge deck surface of a structure to be overlaid.

**Warranty Bond.** A surety which guarantees that the warranty requirements will be met.

**Warranted Work.** Work that is guaranteed not to exceed the specified thresholds of performance during the warranty period.

**Warranty Work.** Corrective action by the Contractor to bring the warranted work back into compliance. All costs will be borne by the Contractor including traffic control, mobilization, pavement markings, and/or other related work.

**b. Materials**.

1. Primer. Furnish a primer that is a 100 percent reactive, methyl methacrylate-based, two-component, roller brush or sprayed applied resin capable of full cure in 60 minutes at 68 °F. Ensure the primer meets the requirements in Table 1.

| **Table 1: Methacrylate Primer** |
| --- |
| Property | Requirement | Test Method |
| Viscosity | 50 - 70 cps | Brookfield |
| Density | 8 - 9 lb/gal (0.96 – 1.08 kg/L) | ASTM D1475 |
| Pot Life @ 70ºF (21°C) | 10 - 30 minutes | ASTM C881/C881M |
| Flash Point | >43°F (>6°C) | ASTM D1310 |
| Solids Content (w/catalyst) | 100% | ASTM D1644 |

2. Hardener Powder. Furnish a peroxide-based hardener powder initiator to cure the methyl methacrylate-based resins.

A. Binder.

(1) Provide a 100 percent reactive, methyl methacrylate-based seamless, three-component material equal to Bridgemaster manufactured by GCP Applied Technologies, Inc; T-18 Thin Overlay manufactured by Transpo; or an approved equal. Ensure the physical properties for an "or equal" product system are verified by independent laboratory results.

(2) The binder must meet the properties in Table 2 as related to laboratory-prepared samples tested at 68 °F and 24-hour cure where applicable.

| **Table 2: Polymer Resin Binder** |
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| Property | Requirement | Test Method |
| Elongation at Break | 50 percent, minimum | ASTM D638, Type 1 |
| Tensile Strength | 500 psi minimum and900 psi maximum at 75 °F | ASTM D638 |
| Tensile Adhesion | 250 psi, minimum | ASTM C1583 |
| Water Absorption | 0.8 percent, @ 24 hours | ASTM D570 |
| Volatile Content | 3 percent, max | ASTM D2369 |

B. Aggregate Broadcast. Ensure materials consist of clean, dry, angular, high alumina aggregates such as basalt, bauxite, emery, and trap rock and are free of dirt, clay, asphalt, and other contaminants. Aggregate size will be us no. 6 by 10, with final selection agreed upon by the Manufacturer and the Engineer.

C. Sealer. Furnish a sealer that is a 100 percent reactive, methyl methacrylate-based, two-component, spray or roller applied resin capable of full cure in 60 minutes at 68 °F. Bridgemaster by GCP Applied Technologies, Inc; T-18 Thin Overlay manufactured by Transpo; or an approved equal are permitted for use. Ensure the physical properties for an "or equal" product system are verified by independent laboratory results. Ensure the sealer meets the property requirements in Table 3.

| **Table 3: Sealer** |
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| Property | Requirement | Test Method |
| Viscosity | 200 – 400 cps | Brookfield |
| Flash Point | >50ºF (>10°C) | ASTM D1310 |

**c. Construction**. The Contractor is responsible for the protection of equipment and adjacent areas.

Dry abrasive blast clean the steel surfaces to be coated.

Water blasting is prohibited.

Construction traffic is not allowed on any portion of the prepared surfaces. Prime the prepared surface within 4 hours of the surface preparation operation. Re-clean all locations showing any evidence of rusting or contamination, as determined by the Engineer, at no additional cost to the contract.

Storage and Protection. Furnish a storage area for all components. Ensure the area is cool, dry, out of direct sunlight, and in complete accordance with Manufacturer's recommendations and relevant health and safety recommendations.

Locate a storage area such that there is no possibility of contaminating mechanical equipment in the case of a leaking package.

Keep on site, for review by the Engineer and other personnel, copies of material data safety sheets for all components.

Environmental and Safety Requirements. Apply the overlay materials while the air and steel temperatures are between 40 °F and 100 °F, providing that at all times during application the substrate temperature is at least 5 °F above the dew point.

Do not install any of the overlay components (primer, overlay slurry mortar, sealer) when the dew point is 5 °F or less below the surface temperature.

The Contractor is responsible for the removal and disposal of all waste generated by the surface preparation and the installation of the system.

Remove all open flames and spark-producing equipment from the work area prior to the start of application. Post "No Smoking" signs at the entrances to the work area. Exclude non-application-related personnel from the work area.

The Contractor and the Engineer, with cooperation from the Contractor, will agree upon a schedule for coordination between trades working in the area which is to receive the system.

If any of the overlay product's components are damaged due to the effects of moisture at the time of their application, remove them and reapply them at no additional cost to the contract.

Obtain approval from the Engineer of the prepared surface prior to applying the primer.

Treat cracks and joints in accordance with the Manufacturer's recommendations.

Apply the polymer concrete overlay system in five distinct steps as listed below:

• Substrate Preparation

• Priming

• Application

• Aggregate Broadcast

• Sealer Application

1. Substrate Preparation. Dry abrasive blast the steel surfaces to be coated in accordance with the provisions of *AMPP NACE No. 2/SSPC-SP 10* near-white metal blast cleaning. The blast cleaning must leave all surfaces with a dense, uniform, angular anchor pattern of no less than 1.5 mils as measured in accordance with the requirements of *ASTM D4417, Method C using Extra Course replica tape*.

Immediately prior to the application of any components of the system, ensure the surface is dry and clean. Remove any remaining dust or loose particles using a vacuum or clean, dry, oil-free compressed air.

Perform handling, mixing, and addition of components in accordance with the approved Mix and Application Procedure.

Provide a neat finish with well-defined boundaries and straight edges.

2. Primer. Ensure there is no visible moisture present on the steel, and the substrate temperature must be at least 5 °F above the dew point at the time of application of the primer. Apply the primer in a uniform coating at a coverage rate of between 100 and125 sq ft/gallon all surfaces to receive the overlay following the approved Mix and Application Procedure.

The primer will be tack-free before application of the seamless overlay.

3. Binder. Apply the binder after the primer has cured dry-to-touch per *ASTM D1640/D1640M*. The Engineer will approve the primer coat application following cure.

Prior to application of the binder, ensure the primer is clean and free from loose debris, dust, moisture, or other contaminants. No visible moisture may be present on the primer, and the surface temperature must be at least 5 °F above the dew point at the time of installation of the polymer concrete overlay.

Apply the binder in one coat with a nominal thickness of 3/8 inch following the approved Mix and Application Procedure.

4. Aggregate Broadcast. Broadcast the aggregate into the wet, uncured binder in such a way that it falls vertically and covers the binder completely. Ensure coverage rate for aggregate is 1.25 pounds/sq ft.

Cure the fully broadcast binder at least 45 minutes or until sweeping-off or vacuuming can be performed without tearing or otherwise damaging the surface. No traffic or equipment is permitted on the binder during the curing period. After the curing period, remove all loose aggregate by sweeping-off or vacuuming prior to sealer application. Recovered loose aggregate may be reused with the approval of the Engineer. Do not open the unsealed surface binder to traffic under any circumstances.

5. Sealer. The sealer must consist of one coat with an overall coverage rate from 65 to 100 sq ft/gallon following the approved Mix and Application Procedure. Ensure the sealer is fully cured before the completed system is opened to traffic.

6. Repairs and Patching. If an area is left untreated or the binder becomes damaged, repair the area to restore integrity of the system following the approved Mix and Application Procedure.

All repairs are subject to the approval of the Engineer.

7. Field Quality Control. Conduct the following tests and record the results on a form that will be submitted to the Engineer:

(1) Temperature. Record air temperature, substrate temperature, and dewpoint at time of application of all components. Calculate dew point from temperature and humidity using standard tables.

(2) Surface Profile Measurements. Record the profile depth of the prepared steel per *ASTM D4417, Method C using Extra Course replica tape.*

(3) Coverage Rates. Monitor coverage rates for all layers by checking the quantity of material used against the area covered.

8. Final Review. The Engineer and the Contractor will jointly review the area in which the completed polymer concrete overlay system has been installed. Any irregularities or other items that do not meet the requirements of the specifications must be addressed at this time at no cost to the contract.

**d. Warranty.**

1. Limits of Warranted Work. The warranted work includes all methyl methacrylate overlays on structures within the project limits unless otherwise indicated in the proposal.

2. Warranty Period. The length of warranty will be 5 years from the Acceptance Date of Warranted Work.

3.Warranty Bond. Furnish a single term warranty bond equal to 100 percent of warranted work for methyl methacrylate overlay, prior to contract award. The effective starting date of the warranty bond will be the Acceptance Date of Warranted Work. The warranty bond will be released at the end of the warranty period or after all warranty work has been satisfactorily completed, whichever is later, and a form furnished by the Department is jointly executed by the Department and the Contractor.

4. Initial Acceptance. The Department and the Contractor must jointly review all completed warranted work, or a portion thereof, as determined by the Department. If the work does not meet contract requirements, make all necessary corrections, at the Contractors expense, prior to initial acceptance. Initial acceptance will occur as soon as the Department determines that all contract requirements have been met for the warranted work. The date on which initial acceptance occurs is termed the Acceptance Date of Warranted Work.

Initial acceptance will be documented and executed jointly by the Department and the Contractor on a form furnished by the Department. A copy of the form will be sent to the Contractor’s warranty bond surety agent by the Department. Neither the initial acceptance nor any prior inspection, acceptance, or approval by the Department diminishes the Contractor’s responsibility under this warranty.

The Department may accept the work and begin the warranty period to accommodate seasonal limitations or staged construction, excluding any area needing corrective work.

5.Rights and Responsibilities of the Department. The Department:

A. Reserves the right to approve the time, traffic control and methods for performing any warranty work by permit through the Region utilities and permit process.

B. Reserves the right to approve or reject the schedule proposed by the Contractor to perform warranty work.

C. Reserves the right to approve all materials and specifications used in warranty work.

D. Reserves the right to determine if warranty work performed by the Contractor meets the contract specifications.

E. Reserves the right to perform, or have performed, routine maintenance during the warranty period. Routine maintenance will not diminish the Contractor’s responsibility under the warranty.

F. Reserves the right, if the Contractor is unable, to make immediate emergency repairs to the methyl methacrylate overlay to prevent an unsafe road condition caused by defective warranted work as determined by the Department. The Department will attempt to notify the Contractor that action is required to address an unsafe condition. The Department will record the time and date of the attempts for Contractor notification. However, should the Contractor be unable to comply with this requirement, to the Department’s satisfaction and within the time frame required by the Department, the Department will perform, or have performed any emergency repairs deemed necessary. Any such emergency repairs undertaken will not relieve the Contractor from meeting the warranty requirements of this special provision. Any costs associated with the emergency repairs must be paid by the Contractor.

G. Reserves the right, if the Contractor is unresponsive, to call the surety to complete the applicable warranty work.

H. Is responsible for monitoring the structure throughout the warranty period by means of the Michigan Bridge Inspection System (MBIS) and in accordance with the National Bridge Inspection Standards (NBIS) and will provide the Contractor all documentation of the methyl methacrylate overlay’s condition related to the warranty requirements. The Department reserves the right to conduct impromptu inspections to evaluate the performance of the thin methyl methacrylate overlay. The Contractor will not be relieved of any responsibility based upon a claim that the Department failed to adequately monitor the structure or to report its findings to the Contractor.

I. Is responsible for notifying the Contractor, in writing, of any corrective action required to meet the warranty requirements.

6.Rights and Responsibilities of the Contractor. The Contractor:

A. Must warrant to the Department that the warranted work will be free of defects as measured by the performance parameters and specified threshold values for each. Ensure the warranty bond is described on a form furnished by the Department. Ensure the completed form is submitted to the Department prior to award of contract.

B. Is responsible for performing all warranty work including, but not limited to, maintaining traffic and restoring methyl methacrylate overlay to the Departments’ specifications, at the Contractor’s expense.

C. Is responsible for performing all temporary or emergency repairs, resulting from being in non-compliance with the warranty requirements, using Department approved materials and methods.

D. Must notify the Department and submit a written course of action for performing the needed warranty work, 10 calendar days prior to commencement of said warranty work, except in the case of emergency repairs as detailed in this special provision. The submittal must propose a schedule for performing the warranty work and the materials and methods to be used.

E. Must follow a Department approved maintaining traffic plan when performing warranty work. Ensure all warranty work is performed under permit issued by the Transportation Service Center Permits Staff. The permit fee and an individual permit performance bond will not be required. The permit insurance requirements, however, will apply. When applying for this permit, note on the application that warranty work is to be performed.

F. Will be responsible for reimbursing the Department a portion of any incentive payments paid to the Contractor for early completion of the original work. Reimbursements will be required if the proposed maintaining traffic plan for corrective action requires lane closures during peak hour traffic prior to contract completion. Peak hours will be determined by the Region Traffic and Safety Engineer. The daily reimbursement amount will not exceed 25 percent of the original daily earned incentive payment. The Department will determine the actual percentage on a project by project basis.

G. Must furnish to the Department, if warranty work is required, a supplemental lien bond in the amount required by the Department to cover the costs of warranty work using Department approved forms. Ensure the supplemental lien bond is furnished prior to beginning any warranty work.

H. Must complete all warranty work required by this special provision prior to conclusion of the warranty period, or as otherwise agreed to by the Department.

I. Will be liable during the warranty period in the same manner as Contractors currently are liable for their construction related activities with the Department pursuant to the Standard Specifications for Construction, including, but not limited to subsections 104.07.C, 107.10 and 107.11. This liability will arise and continue only during the period when the Contractor is performing warranty work. This liability is in addition to the Contractor performing and/or paying for any required warranty work and must include liability for injuries and/or damages and any expenses resulting therefrom which are not attributable to normal wear and tear of traffic and weather, but are due to non-compliant materials, faulty workmanship, and to the operations of the Contractor as set forth more fully in subsections 104.07.C, 107.10 and 107.11 of the Standard Specifications for Construction.

7.Evaluation Method. The Department will conduct methyl methacrylate overlay evaluations for each structure. Evaluation will consist of field condition reviews. This evaluation may be waived in emergency situations.

The beginning and ending points will be the reference lines of the structures.

8.Warranty Requirements. Warranty work will be required when a threshold limit for a condition parameter is exceeded as a result of defects.

Condition parameters (see Table 6) are used to measure the performance of methyl methacrylate overlay during the warranty period. Each condition parameter has a threshold level applied to each structure and a maximum percentage of defects allowed before corrective action (warranty work) is required.

Definitions:

**Spalling.** Broken or missing pieces of methyl methacrylate overlay.

**Scaling.** Worn methyl methacrylate overlay surface with loss of methyl methacrylate and aggregate exceeding 20 percent of overlay thickness.

**Delamination.** Debonding of the methyl methacrylate overlay to the existing bridge surface.

If any of the following minimum performance criteria listed in Table 6 is not met, warranty work is required. Ensure the warranty work is performed prior to conclusion of the warranty period or within such other time frame as agreed to by the Department and the Contractor, unless safety concerns dictate otherwise.

**Table 6: Thresholds for Condition Parameters**

|  |  |
| --- | --- |
| Condition Parameter | Threshold Limits Per SurfaceArea for Each Structure |
| Spalling | 1% |
| Scaling | 1% |
| Delamination | 1% |

The defective areas of the methyl methacrylate overlay may or may not be contiguous to necessitate corrective action. Ensure any corrective action (warranty work) requiring removal or replacement is made at a sufficient depth to restore the integrity of the methyl methacrylate overlay surface.

During the warranty period, the Contractor will not be held responsible for methyl methacrylate overlay distresses including but not limited to: chemical and fuel spills, vehicle fires, structural repairs requiring deck patching, removal or replacement, and quality assurance testing such as coring. The Contractor will be responsible for wear or damage by snowplow blades and other winter maintenance operations. Other factors considered to be beyond the control of the Contractor which may contribute to methyl methacrylate overlay distress will be considered by the Engineer on a case-by-case basis upon receipt of a written request from the Contractor.

9. Corrective Actions. Perform the work necessary to repair all deficiencies associated with the warranted condition parameters. The Department will accept the listed corrective action if the action addresses the cause of the condition parameter as listed in Table 6. The Contractor may use an alternative action subject to Department approval.

**Table 7: Corrective Actions**

|  |  |
| --- | --- |
| Condition Parameter | Recommended Action |
| Spalling | Repair with methyl methacrylate overlay with equal thickness and durability as the original overlay. |
| Scaling | Repair with methyl methacrylate overlay with equal thickness and durability as the original overlay. |
| Delamination | Sound overlay to determine extent of delamination, remove damaged overlay, and repair with methyl methacrylate overlay with equal thickness and durability as the original overlay. |

10.Emergency Repairs. If the Department determines that emergency repairs are necessary for public safety, the Department or its agent may take repair action. Emergency repairs must be authorized by the Engineer.

Prior to emergency repairs, the Department will document the basis for the emergency action. In addition, the Department will preserve evidence of the defective condition.

11.Conflict Resolution Team. The sole responsibility of the Conflict Resolution Team (CRT) is to provide a decision on disputes between the Department and the Contractor regarding application or fulfillment of the warranty requirements. The CRT will consist of five members:

A. Two members selected and compensated by the Department.

B. Two members selected and compensated by the Contractor.

C. One member mutually selected by the Department and the Contractor. Compensation for the third-party member will be equally shared by the Department and the Contractor.

If a dispute arises on the application or fulfillment of the terms of this warranty, either party may serve written notice that the appointment of a CRT is required.

At least three members of the CRT must vote in favor of a motion to make a decision. If agreement cannot be reached, the CRT may decide to conduct a forensic investigation. The CRT will determine the scope of work and select the party to conduct the investigation. All costs related to the forensic investigation will be shared proportionally between the Contractor and the Department based on the determined cause of the condition.

12.Non-Extension of Contract. This special provision must not be construed as extending or otherwise affecting the claim process and statute of limitation applicable to this contract.

**e. Measurement and Payment.** The completed work as described will be measured and paid for at the contract unit price using the following contract item:

**Pay Item Pay Unit**

Slip-Resistant Surfacing, Sidewalk, Warranty Square Foot

**Slip-Resistant Surfacing, Sidewalk, Warranty** will measure the surface area that is coated in square feet.

**Slip-Resistant Surfacing, Sidewalk, Warranty** includes furnishing, installing, and testing the surfacing in accordance with this special provision. No payment will be made for surface preparation that does not meet the requirements of this special provision and therefore needs to be re-done, or for repairs to the overlay necessitated by damage from the Contractor's subsequent operations. The pay item does not include furnishing, fabricating, and erecting the substrate material, including bolts, nuts, washers, and welding.