

BUS & BIKE LANE RESIN BONDED AGGREGATE SURFACING TREATMENT SPECIFICATIONS (Colorized Lane Demarcation)

GENERAL

Under this work, the Contractor shall furnish and apply a resin bonded aggregate surface containing an epoxy binder to bind aggregates together in accordance with patterns as specified on provided Work Orders or Plans, or as ordered by the Engineer and in conformance with these specifications.

Resin bonded aggregate surfacing shall consist of:

1. A two-part resin bonded treatment containing epoxy binder to bind aggregate together.
2. Resin applied to the surface and loose aggregates are scattered onto the surface before the resin sets.
3. Color Coated Glass Aggregate shall be broadcast to 100% penetration into the epoxy binder.
4. An aggregate approved by Engineer for color and sharpness, that may include recycled material to conform to the approved color.
5. The epoxy shall be covered with 0.8mm to 1.2mm sized aggregate.
6. Have a coefficient of friction of at least 0.65 when tested in conformance BS/BPN
7. The aggregate should have an angular geometry for better adhesion to the two-part epoxy and better overall friction rating.

Summary

Specification for placing a resin bonded aggregate surface treatment (RBAST) onto an asphalt and/or concrete pavement.

The RBAST colored surface demarcation consists of a polymer resin binder with a 100% Recycled Color Coated glass aggregate topping.

Submittals

Submit a RBAST Quality Control Plan (QCP)

The RBAST QCP must include:

1. Schedule for the trial RBAST work and the production RBAST work
2. Description of equipment for placing RBAST
3. Description of equipment for measuring, mixing, placing, and finishing RBAST
4. Method for protecting areas not to receive RBAST
5. Cure time estimates for RBAST
6. Storage and handling of RBAST components
7. Disposal of excess RBAST and containers
8. Contingency plan for possible failure during the RBAST application
9. Name of the certified independent testing laboratory for the material components
10. An inspection of the automated application equipment prior to the award of the project

Submit a material safety data sheet (SDS) for each shipment of RBAST components before use.

Submit a certificate of compliance for the polymer resin binder and the 100% recycled pigmented glass aggregate topping.

Have the polymer resin binder and the 100% recycled pigmented glass aggregate topping tested at a certified independent testing laboratory and then furnish the verifications to the Engineer that the materials meet all requirements listed in these specifications.

Allow two (2) working days for the Engineer to review each SDS submittal, certificate of compliance, the mix design and certified independent testing laboratory test results.

Quality Control and Assurance

Complete a trial of RBAST on asphalt concrete pavement before starting RBAST production work and the inspection of the automated application equipment to meet the specification prior to the commencement of the project.

The trial RBAST must:

1. Be at least 10 feet wide by 20 feet long (or a width to suit the project parameters)
2. Be constructed using the same equipment as the production work.
3. Replicate field conditions, including ambient and surface temperatures, anticipated for the production work.
4. Demonstrate surface preparation requirements.
5. Remove pavement markers and delineation within the area to receive RBAST, for the lane and length involved, prior to placing polymer resin binder.
6. Document the settings on the applicator equipment, initial quantities of resin and aggregate topping, and unused quantities of resin and the 100% recycled pigmented aggregate topping remaining in the applicator equipment after applying the RBAST.
7. Determine the initial set time for polymer resin binder in RBAST.
8. Have temporary or permanent delineation in place when lanes are open to public traffic
9. Determine that work can be completed within the time permitted in lane requirement charts as provided elsewhere in these special provisions.
10. Have a coefficient of friction of at least 0.65 when tested in conformance BS / BPN Tester
11. Demonstrate RBAST removal methods by removing the trial RBAST.
12. Dispose of removed material.

MATERIALS

The resin bonded aggregate surfacing shall be capable of application on new and existing asphalt and Portland cement concrete surfaces. New asphalt surface shall be cured a minimum of 30 days prior to installation and shall:

1. Be VOC compliant and lead chromate free.
 2. Not contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or regulated by the US Occupational Safety and Health Administration (OSHA) as a carcinogen.
 3. Conform to current Federal, State, and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC)
 4. Be packaged and stored in accordance with the manufacturer's instructions and requirements for shelf life and storage conditions in original unopened containers. Shipping documents and containers shall have identification numbers or batch dates for confirmation of when products were manufactured, clearly labeled as to the type of material and the ration of the components to be mixed by volume as well as showing resin or hardener components, brand name, name of manufacturer, lot or batch number, temperature range for storage, expiration date and the quantity contained. Include any special instructions regarding mixing and the Safety Data Sheets (SDS). This information shall be made available for inspection at any time.
 5. The color shall be approved by the Engineer prior to the material purchase by the Contractor.
 6. Incorporated aggregates approved by the manufacturer for compatibility and handling in compliance with manufacturer recommendations - providing a minimum surface friction level of 65 PSV (Polished Stone Value).
 7. Follow the Federal, State and City environmental disposal regulations for unused resin bonded aggregate surfacing materials, tarps, tapes, and garbage.
 8. Present a marking whose color and chemical resistance will not degrade under normal exposure to weather, street sweeping/plowing, calcium chloride, sodium chloride, automotive or food oils and automotive fuels.
 9. Use color pigments that remain stable under exposure to ultraviolet light, and if possible, have a positive rating of the LEED Solar Reflectance Index.
-

Polymer Resin Binder

Provide a polymer resin binder which holds the aggregate topping firmly in place, and which meets the following requirements.

Polymer Resin Binder Requirements

Shelf Life	2 years in original unopened container.
Storage Conditions	40°F – 95°F (5°C – 35°C).
Condition material to	65°F – 85°F (18°C – 29°C) before using.
Mix Ratio	1:1 by volume
Viscosity (ASTM D2393)	1,700 cps @ 77°F
Gel Time (60 g mass) (ASTM D881)	20 minutes
Cure Rate (ASTM D1640, 0.2" thickness)	3 hours max
Tack Free Time (73°F or 23°C)	2 to 5 hours
Tensile Properties (ASTM D638), 7-day cure Tensile Strength: Tensile Elongation:	2,500 psi (17.2 MPa) 40%
Bond Strength (ASTM C882) 2-day cure: 14-day cure:	2,000 psi (13.8 MPa) 2,500 psi (17.2 MPa)
Compressive Strength (ASTM C579) 3-hour cure 7-day cure	1,500 psi (10.3 MPa) 5,000 psi (34.5 MPa)
Flexural Strength (ASTM D790)	3,000 psi (20.9 MPa)
Shrinkage on Cure (ASTM D2566)	0.2%
Thermal Compatibility (ASTM C884)	Pass
Heat Deflection Temperature (ASTM D648)	120°F (49°C)
Water Absorption (ASTM D570)	0.2% (24 hr.)
Chloride Ion Permeability (AASHTO T277)	0.0 coulomb

Aggregate Topping

Furnish a post 100% recycled color coated glass aggregate. The aggregate topping is to be the New York City Bike Lane Green color and to be clean, dry, and free from deleterious matter. The aggregate topping must meet the following requirements and must be certified by the manufacturer as being completely post-recycled with a three-year fade free warranty.

Aggregate Topping Requirements: (100% recycled pigmented glass aggregate)

Technical Data

Characteristic	100% Recycled Color Coated Glass Aggregate
Environmentally Sound	100% Post-Consumer Recycled Glass & Natural Pigments
Specific Gravity	2.5
Hardness	6.0 Mohs
Softening Point	~1350°F
Bulk Density	Avg 86lb/ft ³
Loss on Ignition	0.03%
Biochemical Oxygen Demand	0 PPM
Moisture Content	<1%
Reactivity	100% Acid Insoluble <3% Loss - Magnesium Soundness TCLP - EPA compliant
Size Range Available	0.8-1.2mm
Physical & Chemical Composition	No Lead Panel Glass & Clear Soda Lime Glass
Shape:	Sub-Angular, Non-Porous
Physical Composition	Amorphous Silica
Color Retention	100%
Recycled Material	100%
Color Selection	New York City Bike Lane Green

CONSTRUCTION DETAILS

General. The resin bonded aggregate surface shall be installed as shown on the Contract or Work Order Documents or as ordered by the Engineer.

Before any surface installation work is begun, a schedule of operations shall be submitted for the approval of the Engineer and their authorized representative. At least five (5) days prior to starting the application, the Contractor shall provide the Engineer with the New York City Bike Lane approved Green Color Coated Glass Aggregate and the manufacturer's written instructions for use. The instructions shall include, but not be limited to, material mixing ratios and application temperatures.

When applied under traffic, the Contractor shall provide all necessary flags, markers, signs, etc. in accordance with the MUTCD to maintain and protect traffic including pedestrians and bicyclists and to protect marking operations and the markings until thoroughly set.

The Contractor shall be responsible for removing, to the satisfaction of the Engineer, all tracking marks, spilled resin bonded material applied in unauthorized areas.

Atmospheric Conditions. Resin bonded aggregate surface shall only be applied during conditions of dry weather and on dry pavement surfaces. At the time of installation, the pavement surface temperature shall be at or above manufacturer recommendations.

Surface Preparation. The Contractor shall clean the pavement and existing materials to the satisfaction of the Engineer. At the time of application, all pavement surfaces shall be free of pavement markings, oil, dirt, dust, grease, and similar foreign materials.

APPLICATION

Resin bonded aggregate surface shall be placed at the friction, thickness, and pattern designated by the Contract Documents. The installation shall not begin until the applicable surface preparation work is completed and approved by the Engineer, and the atmospheric conditions and pavement surface temperature are acceptable to the Engineer.

Masking tape or similar should be removed as material gels, but before it cures and be properly disposed of.

Application Equipment. Equipment for the placement resin bonded materials shall be approved by the Engineer prior to the start of work.

An automated epoxy resin mixer specifically designed to dispense large volumes of resin is recommended. Should have dispense rates of 300-500 gallons per hours and is pneumatically operated to assure mix ratio accuracy. Automated mixer will reduce work time and ensure correct mix ratios for most efficient bonding.

Defective Results. Resin bonded material, which after installation and curing is determined by the Engineer to be defective and not in conformance with this specification, shall be repaired. Repair of defective resin bonded installation shall be the responsibility of the Contractor and shall be performed to the satisfaction of the Engineer as follows:

1. Insufficient aggregate coverage and coefficient of friction:
Repair Method - Repair shall be made by reapplying the resin bonded over the cleaned surface in accordance with the requirements with 0.8-1.2mm approved aggregates.
2. Uncured or discolored resin bonded material or insufficient bond (to pavement surface)
Repair Method - The defective location shall be completely removed and cleaned to the underlying pavement surface to the satisfaction of the Engineer. After work is complete, repair shall be made by reapplying epoxy, followed by color coated glass aggregate in accordance with the requirements of the specification. Other defects not noted above, but determined by the Engineer to need repair, shall be repaired or replaced as directed by and to the satisfaction of the Engineer. All work in conjunction with the repair or replacement of defective resin bonded installation shall be performed at the Contractor's expense.

Personal Protective Equipment. Follow all exposure, respiratory and personal protective equipment controls, handling and safety precautions, and spill and disposal procedures as identified by safety data sheets (SDS), labels and other manufacturer's recommendations for the products used.

WORK ZONE TRAFFIC CONTROL (WZTC)

The Contractor is responsible for ensuring appropriate WZTC in compliance with the MUTCD appropriate for the dry time of the selected material applied. The Contractor is responsible to ensure adequate WZTC to prevent those walking, skating, bicycling, and driving from coming into contact with applied material that is still capable of being tracked. The Contractor shall be liable for such tracking and property damage should it occur.

METHOD OF MEASUREMENT

The quantity for payment, in square feet of resin bonded aggregate surface, shall be computed within the payment lines shown on the plans, Work Order, or as otherwise ordered in writing by the Engineer.

BASIS OF PAYMENT

The accepted quantities resin bonded aggregate surface will be paid for at the contract unit price, which shall include the cost of furnishing all labor, materials, and equipment to satisfactorily complete the work. The cost of removal of concrete curing compounds and existing pavement markings will be paid under separate items and are not included in this item.
