SB2014-2433.6Chase

Use as directed by the Regional Bridge Construction Engineer for Bridge Preservation. Include on existing bridges getting a new low slump concrete wearing course and where directed for sealing cracks with epoxy by chase method.

CREATED 10/8/2015

REVISED 10/8/2015

SB- Seal Cracks with Epoxy by Chase Method

A. Description of Work

This work consists of sealing cracks with narrow band of approved epoxy. This specification covers application to existing structural slabs that will receive a new concrete wearing course or to existing finished concrete surfaces. The Department defines existing structural slabs as bridge slabs that are existing prior to contract initiation, which have been scarified or otherwise prepared to receive a new concrete wearing course.

On finished roadway surfaces and sidewalks, cracks 0.007 in [0.18 mm] or smaller, as measured at the crack's widest segment, will not require sealing.

When applied on existing concrete roadway surfaces, apply epoxy in a width not exceeding 3 inches.

When applied on an existing structural slab which is to receive a concrete wearing course, apply epoxy in a cured width not exceeding ¾ inches.

B. Materials

Furnish only one of the materials listed on the Department's "Approved/Qualified Product List for Bridge Products, Bridge Surface and Crack Sealers," (www.dot.state.mn.us/products/bridge). A product may be selected from either the "High Elongation Epoxy Crack Sealers" or "High Strength Epoxy Crack Sealers" categories listed on the Bridge surface and crack sealer approved products list. Apply in accordance with the requirements listed on the approved products list, except that when applied under a concrete wearing course only one application pass is required.

C. Surface Preparation and Application

(1) When applied on final roadway surface:

No greater than three weeks prior to application:

a. Clean all areas to be sealed by removing dirt, dust, oil, grease, curing compounds, laitance, or other contaminants that would impede the penetration of the sealant;
b. Collect all debris and other material removed from the surface and cracks, and dispose of it in accordance with applicable federal, state, and local regulations;
c. Wash deck and sidewalk surfaces with a water pressure of 3,000 psi minimum with the wand held 8-inches or less from the surface and moved parallel to the surface. Use clean, fresh water with pressure adequate to remove all visible dirt, salt, animal waste and similar debris. Direct sediment and dirt off bridge and collect sediment on approach panels. Flush joints free of any sediment, dirt or debris;
d. Provide shielding as necessary to prevent dust or debris from striking vehicular traffic;
e. Perform a visual inspection of the roadway surface, and sidewalk where applicable. Locate and mark all cracks appearing on the top surface visible from 5 ft above deck surface, and as directed by the Engineer. Traffic may be run on washed surface and prior to air blasting.

f. Air dry a wet deck for a minimum of seventy-two (72) hours before applying the sealer;
g. Immediately before applying the sealer direct a 125 psi air blast, from a compressor unit with a minimum pressure of 365 ft^3 / min., over the entire surface to remove all dust and debris paying special attention to carefully clean all deck cracks. Provide shielding as necessary to prevent dust or debris from striking vehicular traffic. Use a suitable oil trap between the air supply and nozzle. Use ASTM D 4285 "Standard Test Method for Indicating Oil or Water in Compressed Air" to ensure the compressed air is oil and moisture free;
h. Have the Engineer approve the prepared surface prior to applying the sealer;
i. Seal all cracks 0.007” or greater in width at its widest segment. Chase crack with sealant application to limits of crack, including those portions that are narrower than 0.007” wide.

Where crack spacing is observed closer than an average of 6 ft on center, consult the Engineer for a change order to a MMA FLOOD SEAL.

Protect all expansion joints and prevent the crack sealant from contacting the strip seal glands. Protect all striping and traffic markings from marring, sealant application and reduction in reflective properties. Replace any striping and traffic markings that are marred by sealant.

Fill cracks with an approved crack sealer following the manufacturer's recommendations, and as otherwise directed by the Engineer prior to opening the bridge to vehicular traffic. Where traffic is to be placed on crack sealer before curing is complete, broadcast to refusal oven dried 30 grit or similar sand into wet, uncured resin. If a subsequent treatment will be applied that would be affected by the sand. Cleaning unbonded sand or grit will be not be paid for separately but be considered incidental to surface preparation requirements for the subsequent treatments. Remove excess sand that causes concern for traction or braking from bridge deck including deck joints as directed by the Engineer.

(2) When applied to existing structural slab prior to placing new wearing course:

Supplement 2404.3.C, "Deck Preparation," with the following:

After shotblasting the surface, the Engineer will perform a visual inspection of the bridge deck, and locate all cracks appearing on the top surface. Fill all located cracks with an approved crack sealer following the manufacturer's recommendations, and as otherwise directed by the Engineer. Ensure the sealer is cured prior to preceding pre-wetting of the deck, as required for placement of a low slump concrete wearing course.

Control the application of the crack sealer such that the maximum width of crack sealant does not exceed ¾ inch. If exceeding the permitted width of ¾ inch, remove excess by means of surface grinding to prevent debonding of concrete wearing course. Air dry a wet deck for a minimum of twenty-four (24) hours before applying the sealer. Have the Engineer approve the prepared surface prior to applying the sealer.

D. Weather Limitations

Do not apply sealer materials during wet weather conditions or if adverse weather conditions are anticipated within 6 hours of the completion of sealer application. Do not mix or apply any of these products at temperatures lower or higher than those specified in their product literature. Apply the crack seal at the coolest time of the day within these limitations.

E. Method of Measurement

Designer note: Select either gallons or linear foot.

Sealing cracks in the deck surface will be measured by (gallons of epoxy sealer applied to the cracks) (linear feet of cracks sealed with epoxy) that have been designated by the Engineer to be sealed. Cracks sealed by the Contractor that have not been designated by the Engineer will not be measured for payment. Additional qualifications on measurement are application-specific as follows.

(1) Cracks on Final Roadway Surface:

Cracks sealed with an epoxy width greater than 3 inches on final roadway surface will not be counted for measurement. When the unit of measurement is in gallons, the pay quantity will be established at a rate of 450 linear feet per gallon for any cracks sealed in excess of 3 inch wide and where the gallon measurement is in dispute.

(2) Cracks sealed prior to placing concrete wearing course:

Cracks sealed with an epoxy width greater than $^{3}/_{4}$ inch on structural deck will be not be counted for measurement and must be ground to $^{3}/_{4}$ inch in width. When the unit of measurement is in gallons, the pay quantity will be established at a rate of 1350 linear feet per gallon for any gallon measurement in dispute.

F. Basis of Payment

Designer note: Use when payment will be by the gallon (this will be used the majority of the time).

Payment for Item No. 2433.606 "SEAL CRACKS WITH EPOXY BY CHASE METHOD" will be made at the Contract price per gallon and shall be compensation in full for all costs of cleaning and sealing the cracks in the bridge decks, as described above. No payment will be issued for treating new concrete surfaces placed within contract.

If a contract work on the same area includes "MMA FLOOD SEAL", no payment will be issued for sealing cracks 0.040 inch wide or smaller. These cracks will be prefilled immediately ahead of "MMA FLOOD SEAL" and will be considered incidental "MMA FLOOD SEAL".

No payment will be made for replacement of any striping marred as a result of sealing operations.

Designer note: Use when payment will be by the linear foot (this is usually just for District 6).

Payment for Item No. 2433.603 "SEAL CRACKS WITH EPOXY BY CHASE METHOD" will be made at the Contract price per linear foot and shall be compensation in full for all costs of cleaning and sealing the cracks in the bridge decks, as described above. No payment will be issued for treating new concrete surfaces placed within contract.

If a contract work on the same area includes "MMA FLOOD SEAL", no payment will be issued for sealing cracks 0.040 inch wide or smaller. These cracks will be prefilled immediately ahead of "MMA FLOOD SEAL" and will be considered incidental "MMA FLOOD SEAL".

No payment will be made for replacement of any striping marred as a result of sealing operations.

SB2016-2433.6Flood

Use as directed by the Regional Bridge Construction Engineer for Bridge Preservation. Use for flood sealing treatment of deck cracks where cracks are spaced at 6 feet on center or closer.

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SB- Methyl Methacrylate (MMA) Flood Seal

A. Description of Work

Designer note: review the Bridge Preservation Recommendations for your needed information.

This work consists of furnishing and applying a protective MMA sealer as shown in plans or as authorized by the Engineer. Perform this work in accordance with the applicable provisions of 2433, "Structure Renovation," the plans, as directed by the Engineer, and the following:

B. General

1. Remove existing crack sealants

Remove existing sealants including epoxy crack sealant prior to MMA Flood Seal. Remove sealants with equipment that does not damage the underlying substrate. Use 7,000 psi power wash with a spin head to remove epoxy, or propose alternate means which do not remove more than $^{1}/_{16}$ inch of concrete.

2. Prefill Large Cracks

Prior to application, prefill cracks greater than 0.025 inches with same sealer as used in flood seal or a pre-promoted version of the sealer. Where sealant soaks-in/withdraws from top of crack, place fine grade abrasive sand (20/40 abrasive) in crack and reapply MMA sealant to seal to top of crack. When sealant has not retreated after gel time, the crack is considered prefilled. Do not fill crack with sand beyond top of concrete surface.

3. MMA Application

Apply an approved MMA to roadway surfaces on bridge deck or on surfaces as directed by the Engineer. At least 30 calendar days before the start of the work, provide the Engineer with the sealer Manufacturer's written instructions for application and use.

C. Materials

1. MMA Sealant

Furnish only one of the materials on the Department's "Approved/Qualified Product Lists for Bridge Products, Bridge Surface and Crack Sealers, Methacrylate Resin Crack Sealers" (www.dot.state.mn.us/products/bridge) at a minimum rate of 90 ft^2 / gal.

2. Broadcast sand

Provide a commercial quality dry blast sand meeting the following:

a. 95% passing the No. 8 sieve; and
b. 95% retained on the No. 20 sieve.

3. Fine grade sand

Provide fine grade abrasive sand for (20/40 abrasive) prefilling large cracks unable to be prefilled with sealant alone.

Submit sand material data to the Engineer for review and address all written comments. Submit storage and use plan to the Engineer documenting procedures for maintaining dry sand and within gradation requirements above.

D. Surface Preparation

a. Clean all areas to be sealed by removing dirt, dust, oil, grease, curing compounds, laitance, or other contaminants that would impede the penetration of the sealant;
b. Collect all debris and other material removed from the surface and cracks, and dispose of it in accordance with applicable federal, state, and local regulations;
c. Perform a visual inspection of the roadway surface, and sidewalk where applicable. Locate and mark all cracks greater than 0.024 inches appearing on the top for prefilling.
d. Immediately before applying the sealer direct a 125 psi air blast, from a compressor unit with a minimum pressure of 365 ft^3 / min., over the entire surface to remove all dust and debris paying special attention to carefully clean all deck cracks. Use a suitable oil trap between the air supply and nozzle. Use ASTM D 4285 "Standard Test Method for Indicating Oil or Water in Compressed Air" to ensure the compressed air is oil and moisture free;
e. Provide shielding as necessary to prevent dust or debris from striking vehicular traffic;
f. Air dry a wet deck for a minimum of seventy-two (72) hours before applying the sealer;
g. Have the Engineer approve the prepared surface prior to applying the sealer;

E. Sealant Manufacturer Support

A technical representative from the sealer manufacturer must be present during first application. The need for manufacturer's representative may be waived if the contractor provides evidence and reference contacts for work involving at least 5 bridges treated with the same products and within the last two years. Contractor experience record in no way relieves the contractor from applying in accordance with this specification and as recommended by the manufacturer.

Prior to application of the sealant, hold a meeting with the Manufacturer's Representative, the Engineer, and the Contractor to discuss all necessary safety precautions and application considerations. The manufacturer's representative must be available to answer all safety and installation questions.

F. MMA Flood Seal Application

Do not apply sealer materials during wet weather conditions or if adverse weather conditions are anticipated within twelve (12) hours of the completion of sealer application. Do not mix or apply any of these products at temperatures lower or higher than those specified in their product literature. Apply the sealant at the coolest time of the day within these limitations. Application by spray methods will not be permitted during windy conditions, if the Engineer predicts unsatisfactory results.

Do not thin or alter the MMA crack sealer unless specifically required in the Manufacturer's instructions.

Mix the sealer before and during its use as recommended by the Manufacturer. Distribute the sealant as a flood coat in a gravity-fed process by broom, roller, or with a spray bar near the surface so the spray pattern and coverage rates are reasonably uniform to the satisfaction of the Engineer. Apply the sealant at a minimum rate of 90 ft^2 / gal.

Protect all expansion joints and prevent the crack sealant from contacting the strip seal glands. Protect all striping and traffic markings from marring, sealant application and reduction in reflective properties. Replace any striping and traffic markings that are marred by sealant.

Prior to completion of gel time of the flood seal (within 15 minutes) and before broadcasting sand, broom uncured sealant in the direction of tining or deck grooves to promote maintenance of the deck texture for traction.

Broadcast sand to refusal into uncured resin to create traction and absorb sealant that is not penetrating into cracks. Broadcast approved sand into the wet, uncured resin no sooner than 20 minutes after applying resin but within gel time of product. Apply approved sand at a minimum rate of 250 lbs. per 1000 square feet.

Allow the sealant to dry according to the Manufacturer's instructions. Do not allow vehicular traffic onto the treated areas until the sealer has dried and the treated surfaces provide safe skid resistance and traction. Remove non-adhered sand from bridge deck and joints by power sweeping the deck and vacuuming the joints. Traffic or equipment will be allowed on the sealed deck after the Engineer has determined:

a. The treated deck surface is tack-free and non-oily;
b. The sand cover adheres and resists brushing by hand;
c. Excess sand and absorbent material has been removed; and
d. No sealant material will be tracked beyond limits of treatment by traffic

G. Method of Measurement

Measurement will be made to the nearest square foot of concrete area sealed as designated by the Engineer.

H. Basis of Payment

Payment for Item No. 2433.618 "MMA FLOOD SEAL" will be made at the Contract price per square foot and shall be compensation in full for all costs of furnishing and applying the sealer to the bridge decks, as described above, including surface preparation, and all incidentals thereto. Cleanup of excess sand in joints and on bridge deck will not be paid for separately. Restoration of damaged or marred striping will be considered incidental to application requirements of 2433.618 "MMA FLOOD SEAL".