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**ASPHALT PAVING CRACK SEAL**

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| **SECTION USAGE MATRIX** | | |
| C | NA | Seminary and Small Institute Standard Plan (CHURCH EDUCATION SYSTEM) - New Project |
| SM | NA | Standard MEETINGHOUSE and PHASED MEETINGHOUSE Standard Plan - New Project |
| R | SUP | OM/RI (REPLACEMENT & IMPROVEMENT) for Existing Meetinghouse / Seminary and Institute Project |
| CM | NA | Meetinghouse and Phased Meetinghouse Standard Plan with S&I MODULE ADDITION - New Project |
| SI | NA | S&I MODULE Addition to Existing Meetinghouse Building |
| MO | NA | MISSION OFFICE MODULE Addition to Existing Meetinghouse Building |
| UM | NA | URBAN MEETINGHOUSE for Custom Meetinghouse - New or Addition Project |
| FM | NA | Small Maintenance Project specification for FACILITY MANAGER |
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| **MODIFICATION LOG** | | |
| DATE | SOURCE | DESCRIPTION |
| 26 Apr 24 | Mike Molyneux | Reference Standards Updated. |
| 24 Mar 19 | Gail Olsen | Updated Large Crack Acceptable Products. Reference Standards Updated. |
| 19 Jul 16 | Chris Barker | Changed Soil Sterilant to Pre-emergent Herbicide. |
| 27 Oct 15 | Chris Barker | Procedural Note changes. Updated Reference Standard. |
| 19 May 14 | Chris Barker | Procedural Note Updated. |
| 25 Apr 14 | Chris Barker | Manufactures updated. Procedural Note change. General Upgrade. |
| 27 Nov 13 | Chris Barker | Asphalt Maintenance Checklists and Guideline Attachments eliminated and moved to AEC Webpage. General Upgrade. |

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| PROCEDURAL NOTES |
| COORDINATION GENERAL:   1. This Specification is written for small Maintenance Projects that use Division 01 Maintenance Project Specification instead of full Division 01 Specification. 2. Refer to 'Asphalt, Site Concrete and Pervious Concrete Maintenance Guidelines’ for preservation maintenance program and recommendations for each asphalt paving surface treatment at <http://aec.churchofjesuschrist.org/aec/design_guidelines/>. 3. Refer to *'Asphalt Maintenance Checklists for Facilities Manager and Contractor’* available at <http://aec.churchofjesuschrist.org/aec/design_guidelines> for project checklists. 4. Use the '*Agreement for Asphalt Maintenance'* available on MFD Resource Library for asphalt maintenance scoping, budgeting and for contracts. 5. Applicators: 6. By requiring mechanical application and information about prior Projects, this specification is intended to limit bidding to top, professional applicators and products available in Project area. 7. If Project is in remote area or for some other reason contractors of level required to meet specification requirements are not available, Section should be edited to specify requirements which can be met by top applicators available in Project Area. 8. This relaxation of standard requirements should be done with prior approval of Owner’s Representative. |
| **DESIGN INFORMATION AND BACKGROUND** |

SECTION 32 0117

ASPHALT PAVING CRACK SEAL

1. GENERAL
   * + 1. SUMMARY
          1. Includes But Not Limited To:

Repair cracks in existing asphalt pavement as described in Contract Documents.

* + - * 1. Related Requirements:

Section 01 0000: ‘General Requirements’:

Section 01 3100: ‘Project Management and Coordination’ for pre-installation conference.

Section 01 4000: ‘Quality Requirements’ for administrative and procedural requirements for quality assurance and quality control.

Section 01 4301: ‘Quality Assurance – Qualifications’ establishes minimum qualification levels required.

Section 01 7800: ‘Closeout Submittals’.

Section 32 0113.01: ‘Asphalt Paving Surface Treatment: Asphalt Based Penetration Seal’ when penetration seal is applied after paving cracks are filled or sealed.

Section 32 0113.02: ‘Asphalt Paving Surface Treatment: Asphalt Based Emulsion Seal’ when asphalt based emulsion seal is applied after paving cracks are filled or sealed.

Section 32 0113.03: ‘Asphalt Paving Surface Treatment: Slurry Seal’ when slurry seal is applied after paving cracks are filled or sealed.

Section 32 0113.06: ‘Asphalt Paving Surface Treatment: Chip Seal’ when chip seal is applied after paving cracks are filled or sealed.

Section 32 0113.07: ‘Asphalt Paving Surface Treatment: Fog Seal’ when fog seal is applied after paving cracks are filled or sealed.

Section 32 0113.08: ‘Asphalt Paving Surface Treatment: Refined Coal Tar Emulsion Seal’ when refined coal tar emulsion seal is applied after paving cracks are filled or sealed.

Section 32 0118: ‘Asphalt Paving Repair: ‘Full Depth Path’ when asphalt paving repair is applied after paving cracks are filled or sealed.

**EDIT REQUIRED:** Include following paragraph if included in Project.

Section 32 1713: 'Parking Bumpers'.

**EDIT REQUIRED:** Include following paragraph if included in Project.

Section 32 1723: 'Pavement Markings'.

* + - 1. REFERENCES
         1. Association Publications:

Asphalt Institute:

MS-4, ‘*The Asphalt Handbook’* (Seventh Edition).

MS-16, ‘*Asphalt in Pavement Preservation and Maintenance’* (Fourth Edition).

Asphalt Emulsion Manufacturers Association:

MS-19, ‘*Basic Asphalt Emulsion Manual’* (Fourth Edition).

International Slurry Surfacing Association (ISSA):

ISSA A175, ‘Recommended Performance Guideline For Crack Treatment (November 2012).

* + - * 1. Definitions:

Backer rods: Backer rods are placed in deep cracks to conserve sealant and sometimes to prevent sealant from sagging or flowing to bottom of crack.

Crack Seal: Bituminous material used to fill existing pavements using specially prepared cold or hot poured sealant. Cold poured sealant, using polyurethane or silicone, should not be allowed.

Cracks:

Hairline Cracks: Hairline cracks are 1/8 inch (3 mm) or less in width.

Small Cracks: Small cracks are 1/8 to 1/2 inch (3 mm to 13 mm) in width.

Medium Cracks: Medium cracks are 1/2 to 1 inch (13 mm to 25 mm) in width.

Large Cracks: Large cracks are wider than 1 inch (25 mm).

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

Pre-emergent Herbicide: Chemical that is applied before weeds emerge. It acts by killing weed seedlings and /or establishing layer of chemical on or near soil surface that is toxic to germinating seeds and young seedlings. Herbicide are not soil Sterilants that temporarily or permanently prevents growth of all plants and animals.

* + - * 1. Reference Standards:

ASTM International:

ASTM D36/D36M-14(2020), ‘Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)'.

ASTM D113-17, ‘Standard Test Method for Ductility of Bituminous Materials'.

ASTM D5167-13(2018), ‘Standard Practice for Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation'.

ASTM D5249-10(2021), ‘Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints'.

ASTM D5329–20, ‘Standard Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements'.

ASTM D6690-21, ‘Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements'.

* + - 1. ADMINISTRATIVE REQUIREMENTS

**INFORMATION:** This conference is **mandatory**. Do not delete or cancel. See Section 01 3100 PROJECT MANAGEMENT AND COORDINATION.

* + - * 1. Pre-Installation Conferences:

Participate in pre-installation conference as specified in Section 01 3100.

Schedule asphalt paving crack seal pre-installation conference to be held jointly with any other 'Asphalt Surface Treatment' sections involving asphalt maintenance:

Section 32 0113.01: 'Asphalt Paving Surface Treatment: Asphalt Based Penetrating Seal'.

Section 32 0113.02: 'Asphalt Paving Surface Treatment: Asphalt Based Emulsion Seal'.

Section 32 0113.03: 'Asphalt Paving Surface Treatment: Slurry Seal'.

Section 32 0113.04: 'Asphalt Paving Surface Treatment: Overlay with Fabric - Marshall'.

Section 32 0113.05: 'Asphalt Paving Surface Treatment: Overlay with Fabric - Superpave'.

Section 32 0113.06: 'Asphalt Paving Surface Treatment: Chip Seal'.

Section 32 0113.07: 'Asphalt Paving Surface Treatment: Fog Seal'.

Section 32 0113.08: ‘Asphalt Paving Surface Treatment: Refined Coal Tar Emulsion Seal’.

Section 32 0117.02: 'Asphalt Paving Crack Fill'.

Section 32 0118.00: 'Asphalt Paving Repair - Full Depth Patch'.

In addition to agenda items specified in Section 01 3100, review following:

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

Review pre-emergent herbicide protection of adjoining property and planting area on site requirements, schedule and application requirements to be applied before paving cracks are repaired.

Review asphalt paving crack seal schedule.

Review asphalt paving crack seal mix design.

Review asphalt paving crack seal preparation requirements.

Review asphalt paving crack seal application requirements.

Review safety issues.

* + - * 1. Scheduling:

Provide to Owner’s Representative at least seven (7) days before crack repair commences, approved Laboratory Report and Manufacturer’s Certificate of compliance with these specifications covering specific materials to be used on this project.

* + - 1. SUBMITTALS

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

* + - * 1. Action Submittals:

Product Data:

Pre-emergent Herbicide:

Manufacturer's product literature or cut-sheets for specified products.

* + - * 1. Informational Submittals:

Certificates:

Manufacturer’s Certificate of compliance with these specifications covering specific materials used on this project.

Submit certified affidavit and delivery tickets which show quantities of each material delivered to job site and used on project

Submit certification from manufacturer confirming crack seal properties and Manufacturer's literature and installation instructions.

Manufacturer Instructions:

Crack Seal:

Crack seal mix design is to be submitted with substrate preparation and crack seal application instructions.

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

Pre-emergent Herbicide:

Manufacturer's application instructions.

Field Quality Control Submittals:

Field Reports:

Submit daily work logs which show quantities of each material used on project as per machine readings. Include following information:

Product name.

Project number.

Qualification Statement:

Installer:

Provide Qualification documentation if requested by Owner's Representative.

* + - * 1. Closeout Submittals:

Include following in Operations And Maintenance Manual specified in Section 01 7800:

Record Documentation:

Manufacturer’s documentation:

Crack seal product literature.

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

Pre-emergent Herbicide product literature and application documentation.

* + - 1. QUALITY ASSURANCE
         1. Qualifications: Requirements of Section 01 400 1.06 applies but not limited to following:

Installer:

Minimum five (5) years' experience in asphalt surface treatment installations.

Minimum five (5) years' satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.

Upon request, submit following documentation:

Project names and addresses.

Installation dates.

Supervisor:

Minimum five (5) years’ satisfactorily completed projects of comparable quality, similar size, and complexity in past five (5) years as Supervisor of Applicators.

Upon request, submit following documentation:

Project names and addresses.

Installation dates.

Supervisor or Owner names.

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

* + - 1. DELIVERY, STORAGE, AND HANDLING
         1. Delivery And Acceptance Requirements:

Pre-emergent Herbicide:

Materials shall be delivered in original, unopened packages with labels intact.

* + - * 1. Storage And Handling Requirements:

Pre-emergent Herbicide:

Follow Manufacturer’s storage and handling requirements.

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

* + - 1. FIELD CONDITIONS
         1. Ambient Conditions:

Crack Seal:

Follow printed Manufacturer's instruction for ambient conditions for application of product.

Pre-emergent Herbicide:

Follow printed Manufacturer's instruction for environmental hazards:

Follow printed Manufacturer's instruction for ambient conditions for application of product.

1. PRODUCTS
   * + 1. MANUFACTURERS
          1. Manufacturer Contact List:

Crafco, Chandler, AZ [www.crafco.com](http://www.crafco.com).

Denver Foam by Bay Industries, Denver, CO [www.backerrod.com](http://www.backerrod.com).

Maxwell Products, Salt Lake City, Utah [www.maxwellproducts.com](http://www.maxwellproducts.com).

SealMaster, Sandusky, OH www.sealmaster.net.

* + - 1. DESIGN CRITERIA
         1. General:

Along with proper drainage, crack repair is probably the single most important maintenance activity.

Many pavement distresses can be traced to intrusion of water into pavement structure.

Keeping water out of pavement is essential to delay or prevent more serious distresses.

* + - * 1. Cracks:

Hairline Cracks:

Hairline cracks are too small to seal effectively.

If numerous hairline cracks cover area, surface seal can be used for repair.

Small Cracks:

Crack seal:

Rout crack.

Install backer rods, if desired, in deep cracks.

Clean, dry, and seal crack.

Medium Cracks:

Crack seal:

Routing of crack is unnecessary.

Install backer rods, if desired, in deep cracks.

Clean, dry, and seal crack.

Large Cracks:

Crack seal:

Clean, dry, and seal crack.

* + - * 1. Crack Seal:

General:

Provide hot applied asphalt based, polymer and/or rubber modified, or cold applied emulsified asphalt as per local climate conditions and as approved by Owner's Representative.

Cold applied crack seal:

Normally used in areas with little or no thermal movement.

Cold pour seal can be applied during times of high humidity or when cracks are moist or damp.

Use rubber finishing squeegees when placing cold crack seal materials.

Provide emulsified asphalt similar to CQS, CRS2 or similar emulsified oils that meet requirement of local area/climate.

Hot applied crack seal:

Normally used in areas with greater thermal movements from freeze/thaw cycles or where it needs to withstand higher temperatures.

Hot pour seal materials must be applied when cracks and pavement surface are dry.

Hot air lances must be used to dry moist cracks.

Use rubber finishing squeegees or metal cups when placing hot crack seal materials.

Crack Seal Properties:

Homogeneous blend of asphalt cement and plasticizers combined in such manner as to produce material with following properties (use only hot poured asphalt sealant):

Material shall pour readily and penetrate large cracks at temperatures below 400 deg F (205 deg C).

Cone Penetration at 77 deg F (25 deg C): 50 Maximum.

Flow at 140 deg F (60 deg C) when tested in accordance with ASTM D5329: 1/8 inch (3 mm) maximum.

Resilience at 77 deg F (25 deg C) when tested in accordance with ASTM D5329: 30 percent minimum.

Softening Point when tested in accordance with ASTM D36/D36M: 195 deg F (91 deg C) maximum in cold climates and between 205 and 220 deg F (97 and 105 deg C) minimum in hot climates.

Ductility at 77 deg F (25 deg C), 2 inches (50 mm) per min when tested in accordance with ASTM D113: 12 inches (300 mm).

Flexibility: 1/8 inch (3 mm) thick specimen of product conditioned to minus 20 deg F (minus 29 deg C) shall be capable of being bent to 90 deg angle over one inch (25 mm) mandrel in two seconds without cracking.

Asphalt Compatibility when tested in accordance with ASTM D5329: Pass.

Curing: Product shall contain no water or volatile solvents and shall cure immediately upon cooling to sufficient viscosity to prevent tracking by traffic.

* + - * 1. Backer Rods:

Design criteria:

General:

Backer rods may be used when cracks are sealed but are not ordinarily used when cracks are just filled.

Backer rod shall be compressible, non-shrinking, nonabsorbent material with melting point higher than temperature of sealant (ASTM D5249).

Backer rod shall be about 25 percent wider than crack so that it does not slip into or float out of crack after installing crack seal.

* + - 1. MATERIALS
         1. Backer Rod:

Meet requirements of ASTM D5249.

Type One Acceptable Products:

Denver Foam by Bay Industries.

Equal as approved by Owner’s Representative before bidding. See Section 01 6200.

* + - * 1. Crack Seal:

Type One Acceptable Products:

Crafco: Parking Lot Sealant.

Maxwell Products: Elastoflex 650.

SealMaster: Parking Lot Sealant.

**EDIT REQUIRED:** For large projects using and Architect, change 'Owner's Representative' to 'Architect' in following paragraph.

Equal as approved by Owner’s Representative before bidding. See Section 01 6200.

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

* + - * 1. Pre-emergent Herbicide:

General: Pre-emergent Herbicide is required where weed and other live vegetation matter is present.

Type One Acceptable Product:

Arsenal.

Mixture of Roundup and Pramitol.

Equal as approved by Owner’s Representative before bidding. See Section 01 6200.

1. EXECUTION
   * + 1. EXAMINATION
          1. Evaluation And Assessment:

Examine Project Site with Owner's Representative prior to bid.

* + - 1. PREPARATION
         1. Owner Responsibilities:

Remove Scout Trailer(s) if needed.

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

* + - * 1. Protection Of In-Place Conditions:

Pre-emergent Herbicide:

Take necessary precautions to protect adjoining property and areas designated for planting on building site.

Do not contaminate any body of water by direct application, cleaning of equipment or disposal of wastes.

* + - * 1. Surface Preparation:

Remove weeds by using wire wheel on crack cleaner/edger.

* + - 1. APPLICATION

**EDIT REQUIRED:** Include following paragraph if paving cracks contain weed and other live vegetation matter. Apply pre-emergent herbicide prior to application of crack seal.

* + - * 1. Pre-emergent Herbicide:

Asphalt paving areas:

Follow Manufacturer’s printed application requirements:

Apply to asphalt cracks dispersed in liquid. Concentrate shall be such that Manufacturer's full recommended amount of chemical will be applied.

* + - * 1. Crack Repair:

Cold applied crack seal requirements:

Apply when ambient temperature are between 45 deg F and 65 deg F (7 deg C and 18 deg C).

Reapply material to any crack or joint segment where material shrinkage or insufficient material was applied in previous pass or application.

Smooth applied crack seal with squeegee or device on hand wand leaving crack seal flush with parking lot. Band-Aid on top of crack shall be 3 inches (75 mm) maximum.

Hot applied crack seal requirements:

Apply when ambient temperature is between 40 deg F and 65 deg F (4 deg C and 18 deg C).

If pavement temperature is lower than 40 deg F (4 deg C), it may be warmed using heat lance without placing direct flame on pavement.

Do not apply when weather is foggy or when rain threatens. Pavement must be clean and dry. Product temperature and application must meet manufacturer’s recommendations.

Crack should be slightly overfilled then leveled with 3 inch (76 mm) sealing disk or V-shaped squeegee to create neat over band extending plus or minus 1 inch (25 mm) on each side of crack.

Cracks which have been previously sealed with crack sealant:

Do not clean and rout cracks containing previously applied crack seal without Owner’s approval.

When approved, and where crack seal has sunk or recracked, crack must be cleaned out with compressed air at 100 psi (690 kPA) and 150 cu ft (4.25 cu m) per minute minimum.

Remove old sealant material before installing new crack seal material.

Hairline Cracks:

Do not rout, or seal cracks smaller than 1/8 inch (6 mm) wide.

Small Cracks:

Using carbide tipped router bit, rout existing cracks measuring between 1/8 and 1/2 inch (6 and 13 mm) wide to be 3/4 inch (19 mm) wide and 3/4 inch (19 mm) deep minimum. If cracks are more than 2 inches (50 mm) deep, backer rod 25 percent larger than crack width, may be installed conforming to ASTM D5249.

Locate backer rod with 3/4 inch (19 mm) clear to top surface of asphalt.

Clean, dry and seal cracks.

Medium Cracks:

If cracks measuring between 1/2 inch (13 mm) and 1 inch (25 mm) wide are more than 2 inches (50 mm) deep, backer rod 25 percent larger than crack width may to be installed conforming with ASTM D5249. These cracks do not need to be routed.

Locate backer rod with 3/4 inch (19 mm) clear to top surface of asphalt.

Clean, dry and seal cracks.

Large Cracks:

Clean, dry and seal cracks. Apply one of following methods:

Seal cracks larger than 1 inch (25 mm) wide with asphalt slurry seal material, hot mix asphalt sand mix, or hot poured asphalt sealant to within 1/2 inch (13 mm) of surface of pavement and apply hot poured asphalt sealant over top.

Remove 12 inches (300 mm) x 18 inches (450 mm) wide strip of existing asphalt replace with compacted hot mix asphalt.

Apply asphalt-based, hot pour solution for 1 inch (25 mm) to 4 inch (100 mm) cracks:

Hot-applied polymer modified asphalt binder to prevent water infiltration.

Flexible in cold weather.

Select proper formula for climate requirements.

Follow Manufacturer’s installation instructions.

Type One Acceptable Products:

1. Crafco Mastic one Hot Applied Sealant by Crafco.
2. Nuvo Gap Hot Applied Crack Sealant by Maxwell Products.
3. Equals as approved by Architect before bidding. See Section 01 6200.

Clean routed and unrouted cracks with compressed air at 100 psi (690 kPA) and 150 cu ft (4.25 cu m) per minute minimum:

Do not perform cleaning operations when cracks are wet or muddy.

If ambient temperature is below 40 deg F (4 deg C), use hot air blasting lance to clean cracks. Wait thirty (30) minutes after using hot air blasting lance to seal cracks.

Apply crack seal to full depth of crack. Apply from bottom of crack to top of crack to prevent air bubbles from forming. Reapply crack seal to segments where crack seal has sunk into crack or where insufficient crack seal was applied in previous pass.

At cracks and joints between asphalt paving and concrete, do not allow excess crack seal on concrete.

Apply sand blotter, or equal, to crack seal to prevent tracking.

* + - 1. CLEANING
         1. General:

Upon completion of crack seal operations, clean up and remove debris.

**EDIT REQUIRED:** Include following paragraph if pre-emergent herbicide is used.

* + - * 1. Waste Management:

Pre-emergent Herbicide:

Follow Manufacturer’s recommendations for approved disposal of product and containers.

Do not reuse empty containers.

END OF SECTION