

---

**PAVEMENT REHABILITATION****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Full and Partial Depth PCC Patches
- B. Full and Partial Depth HMA Patches
- C. Full Depth Composite Patches
- D. Diamond Grinding
- E. Milling
- F. Cleaning and Filling Joints and Cracks
- G. Curb and Gutter Replacement
- H. Dowel Bar Retrofit
- I. Core Hole Cutting and Replacement

**1.02 DESCRIPTION OF WORK**

- A. Construct full depth PCC, HMA, and composite patches.
- B. Construct partial depth PCC and HMA patches.
- C. Grind existing PCC pavement surface for profile improvement using a diamond grinder.
- D. Mill the surface of HMA or PCC pavement to improve the surface profile and cross-section in preparation for resurfacing.
- E. Clean and fill longitudinal and transverse joints and random cracks in PCC and HMA pavement.
- F. Remove existing pavement and curb and gutter.
- G. Install epoxy coated dowel bars on transverse joints and cracks.
- H. Cutting and replacement of pavement cores.

**1.03 SUBMITTALS**

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. PCC mix design.
- B. HMA mix design.

**1.04 SUBSTITUTIONS**

Comply with Division 1 - General Provisions and Covenants.

**1.05 DELIVERY, STORAGE, HANDLING, AND SALVAGING**

Comply with Division 1 - General Provisions and Covenants, as well as the following:

**A. PCC:** See [Section 7010](#).

**B. HMA:** See [Section 7020](#)

**1.06 SCHEDULING AND CONFLICTS**

Comply with Division 1 - General Provisions and Covenants.

**1.07 SPECIAL REQUIREMENTS**

None.

**1.08 MEASUREMENT AND PAYMENT****A. Full Depth Patches:**

- 1. Measurement:** Measurement will be in square yards for each type of full depth patch. Patches less than 2 square yards in area will be considered 2 square yards.
- 2. Payment:** Payment will be made at the unit price per square yard for each type of full depth patch.
- 3. Includes:** Unit price includes, but is not limited to, sawing, removing, and disposing of existing pavement and reinforcing; restoring the subgrade; furnishing and installing tie bars and dowel bars; furnishing and placing the patch material, including the asphalt binder and tack coat; forming and constructing integral curb; surface curing and pavement protection; joint sawing and filling; and placing backfill and restoring disturbed surfaces.

**B. Subbase Over-excavation:**

- 1. Measurement:** Measurement will be in tons of subbase material placed for authorized over-excavation.
- 2. Payment:** Payment will be made at the unit price per ton of subbase material.
- 3. Includes:** Unit price includes, but is not limited to, removal of existing subbase or subgrade, disposal of materials removed, furnishing and placing subbase material, and any additional excavation required for subbase placement.

**C. Partial Depth Patches:**

- 1. Measurement:** Measurement will be in square feet for each type of partial depth patch. Patches less than 1 square foot in area will be considered 1 square foot.
- 2. Payment:** Payment will be made at the unit price per square foot for each type of partial depth patch.
- 3. Includes:** Unit price includes, but is not limited to, sawing, removing, and disposing of existing pavement; furnishing tack coat or bonding agent; furnishing and placing the patch material; curing; joint filling (PCC patches only); placing backfill; and restoring disturbed surfaces.

**1.08 MEASUREMENT AND PAYMENT (Continued)**

4. **Extra Payment:** When partial depth patches are constructed to full depth at the direction of the Engineer, payment will be at 2 times the unit price per square foot for each type of partial depth patch.

**D. Crack and Joint Cleaning and Filling, Hot Pour:**

1. **Measurement:** Measurement will be in linear feet measured along the cracks or joints.
2. **Payment:** Payment will be made at the unit price per linear foot of crack and joint cleaning and filling.
3. **Includes:** Unit price includes, but is not limited to, furnishing crack and joint filler material and routing, sawing, cleaning, and filling joints or cracks.

**E. Crack Cleaning and Filling, Emulsion:**

1. **Crack Cleaning and Filling, Emulsion:**
  - a. **Measurement:** Measurement will be in linear feet measured along the cracks. Map cracked areas will not be measured.
  - b. **Payment:** Payment will be made at the unit price per linear foot of crack cleaning and filling.
  - c. **Includes:** Unit price includes, but is not limited to, furnishing emulsified crack filler material, cleaning cracks, placing soil sterilant, and filling cracks.
2. **Hot Mix Asphalt for Crack Filling:**
  - a. **Measurement:** Measurement will be in tons of HMA used for filling cracks greater than 1 inch. Quantity will be based upon scale tickets. Mixture not used in the work will be deducted based upon scaled weights.
  - b. **Payment:** Payment will be made at the unit price per ton for HMA used in filling cracks over 1 inch.
  - c. **Includes:** Unit price includes, but is not limited to, cleaning, applying tack coat, and furnishing and placing HMA for crack filling.

**F. Diamond Grinding:**

1. **Measurement:** Measurement will be in square yards for the area of diamond grinding.
2. **Payment:** Payment will be made at the unit price per square yard of diamond grinding.
3. **Includes:** Unit price includes, but is not limited to, diamond grinding pavement, testing for smoothness according to the contract documents, and removal of slurry and residue from the project site.

**G. Milling:**

1. **Measurement:** Measurement will be in square yards for the area of milling.
2. **Payment:** Payment will be made at the unit price per square yard of milling.
3. **Includes:** Unit price includes, but is not limited to, milling pavement; furnishing water; and salvaging, stockpiling, and removing cuttings and debris.

**1.08 MEASUREMENT AND PAYMENT (Continued)****H. Pavement Removal:**

1. **Measurement:** Measurement will be in square yards. No deduction in area will be made for manholes, storm sewer intakes, valve boxes, or other structures less than 2 square yards in area. Pavement removal for patching is included as part of the patching item and will not be measured separately.
2. **Payment:** Payment will be made at the unit price per square yard.
3. **Includes:** Unit price includes, but is not limited to, sawing, breaking, removing, and disposing of existing pavement and reinforcing steel.

**I. Curb and Gutter Removal:**

1. **Measurement:** Measurement will be in linear feet measured along the back of curb.
2. **Payment:** Payment will be made at the unit price per linear foot of curb and gutter removed.
3. **Includes:** Unit price includes, but is not limited to, sawing, breaking, removing, and disposing of existing curb and gutter.

**J. Dowel Bar Retrofit:**

1. **Measurement:** Measurement will be by count of the number of dowel bars satisfactorily placed.
2. **Payment:** Payment will be made at the contract unit price per bar.
3. **Includes:** Unit price includes, but is not limited to, cutting the slots, preparing the slots, placing and grouting the bars, and curing the surface.

**K. Core Hole Cutting and Replacement:**

1. **Measurement:** Measurement will be by count of the number of core holes replaced.
2. **Payment:** Payment will be made at the contract unit price per core hole replaced.
3. **Includes:** Unit price includes but is not limited to, cutting the core hole, vacuum excavation, furnishing and placing backfill material and pavement, or replacing the pavement core using waterproof bonding material, if specified.

- L. **Sampling and Testing:** Required sampling and testing for pavement repair and rehabilitation work is incidental to other project costs and will not be paid for separately.

---

**PART 2 - PRODUCTS****2.01 MATERIALS****A. PCC:**

1. **Standard Patching:** Use Class C mix complying with [Section 7010](#). Comply with [Iowa DOT Materials I.M. 401](#). Construct all patches as standard patches unless otherwise specified in the contract documents.
2. **High Early Strength Patching:** Use Class M mix complying with [Section 7010](#). Do not use calcium chloride unless otherwise specified in the contract documents.
3. **Partial Depth Patching:** Use a coarse aggregate in concrete mix complying with [Iowa DOT Article 4109.02](#), [Gradation No. 5 in the Aggregate Gradation Table](#).

- B. HMA:** Provide a minimum Low Traffic (LT) mixture complying with [Section 7020](#), unless otherwise specified in the contract documents. Provide mixture with an asphalt binder meeting or exceeding PG 58-28S.

**C. Crack and Joint Filler Material:**

1. **Hot Pour Crack and Joint Filler:** Comply with [Iowa DOT Section 4136](#).
2. **Emulsified Asphalt Crack Filler:** Provide CRS-2 or CRS-2P emulsions complying with [Iowa DOT Section 4140](#).
3. **HMA for Filling Cracks:**
  - a. Provide a 3/4 inch, 1/2 inch, or 3/8 inch HMA mixture complying with [Section 7020](#), or a similar mixture from a commercial source subject to approval from the Engineer.
  - b. Upon approval of the Engineer, a high performance bituminous cold premix may be used, depending on the availability of the specified hot mix asphalt.
4. **Blotting Material:** Provide sand complying with [Iowa DOT Sections 4124](#) or [4125](#), or similar sand approved by the Engineer.
5. **Soil Sterilant:** Provide soil sterilant as specified in the contract documents.

- D. Primer or Tack Coat Bitumen:** Comply with [Iowa DOT Article 2303.02](#).

- E. Epoxy for Bonding Dowel and Tie Bars:** Comply with [Iowa DOT Materials I.M. 491.11](#).

- F. Tie Bars and Dowel Bars:** Provide epoxy coated bars complying with [Iowa DOT Section 4151](#).

- G. Subbase Material:** Unless otherwise specified in the contract documents, use modified subbase complying with [Section 2010](#).

- H. Liquid Curing Compound:** Comply with [Iowa DOT Section 4105](#).

- I. Sand-cement Grout:** Provide a sand-cement grout mixture with a ratio of one part water to one part sand and two parts cement.

- J. Preformed Compression Relief Material:** Provide 1/4 inch polystyrene, 1/4 inch polyethylene, 1/4 inch Styrofoam, or 3/16 inch waxed coated cardboard.

**2.01 MATERIALS (Continued)**

- K. Epoxy Coated Dowel Bars:** Comply with [Figure 7010.101](#) and [Iowa DOT Section 4151](#) for the length and diameter specified. Uniformly coat dowel bars with approved bond breaker according to [Iowa DOT Article 4151.02, B](#). Include tight fitting nonmetallic end caps that allow a minimum of 1/4 inch movement at each end.
- L. Dowel Chairs:** Prevent movement of the dowel bar during grout placement with epoxy coated or nonmetallic dowel chair devices which provide a minimum clearance of 1/2 inch between the bottom of the bar and the surface upon which the bar is placed and also between the bar and the end walls of the slot.
- M. Caulking Filler:** Any commercial caulk designed as a concrete sealant that is compatible with the grout material being used.
- N. Foam Core Inserts:** Provide 3/8 inch  $\pm$  1/8 inch thick closed cell foam core board filler faced with film, foil, or poster board material on both sides.
- O. Rapid Set Patch Material:**
1. Provide a shrinkage compensated rapid set patch material meeting [Iowa DOT Materials I.M. 491.20](#) and the following strength requirements:
    - 3 hour minimum compressive strength of 3,000 psi according to ASTM C 39.
    - 24 hour minimum compressive strength of 5,000 psi according to ASTM C 39.
  2. Use grout material from packaged bags or proportioned on site from bulk cementitious materials.
    - a. Extend packaged bags with pea gravel, proportioned and mixed according to the manufacturer's recommendations. Fine aggregate additions and water in excess of the manufacturer's recommendations are not allowed.
    - b. Use bulk cementitious materials equivalent in composition to the cementitious materials used in packaged bags and proportioned with fine aggregate and water and extended with pea gravel to produce a mixture equivalent to the packaged bag mix meeting the manufacturer's recommendations. Water in excess of the manufacturer's recommendations is not allowed.
    - c. Supply fine aggregates meeting [Iowa DOT Section 4110](#).
  3. Provide pea gravel with a minimum Class 2 durability meeting the requirements of [Iowa DOT Article 4112.03, B](#) and [Article 4109.02, Gradation No. 9 in the Aggregate Gradation Table](#).
  4. Use water meeting the requirements of [Iowa DOT Section 4102](#). Potable water obtained from a municipal supply, suitable for drinking, may be accepted without testing.
- P. Backfill Material:**
1. CLSM or foamed cellular concrete, per [Section 3010, 2.06](#), if required by the Jurisdiction.
  2. Class I granular material meeting [Section 3010, 2.02, A](#) or pea gravel complying with [Iowa DOT Article 4109.02, Gradation No. 21](#).
- Q. Waterproof Bonding Material:** Meet ASTM C 928 with a minimum bond strength of 1,500 psi at one day and 2,000 psi at 7 days. Carry an AASHTO H-25 truck load within 1 hour when temperature is 50° F.

**PART 3 - EXECUTION****3.01 GENERAL**

- A. Conduct all operations to minimize inconvenience to traffic. Confine operations to one traffic lane, unless the road is to be closed to traffic. Minor encroachment into the adjacent lane, such as for sawing and installing forms, will be acceptable with the use of a flagger according to MUTCD.
- B. Do not remove pavement for either full depth or partial depth patching unless the patch can be completed before the end of the working day.
- C. Construct full depth and partial depth patches to the dimensions specified in the contract documents or as marked by the Engineer in the field. Construct all full depth patches to full panel width.
- D. Make saw cuts parallel or perpendicular to the centerline.
- E. Remove and dispose of materials not designated for salvage.
- F. Restore the area outside the pavement by placing and compacting backfill material, placing topsoil, and sodding or seeding as specified in the contract documents.
- G. For pavement patches in areas removed to determine utility locations, replace pavement according to [Figures 7040.101](#), [7040.102](#), [7040.103](#), and [7040.107](#) as directed by the Jurisdiction.

**3.02 FULL DEPTH PATCHING****A. Pavement Removal:**

- 1. Saw pavement to full depth at the edges of the patch. A second saw cut, 2 inches inside the initial saw cut, may be required to prevent damage to adjacent pavement.
- 2. Do not damage pavement that is to remain. Do not use heavy equipment adjacent to new concrete until the opening strength is achieved.

**B. Restoring Subgrade or Subbase:**

- 1. Excavate 2 inches below the bottom of the existing pavement. If more than 2 inches is excavated, place and compact new subbase material as required to bring the subbase to a level 2 inches below the bottom of the existing pavement. Correct unauthorized over-excavation at no additional cost to the Contracting Authority.
- 2. Compact the exposed subgrade or subbase by a minimum of four complete passes with a plate-type vibratory compactor with a minimum force rating of 3,500 pounds.
- 3. When unstable material or excessive moisture is encountered, the Engineer may order removal and replacement of the unstable material.
  - a. Remove existing unstable subgrade or subbase, or both, to the depth directed by the Engineer.
  - b. Place and compact new subbase material as required to bring the subbase to a level 2 inches below the bottom of the existing pavement.

**C. Placing PCC Patches:**

- 1. **Equipment:** Comply with [Iowa DOT Article 2301.03, A](#), specifications on equipment for standard concrete pavement.

**3.02 FULL DEPTH PATCHING (Continued)**

2. **Tie Bars and Dowel Bars:** Comply with [Section 7010](#) and the figures in [Sections 7010](#) and [7040](#).
    - a. When there is a common line between two adjacent patches, a bent bar may be placed in a keyway and later straightened.
    - b. Coat dowel bars extending into the patch area with a bond breaker. Do not coat tie bars.
  3. **Forms:** Comply with [Section 7010, 3.02, D](#), as well as the following.
    - a. Use forms on all exposed edges and along the centerline for patches that extend into an adjacent lane, unless full pavement width patches are constructed.
    - b. Rigid wood forms may be used in lieu of steel.
  4. **Placing, Consolidation, and Finishing the Concrete:**
    - a. Moisten the subbase or subgrade.
    - b. Except for preplanned joints, place the patch continuously until the patch is completed.
    - c. When a delay of 45 minutes cannot be avoided, construct a day's work ('DW') joint.
    - d. Carefully place concrete into the patch area to avoid segregation; spread into place and consolidate with a mechanical vibrator. Place full lane width patches over 25 feet in length with a suitable finishing machine that has at least one vibrating screed. Avoid excessive vibrating.
    - e. Finish patches per [Section 7010, 3.02, H](#).
    - f. For joints with tie bars, tool the edge. For joints with dowel bars, saw to a depth of approximately 1 1/8 inch, leaving an opening of at least 3/8 inch in width to provide a reservoir for joint filler.
    - g. Texture the patch to match the adjacent surface.
  5. **Curing:** Comply with [Section 7010, 3.02, I](#). Cure the concrete, including exposed vertical edges, immediately after the concrete has been finished and the surface water has evaporated.
  6. **Joints:** Construct and fill joints according to [Section 7010, 3.02](#). Place joints at locations specified in the contract documents.
  7. **Pavement Protection:** Comply with [Section 7010, 3.04](#).
  8. **Use of Pavement:** Comply with opening strength requirements of [Section 7010, 3.05](#). Maturity testing is not required.
- D. Placing HMA Patches:**
1. Use equipment complying with [Iowa DOT Article 2303.03](#). Use of a paving machine is not required.
  2. Apply tack coat to the vertical edges of the remaining pavement at a rate of 0.10 to 0.15 gallons per square yard.
  3. Place HMA patch mixture in lifts that will not exceed 3 inches in thickness after compaction, with the top lift not exceeding 2 inches in thickness when compacted.
  4. Compact each lift while hot by rolling or compacting with a vibratory compactor. Subsequent lifts may be placed as soon as the preceding lift has been properly compacted.



**3.02 FULL DEPTH PATCHING (Continued)**

5. Smooth the final lift with a steel-tired finish roller. Ensure the final compacted surface is level with, or no more than 1/8 inch above, the adjacent pavement and has a smooth riding surface. If the patch becomes distorted for any reason, smooth the surface by blading, scraping, grinding, filling, or other approved means.
6. Do not extend patch material beyond the edge of the existing pavement; remove patch material that extends outside the patch limits.
7. Do not open to traffic until the mixture has cooled sufficiently to provide stability.

**3.03 PARTIAL DEPTH PATCHING****A. Pavement Removal:**

1. Ensure all patches are square or rectangular in shape.
2. For removal by the saw and chip method, cut at the designated removal limits to a minimum depth of 2 inches and a maximum depth of T/2 or the top of the dowels in PCC pavement. For PCC patches, taper the sides of the removal area 30 to 60 degrees from vertical using a pneumatic hammer to eliminate the polished face.
3. Using a 15 pound maximum size pneumatic hammer, remove the deteriorated pavement down to sound pavement. A 30 pound pneumatic hammer may be used if it does not result in damage to the patch area and edges.
4. In lieu of sawing and removal with a pneumatic hammer, the designated patch area may be milled to the prescribed depth. Milling equipment must provide tapered edges 30 to 60 degrees from vertical for PCC patches. Chip out secondary spalling resulting from milling at no additional cost to the Contracting Authority.
5. Remove pavement to the appropriate depth. Do not damage steel reinforcement during the removal process on PCC pavements. Damaged steel will be the responsibility of the contractor. If the end of a dowel bar is exposed, cut and remove the bar. Place duct tape, form oil, grease or use other method approved by the Engineer as a bond breaker on dowels not removed. If the required depth to sound pavement exceeds the maximum T/2 removal depth, construct a full depth patch.

**B. PCC Patch Placement:**

1. Clean removal area by sandblasting or water blasting, followed by airblasting, until the area is clean and dry. Ensure the compressed air used for cleaning is oil and moisture free. Place concrete the same day as cleaning.
2. Install preformed compression relief material in joints or cracks or tool the joint in the plastic concrete. Use material equal in width to the adjacent joint or crack at the patch boundary. For wide openings, use multiple thicknesses. Compression relief material is to extend at a minimum of 1/4 inch below the bottom of the patch so as to completely separate all patching material on both sides and 3 inches beyond the patch boundaries. If tooling of the joint is specified, complete a relief saw cut to the full depth of the patch plus 1/4 inch as soon as the concrete has reached proper set.
3. Thoroughly coat the bottom and sides of the patch area with a cement grout immediately prior to placement of concrete. Do not allow grout to set prior to placement of concrete. Remove grout set by sandblasting and reapply.

**3.03 PARTIAL DEPTH PATCHING (Continued)**

4. Deposit concrete in the patch; finish patch from the center outward. Ensure concrete does not infiltrate into existing cracks or joints.
5. Apply joint filler material to expansion joints. At the interface between the patch and the slab, apply sand-cement grout to fill and seal the edge. Position the grout so 1 inch is over the surrounding pavement and 3 inches are over the patch.
6. Texture the patch similar to the adjacent surface.
7. Cure patch according to [Section 7040, 3.02](#).
8. Fill joints according to [Section 7040, 3.06](#). Complete filling within 5 calendar days after patch is placed.

**C. HMA Patch Placement:**

1. Clean removal area by airblasting until the area is clean and dry. Ensure the compressed air used for cleaning is moisture free.
2. Cover the entire removal area with tack coat at a rate of 0.10 to 0.15 gallons per square yard.
3. Place HMA patch mixture in lifts that will not exceed 3 inches in thickness after compaction, with the top lift not exceeding 2 inches in thickness when compacted.
4. Compact each lift while hot by rolling with an adequately weighted pneumatic tire roller or by tamping with a mechanical tamper. Succeeding lifts may be placed as soon as the preceding lift has been properly compacted.
5. Smooth the final lift with a steel-tired finish roller. Ensure the final compacted surface is level with, or no more than 1/8 inch above, the adjacent pavement and has a smooth riding surface. If the patch becomes distorted for any reason, smooth the surface by blading, scraping, grinding, filling, or other approved means.
6. Do not open to traffic until the mixture has cooled sufficiently to provide stability.

**3.04 DIAMOND GRINDING**

- A. Use equipment complying with [Iowa DOT Article 2532.03, A](#).
- B. Grind and texture the entire surface of the pavement parallel to the centerline until the pavement surface on both sides of transverse joints and all cracks are in the same plane with no greater than 1/16 inch difference between adjacent sides of joints and cracks and the pavement surface meets the required smoothness. Feather grind into existing structures such as manholes and water valves in a manner that eliminates abrupt edges or drops and provides a uniform texture.
- C. Ensure the ground surface is of uniform texture. In each lane, ensure at least 95% of the area in each 100 foot section has a newly textured surface. Depressed pavement areas due to subsidence or other localized causes and areas containing feathering due to pavement structures will be exempted from texturing requirements.
- D. Except at joints and cracks, ensure grinding depth does not exceed 1/2 inch. At joints and cracks, ensure grinding depth does not exceed 3/4 inch.

**3.04 DIAMOND GRINDING (Continued)**

- E. For multiple passes, ensure overlaps do not exceed 1 inch. Begin at the crown of the roadway, proceeding toward the pavement edge with each subsequent pass. Ensure each subsequent pass is at least as deep as the previous pass in order to provide transverse drainage. All passes are to begin and end at the same station location. Ensure no unground areas are left between passes. For grinding adjacent to an unground turn lane or other pavement surface, feather smoothly from the edge of the ground surface to the unground surface leaving no more than a 1/8 inch ridge. If street surface to be ground includes a curb and gutter section, extend grinding to within 4 inches of the curb face and feather to provide proper drainage.
- F. Assemble and adjust the grinding head as necessary during the project to produce the following tolerances on pavements with the indicated coarse aggregates. Both the distance between grooves and the texture depth must be within the specified range to be in compliance. Assemble the grinding head to produce the tolerances indicated below for the type of coarse aggregate in the pavement.

	Crushed Stone	Gravel/Quartzite
Width of Land Area Between Grooves*	0.090" to 0.110"	0.080" to 0.095"
Texture Depth**	Target of 1/8" with average between 1/16" and 3/16"	

\*Based on an average of a minimum of ten measurements across the ground width for one pass.

\*\*Based on an average of a minimum of six measurements across the ground width for one pass.

- G. Prior to enforcement of the tolerances listed above, a test area 300 feet long and the width of the grinding head will be allowed for a new head that has been restacked, provided a surface texture in reasonable conformance with the specifications, as determined by the Engineer, is being produced.
- H. Ensure the transverse slope of the ground pavement is uniform to a degree that there are no depressions or misalignment of slope greater than 1/4 inch in 12 feet when tested by string line or straightedge placed perpendicular to the centerline.
- I. Continuously remove all slurry or residue resulting from the grinding operations with a well-maintained vacuum system and remove from the project limits. Ensure residue from grinding operations does not flow across lanes occupied by public traffic or into gutters, storm sewers, ditches, or other drainage facilities.
- J. Measure smoothness with a 10-foot straightedge. Re grind high spots to ensure no surface deviations greater than 1/8 inch remain. When profilograph testing is specified in the contract documents, comply with [Iowa DOT Materials I.M. 341](#) and the following requirements:
1. Prior to performing any grinding work, provide a control profilogram for each lane and/or segment over 50 feet in length that is to be ground. Ensure pavement is relatively clean and free of debris prior to establishing the control profilogram.
  2. Ensure each segment of the finished ground surface has a final profile index less than or equal to 35% of the control profilogram trace or 22 inches per mile, whichever is greater, and does not include any bumps exceeding 1/2 inch in 25 feet.
  3. Depressed pavement areas due to subsidence or other localized causes and areas where the maximum cut restricts further grinding will be excluded from testing with the profilograph when approved by the Engineer.
- K. Recheck smoothness following any regrinding activities to ensure compliance with the above requirements.

**3.05 MILLING**

- A. Use equipment complying with [Iowa DOT Article 2531.03, A.](#)
- B. Mill the entire pavement area designated to the depth specified in the contract documents. Mill in straight lines. Make sufficient passes, or cuts, such that all irregularities or high spots are eliminated.
- C. Control milling operations to provide a surface that is true within a nominal tolerance of 1/4 inch and 1/4 inch at longitudinal joints where adjacent passes meet. The profile may be inspected by checking with a 10 foot surface checker placed parallel to the centerline. Correct variations greater than 1/4 inch.
- D. Load cuttings directly into dump trucks and remove the remaining small cuttings and debris from the street. Sweep the scarified surface with a rotary broom before opening to traffic. Unless otherwise specified in the contract documents, all materials removed are property of the Contractor.
- E. Do not operate metal tracked equipment on streets, other than those being milled.
- F. Ensure excessive dust does not become airborne during construction. Additional water may be required at any time for dust control.
- G. Mill around manholes and utility valves. Correct any damage to manholes or valves by the milling operation at no additional cost to the Contracting Authority.
- H. Do not leave a vertical drop of more than 2 inches at the centerline or lane line overnight. Taper the ends of milled sections subject to traffic to provide a uniform and gradual transition.

**3.06 CRACK AND JOINT CLEANING AND FILLING, HOT POUR****A. General:**

- 1. Use equipment complying with [Iowa DOT Articles 2541.03](#) (HMA) and [2542.03](#) (PCC).
- 2. Rout or saw joints and cracks with an average opening of 3/8 inch or less to provide a minimum sealant reservoir of 3/8 inch wide by a nominal 1/2 inch deep.

**B. Crack and Joint Cleaning:**

- 1. Clean cracks or joints of existing joint filler material, backer rod, vegetation, dirt, and other foreign material.
- 2. Clean joints or cracks by air blasting or by other methods as necessary to remove debris.
- 3. If specified in the contract documents, clean wet sawn joints with high pressure water immediately after sawing to remove residue produced by the sawing operation.
- 4. When cleaned joints or cracks are contaminated before being filled, clean them again before filling.

**C. Crack and Joint Filling:**

- 1. Ensure cracks and joints are dry prior to placement of filler material.

**3.06 CRACK AND JOINT CLEANING AND FILLING, HOT POUR (Continued)**

2. Heat, handle, and apply joint filler material to the proper level as specified in the contract documents and as recommended by the manufacturer.
  - a. PCC Pavement: Do not overfill joint or crack with filler material. Immediately remove filler material placed on the pavement surface.
  - b. HMA Pavement: Slightly overfill the entire crack reservoir with filler material. Smooth with a narrow V-shaped squeegee immediately after placement of the filler material to within 1/2 inch on each side of the crack edge.
4. Place joint filler material when the pavement and ambient air temperatures are 40°F or higher. When near this minimum, additional air blasting or drying time, or both, may be necessary to ensure a satisfactory bond to the joint surfaces.
5. Lanes may be opened to traffic only after the filler material has set sufficiently so it will not pick up under traffic. Blotting material may be applied to the filler material, but only after the surface has set to avoid penetration of the blotting material into the filler material.

**3.07 CRACK CLEANING AND FILLING, EMULSION**

Use emulsified asphalt for filling cracks in HMA surfaces only. Do not use on PCC pavements.

**A. General:**

1. Clean cracks with either high pressure air or water equipment. Do not use water when freezing temperatures exist or are forecasted.
2. Ensure vegetation is removed from cracks. Alternative cleaning methods may be necessary to remove vegetation.
3. When specified in the contract documents, apply a soil sterilant in crack prior to placing the filler material.
4. For filling cracks, use a hand operated wand or pouring pot, capable of placing the filler material into the crack and filling to the adjacent surface. Use a spout or nozzle small enough to place the filler material into the crack without soiling the adjacent surface.
5. Immediately after placement of the filler material, tightly spread the emulsion using a 2 inch, or less, V-shaped rubber-edged squeegee. Take proper measures to hold the filler in place and prevent runout at edge of pavement or at low areas.

**B. Cracks Wider Than 1 inch:**

1. Clean the cracks of loose and spalled material, sand, and other foreign debris to a depth of 3 inches using high pressure water.
2. When specified in the contract documents, utilize additional methods to clean cracks of old crack filler.
3. Blow the cleaned cracks free of water with high pressure air.
4. Lightly apply a tack coat to the crack surfaces.

**3.07 CRACK CLEANING AND FILLING, EMULSION (Continued)**

5. Fill the cracks with hot mix asphalt.
  - a. Ensure mix is warm and pliable when placed.
  - b. Rod and tamp the mix into place level with the adjacent surface.
  - c. Place mixture prior to filling cracks with emulsion.
6. Place a thin application of emulsion over the hot mix asphalt and tightly spread with a squeegee.

**C. Cracks 1/4 inch to 1 inch in Width:**

1. Clean the cracks of loose and spalled material, sand, and other foreign debris with high pressure air or high pressure water. Clean crack down to sound material, but a depth greater than 3 inches will not be required.
2. When specified in the contract documents, utilize additional methods to clean cracks of old crack filler.
3. Fill cracks with emulsion filler material.

**D. Cracks Less Than 1/4 inch in Width:**

1. Clean sufficiently to remove sand and other foreign debris.
2. Fill cracks with emulsion filler material.

**E. Map-cracked (Alligator) Areas:**

1. Cover area with emulsion filler material.
2. Spread emulsion over area with squeegee, working emulsion into cracks. Provide a thin, smooth application.
3. Promptly cover the filler material with a light application of blotter material.

**3.08 PAVEMENT REMOVAL**

- A. Saw full depth at pavement removal limits.
- B. Extend pavement removal limits to existing joint lines as directed by the Engineer.
- C. Protect existing pavement, beyond removal limits, from damage. Remove to a new saw line and replace, at no additional cost to the Contracting Authority, all concrete broken or damaged beyond the removal limits designated by the Engineer.

**3.09 CURB AND GUTTER REMOVAL**

- A. Saw longitudinally along the existing gutter joint or at a location directed by Engineer. Saw transversely at the curb and gutter removal limits.
- B. Remove existing curb and gutter without damaging the existing pavement to remain.

**3.10 DOWEL BAR RETROFIT****A. Cutting and Preparing Slots:**

1. Cut slots to the required width and depth with gang saw capable of cutting a minimum of three slots in each wheel path simultaneously. Multiple cuts in each slot may be required.
2. Use 30 pound maximum pneumatic hammers operated at a 45 degree angle or less to remove concrete from the slots. Prevent damage to surrounding concrete. Smooth and level the bottom of the slots with a lightweight bush hammer.
3. Sandblast or waterblast to clean exposed surfaces of slot and fill transverse contraction joint on the bottom and sides of the slot with caulking filler.

**B. Placing Dowel Bars:**

1. Set dowel bars at the depth shown on the plans with chair devices.
2. Ensure dowel bars are parallel to the centerline of the pavements and to the pavement surface.
3. Place dowel bars within 1/4 inch of required alignment.
4. Center dowel bars over transverse joints or cracks so a minimum of 6 inches extends into adjacent panel.
5. Cut foam core material and place at center of dowel bar so the material is flush with the pavement surface or slightly recessed and in line with the joint or crack. Maintain foam core material in vertical position, tight to the slot edges during grout placement.

**C. Grouting:**

1. Thoroughly moisten all surfaces of the slot immediately prior to filling with grout. Remove any excess water with compressed air.
2. Produce grout with a portable mixer and place immediately after mixing and before grout has attained initial set. Do not retemper grout with water.
3. Place grout according to manufacturer's recommendations. Consolidate with hand held vibrator. If pavement is to be diamond ground place grout 1/8 inch higher than surrounding pavement. Place grout flush if the pavement is not to be ground.
4. Thoroughly coat grout with white pigment curing compound immediately after placement.

- D. Re-establish Joints or Cracks:** After grout has attained sufficient strength, re-establish joint or crack above the foam core insert within 8 hours of grout placement by means of sawing. If foam board is visible, sawing is not required.

**3.11 CORE HOLE CUTTING AND REPLACEMENT****A. Cutting Core:**

1. Place a temporary mark on the pavement core and adjacent pavement if the core is to be reinstalled. Maximum diameter is 12 inches.
2. Utilize a diamond bit with the vertical alignment of core hole saw perpendicular to the horizon. Include a center core hole or another mechanism to extract the core without damage.
3. Cut the full depth of the existing pavement. Protect core from damage if it is expected to be re-used.
4. Vacuum or hydro excavate to expose the buried infrastructure. Maintain vertical sides.

**B. Backfill:** Place backfill using suitable native soil compacted to 95% Standard Proctor Density according to [Section 3010](#), granular material compacted to 65% Relative Density, CLSM, or foamed cellular concrete to the elevation required in [Figure 7040.107](#).

**C. Pavement Core Replacement:** Comply with [Figure 7040.107](#) and the following.

1. If allowed by the Jurisdiction, replace pavement core utilizing waterproof bonding material. Mix and place bonding material according to the manufacturer's recommendations to fill the annular space around the core and the original slab. Ensure reinstalled core is in its original orientation and is flush and level with the adjacent pavement. Remove excess bonding material.
2. For PCC pavement install rebar pins and place low slump concrete to match elevation of existing pavement.
3. For asphalt pavements, use standard traffic surface, 1/2 inch mix, and PG 58-28S binder. Maximum lift thickness is 2 inches. If allowed by the Engineer, replace core with low slump concrete or pre-mixed high performance cold mix generally meeting the asphalt mixture noted above. Match elevation of existing pavement.

END OF SECTION