SECTION 9 – PAVEMENT PATCHING AND PCCP JOINT REPAIR

9.1 SELECTING PATCH AREAS *(Rev. 03-01-22)*

PCCP and HMA patching locations will be marked on the pavement by Department personnel, generally by the PEMS and staff. The PEMS should refer to the contract plans for specific locations identified by the Designer. However, patching quantities often are planned as a percentage of the entire pavement within the contract without specific locations identified. The use of a quantity based on a "percentage" of the pavement will require the PEMS to use sound judgment when marking the patching areas to verify that the worst sections are repaired without overrunning the contract plan quantity. A general procedure that can be used is as follows:

- Note the location of any patches that are specifically identified on the plans. If the planned patch locations equal the total contract quantity, then no further investigation needs to be done and the planned patches should be marked. Otherwise, continue below.

- Drive each lane of the entire job and note the general condition of the pavement.

- Determine the approximate total area of the pavement within the project limits.

- Determine the percentage of contract patching area over the total area.

- Pick an area that has a degree of deterioration that should be repaired and use it as an example to select other locations within the job.

- Drive the job again, counting the approximate number of locations that are similar to the example.

- Calculate the approximate total area of patching based on standard patch size along with any added areas of oversize patches added in.

- If the calculation is less than the contract quantity, continue to pick additional locations with decreasing degrees of deterioration until the contract quantity is met.

- If the calculation is more than the contract quantity, delete some less deteriorated patches until the contract quantity is met.

The contract quantity may not be enough to repair every location identified by the PEMS. The PEMS should contact the AE and the PM if there is concern that the contract cannot be properly completed without additional patching.

9.2 REMOVING PAVEMENT AND PLACING PATCHES *(Rev. 03-01-22)*

PCCP patching is covered in 506 of the SS. HMA patching is covered in 304 of the SS.

In addition to details within the standard drawings and plans, the guidance presented below should be followed when removing pavement and placing patches.

(a) Methods and equipment used in cutting, breaking and removal of the PCCP and HMA pavement must not cause structural damage to the pavement left in place. To help avoid damage to surrounding pavement, it may be necessary to use hand methods to trim and straighten the edges of the patch after removal of the pavement. Minor chipping of existing concrete pavement cannot be avoided in some cases.

(b) If the existing PCCP or HMA pavement is damaged, the Contractor must replace the damaged pavement at no additional cost to the Department, provided that the damage was due to poor workmanship. If the damage was unavoidable or was the result of previous damage not observed at the time the patch was marked, then the repair should be included in the patch and paid through the contract.

(c) Determine if the subbase is suitable to remain in place. The Contractor must not needlessly remove subbase during the pavement removal process and must recompact the subbase left in place. If the subbase is contaminated due to pumping, it should be replaced in kind and to the depth of the original subbase. If the contract does not include an item for new subbase material, the PEMS should contact the AE to confirm that items will be added to the contract to place new subbase material.

(d) If the existing subbase is clean, but is saturated or standing in water, the PEMS should contact the AE to determine if drainage pipe or drainage aggregate should be installed to drain the subbase.

(e) The depth of a full depth concrete patch should not exceed the depth of the existing PCCP pavement. Patching material should not extend under the existing PCCP pavement.

(f) PCCP partial depth patches may be constructed to a maximum of 1/3 the thickness of the existing pavement. The PEMS must verify that hand chipping tools or handheld mechanically driven equipment used for removal of unsound partial depth patch concrete are operated at a maximum angle of 45° from the PCCP surface.

(g) For concrete patching, longitudinal tie bars that are to remain in place must be straightened. Retrofit tie bars must be added as required, dependent on the length of the patch.

(h) For concrete patching, dowel bars must be installed at each end of the patch and intermediate D-1 dowel baskets placed within the new patch to match existing adjacent D-1 joint locations.

(i) PCCP concrete patch mix design, mix criteria, trial batch, and CMDP beam validation are required to be in accordance with 506 of the SS.

(j) Concrete patches shall not be placed on frozen subgrade, frozen subbase, or frozen PCCP.

(k) For HMA patches, a smooth riding surface must be maintained at all times. Any deformations are to be corrected immediately.

(l) For HMA patches, excavated patch areas are required to be filled with the HMA material specified in the pay item.

9.3 PCCP JOINT REPAIR *(Rev. 03-01-24)*

PCCP joint repair is an integral part of pavement maintenance and preservation. Joint repairs for PCCP include those for both partial depth and bottom-half of slab repairs. Repairs must follow the SS and Standard Drawings to be successful. Joint repairs can be performed when the ambient temperature is 50°F or higher. The work must be protected from rain and follow the QCP for the protection of edges and surface of the repair area.

9.3.1 Quality Control Plan and Trial Batch

A QCP, in accordance with ITM 803, is required for the operation. The specified Quality Control Technician, described within ITM 803, must be an ACI-Certified Concrete Field Testing Technician, Grade I. The requirements for the QCP are listed and described within the SS.

9.3.2 Concrete Mix Design

A CMD is required to identify the type of material to be used for the work. The allowable material types are listed and described within the SS. The SS also require a CMD to be produced and submitted by the Contractor for any of the patching materials utilized **except** when pre-packaged concrete patching materials, CPM, or rapid setting patching, RSP, materials are used.

9.3.3 Proportioning

The proportioning requirements for the allowed patching material mixes are listed within the SS. There are differences for specific type mixes. The CMD for the contract should be reviewed carefully and any errors corrected prior to the work progressing.

A trial batch production is required to be performed prior to use to verify that the repair concrete is in accordance with the appropriate concrete mix criteria listed within the SS. Specific trial batch testing requirements for compressive strength, modulus of rupture, and plastic testing for each of the allowable mixes is listed within the SS.

9.3.4 Construction

The PEMS and the Contractor are required to set-up an on-site pre-work meeting to discuss the work schedule, the traffic control plan, the equipment calibration and potential adjustments, the inspection and evaluation of the equipment, the concrete mix design for production, the Contractor's daily rate of production per work crew, and the QCP. Other issues for particular contract circumstances should also be discussed during this meeting.

The Department identification of repair locations should be performed by sounding and in coordination with the plan repair summary information. As the repair areas are located, they should be marked and recorded by size and location. The recording of repair area size and location can be used later as original information for payment and resolution of Contractor disputes. It is the Contractor's responsibility to remove only the areas marked and identified by the Department. If patch areas are cut larger or patch areas are added without the authority of the Department, those additional areas are at the Contractor's expense. Contractor PCCP removal, in accordance with the SS, should follow the identification and marking of the repair locations. Areas of less than 1 sq ft are to be removed by saw cutting and hand chipping rather than by machine. Sawing should be 2 in. deep within the marked area. The same procedure described above should be used on jointed reinforced concrete pavement. Wire mesh exposed during removal operations is required to be removed. PCCP removal areas are not to remain open overnight.

For portland cement concrete pavement joint repairs, if there is a need for a transverse joint to intersect a longitudinal joint that has already been repaired, the longitudinal repair must have at least 12 h of curing, a passing visual inspection for repair soundness, and demonstrate adequate flexural strength of 500 psi for one individual flexural strength test or 3,200 psi for two individual cylinder breaks consistent with opening to traffic requirements Visual inspection should include issues with debonding of the repair concrete or random surface cracks. Longitudinal joint repairs should stop 12 in. or more from a transverse joint.

Inspection of the milled surface of the repair area is required to help identify remaining unsound concrete. Remove any identified unsound concrete **except** if it is found below the tops of dowel or tie bars. When unsound material is found below the tops of dowel or tie bars, it can remain in place. No dowel bars are to be damaged during removal operations. Based on the exposure of dowel bars during the removal operations, the decision to transition a repair area to a full-depth patch is at the discretion of the PEMS.

Cavities of repair areas are to be left with a clean and irregular surface to help develop the bond between existing concrete and the new joint repair mix. All broken concrete should be removed, and the cavity swept clean. The cavity is then required to be thoroughly sandblasted and cleaned with compressed air to remove remaining dust and chips. Compressed air cleaning should occur as close to placing the concrete as possible, but not after the installation of any joint filler.

Joint filler material is required to be placed prior to placement of the new concrete mix. The placement should follow with the plans and Standard Drawings for the identified joint.

The placing and curing of joint repair concrete mix must follow the SS requirements to produce the best quality for the repair. Deviation from these requirements may cause undesirable results and the possible necessity to remove and replace the repair area.

All joint openings within the repair area are to be maintained for the full depth of the joint repair. Longitudinal and transverse joints should be sawed to produce a reservoir for sealant. Once sawed, the reservoir is required to be cleaned prior to placing the sealant. If a longitudinal joint was re-established by sawing, additional sawing to create a reservoir is not required. Sealing of joints is required to be with hot pour sealant, in accordance with the manufacturer's recommendations. The sealant is required to be placed to a level consistent with the SS.