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Section 8:

Portland Cement Concrete Pavement, PCCP

SECTION 8 – PORTLAND CEMENT CONCRETE PAVEMENT, PCCP

8.1 INTRODUCTION

The Department has specifications for both QC/QA PCCP, in 501, and non-QC/QA PCCP, in 502. The SS for QC/QA PCCP requires a QCP in accordance with ITM 803. The major differences between the two specifications are the testing and documentation requirements. The planned quantity and planned use of concrete pavement will determine whether the pay items are from 501 or 502. There must be at least 7,200 syd of a concrete pavement item for 501 to be applied. If the contract starts as a 502 non-QC/QA PCCP pavement, but a significant increase in the quantity is authorized, then the DMTE should be contacted to determine if the pavement should be tested under 501.

The Contractor is responsible for designing the concrete mixes in accordance with the SS. All mix designs are reviewed for SS compliance. A trial batch procedure is required in accordance with 501 of the SS.

These instructions apply to both 501 and 502 concrete pavements unless specifically indicated otherwise.

8.2 PERSONNEL AND EQUIPMENT

The checking of equipment and tools is performed by the Department contract personnel. Give particular attention to the finishing machine screed crown set-up, the float pan crown, if used, or the crown in the rails of the mechanical float.

Equipment for making plastic concrete tests should be obtained through the DMTE before paving operations start. The equipment must be properly calibrated prior to use. Prior to a trail batch demonstration, a discussion should be held with the CCT on the operation to see they understand their responsibilities and documentation requirements. Prior to the start of the paving, a pre-paving meeting should be held with the Contractor and all Department field personnel involved in inspecting the paving operations to outline specific responsibilities and review the paving plan, QCP, mix designs, and schedule.

All materials must be accepted before being used in the concrete mix. The SS allow the use of blended pozzolan cements, coal ash or slag cement as an additive in concrete pavements when the ambient temperature is above 45° F during the entire placement period.

If problems are found, the Contractor must correct them, including removal and replacement, if necessary, before the contract is accepted.

For 501 QC/QA PCCP, the Contractor is required to have an ACI-Certified Concrete Field Testing Technician, Grade I, on-site to supervise the QC testing. Trial batches must be run for each mix design with the Department and the Contractor present and performing independent tests. The Contractor is required to provide a common testing facility for use during the contract. Good communications between the Department's field HT, the Contractor's paving foreman, and the batch plant are essential to help relay problems if they occur.

8.3 SUBGRADE AND SUBBASE

Prior to starting paving operations, the subgrade and subbase must be completed in accordance with the SS. Checking of subgrade and subbase must be done well in advance of the paving operations. In general, the Contractor should keep a minimum of 500 ft of subbase prepared ahead of the paving operation to allow time for proper inspection before concrete is placed.

8.4 SETTING FORMS

Almost all concrete paving, including shoulders, is performed using the slipform method of paving. However, the Contractor has the option to set forms and use various types of form riding paving equipment. Short gaps and tight areas may likely be performed using the formed method of paving. This particular section applies only when the Contractor uses the formed method of paving.

Form stakes, used to set forms to line and grade, should be set no more than 50 ft apart on the outside of each form line. The offset distance from the form line is usually 2 ft. Stakes are tacked for line on one side only.

When setting forms, the most important factor in maintaining a true line and grade is a full and complete bearing of the form base on the subbase. Tamping under the forms after they are set, or shimming with stones, loose material, or blocks of wood to bring them up to proper elevation should not be permitted. A form that is too low must be removed, suitable material added and tamped, and the form reset and checked. This operation must be repeated until the correct line and grade is obtained.

Forms must be anchored in place with a minimum of 3 pins per 10 ft section of form.

Check for tight and complete closure of all form keys, wedges, and latches. All forms should be inspected for proper support and should be checked with a 10 ft straightedge. Variations of 1/8 in. or more in 10 ft. must be corrected before concrete is placed.

Forms that will not straightedge to the above tolerance, which are bent, twisted, or will not match adjacent forms satisfactorily must be removed from the work.

8.5 ACCEPTANCE TESTING

As previously noted, the primary difference between QC/QA PCCP (501) and PCCP (502) is the procedure for testing the concrete. These differences are outlined below:

a. QC/QA PCCP (501)

Testing is based on random sampling of Lots and Sublots as defined in the SS. The testing is performed by the CCT. Standardized forms are available through the DO. Accurate and timely documentation are necessary to ensure proper application of the SS QA adjustment factors, in accordance with the SS. Daily review of this data is necessary to ensure proper tracking of lot and sublot quantities. The Contractor's QC charts should be reviewed, and any problems discussed

with the Contractor. Opening to traffic test beams are separate beams from those cast for acceptance purposes.

b. PCCP (502)

A standard concrete series of tests (air, slump, and yield) must be taken immediately after the paving starts and for any necessary adjustments of the batch weights made. Adjustments should be made by the Contractor as work continues. Tests are recorded and the results stored within AWP. The SS state the limits on all tests. The frequency of testing is outlined in the Manual for Frequency of Sampling and Testing located on the Materials and Tests website.

A water/cementitious ratio test is also made as soon as practicable. The results are reported on form ITM 403-18 within Appendix A of ITM 403. The water/cementitious ratio shall not exceed the limits set out in the SS.

8.6 PLACING CONCRETE

The subbase must be kept uniformly moist in front of placing the concrete mix to prevent the dry subbase from absorbing moisture from the mix.

The concrete is placed on the subbase and spread by means of a mechanical spreader. Strike-offs that do not have sufficient weight or will not level off the concrete at the correct elevation, shall not be used. Paving machines shall utilize mounted vibrators to consolidate the mix appropriately.

A sufficient amount of concrete must be kept in front of the entire length of the strike-off at all times, while moving forward, to prevent depressions in the surface from occurring. Where depressions do occur, they shall be filled and leveled to the correct surface of the adjacent mix.

The Contractor must place the concrete at joints carefully so the dowel bar assemblies are not displaced.

For formed paving, the edges of the pavement at the form line must be appropriately vibrated to prevent honeycombing. Care must be taken to see that the paving machine operator uses these vibrators only while the machine is moving forward. Inspect the pavement edge after the removal of forms and have any honeycombed areas patched before the edges are banked with earth or sprayed with curing compound. Patching of honeycomb must be performed immediately after removal of the forms.

8.7 PAVEMENT JOINTS

Joints are placed in concrete pavements primarily to control cracking and to permit placing of adjacent slabs. Poorly constructed joints constitute one of the greatest sources of trouble in concrete pavement construction. For example, poor construction of transverse joints can result in differential settlement between slabs causing bumps at each joint which negatively impacts the traveling public and the life of the concrete pavement. Regular and consistent inspection is important to achieve proper placement and finishing of joints.

When placing fresh concrete adjacent to a joint within a pavement, the existing joint must be protected to prevent mortar and fines from entering the joint. If this is not achieved, the joint will fail prematurely.

No two transverse joints, of any kind, should be spaced closer than the specified spacing.

Each type of pavement joint is discussed in detail in the following sections.

8.7.1 Longitudinal Joints

Longitudinal joints are constructed parallel to the centerline and allow a hinge type movement to occur between slabs. They may be either of the types shown on the plans or specified in the contract. Longitudinal joint spacing should not exceed 14 feet.

Tie bars are an integral part of a longitudinal joint and are installed using mechanical equipment, in accordance with the SS, or rigidly secured in place. Check that the Contractor uses the correct size and spacing of the tie bars.

Unless a particular type of longitudinal joint is specified, all longitudinal joints must be sawed in accordance with Division 500 of the SS. All longitudinal joint sawing should typically be performed within 2 to 12 hours after the pavement is placed. The slurry created by sawing operations must be completely flushed from the joint by a high-pressure water jet. All joints must be entirely clean and open for their entire depth immediately prior to sealing.

8.7.2 Contraction Joints

Contraction joints are placed across the pavement at right angles to the centerline to control cracking and, unless otherwise provided, must be sawed.

The maximum allowable contraction joint spacing is specified in the plans. When manholes, utility access ports, catch basins, inlets, etc. are located within the pavement, a contraction joint layout plan is necessary. No pavement block-out section should be closer than 4 ft from a contraction joint unless a contraction joint is incorporated as one side of a block-out section. Under no circumstances should the maximum contraction joint spacing be exceeded. Contraction joint placement is especially critical in urban pavement sections by helping to avoid random pavement cracking and deterioration after construction.

The subbase must be properly prepared at the joint location when either a welded dowel bar assembly, that rests on the subgrade, or a full depth separator is used. If needed, a template may be required for checking the subbase and the position of the dowels. The dowel position must be checked, as described in 8.10 of these instructions, to ensure all the dowels are parallel with both the horizontal and vertical profiles of the pavement section.

Dowel bar assemblies must be pinned securely to the subbase. The concrete must be placed so individual dowels, or entire assemblies, will not move from their true position during the paving operation. Dowels that do not remain parallel with the pavement will cause stress cracking and spalling of the pavement.

Contraction joints are to be sawed the full pavement width. The saw cut should commence as soon as the concrete has hardened sufficiently to permit sawing without raveling, usually 2 to 12 h after placement. If necessary, the sawing operations must be continued day and night, regardless of the weather conditions. The width of the saw cut should be measured for compliance. Immediately upon completion of the sawing operation, the joint must be thoroughly washed to ensure that all the slurry is removed and not permitted to remain and harden in the saw cut groove of the joint.

8.7.3 Sawed Joints

When sawed contraction or longitudinal joints are required, the work must be performed in accordance with all applicable provisions of the contract, plans, Standard Drawings, and SS. Contraction joints should be sawed within a period of 2 to 12 h after placing of the concrete to prevent the development of random and premature cracking. Sawing should start as soon as the concrete has hardened sufficiently so the sawing can be performed without undue raveling or spalling. If this process is followed properly, the result will be a clean and neat saw cut groove. Careful detailed inspection is necessary to see that the contraction joints are sawed prior to the development of random cracks resulting from poor timing. If random cracks develop, contact the AE immediately and secure assistance in determining the cause of the cracks, means of preventing them, and any corrective measures that may be required.

During the placing of concrete, the Contractor must accurately reference the location of the contraction joint assemblies so the saw cut is made directly over the center of the dowel bars.

The Department's assigned inspector to the sawing operation should be thoroughly familiar with the applicable SS requirements and, in addition, provide detailed attention to the following:

1. Width of the saw cut
2. Depth of the saw cut
3. Straightness of the saw cut
4. Transverse saw cuts are at right angles to the pavement lanes
5. Saw cuts are clean.

8.7.4 Expansion Joints

Expansion joints are special-use joints constructed in new pavements to accommodate potential excessive slab expansion or movement without developing high compressive forces in the pavement. Expansion joints typically include dowels or other load transfer devices and allow independent movement only in the direction of expansion. Expansion joints are used only when called for in the plans. Expansion joint type and width are indicated on the intersection detail sheets in the plans. A careful study of all detailed intersections and if the planned joint arrangement does not indicate proper function, the layout should be discussed with the AE and the Designer.

Older expansion joints labeled as terminal joints at bridges, railroad grade crossings, or abutting existing jointed pavement, consist of a concrete sleeper slab installed below the joint, and the

joint itself is filled with HMA mixture.

The more recent terminal joint designs used at bridges should be constructed at the specific locations indicated within the plans as either Terminal Joint, Type PCCP or Terminal Joint, Type HMA. Standard Drawings for both types of joints should be referenced and used when constructing these types of bridge terminal joints.

Both types of terminal joints continue to use a traditional sleeper slab below the reinforced concrete bridge approach, RCBA, and pavement sections, but eliminate the use of the older 24 in. wide HMA filled joint and replace it with a much smaller width joint (2 1/2 in. at 60^{o} F). This smaller width joint is filled with a pre-compressed foam on top of expanded polystyrene. The Terminal Joint, PCCP also utilizes 40 ft of jointed reinforced concrete pavement, JRCP, beyond the RCBA. The Terminal Joint, Type HMA utilizes a 2 ft concrete lug, attached to the end of the sleeper slab, and adjacent to the pre-compressed foam joint beyond the RCBA. Care should be taken to ensure that the sleeper slab is constructed in the same horizontal plane as the pavement that will be placed on it.

8.7.5 Construction Joints

A construction joint is a rigid joint that joins two sections of pavement together using deformed reinforcing bars.

Construction joints are commonly used at the end of a day's pour or whenever the paving is stopped for 30 minutes or more and the location does not fall at a contraction joint. The tie bars are pushed into the concrete's vertical face, to the required depth, through holes or slots in a header board. The free ends on the bars must be supported. When starting from a construction joint the Department's inspector must check the vertical face of the existing pavement for right angles and alignment.

The SS state that the construction joints must be a minimum distance from a contraction joint. This means that header boards must be placed exactly at mid-slab between preset contraction joint baskets, unless a contraction joint is used as a header location.

Contraction joints may be used as a construction joint, but care must be taken to see that the dowels are positioned parallel to the plane of the pavement, both horizontally and vertically. A slotted header board is recommended.

8.8 FORMED PAVING

It is the responsibility of the Department's assigned inspector to see that the Contractor's operation in placing and finishing concrete is performed in a manner that will produce a smooth riding pavement. Any variations that exceed the acceptable limits must be corrected preferably at the time of finishing.

The following are important elements in securing a smooth riding pavement:

1. Uniformly compacted subgrade and/or subbase.

2. Straight forms properly aligned and staked or properly aligned stringlines for slipform equipment.
3. Uniform consistency of concrete as specified.
4. Uniform spreading and consolidation of the concrete in front of the finishing machine to produce a constant elevation during the forward movement.
5. Correctly adjusted finishing machine that is in good condition and operating properly.
6. Correct and constant use of a true 10 ft straightedge which is cleaned and checked frequently.
7. Checking the pavement as far back of the float as concrete setting will permit.
8. Skilled and judicious use of hand tools.
9. Texturing at the proper time and in the proper manner.

The following is a discussion of operations and equipment used in the normal order for paving operations.

(a) Mechanical Spreader or Strike-off - A properly operating machine spreads the concrete uniformly over the subgrade in a manner that produces minimum segregation.

(b) Finishing Machine - The principal function of the finishing machine is to uniformly screed and consolidate the concrete mix. The rate of placement of the mix in front of the finishing machine must be matched to the finishing machine's capacity.

A uniform head of concrete should be carried in front of the finishing machine. The amount of surge under a screed is controlled by the head of concrete in front of it, the consistency of the mix, and the tilt of the screed. When the head is too high, an excess will pass under the screed making a bump in the finished pavement. A deficiency of concrete at any point along the width of the screed will cause a low spot at that point. The rear screed should cut the concrete off to the elevation and section of the finished surface, allowing a slight surplus of mortar for proper operation of the longitudinal float.

Tearing of the surface indicates too stiff a mix or too much forward travel as related to transverse motion. A non-uniform surface behind the finishing machine, such as deep or irregular corrugations, indicates improper adjustment or operation of the machine.

Floating of the pavement surface follows the finishing machine and is intended to further smooth and true the pavement.

(c) Mechanical Float - This is the next mechanically controlled piece of finishing equipment. Poor-quality work will leave irregularities that cannot be properly corrected by the hand finishers. A mechanical float may be used to correct minor variations, but anything other than this calls for immediate revision of the finishing machine operation. Low spots shall be corrected.

Even if the mechanical float is performing satisfactorily, changing conditions can affect pavement smoothness. These conditions may consist of items such as:

- concrete mix or consistency,
- working up or down grade,
- change in the drying conditions,
- change in the rate of cross slope, and
- time interval between placing of concrete and operation of the float.

Attention to these changing conditions will make the difference between an excellent pavement surface and a relatively poor one.

Floating prior to the initial settlement of the concrete is frequently the reason why pavements are found to be rough when straightedged the next day and require corrective action to remove the variations. Initial settlement of the concrete should take place before passing of the mechanical float. The float must be held back from the paver to allow for this initial settlement.

If the mechanical float is properly operated, the surface will require only minor hand finishing after its passage. The finishers following the mechanical float should have little to do except remove the slight trail marks and carefully check the surface. If the finishers are working hard at any time, a careful check should be made of the finishing machine adjustment in addition to a careful check of the float.

(d) Hand Finishers - Final checking of the pavement is done as far back as possible, but not so far that good texturing and edging cannot follow. Additional water for finishing purposes shall be limited to a quantity applied by fogging, as approved.

(e) Texturing - The pavement will receive a finish in accordance with Division 500 of the SS. Areas of the hardened grooved pavement which do not meet the contract requirements must be corrected by cutting acceptable

grooves in the pavement with an approved mechanical grinder or cutting machine.

(f) Edging - This operation shall be performed in accordance with Division 500 of the SS.

(g) Pavement Smoothness - After the concrete has hardened, the profile of the surface shall be checked in accordance with Division 500 of the SS.

(h) Pavement Thickness - The PEMS must be alert for any operation that would contribute to thin pavement. The Contractor is responsible to ensure proper pavement thickness as shown in the contract documents. Cores shall be taken to check the pavement thickness in accordance with the SS. Factors essential to ensure proper thickness are as follows:

1. Check the correct crown in the equipment screeds. Carefully check the actual pavement crown several times each day, both before and after the concrete has set.

2. Check the stability of foundation under the forms, if utilized. Give particular attention if paving operations are caught in a hard rain.

3. Check for the removal of crown in the subgrade at transitions from crowned to flat sections and from flat to crowned sections.

(i) Hand Methods - Hand methods, in accordance with Division 500 of the SS, may be used on widened pavement and other locations as permitted.

8.9 SLIPFORM PAVING

Most mainline paving is currently performed by the slipform method. Uniformity and consistency are key concepts in slipform paving. The need for uniformity and consistency begins with the subgrade. Uniform and consistent conformance with both grade-line and cross-section of the subgrade affect the ability to achieve uniform slab thickness, final smoothness, and riding quality of the pavement.

To accomplish this purpose the Contractor will utilize an auto-grade machine with automatic grade control obtained from a pre-set grade-line to trim the subbase. This grade-line on each side of the pavement should be set, in or parallel with, the plane of the edges of pavement.

This same rule applies if the Contractor uses automatic grade control when slip-forming. If automatic grade control is used when paving, a common elevation datum must be used for both subbase and pavement to prevent deviation in pavement thickness and variance in concrete quantities.

After the subbase has been completed, contraction joint assemblies for jointed pavement may be set on the subbase. Pre-set pins or other procedures must be used to properly align the joint assemblies, since no side forms can be used for reference.

Uniform and consistent concrete mix is also important in slip-form paving. This concept will have a pronounced effect on the smoothness of the final pavement. A uniform slump can be achieved with the use of properly drained aggregate. Uniform mix consistency and low slump are necessary to minimize problems with edge slump and rough pavement. Inspection for uniform moisture in the subgrade ahead of the paving and water added to the subgrade are necessary.

The best results for controlling edge slump and smooth pavement are attained with a uniform and consistent concrete mix, rate of delivery to the paver, and lateral distribution and level of mix maintained at the main screed. Interruption in the truck cycle causing the paver to stop is a potential source of rough pavement. Therefore, paving speed should be coordinated with the concrete delivery rate to the paver. The interval between the spreader and the paver should be maintained so that a short delay at the spreader will not cause the paver to stop. A slow continuous paver speed should be maintained rather than starting and stopping. Since the main screed is producing the final profile and cross section of the pavement, a uniform level of concrete must be maintained across the entire width of the screed.

To obtain uniform consolidation and adequate density of the concrete, a series of internal vibrators are installed in front of the main screed. Frequent observation of the vibratory devices should be made to detect any failure of individual units. Inspection should be made on the configuration of the main screed after each major move of the paver to check for deviations from the required alignment. The pavement should be checked immediately behind the paver for conformance with the required cross section.

Periodic checks of the pavement thickness should be made. One of the more efficient methods is to insert a thin rod down through the slab to a metal plate set at a pre-determined point. Once removed, the depth can be measured from the rod. A depth check should be made at least every 400 to 500 ft when starting a project, then as necessary to confirm proper depth. The information should be recorded noting the station, offset, and depth.

Edge slump should be checked after the trailing forms have passed. Minimal edge slump is particularly critical when an adjacent lane is to be constructed. To protect against edge slump being caused by rainfall, auxiliary side forms and plastic sheeting, or other material, sufficient to cover several hundred feet should be readily available.

8.10 TEST PROCEDURE FOR CHECKING POSITION OF DOWEL BARS

After placement on the subgrade each dowel bar assembly should be visually checked for proper alignment. The bars must be parallel to the side and top of the pavement. A minimum of three bars in every assembly should be checked and reported. If any one of the bars is out of alignment, the assembly must be adjusted and every bar in the assembly needs to be checked. The check must be performed before the placement of concrete around the bars.

At the beginning of a paving operation, several assemblies should be checked after placement of the PCC prior to initial strike off to ensure no movement of the assembly has occurred during the PCC placement operation.

A commonly used method is the “dowel bar checker” which may be obtained at the DO. This instrument is a “U” shaped frame having legs of equal length that support a level dial (see Figure 8.10.1). It is first set on the side form or string line with the legs at equal distance from the joint, and the level adjusted until the bubble is centered. This is necessary to compensate for the grade of the pavement. Next, the legs of the checker are set on top of each dowel to be checked. If the bubble is in the center of the vial, the dowel is in the correct vertical position. If not, the dowel bar shall be marked and the Contractor should be notified.

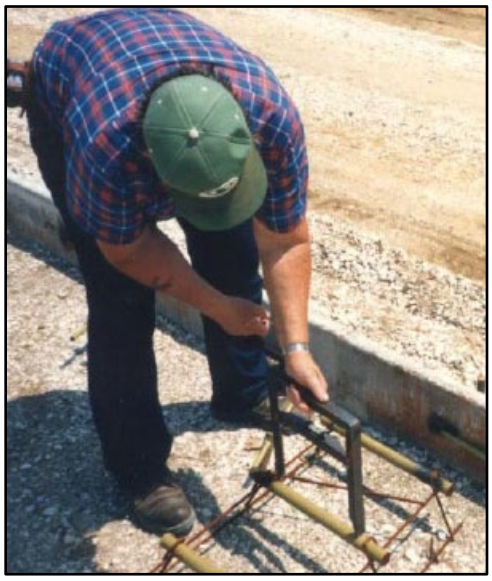

Figure 8.10.1. Dowel Bar Checker Device

8.11 PERMANENT MARKING OF STATIONING ON PAVEMENT

Station numbers must be marked on the right-hand side of the pavement (facing the higher numbers) with the nearest number about 8 in. from the edge of the pavement. The full station number should be placed every 100 feet. Intermediate points will be placed between full stations. At the beginning of each day’s run, the plus of the station and the date should be marked. In the case of a divided lane, the station numbers are to be placed along the outside edge of the pavement, readable from the same direction as the flow of traffic. Cast iron dies of numbers are available from the DMTE.

8.12 CURING

All pavements must be cured using an approved method outlined in accordance with Division 500 of the SS. Curing operations must be continuous until requirements are met. During the curing period, any defects in the curing method must be repaired immediately. Curing should be

checked daily during the entire required period. If there is any potential for the temperature to drop below freezing after any pavement is placed, the pavement must be protected by using insulated blankets or other approved means.

8.13 PAVEMENT SMOOTHNESS

The SS requirements for smoothness stipulate that PCCP smoothness is required to be checked as soon as the concrete pavement has cured sufficiently to permit testing. Longitudinal smoothness is checked by using an inertial profiler or a straightedge. Both the inertial profiler and the straightedge are furnished and operated by the Contractor. For contracts which include the pay item for Inertial Profiler, PCCP, refer to Section 11 of these Instructions which contain comprehensive information on Pavement Smoothness utilizing the IRI index and Inertial Profiler equipment. The PEMS or a designated representative should be present to observe PCCP smoothness checking operations to see that compliance with the SS is maintained.

When the Inertial Profiler, PCCP pay item in included in the contract, it is only used to measure smoothness on lanes meeting all requirements of 501.25 and on areas not exempted by the requirements of ITM 917. The 16 ft straightedge is used to check the longitudinal profile at all other locations. The 10 ft straightedge is used to verify transverse slopes.

If there is no pay item in the contract for Inertial Profiler, PCCP, the 16 ft and 10 ft straightedges are required to be used for all newly placed QC/QA PCCP. The 16 ft and 10 ft straightedges are required to be used for all non-QC/QA PCCP. For either of the straightedge situations mentioned, QA smoothness calculations are not performed.

The Contractor is responsible for furnishing and operating the 16 ft straightedges while Department personnel are responsible for furnishing and operating 10 ft straightedges. Contractors are also responsible for providing, setup, maintenance, and removal of all traffic control required to safely operate the straightedge.

8.14 CLEANING PAVEMENT

When the paver is supported by an existing pavement while placing widening, adjacent slabs, or incidental construction, care shall be taken that all mortar and concrete drippings are carefully and completely removed from the existing pavement without marring or damaging the existing surface.

8.15 SEALING CRACKS AND JOINTS

All cracks and joints must be sealed prior to discontinuing work for the winter or before opening the pavement to traffic.

Sealing of cracks and joints requires inspection and must be performed in accordance with applicable requirements of the SS.

Joints are to be thoroughly cleaned and inspected prior to sealing in accordance with Division 500 of the SS. All excess and unsightly sealing material shall be cleaned from the pavement surface.

8.16 PAVEMENT INSPECTION

Prior to opening a new pavement to traffic, the Contractor and the PEMS must inspect the pavement for any damage, including random cracks. All random cracking must be repaired prior to opening the pavement to non-construction traffic.

8.17 TEST BEAMS AND OPENING PAVEMENT TO TRAFFIC

For opening to equipment and traffic, the Contractor may choose to determine concrete strengths by using either the maturity meter or test beams. ITM 402 discusses the use of the maturity meter.

When test beams are used for opening to traffic, one or more sets of test beams will be made at each intersecting road and at any other location where the Contractor requests beams to control the cure period. The purpose of the beams at intersecting roads is to furnish a basis for allowing traffic across the new pavement.

Test beams are also required for trial batches when coal ash is used in the mix design and for all QC/QA PCCP mixtures.