

Amend **SECTION 411 – Portland Cement Concrete Pavement** to read as follow:

“SECTION 411 - PORTLAND CEMENT CONCRETE PAVEMENT

411.01 Description. This section describes constructing portland cement concrete (PCC) pavement, with or without reinforcement, on a prepared surface.

411.02 Materials.

Structural Concrete	601
Joint Filler	705.01
Joint Sealer	705.04
Reinforcing Steel	709.01
Curing Materials	711.01

411.03 Construction.

(A) Paving Plan. Submit paving plan no later than 30 days after contract award. Paving plan shall be complete and provide all information required. No partial submittal, except as noted, will be accepted. Partial submittals will be returned without review. The Engineer will review the paving plan in accordance with Subsection 105.04 – Review and Acceptance Process. Obtain acceptance of paving plan from the Engineer before starting any paving work including but not limited to any roadway excavation and subbase preparation and installation. Installation plan shall include but not be limited to the following:

(1) Type, make, model and number of all equipment to be used for placing, finishing, curing, saw cutting, and diamond grinding. Include a list of the equipment to be used and the number of equipment to be held in reserve in anticipation of breakdown.

(2) Provide details of:

- i. Traffic control, methods to protect the public.
- ii. Repair of non-compliant areas
- iii. PCC concrete placement, including proposed operational procedures, subgrade protection, delivery or pumping, leveling, finishing methods, etc.

- 47 iv. How weather conditions detrimental to the PCC will be
48 addressed, e.g., rain, hot weather, wind, humidity, etc.,
49 shall be monitored and addressed. Include assumed
50 temperature of concrete to be used in initial calculation
51 of evaporation rate.
52
53 v. Curing means and methods, equipment and materials.
54
55 vi. Saw cutting of PCC, list equipment, number of
56 equipment, manpower, how it will be determined when
57 to start cutting
58
59 vii. Diamond grinding, control of slurry and debris. Disposal
60 method and location.
61
62 viii. Construction operation sequence and location of
63 panels/blocks and order they will be constructed in.
64
65 (3) Saw cutting pattern plan.
66
67 (4) List of ACI Certified Flatwork Finisher and Technicians and a
68 copy of their certification.
69
70 (5) Testing laboratory to be used for all testing, testing methods to
71 be provided, qualifications of technician and laboratory. If a
72 commercial AMRL certified testing laboratory or technician is not
73 readily available on the island where the work is taking place the
74 Engineer may allow a non-certified AMRL testing laboratory or
75 technician to perform the tests. Provide documentation that an AMRL
76 laboratory does not exist on the island and submit qualifications of
77 testing laboratory or technician.
78
79 (6) Proposed concrete mix design, including expected strengths at
80 24-hours, 3, 7, and 28 days. If the opening of pavement is to be
81 scheduled for a time period other than the previously stated time
82 period submit test for that day to ensure the concrete will meet
83 requirements. Submit test results of both a trial mix conducted by
84 State-accepted testing laboratory using methods specified in
85 Subsection 601.03(B) – Design and Designation of Concrete.
86

87 The Engineer will review the paving plan for conformance with the
88 contract documents. Within 30 days after the paving plan receipt, the
89 Engineer will notify the Contractor if the paving plan is acceptable or if
90 additional information is required, or there is a need for clarification, and if
91 applicable, changes necessary to meet requirements of the contract
92 documents. The Engineer may reject parts of or the entire paving plan if
93 found unacceptable. Resubmit entire paving plan with changes for

re-evaluation within 30 days. The Engineer will have the same amount of time for the review of each resubmitted paving plan as it did for the original submittal. Submit revised paving plan until it is acceptable to the Engineer. Any delay due to the paving plan not being acceptable is solely a Contractor's delay and no additional compensation or contract time will be granted. However, if the Engineer's review and acceptance of the paving plan exceeds the 30 days allowed for the review of each version of the paving plan, additional time and compensation may be claimed for. Procedural acceptance given by the Engineer is subject to trial in the field.

(B) Equipment.

(1) Batching Plant and Mixers. Batching plant and mixers shall conform to Section 601 - Structural Concrete.

(2) Hauling Equipment. Hauling equipment shall conform to Section 601 - Structural Concrete.

(3) Finishing Equipment.

Vibrators. Vibrators for full-width concrete consolidation may be either internal-type, with immersed tube or multiple spuds, or surface pan type. Vibrators shall be attached to spreader or finishing machine, or shall be mounted on separate carriage. Vibrators shall not come in contact with reinforcement, load transfer devices, subgrade, and side forms. Vibrators shall not be dragged horizontally through the concrete, when moved they shall be lifted out of the concrete and placed perpendicular to the concrete surface.

Furnish vibrators that operate at frequencies not less than the following: 3,500 impulses per minute for surface vibrators; and 5,000 impulses per minute for internal and hand vibrators. Furnish tachometer for measuring and indicating vibration frequencies along with a test certifying to the tachometer's accuracy.

(4) Concrete Saw. If sawed joints are specified or elected by the Contractor, furnish power-driven concrete saws sufficient in number, power, and type of blade to cut joints. Provide at least one back-up saw and replacement blades during concrete sawing operations. Equip saws with blade guards and guides or devices to control alignment and depth. Remove all cuttings, slurry, and other by-products of the sawing operations immediately from the sawed surface and from the work site.

(C) Preparing the Proper Grade. Trim beyond edges of proposed

concrete pavement to accommodate forms and slip-form paving equipment. Fill and compact areas that are below established grade with subgrade or base course material, in lifts up to 1/2 inch, for widths of 18 inches on both sides of form base. Tamp and trim areas above established grade, as necessary.

(D) Setting Forms. Adjacent existing pavement shall serve as form and guide during placement of concrete. At least one working day prior to placing concrete, notify the Engineer that forms are ready for inspection.

(E) Conditioning of Subgrade or Base Course. Unless waterproof cover material is indicated in the contract documents, keep subgrade and base course uniformly moist before placing concrete.

(F) Handling, Measuring, and Batching Materials. Handle, measure, and batch materials in accordance with Section 601 - Structural Concrete.

(G) Mixing Concrete. Mix concrete in accordance with Section 601 - Structural Concrete.

(H) Mixing Limitations and Water Supply. Provide for adequate natural or artificial lighting when mixing, placing, and finishing concrete.

Place mixed concrete only when concrete temperature is between 50 and 90 degrees F. Use Plastic Shrinkage Evaporation Chart ACI 305 as a guide to determine if additional precautions should be taken to prevent shrinkage cracks. Approximately 30 minutes prior to the scheduled start of concrete placement, at the project site and the location of concrete placement measure the ambient air temperature, relative humidity and wind velocity with industrial grade weather monitoring instruments to determine the on-site evaporation rate. Compute the evaporation rate by using the nomograph in the 305R Hot Weather Concreting or by using an evaporation rate calculator reviewed and accepted by the Engineer. The temperature of the concrete used in the initial calculation of the evaporation rate shall be the accepted value stated in the paving plan until sufficient data is obtained by current on-site testing to calculate a new value based on on-going pours. If the evaporation is, or is likely to become 0.1 lb/ft²/hr or greater, employ measures to prevent moisture loss such as but not limited to the application of evaporation retarder, application of supplemental moisture by fogging or reduction of the concrete temperature during batching, reduction of wind velocity or other means accepted by the Engineer that were included in the paving plan. Evaporation retarder shall be diluted at half the rate of the manufacturer's recommendation and shall not be used to finish concrete in the same manner that water would be, i.e., as a wetting agent, sprinkled on the concrete surface and then floated or towed. Sprinkling of water onto the concrete surface is not allowed. During the placement of the concrete recalculate evaporation rate every 15 minutes using new real-time data

including actual temperature of concrete being placed. Submit all data and calculations with a copy of the nomograph used to the Engineer within 24 hours or next working day. If an evaporation retarder's use is a mandatory part of the Contractor's accepted paving plan, the monitoring of the weather and concrete conditions and the use of the nomograph may have its frequency reduced to one test every 45 minutes provided, in the opinion of the Engineer, the application successfully prevented cracks in the UTW. Monitoring may be increased up to the required frequency again by the Engineer if directed.

Before placing concrete pavement, provide adequate supply of water for entire work period. Inadequate water supply will be sufficient cause for delaying or stopping mixing operations. If there is a water supply deficiency, give first water-use priority to curing concrete already placed before using water for mixing concrete.

(I) Placing, Consolidating, and Shaping Concrete.

Make advance arrangements for preventing delay in concrete delivery and placement. An interval of more than 45 minutes between placement of two consecutive batches or loads shall constitute cause for stopping paving operations and requiring construction joint to be placed, at no increase in contract price or contract time, at location and of the type ordered by the Engineer. Concrete not placed monolithically at the design thickness, unless specifically allowed by the contract documents, is defective work and shall be removed.

Prior to placing concrete, demonstrate proper adjustment of screeds, floats, slip-form pavers, or any other equipment used to level the concrete to its finish grade by measurements from grade stakes driven to known elevations or the accepted grade controls. Placement of concrete shall not start until this is done. Demonstrate satisfactory operation and adjustments of propulsion and control equipment, including pre-erected grade and alignment lines, by running slip-form pavers and finishing machines over 500-foot length of prepared subgrade or base course with propulsion and control equipment fully operational.

Unless otherwise indicated in the contract documents, construct pavement in full-lane widths separated by longitudinal weakened plane joints, or monolithically in multiples of full-lane widths, with longitudinal weakened plane joints at each traffic lane line. Deposit concrete with minimum of handling. Spread concrete uniformly over entire area between forms, without segregation, using mechanical spreader. Where hand methods are necessary due to pavement design, equipment breakdown, or other factors, use shovels, not rakes, for hand spreading. Place concrete continuously

between transverse joints without using intermediate bulkheads. Prohibit workers from walking in concrete with boots or shoes coated with earth or foreign substances.

Improperly proportioned concrete will be rejected. Remove and dispose of concrete rejected by the Engineer in accordance with Subsection 201.03(F) - Removal and Disposal of Material, at no increase in contract price or contract time.

Spread, consolidate, and shape concrete so that completed pavement will conform to thickness and cross-sectional requirements indicated in the contract documents.

Where concrete is to be placed adjacent to previously constructed pavement, keep mechanical equipment off previously constructed pavement until that concrete pavement has attained flexural strength of not less than 550 pounds per square inch when tested in accordance with AASHTO T 97.

Where concrete is being placed adjacent to existing pavement, provide that part of equipment supported on existing pavement, with protective pads on crawler tracks or rubber tired wheels; and offset bearing surface to run a sufficient distance from pavement edge to avoid breaking or cracking that edge.

(J) Test Specimens. Furnish concrete necessary for casting test beams and cylinders and for testing air and slump. Unless otherwise indicated in the contract documents, furnish, maintain, and clean beams or cylinder molds, or both. Beams or cylinder molds, or both shall conform to AASHTO T 23. Cure beams, as specified for pavement, in accordance with AASHTO T 23. For early opening to traffic, cure flexural test specimens at same time and in same manner as pavement.

Additional flexural strength test specimens will be required due to concrete placement conditions or to determine concrete strength where early opening of pavement to traffic is dependent on concrete strength test results.

(K) Striking-Off Concrete. After placement, strike off concrete to cross section indicated in the contract documents.

(L) Joints. Construct joint faces normal to pavement surface, as indicated in the contract documents. Use chalk line, string line, sawing template, or other methods to provide true joint alignment. Prior to contract acceptance, maintain joints free of soil, gravel, concrete or asphalt mix, and other foreign material except filler material.

Where sawing method is used to cut pavement grooves, use saw conforming to Subsection 411.03(B)(4) - Concrete Saw. Saw joints before

uncontrolled shrinkage cracking occurs, but only after concrete has hardened sufficiently to prevent excessive tearing or raveling, or both during sawing operations. Determining concrete readiness for sawing transverse contraction and longitudinal joints in accordance with requirements specified herein shall be the Contractor's responsibility. Cut grooves to minimum width possible for type of saw used, but limit groove width to 0.02 foot.

Once sawing has commenced for any day's concrete placement, continue sawing for 12 hours after placement. Should sawing fail to be completed within 12 hours of concrete placement, limit subsequent concrete placements to quantities that can be sawed in 12 hours. Restore curing membrane disturbed during sawing operations by spraying disturbed areas with additional curing compound.

Transverse Contraction Joints. Construct transverse contraction joints by forming or sawing grooves in pavement surface for the pavement's entire width. Dowel bars and assemblies are not to be installed on transverse contraction joint.

Transverse contraction joints may be formed by depressing tool or device into plastic concrete before initial concrete set.

If uncontrolled shrinkage cracking occurs during or before joint sawing, modify sawing sequence accordingly or use other methods accepted by the Engineer. If necessary to eliminate uncontrolled shrinkage cracking, add more sawing units or use early entry concrete cutting machines with special blades that cut through relatively fresh concrete without needing water. Where transverse crack occurs prior to sawing and any point on crack is within 5 feet of planned transverse contraction joint, omit sawing planned joint.

Unless otherwise indicated in the contract documents, construct groove between depths of 1/3 to 1/4 of pavement thickness.

(M) Final Strike-Off, Consolidation, and Finishing.

(1) Sequence. Sequence operations as follows: strike-off, consolidate, float, remove laitance, straightedge, and perform final surface finish. Provide work bridges and other equipment necessary to reach pavement surface to inspect, straightedge, finish, and perform corrective work as necessary.

Finish concrete surface without adding water to surface.

(2) Hand Finishing.

Use portable screed to strike-off and screed concrete

329 Use metal screed or metal-reinforced screed, that is at least 2
330 feet longer than widest part of slab to be placed.

331
332 Consolidate concrete with hand-operated vibrator.

333
334 Move screed along forms in forward motion that combines
335 longitudinal and transverse shearing motion without raising either end
336 from side forms. Repeat this strike-off process until pavement is true
337 to grade and cross section, and surface texture is uniform and free of
338 porous areas.

339
340 **(3) Floating.** After striking off and consolidating concrete, use
341 float to finish surface to specified grade and smoothness. Use one of
342 the following methods:

343
344 **(a) Hand Method.** Use hand-operated, longitudinal float at
345 least 12 feet long and 6 inches wide and sufficiently rigid to
346 retain its shape. Operate longitudinal float from footbridges.
347 Work float in sawing motion while holding it in position parallel
348 to road centerline and passing it gradually from one side of
349 pavement to the other.

350
351 Move ahead along pavement centerline, advancing not
352 more than one-half of float length. Waste excess water and
353 laitance over side forms on each pass.

354
355 **(b) Mechanical Method.** Adjust tracks and float to required
356 crown. Coordinate float with adjustments of transverse
357 finishing machine so that small quantity of mortar is maintained
358 ahead of float. Operate float over pavement as few times and
359 at such intervals as is necessary to produce surface of uniform
360 texture. Excessive operation over a given area will not be
361 allowed. Waste excess water and laitance over side forms on
362 each pass.

363
364 **(c) Alternate Mechanical Method.** Use equipment with
365 cutting and smoothing float or floats, suspended from and
366 guided by rigid frame mounted on four or more visible wheels.
367 Maintain constant contact of all four wheels with forms.

368
369 After mechanical floating, use hand method to fill
370 open-textured areas in pavement or if the method does not
371 provide an acceptable finish.

372
373 **(4) Straightedge Testing and Surface Correction.** After
374 completing floating and removing excess water and laitance, correct
375 surface irregularities while concrete is plastic. Fill, strike-off,

consolidate, and refinish depressions. . Utilize a 12-foot wide "bump cutter" to shape plastic concrete. Cut down and refinish high areas. Smooth surface across joints to tolerances indicated in the contract documents.

Test concrete surface for trueness using 12-foot straightedge swung from handle that is 3 feet longer than one-half of slab width. Hold straightedge in contact with surface in successive positions parallel to road centerline. Test entire pavement width, moving from one side of slab to the other, as necessary. Advance testing operation along road, in successive stages of not more than one-half straightedge length.

(5) Final Finish. After surface sheen has disappeared, texture pavement surface without tearing it. Texture final surface using artificial turf drag followed immediately by metal comb transverse grooving device.

Use artificial turf made of molded polyethylene with synthetic turn blades measuring approximately 0.85 inches long and containing approximately 7,200 individual blades per square foot. Submit sample of artificial turf at least five working days before production.

Attach artificial turf to self-propelled equipment having external alignment control. Device shall be separate piece of equipment to be used exclusively for texturing operation and shall not be attached to other paving-train equipment. Artificial turf shall be approximately the full width of paving and of sufficient size that during the longitudinal artificial turf drag operation, approximately two to four feet of turf, measured parallel to pavement centerline, is in contact with pavement surface. Increase or decrease the depth of the artificial turf drag by increasing the length of the artificial turf being drawn on the concrete surface or apply weight uniformly across the artificial turf. Maintain downward pressure on pavement surface with turf, so as to achieve uniform texturing parallel to the lane's centerline without measurable variations in pavement profile. Adjust timing of the operation if the surface is so wet or plastic that the ridges formed by the artificial turf flows back into the valleys when the drag has passed, nor should dragging be delayed until the concrete is so hard that sharp ridges cannot be formed by the drag. When artificial turf texturizing machine is stopped do not leave the artificial turf on the concrete, raise the artificial turf off the concrete. If the concrete hardens on the artificial turf remove harden concrete or replace artificial turf.

In addition to the artificial turf drag, grooving (tining) shall be done immediately after the artificial turf drag is performed by a self-

propelled mechanical device (grooving device) having an external alignment control and capable of grooving the entire width of pavement being paved in single pass at uniform speed. The grooving device shall be a separate piece of self-propelled equipment to be used exclusively for texturing operation and shall not be attached to other paving-train equipment. The metal comb which creates the tining marks shall include a single line of evenly spaced, tempered spring steel tines of size and stiffness sufficient to produce grooves of specified dimensions in plastic concrete without edge slumping and severe surface tearing. Adjust comb or use other methods so if structural fiber reinforcement is used displacement or pulling of those fibers is minimal. Operate grooving device to produce a uniform pattern of grooves parallel to pavement centerline. If the surface is tearing, the contractor shall decrease the speed of tining or move the tining machine closer to the paver or make whatever adjustments needed to prevent the tearing. If the tined grooves are slumping, i.e., the surface is so wet or plastic that the ridges formed flow back into the valleys when the tine has passed or the concrete is not stiff enough; the contractor shall move the tining machine away from the paver. If the grooves are not deep enough, the contractor shall adjust the machine or move it closer to the paver or correct its timing if the concrete is so hard that sharp ridges cannot be formed by the tining machine. Inspect the tining comb before each use to ensure that it is clean; all tines are aligned and spaced correctly. Clean and repair tine comb as needed before use in order to have tining marks meet the contract documents requirements. Tine marks shall have in the harden pavement surface a uniform tine spacing of 0.75 inch between centers, 1/8 inch deep, and a tine width of 1/8 inch.

The timing of the tining operation shall be coordinated with the artificial turf dragging operation and adjusted for conditions to produce a grooves with uniform depth and grooves that are sharp and well-defined. The finished surface shall be free from rough or porous areas, irregularities, and depressions resulting from improper handling of the tining machine and artificial turf dragging operation.

Tining and artificial turf drag shall be parallel and aligned to the center line of the lane.

Small areas may be textured manually when accepted by the Engineer.

(6) Edging at Joints. After final finish, tool pavement edges to radius of 1/4 inch, along both sides of each slab; and on both sides of

transverse expansion joints, formed joints, and construction joints.
Produce smooth, dense mortar finish.

Eliminate tool marks on slab, next to joints. Avoid disturbing
rounding of slab corners. Remove concrete from joint filler top.

Before concrete sets, test joints with straightedge and correct
unevenness between joints and adjacent slabs.

(N) Surface Test. Perform surface tests not more than 14 days following
concrete placement and before opening pavement to the public. Finished
pavement shall conform to all of the following requirements:

Conduct surface test using 12-foot straightedge at locations
determined by the Engineer. When straightedge is laid on finished
pavement in direction parallel or normal to centerline, surface shall
not vary more than 1/4 inch from lower edge.

(O) Curing. After finishing operations have been completed and as soon
as marring of concrete will not occur, cure entire newly placed concrete
surface and edges in accordance with one of the methods described in this
subsection. When curing requires use of water, assign highest priority for
project water supply allocation to curing operations. Suspend concrete
operations if there is insufficient cover material or water supply for curing and
other project requirements. Do not leave concrete exposed for more than 30
minutes between stages of curing or during curing period. Use atomized fog
spray to place water into the air to increase the humidity as an interim cure or
other methods accepted by the Engineer until final curing medium is in place.
Cure concrete for at least 72 hours immediately after finishing operation.
When water is used the water shall not change the water/cement ratio of any
portion of the concrete.

(1) Cotton or Burlap Mats. Cover surfaces to be cured with
cotton or burlap mats having dimensions that when placed, extend at
least 2 feet beyond edges of concrete strip placed. Overlap mats at
least 6 inches. Place and maintain mats in complete contact with
surface being cured, throughout curing period. Keep mats fully moist
and in position for entire portion of required cotton or burlap curing
period. Dried mats may be cause of rejection of the affected
concrete. Address any run-off water in the BMP plan required in
Section 209.

(2) Waterproof Paper. Thoroughly wet pavement surface and
edges before placing paper. Cover surfaces to be cured with
waterproof paper, sized to extend when sheets are placed, at least 2
feet beyond edges of concrete strip; or sized to match pavement
width and supplemented with 2-foot paper edge strips. Overlap

517 sheets at least 18 inches. Place and maintain paper in complete
518 contact with surface being cured, throughout curing period. When
519 sheets are laid longitudinally, seal paper so that it does not open up or
520 separate during curing period.
521

522 **(3) White-Pigmented Curing Compound.** Immediately after
523 finishing surface and before concrete set has taken place, spray
524 uniformly surfaces to be cured with white-pigmented curing
525 compound. When cotton or burlap mats are used to initially cure
526 pavement, apply white-pigmented curing compound upon removal of
527 mats. Do not apply curing compound during and immediately after
528 rainfall.
529

530 Use fully atomized mechanical sprayer equipped with tank
531 agitator and wind guard to apply curing compound, under pressure, at
532 rate of at least one gallon per 100 square feet. Before spraying,
533 compound shall be in thoroughly mixed condition with pigment
534 uniformly dispersed throughout vehicle. Mechanically agitate
535 compound continuously during application. Hand-pump sprayers will
536 be allowed only for spraying irregular widths and shapes and concrete
537 surfaces exposed by form removal. Do not apply curing compound to
538 inside faces of joints to be sealed. Sprayed surface when curing
539 compound has dried shall have no holidays or areas that are not
540 colored white by the curing compound. If surface is not white in color
541 immediately reapply and keep reapplying curing compound until
542 surface is white and remains white for the entire curing period.
543 Provide means to verify application rate.
544

545 If curing film is damaged during required curing period,
546 immediately repair damaged portions with additional curing
547 compound. Upon removal of side forms, immediately protect exposed
548 slab edges with curing treatment equivalent to that provided for
549 pavement surface. After saw cutting the joints and the removal of all
550 concrete residue apply curing compound to the joint to seal the newly
551 sawed concrete surface.
552

553 Before concrete is poured against a surface that has curing
554 treatment applied to it the curing treatment shall be completely
555 removed. Care shall be taken during the removal of the curing
556 compound not to disturb the aggregate material under the concrete
557 slab or undermine the slab.
558

559 **(4) White Polyethylene Sheeting.** Cover surfaces to be cured
560 with polyethylene sheeting, sized to extend when sheets are placed,
561 at least 2 feet beyond edges of concrete strip. Overlap sheets at least
562 18 inches. Place and maintain sheeting in complete contact with
563 surface covered, throughout curing period.

564
565 **(P) Sealing Joints.** Clean and seal joints after completion of curing
566 period and before pavement is opened to traffic. Clean each joint thoroughly
567 of foreign matter, including debris, dirt, dust, concrete, saw cuttings, and
568 curing material. Collect and dispose of all removed material.

569
570 Dry joint surfaces before sealing joint. Apply sealing material as
571 indicated in the contract documents. If hot sealer is used, stir material during
572 heating to prevent localized overheating. Pour sealing material without
573 spilling on exposed concrete pavement surfaces. Immediately remove and
574 clean excess material from pavement surface. Use of sand or similar
575 material as a cover for sealing material will not be allowed.

576
577 **(Q) Protection of Pavement.** Protect pavement and its appurtenances
578 from public and construction traffic. Protection shall include using flaggers to
579 direct traffic; and erecting and maintaining warning signs, lights, pavement
580 bridges, and crossovers.

581
582 Where indicated in the contract documents, construct pavement
583 crossings for convenience of public traffic in accordance with Subsection
584 104.09 - Maintenance of Traffic.

585
586 Furnish and install materials for edge and surface protection of
587 unhardened concrete. Edge protection materials include standard metal
588 forms and wood planks having nominal thickness of not less than 2 inches
589 and nominal width of not less than pavement-edge thickness. Surface
590 protection materials include burlap or cotton mats, curing paper, and plastic
591 sheeting. Stop paving operations when rain appears imminent.

592
593 Repair or replace damaged pavement before final acceptance.

594
595 **(R) Opening to Traffic.** Allow traffic on pavement when test specimens
596 conforming to Subsection 411.03(J) - Test Specimens have attained flexural
597 strength of 550 pounds per square inch when tested in accordance with
598 AASHTO T 97. Traffic will not be allowed on pavement sooner than seven
599 days after concrete placement, regardless of strength attainment.

600
601 Clean, sign, mark pavement properly, install all safety devices and
602 clear pavement of obstructions before opening roadway to public traffic.

603
604 Construction traffic, equipment, and materials will not be allowed on
605 pavement during the curing period and before the time designated and
606 accepted in the paving plan.

607
608 Should the Contractor open the pavement to traffic before all testing is
609 complete the contractor is to provide traffic control for all testing being
610 performed and the preparation of the test locations at no additional cost.

611 Provided labor, material and equipment to prepare the area to be tested as
612 directed by the engineer at no additional cost. Flexural strength testing shall
613 be completed and meet required time and strength requirements before
614 opening pavement to traffic.
615

616 **(S) Pavement Thickness.** The Engineer will determine coring locations
617 and observe coring operation. The Engineer will check thickness of
618 pavement by cores obtained by the Contractor in accordance with
619 AASHTO T 24. The Engineer will measure cores in accordance with
620 AASHTO T 148, except that measurement will be taken to nearest one
621 thousandth of an inch; and average of such measurements will be taken to
622 nearest one hundredth of an inch. Take thickness core samples after
623 completion of corrective work.
624

625 The Engineer will remove non-PCC pavement materials from bottom
626 of core before determining pavement thickness.
627

628 Thickness core samples will be evaluated on basis of primary and
629 secondary units. Primary pavement unit is defined as that area of mainline
630 pavement placed in each day's paving operations, but not to exceed 1,300
631 square yards. Each ramp, including tapers, each intersection, and each
632 crossover will be considered separate primary units. Drill one core for each
633 primary unit. The Engineer will determine the location of all cores.
634

635 Secondary pavement unit is defined as 1,000 linear feet, or fraction
636 thereof, of each mainline traffic lane and each shoulder in each primary unit.
637 Additionally, each 1,300 square yards or fraction thereof, of pavement in
638 ramps, tapers, intersections, and crossroads will be considered secondary
639 units, regardless of when concrete was placed. Drill one core for each
640 secondary unit.
641

642 When the primary or secondary unit core is deficient by more than 0.2
643 inch but less than 0.6 inch, drill two additional cores within same secondary
644 unit. Length of initial and two additional cores will be averaged.
645

646 When the primary or secondary unit core is deficient by more than 0.6
647 inch, that core will not be used to determine average thickness of the primary
648 or secondary unit. Drill additional cores at intervals not exceeding 10 feet in
649 each direction from deficient core, measured parallel to centerline, until one
650 core is obtained in each direction, which is not deficient by more than 0.6
651 inch. Pavement thickness between these two additional cores will be
652 evaluated separately from balance of pavement in that lot.
653

654 Pavement limits for separate evaluation will be longitudinal weakened
655 plane or construction joint on each side of core and next transverse
656 weakened plane, construction, or expansion joint, beyond each of last two
657 cores. Unless the Engineer allows pavement within evaluation limits to

remain, remove and replace with pavement of specified thickness, at no increase in contract price or contract time. Drill one additional core in remaining portion of the primary or secondary unit. That portion will be evaluated separately for payment in accordance with provisions specified in Subsection 411.05 - Payment.

After replacing deficient pavement, drill one core at random in the primary or secondary unit beyond limits of replaced pavement and drill one core in replaced pavement. The Engineer will evaluate for payment, pavement represented by core taken beyond limits of replaced pavement in accordance with provisions specified in Subsection 411.05 - Payment.

Before filling, apply epoxy grout conforming to Subsection 712.04(B) - Epoxy Grout to core holes. Fill core holes completely with concrete accepted by the Engineer.

(T) Cracks and Other Defects in Pavement. The Engineer will inspect for cracks and other defects in the placed concrete pavement after a minimum of 60 days has passed since the day of installation. The contractor shall lightly wet the concrete surface and let the surface dry so that cracks in the pavement become visible. Repeat as often as required by the Engineer. Other defects in the pavement may be located by using means determined by the Engineer. Provide traffic control during the inspection as well as cleaning the pavement. All cracks and defects in the pavement shall be repaired using a method acceptable to the Engineer or if directed by the Engineer the pavement is to be removed and replaced.

(U) Certified Concrete Flatwork Finisher Requirement. Perform the placement, and finishing operations of concrete flatwork with a minimum ratio of one certified ACI Concrete Flatwork Finisher and Technician with 4,500 hours of acceptable work experience (certified craftsman) per three concrete finishers (concrete finishers without ACI Concrete Flatwork Finisher and Technician certification and 4,500 hours of acceptable work experience) at each location on the project site having flatwork done. The concrete flatwork shall be under the direct supervision of a certified craftsman. Designate the certified craftsman who will be supervising and responsible for determining the quality of the finish of the concrete flatwork being performed. No flatwork shall be performed without the required amount of certified craftsman present.

- a. Flatwork concrete is defined as any concrete work that requires tools or machines to be used during the placement and finishing operations of concrete. Concrete flatwork includes concrete work that requires a specified finishing, smoothness or rigid surface tolerances such as sidewalks, walkways, Portland cement concrete pavement, concrete white-topping, girder seats, pier caps, bridge decks, on-grade concrete slabs,

705 approach slabs, concrete overlays, and concrete repairs which
706 exceed one square foot per day.

707
708 b. Areas that are not considered flatwork concrete are the top of
709 foundations or structures that will have backfill material placed
710 directly on the concrete surface.

711
712 c. Submit copies of the craftsman's current ACI certification 30
713 days before concrete flatwork begins for the Engineer's review
714 and acceptance. The Engineer has the right to require the
715 removal, replacement, retraining and re-certification of a
716 certified craftsman if that person does not, in the opinion of the
717 Engineer, demonstrate the ability to place and finish concrete in
718 accordance with the practices recommended in the ACI
719 Concrete Flatwork Finisher Certification Program and to meet
720 the finishing standards required by the contract documents.

721
722 d. Any cost or impact to the contractor in providing, training,
723 certification, retraining, replacement or re-certification is
724 incidental to the contract items that require concrete flatwork.

725
726 **411.04 Measurement.** The Engineer will measure concrete pavement per cubic
727 yard in accordance with the contract documents.

728
729 **411.05 Payment.** The Engineer will pay for the accepted pay items listed below
730 at the contract price per pay cubic yard, as shown in the proposal
731 schedule. Payment will be full compensation for all the work prescribed
732 in this section and the contract documents.

733
734 The Engineer will pay for each of the following pay item when included in the
735 proposal schedule:

736	737 Pay Item	738 Pay Unit
739	Concrete Pavement, _____	Cubic Yard

740 The Engineer will pay for:

741
742
743 **(A)** 70 percent of the contract bid price upon completion of furnishing and
744 placing formed joints or cutting grooves in pavement.

745
746 **(B)** 30 percent of the contract bid price upon completion of cleaning up,
747 including removal of saw-cutting residue and the conforming results are
748 obtained for the pavement thickness.

749
750 When the primary or secondary unit core thickness is deficient by not more
751 than 0.2 inch from planned thickness, the Engineer will pay for that primary or

752 secondary unit at 100 percent.
753

754 When the primary or average secondary unit core thickness indicates
755 pavement thickness is deficient by more than 0.2 inch but not more than 0.6 inch,
756 the Engineer will determine pay for that the primary or secondary unit at an adjusted
757 price that will be the final adjusted price after adjustments have been made for other
758 deficiencies, if any are applicable.
759

760 The Engineer will not pay for pavement allowed to remain with thickness
761 deficiency greater than 0.6 inch.
762

763 When the Engineer determines that thickness-deficient areas warrant
764 removal, remove and replace those areas with concrete having thickness indicated
765 in the contract documents. Replacement pavement will be in accordance with
766 requirements of Subsection 411.03(T) - Pavement Thickness and this subsection.
767

768 The Engineer at its sole digression may subtract from the monthly payment
769 the amount previously paid for work that is found non-conforming.”
770
771
772
773
774
775

776 **END OF SECTION 411**