

SECTION 411 - PORTLAND CEMENT CONCRETE PAVEMENT

411.01 Description. This work includes constructing pavement made up of portland cement concrete (PCC), with or without reinforcement, on a prepared subgrade or base course according to the contract or ordered by the Engineer.

At the option of the Contractor, the Contractor may construct the pavement with equipment using stationary side forms or slip form paving.

411.02 Materials. Concrete shall have a minimum flexural strength, f'_r , of six hundred fifty (650) pounds per square inch and shall conform to Section 601 - Structural Concrete. Other materials shall conform to :

Joint Filler	705.01
Joint Sealer	705.04
Reinforcing Steel	709.01
Curing Materials	711.01

411.03 Construction Requirements.

(A) Proportioning. The Contractor shall base the proportioning on the predetermined cement content or designed for minimum flexural strength as specified in the contract. The Contractor shall submit the proportions of the materials for acceptance by the Engineer.

The Contractor shall determine the slump according to AASHTO T 119 and air content according to AASHTO T 152. The Contractor shall make, cure, and test the test specimens according to AASHTO T 23, T 22 and T 97, and the cement content according to AASHTO T 121.

The Contractor shall state the proportions in terms of aggregates in a saturated surface-dry condition. The Contractor shall adjust the batch weights periodically to take into account the actual moisture of the aggregates at the time of use. The designated proportions govern during the progress of the work except in the following:

(1) the Contractor shall not make changes in the sources or character of the materials without due notice to the Engineer. The Contractor shall not use the new materials until the Engineer designates and accepts the new proportions based upon laboratory tests and trial mixes.

(2) If the Contractor cannot produce concrete having the required consistency without exceeding the maximum allowable water-cement ratio specified, the Contractor shall increase the cement content ordered.

(3) If the Contractor cannot obtain concrete of the desired plasticity and workability with the proportions originally accepted, the Engineer will make such changes in aggregate weights as required provided the Contractor shall not change the original designated cement content except as specified in items (1) and (2) above.

(B) Equipment. The Engineer will examine the equipment and tools necessary for handling materials and doing the work for acceptance as to the design, capacity, and mechanical condition. The equipment shall be at the work site sufficiently ahead of the start of this activity for examination. The Contractor shall comply to the following:

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

(2) Hauling Equipment. Equipment for hauling concrete shall conform to Section 601 - Structural Concrete.

(3) Finishing Equipment.

(a) Finishing Machine. The finishing machine shall be self-propelled. When in operation, the Contractor shall equip the finishing machine with at least two (2) oscillating type transverse screeds supported by the forms. The finishing machine shall handle and finish the mixes required for this type of construction. The finishing machine shall not displace the reinforcement, side forms, or joints. The Engineer will base the final approval of the machine upon its performance during actual construction.

(b) Vibrators. Vibrators, for full width vibration of the concrete, may be either the surface pan type or the internal type with immersed tube or multiple spuds. The Contractor may attach the vibrators to the spreader or the finishing machine or mounted on a separate carriage. The vibrators shall not come in contact with the reinforcement, load transfer devices, subgrade, or side forms. The Contractor shall operate the vibrating equipment according to the manufacturer's recommended frequency. However, the frequency of the surface vibrators shall not be less than three thousand five hundred (3500) impulses per minute and the frequency of the internal type shall not be less than five thousand (5000) impulses per minute. Hand vibrators shall have a frequency of not less than five thousand (5000) impulses per minute. The Contractor shall furnish a tachometer or other acceptable device for measuring and indicating the frequency of vibration.

(c) Machine Floats. Mechanical floats shall be self-propelled. The Contractor shall design the mechanical floats to finish pavement smoothly and true to grade. Mechanical floats shall run either on side forms or on adjacent lanes of concrete.

The Contractor shall construct the floats of hardwood, steel, or steel-shod and equip the floats with devices to permit adjusting the underside of a true flat surface.

(d) Slip-Form Pavers. Slip-form pavers shall be self-propelled. The Contractor shall equip the slip-form pavers with traveling side forms of sufficient dimensions, shape and strength to produce pavement of the required cross section. Slip-form paving equipment shall spread, consolidate and screed freshly placed concrete so that the Contractor will require a minimum of handwork to produce a dense homogeneous pavement true to the cross section and profile within the specified tolerances.

The Contractor shall equip the slip-form paver with high frequency internal vibrators for the full width. The Contractor may mount the vibrators with their axis parallel or normal to pavement alignment. When vibrators are mounted with their axis parallel with the pavement alignment, the Contractor shall space the vibrators at an interval not to exceed two and a half (2-1/2) feet measured center to center. When vibrators are mounted with their axis normal to the pavement alignment, the Contractor shall space the vibrators so that the lateral clearance between individual vibrating units does not exceed 0.5 feet.

The Contractor shall design the slip-form paver so that the longitudinal axis at the center of each vibrating unit is not more than 0.5 feet above the pavement grade while the Contractor is spreading, compacting, and shaping the pavement.

The vibration rate of each vibrating unit shall be not less than five thousand (5000) cycles per minute. The Contractor shall furnish a tachometer or other suitable device to measure the frequency of vibration.

The Contractor may design the equipment to complete the paving operations with one (1) machine or may consist of a mechanical spreader followed by a separate power unit.

(4) Concrete Saw. When sawing joints is elected or specified, the Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing with a water-cooled diamond edge saw blade or an abrasive wheel to the required dimensions and at the required rate. The Contractor shall provide at least one (1) standby saw in good working order. The Contractor shall maintain an ample supply of saw blades at the work site during sawing operations. The Contractor shall provide adequate artificial lighting facilities for night sawing. This equipment shall be on the work site both before and continuously during concrete placement.

(5) **Forms.** The Contractor shall make the straight side forms of a metal having a thickness of not less than seven-thirty-secondth ($7/32$) inch. The Contractor shall furnish the straight side forms in sections not less than ten (10) feet in length. Forms shall have a depth equal to the prescribed edge thickness of the concrete and a base width equal to at least eighty (80) percent of the specified pavement thickness. The Engineer will not allow horizontal joint unless accepted by the Engineer as a built-up form. Each form section shall be straight and free from bends and warps. No section shall show a variation greater than one-eighth ($1/8$) in ten (10) feet from the true plane on the top, and one-fourth ($1/4$) inch in ten (10) feet along the face of the form. The method of connecting form sections shall insure tight, neat joint. Side forms shall be of sufficient rigidity in the form and in the interlocking connection with adjoining forms such that springing will not occur under the weight of the subgrading and paving equipment or from pressure of concrete. The Contractor may use built-up metal forms by rigidly attaching a wood or metal section of suitable width and thickness to the bottom of the form providing an increase in depth of not more than twenty (20) percent.

The Contractor shall use the flexible or curved forms of proper radius for curves of one hundred (100) foot radius or less. The Contractor may use the straight steel forms in sections of ten (10) feet or less in length for form lines having a radius greater than two hundred (200) feet. The Engineer will permit special forms of wood or steel for curved form lines having a radius of two hundred (200) feet or less. Where the use of standard pavement forms are impracticable, the Contractor shall submit working drawings for acceptance. Five (5) feet long straight steel form section will be acceptable for curved form lines having a radius of not less than one hundred (100) feet.

Forms shall be of sufficient rigidity to prevent distortion in edge alignment due to pressure of concrete. The Contractor shall not use the wood forms as a track for operating paving and finishing equipment.

(C) **Preparation of Grade.** After the Contractor has graded and compacted the roadbed, the Contractor shall trim the grade approximately to correct elevation, extending the work at least two (2) feet beyond each edge of the proposed concrete pavement.

The Contractor shall grade and maintain the track path in a smooth compacted condition until the pavement is constructed.

(D) **Setting Forms.**

(1) **Base Support.** The foundation under the forms shall be hard and true to grade so that the form, when set, shall be firmly in contact for its whole length and at the specified grade. The

Contractor shall fill the grades found below established grade with granular material in lifts of half (1/2) inch or less for a distance of eighteen (18) inches on each side of the base of the form, and thoroughly compacted. The Contractor shall correct the imperfections or variations above grade by tamping or trimming as necessary.

(2) **Form Setting.** The Contractor shall set the forms sufficiently ahead of concrete placement to provide time to check the line and grade and provide a continuous concrete placement operation. After the Contractor have set the forms to correct grade, the Contractor shall tamp the grade thoroughly, mechanically or by hand, at both the inside and outside edges of the base of the forms. The Contractor shall stake the forms into place with not less than three (3) pins for each ten (10) foot section. The Contractor shall place a pin at each side of every joint. The Contractor shall lock the form sections tightly from play or movements. The forms shall not deviate from true line by more than quarter (1/4) inch. The Contractor shall set the forms so that the forms will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. The Contractor shall clean and coat the forms with a form release agent or oiled before the Contractor places the concrete.

(3) **Grade and Alignment.** The Contractor shall check and correct the alignment and grade elevations of the forms immediately before the Contractor places the concrete. When the forms has been disturbed or grades has become unstable, the Contractor shall reset and recheck the form.

(E) **Conditioning of Subgrade or Base Course.** The Contractor shall bring the subgrade or base course to proper cross section. The Contractor shall trim the high areas to proper elevation. The Contractor may fill and compact the low areas to a condition similar to that of surrounding grade, or fill the low areas with concrete integral with the pavement. The Contractor shall maintain the finished grade in a smooth and compacted condition until the Contractor places the pavement.

If waterproof subgrade or base course cover material is not specified, the Contractor shall moisten the subgrade or base course uniformly and remove excess water standing in pools or flowing on the surface before the Contractor places the concrete.

(F) **Handling, Measuring and Batching Materials.** Handling, measuring and batching materials shall be according to Section 601 - Structural Concrete.

(G) **Mixing Concrete.** Mixing concrete shall be according to Section 601 - Structural Concrete.

(H) **Limitations of Mixing.** The Contractor shall not mix, place, or finish the concrete when the natural light is insufficient, unless an adequate and acceptable artificial lighting system is operated.

Before the Contractor places concrete pavement, the Contractor shall develop a good and sufficient supply of water and have water available throughout the work. An inadequate water supply will be cause for delaying or shutting down the concrete mixer. In case of a deficiency of water, the Contractor shall use the water available for curing the concrete already placed.

The Contractor shall make advance arrangements to prevent delay in delivery and placing of the concrete. An interval of more than thirty (30) minutes between placing of two (2) consecutive batches or loads of concrete shall constitute cause for stopping paving operations. If concrete operations are suspended for such cause, the Contractor shall make a joint at no cost to the State at the location and of the type ordered by the Engineer in the concrete already placed and according to Subsection 411.03(L) - Joints.

(I) **Placing Concrete.** The Contractor shall deposit the concrete on the grade as to require as little rehandling as possible. If truck mixers, truck agitators, or nonagitator hauling equipment are not equipped with means for discharge of concrete without segregation of the materials, the Contractor shall unload the concrete into an acceptable spreading device and spread the concrete mechanically on the grade as to prevent segregation of the materials. The Contractor shall place the concrete continuously between transverse joints without the use of intermediate bulkheads. The Contractor shall do the necessary hand spreading with shovels and not with rakes. The Contractor shall not allow the workers to walk in the freshly mixed concrete with boots or shoes coated with earth or foreign substances.

The Contractor shall construct the pavement in twelve (12) foot traffic lane widths separated by contact joints, or monolithically in multiples of twelve (12) foot traffic lane widths, with a longitudinal weakened plane joint at each traffic lane line.

The Contractor shall place concrete while fresh. The Engineer will not permit the use of water for retempering concrete.

The Contractor shall not use concrete showing improper proportions of materials including water in the pavement. The Contractor shall remove and dispose of such unsatisfactory concrete at no cost to the State.

The Contractor shall spread, shape, and consolidate the concrete so that the completed pavement will conform to the thickness and cross section requirements of the contract. The Contractor may construct the sides of pavement on a batter not to exceed one (1) horizontal to six (6) vertical provided the top of the pavement is maintained at the specified width.

When the pavement being constructed is next to an existing parallel concrete pavement, the elevation of the new pavement surface shall conform as closely as possible to the elevation of the existing pavement surface to prevent ponding. Where concrete is placed adjacent to a previously constructed lane of pavement, the Contractor shall not operate the mechanical equipment on the existing lane of pavement until the existing pavement has obtained a strength of not less than five hundred fifty (550) pounds per square inch when tested according to AASHTO T97, Flexural Strength of Concrete (Using Simple Beam With Three Point Loading).

The Contractor shall construct the pavement using only that paving equipment that produces a finished surface meeting straightedge and profile index requirements specified in Subsection 411.03(M) - Final Strike-Off, Consolidation and Finishing and Subsection 411.03(N) - Surface Test. Failure of equipment to produce pavement that conforms to said requirements will constitute cause for stopping placement of concrete until the deficiency or malfunction is corrected.

When concrete is being placed adjacent to an existing pavement, the Contractor shall equip that part of the equipment supported on existing pavement with protective pads on crawler tracks or rubber tired wheels with the bearing surface offset to run a sufficient distance from the pavement edge to avoid breaking or cracking that edge. Spreading, compacting, and shaping shall also conform to the following:

(1) Stationary Side Form Construction. The Contractor shall spread, shape, and consolidate the concrete by one (1) or more machines. These machines shall uniformly distribute and consolidate concrete without segregation so that the completed pavement will conform to required cross section with a minimum of hand work. The number and capacity of machines furnished shall be adequate to do the work required at a rate equal to that of concrete delivery.

The Contractor shall consolidate the concrete for full paving width effectively by means of high frequency internal vibrators. Vibrators shall not rest on new pavement or side forms. The Contractor shall connect the power to vibrators so that vibration ceases when forward or backward motion of the machine is stopped.

The Contractor shall spread and shape the concrete for exit ramp termini, truck weight stations, ramps and connectors with steep grades and high rates of superelevation, short sections of city or county streets and roads, and concrete required to be placed in short lengths or in widths other than multiples of twelve (12) foot traffic lanes by suitable powered finishing machines supplemented by handwork as necessary. Consolidation of such concrete shall be by means of high frequency internal vibrators within fifteen (15) minutes after the concrete is deposited on the subgrade. The Contractor shall vibrate with care to assure adequate consolidation adjacent to forms and uniformly across the full

paving width. The Engineer will not permit the use of vibrators for extensive shifting of the mass of concrete. The Contractor shall discontinue the methods of spreading, shaping, and compacting that result in segregation, voids or rock pickets. The Contractor shall adopt methods that will produce dense homogeneous pavement conforming to required cross section.

(2) Slip Form Construction. Slip form paving equipment shall spread, consolidate and screed freshly placed concrete so that the Contractor will require a minimum of handwork to produce a dense homogeneous pavement true to the cross section and profile. The Engineer will not permit abrupt changes in longitudinal alignment of the pavement. The horizontal deviation shall not exceed 0.10 of a foot from the alignment established by the Engineer.

The Contractor shall consolidate the concrete for the full paving width effectively by means of high frequency internal vibrators. The Contractor shall operate the slip form paver with as nearly a continuous forward movement as possible. The Contractor shall coordinate the operations of mixing, delivering, and spreading the concrete to provide a uniform progress with stopping and starting of the paver held to a minimum. If, for any reason, the forward movement of the paver stops, the vibratory and tamping elements shall also cease immediately. The Contractor shall not apply the tractive force to the machine except those tractive force controlled by the machine.

(J) Test Specimens. The Contractor shall furnish the concrete necessary for casting test beams and cylinders without cost to the State. The Engineer will cure the beams as specified for pavement according to AASHTO T 23.

(K) Strike-Off of Concrete and Placement of Reinforcement. After placing the concrete, the Contractor shall strike off the concrete to conform to the cross section shown in the contract and to an elevation such that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown in the contract. When reinforced concrete pavement is placed in two (2) layers, the entire Contractor shall strike off the width of the bottom layer to such length and depth that the Contractor may lay the sheet of fabric or bar mat full length on the concrete in final position without further manipulation.

The Contractor shall then place the reinforcement directly upon the concrete, after which the Contractor shall place, strike off, and screed the top layer of the concrete. The Contractor shall remove and replace the portions of the bottom layer of concrete which the Contractor has placed more than thirty (30) minutes without being covered with the top layer with freshly mixed concrete at no cost to the State. When reinforced concrete is placed in one (1) layer, the Contractor may position the reinforcement ahead of concrete placement or the Contractor may place the reinforcement in plastic concrete, after spreading by mechanical or vibratory means.

For the reinforcing steel, Subsection 602.04 - Storage, Surface Condition and Protection of Reinforcement, shall apply.

(L) Joints. The Contractor shall construct the joints normal to the pavement surface of the type, dimensions, and at locations required by the contract.

(1) Longitudinal Joints. The width of the joint shall be as required with a depth of $d = t/4$ where:

d = minimum depth rounded up to the nearest 0.01-foot

t = thickness of pavement in each lane

When paving lanes are poured separately and a sawed longitudinal joint is required, the longitudinal joints shall be as required by the contract.

The Contractor shall place the deformed steel tie bars of the specified length, size, spacing and material perpendicular to the longitudinal joint at a target depth of $d = t/2$. The Contractor shall place the deformed steel tie bars by mechanical equipment. The Contractor shall secure the deformed steel tie bars rigidly by chairs or other supports to prevent displacement. The Contractor shall use thirty (30) inches long bar size number five (5) rebars and space thirty (30) inches center to center. Tie bars which are to be bent and later straightened shall be grade 40. The Contractor may require other sizes, grades, lengths, and spacing base on slab width, thickness and the type of underlying base. The Contractor shall not paint or coat the tie bars with asphalt or other material not enclosed in tubes or sleeves.

(a) Longitudinal Construction Joints. When adjacent paving lanes are constructed separately, the Contractor may bend the tie bars used in conjunction with keyways at right angles against the forms of the first lane constructed and straightened into final position before the concrete in the adjacent lane is placed or the Contractor may use acceptable two-piece connectors. If two-piece tie bar connectors are mechanically inserted during slip form paving, the Contractor shall maintain the proper alignment and adequate bond with the plastic concrete.

(b) Sawed Joint. The Contractor shall complete the sawing longitudinal joints within twelve (12) hours of paving and before the Contractor places concrete in subsequent adjacent lanes and before equipments or vehicles are allowed on the pavement.

(2) **Transverse Expansion Joints.** The expansion joint filler shall be continuous from form to form. The Contractor shall shape the expansion joint to the subgrade and to the keyway, if any, along the form. The Contractor shall furnish the preformed joint filler in lengths equal to the pavement width or equal to the width of one (1) lane. The Contractor shall not use damaged or repaired joint filler.

The Contractor shall hold the expansion joint filler in a vertical position to secure the preformed expansion joint filler at the proper grade and alignment during placing and finishing of the concrete. Finished joints shall not deviate more than quarter (1/4) inch in the horizontal alignment from a straight line. If joint fillers are assembled in sections, the Contractor shall not use the offsets between units. The Engineer will not permit plugs of concrete anywhere within the expansion space.

(3) **Transverse Contraction Joints.** Transverse contraction joints includes planes of weakness created by forming or cutting grooves in the surface of the pavement and, when shown on the plans, shall include load transfer assemblies.

(a) **Formed Joints.** The Contractor may use the formed joints made by depressing a tool or device into the plastic concrete, regardless whether the joints are to remain in or removed from the finished pavement, only with the written acceptance of the Engineer.

(b) **Sawed Joints.** The Contractor shall form the sawed contraction joints by cutting grooves in the pavement with an acceptable power saw and the width shall be the minimum width possible with the type of saw being used, not exceeding quarter (1/4). After each joint is sawed, the Contractor shall clean the sawed cut and adjacent concrete surface thoroughly.

The Contractor shall designate the first joint immediately after separation or transverse contact joint and every second planned transverse contraction joint as control joints. The Contractor shall saw them from four (4) to twelve (12) hours after the Contractor has placed the concrete. The Engineer will determine the exact time of sawing. If necessary and regardless of weather conditions, the Contractor shall continue the sawing operations day and night. The Contractor shall complete the sawing of transverse contraction joints before the Contractor places the concrete in adjacent lanes and before the Contractor permits permitting traffic on the pavement.

In succeeding lanes of concrete pavement, the Contractor shall saw transverse joints opposite those which have opened in the initial lane within twenty-four (24) hours after the Contractor has placed the concrete. The Engineer will determine

the exact time but the Contractor shall omit not more than (3) *
 consecutive planned transverse contraction joints. The *
 Contractor shall saw the remaining transverse contraction *
 joints after twenty-four (24) hours as the Contractor may *
 elect, except the Contractor shall complete the transverse *
 contraction joints before the Contractor places concrete in *
 adjacent lanes and before permitting traffic on the pavement. *

If a crack occurs within five (5) feet of a planned *
 transverse contraction joint, the Contractor shall omit sawing *
 of that joint. The Contractor shall discontinue sawing when a *
 crack develops in front of the saw. The Engineer will not pay *
 for the joints sawed in violation of these provisions. *

If the pavement is cured by curing seal, the Contractor *
 shall restore the portions of the seal that the Contractor *
 have disturbed by sawing operations by spraying the area with *
 additional curing seal. *

(c) Transverse Construction Joints. The Contractor shall *
 construct the transverse construction joints when an *
 interruption of more than thirty (30) minutes in the concrete *
 operations occurs. The Contractor shall not construct the *
 transverse joints within ten (10) feet of expansion joint, *
 contraction joint or plane of weakness. If the Contractor has *
 not mixed sufficient concrete at the time of interruption to *
 form a slab at least ten (10) feet long, the Contractor shall *
 remove and dispose of excess concrete back to the last *
 preceding joint as ordered at no cost to the State. *

(4) Load Transfer Devices. The Contractor shall install the load *
 transfer units, when required, at transverse joints. The load *
 transfer units includes dowel bars of a grade and size required by *
 the contract spaced on one (1) foot centers and held in position *
 with a wire basket or mechanically implanted. The Contractor shall *
 place the dowels at a depth of $d = t/2$ where: *

d = minimum depth rounded up to the nearest 0.01 foot |

t = thickness of pavement of each lane |

The Contractor shall place the dowels at this depth in the *
 pavement parallel to the surface and pavement edge with a tolerance *
 for such alignment of \pm quarter (1/4) inch per dowel. The *
 Contractor shall vibrate the concrete around dowel bars without *
 disrupting the alignment of the load transfer devices. The method *
 of dowel placement shall demonstrate that the bars are in the *
 proper location after the paving train has made its final pass over *
 the joint. The Contractor shall mark the center of the dowel *
 assembly properly on both sides of the pavement slab for reference *
 informing or sawing the contraction joint. |

The Contractor shall hold the dowels and preformed material for load transfer units in place with a wire basket that remains in the pavement. The Contractor shall furnish a metal dowel cap or sleeve on each dowel bar to accommodate the expansion. The Contractor shall equip the cap with a stop to prevent closing during pavement operation and the Contractor shall maintain a clearance of one (1) inch between the closed end of the cap and the end of the dowel to accommodate future movement of the concrete slab.

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

(1) **Sequence.** The sequence of operations shall be the strike-off and consolidation, floating and removal of laitance, straightedging, and final surface finish.

In general, the Engineer will not permit the application of additional water to the surface of the concrete to assist in finishing operations. If the application of water to the surface is permitted, the Contractor shall apply the water as a fog spray by means of an acceptable spray equipment.

(2) **Finishing at Joints.** The Contractor shall compact or firmly place the concrete adjacent to joints without voids or segregation against the joint material, under and around load transfer devices, joint assembly units, and other features designed to extend into the pavement. The Contractor shall vibrate the concrete adjacent to joints mechanically as required in Subsection 411.03(I) - Placing Concrete.

After the Contractor has placed and vibrated the concrete adjacent to the joint as required in Subsection 411.03(I) - Placing Concrete, the Contractor shall bring the finishing machine forward, operating to avoid damage or misalignment of the joints. If operation of the finishing machine, to, over, and beyond the joints causes segregation of concrete and damage to or misalignment of the joints, the Contractor shall stop the finishing machine when the front screed is approximately eight (8) inches from the joint. The Contractor shall remove the segregated concrete from in front of and off the joint; lift the front screed and set directly on top of the joint; and resume the forward motion of the finishing machine. When the second screed is close enough to permit the excess mortar in front of the screed to flow over the joint, the Contractor shall lift the screed and carry over the joint. Thereafter, the Contractor may run the finishing machine over the joint without lifting the screeds, provided there is no segregated concrete immediately between the joint and the screed or on top of the joint.

(3) Machine Finishing.

(a) Nonvibratory Method. The Contractor shall distribute or spread the concrete as soon as placed. As soon as the Contractor has placed the concrete, the Contractor shall strike off and screed the concrete by an acceptable finishing machine. The machine shall go over each area of pavement as many times and at such intervals as necessary to give the proper compaction and to leave a surface of uniform texture. The Contractor shall avoid excessive operation over a given area. The Contractor shall keep the tops of the forms clean by an effective device attached to the machine and maintain the travel of the machine on the forms true without lift, wobbling, or other variation tending to affect the precision finish.

During the first pass of the finishing machine, the Contractor shall maintain the a uniform ridge of concrete ahead of the front screed for its entire length.

(b) Vibratory Method. Vibrators for full width vibration of concrete paving slabs shall conform to Subsection 411.03(B)(3)(b) - Vibrators. If uniform and satisfactory density of the concrete is not obtained by the vibratory method, the Contractor shall furnish equipment and methods that produces pavement conforming to the contract. The provisions in Subsection 411.03(M)(3)(a) - Nonvibratory Method, not in conflict with the provisions for the vibratory method shall govern.

(4) Nonvibratory Method, Hand Finishing. The Engineer will not permit hand finishing methods except the following:

(a) If the mechanical equipment breaks down, the Contractor may use hand methods to finish the concrete already deposited on the grade when the breakdown occurs, or

(b) Where operations of the mechanical equipment is impractical such as narrow widths or areas of irregular dimensions, the Contractor may use had methods to finish the concrete.

The Contractor shall strike off and screed the concrete, as soon as placed. The Contractor shall use an acceptable portable screed. The Contractor shall provide a second screed to strike-off the bottom layer of concrete if reinforcement is used.

The screed for the surface shall be at least two (2) feet longer than the maximum width of the slab to be struck off. The screed shall be an acceptable design and sufficiently rigid to retain its shape. The Contractor shall construct the screed either of metal or of other suitable material shod with metal.

The Contractor shall attain consolidation by the use of a suitable vibrator or other acceptable equipment. *

In operation, the Contractor shall move the screed forward on the forms with a combined longitudinal and transverse shearing motion, moving always in the direction in which the work is progressing and so manipulated that neither end is raised from the side forms during the strike-off process. If necessary, the Contractor shall repeat this until the surface is of uniform texture, true to grade and cross section and free from porous areas. *

(5) **Floating.** After the Contractor has struck off and consolidated the concrete, the Contractor shall smooth, true, and consolidate the concrete further by a longitudinal float, using one of the following methods as specified or permitted. *

(a) **Hand Method.** The hand-operated longitudinal float shall not be less than twelve (12) feet in length and six (6) inches in width. The Contractor shall stiffen the hand-operated longitudinal float properly to prevent the float from flexing and warping. The Contractor shall work the longitudinal float with a sawing motion while the float is held in a floating position parallel to the road centerline and passing gradually from one side of the pavement to the other. The float shall operate from the foot bridges, rest on the side forms, and span without touching the concrete. Movement ahead along the centerline of the pavement shall be in successive advances of not more than half (1/2) the length of the float. The Contractor shall waste excess water or soupy material over the side forms on each pass. *

(b) **Mechanical Method.** The Contractor shall submit the design of the mechanical longitudinal float for acceptance by the Engineer. The mechanical longitudinal float shall be in good working condition. The Contractor shall adjust the tracks accurately to the required crown. The Contractor shall adjust the float accurately and coordinate the float with the adjustments of the transverse finishing machine so that a small quantity of mortar is carried ahead of the float. The Contractor shall adjust the forward speed so that the float shall lap the distance specified on each transverse trip. The float shall pass over each area of pavement at least two (2) times. The Engineer will not permit excessive operation over a given area. The Contractor shall waste the excess water or soupy material over the side forms on each pass. *

(c) **Alternate Mechanical Method.** As an alternative to Subsection 411.03(M)(5)(b) - Mechanical Method, the Contractor may use a machine composed of a cutting and smoothing float or floats, suspended from and guided by a rigid frame. The Contractor shall carry the frame by four (4) or more visible wheels riding on and constantly in contact with the side forms. *

If necessary, the Contractor may use the long-handled floats to smooth and fill in open-textured areas in the pavement. The floats shall have blades not less than five (5) feet in length and six (6) inches in width. The Contractor shall not use the long-handled floats to float the entire surface of the pavement in lieu of, one of the preceding methods of floating.

When the Contractor strike-off and consolidate by the hand method and the crown of the pavement does not permit the use of the longitudinal float, the Contractor shall float the surface transversely by means of the long-handled float. The Contractor shall take care not to work the crown out of the pavement during the operation. After floating, the Contractor shall remove the excess water and laitance from the surface of the pavement by a straightedge ten (10) feet or more in length. The Contractor shall lap the successive drags half (1/2) the length of the blade.

(d) Slip-Form Finishing. The Contractor shall give the pavement a preliminary float finish by devices incorporated in the slip-form paver. The Contractor may supplement these with suitable machine floats.

The Contractor shall correct the edge slump of pavement, exclusive of edge rounding, over 0.02 foot before concrete has hardened.

(6) Straightedge Testing and Surface Correction. After the Contractor has completed floating and removes the excess water removed, but while the concrete is still plastic, the Contractor shall test the surface of the concrete for trueness with a ten (10) foot straightedge. For this purpose, the Contractor shall furnish and use an accurate ten (10) foot straightedge swung from a handle three (3) feet longer than half (1/2) the width of the slab. The Contractor shall hold the straightedge in contact with the surface in successive positions parallel to the road centerline and the whole area gone over from one side of the slab to the other as necessary. Advance along the road shall be in successive stages of not more than half (1/2) the length of the straightedge. The Contractor shall fill the depressions found immediately with freshly mixed concrete, strike off, consolidate, and refinish. The Contractor shall cut down and refinish high areas. The Contractor shall give special attention to assure that the surface across joints meets the requirements for smoothness. The Contractor shall continue straightedge testing and surface corrections until the entire surface is found to be free from observable departures from the straightedge and the slab conforms to the required grade and cross section.

(7) **Final Finish.** After the Contractor have made straightedging *
and surface corrections and as soon as the water sheen has *
practically disappeared, the Contractor shall texture the pavement *
surface uniformly. The Contractor shall apply the final finish or *
texture by the use of an artificial turf drag followed immediately *
by a metal comb transverse grooving device. *

The Contractor shall make the artificial turf of molded *
polyethylene with synthetic turn blades approximately 0.85 inches *
long and contain approximately seven thousand two hundred (7,200) *
individual blades per square foot. The Contractor shall submit the *
artificial turf for acceptance by the Engineer. *

The Contractor shall attach the artificial turf suitably to an *
acceptable device that will permit control of the time and rate of *
texturing. The Contractor shall not attach this device to other *
pieces of equipment in the paving train. They shall be a separate *
piece of equipment use exclusively for the texturing operation. The *
artificial turf shall be full pavement width and of sufficient size *
that during the finishing operation, approximately two (2) feet of *
turf parallel to the pavement is laid so as to produce a uniform *
appearing surface meeting the acceptance of the Engineer. If *
necessary for maintaining intimate contact with the pavement *
surface, the Contractor may weigh the turf. *

The metal comb includes a single line of tempered spring steel *
spaced at three-fourths (3/4) inch centers. The Contractor shall *
mount the metal comb securely in a suitable head. The tines shall *
be of the size and stiffness sufficient to produce a groove of the *
specified dimension in the plastic concrete without slumping of the *
edge or severe tearing of the surface. The Contractor shall attach *
the metal comb to an acceptable mechanical device capable of *
transversing the entire pavement width in a single pass at a uniform *
speed. The Contractor shall operate the grooving device so as to *
produce a relatively uniform pattern of grooves perpendicular to the *
pavement centerline, spaced approximately three-fourths (3/4) inch *
centers, one-eighth (1/8) inch to three-sixteenth (3/16) inch deep, *
and 0.100 to 0.125 inch wide. Hand combs with steel tines shall be *
available for the purpose of providing a surface texture in event of *
breakdown of the mechanical comb. The Engineer may allow deviations *
from the stated dimensions provided the Contractor can produce a *
finish texture according to the contract. *

(8) **Edging at Forms and Joints.** After the final finish, but before *
the concrete has taken its initial set, the Contractor shall work *
the edges of the pavement along each side of each slab, on each side *
of the transverse expansion joints, and construction (contact) *
joints with an acceptable tool and round the above to a radius of *
quarter (1/4) inch. The Contractor shall produce a well-defined and *
continuous radius and a smooth, dense mortar finish obtained. The *
Contractor shall not disturb the surface of the slab unduly by *
tilting the tool during use. *

At joints, the Contractor shall eliminate the tool marks *
 appearing on the slab adjacent to the joints by brooming the *
 surface. In doing this, the Contractor shall not disturb the *
 rounding of the corner of the slab. The Contractor shall remove *
 the concrete on top of the joint filler completely. *

If one side of the joint is higher than the other or if the *
 joint are higher or lower than the adjacent slabs, the Contractor *
 shall test the joints with a straightedge before the concrete has *
 set and correction made. *

(N) Surface Test. The finished pavement shall conform to the following *
 requirements when tested by the Engineer not more than fourteen (14) *
 days following the placement of concrete: |

(1) The Contractor shall straightedge the pavement surface at *
 locations determined by the Engineer with a straightedge twelve *
 (12) feet long. When the straightedge is laid on a finished *
 pavement in a direction parallel with centerline or normal to *
 centerline, the surface shall not vary more than 0.25 inch from the *
 lower edge. |

(2) The Engineer will test the profile of the pavement surface *
 using a profilograph according to Hawaii Test Method HWY-TC 10 and *
 these provisions. The Engineer will make the profiles three (3) *
 feet from and parallel to each edge of pavement and at the *
 approximate location of each longitudinal joint. |

The Contractor shall be responsible to schedule profile *
 testing. The Contractor shall make the request for testing at *
 least seven (7) calendar days before testing. The Contractor shall *
 clean and clear the area to be tested of obstructions. The Engineer *
 will profilograph test up to two (2) times per pavement surface *
 test at no cost to the Contractor. The Contractor shall submit the *
 total area to be tested for acceptance by the Engineer. The *
 Engineer will do additional profilograph testing at a cost to the *
 Contractor at a rate of seven hundred fifty dollars (\$750) per test *
 per day. |

During the initial paving operations, either startup or after *
 a long shutdown, the Contractor shall furnish, operate, and test *
 the pavement surface using a California type profilograph as soon *
 as the concrete has cured sufficiently to allow testing. The *
 Contractor shall repair the membrane curing film damaged during the *
 testing operations as ordered by the Engineer. The Contractor and *
 the Engineer will use the initial profile testing to aid and *
 evaluate the paving methods and equipment. If an average profile *
 index of fifteen (15) inches per mile is exceeded, the Contractor *
 shall suspend the paving operations. The Engineer will not allow *
 the Contractor to resume until the Contractor takes corrective *
 action. The Engineer will test the subsequent paving operations *
 according to the initial testing procedures. |

The Contractor shall furnish paving equipment and employ methods that produce a riding surface having a profile index of ten (10) inches per mile or less, except as provided herein. The Contractor may accept the initial profiles up to fifteen (15) inches per mile with applicable price adjustments. The Engineer will not profile the pavements within fifteen (15) feet from each bridge approach slab or existing pavement that is joined by the new pavement. The Engineer will apply the surface requirement of Subsection 503.03(M)(3)(a) - Finishing Bridge Decks to these areas.

The Engineer will not profile the following areas of pavement:

(1) Pavement on horizontal curves having a centerline radius of curve less than one thousand (1,000) feet and pavement within the superelevation transition of such curves.

(2) Pavement for exit ramp termini, ramps and connectors with steep grades and high rates of superelevation and short sections of city and county streets and roads.

The Contractor shall reduce individual high points over 0.3 inch, as determined by measurements of the profilogram according to Hawaii Test Method HWY-TC 10, by grinding until such high points as shown by reruns of the profilogram do not exceed 0.3 inch.

After the Contractor has completed the grinding, the Contractor shall do additional grinding as necessary to reduce the Profile Index to values specified in any 0.1 mile section along any line parallel with the pavement edge.

The Contractor shall do additional grinding as necessary to extend the area ground in each lateral direction so the lateral limits of grinding are at a constant offset from and parallel to, the nearest lane line or pavement edge. Also, the Contractor shall do additional grinding as necessary to extend the area ground in each longitudinal direction so the grinding begins and ends at lines normal to the pavement centerline, within one ground area. Ground areas shall be neat rectangular areas of uniform surface appearance.

When pavement is ground, the Contractor shall not smooth or polish the finished texture. The Contractor shall cut the finished texture neatly, have uniformly spaced grooves, and in the direction ordered by the Engineer.

The Contractor shall grind by an acceptable machine. The Engineer will not permit bush hammers or other impact devices. The Engineer will consider grinding or grooving incidental to the concrete pavement. The Engineer will not make additional compensation.

The Contractor shall complete the corrective work before determining pavement thickness.

When the profile index does not exceed ten (10) inches per mile per 0.1 mile section, the Engineer will make payment at the contract unit price for the completed pavement. When the profile index exceeds ten (10) inches per mile per 0.1 mile section, the Contractor may elect to accept a contract unit price adjustment in lieu of reducing the profile index. The Engineer will make the contract unit price adjustment according to the following schedule:

INDEX PROFILE Inches per mile per 0.1 mile section	PRICE ADJUSTMENT Percent of pavement unit bid price
10 or less	100
Over 10 but less than 11	98
Over 11 but less than 12	96
Over 12 but less than 13	94
Over 13 but less than 14	92
Over 14 but less than 15	90
Over 15	Corrective work required

The Engineer will compute the unit bid adjusted price using the planned thickness of PCC pavement. This unit bid adjusted price will apply to the total area of the 0.1 mile section for the lane width represented by the profilogram.

(0) Curing. As soon as the Contractor completes the finishing operations and as soon as marring of the concrete does not occur, the Contractor shall cover and cure the entire surface of the newly placed concrete according to one of the following methods shown below. If curing requires the use of water, the curing shall have priority to water supplies. Failure to provide sufficient cover material or lack of water to take care of both curing and other requirements shall be cause for immediate suspension of the concrete operations. The Contractor shall not leave the concrete exposed for more than half (1/2) hour between stages of curing or during the curing period. The Contractor shall maintain the covering in place for seventy-two (72) hours after the Contractor has placed the concrete.

(1) Cotton or Burlap Mats. The Contractor shall cover the entire surface of the pavement with mats. The mats used shall be of such length or width that as laid they extend at least twice the thickness of the pavement beyond the edges of the slab. The Contractor shall place the mats so that the entire surface and both edges of the slab are completely covered. Before placement, the Contractor shall saturate the mats thoroughly with water. The Contractor shall place and weigh down the mats as to cause them to remain in intimate contact with the surface covered. The Contractor shall maintain the covering fully wetted and in position for the required period.

(2) **Waterproof Paper.** The Contractor shall cover the entire top surface and sides of the pavement with waterproofed paper. The Contractor shall lap the units at least eighteen (18) inches. The Contractor shall place and weigh down the paper as to cause the paper to remain in intimate contact with the surface covered. The paper shall have such dimensions that each unit laid shall extend beyond the edges of the slab at least twice the thickness of the pavement or of pavement width and two (2) foot strips of paper for the edges. If laid longitudinally, the Contractor shall securely seal the paper not manufactured in sizes which shall provide this width so that they do not open up or separate during the curing period. The Contractor shall thoroughly wet the surface of the pavement before the Contractor places the paper.

(3) **Impervious Membrane Method.** The Contractor shall spray the entire surface of the pavement uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. If the pavement is cured initially with jute or cotton mats, the Contractor may apply the white pigment curing compound upon removal of the mats. The Contractor shall not apply the curing compound during rainfall.

The Contractor shall apply the curing compound under pressure at the rate of one (1) gallon to not more than one hundred fifty (150) square feet by mechanical sprayers. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application, the Contractor shall stir the compound continuously by effective mechanical means. The Engineer will permit hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms. The Contractor shall not apply the curing compound to the inside faces of joints to be sealed.

-- If the curing film become damaged from causes within the required curing period, the Contractor shall repair the damaged portions immediately with additional compound. Upon removal of side forms, the Contractor shall protect the sides of the slabs exposed immediately to provide a curing treatment equal to that provided for the surface.

(4) **White Polyethylene Sheeting.** The Contractor shall cover the top surface and sides of the pavement entirely with polyethylene sheeting. The Contractor shall overlap the units at least eighteen (18) inches. The Contractor shall place and weigh down the sheeting as to cause the sheeting to remain in intimate contact with the surface covered. The sheeting as prepared for use shall have a dimension that each unit as laid shall extend beyond the edges of the slab at least twice the thickness of the pavement.

(P) **Removing Forms.** The Contractor shall remove the forms from freshly placed concrete until the concrete has set for at least twelve (12) hours, except auxiliary forms used temporarily in widened areas. The Contractor shall remove the forms carefully so as to avoid damage to the pavement. After the Contractor removes the forms, the Contractor shall cure the sides of the slab as outlined in one of the methods indicated above. The Engineer will consider major honeycombed areas as defective work. The Contractor shall remove and replace the major honeycomb areas. Areas or sections removed shall not be less than ten (10) feet in length nor less than full width of the lane involved. When removing and replacing a section of pavement is necessary, the Contractor shall also remove and replace remaining portion of the slab adjacent to the joints that is less than ten (10) feet in length.

(Q) **Sealing Joints.** When required by the contract, the Contractor shall fill the joints with joint sealing material before the pavement is opened to traffic, and as soon after completion of the curing period is feasible. The Contractor shall clean each joint thoroughly of foreign matters including membrane curing compound and clean the joint faces and dry the surface before sealing. The Contractor shall stir the material for seal applied hot during heating so that localized overheating does not occur.

The Contractor shall apply the sealing material as required by the contract or as ordered by the Engineer. The Contractor shall pour such that the Contractor does not spill the material on the exposed surfaces of the concrete. The Contractor shall remove excess material on the surface of the concrete pavement and the pavement surface cleaned immediately. The Engineer will permit the use of sand or similar material as a cover for the seal.

(R) **Protection of Pavement.** The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by its own employees and agents. This shall include flaggers to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, or crossover.

When ordered, the Contractor shall construct the pavement crossings for the convenience of public traffic according to Subsection 104.04 - Maintenance of Traffic. The Engineer will not make additional compensation for the work involved.

The Contractor shall repair or replace damages to the pavement occurring before final acceptance.

The Engineer will require the Contractor to have available materials for the protection of the edges and surface of the unhardened concrete. The protective materials includes standard metal form or wood plank having a nominal thickness of not less than two (2) inches and a nominal width of not less than the thickness of the pavement at its

edges. The surface protective material includes burlap or cotton mats, curing paper, or plastic sheeting. When rain appears imminent, paving operations shall stop and the Contractor shall place the forms against the sides of the pavement and cover the surface of the unhardened concrete with the protective covering.

(S) Opening to Traffic. The Contractor shall not open the pavement to traffic until the specimen beams conform to Subsection 411.03(J) - Test Specimens. The specimen beam shall attain a flexural strength of five hundred fifty (550) pounds per square inch when tested according to AASHTO T 97. The Contractor shall not open the pavement to traffic before seven (7) days regardless of strength attainment.

Before opening pavements to public traffic, the Contractor shall clean, properly sign, mark, and clear the pavement of obstructions.

The Engineer will not allow construction traffic, equipment, or materials on the pavement while the Contractor is attaining the pavement strength

(T) Tolerance in Pavement Thickness. The Engineer will determine the thickness of the pavement by cores taken by the Contractor according to AASHTO T 24. The Engineer will order and observe the Contractor taking cores. The Engineer will test the cores according to AASHTO T 148. The Engineer will take cores to determine thickness acceptability after completion of corrective work.

When cores are taken to determine the thickness of PCC pavement, a layer of material may adhere to the bottom of the core. Before determining the thickness of the PCC pavement, the Contractor shall remove non-PCC pavement materials from the bottom of the core.

The Engineer will evaluate the pavement on the basis of primary and secondary unit. The primary unit of pavement will be the area of mainline pavement placed during one (1) day's paving operations. Additionally, the Engineer will consider each ramp including tapers, each intersection, each crossover as a separate primary unit.

A secondary unit of pavement includes one thousand (1,000) linear feet of fraction thereof, of each mainline traffic lane and each one thousand three hundred (1,300) square yards of pavement in ramps, tapers, intersections, and crossroads regardless of when the concrete was placed.

The Contractor shall drill one (1) core in each secondary unit. If the length of that core is not deficient by more than 0.2 inch from the planned thickness, the Engineer will pay for that secondary unit at one hundred (100) percent of the contract unit price.

If the length of that core is deficient by more than 0.2 inch but less than 0.6 inch, the Contractor shall drill two (2) additional cores within the secondary unit and the Engineer will average the length of the three (3) cores.

If the average of the three (3) cores is not deficient by more than 0.2 inch, the Engineer will pay for the secondary unit at one hundred (100) percent of the contract unit price. *

If the average length of the three (3) cores is deficient by more than 0.2 inch, the Engineer will pay for the secondary unit according to Subsection 411.05(B) - Price Adjustment. *

In calculating the average thickness of the pavement, the Engineer will consider measurements that are in excess of the specified thickness by more than 0.2 inch as the specified thickness plus 0.2 inch. *

If the core in a secondary unit is deficient by more than 0.6 inch, the Engineer will not use the core to determine the average thickness of the secondary unit. The Contractor shall drill additional cores at intervals not exceeding ten (10) feet in each direction from the deficient core, measured parallel to the centerline, until one (1) core is obtained in each direction which is not deficient by more than 0.6 inch. The Engineer will evaluate the pavement between these two (2) cores separately from the balance of the pavement in that secondary unit. The limits for the evaluation will be between the longitudinal weakened plane or construction joint on each side of the core and between the next transverse weakened plane, construction, or expansion joint beyond each of the last two (2) cores. Unless the Engineer allows the pavement to remain, the Contractor shall remove and replace the pavement with pavement of the specified thickness. The Engineer will not pay for the removal of the deficient pavement. If the deficient pavement is allowed to remain, the Engineer will not make payment for the deficient pavement. The Contractor shall drill one (1) additional core in the remaining portion of the secondary unit. The Engineer will evaluate this portion separately for payment as hereinbefore specified. *

If deficient pavement is removed, the Contractor shall remove and replace the deficient pavement within the evaluation limits. After the Contractor has replaced the deficient pavement, the Contractor shall drill one (1) core at random in the secondary unit outside of the limits of the replaced pavement and drill one (1) core in the new pavement. The Engineer will evaluate the pavement represented by the drilled core outside of the limits of the replaced pavement for payment as hereinbefore specified. If the core drilled in the replaced pavement is less than the specified thickness, the Engineer will not make payment for the replaced pavement. *

The Contractor shall completely fill the holes with concrete of the same quality as used to construct the pavement. *

The Engineer will not pay for obtaining the cores and backfilling the holes with concrete separately. The Engineer will consider them incidental to the concrete pavement. *

411.04

411.04 Method of Measurement. The Engineer will measure the concrete pavement *
the cubic yard or square yard complete in place as specified in the proposal. *
The width for measurement will be the width of the pavement shown on the
typical cross section of the plans, additional widening where called for, or
as ordered in writing by the Engineer. The Engineer will measure the length *
horizontally along the centerline of each roadway or ramp. The thickness for
cubic yard measurement will be the thickness of the pavement shown on the
typical cross section of the plans or as ordered in writing by the Engineer. |

The Engineer will measure transverse contraction joints, other than *
transverse construction joint, by the linear foot. *

411.05 Basis of Payment.

(A) General. The Engineer will pay for the accepted quantities of PCC *
pavement at the contract unit price per cubic yard or per square yard. *
The price shall be full compensation for furnishing reinforcements, *
dowels, tie bars, other joint materials; furnishing, placing, and *
removing of forms, protection devices; furnishing and placing curing *
materials, furnishing and installing longitudinal joints, transverse *
expansion joints, and transverse construction joints, obtaining cores; *
backfilling holes with concrete; furnishing labors, materials, tools, *
equipment, and incidentals necessary to complete the work. *

When the average length of cores indicates pavement thickness is |
deficient by more than 0.2 inch but not more than 0.6 inch, only the |
reduced price stipulated below will be paid. The Engineer will not make *
additional payment over the unit contract bid price for pavements having *
an average thickness over that shown in the contract. *

The Engineer will pay for the accepted quantities of transverse *
contraction joints, other than transverse construction joints, at the *
contract unit price per linear foot of joint. The price shall be full *
compensation for the furnishing and placing of materials, equipment, |
tools, labors, and other incidentals required to complete the work. |

The Engineer will make payment under:

Pay Item	Pay Unit
____-inch, Concrete Pavement	Cubic Yard
____-Inch, Concrete Pavement	Square Yard
Transverse Contraction Joint	Linear Foot

(B) Price Adjustments. Where the average thickness of pavement is
deficient in thickness by more than 0.2 inch, but not more than 0.6 inch,
the Engineer will make payment at an adjusted price as specified in *
Table 411-I - Concrete Pavement Deficiency. Contract unit price in Table |
411-I shall be the final adjusted unit price after adjustments for other |
deficiencies, if applicable. |

TABLE 411-I - CONCRETE PAVEMENT DEFICIENCY	
Core Thickness, Less Than Specified Thickness, Inches	Percent of Contract Unit Price Allowed
0.00 to 0.20	100
0.21 to 0.40	75
0.41 to 0.60	40

When the thickness of pavement is deficient by more than one (1) inch and the Engineer determines that the area of such deficiency should not be removed and replaced, the Engineer will not make payment for the area retained. If the Engineer determines that the deficient areas warrant removal, the Contractor shall remove and replace the deficient areas with concrete of the thickness shown in the contract. The Engineer will pay for the replacement according to the above.