

(E) Compressive Strength

Determine the compressive strength of concrete using one set of two 6" x 12" cylinders at 28 calendar days. Test samples will be made by the Engineer from the concrete as it comes from the mixer. The samples will be made and cured in accordance with AASHTO T 23. Test specimens will be tested by the Engineer in accordance with AASHTO T 22. Furnish curing facilities for the test samples in accordance with Section 725.

(F) Thickness

The thickness of the pavement will be determined by measurement of cores in accordance with AASHTO T 148.

Take 4" diameter cores in the presence of the Engineer. The Engineer will take immediate possession of the cores. Take the cores when the concrete has attained a compressive strength of at least 3,500 psi and at least 72 hours have elapsed since placement of the pavement. If the concrete has not attained a compressive strength of at least 3,500 psi, the gross vehicle weight rating of vehicles supporting the coring operation may not exceed 7,000 lb. Take cores no later than 30 days after the pavement has been placed. The core locations for each lot will be selected at random by the Engineer.

Patch all core holes within 72 hours of taking the core, using an approved nonshrink grout compatible with the pavement or shoulder concrete.

(G) Surface Smoothness

Perform acceptance testing for surface smoothness on concrete pavements in accordance with Article 710-7. The Engineer will have a representative present during all testing and will take possession of the results at the completion of each day's testing.

700-16 MEASUREMENT AND PAYMENT

Remove and repair defects and damage to underlying asphalt course, Portland cement concrete and joints at no cost to the Department.

SECTION 710 CONCRETE PAVEMENT

710-1 DESCRIPTION

Perform the work covered by this section, including, but not limited to, designing the concrete mix; furnishing and placing concrete; furnishing of all admixtures and additives; constructing all joints and furnishing joint materials; marking the pavement; curing the pavement and furnishing all curing materials; furnishing concrete necessary for making test beams and cylinders; performing maturity testing; coring and patching the pavement; calibrating and checking the operation of batching equipment; taking actions necessary to prevent or to repair cracking; sawing and sealing joints; verifying dowel bar alignment; removing and replacing of defective pavement; and constructing Portland cement concrete pavement in accordance with these *Standard Specifications* and with the lines, grades and dimensions shown on the plans.

710-2 MATERIALS

Refer to Division 10.

Item	Section
Curing Agents	1026
Dowels and Tie Bars	1070-6
Joint Filler	1028-1
Low Modulus Silicone Sealant	1028-3
Portland Cement Concrete	1000

Section 710

Item

Water

Section

1024-4

1 **710-3 COMPOSITION OF CONCRETE**

2 Design the concrete mix in accordance with Section 1000.

3 Before placement, produce a trial batch through the plant. The Engineer will make
4 compressive and flexural samples from the trial batch for testing at 1, 3, 7, 14 and 28 days of
5 age. Until the trial batch meets 650 psi flexural strength and 4,500 psi compressive strength,
6 the Engineer will make acceptance samples for flexural and compressive tests for mix placed.
7 If the trial batch test results meet strength requirements, flexural samples representing placed
8 concrete will be discarded, and compressive samples will be used for acceptance. If the trial
9 batch does not meet strength requirements, flexural samples will be used for acceptance until
10 plant produced mix meets strength requirements.

11 If any major change as defined in Section 1000-3 is made to the mix design, this process shall
12 be initiated again.

13 **710-4 ACCEPTANCE OF CONCRETE**

14 The Department will test the concrete pavement for acceptance with respect to compressive
15 strength and thickness on a lot by lot basis in accordance with Article 700-15 and the
16 requirements herein.

17 For all concrete pavement, including mainline, shoulders, ramps, tapers, intersections,
18 entrances, crossovers and irregular areas not otherwise defined, produce a lot consisting of
19 1,333.3 sy or fraction thereof placed within 28 calendar days. From each lot, the Engineer
20 will make at least one set of two 6" x 12" cylinders from a randomly selected batch of
21 concrete. The average compression strength of the 2 cylinders is considered one test. If
22 Department personnel make and test additional sets of cylinders for a lot, all sets will be
23 averaged with the original set to determine the strength. In the case of low strength, the
24 Engineer will perform an investigation.

25 **710-5 CONSTRUCTION METHODS**

26 Construct concrete pavement in accordance with Section 700.

27 Place concrete in 2 lane minimum widths in a single operation except as follows:

28 (A) Where the total number of lanes is an odd number, in which case one of the lanes may be
29 placed in a separate operation.

30 (B) Areas such as ramps or auxiliary lanes where the total width is less than 2 lanes.

31 **710-6 FINISHING**

32 Screed and float finish the concrete to the required cross section that minimizes or eliminates
33 hand finishing. Additional water for finishing will not be allowed. Hand finishing will not be
34 permitted except under the following conditions:

35 (A) Narrow widths or irregular areas, where operation of mechanical equipment is
36 impractical.

37 (B) If a breakdown of mechanical equipment occurs, hand methods may be used to finish
38 only that concrete deposited on the base before the breakdown.

39 (C) Abnormal circumstances of short duration subject to approval.

40 Produce a final finish on the pavement surface true to grade and uniform in appearance and
41 free of irregular, rough or porous areas.

1 Following the finishing of the pavement by screeding, floating and checking with
2 straightedges, further finish the surface of the pavement by burlap dragging or other
3 acceptable method to produce a uniform surface texture. Pull the burlap drag in a longitudinal
4 direction.

5 Produce the final surface finish on all mainline pavement, auxiliary lanes and ramps by
6 mechanical equipment for grooving plastic concrete which uses spring steel tines. Hand
7 finishing may be permitted when the use of mechanical equipment is impractical. Use
8 mechanical equipment that produces transverse grooves that are spaced at random intervals of
9 1/2", 5/8" or 3/4" center to center. Do not overlap adjacent grooving. Produce grooves in the
10 hardened surface, which are 0.08" to 0.12" wide and 0.15" to 0.25" deep.

11 After final finishing, hand finishing may be required on the edges of pavement and joints
12 whenever irregularities in surface texture or alignment occur. Care should be taken in hand
13 finishing pavement edges to avoid ridges or high places that will prevent water from draining
14 out of the transverse grooves.

15 The use of excessive water during the finishing operations will not be permitted.

16 Provide a textured surface with an average texture depth of 0.8 mm as tested in accordance
17 with ASTM E965 with no single test having a texture depth of 0.5 mm or less. The Engineer
18 will perform 4 randomly located tests in accordance with ASTM E965 within the initial
19 pavement lot of each mobilization. A "lot" is defined in Article 710-4. If the average of the
20 4 tests does not meet the above criteria, make appropriate changes to the surface texture
21 operations and test the next lot as detailed above. Once the surface texture process is
22 established to meet minimum texture requirements, maintain consistency within the operation
23 to provide the above minimum texture depth. Perform additional sand patch tests in
24 accordance with ASTM E965 when directed.

25 If the surface texture becomes damaged or reduced by rain or any other action, reestablish or
26 restore surface texture by an approved method.

27 **710-7 FINAL SURFACE TESTING**

28 Use an Inertial Profiler to measure the longitudinal pavement profile for construction quality
29 control and smoothness acceptance. Use a profiler with line laser technology as single-point
30 laser technology will not be allowed. Produce International Roughness Index (IRI) and Mean
31 Roughness Index (MRI) values for measuring smoothness.

32 Use testing and recording software to produce electronic inertial road profiles in a format
33 compatible with the latest version of FHWA's ProVAL (Profile Viewing and Analysis)
34 software.

35 The Inertial Profiler shall be calibrated and verified in accordance with the most current
36 version of AASHTO M 328. Provide certification documentation that the profiler meets
37 AASHTO M 328 to the Engineer before the first day the Inertial Profiler is used on the
38 project.

39 Configure the profiler to record the actual elevation of the pavement surface. Do not use the
40 profiler's internal IRI calculation mode. The profile data shall be filtered with a cutoff
41 wavelength of 300 ft. The interval at which relative profile elevations are reported
42 shall be 1".

43 Provide IRI data in accordance with most current version of ASTM E1926. Use personnel
44 trained to record and evaluate IRI data.

45 Provide a competent operator, trained in the operation of the Inertial Profiler. Operation of
46 the Inertial Profiling system shall conform to AASHTO R 57.

47 Provide the user selected Inertial Profiler settings to the Engineer for the project records.
48 Certification of the Inertial Profiling system shall conform to AASHTO R 56.

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- 1 Remove all objects and foreign material on the pavement surface prior to longitudinal
2 pavement profile testing.
- 3 Operate the profiler at any speed as per the manufacturer's recommendations, however, the
4 speed must be constant to within ± 3 mph of the intended speed and any required acceleration
5 should be as gradual as possible. For example, if the intended speed were 30 mph, the
6 acceptable range of speed for testing would be 27 to 33 mph.
- 7 Operate the Inertial Profiler in the direction of the final traffic pattern. Collect IRI data from
8 both wheel paths during the same run. It is permissible to collect data one wheel path at a
9 time if each wheel path is tested and evaluated separately. Define a "wheel path" as the 3 ft
10 from the edge of the travel lane. MRI values are the average of the IRI values from both
11 wheel paths. When using an inertial profiler that collects a single trace per pass, take care to
12 ensure that the measurements from each trace in a travel lane start and stop at the same
13 longitudinal locations. Unless otherwise specified, multiple runs are not necessary for data
14 collection.
- 15 Operate the automatic triggering method at all times unless impractical. A tape stripe or
16 traffic cone wrapped with reflective material may be used to alert the profiler's automatic
17 triggering sensor to begin data collection. The profiler shall reach the intended operating
18 speed before entering the test section. The runup and runout distances should be sufficient to
19 obtain the intended operating speed and to slow down after testing is completed.
- 20 Divide the pavement surface for the project into sections which represent a continuous
21 placement (i.e. the start of the project to bridge, intersection to intersection). Terminate
22 a section 50 ft before a bridge approach, railroad track, or similar interruption. (Separate into
23 0.10-mile sections).
- 24 The evaluation of the profiles will be performed on a section basis. A section is 0.10 mile of
25 a single pavement lane. For any section, which is less than 0.10 mile in length, the applicable
26 pay adjustment incentive will be prorated on the basis of the actual length.
- 27 Mark the limits of structures and other special areas to be excluded from testing using the
28 profiler's event identifier such that the exact locations can be extracted from the profile data
29 file during processing.
- 30 Unless otherwise authorized by the Engineer, perform all smoothness testing in the presence
31 of the Engineer. Perform smoothness tests on the finished surface of the completed project or
32 at the completion of a major stage of construction as approved by the Engineer. Coordinate
33 with and receive authorization from the Engineer before starting smoothness testing. Perform
34 smoothness tests within 7 days after receiving authorization. Any testing performed without
35 the Engineer's presence, unless otherwise authorized, may be ordered retested at the
36 Contractor's expense.
- 37 After testing, transfer the profile data from the profiler portable computer's hard drive to a
38 write once storage media (DVD-R or CD-R) or electronic media approved by the Engineer.
39 Label the disk or electronic media with the Project number, Route, file number, date, and
40 termini of the profile data. Submit the electronic data on the approved media to the Engineer
41 immediately after testing and this media will not be returned to the Contractor.
- 42 Submit documentation and electronic data of the evaluation for each section to the Engineer
43 within 10 days after completion of the smoothness testing. Submit the electronic files
44 compatible with ProVAL and the evaluation in tabular form with each 0.10-mile segment
45 occupying a row. Include each row with the beginning and ending station for the section, the
46 length of the section, the original IRI values from each wheel path, and the MRI value for the
47 section. Each continuous run for a section will occupy a separate table and each table will
48 have a header that includes the following: the project contract number, county, the roadway
49 number or designation, a lane designation, the dates of the smoothness runs, and the
50 beginning and ending station of the continuous run. Summarize each table at the bottom.

1 Traffic control and all associated activities included in the pavement smoothness testing of the
2 pavement surface will be the responsibility of the Contractor.

3 **(A) Acceptance for New Construction**

4 IRI and MRI numbers recorded in inches per mile will be established for each
5 0.10-mile section for each travel lane of the finished pavement surface designated by the
6 Contract.

7 Areas excluded from testing by the profiler will be tested by the Contractor and the
8 Engineer using a 10-ft stationary straightedge furnished by the Contractor. Any location
9 on the pavement selected by the Department shall be tested as well as all transverse
10 joints. Apply the straightedge parallel to the centerline of the surface. Do not exceed
11 1/8" variation of the surface being tested from the edge of the straightedge between any
12 2 contact points. Correct areas found to exceed this tolerance by removal of the defective
13 work and replacement with new material, unless other corrective measures are permitted.
14 Provide the work and materials required in the correction of defective work.

15 Table 710-1 provides the acceptance quality rating scale of pavement based on the final
16 rideability determination.

TABLE 710-1	
MRI PRICE ADJUSTMENT PER 0.10-MILE SECTION	
MRI after Completion (Inches Per Mile)	Price Adjustment Per Lane (0.10-Mile Section)
45.0 and Under	\$200.00
45.1-55.0	PA = 600 – (10 * MRI)
55.1-70.0	Acceptable (No Pay Adjustment)
70.1-90.0	PA = 650 – (10 * MRI)
Over 90.1	Corrective Action Required

17 This price adjustment will apply to each 0.10-mile section based on the Mean Roughness
18 Index (MRI), the average IRI values from both wheel paths.

19 When corrections to the pavement surface are required, the Engineer shall approve the
20 Contractor's method of correction. Methods of correction shall be diamond grinding,
21 remove and replace, or other methods approved by the Engineer. To produce a uniform
22 cross section, the Engineer may require correction to the adjoining traffic lanes or
23 shoulders. Corrections to the pavement surface, the adjoining traffic lanes and shoulders
24 will be at no cost to the Department.

25 Where corrections are made after the initial smoothness testing, the pavement will be
26 retested by the Contractor to verify that corrections have produced the acceptable ride
27 surface. No incentives will be provided for sections on which corrective actions have
28 been required. The Contractor will have one opportunity to perform corrective action(s).

29 **(B) Localized Roughness**

30 Areas of localized roughness shall be identified through the "Smoothness Assurance
31 Module" provided in the ProVAL software. Use the "Smoothness Assurance Module" to
32 optimize repair strategies by analyzing the measurements from profiles collected using
33 inertial profilers. The ride quality threshold for localized roughness shall be 125 in/mile
34 at the continuous short interval of 25 ft. Submit a continuous roughness report to identify
35 sections outside the threshold and identify all localized roughness, with the signature of
36 the Operator included with the submitted IRI trace and electronic files.

37 The Department will require that corrective action be taken regardless of final IRI.
38 Re-profile the corrected area to ensure that the corrective action was successful. If the
39 corrective action is not successful, the Department will assess a penalty or require
40 additional corrective action.

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1 Corrective work for localized roughness shall be approved by the Engineer before
2 performing the work and shall consist of either diamond grinding or other methods
3 approved by the Engineer. Any corrective action performed shall not reduce the integrity
4 or durability of the pavement that is to remain in place. Notify the Engineer 5 days prior
5 to commencement of the corrective action.

6 Localized roughness correction work shall be for the entire traffic lane width. Pavement
7 cross slope shall be maintained through corrective areas.

8 **710-8 PAVEMENT MARKING**

9 Mark the pavement at locations as shown on the plans with station numbers. Mark the
10 pavement by pressing beveled-face metal dies between 4" and 6" high into the plastic
11 concrete.

12 At locations where shoulder drain outlets are placed, mark the edge of pavement nearest the
13 outlet with the letters "OL". Use the same marking procedure as for station numbers.

14 **710-9 THICKNESS TOLERANCES**

15 A lot for thickness acceptance testing is defined in Article 710-4.

16 To establish an adjusted unit price, if appropriate, for mainline pavement, take one
17 4" diameter core from each lot at a random location as directed. Other areas such as
18 intersections, entrances, crossovers and ramps will each be considered as one lot and the
19 thickness of each of these lots will be determined separately. Small irregular areas may be
20 included as part of another lot. Take one core for each 1,333.3 sy of pavement or fraction
21 thereof in the lot.

22 When the measurement of any core, original core or additional cores taken to calculate the
23 average, is less than the plan thickness by more than 1.0", the extent of the removal area due
24 to thickness deficiency will be determined by taking additional exploratory cores at
25 approximately 10 ft intervals parallel to the center line in each direction from the deficient
26 core until an exploratory core is found in each direction which is within 1.0" of the plan
27 thickness. The pavement between these exploratory cores will be removed full lane width
28 wide and replaced with concrete of the thickness shown on the plans. Exploratory cores for
29 deficient thickness will not be used in averages for adjusted unit price.

30 When the measurement of the core from a lot is deficient by 0.2" or less from the plan
31 thickness, no pay reduction will be made for thickness. When such measurement is deficient
32 by more than 0.2" from the plan thickness, take 2 additional cores at random locations within
33 the lot and calculate the average thickness of the lot from the 3 cores.

34 In determining the average thickness of the pavement lot, the Engineer will use all 3 core
35 measurements. Individual core measurements which are greater than the plan thickness
36 + 0.2" will be considered as the plan thickness + 0.2". Individual cores which are less than
37 the plan thickness - 1.0" will be considered as the plan thickness - 1.0". If the average
38 measurement of the 3 cores is within 0.2" from the plan thickness, full payment will be made.
39 If the average measurement of the 3 cores is deficient by more than 0.2" from the plan
40 thickness, an adjusted unit price in accordance with Subarticle 710-10(B) will be paid for the
41 lot represented.

42 Areas found deficient in thickness by more than 1.0" shall be removed and replaced with
43 concrete of the thickness shown on the plans. Any full lane or full shoulder width repairs to
44 the concrete pavement shall be performed in accordance with the *North Carolina Department*
45 *of Transportation Partial and Full Depth Repair Manual* and not be less than 1/2 of the slab
46 length.

47 Patch all core holes within 72 hours of taking the core, using a Department approved
48 nonshrink grout compatible with the pavement concrete.

1 **710-10 MEASUREMENT AND PAYMENT**

2 **(A) General**

3 The quantity of Portland cement concrete pavement to be paid will be the actual number
4 of square yards of concrete pavement completed and accepted. In measuring this
5 quantity, the width of the pavement will be as called for on the plans or as directed. The
6 length will be the actual length constructed, measured along the centerline of the
7 pavement.

8 Separate measurement will be made of pavement that is deficient in thickness by more
9 than 0.2" and of pavement that is deficient in compressive strength.

10 The quantities of Portland cement concrete pavement will be paid at the contract unit
11 price per square yard for ___" *Portland Cement Concrete Pavement, Through Lanes, (with*
12 *dowels)*, ___" *Portland Cement Concrete Pavement, Ramps, (with dowels)* or ___" *Portland*
13 *Cement Concrete Pavement, Miscellaneous, (without dowels)*, or if applicable, at such
14 contract unit prices adjusted in accordance with the requirements shown below. No unit
15 price adjustments on lots will be made until a final determination of the lot strength and
16 depth is made. Pavement will be classified as through lane, ramp or miscellaneous
17 pavement in accordance with the classification shown on the plans.

18 Payment for all work of surface testing will be made at the contract lump sum price for
19 *Surface Testing Concrete Pavement*. Partial payments for surface testing will be
20 proportional to the percentage of pavement surface tested at the time the partial estimate
21 is prepared.

22 **(B) Pavement Deficient In Thickness**

23 The quantities of Portland cement concrete pavement which are deficient in thickness by
24 more than 0.2" but not deficient by more than 1.0", measured as provided in
25 Article 710-10, will be paid at an adjusted contract unit price per square yard for
26 ___" *Portland Cement Concrete Pavement, Through Lanes, (with dowels)*, ___" *Portland*
27 *Cement Concrete Pavement, Ramps, (with dowels)* or ___" *Portland Cement Concrete*
28 *Pavement, Miscellaneous, (without dowels)* completed in place and accepted.

29 The adjusted contract unit price is determined by the following formula, except no pay
30 over 100% will be allowed:

31
$$\text{Pay Factor (\%)} = 110 - \left[50 \times (\text{Plan Thickness} - \text{Average Core Thickness}) \right]$$

32 Exploratory cores for deficient thickness will not be used in averages for adjusted unit
33 price. Where pavement deficient by more than 1.0" is removed and replaced, the
34 replacement pavement will be paid at the contract unit price per square yard for
35 ___" *Portland Cement Concrete Pavement, Through Lanes, (with dowels)*, ___" *Portland*
36 *Cement Concrete Pavement, Ramps, (with dowels)* or ___" *Portland Cement Concrete*
37 *Pavement, Miscellaneous, (without dowels)* which price and payment will be full
38 compensation for all work of placement, removal, restoration of subgrade and base and
39 replacement.

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1 (C) Concrete Pavement Varying In Strength

2 One of the following formulas will be used to calculate the concrete pavement pay factor.

3 (1) Compressive Strength

4 The pay factor for pavement achieving a compressive strength in 28 days of
5 4,500 psi or greater is 100%. The pay factor for pavement achieving a compressive
6 strength in 28 days between 3,500 psi and 4,500 psi is determined by the following
7 formula:

$$8 \quad \text{Pay Factor (\%)} = 100.0 - \left[0.05 \times (4,500 - \text{Compressive Strength}) \right]$$

9 (pay factor rounded to nearest 0.1%)

10 (2) Flexural Strength

11 The pay factor for pavement achieving a flexural strength in 28 days of 650 psi or
12 greater is 100%. The pay factor for pavement achieving a flexural strength in
13 28 days between 600 psi and 650 psi is determined by the following formula:

$$14 \quad \text{Pay Factor (\%)} = 100.0 - (650 - \text{Flexural Strength})$$

15 (pay factor rounded to nearest 0.1%)

16 The quantities of Portland cement concrete pavement that meet these criteria, will be paid
17 at an adjusted unit price per square yard for ___" *Portland Cement Concrete Pavement,*
18 *Through Lanes, (with dowels),* ___" *Portland Cement Concrete Pavement, Ramps, (with*
19 *dowels)* or ___" *Portland Cement Concrete Pavement, Miscellaneous, (without dowels)*
20 completed in place and accepted. The adjusted contract unit price will be determined by
21 multiplying the contract unit price by the pay factor level determined for the average
22 strength of concrete in each lot and will be applicable to the total square yards of concrete
23 in each lot.

24 Any pavement that fails to attain 3,500 psi in compression is subject to removal. If
25 allowed to remain in place, the pavement will be accepted at a reduced unit price based
26 on a pay factor level of 50% as provided in Article 105-3.

27 Where pavement deficient in strength is removed and replaced, the replacement
28 pavement, if acceptable, will be paid at the contract unit price for ___" *Portland Cement*
29 *Concrete Pavement, Through Lanes, (with dowels),* ___" *Portland Cement Concrete*
30 *Pavement, Ramps, (with dowels)* or ___" *Portland Cement Concrete Pavement,*
31 *Miscellaneous, (without dowels)* which price and payment will be full compensation for
32 all work including placement, removal, restoration of subgrade and base and replacement.

33 (D) Multiple Adjustments in Price

34 Pavement found deficient in both thickness and strength will be evaluated by the
35 Engineer to determine if it may be permitted to remain in place. Pavement permitted to
36 remain in place will be paid at a reduced price determined by successively multiplying
37 the contract price by the appropriate factor indicated for each deficiency.

38 (E) Compensation

39 Payment at the contract unit prices for ___" *Portland Cement Concrete Pavement,*
40 *Through Lanes, (with dowels)* and ___" *Portland Cement Concrete Pavement Ramps,*
41 *(with dowels)* and ___" *Portland Cement Concrete Pavement, Miscellaneous, (without*
42 *dowels)* will be full compensation for all work covered by this section.

1 Payment at the contract lump sum price for *Surface Testing Concrete Pavement* will be
 2 full compensation for all work of surface testing including, but not limited to, furnishing,
 3 maintaining and operating the profilograph and towing equipment; for furnishing graph
 4 paper and any other materials and supplies for performing the surface testing; and for
 5 repairing membrane curing compound damaged during surface testing.

6 **(F) Pay Items**

7 Payment will be made under:

Pay Item	Pay Unit
— " Portland Cement Concrete Pavement, Through Lanes (with dowels)	Square Yard
— " Portland Cement Concrete Pavement, Ramps (with dowels)	Square Yard
— " Portland Cement Concrete Pavement, Miscellaneous (without dowels)	Square Yard
Surface Testing Concrete Pavement	Lump Sum

8

SECTION 720

9

CONCRETE SHOULDERS

10 **720-1 DESCRIPTION**

11 Perform the work covered by this section including, but not limited to, the construction of
 12 Portland cement concrete shoulders in accordance with this section and with the lines, grades
 13 and dimensions shown on the plans; designing the mix; furnishing and placing the concrete
 14 shoulders; furnishing maturity testing equipment; furnishing all admixtures and additives;
 15 constructing joints; furnishing joint materials; curing the shoulder and furnishing curing
 16 materials; coring and patching core holes; taking actions to prevent or repair cracking; and
 17 removing and replacing unsatisfactory shoulder.

18 **720-2 MATERIALS**

19 Refer to Division 10.

Item	Section
Curing Agents	1026
Dowels and Tie Bars	1070-6
Joint Filler	1028-1
Low Modulus Silicone Sealant	1028-3
Portland Cement Concrete	1000
Water	1024-4

20 **720-3 COMPOSITION OF CONCRETE**

21 Design the concrete mix in accordance with Section 1000.

22 **720-4 ACCEPTANCE OF CONCRETE**

23 The Engineer will test concrete shoulders for acceptance with respect to compressive strength
 24 and thickness on a lot by lot basis. A "lot" is defined in Article 710-4.

25 **720-5 EQUIPMENT**

26 Use equipment in the production and placement of the concrete shoulders in accordance with
 27 Section 700 and Section 1000.

28 **720-6 CONSTRUCTION METHODS**

29 Place the concrete shoulders only in the presence of an authorized representative of the
 30 Engineer. Construct concrete shoulders in accordance with Section 700.