

**PROJECT SPECIAL PROVISIONS****ROADWAY****SHOULDER RECONSTRUCTION (State Furnished Sources):**

(1-18-00) (Rev. 6-19-07)(08-25-09)

DDC\_SRSFS

**Description**

The work covered by this provision consists of reconstructing earth shoulders (including median shoulders as applicable) in accordance with the *Roadway Standard Drawing Nos. 560.01 and 560.02*, except that the rate of slope and width will be as shown on typical section, or to the existing shoulder point, whichever is nearer, as long as the desired typical is achieved. Perform this work immediately after the resurfacing operations are completed as directed by the Engineer.

**Materials**

On any map that contains widening, use all suitable material generated from the widening operation to construct the shoulder. Obtain any other earth material necessary for the construction of the shoulders from NCDOT borrow pits as provided elsewhere in the Contract. The Contractor shall remove stones and other foreign materials 2 inches or larger in diameter. All earth material shall meet the approval of the Engineer. No testing is necessary.

**Construction Methods**

**The Contractor will begin grading to final section and begin permanent seeding and mulching immediately upon completion of 10 shoulder miles.**

Perform shoulder reconstruction in the following order: scarify the existing shoulder to provide the proper bond; add the earth material to the shoulder; and compact the reconstructed shoulder to the satisfaction of the Engineer.

As a part of this work, the Contractor will be required to tie from the Typical Section Shoulder Point to the existing slope at a minimum slope of 4:1 or as directed by the Engineer.

The Contractor shall dispose of any excess material generated by the shoulder reconstruction in an approved disposal site.

**Measurement and Payment**

*Shoulder Reconstruction* will be measured and paid for as the actual number of shoulder miles that have been constructed. Measurement will be made along the edge of pavement of each shoulder. Measurement will be made to the nearest 0.01 of a mile. Such price and payment will be full compensation for placing, compaction, and all incidentals necessary to complete construction of the shoulders.

*Incidental Stone Base* will be measured and paid for as provided in Article 545-6 of the *Standard Specifications*.

*Seeding and Mulching* will be measured and paid for as provided elsewhere in this contract.

*Borrow Excavation (State Furnished Sources)* will be measured and paid for as provided elsewhere in this contract.

**CONSTRUCTION SEQUENCE:**

(7-1-95)

R1 R34

Pave each section of roadway begun in a continuous operation. Do not begin work on another section of roadway unless satisfactory progress is being made toward completion of intersections and all other required incidental work by satisfactorily furnishing additional paving equipment and personnel, except for milling and patching operations.

**GRADING PER SHOULDER MILE:**

The Division of Highways will set all construction stakes necessary to complete the work including, but not limited to, grade and alignment stakes, slope stakes, and pipe culvert stakes.

Grading Per Shoulder Mile will include all clearing and grubbing, all disposal of waste and debris, all excavation within the limits of the typical section including front and back slopes of roadway ditches, all grading necessary for suitable connections with intersecting roads to the limits shown on the plans, and all grading necessary for suitable connections with existing drives. Grading Per Shoulder Mile will also include all work covered by Section 200, for "Clearing and Grubbing"; Section 802, "Disposal of Waste and Debris"; Section 225, "Roadway Excavation"; Section 235, "Embankments"; Section 500, "Subgrade"; and section 560, "Shoulder Construction"; except that the provisions of the above referenced sections pertaining to measurement, payment, or compensation will not apply. A tolerance of 0.2 foot above or below grade will be allowed, provided that the deviation from the required grade is sufficiently regular to provide a visibly uniform surface. Waste material shall be disposed of wherever practical by widening or flattening fill slopes, as directed by the Engineer.

Where this method of disposal is not considered practical by the Engineer, waste material shall be disposed of in disposal areas furnished by the Contractor. No payment will be made for hauling waste material to disposal areas nor for clearing and grubbing disposal areas.

Construct the top 6 inches of shoulder and fill slopes with soils capable of supporting vegetation.

Provide soil with a P.I. greater than 6 and less than 25 and with a pH ranging from 5.5 to 6.8. Remove stones and other foreign material 2 inches or larger in diameter. All soil is subject to test and acceptance or rejection by the Engineer.

Obtain material from within the project limits or approved borrow source.

The quantity of Grading Per Shoulder Mile to be paid for will be the length in miles of those

portions of the project where this work has been performed. Measurement will be made horizontally along the center line of the project to the nearest thousandth of a mile, with deductions being made for bridges. Measurement will not be made along any intersecting roads and streets.

The quantity of Grading Per Shoulder Mile, measured as provided above, will be paid for at the contract unit price per shoulder mile for "Grading Per Shoulder Mile". Such price and payment will be full compensation for all work covered by Section 200, for "Clearing and Grubbing"; Section 802, "Disposal of Waste and Debris"; Section 225, "Roadway Excavation"; Section 235, "Embankment"; Section 500, "Subgrade"; and Section 560, "Shoulder Construction". The above price and payment will also be full compensation for the required grading for connections at intersections and drives, for all hauling of materials, for disposal of all waste materials, and for furnishing any disposal areas that may be necessary.

**BORROW EXCAVATION (State Furnished Sources):**

(1-18-00) (Rev. 6-19-07)(08-25-09)

DDC\_230

Revise the *Standard Specifications for Roads and Structures July 2006* as follows:

Amend Section 230, Borrow Excavation, to add the Pay Item "*Borrow Excavation (State Furnished Sources)*"

Earth material provided under the pay item "*Borrow Excavation (State Furnished Sources)*" shall meet all requirements of Section 230 of the *Standard Specifications*, except that the source of the earth material will be provided by the Engineer in NCDOT borrow pit sites. A Map showing the locations of the NCDOT pits with available earth material will be provided elsewhere in this contract.

The Contractor shall provide his own labor and loading equipment at State Furnished Sources.

**Measurement and Payment**

*Borrow Excavation (State Furnished Sources)* will be measured and paid for in cubic yards. Borrow excavation will be measured in place in its original position except that truck measurement will be made where called for in the contract, or as directed by the Engineer.

**Pay Item**

Borrow Excavation (State Furnished Sources)

**Pay Unit**

Cubic Yard

**INCIDENTAL STONE BASE:**

(7-1-95) (Rev.7-18-06)

R5 R28

**Description**

Place incidental stone base on driveways, mailboxes, etc. immediately after paving and do not have the paving operations exceed stone base placement by more than one week without written permission of the Engineer.

**Materials and Construction**

Provide and place incidental stone base in accordance with the requirements of Section 545 of the *2006 Standard Specifications*.

**Measurement and Payment**

*Incidental Stone Base* will be measured and paid for in accordance with Article 545-6 of the *2006 Standard Specifications*.

**ASPHALT PAVEMENTS - SUPERPAVE:**

(7-18-06)(Rev 11-16-10)

R6 R01

Revise the *2006 Standard Specifications* as follows:

**Page 6-2, Article 600-9 Measurement and Payment, delete the second paragraph.**

**Page 6-12, Subarticle 609-5(C)(2), Required Sampling and Testing Frequencies, first partial paragraph at the top of the page, delete last sentence and replace with the following:**

If the Engineer allows the mix to remain in place, payment will be made in accordance with Article 105-3.

**Page 6-12, Subarticle 609-5(C)(2), Quality Control Minimum Sampling and Testing Schedule, first paragraph, delete and replace with the following:**

Sample and test the completed mixture from each mix design per plant per year at the following minimum frequency during mix production:

**Second paragraph, delete the fourth sentence and replace with the following:**

When daily production of each mix design exceeds 100 tons and a regularly scheduled full test series random sample location for that mix design does not occur during that day's production, perform at least one partial test series consisting of Items A and B in the schedule below.

**Page 6-12, Subarticle 609-5(C)(2)(c) Maximum Specific Gravity, add after (AASHTO T 209):**

or ASTM D 2041

**Page 6-13, last line and on page and Page 6-14, Subarticle 609-5(C)(2)(e) Tensile Strength Ratio (TSR), add a heading before the first paragraph as follows:**

(i) Option 1

**Insert the following immediately after the first paragraph:**

## (ii) Option 2

Mix sampled from truck at plant with one set of specimens prepared by the Contractor and then tested jointly by QA and QC at a mutually agreed upon lab site within the first 7 calendar days after beginning production of each new mix design.

**Second paragraph, delete and replace with the following:**

Test all TSR specimens required by either option noted above on either a recording test press or a test press that maintains the peak load reading after the specimen has broken.

**Subarticle 609-5(C)(3) Control Charts, delete the second sentence of the first paragraph and replace with the following:**

For mix incorporated into the project, record full test series data from all regularly scheduled random samples or directed samples that replace regularly scheduled random samples, on control charts the same day the test results are obtained.

**Page 6-15, Subarticle 609-5(C)(3) Control Charts, first paragraph on this page, delete the last sentence and substitute the following:**

Denote the moving average control limits with a dash green line and the individual test limits with a dash red line.

**Page 6-15, Subarticle 609-5(C)(3)(a), (b) and (c), replace (a) (b) and (c) with the following:**

- (a) A change in the binder percentage, aggregate blend, or  $G_{mm}$  is made on the JMF, or,
- (b) When the Contractor elects to stop or is required to stop production after one or two moving average values, respectively, fall outside the moving average limits as outlined in Subarticle 609-5(C)(6) or,
- (c) If failure to stop production after two consecutive moving averages exceed the moving average limits occurs, but production does stop at a subsequent time, re-establish a new moving average beginning at the actual production stop point.

**Page 6-15, Subarticle 609-5(C)(4) Control Limits, replace the first paragraph and the CONTROL LIMITS Table on page 6-16 with the following:**

The following are established as control limits for mix production. Apply the individual limits to the individual test results. Control limits for the moving average limits are based on a moving average of the last 4 data points. Apply all control limits to the applicable target source.

**CONTROL LIMITS**

<b>Mix Control Criteria</b>	<b>Target Source</b>	<b>Moving Average Limit</b>	<b>Individual Limit</b>
2.36 mm Sieve	JMF	±4.0 %	±8.0 %
0.075 mm Sieve	JMF	±1.5 %	±2.5 %
Binder Content	JMF	±0.3 %	±0.7 %
VTM @ N <sub>des</sub>	JMF	±1.0 %	±2.0 %
VMA @ N <sub>des</sub>	Min. Spec. Limit	Min Spec. Limit	-1.0%
P <sub>0.075</sub> / P <sub>be</sub> Ratio	1.0	±0.4	±0.8
%G <sub>mm</sub> @ N <sub>ini</sub>	Max. Spec. Limit	N/A	+2.0%
TSR	Min. Spec. Limit	N/A	- 15%

**Page 6-16, Subarticle 609-5(C)(5) Warning Bands, delete this subarticle in its entirety.**

**Pages 6-16 through 6-19, Subarticle 609-5(C)(6), delete the word "warning" and replace with the words "moving average".**

**Page 6-16, Subarticle 609-5(C)(6) Corrective Actions, first paragraph, first sentence, delete and replace with the following:**

Immediately notify the Engineer when moving averages exceed the moving average limits.

**Page 6-17, Subarticle 609-5(C)(6) Corrective Actions, delete the third full paragraph and replace with the following:**

Failure to stop production when required due to an individual mix test not meeting the specified requirements will subject all mix from the stop point tonnage to the point when the next individual test is back on or within the moving average limits, or to the tonnage point when production is actually stopped, whichever occurs first, to being considered unacceptable.

**Sixth full paragraph, delete the first, second, and third sentence and replace with the following:**

Immediately notify the Engineer when any moving average value exceeds the moving average limit. If two consecutive moving average values for any one of the mix control criteria fall outside the moving average limits, cease production of that mix, immediately notify the Engineer of the stoppage, and make adjustments. The Contractor may elect to stop production after only one moving average value falls outside the moving average limits.

**Page 6-18, Subarticle 609-5(C)(6) Corrective Actions, second full paragraph, delete and replace with the following:**

If the process adjustment improves the property in question such that the moving average after four additional tests is on or within the moving average limits, the Contractor may continue production with no reduction in payment.

**Page 6-18, Subarticle 609-5(C)(6) Corrective Actions, delete the third and fourth full paragraphs, including the Table for Payment for Mix Produced in the Warning Bands and substitute the following:**

If the adjustment does not improve the property in question such that the moving average after four additional individual tests is outside the moving average limits, the mix will be evaluated for acceptance in accordance with Article 105-3. Reduced payment for or removal of the mix in question will be applied starting from the plant sample tonnage at the stop point to the sample tonnage when the moving average is on or within the moving average limits. In addition, any mix that is obviously unacceptable will be rejected for use in the work.

**Page 6-19, Subarticle 609-5(C)(6) Corrective Actions, first paragraph, delete and replace with the following:**

Failure to stop production and make adjustments when required due to two consecutive moving average values falling outside the moving average limits will subject all mix produced from the stop point tonnage to the tonnage point when the moving average is back on or within the moving average limits or to the tonnage point when production is actually stopped, whichever occurs first, to being considered unacceptable. Remove this material and replaced with materials that comply with the Specifications at no additional costs to the Department, unless otherwise approved. Payment will be made for the actual quantities of materials required to replace the removed quantities, not to exceed the original amounts.

**Page 6-20, Subarticle 609-5(D)(1) General, delete the third full paragraph, and replace with the following:**

Perform the sampling and testing at the minimum test frequencies as specified above. Should the density testing frequency fail to meet the minimum frequency as specified above, all mix without the required density test representation will be considered unsatisfactory. If the Engineer allows the mix to remain in place, payment will be made in accordance with Article 105-3.

**Page 6-22, Subarticle 609-5(D)(4) Nuclear Gauge Density Procedures, third paragraph, insert the following as the second sentence:**

Determine the Daily Standard Count in the presence of the QA Roadway Technician or QA Nuclear Gauge Technician on days when a control strip is being placed.

**Page 6-23, Subarticle 609-5(D)(5) Limited Production Procedure, delete the first paragraph including (a), (b), (c) and substitute the following:**

Proceed on limited production when, for the same mix type and on the same contract, one of the following conditions occur (except as noted in the first paragraph below).

- (a) Two consecutive failing lots, except on resurfacing\*
- (b) Three consecutive failing lots on resurfacing\*
- (c) Two consecutive failing nuclear control strips.

\* Resurfacing is defined as the first new uniform layer placed on an existing pavement.

**Page 6-25, Article 609-6 QUALITY ASSURANCE, DENSITY QUALITY ASSURANCE, insert the following items after item (E):**

- (F) By retesting Quality Control core samples from control strips (either core or nuclear) at a frequency of 100% of the frequency required of the Contractor;
- (G) By observing the Contractor perform all standard counts of the Quality Control nuclear gauge prior to usage each nuclear density testing day; or
- (H) By any combination of the above.

**Page 6-28, Subarticle 610-3(A) Mix Design-General, delete the fourth and fifth paragraphs and replace with the following:**

Reclaimed Asphalt Pavement (RAP) or Reclaimed Asphalt Shingles (RAS) may be incorporated into asphalt plant mixes in accordance with Article 1012-1 and the following applicable requirements.

Reclaimed asphalt pavement (RAP) may constitute up to 50% of the total material used in recycled mixtures, except for mix Type S 12.5D, Type S 9.5D, and mixtures containing reclaimed asphalt shingle material (RAS). Reclaimed asphalt shingle (RAS) material may constitute up to 6% by weight of total mixture for any mix. When both RAP and RAS are used, do not use a combined percentage of RAS and RAP greater than 20% by weight of total mixture, unless otherwise approved. When the percent of binder contributed from RAS or a combination of RAS and RAP exceeds 20% but not more than 30% of the total binder in the completed mix, the virgin binder PG grade shall be one grade below (both high and low temperature grade) the binder grade specified in Table 610-2 for the mix type, unless otherwise approved. When the percent of binder contributed from RAS or a combination of RAS and RAP exceeds 30% of the total binder in the completed mix, the Engineer will establish and approve the virgin binder PG grade. Use approved methods to determine if any binder grade adjustments are necessary to achieve the performance grade for the specified mix type.

For Type S 12.5D and Type S 9.5D mixes, the maximum percentage of reclaimed asphalt material is limited to 20% and shall be produced using virgin asphalt binder grade PG 76-22. For all other recycled mix types, the virgin binder PG grade shall be as specified in Table 610-2A for the specified mix type.

When the percentage of RAP is greater than 20% but not more than 30% of the total mixture, use RAP meeting the requirements for processed or fractionated RAP in accordance with the requirements of Article 1012-1.

When the percentage of RAP is greater than 30% of the total mixture, use an approved stockpile of RAP in accordance with Subarticle 1012-1(C). Use approved test methods to determine if any binder grade adjustments are necessary to achieve the performance grade for the specified mix type. The Engineer will establish and approve the virgin asphalt binder grade to be used.



Page 6-34, Subarticle 610-3(C) Job Mix Formula, delete Table 610-2 and associated notes and replace with the following:

**TABLE 610-2  
SUPERPAVE MIX DESIGN CRITERIA**

Mix Type	Design ESALs Millions (a)	Binder PG Grade (b)	Compaction Levels No. Gyration @		Max. Rut Depth (mm)	Volumetric Properties (c)			
			N <sub>ini</sub>	N <sub>des</sub>		VMA % Min.	VTM %	VFA Min. - Max.	%G <sub>mm</sub> @ N <sub>ini</sub>
S-4.75A(e)	< 0.3	64 -22	6	50	-----	20.0	7.0 - 15.0	-----	-----
SF-9.5A	< 0.3	64 -22	6	50	11.5	16.0	3.0 - 5.0	70 - 80	≤ 91.5
S-9.5B	0.3 - 3	64 -22	7	65	9.5	15.5	3.0 - 5.0	65 - 80	≤ 90.5
S-9.5C	3 - 30	70 -22	7	75	6.5	15.5	3.0 - 5.0	65 - 78	≤ 90.5
S-9.5D	> 30	76 -22	8	100	4.5	15.5	3.0 - 5.0	65 - 78	≤ 90.0
S-12.5C	3 - 30	70 -22	7	75	6.5	14.5	3.0 - 5.0	65 - 78	≤ 90.5
S-12.5D	> 30	76 -22	8	100	4.5	14.5	3.0 - 5.0	65 - 78	≤ 90.0
I-19.0B	< 3	64 -22	7	65	-----	13.5	3.0 - 5.0	65 - 78	≤ 90.5
I-19.0C	3 - 30	64 -22	7	75	-----	13.5	3.0 - 5.0	65 - 78	≤ 90.0
I-19.0D	> 30	70 -22	8	100	-----	13.5	3.0 - 5.0	65 - 78	≤ 90.0
B-25.0B	< 3	64 -22	7	65	-----	12.5	3.0 - 5.0	65 - 78	≤ 90.5
B-25.0C	> 3	64 -22	7	75	-----	12.5	3.0 - 5.0	65 - 78	≤ 90.0
	<b>Design Parameter</b>							<b>Design Criteria</b>	
All Mix Types	1. Dust to Binder Ratio ( $P_{0.075}/P_{be}$ )							0.6 – 1.4	
	2. Retained Tensile Strength (TSR) (AASHTO T283 Modified)							85% Min. (d)	

- Notes:
- (a) Based on 20 year design traffic.
  - (b) When Recycled Mixes are used, select the binder grade to be added in accordance with Subarticle 610-3(A).
  - (c) Volumetric Properties based on specimens compacted to N<sub>des</sub> as modified by the Department.
  - (d) AASHTO T 283 Modified (No Freeze-Thaw cycle required). TSR for Type S 4.75A, Type B 25.0B, and Type B 25.0C mixes is 80% minimum.
  - (e) Mix Design Criteria for Type S 4.75A may be modified subject to the approval of the Engineer.

**Page 6-34, Insert the following immediately after Table 610-2:**

**TABLE 610-2A  
SUPERPAVE MIX DESIGN CRITERIA**

Mix Type	Percentage of RAP in Mix		
	Category 1	Category 2	Category 3
	% RAP ≤20%	20.1% ≤%RAP ≤ 30.0%	%RAP > 30.0%
All A and B Level Mixes, I19.0C, B25.0C	PG 64 -22	PG 64 -22	TBD
S9.5C, S12.5C, I19.0D	PG 70 -22	PG 64-22	TBD
S 9.5D and S12.5D	PG 76-22	N/A	N/A

- Note:
- (1) Category 1 RAP has been processed to a maximum size of 2 inches.
  - (2) Category 2 RAP has been processed to a maximum size of 1 inch by either crushing and or screening to reduce variability in the gradations.
  - (3) Category 3 RAP has been processed to a maximum size of 1 inch, fractionating the RAP into 2 or more sized stockpiles

**Page 6-35, Table 610-3 delete and replace with the following:**

**TABLE 610-3  
ASPHALT PLACEMENT- MINIMUM TEMPERATURE REQUIREMENTS**

Asphalt Concrete Mix Type	Minimum Air Temperature	Minimum Surface Temperature
ACBC, Type B 25.0B, C, B 37.5C	35°F	35°F
ACIC, Type I 19.0B, C, D	35°F	35°F
ACSC, Type S 4.75A, SF 9.5A, S 9.5B	40°F	50°F*
ACSC, Type S 9.5C, S 12.5C	45°F	50°F
ACSC, Type S 9.5D, S 12.5D	50°F	50°F

\* 35°F if surface is soil or aggregate base for secondary road construction.

**Page 6-45, Article 610-8 SPREADING AND FINISHING delete the third paragraph on page 6-45 and replace with the following:**

Use a Material Transfer Vehicle (MTV) when placing all asphalt concrete plant mix pavements which require the use of asphalt binder grade PG 76-22 and for all types of OGAFAC, unless otherwise approved. Use a MTV for all surface mix regardless of binder grade placed on Interstate facilities. Where required above, utilize the MTV when placing all full width travel lanes, collector lanes, ramps, and loops.

**Page 6-44, Article 610-8 SPREADING AND FINISHING, third full paragraph, replace the first sentence with the following:**

Use the 30 foot minimum length mobile grade reference system or the non-contacting laser or sonar type ski *with at least four referencing stations mounted on the paver at a minimum length of 24 feet* to control the longitudinal profile when placing the initial lanes and all adjacent lanes of all layers, including resurfacing and asphalt in-lays, unless otherwise specified or approved.

**Page 6-50, Article 610-13 DENSITY ACCEPTANCE, delete the second paragraph and replace with the following:**

As an exception, when the first layer of mix is a surface course and is being placed directly on an unprimed aggregate or soil base, the layer will be included in the "Other" construction category.

**Page 6-50, Article 610-13 DENSITY ACCEPTANCE, delete the formula and description in the middle of the page and replace with the following:**

$$PF = 100 - 10(D)^{1.465}$$

Where: PF = Pay Factor (computed to 0.1%)  
 D = the deficiency of the lot average density, not to exceed 2.0%

**Page 6-53, Article 620-4 MEASUREMENT AND PAYMENT, sixth paragraph, delete the last sentence and seventh paragraph, delete the paragraph and replace with the following:**

The adjusted contract unit price will then be applied to the theoretical quantity of asphalt binder authorized for use in the plant mix placed during the partial payment period involved, except that where recycled plant mix is used, the adjusted unit price will be applied only to the theoretical number of tons of additional asphalt binder materials required by the job mix formula.

**Page 6-54, Article 620-4 MEASUREMENT AND PAYMENT, add the following pay item:**

Pay Item	Pay Unit
Asphalt Binder for Plant Mix, Grade PG 70-28	Ton

**Page 6-59, Article 650-5 CONSTRUCTION REQUIREMENTS delete the second paragraph from the bottom of the page beginning "Use a Material Transfer Vehicle (MTV)..." and replace with the following:**

Use a Material Transfer Vehicle (MTV) when placing all asphalt concrete plant mix pavements which require the use of asphalt binder grade PG 76-22 and for all types of OGAFc, unless otherwise approved. Use a MTV for all surface mix regardless of binder grade placed on Interstate facilities. Where required above, utilize the MTV when placing all full width travel lanes, collector lanes, ramps, and loops.

**Page 6-69, TABLE 660-1 MATERIAL APPLICATION RATES AND TEMPERATURES, add the following:**

Type of Coat	Grade of Asphalt	Asphalt Rate gal/yd <sup>2</sup>	Application Temperature °F	Aggregate Size	Aggregate Rate lb./sq. yd. Total
Sand Seal	CRS-2 or CRS-2P	0.22-0.30	150-175	Blotting Sand	12-15

**Page 6-75, Subarticle 660-9(B) Asphalt Seal Coat, add the following as sub-item (5)****(5) Sand Seal**

Place the fully required amount of asphalt material in one application and immediately cover with the seal coat aggregate. Uniformly spread the fully required amount of aggregate in one application and correct all non-uniform areas prior to rolling.

Immediately after the aggregate has been uniformly spread, perform rolling.

When directed, broom excess aggregate material from the surface of the seal coat.

When the sand seal is to be constructed for temporary sealing purposes only and will not be used by traffic, other grades of asphalt material meeting the requirements of Articles 1020-6 and 1020-7 may be used in lieu of the grade of asphalt required by Table 660-1 when approved.

**Page 6-76, Article 661-1 DESCRIPTION, add the following as the 2nd paragraph:**

Provide and conduct the quality control and required testing for acceptance of the UBWC in accordance with *Quality Management System for Asphalt Pavements (OGAFC, PADL, and Ultra-Thin HMA Version)*, included in the contract.

**Page 6-76, Article 661-2 MATERIALS, add the following after Asphalt Binder, Grade 70-28:**

<b>Item</b>	<b>Section</b>
Asphalt Binder, Grade 76-22	1020
Reclaimed Asphalt Shingles	1012

**Page 6-78, Subarticle 661-2(E), Asphalt Binder For Plant Mix, Grade PG 70-28, rename as ASPHALT BINDER FOR PLANT MIX and add the following as the first paragraph:**

Use either PG 70-28 or PG 76-22 binder in the mix design. Where PG 76-22 is being used in the production of Ultra-thin, the grade of asphalt binder to be paid for will be PG 70-28, unless otherwise approved.

**Page 6-79, Subarticle 661-2(G) Composition of Mix, add the following as the third sentence of the first paragraph.**

The percent of asphalt binder contributed from the RAS shall not exceed 20% of the total binder in the completed mix.

**Page 6-80, Article 661-2(G) Composition of Mix, replace Table 661-4 and associated notes with the following:**

Standard Sieves		1/2 in. Type A	3/8 in. Type B	1/4 in. Type C
ASTM	mm	(% Passing by Weight)		
¾ inch	19.0	100		
½ inch	12.5	85 - 100	100	
3/8 inch	9.5	60 - 80	85 - 100	100
#4	4.75	28 - 38	28 - 44	40 - 55
#8	2.36	19 - 32	17 - 34	22 - 32
#16	1.18	15 - 23	13 - 23	15 - 25
#30	0.600	10 - 18	8 - 18	10 - 18
#50	0.300	8 - 13	6 - 13	8 - 13
#100	0.150	6 - 10	4 - 10	6 - 10
#200	0.075	4.0 - 7.0	3.0 - 7.0	4.0 - 7.0

	1/2 in. Type A	3/8 in. Type B	1/4 in. Type C
Asphalt Content, %	4.6 - 5.6	4.6 - 5.8	5.0 - 5.8
Draindown Test, AASHTO T 305	0.1% max.		
Moisture Sensitivity, AASHTO T 283*	80% min.		
Application Rate, lb/ yd <sup>2</sup>	90	70	50
Approximate Application Depth, in.	3/4	5/8	1/2
Asphalt PG Grade, AASHTO M 320	PG 70-28 or PG 76-22	PG 70-28 or PG 76-22	PG 70-28 or PG 76-22

NOTE: \*Specimens for T-283 testing are to be compacted using the SUPERPAVE gyratory compactor. The mixtures shall be compacted using 100 gyrations to achieve specimens approximately 95 mm in height. Use mixture and compaction temperatures recommended by the binder supplier.

**Page 6-80, Subarticle 661-3(A) Equipment, add the following as the first paragraph:**

Use asphalt mixing plants in accordance with Article 610-5 of the *Standard Specifications*.

**Page 6-82, Subarticle 661-3(C), Application of Ultra-thin Bonded Wearing Course, delete the first paragraph and add the following as the first and second paragraphs.**

Use only one asphalt binder PG grade for the entire project, unless the Engineer gives written approval.

Do not place Ultra-thin Bonded Wearing Course between October 31 and April 1, when the pavement surface temperature is less than 50°F or on a wet pavement. In addition, when PG 76-22 binder is used in the JMF, place the wearing course only when the road pavement surface temperature is 60°F or higher and the air temperature in the shade away from artificial heat is 60°F or higher.

**Page 10-40, Subarticle 1012-1(A) General, add the following at the end of the last paragraph, last sentence:**

or ultra-thin bonded wearing course.

**Page 10-41, Table 1012-1, delete the entries for OG AFC and add new entries for OG AFC and a row for UBWC with entries:**

Mix Type	Coarse Aggregate Angularity <sup>(b)</sup> ASTM D5821	Fine Aggregate Angularity % Minimum AASHTO T304 Method A	Sand Equivalent % Minimum AASHTO T176	Flat & Elongated 5:1 Ratio % Maximum ASTM D4791 Section 8.4
S 9.5 D	100/100	45	50	10
OG AFC	100/100	N/A	N/A	10
UBWC	100/85	40	45	10

**Delete Note (c) under the Table 1012-1 and replace with the following:**

(c) Does not apply to Mix Types SF 9.5A and S 9.5B.

**Page 10-42, Subarticle 1012-1(B)(6) Toughness (Resistance to Abrasion), add as the last sentence:**

The percentage loss for aggregate used in UBWC shall be no more than 35%.

**Page 10-43, Subarticle 1012-1(F) Reclaimed Asphalt Shingle Material (RAS), insert the following immediately following the first paragraph:**

(1) Mix Design RAS

Incorporate RAS from stockpiles that have been tested for uniformity of gradation and binder content prior to use in an asphalt mix design.

(2) Mix Production RAS

New Source RAS is defined as acceptable material which was not included in the stockpile when samples were taken for mix design purposes. Process new source RAS so that all materials will pass a 1/2" sieve prior to introduction into the plant mixer unit.

After a stockpile of processed RAS has been sampled and mix designs made from these samples, do not add new source RAS to the original stockpile without prior field testing to insure gradation and binder uniformity. Sample and test new source RAS before blending with the existing stockpile.

Store new source RAS in a separate stockpile until the material can be sampled and tested for comparison with the original recycled mix design data. New source RAS may also be placed against the existing stockpile in a linear manner provided it is sampled for mix design conformity prior to its use in the recycled mix.

RAS contamination including but not limited to excessive dirt, debris, clean stone, concrete will not be allowed.

Field approval of new source RAS will be based on the table below and volumetric mix properties on the mix with the new source RAS included. Provided these tolerances are met, volumetric properties of the new mix will then be performed. If all volumetric mix properties meet the mix design criteria for that mix type, the new source RAS may continue to be used.

If the gradation, binder content, or any of the volumetric mix properties are not within the allowable tolerances of the table below, do not use the new source RAS unless approved by the Engineer. The Contractor may elect to either not use the stockpile, to request an adjustment to the JMF, or to redesign the mix.

**NEW SOURCE RAS GRADATION and BINDER TOLERANCES  
(Apply Tolerances to Mix Design Data)**

<b>0-6% RAS</b>	
<b>P<sub>b</sub> %</b>	<b>±1.6%</b>
<b>Sieve Size (mm)</b>	<b>Tolerance</b>
9.5	±1
4.75	±5
2.36	±4
1.18	±4
0.300	±4
0.150	±4
0.075	±2.0

**Page 10-43 through 10-45, Subarticle 1012-1(G), delete this in its entirety and replace with the following:**

**(G) Reclaimed Asphalt Pavement (RAP)**

**(1) Mix Design RAP**

Incorporate RAP from stockpiles or other sources that have been tested for uniformity of gradation and binder content prior to use in an asphalt mix design. Use reclaimed asphalt pavement that meets all requirements specified for *one* of the following *two* classifications.

**(a) Millings**

Existing reclaimed asphalt pavement (RAP) that is removed from its original location by a milling process as specified in Section 607. Millings should be such that it has a uniform gradation and binder content and all materials will pass a 2" sieve prior to introduction into the plant mixer unit.

**(b) Processed RAP**

RAP that is processed in some manner (possibly by crushing and/or use of a blending method) to produce a uniform gradation and binder content in the RAP prior to use in a recycled mix. Process RAP so that all materials have a uniform gradation and binder content and will pass a 1" sieve prior to introduction into the plant mixer unit.

**(c) Fractionated RAP**

Fractionated RAP is defined as having two or more RAP stockpiles, where the RAP is divided into coarse and fine fractions. Grade RAP so that all materials will pass a 1" sieve. The coarse RAP stockpile shall only contain material retained on a 3/8" screen, unless otherwise approved. The fine RAP stockpile shall only contain material passing the 3/8" screen, unless otherwise approved. The Engineer may allow the Contractor to use an alternate to the 3/8" screen to fractionate the RAP. The maximum percentages of fractionated RAP may be comprised of coarse, fine, or the combination of both. Utilize a separate cold feed bin for each stockpile of fractionated RAP used.

**(d) Approved Stockpiled RAP**

Approved Stockpiled RAP is defined as fractionated RAP which has been isolated and tested for asphalt content, gradation, and asphalt binder characteristics with the intent to be used in mix designs with greater than 30% RAP materials. Fractionate the RAP in accordance with Subarticle 1012-1(G)(1)(c). Utilize a separate cold feed bin for each approved stockpile of RAP used.

Perform extraction tests at a rate of 1 per 1000 tons of RAP, with a minimum of 5 tests per stockpile to determine the asphalt content and gradation. Separate stockpiles of RAP material by fine and coarse fractions. Erect and maintain a sign satisfactory to the Engineer on each stockpile to identify the material. Assure that no deleterious material is allowed in any stockpile. The Engineer may reject by visual inspection any stockpiles that are not kept clean, separated, and free of foreign materials.

Submit requests for RAP stockpile approval to the Engineer with the following information at the time of the request:

- (1) Approximate tons of materials in stockpile
- (2) Name or Identification number for the stockpile
- (3) Asphalt binder content and gradation test results
- (4) Asphalt characteristics of the Stockpile.



For the Stockpiled RAP to be considered for approval, the gradation and asphalt content shall be uniform. Individual test results, when compared to the target, will be accepted if within the tolerances listed below:

**APPROVED STOCKPILED RAP GRADATION and BINDER TOLERANCES  
(Apply Tolerances to Mix Design Data)**

<b>P<sub>b</sub> %</b>	<b>±0.3%</b>
<b>Sieve Size (mm)</b>	<b>Percent Passing</b>
25.0	±5%
19.0	±5%
12.5	±5%
9.5	±5%
4.75	±5%
2.36	±4%
1.18	±4%
0.300	±4%
0.150	±4%
0.075	±1.5%

Note: If more than 20% of the individual sieves are out of the gradation tolerances, or if more than 20% of the asphalt binder content test results fall outside the appropriate tolerances, the RAP shall not be used in HMA unless the RAP representing the failing tests is removed from the stockpile.

Do not add additional material to any approved RAP stockpile, unless otherwise approved by the Engineer.

Maintain at the plant site a record system for all approved RAP stockpiles. Include at a minimum the following: Stockpile identification and a sketch of all stockpile areas at the plant site; all RAP test results (including asphalt content, gradation, and asphalt binder characteristics).

**(2) Mix Production RAP**

During mix production, use RAP that meets the criteria for one of the following categories:

**(a) Mix Design RAP**

RAP contained in the mix design stockpiles as described above may be used in all applicable JMFs. These stockpiles have been pretested; however, they are subject to required QC/QA testing in accordance with Subarticle 609-5(C)(2).

**(b) New Source RAP**

New Source RAP is defined as any acceptable material that was not included in the stockpile or other source when samples were taken for mix design purposes. Process new source RAP so that all materials have a uniform gradation and binder content and will pass a 2" sieve prior to introduction into the plant mixer unit.

After a stockpile of millings, processed RAP, or fractionated RAP has been sampled and mix designs made from these samples, do not add new source RAP to the original stockpile without prior field testing to insure gradation and binder uniformity. Sample and test new source RAP before blending with the existing stockpile.

Store new source RAP in a separate stockpile until the material can be sampled and tested for comparison with the original recycled mix design data. New source RAP may also be placed against the existing stockpile in a linear manner provided it is sampled for mix design conformity prior to its use in the recycled mix.

Unprocessed RAP is asphalt material that was not milled and/or has not been processed to obtain a uniform gradation and binder content and is not representative of the RAP used during the applicable mix design. Unprocessed RAP shall not be incorporated into any JMFs prior to processing. Different sources of unprocessed RAP may be stockpiled together provided it is generally free of contamination and will be processed prior to use in a recycled mix. RAP contamination in the form of excessive dirt, debris, clean stone, concrete, etc. will not be allowed. Incidental amounts of dirt, concrete, and clean stone may be acceptable. Unprocessed RAP may be processed and then classified as a new source RAP as described above.

Field approval of new source RAP will be based on Table 1012-2 below and volumetric mix properties on the mix with the new source RAP included. Provided the Table 1012-2 tolerances are met, volumetric properties of the new mix will then be performed. If all volumetric mix properties meet the mix design criteria for that mix type, the new source RAP may continue to be used.

If the gradation, binder content, or any of the volumetric mix properties are not within the allowable tolerances of Table 1012-2, do not use the new source RAP unless approved by the Engineer. The Contractor may elect to either not use the stockpile, to request an adjustment to the JMF, or to redesign the mix.

<b>TABLE 1012-2 NEW SOURCE RAP GRADATION and BINDER TOLERANCES (Apply Tolerances to Mix Design Data)</b>									
<b>Mix Type</b>	<b>0-20% RAP</b>			<b>20<sup>+</sup>-30 % RAP</b>			<b>30<sup>+</sup> % RAP</b>		
<b>Sieve (mm)</b>	<b>Base</b>	<b>Inter.</b>	<b>Surf.</b>	<b>Base</b>	<b>Inter.</b>	<b>Surf.</b>	<b>Base</b>	<b>Inter.</b>	<b>Surf.</b>
<b>P<sub>b</sub> %</b>	<b>± 0.7%</b>			<b>± 0.4%</b>			<b>± 0.3%</b>		
25.0	±10	-	-	±7	-	-	±5	-	-
19.0	±10	±10	-	±7	±7	-	±5	±5	-
12.5	-	±10	±10	-	±7	±7	-	±5	±5
9.5	-	-	±10	-	-	±7	-	-	±5
4.75	±10	-	±10	±7	-	±7	±5	-	±5
2.36	±8	±8	±8	±5	±5	±5	±4	±4	±4
1.18	±8	±8	±8	±5	±5	±5	±4	±4	±4
0.300	±8	±8	±8	±5	±5	±5	±4	±4	±4
0.150	-	-	±8	-	-	±5	-	-	±4
0.075	±4	±4	±4	±2	±2	±2	±1.5	±1.5	±1.5

### **ASPHALT PAVEMENTS - WARM MIX ASPHALT SUPERPAVE:**

(5-19-09) (Rev 2-15-11)

R6 R02A

Warm Mix Asphalt (WMA) is defined as additives or processes that allow a reduction in the temperature at which asphalt mixtures are produced and placed.

Notify the Engineer at least 2 weeks before producing the WMA so the Engineer can arrange a pre-pave meeting. Discuss special testing requirements necessary for WMA at the pre-pave meeting. Include at the pre-pave meeting the Contractor's QC manager, Paving Superintendent, and manufacturer's representative for the WMA technology, the Department's Roadway Construction Engineer, Resident Engineer, State Pavement Construction Engineer, and Quality Assurance Supervisor.

Require a manufacturer's representative for the WMA technology used to be present on site at the plant during the initial production and on the roadway during the laydown of the warm mix asphalt.

The requirement for the manufacturer's representative to be present at the pre-pave meeting and on-site at the plant may be waived by the Engineer based on previous work experience with the specific WMA technology used.

If the use of WMA is suspended during production, and the Contractor begins using Hot Mix Asphalt (HMA), then the Contractor shall be required to use HMA for the remainder of the specific route or map unless otherwise approved by the Engineer.

Revise the *2006 Standard Specifications* as follows:

**Page 6-8, Article 609-1 Description, insert the following as the second paragraph:**

Warm Mix Asphalt (WMA) is defined as additives or processes that allow a reduction in the temperature at which asphalt mixtures are produced and placed. Use WMA at the Contractor's option when shown in the contract.

**Page 6-9, Article 609-4 Field Verification of Mixture and Job Mix Formula Adjustments, second paragraph, insert the following immediately after the first sentence:**

When producing a WMA, perform field verification testing including Tensile Strength Ratio (TSR) testing in accordance with AASHTO T 283 as modified by the Department.

**Third paragraph, delete the third sentence and replace with the following:**

Verification is satisfactory for HMA when all volumetric properties except  $\%G_{mm}@N_{ini}$  are within the applicable mix design criteria and the gradation, binder content, and  $\%G_{mm}@N_{ini}$  are within the individual limits for the mix type being produced. Verification is satisfactory for WMA when all volumetric properties except  $\%G_{mm}@N_{ini}$  are within the applicable mix design criteria, the TSR meets the design criteria, and the gradation, binder content, and  $\%G_{mm}@N_{ini}$  are within the individual limits for the mix type being produced.

**Page 6-12, Subarticle 609-5(C)(2)(d) Bulk Specific Gravity of Compacted Specimens, add after (AASHTO T 312):**

When producing WMA, gyrate specimens to specified  $N_{des}$  compaction effort without reheating mix other than to desired compaction temperature. Record time needed to reheat samples (if any).

**Page 6-14, Subarticle 609-5(C)(2)(e) Tensile Strength Ratio, insert the following immediately after the third paragraph:**

When producing WMA, perform TSR testing:

- (i.) Prior to initial production for each JMF and
- (ii.) Every 15,000 tons.

After three (3) consecutive passing TSR tests for a specific JMF, a request may be submitted to the State Asphalt Design Engineer to revert to the *Hot-Mix Asphalt QMS Manual* procedures for TSR testing on that JMF. This request shall be submitted in writing and shall include all test result data (Material and Tests Unit Form 612s) performed on the specific JMF.

**Page 6-27, Article 610-1 Description, insert the following as the third paragraph:**

Warm Mix Asphalt (WMA) is defined as additives or processes that allow a reduction in the temperature at which asphalt mixtures are produced and placed. Use WMA at the Contractor's option when shown in the contract.

**Page 6-27, Article 610-2 Materials, insert the following at the end of this Article:**

Use only WMA technologies on the allowable routes listed on the Department’s approved list maintained by the Materials and Tests Unit. The Department’s approved list can be found at the following website: <http://www.ncdot.org/doh/operations/materials/pdf/wma.pdf>.

**Page 6-31, Subarticle 610-3(B) Mix Design-Criteria, add the following as the fifth paragraph:**

When WMA is used, submit the mix design without including the WMA additive.

**Page 6-32, Subarticle 610-3(C) Job Mix Formula, add the following as the second paragraph:**

When WMA is used, document the technology used, the recommended dosage rate, and the requested plant mix temperature on the JMF submittal. Verify the JMF based on plant produced mixture from the field verification test.

**Immediately following PG 76-22 335°F, add the following paragraph:**

When WMA is used, produce an asphalt mixture within the temperature range of 225°F to 275°F.

**ASPHALT BINDER CONTENT OF ASPHALT PLANT MIXES:**

(1-1-02)

R6 R15

The approximate asphalt binder content of the asphalt concrete plant mixtures used on this project will be as follows:

Asphalt Concrete Base Course	Type B 25.0	4.3 %
Asphalt Concrete Intermediate Course	Type I 19.0	4.7 %
Asphalt Concrete Surface Course	Type S 4.75A	7.0 %
Asphalt Concrete Surface Course	Type SF 9.5A	6.5 %
Asphalt Concrete Surface Course	Type S 9.5	6.0 %
Asphalt Concrete Surface Course	Type S 12.5	5.5 %

The actual asphalt binder content will be established during construction by the Engineer within the limits established in the *2006 Standard Specifications*.

**ASPHALT PLANT MIXTURES:**

(7-1-95)

R6 R20

Place asphalt concrete base course material in trench sections with asphalt pavement spreaders made for the purpose or with other equipment approved by the Engineer.

**PRICE ADJUSTMENT - ASPHALT BINDER FOR PLANT MIX:**

(11-21-00)

R6 R25

Price adjustments for asphalt binder for plant mix will be made in accordance with Section 620 of the *2006 Standard Specifications*.

The base price index for asphalt binder for plant mix is \$ **467.00** per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **January 1, 2011**.

**RESURFACING EXISTING BRIDGES:**

(7-1-95)

R6 R61

The Contractor's attention is directed to the fact that he will be required to resurface the bridges on this project if directed by the Engineer.

Place the surface so as to follow a grade line set by the Engineer with the minimum thickness as shown on the sketch herein or as directed by the Engineer. State Forces will make all necessary repairs to the bridge floors prior to the time that the Contractor places the proposed surfacing. Give the Engineer at least 15 days notice prior to the expected time to begin operations so that State Forces will have sufficient time to complete their work.

At all bridges that are not to be resurfaced, taper out the proposed resurfacing layer adjacent to the bridges to insure a proper tie-in with the bridge surface.

**INCIDENTAL CONCRETE:**

(3-7-08)

DDC\_825

Revise the *Standard Specifications* as follows:

825-11 Measurement and Payment

Replace with the following:

*Incidental Concrete* will be measured and paid for in square yards, measured along the surface of the completed and accepted work. Such price includes, but is not limited to excavating and backfilling, sawing the existing adjacent concrete, furnishing and placing concrete, and constructing and sealing joints.

**Pay Item**  
Incidental Concrete

**Pay Unit**  
Square Yard

**REMOVE AND REPLACE DRIVEWAY TURNOUT:**

**Description**

The Contractor shall Remove and Replace existing driveway turn outs as directed by the Engineer. All work for this item shall be in accordance with Section 848. Section 848 is amended as follows: Removal and disposal of existing driveway turn out shall be incidental to the item *Remove and Replace Driveway Turnout*.

**Measurement and Payment**

*Remove and Replace Driveway Turnout* will be measured and paid for in units of square yards for the actual number of square yards that have been completed and accepted.

Such price and payment includes but is not limited to providing all materials, removal and disposal of existing driveway turnout, concrete, sidewalk, placing all concrete, excavating and backfilling, forming, finishing, constructing and sealing joints, and all incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
<i>Remove and Replace Driveway Turnout</i>	<i>Square Yards</i>

**PAVING INTERSECTIONS, DRIVEWAYS, AND MAILBOX TURNOUTS:**

(7-1-95)

R6 R73

Surface all unpaved intersections back from the edge of the pavement on the mainline of the project at least 50 feet, or as directed by the Engineer. The base material for all intersections to be surfaced will be prepared for surfacing by State Forces. Place pavement in the intersections of the same material and thickness as being used on the mainline.

Surface all paved intersections back to the ends of the radii, or as directed by the Engineer. In addition, the Contractor will be required to resurface all driveway and mailbox turnouts as directed by the Engineer.

**PATCHING EXISTING PAVEMENT (MILL):**

(1-26-07)

RR 88

**Description:**

The Contractor's attention is directed to the fact that there are areas of existing pavement on this project that will require repair prior to resurfacing.

The Contractor shall patch the areas that, in the opinion of the Engineer, need repairing. The areas to be patched will be delineated by the Engineer prior to the Contractor performing repairs.

**Construction Methods:**

The patching shall consist of Asphalt Concrete Base Course, Asphalt Concrete Intermediate Course, or Asphalt Concrete Surface Course, or a combination of base, intermediate and surface course, and pavement removal, **as shown on the Summary of Quantities sheet** or as directed by the Engineer.

Patching of existing pavement shall include, but not be limited to, the cutting of the existing pavement to a neat vertical joint and uniform line; the removal and disposal of pavement, base, and subgrade material as approved or directed by the Engineer; the coating of the area to be repaired with a tack coat; and the replacement of the removed material with asphalt plant mix.



Asphalt Concrete Base Course shall be placed in lifts not exceeding 5 1/2 inches. Compaction equipment suitable for compacting patches as small as 4 feet by 6 feet shall be utilized on each lift. Compaction pattern to achieve proper compaction shall be approved by the engineer.

The Contractor shall remove existing pavement at locations directed by the Engineer in accordance with Section 607 of the *Standard Specifications*.

The Contractor may be required to make multiple passes with the milling machine to achieve additional depth of the patch at the direction of the engineer. There will be no additional payment for additional passes as all work will be compensated at the unit price for the type of mill patching to be performed. The Contractor will utilize a maximum milling head width of 4 feet unless otherwise allowed by the Engineer.

The Contractor shall schedule his operations so that all areas where pavement has been removed will be repaired on the same day of the pavement removal, and all lanes of traffic shall be restored.

**Method of Measurement:**

The quantity of patching existing pavement to be paid for will be the actual number of tons of asphalt plant mix, complete in place, which has been used to make completed and accepted repairs. The asphalt plant mixed material will be measured by being weighed in trucks on certified platform scales or other certified weighing devices.

**Basis of Payment:**

The quantity of patching existing pavement, measured as provided above, will be paid for at the contract unit price per ton for the type of mill patching to be performed.

The above price and payment will be full compensation for all work covered by this provision, including but not limited to removal and disposal of pavement; furnishing and applying tack coat; furnishing, placing, and compacting of asphalt plant mix; furnishing of asphalt binder for the asphalt plant mix; and furnishing scales.

Any provisions included in the contract in the form of project special provisions or in any other form which provides for adjustments in compensation due to variations in the price of asphalt binder will not be applicable to payment for the work covered by this provision.

Patching Existing Pavement will be considered a minor item. In the event that the item of Patching Existing Pavement overruns the original bid quantity by more than 100 percent, the provisions of Article 104-5 of the *Standard Specifications* pertaining to revised contract unit price for overrunning minor items will not apply to this item.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Patching Existing Pavement (Mill)	Ton

**PATCHING EXISTING PAVEMENT (FULL DEPTH):**

(1-26-07)

RR 88

**Description:**

The Contractor's attention is directed to the fact that there are areas of existing pavement on this project that will require repair prior to resurfacing.

The Contractor shall patch the areas that, in the opinion of the Engineer, need repairing. The areas to be patched will be delineated by the Engineer prior to the Contractor performing repairs.

**Construction Methods:**

The patching shall consist of Asphalt Concrete Base Course, Asphalt Concrete Intermediate Course, or Asphalt Concrete Surface Course, or a combination of base, intermediate and surface course, and pavement removal, **as shown on the Summary of Quantities sheet** or as directed by the Engineer.

Patching of existing pavement shall include, but not be limited to, the cutting of the existing pavement to a neat vertical joint and uniform line; the removal and disposal of pavement, base, and subgrade material as approved or directed by the Engineer; the coating of the area to be repaired with a tack coat; and the replacement of the removed material with asphalt plant mix.

Asphalt Concrete Base Course shall be placed in lifts not exceeding 5 1/2 inches. Compaction equipment suitable for compacting patches as small as 4 feet by 6 feet shall be utilized on each lift. Compaction pattern to achieve proper compaction shall be approved by the engineer.

The Contractor shall remove existing pavement at locations directed by the Engineer in accordance with Section 607 of the *Standard Specifications*.

The Contractor may be required to make multiple passes with the milling machine to achieve additional depth of the patch at the direction of the engineer. There will be no additional payment for additional passes as all work will be compensated at the unit price for the type of full depth patching to be performed. The Contractor will utilize a maximum milling head width of 4 feet unless otherwise allowed by the Engineer.

The Contractor shall schedule his operations so that all areas where pavement has been removed will be repaired on the same day of the pavement removal, and all lanes of traffic shall be restored.

**Method of Measurement:**

The quantity of patching existing pavement to be paid for will be the actual number of tons of asphalt plant mix, complete in place, which has been used to make completed and accepted repairs. The asphalt plant mixed material will be measured by being weighed in trucks on certified platform scales or other certified weighing devices.

**Basis of Payment:**

The quantity of patching existing pavement, measured as provided above, will be paid for at the contract unit price per ton for the type of full depth patching to be performed.

The above price and payment will be full compensation for all work covered by this provision, including but not limited to removal and disposal of pavement; furnishing and applying tack coat; furnishing, placing, and compacting of asphalt plant mix; furnishing of asphalt binder for the asphalt plant mix; and furnishing scales.

Any provisions included in the contract in the form of project special provisions or in any other form which provides for adjustments in compensation due to variations in the price of asphalt binder will not be applicable to payment for the work covered by this provision.

Patching Existing Pavement will be considered a minor item. In the event that the item of Patching Existing Pavement overruns the original bid quantity by more than 100 percent, the provisions of Article 104-5 of the *Standard Specifications* pertaining to revised contract unit price for overrunning minor items will not apply to this item.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Patching Existing Pavement (Full Depth)	Ton

**CURB & GUTTER, REMOVE AND REPLACE:****Description**

The Contractor shall Remove and Replace existing curb & gutter as directed by the Engineer. All work for this item shall be in accordance with Section 846. Section 846 is amended as follows: Removal and disposal of existing curb & gutter shall be incidental to the work covered by this provision

**Measurement and Payment**

*Remove and Replace 2'-6" Curb & Gutter* and *Remove and Replace Concrete Valley Gutter* will be measured and paid for in units of linear feet for the actual number of linear feet that have been completed and accepted. Such price and payment includes but is not limited to providing all materials, removal and disposal of existing curb & gutter, placing all concrete, excavating and backfilling, forming, finishing, constructing and sealing joints, and all incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
<i>Remove and Replace 2'-6" Curb &amp; Gutter</i>	<i>Linear Feet</i>
<i>Remove and Replace Concrete Valley Gutter</i>	<i>Linear Feet</i>

**BORROW EXCAVATION AND SHPO DOCUMENTATION FOR BORROW/WASTE**

**SITES:**

(12-18-07) (4-15-08)

R8 R02

Revise the *2006 Standard Specifications* as follows:

**Division 2 Earthwork**

**Page 2-16, Subarticle 230-1(D)**, add the words: *The Contractor specifically waives* as the first words of the sentence.

**Page 2-17, Article 230-4(B) Contractor Furnished Sources, first paragraph, first sentence** replace with the following:

Prior to the approval of any borrow sources developed for use on any project, obtain certification from the State Historic Preservation Officer of the State Department of Cultural Resources certifying that the removal of the borrow material from the borrow sources(s) will have no effect on any known district, site building, structure, or object, architectural and/or archaeological that is included or eligible for inclusion in the National Register of Historic Places.

**Division 8 Incidentals**

**Page 8-9, Article 802-2 General Requirements, add the following as the 1st paragraph:**

Prior to the removal of any waste from any project, obtain certification from the State Historic Preservation Officer of the State Department of Cultural Resources certifying that the deposition of the waste material to the proposed waste area will have no effect on any known district, site building, structure, or object, architectural and/or archaeological that is included or eligible for inclusion in the National Register of Historic Places. Furnish a copy of this certification to the Engineer prior to performing any work in the proposed waste site.

**Page 8-10, Article 802-2, General Requirements, 4th paragraph, add the following as the 2nd sentence:**

The Department’s borrow and waste site reclamation procedures for contracted projects is available on the NCDOT website and shall be used for all borrow and waste sites on this project.

**REMOVE AND REPLACE 5' SIDEWALK:**

**Description**

The Contractor shall Remove and Replace existing sidewalk as directed by the Engineer. All work for this item shall be in accordance with Section 848. Section 848 is amended as follows: Removal and disposal of existing sidewalk shall be incidental to the item *Remove and Replace 5' Sidewalk*.

**Measurement and Payment**

*Remove and Replace 5' Sidewalk* will be measured and paid for in units of square yards for the actual number of square yards that have been completed and accepted.

Such price and payment includes but is not limited to providing all materials, removal and disposal of existing sidewalk, placing all concrete, excavating and backfilling, forming, finishing, constructing and sealing joints, and all incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b> <i>Remove and Replace 5' Sidewalk</i>	<b>Pay Unit</b> <i>Square Yards</i>
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**ADJUSTMENT OF MANHOLES, METER BOXES, AND VALVE BOXES:**

(7-1-95)

R8 R97

The Contractor's attention is directed to Article 858-3 of the *2006 Standard Specifications*. Cast iron or steel fittings will not be permitted for the adjustment of manholes, meter boxes, and valve boxes on this project.

**DETECTABLE WARNINGS:**

(11-22-10)

DDC 848

**Description**

Construct detectable warnings consisting of raised truncated domes in accordance with the plan details, Section 848 of the *2006 Standard Specifications*, the requirements of the *28 CFR Part 36 ADA Standards for Accessible Design* and these provisions.

**Materials**

Detectable warnings shall consist of raised truncated domes. The description, size and spacing shall conform to Section 848 of the *Standard Specifications*.

Use material for detectable warning systems as shown herein. Material and coating specifications must be stated in the Manufacturers Type 3 Certification and all Detectable Warning systems must be on the Alternative Delivery Unit's Approved Product List for Specialty & Temporary Items.

Install detectable warnings created from one of the following materials: precast concrete blocks or bricks, clay paving brick, gray or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile. Only one material type for detectable warnings will be permitted per project, unless otherwise approved by the Engineer.

- (A) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **when constructed of precast concrete** they shall conform to the material requirements of Article 848-2 of the *Standard Specifications*.
- (B) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **may be comprised of other materials including but not limited to clay paving brick, gray iron or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile**, which are applied directly to the pedestrian refuge area by incorporating into or attaching to the existing ramp floor. The material shall have an integral color throughout the thickness of the material. The detectable warnings shall include fasteners, anchors, or adhesives for attachment in the existing pavement and shall be furnished as a system from the manufacturer.

Prior to installation, the Contractor shall submit to the Engineer assembling instructions from the manufacturer for each type of system used in accordance with Article 105-2 of the *Standard Specifications*. The system shall be furnished as a kit containing all consumable materials and consumable tools required for the application. They shall be capable of being affixed to or anchored in the concrete pavement, including green concrete (concrete that has set but not appreciably hardened). The system shall be solvent free and contain no volatile organic compounds (VOC). The static coefficient of friction shall be 0.8 or greater when measured on top of the truncated domes and when measured between the domes in accordance with ASTM C1028 (dry and wet). The system shall be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to degradation by motor fuels, lubricants and antifreeze.

- (C) When steel or gray iron or ductile iron casting products are provided, only products that meet the requirements of Subarticle 106-1(B) of the *Standard Specifications* may be used. Submit to the Engineer a Type 6 Certification, catalog cuts and installation procedures at least 30 days prior to installation for all.

### Construction Methods

Prior to placing detectable warnings in existing concrete, saw cut to the full depth of the concrete, for other material remove as necessary, and adjust the existing subgrade to the proper grade and in accordance with Article 848-3 of the *Standard Specifications*.

Install all detectable warnings in accordance with the manufacturer's recommendations.

### Measurement and Payment

*Detectable Warnings* constructed of any type material will be paid as the actual number of detectable warnings which have been completed and accepted. Such price and payment will be full compensation for excavating and backfilling; sawing, repairing and replacing portions of the existing surface within the pay limits for detectable warning domes shown on the detail; pavement repairs; furnishing and placing detectable warnings, construction joints and removing and disposing of portions of the surfaces when required; and for all materials, labor, equipment, tools and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Detectable Warnings	Each

### **DETECTABLE WARNINGS TO RETROFIT EXISTING WHEELCHAIR RAMPS:**

(10-21-03) (Rev.12-21-10)

R8 R125

#### Description

Construct detectable warnings consisting of raised truncated domes to retrofit existing wheelchair ramps in accordance with the plan details, Section 848 of the 2006 *Standard Specifications*, the requirements of the 28 CFR Part 36 ADA Standards for Accessible Design and these provisions.

#### Materials

Detectable warning for retrofitting existing wheelchair ramps shall consist of raised truncated domes. The description, size and spacing shall conform to Section 848 of the *Standard Specifications*.

Use material for detectable warning systems as shown herein. Material and coating specifications must be stated in the Manufacturers Type 3 Certification and all Detectable Warning systems must be on the NCDOT Approved Product List for Wheelchair Ramps.

Install detectable warnings created from one of the following materials: precast concrete blocks or bricks, clay paving brick, gray or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile. Only one material type for detectable warning will be permitted per project, unless otherwise approved by the Engineer.

- (A) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **when constructed of precast concrete** they shall conform to the material requirements of Article 848-2 of the *Standard Specifications*.
- (B) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **may be comprised of other materials including but not limited to clay paving brick, gray iron or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile**, which are applied directly to the wheelchair ramps by incorporating into or attaching to the existing ramp floor. The material shall have an integral color throughout the thickness of the material. The detectable warning shall include fasteners, anchors, or adhesives for attachment in the existing ramp and shall be furnished as a system from the manufacturer.

Prior to installation, the Contractor shall submit to the Engineer assembling instructions from the manufacturer for each type of system used in accordance with Article 105-2 of the *Standard Specifications*. The system shall be furnished as a kit containing all consumable materials and consumable tools, required for the application. They shall be capable of being affixed to or anchored in the concrete ramp, including green concrete (concrete that has set but not appreciably hardened). The system shall be solvent free and contain no volatile organic compounds (VOC). The static coefficient of friction shall be 0.8 or greater when measured on top of the truncated domes and when measured between the domes in accordance with ASTM C 1028 (dry and wet). The system shall be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to degradation by motor fuels, lubricants and antifreeze.

- (C) When steel or gray iron or ductile iron casting products are provided, only products that meet the requirements of Article 106-1(B) of the *Standard Specifications* may be used. Submit to the Engineer a Type 6 Certification, catalog cuts and installation procedures at least 30 days prior to installation for all.

### **Construction Methods**

- (A) Prior to placing detectable warnings in existing concrete ramps, saw cut to the full depth of the concrete, for other material remove as necessary, and adjust the existing subgrade to the proper grade and in accordance with Article 848-3 of the *Standard Specifications*.
- (B) Install all detectable warning to retrofit existing wheelchair ramps in accordance with the manufacturer's recommendations.

### **Measurement and Payment**

*Retrofit Existing Wheelchair Ramps* with detectable warnings constructed of any type material will be paid for as the actual number of retrofitted wheelchair ramps, which have been completed and accepted. Such price and payment will be full compensation for excavating and backfilling; sawing, repairing and replacing portions of the existing wheelchair ramp within the pay limits for



retrofit shown on the detail; pavement repairs; furnishing and placing detectable warnings, construction joints and removing and disposing of portions of the existing wheelchair ramp when required and for all materials, labor, equipment, tools and incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Retrofit Existing Wheelchair Ramp	Each

**DETECTABLE WARNINGS FOR PROPOSED WHEELCHAIR RAMPS;**

(6-15-10)

R8 R126

**Description**

Construct detectable warnings consisting of integrated raised truncated domes on proposed concrete wheelchair ramps in accordance with the *2006 Standard Specifications*, plan details, the requirements of the *28 CFR Part 36 ADA Standards for Accessible Design* and this provision.

**Materials**

Detectable warning for proposed wheelchair ramps shall consist of integrated raised truncated domes. The description, size and spacing shall conform to Section 848 of the *Standard Specifications*.

Use material for detectable warning systems as shown herein. Material and coating specifications must be stated in the Manufacturers Type 3 Certification and all Detectable Warning systems must be on the NCDOT Approved Product List for Wheelchair Ramps.

Install detectable warnings created from one of the following materials: precast concrete blocks or bricks, clay paving brick, gray or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile. Only one material type for detectable warning will be permitted per project, unless otherwise approved by the Engineer.

- (A) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **when constructed of precast concrete** they shall conform to the material requirements of Article 848-2 of the *Standard Specifications*.
- (B) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **may be comprised of other materials including but not limited to clay paving brick, gray iron or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile**, which are cast into the concrete of the wheelchair ramps. The material shall have an integral color throughout the thickness of the material. The detectable warning shall include fasteners or anchors for attachment in the concrete and shall be furnished as a system from the manufacturer.

Prior to installation, the Contractor shall submit to the Engineer assembling instructions from the manufacturer for each type of system used in accordance with Article 105-2 of the *Standard Specifications*. The system shall be furnished as a kit containing all consumable materials and consumable tools, required for the application. They shall be capable of being affixed to or anchored in the concrete ramp, including green concrete (concrete that has set but not appreciably hardened). The system shall be solvent free and contain no volatile organic compounds (VOC). The static coefficient of friction shall be 0.8 or greater when measured on top of the truncated domes and when measured between the domes in accordance with ASTM C 1028 (dry and wet). The system shall be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to degradation by motor fuels, lubricants and antifreeze.

- (C) When steel or gray iron or ductile iron casting products are provided, only products that meet the requirements of Article 106-1(B) of the *Standard Specifications* may be used. Submit to the Engineer a Type 6 Certification, catalog cuts and installation procedures at least 30 days prior to installation for all.

### **Construction Methods**

- (A) Prior to placing detectable warnings in proposed concrete ramps, adjust the existing subgrade to the proper grade and in accordance with Article 848-3 of the *Standard Specifications*.
- (C) Install all detectable warning in proposed concrete ramps in accordance with the manufacturer's recommendations.

### **Measurement and Payment**

Detectable Warnings installed for construction of proposed wheelchair ramps will not be paid for separately. Such payment will be included in the price bid for *Concrete Wheelchair Ramps*.

### **AGGREGATE PRODUCTION:**

(11-20-01) (Rev. 11-21-06)

R10 R05

Provide aggregate from a producer who uses the current Aggregate Quality Control/Quality Assurance Program which is in effect at the time of shipment.

No price adjustment is allowed to contractors or producers who use the program. Participation in the program does not relieve the producer of the responsibility of complying with all requirements of the *2006 Standard Specifications*. Copies of this procedure are available upon request from the Materials and Test Unit.

**CONCRETE BRICK AND BLOCK PRODUCTION:**

(11-20-01) (Rev. 11-21-06)

R10 R10

Provide concrete brick and block from a producer who uses the current Solid Concrete Masonry Brick/Unit Quality Control/Quality Assurance Program that is in effect on the date that material is received on the project.

No price adjustment is allowed to contractors or producers who use the program. Participation in the program does not relieve the producer of the responsibility of complying with all requirements of the *2006 Standard Specifications*. Copies of this procedure are available upon request from the Materials and Test Unit.

**VOLUMETRIC CONCRETE BATCHING:**

(5-18-10)

R10 R13

Revise the *2006 Standard Specifications* as follows:

**Page 10-19, after Article 1000-12, add the following as a new article:**

**1000-13      VOLUMETRIC MIXED CONCRETE**

Upon written request by the contractor, the Department may approve the use of concrete proportioned by volume. The volumetric producer must submit and have approved a process control plan and product quality control plan by the Materials and Tests Unit. If concrete is proportioned by volume, the other requirements of these specifications with the following modifications will apply. Unless otherwise approved by the Department, use of concrete proportioned by volume shall be limited to Class B concrete and a maximum of 30 cubic yards per unit per day.

**(A)      Materials**

Use materials that meet the requirements for the respective items in the *Standard Specifications* except that they will be measured by a calibrated volume-weight relationship.

Storage facilities for all material shall be designed to permit the Department to make necessary inspections prior to the batching operations. The facilities shall also permit identification of approved material at all times, and shall be designed to avoid mixing with or contaminating by unapproved material. Coarse and fine aggregate shall be furnished and handled so variations in the moisture content affecting the uniform consistency of the concrete will be avoided.

Moisture content of the coarse and fine aggregate will be made available onsite for the Engineer's review for each load. The frequency of moisture testing will be dependent on certain variables such as weather, season and source; however, moisture tests should be performed at least once at the beginning of the work day for each source material. Additional daily moisture tests for the coarse and fine aggregate shall be performed if requested by the Engineer.

Unused materials should be emptied from hopper daily. Concrete should not be mixed with materials that have been left in the hopper overnight.

**(B) Equipment**

Provide volumetric mixers with rating plates indicating that the performance of the mixer is in accordance with the Volumetric Mixer Manufacturer Bureau or equivalent. Mixers must comply with ASTM C685. Unless otherwise specified, all mixing operations must be in strict accordance with the manufacturer's recommended procedures. Such procedures shall be provided to the Department for review upon request.

The volumetric mixer shall be capable of carrying sufficient unmixed dry bulk cement, pozzolan (if required), fine aggregate, coarse aggregate, admixtures and water, in separate compartments and accurately proportioning the specified mix. Each batching or mixing unit (or both) shall carry in a prominent place a metal plate or plates on which are plainly marked the gross volume of the unit in terms of mixed concrete, discharge speed and the weight-calibrated constant of the machine in terms of a revolution counter or other output indicator.

The concrete mixing device shall be an auger-type continuous mixer used in conjunction with volumetric proportioning. The mixer shall produce concrete, uniform in color and appearance, with homogeneous distribution of the material throughout the mixture. Mixing time necessary to produce uniform concrete shall be established by the contractor and shall comply with other requirements of these specifications. Only equipment found acceptable in every respect and capable of producing uniform results will be permitted.

Each volumetric mixer shall be equipped with an onboard ticketing system that will electronically produce a record of all material used and their respective weights and the total volume of concrete placed. Alternate methods of recordation may be used if approved by the Engineer. Tickets should also identify the following information, at minimum:

- Contractor Name
- Contractor Phone Number
- NCDOT Project No. and TIP No.
- Date
- Truck No.
- Ticket No.
- Time Start/End of Pour
- Mix ID & Description (Strength)
- Aggregate Moisture Before Mixing

**(C) Proportioning Devices**

Volume proportioning devices, such as counters, calibrated gate openings or flow meters, shall be easily accessible for controlling and determining the quantities of the ingredients discharged. All indicating devices that affect the accuracy of proportioning and mixing of concrete shall be in full view of and near enough to be read by the operator and Engineer while concrete is being produced. In operation, the entire measuring and dispensing mechanism shall produce the specified proportions of each ingredient.

The volumetric mixer shall provide positive control of the flow of water and admixtures into the mixing chamber. Water flow shall be indicated by a flow meter and be readily adjustable to provide for slump control and/or minor variations in aggregate moisture. The mixer shall be capable of continuously circulating or mechanically agitating the admixtures.

Liquid admixtures shall be dispensed through a controlled, calibrated flow meter. A positive means to observe the continuous flow of material shall be provided. If an admixture requires diluting, the admixture shall be diluted and thoroughly mixed prior to introducing the admixture into the dispenser. When admixtures are diluted, the ratio of dilution and the mixing shall be approved by and performed in the presence of the Department.

The volumetric mixer shall be capable of measurement of cement, pozzolan (if required), liquids and aggregate being introduced into the mix.

**(D) Calibration**

Volume-weight relationships will be based on calibration. The proportioning devices shall be calibrated by the contractor prior to the start of each NCDOT job, and subsequently at intervals recommended by the equipment manufacturer. Calibrations will be performed in the presence of the Department and subject to approval from the Department. Calibration of the cement and aggregate proportioning devices shall be accomplished by weighing (determining the mass of) each component. Calibration of the admixture and water proportioning devices shall be accomplished by weight (mass) or volume. Tolerances in proportioning the individual components will be as follows:

**TABLE 1000-4  
VOLUMETRIC MIXED CONCRETE CALIBRATION  
PROPORTION TOLERANCES**

<b>Item</b>	<b>Tolerance</b>
Cement, Weight (Mass) percent	0 to +4
Fine Aggregate, Weight (Mass) percent	± 2
Coarse Aggregate, Weight (Mass) percent	± 2
Admixtures, Weight (Mass) or Volume percent	± 3
Water, Weight (Mass) or Volume percent	± 1

Each volumetric mixer must be accompanied at all times by completed calibration worksheets and they shall be made available to the Department upon request.

**(E) Verification of Yield**

Verification of the proportioning devices may be required at any time by the Department. Verification shall be accomplished by proportioning the rock and sand based on the cement meter count for each concrete mobile mixer. Once the count (revolutions) for 94 pounds of cement has been determined then delivery of the correct amount of rock and sand can be verified.

**(F) Uniformity**

When concrete is produced, have present during all batching operations a Certified Concrete Batch Technician. During batching and placement, the sole duty of this employee is to supervise the production and control of the concrete, perform moisture tests, adjust mix proportions of aggregates for free moisture, complete and sign approved delivery tickets, and assure quality control of the batching.

Two samples of sufficient size to make the required tests will be taken after discharge of approximately 15 and 85 percent of the load. Each of the 2 samples of concrete will be separately tested for the properties listed in Table 1000-3. Tests will be conducted in accordance with the test procedures specified in Table 1000-3 or procedures established by the Materials and Tests Unit. The Engineer may recheck mixer performance at any time when in his opinion satisfactory mixing is not being accomplished.

**PORTLAND CEMENT CONCRETE (Alkali-Silica Reaction):**

2-20-07

R10 R16

Revise the *2006 Standard Specifications* as follows:

**Article 1024-1(A)**, replace the 2nd paragraph with the following:

Certain combinations of cement and aggregate exhibit an adverse alkali-silica reaction. The alkalinity of any cement, expressed as sodium-oxide equivalent, shall not exceed 1.0 percent. For mix designs that contain non-reactive aggregates and cement with an alkali content less than 0.6%, straight cement or a combination of cement and fly ash, cement and ground granulated blast furnace slag or cement and microsilica may be used. The pozzolan quantity shall not exceed the amount shown in Table 1024-1. For mixes that contain cement with an alkali content between 0.6% and 1.0%, and for mixes that contain a reactive aggregate documented by the Department, regardless of the alkali content of the cement, use a pozzolan in the amount shown in Table 1024-1.

Obtain the list of reactive aggregates documented by the Department at:<http://www.ncdot.org/doh/operations/materials/pdf/quarryasrprob.pdf>

<b>Table 1024-1</b>	
<b>Pozzolans for Use in Portland Cement Concrete</b>	
<i>Pozzolan</i>	<i>Rate</i>
Class F Fly Ash	20% by weight of required cement content, with 1.2 lbs Class F fly ash per lb of cement replaced
Ground Granulated Blast Furnace Slag	35%-50% by weight of required cement content with 1 lb slag per lb of cement replaced
Microsilica	4%-8% by weight of required cement content, with 1 lb microsilica per lb of cement replaced

**WATER FOR CONCRETE:**

(10-19-10)

R10 R17

Revise the *Standard Specifications for Roads and Structures* as follows:

**Page 10-63, Article 1024-4**, replace article with the following:

**1024-4 WATER**

Ensure that water used to condition, wash, or as an integral part of materials is clear and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substance. It shall not be salty or brackish. Water used in the production of concrete or grout shall be from wells or public water systems which are suitable for drinking and must meet the criteria listed in Table 1024-1.

Test all water from wells and public water supplies from all out of state locations and in the following counties: Beaufort, Bertie, Brunswick, Camden, Carteret, Chowan, Craven, Currituck, Dare, Gates, Hyde, New Hanover, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Tyrell, and Washington unless the Engineer waives the testing requirements. Water from a municipal water supply in all other NC counties may be accepted by the Engineer without testing.

**TABLE 1024-1  
ACCEPTANCE CRITERIA FOR WATER  
USED IN THE PRODUCTION OF CONCRETE**

<b>Requirement</b>	<b>Limit</b>	<b>Test Method</b>
Compressive Strength, minimum percent of control at 3 and 7 days	90 percent	NCDOT Modified / AASHTO T106
Time of set, deviation from control	From 1:00 hr. earlier to 1:30 hr. later	NCDOT Modified / AASHTO T131
pH	4.5 to 8.5	NCDOT Modified / AASHTO T26
Chloride Ion Content, Max.	250 ppm	ASTM D512
Total Solids Content (Residue), Max.	1000 ppm	NCDOT Modified / Standard Methods for Examination of Water and Wastewater
Resistivity, Min.	0.500 kohm-cm	NCDOT Modified / ASTM D1125
Sulfate as SO <sub>4</sub> , Max.	1500 ppm	NCDOT Modified / ASTM D516
Presence of Sugar	None	NCDOT Procedure
Dissolved Organic Matter	None	NCDOT Modified / AASHTO T26

**Page 10-65, Article 1026-4**, replace article with the following:

**1026-4 WATER**

All water used for curing concrete shall meet the requirements of Article 1024-4 and Table 1024-1. Water from wells, streams, ponds, or public water systems may be used.

**GLASS BEADS:**

(7-18-06)(Rev 10-19-10)

R10 R35

Revise the *2006 Standard Specifications* as follows:

**Page 10-223, 1087-4(A) Composition**, add the following as the fourth paragraph:

Glass beads shall have no more than 75 parts per million of arsenic as determined by the United States Environmental Protection Agency Method 6010B in conjunction with the United States Environmental Protection Agency Method 3052 modified.

**Page 10-223, 1087-4(C) Gradation & Roundness**, delete the last paragraph and replace the second sentence of the first paragraph with the following:

All Drop-On and Intermixed Glass Beads shall be tested in accordance with ASTM D1155.



**Page 10-226, 1087-8 Material Certification**, add the following below the first sentence:

Glass Beads (for paint, thermoplastic and polyurea) – Type 3 Material Certification for no more than 75 parts per million of arsenic

**ENGINEERING FABRICS:**

(7-18-06) (Rev 10-19-10)

R10 R40

Revise the *Standard Specifications* as follows:

**Page 10-99, Delete Section 1056 ENGINEERING FABRICS** and replace it with the following:

**SECTION 1056  
ENGINEERING FABRICS**

**1056-1 General**

Use engineering fabrics that meet the requirements of Article 4.1 of AASHTO M288 and have been evaluated by National Transportation Product Evaluation Program (NTPEP). When required, sew fabrics together in accordance with Article X1.1.4 of AASHTO M288. Provide sewn seams with seam strengths meeting the required strengths for the engineering fabric type and class specified.

Load, transport, unload and store fabrics such that they are kept clean and free of damage. Label, ship and store fabrics in accordance with Section 7 of AASHTO M288. Fabrics with defects, flaws, deterioration or damage will be rejected. Do not unwrap fabrics until just before installation. With the exception of fabrics for temporary silt fences and mechanically stabilized earth (MSE) wall faces, do not leave fabrics exposed for more than 7 days before covering fabrics with material.

When required, use pins a minimum of 3/16" in diameter and 18" long with a point at one end and a head at the other end that will retain a steel washer with a minimum outside diameter of 1.5". When wire staples are required, provide staples in accordance with Subarticle 1060-8(D) of the *Standard Specifications*.

**1056-2 Fabric Properties**

Provide Type 1 Certified Mill Test Report, Type 2 Typical Certified Mill Test Report or Type 4 Certified Test Report in accordance with Article 106-3 of the *Standard Specifications*. Furnish certifications with minimum average roll values (MARV) as defined by ASTM D4439 for all fabric properties with the exception of elongation. For testing fabrics, a lot is defined as a single day's production.

Provide engineering fabric types and classes in accordance with the contract. Machine direction (MD) and cross-machine direction (CD) are as defined by ASTM D4439. Use woven or nonwoven fabrics with properties meeting the requirements of Table 1056-1.

**TABLE 1056-1  
FABRIC PROPERTY REQUIREMENTS**

Property	ASTM Test Method	Requirements (MARV <sup>1</sup> )				
		Type 1	Type 2	Type 3 <sup>2</sup>	Type 4	Type 5 <sup>3</sup>
<i>Typical Application</i>		<i>Shoulder Drains</i>	<i>Under Riprap</i>	<i>Temporary Silt Fence</i>	<i>Soil Stabilization</i>	<i>Temporary MSE Walls</i>
Elongation (MD & CD)	D4632	≥ 50 %	≥ 50 %	≤ 25 %	< 50 %	< 50 %
Grab Strength (MD & CD)	D4632	90 lbs	205 lbs	100 lbs	180 lbs	---
Tear Strength (MD & CD)	D4533	40 lbs	80 lbs	---	70 lbs	---
Puncture Strength	D6241	220 lbs	440 lbs	---	370 lbs	---
Wide Width Tensile Strength @ Ultimate (MD & CD)	D4595	---	---	---	---	2400 lbs/ft (unless required otherwise in the contract)
Permittivity	D4491	0.20 sec <sup>-1</sup>	0.20 sec <sup>-1</sup>	0.05 sec <sup>-1</sup>	0.05 sec <sup>-1</sup>	0.20 sec <sup>-1</sup>
Apparent Opening Size <sup>4</sup>	D4751	#60	#60	#30	#40	#30
Ultraviolet Stability (retained strength) <sup>5</sup>	D4355	50 %	50 %	70 %	50 %	50%

<sup>1</sup>MARV does not apply to elongation

<sup>2</sup>Minimum roll width of 36" required

<sup>3</sup>Minimum roll width of 13 ft required

<sup>4</sup>US Sieve No. per AASHTO M92

<sup>5</sup>After 500 hours of exposure

**CHANNELIZING DEVICES (Drums)**

7-20-10

R10 R60

**Revise the 2006 Standard Specifications as follows:**

**Page 10-236, Subarticle 1089-5 (A) Drums (1) General, replace the paragraph with the following:**

**(1) General**

Provide drums composed of a body, alternating orange and white 4 band pattern of Type III-High Intensity Microprismatic sheeting and ballasts that have been evaluated by NTPEP.

The following guidelines will be used during the transition from drums with the standard 5 banded engineer's grade sheeting to the new 4 banded configuration.

(a) All **new** drums purchased **after July 20, 2010** shall have the new sheeting and 4 band configuration.

(b) Existing 5 band drums with Engineer's Grade sheeting (both new and used devices in existing inventories) will be allowed for use on all on-going construction projects until project completion and will also be allowed for use on other projects until a sunset date has been established.

(c) Intermixing of "old drums" and "new drums" on the same project is acceptable during the transition.

(d) 4 band drums with Engineer's Grade sheeting will not be allowed at anytime.

**Page 10-236, Subarticle 1089-5 (A) Drums (3) Retroreflective Stripes, replace the paragraph with the following:**

**(3) Retroreflective Bands**

Provide a minimum of 4 retroreflective bands- 2 orange and 2 white alternating horizontal circumferential bands. The top band shall always be orange. Use a 6" to 8" wide band Type III - High Intensity microprismatic retroreflective sheeting or better that meets the requirement of Section 1093 for each band. Do not exceed 2" for any non-reflective spaces between orange and white stripes. Do not splice the retroreflective sheeting to create the 6-inch band. Apply the retroreflective sheeting directly to the drum surface. Do not apply the retroreflective sheeting over a pre-existing layer of retroreflective sheeting. Do not place bands over any protruding corrugations areas. No damage to the reflective sheeting should result from stacking and unstacking the drums, or vehicle impact.

**Page 10-237, Subarticle 1089-5 (B) Skinny-Drums (1) General, replace the paragraph with the following:**

(1) General

All existing skinny-drums that do not have Type III-High Intensity microprismatic sheeting as a minimum will have the same transition requirements as drums as stated above. All **new** skinny-drums purchased **after July 20, 2010** shall have Type III – High Intensity microprismatic sheeting as the minimum. Type IV and higher grade sheeting is acceptable for use on both new and used devices.

Provide skinny-drums composed of a body, reflective bands, and ballasts that have been evaluated by NTPEP.

**Page 10-237, Subarticle 1089-5 (B) Skinny Drums (3) Retroreflective Stripes, replace the paragraph with the following**

(3) Retroreflective Bands

Provide a minimum of 4 retroreflective bands- 2 orange and 2 white alternating horizontal circumferential bands for each skinny-drum. The top band shall always be orange. Use a 6” to 8” wide band Type III – High Intensity microprismatic retroreflective sheeting or better that meets the requirement of Section 1093 for each band. Do not exceed 2” for any non-reflective spaces between orange and white stripes. Do not splice the retroreflective sheeting to create the 6-inch band. Apply the retroreflective sheeting directly to the skinny-drum surface. Do not apply the retroreflective sheeting over a pre-existing layer of retroreflective sheeting. Do not place bands over any protruding corrugations areas. No damage to the reflective sheeting should result from stacking and unstacking the skinny-drums, or vehicle impact.

**CHANGEABLE MESSAGE SIGNS:**

(11-21-06)

R11 R11

Revise the *2006 Standard Specifications* as follows:

**Page 11-9, Article 1120-3, Replace the 3rd sentence with the following:**

Sign operator will adjust flash rate so that no more than two messages will be displayed and be legible to a driver when approaching the sign at the posted speed.

**FLAGGERS:**

(2-15-11)

R11 R20

Revise the *2006 Standard Specifications* as follows:

**Page 11-13, Article 1150-3 Construction Methods**, replace the article with the following:

Provide the service of properly equipped and qualified flaggers (see *Roadway Standard Drawing* 1150.01) at locations and times for such period as necessary for the control and protection of vehicular and pedestrian traffic. Anyone who controls traffic is required to be qualified. Qualification consists of each flagger receiving proper training in the set-up and techniques of safely and competently performing a flagging operation. Qualification of flaggers is to be done at an NCDOT approved training agency. For a complete listing of these, see the Work Zone Traffic Control’s webpage, <http://www.ncdot.gov/doh/preconstruct/wztc/>.

Prior to beginning work on the project, a Qualification Statement that all flaggers used on the project have been properly trained through an NCDOT approved training resource shall be provided to the Engineer.

Flagging operations are not allowed for the convenience of the Contractor’s operations. However, if safety issues exist (i.e. sight/stopping site distance), the Engineer may approve the use of flagging operations. Use flagging methods that comply with the guidelines in the MUTCD.

**PAVEMENT MARKING LINES:**

(11-21-06) (Rev. 08-17-10)

R12 R01

Revise the *2006 Standard Specifications* as follows:

**Page 12-2, 1205-3(D) Time Limitations for Replacement**, add the following at the beginning of the chart:

Facility Type	Marking Type	Replacement Deadline
Full-control-of-access multi-lane roadway (4 or more total lanes) and ramps, including Interstates	All markings including symbols	By the end of each workday's operation if the lane is opened to traffic

**Page 12-5, 1205-3 (H) Observation Period**, delete 1205-3 (H) and replace with the following:

Maintain responsibility for debonding and color of the pavement markings during a 12 month observation period beginning upon final acceptance of the project as defined under Article 105-17. Guarantee the markings under the payment and performance bond in accordance with Article 105-17.

During the 12 month observation period, provide pavement marking material that shows no signs of failure due to blistering, chipping, bleeding, discoloration, smearing or spreading under heat or poor adhesion to the pavement materials. Pavement markings that debond due to snowplowing will not be considered a failed marking. Replace, at no additional expense to the Department, any pavement markings that do not perform satisfactorily under traffic during the 12 month observation period.

**Page 12-8, 1205-4 (C) Application**, delete the last two sentences of the second paragraph and replace with the following:

Produce in place markings with minimum retroreflective values shown below, as obtained with a LTL 2000 Retroreflectometer or Department approved mobile retroreflectometer. Retroreflective measurements will be taken within 30 days after final placement of the pavement marking.

**Page 12-9, 1205-4 (D) Observation Period**, delete the entire section and replace with the following:

In addition to the requirements of Subarticle 1205-3(H), maintain responsibility for minimum retroreflective values for a 30-day period beginning upon the Engineer's acceptance of all markings on the project. Guarantee retroreflective values of the markings during the 30-day period under the payment and performance bond in accordance with Article 105-17.

**Page 12-9, 1205-5 (B) Application**, delete the second sentence of the fourth paragraph and replace with the following:

Produce in place markings with minimum retroreflective values shown below, as obtained with a LTL 2000 Retroreflectometer or Department approved mobile retroreflectometer. Retroreflective measurements will be taken within 30 days after final placement of the pavement marking.

**Page 12-10, 1205-5 (C) Observation Period**, delete this entire section and replace with the following:

Maintain responsibility for minimum retroreflective values for a 30-day period beginning upon satisfactory final placement of all markings on the project. Guarantee retroreflective values of the markings during the 30-day period under the payment and performance bond in accordance with Article 105-17.

**Page 12-14, Article 1205-9, Maintenance**, delete Article 1205-9 and replace with the following:

Replace pavement markings that prematurely deteriorate, fail to adhere to the pavement, lack reflectorization, or are otherwise unsatisfactory during the life of the project or during the 12 month observation period as determined by the Engineer at no cost to the Department.

Upon notification from the Engineer, winterize the project by placing an initial or additional application of paint pavement marking lines in accordance with Article 1205-8. Payment for *Paint Pavement Marking Lines* required to winterize the project will be made in accordance with Article 1205-10 except that no payment will be made on resurfacing projects where paving is completed more than 30 days prior to the written notification by the Department that winterization is required.

**Page 12-14, Article 1205-10, Measurement and Payment**, add the following after the first sentence of the first paragraph:

In addition, *Paint Pavement Marking Lines* will be paid per linear foot for each 15 mil application placed in accordance with Subarticle 1205-8(C).

**EROSION AND STORMWATER CONTROL FOR SHOULDER CONSTRUCTION AND RECONSTRUCTION:**

(11-16-10)

R16 R02

Land disturbing operations associated with shoulder construction/reconstruction may require erosion and sediment control/stormwater measure installation. National Pollutant Discharge Elimination System (NPDES) inspection and reporting may be required.

Erosion control measures shall be installed per the erosion control detail in any area where the vegetated buffer between the disturbed area and surface waters (streams, wetlands, or open waters) or drainage inlet is less than 10 feet. The Engineer may reduce the vegetated buffer threshold for this requirement to a value between 5 and 10 feet. Erosion control measures shall be spot checked every 14 days until permanent vegetative establishment.

In areas where shoulder construction/reconstruction includes disturbance or grading on the front slope or to the toe of fill, relocating ditch line or backslope, or removing vegetation from the ditch line or swale, NPDES inspection and monitoring are required every 14 days or within 24 hours of a rainfall event of 0.5" or greater. Maintain daily rainfall records. Install erosion control measures per detail.

In areas where the vegetated buffer is less than 10 feet between the disturbed area and waters of the State classified as High Quality Water (HQW), Outstanding Resource Water (ORW), Critical Areas, or Unique Wetlands, NPDES inspection and monitoring are required every 14 days or within 24 hours of a rainfall event of 0.5" or greater. The Engineer may reduce the vegetated buffer threshold for this requirement to a value between 5 and 10 feet. The plans or provisions will indicate the presence of these water classifications. Maintain daily rainfall records. Install erosion control measures per detail.

Land disturbances hardened with aggregate materials receiving sheet flow are considered non-erodible.

Sites that require lengthy sections of silt fence may substitute with rapid permanent seeding and mulching as directed by the Engineer.

NPDES documentation shall be performed by a Level II Erosion and Sediment Control/Stormwater certificate holder.

Materials used for erosion control will be measured and paid as stated in the contract.