

PROJECT SPECIAL PROVISIONS**ROADWAY****CLEARING AND GRUBBING – METHOD II:**

(9-17-02) (Rev 3-18-08)

M2 R01

Perform clearing on this project to the limits established by Method “II” shown on Standard No. 200.02 of the *2006 Metric Roadway Standard Drawings*.

The Contractor shall also clear the permanent utility easement areas (PUE) as shown on the plans and as listed below:

From Station 10+60 Left To 16+60 Left	(Clear to PUE outer limit)
From Station 16+60 Left To 42+40 Left	(Clear to R/W limit)
From Station 42+40 Right To 42+72 Right	(Clear to New R/W limit)
From Station 42+72 Right To 46+50 Right	(Clear to PUE outer limit)

Clearing shall be in accordance with the conditions of the permits contained elsewhere in this proposal.

Revise the *2006 Metric Standard Specifications* as follows:

Page 2-2, Article 200-3, Clearing, add the following as the 6th paragraph:

At bridge sites, clear the entire width of the right of way beginning at a station 1 m back of the beginning extremity of the structure and ending at a station 1 m beyond the ending extremity of the structure.

EMBANKMENTS:

(5-16-06)

M2 R18

Revise the *2006 Metric Standard Specifications* as follows:

Page 2-18, Article 235-4(B) Embankment Formation, add the following:

- (16) Do not place rock or broken pavement in embankment areas where piles or drilled shaft foundations are to be constructed. This shall include but not be limited to piles and foundations for structures, metal signal poles, overhead sign structures, and high mount lighting.

SHALLOW UNDERCUT:

(9-18-07)

M2 R35 A

Description

Undercut to a depth of 150 to 600 mm and place fabric for soil stabilization and Class IV Subgrade Stabilization at locations shown on the plans or as directed by the Engineer.

Materials

Refer to Division 10 of the *2006 Metric Standard Specifications*.

Item	Section
Select Material, Class IV	1016
Fabric for Soil Stabilization, Type 4	1056

Use Class IV Select Material for Class IV Subgrade Stabilization. If Class IV Subgrade Stabilization does not meet the requirements of Article 1010-2 of the *2006 Metric Standard Specifications*, the Engineer, at his discretion, may consider the material reasonably acceptable in accordance with Article 105-3 of the *2006 Metric Standard Specifications*.

Construction Methods

Perform undercut excavation in accordance with Section 225 of the *2006 Metric Standard Specifications*. Place fabric for soil stabilization in accordance with Article 270-3 of the *2006 Metric Standard Specifications* before backfilling. Backfill with Class IV Subgrade Stabilization by end dumping subgrade stabilization material on the fabric. Do not operate heavy equipment on the fabric until it is covered with Class IV Subgrade Stabilization. Compact subgrade stabilization material to 92% of AASHTO T180 as modified by the Department or to the highest density that can be reasonably obtained.

Maintain Class IV Subgrade Stabilization in an acceptable condition and minimize the use of heavy equipment on subgrade stabilization material in order to avoid damaging the backfill. Provide and maintain drainage ditches and drains as required to prevent entrapment of water in backfill.

Measurement and Payment

Class IV Subgrade Stabilization will be measured and paid for at the contract unit price per metric ton. The quantity to be paid for will be the actual number of metric tons of subgrade stabilization material that has been incorporated into the completed and accepted work. The material will be measured by being weighed in trucks on certified platform scales or other certified weighing devices. This work includes but is not limited to furnishing, hauling, handling, placing, compacting and maintaining the subgrade stabilization material.

Undercut Excavation will be measured and paid for in accordance with Section 225 of the *2006 Metric Standard Specifications*.

Fabric for Soil Stabilization will be measured and paid for in accordance with Section 270 of the *2006 Metric Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
Class IV Subgrade Stabilization	Metric Ton

SHOULDER AND FILL SLOPE MATERIAL:

(5-21-02)

M2 R45 C

Description

Perform the required shoulder and slope construction for this project in accordance with the applicable requirements of Section 560 and Section 235 of the *2006 Metric Standard Specifications* except as follows:

Construct the top 150 mm 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 50 mm 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.

Compensation

When the Contractor elects to obtain material from an area located beneath a proposed fill sections which does not require excavation for any reason other than to generate acceptable shoulder and fill slope material, the work of performing the excavation will be considered incidental to the item of *Borrow Excavation* or *Shoulder Borrow*. If there is no pay item for *Borrow* or *Shoulder Excavation* in the contract, this work will be considered incidental to *Unclassified Excavation*. Stockpile the excavated material in a manner to facilitate measurement by the Engineer. Fill the void created by the excavation of the shoulder and fill slope material with suitable material. Payment for material used from the stockpile will be made at the contract unit price for *Borrow Excavation* or *Shoulder Borrow*. If there is no pay item for *Borrow Excavation* or *Shoulder Borrow*, then the material will be paid for at the contract unit price for *Unclassified Excavation*. The material used to fill the void created by the excavation of the shoulder and fill slope material will be made at the contract unit price for *Unclassified Excavation*, *Borrow Excavation*, or *Shoulder Borrow*, depending on the source of the material.

Material generated from undercut excavation, unclassified excavation or clearing and grubbing operations that is placed directly on shoulders or slope areas, will not be measured separately for payment, as payment for the work requiring the excavation will be considered adequate compensation for depositing and grading the material on the shoulders or slopes.

When undercut excavation is performed at the direction of the Engineer and the material excavated is found to be suitable for use as shoulder and fill slope material, and there is no area on the project currently prepared to receive the material generated by the undercut operation, the Contractor may construct a stockpile for use as borrow at a later date. Payment for the material used from the stockpile will be made at the contract unit price for *Borrow Excavation* or *Shoulder Borrow*.

When shoulder material is obtained from borrow sources or from stockpiled material, payment for the work of shoulder construction will be made at the contract unit price per cubic yard for *Borrow Excavation* or *Shoulder Borrow* in accordance with the applicable provisions of Section 230 or Section 560 of the *2006 Metric Standard Specifications*.

BORROW EXCAVATION (In Place or Truck Measurement):

(7-1-95)

M2 R58

The borrow material used on this project will be measured for payment by in place measurement as provided in Subarticle 230-5 of the *2006 Metric Standard Specifications*, or by truck measurement as provided in Subarticle 230-5 of the *2006 Metric Standard Specifications*, as directed by the Engineer.

EMBANKMENT WAITING PERIODS:

For embankment waiting periods, see structure plans.

EMBANKMENT MONITORING:

The instrumentation will consist of 4 settlement gauges. The settlement gauges shall be placed at the locations as shown in the plans or as directed by the Engineer.

<u>GAUGE NOS.</u>	<u>STATION</u>	<u>OFFSET FROM CENTERLINE</u>
1	42+75 -L-	10 m ±, Right
2	42+85 -L-	10 m ±, Right
3	43+40 -L-	10 m ±, Right
4	43+50 -L-	10 m ±, Right

Settlement Gauges

Settlement Gauges as shown in the plans shall be furnished and installed by the Contractor. The base shall be placed on a level surface near the natural ground as shown in the plans. The 64 mm diameter metal pipe shall be extended by the Contractor by adding pipe sections at threaded couplings as the embankment progresses. The top of the extension section shall be no less than 305 mm above the embankment surface and no higher than 1.8 meters. The exposed length of pipe shall be made conspicuous to avoid chance of damage.

The Contractor shall conduct his operation in such a manner that the gauges are not damaged. Fill around the gauge pipes and plates shall be compacted to the same density as the surrounding material. Any settlement gauge pipe damaged or destroyed due to fault or negligence on the part of the Contractor shall be restored or replaced by the Contractor at no additional cost. No additional payment will be made for compaction of fill around and over the settlement gauges or for interference with the Contractor's operations resulting from settlement gauge installations. Care shall be taken that the 64 mm diameter pipe remains plumb.

The 64 mm diameter pipe shall be ASTM A53 type F, threaded with a black finish.

Method of Measurement

The quantity of settlement gauges to be paid for will be the actual number of each of these items which have been incorporated into the completed and accepted work.

Basis of Payment

The quantity of settlement gauges, measured as provided above, will be paid for at the contract unit price each for "Embankment Settlement Gauge". Such price and payment will be full compensation for all materials, labor, equipment and other necessary to complete the work satisfactorily.

Payment will be made under:

Embankment Settlement Gauge.....Each

FABRIC FOR EMBANKMENT STABILIZATION:

Description

This work consists of furnishing and installing synthetic fabric for stabilizing embankment in accordance with this provision and as directed by the Engineer. The work shall include maintaining the fabric in the required configuration until completion and acceptance of overlying work items. The fabric shall be placed at the locations as shown on the plans or as directed by the Engineer.

Material

(1) Fabric

The fabric shall be made of high-tenacity polyester in the machine (warp) direction with a plain or straight-warp weave pattern and polyester or polypropylene in the cross machine direction or approved equal. The fabric shall be composed of strong rot-proof synthetic fibers formed into a fabric of the woven type. The fabric shall be free of any treatment or coating which might significantly alter its physical properties after installation. The fabric shall contain stabilizers and/or inhibitors to make the filaments resistant to deterioration resulting from ultraviolet or heat exposure. The fabric shall be a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative positions with respect to each other. The edges of the fabric shall be finished to prevent the outer yarn from pulling away from the fabric. The fabric shall be free of defects or flaws, which significantly effect its physical and/or filtering properties. Sheets of fabric shall be sewn together with a seam that furnishes the required minimum strengths. The seam thread shall be made of synthetic fibers, which are resistant to deterioration, as are the fabric fibers. Lamination of fabric sheets to produce the physical requirements of a fabric layer will not be accepted.

During all periods of shipment and storage, the fabric shall be wrapped in a heavy duty protective covering to protect the fabric from direct sunlight ultraviolet rays, mud, dust, dirt, and debris. The fabric shall not be exposed to temperatures greater than 140°F. After the protective wrapping has been removed, the fabric shall not be left uncovered under any circumstances for longer than one (1) week.

The fabric shall meet the following physical requirements:

All values represent minimum average roll values (any roll in a lot should meet or exceed the minimum values in this table).

<u>Fabric Property</u>	<u>Test Method</u>	<u>Requirements</u>
Min. Puncture Strength	ASTM D-4833	580 N
Min. Bursting Strength	ASTM D-3786	4100 kPa
Trapezoid Tear	ASTM D-4533	445 N
AOS, US STD Sieve	ASTM D-4751	20-70
Seams, Strength Cross Machine Direction Only	ASTM D-4884	30 kN/m
Ultraviolet (UV) % Strength Retained	ASTM D-4355	70%
Permeability	ASTM D-4491	.02 cm/sec.
Fabric Tensile Strength at 10% Strain	ASTM D-4595 (Wide Strip Test)	Warp Direction 60 kN/m
Fabric Ultimate Wide Width Tensile Strength	ASTM D-4595 (Wide Strip Test)	Warp Direction 150 kN/m

The Contractor shall furnish certified test reports by an approved independent testing laboratory with each shipment of material attesting that the fabric meets the requirements of this provision; however, the material shall be subject to inspection or test, by the Engineer at any time. The Contractor shall furnish the Engineer certified test reports by an approved independent testing laboratory attesting that the sewn seam provides the required strength.

(2) Select Material

The Contractor shall furnish and place over the embankment stabilization fabric to a depth of 600 mm select material which meets the requirements of Class III, Section 1016 of the Standard Specifications.

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Construction Methods

The fabric shall be placed at locations shown in the plans and as directed by the Engineer. The surface shall be free of obstructions, debris and pockets. Stumps shall be cut smooth at ground elevation with the root system left intact.

At the time of installation, the fabric shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation, or storage.

The fabric shall be placed with machine (warp) direction perpendicular to the centerline of the roadway. Fabric shall be laid smooth and free from tension, stress fold, wrinkles or creases. The fabric shall be placed in a continuous manner without any joint, seam, or overlapping in the machine (warp) direction. All joints in the cross machine direction shall be overlapped a minimum of 450 mm or sewn by an approved method to develop the required seam strength. All sewn seams shall be placed facing upward to allow for inspection. No equipment will be allowed to operate on the fabric until the fabric layer is covered with 300 mm of select material, or as directed by the Engineer. The select material should be placed and compacted using low ground pressure equipment or as directed by the Engineer. All fabric which is damaged as a result of installation will be required to be replaced or repaired at the discretion of the Engineer with no additional cost to the Department. Compaction equipment shall be operated such that it will not damage the fabric.

“Fabric for Soil Stabilization” may be used directly on the natural ground if needed for workability, as directed by the Engineer. If “Fabric for Soil Stabilization” is used directly on the natural ground then a minimum 300 mm of select material shall be placed between “Fabric for Soil Stabilization” and “Fabric for Embankment Stabilization”. For “Fabric for Soil Stabilization” see Section 270 of the Standard Specifications.

If stumps or high water are present then use a minimum of 300 mm of select material as a leveling pad to insure a smooth and dry surface under the “Fabric for Embankment Stabilization” as directed by the Engineer.

If there are no stumps or high water and there is no need of using “Fabric for Soil Stabilization” for workability, then “Fabric for Embankment Stabilization” can be used directly on the natural ground.

No full size compaction equipment will be allowed to operate on the fabric until it is covered with 600 mm of select material fill. End dumping fill directly on the fabric is not permitted. Spreading and compaction of select material fill with low ground pressure equipment is required until 600 mm of material have been placed.

Any fabric which is damaged as a result of installation or which is left uncovered for longer than one week after placement shall be replaced at no additional cost to the Department.

Method of Measurement

The quantity of fabric to be paid for will be the number of square meters of “Fabric for Embankment Stabilization” measured along the surface of the ground, which has been acceptably placed. No separate measurement will be made of overlapping fabric.

The quantity of select material to be paid for will be the actual number of cubic meters of approved material measured in-place, which has been incorporated into the completed and accepted work.

Basis of Payment

The quantity of fabric, measured as provided above, will be paid for at the contract unit price per square meter for “Fabric for Embankment Stabilization”.

The quantity of select material, measured as provided for above, will be paid for at the contract unit price per cubic meter for “Select Material”. Such price and payment will be full compensation for furnishing, hauling, placing, compaction, and all incidentals necessary to complete the work.

Pay Items:	Fabric for Embankment Stabilization	Square Meter
	Select Granular Material	Cubic Meter

PIPE TESTING:

4-17-07

M3 R33

Revise the *2006 Metric Standard Specifications* as follows:

Page 3-2, Article 300-6, add the following as a new paragraph before (A):

The Department reserves the right to perform forensic testing on any installed pipe.

PIPE ALTERNATES:

(7-18-06) (Rev 4-17-07)

M3 R36

Description

The Contractor may substitute Aluminized Corrugated Steel Pipe, Type IR or HDPE Pipe, Type S or Type D up to 1219 mm in diameter in lieu of concrete pipe in accordance with the following requirements.

Material

Item	Section
HDPE Pipe, Type S or D	1032-10
Aluminized Corrugated Steel Pipe, Type IR	1032-3(A)(7)

Aluminized Corrugated Steel Pipe will not be permitted in counties listed in Article 310-2 of the *2006 Metric Standard Specifications*.

Construction Methods

Aluminized Corrugated Steel Pipe Culverts and HDPE Pipe Culverts shall be installed in accordance with the requirements of Section 300 of the *2006 Metric Standard Specifications* for Method A, except that the minimum cover shall be at least 300 mm. Aluminized Corrugated Steel Pipe Culvert and HDPE Pipe Culvert will not be permitted for use under travelways, including curb and gutter.

Measurement and Payment

_____ mm Aluminized Corrugated Steel Pipe Culvert to be paid for will be the actual number of linear meters installed and accepted. Measurement will be in accordance with Section 310-6 of the *2006 Metric Standard Specifications*.

_____ mm HDPE Pipe Culvert to be paid for will be the actual number of linear meters installed and accepted. Measurement will be in accordance with Section 310-6 of the *2006 Metric Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
_____ mm Aluminized Corrugated Steel Pipe Culverts, _____ mm Thick	Linear Meter
_____ mm HDPE Pipe Culverts	Linear Meter

REINFORCED BRIDGE APPROACH FILL:

(3-18-03) (Rev.7-18-06)

M4 R01 A

Description

This work consists of all work necessary to construct reinforced bridge approach fills in accordance with these provisions and the plans, and as directed by the Engineer.

Materials

(A) Geomembrane

Provide geomembrane that is impermeable, composed of polyethylene polymers or polyvinyl chloride, and meets the following physical requirements:

<u>Property</u>	<u>Requirements</u>	<u>Test Method</u>
Thickness	0.6 mm Minimum	ASTM D1593
Tensile Strength at Break	18 kN/M Minimum	ASTM D638
Puncture Strength	0.2 kN Minimum	ASTM D 4833
Moisture Vapor Transmission Rate	0.667/gm/m ² per Day Maximum	ASTM E96

(B) Fabric

Refer to Section 1056 for Type 2 Engineering Fabric and the following:

Use a woven fabric consisting of strong rot-proof synthetic fibers such as polypropylene, polyethylene, or polyester formed into a stable network such that the filaments or yarns retain their relative positions to each other.

<u>Fabric Property</u>	<u>Requirements</u>	<u>Test Method</u>
Minimum Flow Rate	1358 cm ³ /sec/m ²	ASTM D 4491

Lamination of fabric sheets to produce the physical requirements of a fabric layer will not be accepted. Furnish letters of certification from the manufacturer with each shipment of the fabric and geomembrane attesting that the material meets the requirements of this provision; however, the material is subject to inspection, test, or rejection by the Engineer at any time.

During all periods of shipment and storage, wrap the geomembrane and fabric in a heavy-duty protective covering to protect the material from ultraviolet rays. After the protective wrapping has been removed, do not leave the material uncovered under any circumstances for longer than 4 days.

(C) Select Material

Provide select material meeting the requirements of Class III, Type 1 or Type 2, or Class V select material of Section 1016 of the *2006 Metric Standard Specifications*. When select material is required under water, use select material class V only, up to one foot above the existing water elevation.

(D) 100 mm Diameter Corrugated Drainage Pipe and Fittings

Provide pipe and fittings that meet all the applicable requirements of Section 815 or 816 of the *2006 Metric Standard Specifications*.

Construction Methods

Place the geomembrane and fabric as shown on the plans or as directed by the Engineer. Perform the excavation for the fabric reinforced fill to the limits shown on the plans. Provide an excavated surface free of obstructions, debris, pockets, stumps, and cleared of all vegetation. The geomembrane or fabric will be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation, handling or storage. Lay all layers smooth, and free from tension, stress, folds, wrinkles or creases. Place all the fabric layers with the machine direction (roll direction) parallel to the centerline of the roadway. A minimum roll width of 3 m for the fabric is required. Overlap geomembrane or fabric splices parallel to the centerline of the roadway a minimum of 450 mm. Geomembrane or fabric splices parallel to the backwall face will not be allowed.

Deposit and spread select material in successive, uniform, approximately horizontal layers of not more than 254 mm in depth, loose measurement, for the full width of the cross section, and keep each layer approximately level. Place and compact each layer of select material fill no more than 254 mm thick with low ground pressure equipment. Use hand operated equipment to compact the fill material within 1 m of the backwall and wingwalls as directed by the Engineer. Compact select material to a density equal to at least 95% of that obtained by compacting a sample of the material in accordance with AASHTO T99 as modified by the Department. Compact the top 200 mm of select material to a density to at least 100% of that obtained by compacting a sample of the material in accordance with AASHTO T99 as modified by the Department. Density requirements are not applicable to select material, class V; however compact the fill with at least four passes of low ground pressure equipment on the entire surface as directed by the Engineer. The compaction of each layer of select material shall be inspected and approved by the Department prior to the placement of the next fill layer. No equipment will be allowed to operate on the drainage pipe or any geomembrane/fabric layer until it is covered with at least 150 mm of fill material. Compaction shall not damage the drainage pipe, geomembrane, or fabric under the fill. Cover the geomembrane/fabric with a layer of fill material within four days after placement of the geomembrane/fabric. Geomembrane and fabric that are damaged as a result of installation will be replaced as directed by the Department at no additional cost.

Place the geomembrane on the ground, and attach and secure it tightly to the vertical face of the backwall and wingwalls with adhesives, duct-tape, nails or any other method approved by the Engineer. Place the first fabric layer on the surface of the geomembrane with the same dimensions of the geomembrane. No material or void is allowed between the geomembrane and the first fabric layer. Place and fold the remaining fabric layers on the edges as shown on the plans or as directed by the Engineer. Provide vertical separation between fabric layers as specified on the plans. The number of fabric layers will be shown in the plans.

Place 100 mm diameter perforated drainage pipe along the base of the backwall and sloped to drain as shown on the plans. Completely wrap perforated drainage pipe and #78M stone with Type 2 Engineering Fabric as shown on the plan detail. Install a pipe sleeve through the bottom of or under the wing wall prior to placing concrete for the wing wall. The pipe sleeve shall be of adequate strength to withstand the wingwall load. Place the pipe sleeve in position to allow the drainage pipe to go through the wing wall with a proper slope. Connect 100 mm diameter nonperforated (plain) drainage pipe with a coupling to the perforated pipe near the inside face of the wingwall. Place the nonperforated drainage pipe through the pipe sleeve, extend down to the toe of the slope and connect, to a ditch or other drainage systems as directed by the Engineer. For bridge approaches in cut sections where no side slope is available, direct the drainage pipe outlet to the end slope down to the toe using elbows as directed by the Engineer.

Measurement and Payment

Reinforced Bridge Approach Fill, Station _____ will be paid for at the contract lump sum price. Such price and payment will be full compensation for both approach fills at each bridge installation, including but not limited to furnishing, placing and compacting select material, furnishing and placing geomembrane and woven fabric, furnishing and placing pipe sleeve,

drainage pipe, and stone, furnishing and installing concrete pads at the end of outlet pipes, excavation and any other items necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Reinforced Bridge Approach Fill, Station _____	Lump Sum

ASPHALT PAVEMENTS - SUPERPAVE:

(7-18-06) (Rev 12-16-08)

M6 R01

Revise the *2008 Metric Standard Specifications* as follows:

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

Page 6-10, Subarticle 609-5(C)2, Required Sampling and Testing Frequencies, first partial paragraph at the top of the page, delete last sentence and add the following:

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

Page 6-10, 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 metric 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 6-10, Subarticle 609-5(C)2(c) Maximum Specific Gravity, add after (AASHTO T 209):

or ASTM D 2041

Page 6-11, Subarticle 609-5(C)2(e) Retained Tensile Strength, 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 the 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.

Page 6-11, 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 6-12, Subarticle 609-5(C)(3) Control Charts, fourth 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.

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.

Subarticle 609-5(C)(4) Control Limits, replace the first paragraph and the CONTROL LIMITS Table on page 6-13 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			
Mix Control Criteria	Target Source	Moving Average Limit	Individual Limit
2.36 mm Sieve	JMF	±4.0 %	±8.0 %
0.075mm Sieve	JMF	±1.5 %	±2.5 %
Binder Content	JMF	±0.3 %	±0.7 %
VTM @ N _{des}	JMF	±1.0 %	±2.0 %
VMA @ N _{des}	Min. Spec. Limit	-0.5%	-1.0%
P _{0.075} / P _{be} Ratio	1.0	±0.4	±0.8
%G _{mm} @ N _{ini}	Max. Spec. Limit	N/A	+2.0%
TSR	Min. Spec. Limit	N/A	- 15%

Page 6-13, Subarticle 609-5(C)(5) Warning Bands, delete this Subarticle in its entirety.

Pages 6-13 through 6-15, Subarticle 609-5(C)(6), delete the word "warning" and substitute the words "moving average".

Page 6-13, 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 6-14, Subarticle 609-5(C)(6) Corrective Actions, second paragraph, delete 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.

Fifth 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 6-14, Subarticle 609-5(C)(6) Corrective Actions eighth 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 6-14, delete the last paragraph and the first paragraph on Page 6-15, 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 6-15, Subarticle 609-5(C)(6) Corrective Actions, delete the last paragraph in this Subarticle 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 6-16, Subarticle 609-5(D)(1) General, delete the last paragraph on this page, 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 6-18, 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 6-18, 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 6-20, 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 6-23, Subarticle 610-3(A) Mix Design-General, add the following as the fourth paragraph:

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.

Page 6-23, Subarticle 610-3(A) Mix Design-General, fourth paragraph, third sentence:

Substitute 20% for 15%

Page 6-24, Subarticle 610-3(A) Mix Design-General, first full paragraph, first, second and third sentences:

Substitute 20% for 15%

Page 6-29, 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	2°C	2°C
ACIC, Type I 19.0B, C, D	2°C	2°C
ACSC, Type S 4.75A, SF 9.5A, S 9.5B	4°C	* 10°C
ACSC, Type S 9.5C, S 12.5C	7°C	10°C
ACSC, Type S 9.5D, S 12.5D	10°C	10°C

* 2°C if surface is soil or aggregate base for secondary road construction.

Page 6-36, Article 610-8 Spreading and Finishing, sixth paragraph on this page, replace the first sentence with the following:

Use the 9 m 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 7.3 m* 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 6-41, 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 6-44, Article 620-4 Measurement and Payment, fourth full paragraph, delete the last sentence.

Page 6-44, Article 620-4 Measurement and Payment, add the following pay item:

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

Page 6-57, Table 660-1 Material Application Rates and Temperatures, add the following:

Type of Coat	Grade of Asphalt	Asphalt Rate L/Sq M	Application Temperature °C	Aggregate Size	Aggregate Rate Kg/Sq M Total
Sand Seal	CRS-2 or CRS-2P	1.00-1.36	66-79	Blotting Sand	6-8

Page 6-62, Subarticle 660-9(B), 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 6-63, 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 6-66, Subarticle 661-3(A) Equipment, add the following as the first paragraph:

Use asphalt mixing plants in accordance with Article 610-5.

Page 10-34, Table 1012-1, delete the last row of entries for OGAFC and add the following:

Mix Type	Course Aggregate Angularity ^(b) 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
OGAFC	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 10-35 through 10-37, 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 50 mm 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 50 mm sieve prior to introduction into the plant mixer unit.

(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 50 mm sieve prior to introduction into the plant mixer unit.

After a stockpile of processed RAP or millings 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.

**TABLE 1012-2
NEW SOURCE RAP GRADATION and BINDER TOLERANCES
(Apply Tolerances to Mix Design Data)**

Mix Type Sieve (mm)	0-20% RAP			20 ⁺ -25 % RAP			25 ⁺ % RAP				
	Base	Inter.	Surf.	Base	Inter.	Surf.	Base	Inter.	Surf.		
P _b %		± 0.7%				± 0.4%				± 0.3%	
25.0	±10	-	-	±7	-	-	±5	-	-	-	
19.0	±10	±10	-	±7	±7	-	±5	±5	-	-	
12.5	-	±6	±6	-	±3	±3	-	±2	±2	±2	
9.5	-	-	±8	-	-	±5	-	-	-	±4	
4.75	±10	-	±10	±7	-	±7	±5	-	-	±5	
2.36	±8	±8	±8	±5	±5	±5	±4	±4	±4	±4	
1.18	±8	±8	±8	±5	±5	±5	±4	±4	±4	±4	
0.300	±8	±8	±8	±5	±5	±5	±4	±4	±4	±4	
0.150	-	-	±8	-	-	±5	-	-	-	±4	
0.075	±4	±4	±4	±2	±2	±2	±1.5	±1.5	±1.5	±1.5	

ASPHALT BINDER CONTENT OF ASPHALT PLANT MIXES:

(11-21-00)

M6 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 Metric Standard Specifications*.

ASPHALT PLANT MIXTURES:

(7-1-95)

M6 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)

M6 R25

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

The base price index for asphalt binder for plant mix is **\$441.70** per metric ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **February 1, 2009**.

FINAL SURFACE TESTING - ASPHALT PAVEMENTS (Rideability):

(5-18-04) (Rev. 7-15-08)

M6 R45

On portions of this project where the typical section requires two or more layers of new pavement, perform acceptance testing of the longitudinal profile of the finished pavement surface in accordance with these provisions using a North Carolina Hearne Straightedge (Model No. 1). Furnish and operate the straightedge to determine and record the longitudinal profile of the pavement on a continuous graph. Final surface testing is an integral part of the paving operation and is subject to observation and inspection by the Engineer as deemed necessary.

Push the straightedge manually over the pavement at a speed not exceeding 2 miles per hour. For all lanes, take profiles in the right wheel path approximately 3 feet from the right edge of pavement in the same direction as the paving operation, unless otherwise approved due to traffic control or safety considerations. As an exception, lanes adjacent to curb and gutter, expressway gutter, or shoulder berm gutter may be tested in the left wheel path. Make one pass of the straightedge in each full width travel lane. The full lane width should be comparable in ride quality to the area evaluated with the Hearne Straightedge. If deviations exist at other locations across the lane width, utilize a 10 foot non-mobile straightedge or the Hearne Straightedge to evaluate which areas may require corrective action. Take profiles as soon as practical after the pavement has been rolled and compacted, but no later than 24 hours following placement of the pavement, unless otherwise authorized by the Engineer. Take profiles over the entire length of final surface travel lane pavement exclusive of -Y- line travel lanes less than or equal to 1000 feet in length, ramps less than or equal to 1000 feet in length, turn lanes less than or equal to 1000 feet in length, structures, approach slabs, paved shoulders, loops, and tapers or other irregular shaped areas of pavement, unless otherwise approved by the Engineer. Test in accordance with this provision all mainline travel lanes, full width acceleration or deceleration lanes, -Y- line travel lanes greater than 1000 feet in length, ramps, full width turn lanes greater than 1000 feet in length, and collector lanes.

At the beginning and end of each day's testing operations, and at such other times as determined by the Engineer, operate the straightedge over a calibration strip so that the Engineer can verify correct operation of the straightedge. The calibration strip shall be a 100 foot section of pavement that is reasonably level and smooth. Submit each day's calibration graphs with that day's test section graphs to the Engineer. Calibrate the straightedge in accordance with the current NCDOT procedure titled *North Carolina Hearne Straightedge - Calibration and Determination of Cumulative Straightedge Index*. Copies of this procedure may be obtained from the Department's Pavement Construction Section.

Plot the straightedge graph at a horizontal scale of approximately 25 feet per inch with the vertical scale plotted at a true scale. Record station numbers and references (bridges, approach slabs, culverts, etc.) on the graphs. Distances between references/stations must not exceed 100 feet. Have the operator record the Date, Project No., Lane Location, Wheel Path Location, Type Mix, and Operator's Name on the graph.

Upon completion of each day's testing, evaluate the graph, calculate the Cumulative Straightedge Index (CSI), and determine which lots, if any, require corrective action. Document the evaluation of each lot on a QA/QC-7 form. Submit the graphs along with the completed QA/QC-7 forms to the Engineer, within 24 hours after profiles are completed, for verification of the results. The Engineer will furnish results of their acceptance evaluation to the Contractor within 48 hours of receiving the graphs. In the event of discrepancies, the Engineer's evaluation of the graphs will prevail for acceptance purposes. The Engineer will retain all graphs and forms.

Use blanking bands of 0.2 inches, 0.3 inches, and 0.4 inches to evaluate the graph for acceptance. The 0.2 inch and 0.3 inch blanking bands are used to determine the Straightedge Index (SEI), which is a number that indicates the deviations that exceed each of the 0.2 inch and 0.3 inch bands within a 100 foot test section. The Cumulative Straightedge Index (CSI) is a number representing the total of the SEIs for one lot, which consist of not more than 25 consecutive test sections. In addition, the 0.4 inch blanking band is used to further evaluate deviations on an individual basis. The CSI will be determined by the Engineer in accordance with the current procedure titled "North Carolina Hearne Straightedge - Calibration and Determination of Cumulative Straightedge Index".

The pavement will be accepted for surface smoothness on a lot by lot basis. A test section represents pavement one travel lane wide not more than 100 feet in length. A lot will consist of 25 consecutive test sections, except that separate lots will be established for each travel lane, unless otherwise approved by the Engineer. In addition, full width acceleration or deceleration lanes, ramps, turn lanes, and collector lanes, will be evaluated as separate lots. For any lot that is less than 2500 feet in length, the applicable pay adjustment incentive will be prorated on the basis of the actual lot length. For any lot which is less than 2500 feet in length, the applicable pay adjustment disincentive will be the full amount for a lot, regardless of the lot length.

If during the evaluation of the graphs, 5 lots require corrective action, then proceed on limited production for unsatisfactory laydown in accordance with Article 610-12 of the *Standard Specifications*. Proceeding on limited production is based upon the Contractor's initial evaluation of the straightedge test results and shall begin immediately upon obtaining those results. Additionally, the Engineer may direct the Contractor to proceed on limited production in accordance with Article 610-12 due to unsatisfactory laydown or workmanship.

Limited production for unsatisfactory laydown is defined as being restricted to the production, placement, compaction, and final surface testing of a sufficient quantity of mix necessary to construct only 2500 feet of pavement at the laydown width. Once this lot is complete, the final surface testing graphs will be evaluated jointly by the Contractor and the Engineer. Remain on limited production until such time as acceptable laydown results are obtained or until three consecutive 2500 foot sections have been attempted without achieving acceptable laydown results. The Engineer will determine if normal production may resume based upon the CSI for the limited production lot and any adjustments to the equipment, placement methods, and/or personnel performing the work. Once on limited production, the Engineer may require the Contractor to evaluate the smoothness of the previous asphalt layer and take appropriate action to reduce and/or eliminate corrective measures on the final surface course. Additionally, the Contractor may be required to demonstrate acceptable laydown techniques off the project limits prior to proceeding on the project.

If the Contractor fails to achieve satisfactory laydown results after three consecutive 2500 foot sections have been attempted, cease production of that mix type until such time as the cause of the unsatisfactory laydown results can be determined.

As an exception, the Engineer may grant approval to produce a different mix design of the same mix type if the cause is related to mix problem(s) rather than laydown procedures. If production of a new mix design is allowed, proceed under the limited production procedures detailed above.

After initially proceeding under limited production, the Contractor shall immediately notify the Engineer if any additional lot on the project requires corrective action. The Engineer will determine if limited production procedures are warranted for continued production.

If the Contractor does not operate by the limited production procedures as specified above, the 5 lots, which require corrective action, will be considered unacceptable and may be subject to removal and replacement. Mix placed under the limited production procedures for unsatisfactory laydown will be evaluated for acceptance in accordance with Article 105-3.

The pay adjustment schedule for the Cumulative Straightedge Index test results per lot is as follows:

Pay Adjustment Schedule for Cumulative Straightedge Index (CSI) (Obtained by adding SE Index of up to 25 consecutive 100 foot test sections)				
*CSI	ACCEPTANCE CATEGORY	CORRECTIVE ACTION	PAY ADJUSTMENT	
			Before Corrective	After Corrective Action
0-0	Acceptable	None	\$300 incentive	None
1-0 or 2-0	Acceptable	None	\$100 incentive	None
3-0 or 4-0	Acceptable	None	No Adjustment	No Adjustment
1-1, 2-1, 5-0 or 6-0	Acceptable	Allowed	\$300 disincentive	\$300 disincentive
3-1, 4-1, 5-1 or 6-1	Acceptable	Allowed	\$600 disincentive	\$600 disincentive
Any other Number	Unacceptable	Required	Per CSI after Correction(s) (not to exceed 100% Pay)	

***Either Before or After Corrective Actions**

Correct any deviation that exceeds a 0.4 inch blanking band such that the deviation is reduced to 0.3 inches or less.

Corrective actions shall be performed at the Contractor's expense and shall be presented for evaluation and approval by the Engineer prior to proceeding. Any corrective action performed shall not reduce the integrity or durability of the pavement that is to remain in place. Corrective action for deviation repair may consist of overlaying, removing and replacing, indirect heating and rerolling. Scraping of the pavement with any blade type device will not be allowed as a corrective action. Provide overlays of the same type mix, full roadway width, and to the length and depth established by the Engineer. Tapering of the longitudinal edges of the overlay will not be allowed.

Corrective actions will not be allowed for lots having a CSI of 4-0 or better. If the CSI indicates *Allowed* corrective action, the Contractor may elect to take necessary measures to reduce the CSI in lieu of accepting the disincentive. Take corrective actions as specified if the CSI indicates *Required* corrective action. The CSI after corrective action shall meet or exceed *Acceptable* requirements.

Where corrective action is allowed or required, the test section(s) requiring corrective action will be retested, unless the Engineer directs the retesting of the of the entire lot. No disincentive will apply after corrective action if the CSI is 4-0 or better. If the retested lot after corrective action has a CSI indicating a disincentive, the appropriate disincentive will be applied.

Test sections and/or lots that are initially tested by the Contractor that indicate excessive deviations such that either a disincentive or corrective action is necessary, may be re-rolled with asphalt rollers while the mix is still warm and in a workable condition, to possibly correct the

problem. In this instance, reevaluation of the test section(s) shall be completed within 24 hours of pavement placement and these test results will serve as the initial test results.

Incentive pay adjustments will be based only on the initially measured CSI, as determined by the Engineer, prior to any corrective work. Where corrective actions have been taken, payment will be based on the CSI determined after correction, not to exceed 100 percent payment.

Areas excluded from testing by the N.C. Hearne Straightedge will be tested by using a non-mobile 10-foot straightedge. Assure that the variation of the surface from the testing edge of the straightedge between any two contact points with the surface is not more than 1/8 inch. Correct deviations exceeding the allowable tolerance in accordance with the corrective actions specified above, unless the Engineer permits other corrective actions.

Furnish the North Carolina Hearne Straightedge(s) necessary to perform this work. Maintain responsibility for all costs relating to the procurement, handling, and maintenance of these devices. The Department has entered into a license agreement with a manufacturer to fabricate, sell, and distribute the N.C. Hearne Straightedge. The Department's Pavement Construction Section may be contacted for the name of the current manufacturer and the approximate price of the straightedge.

No direct payment will be made for the work covered by this section. Payment at the contract unit prices for the various items covered by those sections of the specifications directly applicable to the work constructed will be full compensation for all work covered by this section including, but not limited to, performing testing in accordance with this specification, any corrective work required as a result of this testing and any additional traffic control as may be necessary.

BORROW EXCAVATION AND SHPO DOCUMENTATION FOR BORROW/WASTE

SITES:

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

M8 R02

Revise the *2006 Metric Standard Specifications* as follows:

Division 2 Earthwork

Page 2-12, Subarticle 230-1(D), add the words: *The Contractor specifically waives* as the first words of the sentence.

Page 2-13, 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 8-8, 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 8-8, Article 802-2, General Requirements, 7th 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.

GUARDRAIL ANCHOR UNITS, TYPE 350:

(4-20-04)

M8 R65

Description

Furnish and install guardrail anchor units in accordance with the details in the plans, the applicable requirements of Section 862 of the *2006 Metric Standard Specifications*, and at locations shown in the plans.

Materials

The Contractor may at his option, furnish any one of the guardrail anchor units.

Guardrail anchor unit (ET-2000) as manufactured by:

Trinity Industries, Inc.
2525 N. Stemmons Freeway
Dallas, Texas 75207
Telephone: 800-644-7976

The guardrail anchor unit (SKT 350) as manufactured by:

Road Systems, Inc.
3616 Old Howard County Airport
Big Spring, Texas 79720
Telephone: 915-263-2435

Prior to installation the Contractor shall submit to the Engineer:

(A) FHWA acceptance letter for each guardrail anchor unit certifying it meets the requirements of NCHRP Report 350, Test Level 3, in accordance with Section 106-2 of the 2006 Standard Specifications.

(B) Certified working drawings and assembling instructions from the manufacturer for each guardrail anchor unit in accordance with Section 105-2 of the 2006 Metric Standard Specifications.

No modifications shall be made to the guardrail anchor unit without the express written permission from the manufacturer. Perform installation in accordance with the details in the plans, and details and assembling instructions furnished by the manufacturer.

Construction Methods

Guardrail end delineation is required on all approach and trailing end sections for both temporary and permanent installations. Guardrail end delineation consists of yellow reflective sheeting applied to the entire end section of the guardrail in accordance with Section 1088-3 of the 2006 Metric Standard Specifications and is incidental to the cost of the guardrail anchor unit.

Measurement and Payment

Measurement and payment will be made in accordance with Articles 862-6 of the 2006 Metric Standard Specifications.

Payment will be made under:

Pay Item	Pay Unit
Guardrail Anchor Units, Type 350	Each

FENCE:
(3-6-06)

M8 R86

Revise the 2006 Metric Standard Specifications as follows:

Page 8-44, Subarticle 866-3(A), second sentence,

Add *existing fencing* after stumps

CHAIN LINK FENCING WITH BARBED WIRE ON EXTENSION ARMS:
(7-1-95)

M8 R100

Description

Provide 1800 mm chain link fencing with barbed wire on extension arms in accordance with the plans, Section 866 of the 2006 Metric Standard Specifications, and the provisions herein.

Construction Methods

On all 1800 mm fencing on this project, place three strands of barbed wire placed at the top of the fence fabric. Attach the barbed wire to extension arms that are to be fitted to the post tops.

Provide extension arms constructed to locate the top most strand of barbed wire approximately 300 mm above and approximately 300 mm out from the top rail. Space all strands of barbed wire at an approximately equal distance from each other. Make provisions for supporting the top rail. The arm shall make a 45 degree angle with the post, and be an item of standard manufacture. Have samples of extension arms to be used on the project approved prior to their installation.

Fabricate the extension arms from pressed steel or malleable wrought iron, or either of these materials in conjunction with a cast base. Provide a minimum weight of the arm material of 14 gauge. Provide a complete arm assembly of sufficient strength to support the barbed wire when stretched to proper tension. Galvanize all arms in accordance with ASTM A153.

Erect extension arms so as to point away from the pavement. Splicing of barbed wire between the arms will not be permitted. Use a method of attaching barbed wire to the arms acceptable to the Engineer.

Measurement and Payment

No direct payment will be made for furnishing and installing the barbed wire and extension arms as such work will be considered incidental to other work being paid for by the various fencing items in the contract.

STREET SIGNS AND MARKERS AND ROUTE MARKERS:

(7-1-95)

M9 R01

Move any existing street signs, markers, and route markers out of the construction limits of the project and install the street signs and markers and route markers so that they will be visible to the traveling public if there is sufficient right of way for these signs and markers outside of the construction limits.

Near the completion of the project and when so directed by the Engineer, move the signs and markers and install them in their proper location in regard to the finished pavement of the project.

Stockpile any signs or markers that cannot be relocated due to lack of right of way, or any signs and markers that will no longer be applicable after the construction of the project, at locations directed by the Engineer for removal by others.

The Contractor shall be responsible to the owners for any damage to any street signs and markers or route markers during the above described operations.

No direct payment will be made for relocating, reinstalling, and/or stockpiling the street signs and markers and route markers as such work shall be considered incidental to other work being paid for by the various items in the contract.

SHIPPING SIGNS:

5-15-07

M9 R03

Revise the *2006 Metric Standard Specifications* as follows:

Page 9-2, Section 901-3(A), General, add the following as the 7th paragraph:

Ship all multi-panel signs to the project intact, completely assembled and ready to be hung. Fabricate signs taller than 3.6 m as 2 separate signs with a horizontal splice, ready to be spliced and hung. No assembly other than a horizontal splice will be permitted.

GALVANIZED HIGH STRENGTH BOLTS, NUTS AND WASHERS:

(2-17-09)

M10R02

Revise the *Metric Standard Specifications* as follows:

Page 10-101, Subarticle 1072-7(F)(3) Change the AASHTO reference to B 695 Class 55

Page 10-201, Table 1092-2, Steel Sign Materials, Change High Strength Bolts, Nuts & Washers ASTM Specifications for Galvanizing to B695 Class 55.

Page 10-211, Subarticle 1094-1(A) Breakaway or Simple Steel Beam Sign Supports, replace the first full paragraph with the following:

Fabricate high strength bolts, nuts, and washers required for breakaway supports from steel in accordance with ASTM A325 and galvanize in accordance with AASHTO B 695 Class 55.

Page 10-212, Article 1096-2 Steel Overhead Sign Structures, replace the last sentence with the following:

The galvanizing shall meet the requirements of AASHTO B 695 Class 55 for fasteners and of ASTM A123 for other structural steel.

AGGREGATE PRODUCTION:

(11-20-01)

M10 R05

Provide aggregate from a producer who uses the current Aggregate Quality Control/Quality Assurance Program that 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 Metric Standard Specifications*. Copies of this procedure are available upon request from the Materials and Test Unit.

CONCRETE BRICK AND BLOCK PRODUCTION:

(11-20-01)

M10 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 Metric Standard Specifications*. Copies of this procedure are available upon request from the Materials and Test Unit.

PORTLAND CEMENT CONCRETE (Alkali-Silica Reaction):

(2-20-07)

M10 R16

Revise the *2006 Metric 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/quarriesrprob.pdf>

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

GLASS BEADS:

(7-18-06)

M10 R35

Revise the *2006 Metric Standard Specifications* as follows:

Page 10-182, 1087-4(C) Gradation & Roundness

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.

Delete the last paragraph.

ENGINEERING FABRICS TABLE 1056-1:

(7-18-06)

M10 R40

Revise the *2006 Metric Standard Specifications* as follows:

Page 10-80, Table 1056-1, replace the values for Trapezoidal Tear Strength with the following:

Physical Property	ASTM Test Method	Type 1	Type 2	Type 3		Type 4
				Class A	Class B	
Typical Applications		Shoulder Drain	Under Riprap	Temporary Silt Fence		Soil Stabilization
Trapezoidal Tear Strength	D4533	200 N	334 N	--	--	334 N

MACRO-SYNTHETIC FIBERS FOR CONCRETE REINFORCEMENT

(7-15-08)

M 10 R42

Description

Substitute as an option, macro-synthetic fibers in lieu of 100 mm x 100 mm welded wire fabric reinforcement for selected precast concrete products in accordance with the following requirements.

Materials

Item	Section
Portland Cement Concrete	1077-5

Substitute macro-synthetic fibers only for steel reinforcement with an area of steel of 254 mm²/m or less in the following items:

- (A) Precast Drainage Structure units in accordance with the requirements of *Standard Drawing 840.45*.

- (B) Precast Manhole 4.0' Riser Sections in accordance with the requirements of *Standard Drawing 840.52*.

All other requirements, including reinforcement for these precast concrete items will remain the same.

Submittal Submit to the Department for approval by the precast producer and fiber manufacturer, independently performed test results certifying the macro-synthetic fibers and the precast concrete products meet the requirements listed herein:

(A) **Macro-Synthetic Fibers**

- (1) Manufacture from virgin polyolefins (polypropylene and polyethylene) and comply with ASTM C 1116.4.1.3.

Fibers manufactured from materials other than polyolefins Submit test results certifying resistance to long-term deterioration when in contact with the moisture and alkalis present in cement paste and/or the substances present in air-entraining and chemical admixtures.

- (2) Fiber length - no less than 38 mm.
- (3) Macro-synthetic fibers - aspect ratio (length divided by the equivalent diameter of the fiber) between 45 and 150.
- (4) Macro-synthetic fibers - Minimum tensile strength of 2812 kg/cm² when tested in accordance with ASTM D 3822.
- (5) Macro-synthetic fibers - minimum modulus of elasticity of 28,123 kg/cm² when tested in accordance with ASTM D 3822.

(B) **Fiber Reinforced Concrete**

- (1) Approved structural fibers may be used as a replacement of steel reinforcement in allowable structures of NCDOT Standards 840.45 and 840.52. The dosage rate, in kilograms of fibers per cubic meter, shall be as per recommended by the fiber manufacturer to provide a minimum average residual strength (in accordance with ASTM C 1399) of concrete of no less than that of the concrete with the steel reinforcement that is being replaced, but no less than 2.97 kg/m³. Submit the recommendations of the manufacturer that correlate the toughness of steel-reinforced concrete with that of the recommended dosage rate for the fiber-reinforced concrete.
- (2) Fiber reinforced concrete - 4.5% air content, ± 1.5% tolerance.
- (3) Fiber reinforced concrete - develop a minimum compressive strength 281 kg/cm² in 28 days.

- (4) Workability of the concrete mix - determine in accordance with ASTM C995. The flow time - not be less than 7 seconds or greater than 25 seconds.
- (5) Assure the fibers are well dispersed and prevent fiber balling during production. After introduction of all other ingredients, add the plastic concrete and mix the plastic concrete for at least 4 minutes or for 50 revolutions at standard mixing speed.

Measurement and Payment

No separate payment will be made for substitution of macro-fiber synthetic reinforcement for the steel reinforcing. The price bid for the precast units will be full compensation for furnishing and incorporating the macro-fiber synthetic reinforcement.

PORTABLE CONCRETE BARRIER

(2-20-07)

M10 R50

The *2006 Metric Standard Specifications* is revised as follows:

Page 10-200, Article 1090-1(A) General, add the following after the first sentence:

The requirement for approved galvanized connectors will be waived if the barrier remains the property of the Contractor.

TEMPORARY SHORING:

(2-20-07) (Rev 9-25-07)

M11 R02

Description

Design and construct temporary shoring in accordance with the contract. Temporary shoring includes standard shoring, temporary mechanically stabilized earth (MSE) walls and non-anchored temporary shoring. Trench boxes are not considered temporary shoring. "Standard shoring" refers to *standard temporary shoring* and *standard temporary MSE walls*. Notes on plans may restrict the use of one or both types of standard shoring. Notes on plans may also require or prohibit temporary MSE walls.

Unless noted otherwise on the plans, temporary shoring is required as shown on the plans and to maintain traffic. Temporary shoring to maintain traffic is defined as shoring necessary to provide lateral support to the side of an excavation or embankment parallel to an open travelway when a theoretical 2:1 (H:V) slope from the bottom of the excavation or embankment intersects the existing ground line closer than 1.5 m from the edge of pavement of the open travelway.

This provision is not applicable to anchored temporary shoring or the installation of pipes, drop inlets and utilities unless noted otherwise on the plans. Provide all shoring submittals before beginning work.

Materials**(A) Certifications, Storage and Handling**

Provide Type 7 Contractor's Certifications in accordance with Article 106-3 of the *2006 Metric Standard Specifications* for all shoring materials used with the exception of reinforcing fabrics and geogrids. Furnish Type 2 Typical Certified Mill Test Reports in accordance with Article 106-3 of the *2006 Metric Standard Specifications* for all seam strengths and reinforcing fabric and geogrid properties. Provide minimum average roll values (MARV) in accordance with ASTM D4759 for test reports. For testing reinforcing fabric and geogrids, a lot is defined as a single day's production.

Load, transport, unload and store shoring materials such that they are kept clean and free of damage. Identify, store and handle all geogrids and geotextile fabrics in accordance with ASTM D4873. Geogrids and fabrics with defects, flaws, deterioration or damage will be rejected. Do not leave fabrics or geogrids uncovered for more than 7 days.

(B) Shoring Backfill

Use shoring backfill for the construction of all temporary shoring including backfilling behind non-anchored temporary shoring and in the reinforced zone for temporary MSE walls. Unless backfilling around culverts, use shoring backfill that meets the requirements of Class II Type I, Class III, Class V or Class VI select material in accordance with Section 1016 of the *2006 Metric Standard Specifications* or AASHTO M145 for soil classification A-2-4 with a maximum plasticity index (PI) of 6. For backfilling around culverts, use shoring backfill as defined herein except for A-2-4 soil.

(C) Non-anchored Temporary Shoring

Use steel shapes, plates and piles that meet the requirements of ASTM A36 and steel sheet piles that meet the requirements of Article 1084-2 of the *2006 Metric Standard Specifications*. Use timber lagging with a minimum allowable bending stress of 6.9 MPa that meets the requirements of Article 1082-1 of the *2006 Metric Standard Specifications*. For standard temporary shoring, use pile sections and lengths and lagging sizes as shown on the plans.

(D) Temporary MSE Walls

Use welded wire reinforcement forms, facings, mesh and mats that meet the requirements of AASHTO M55 or M221. Use connector bars and wires for welded wire wall components and support struts that meet the requirements of AASHTO M32. For standard temporary MSE walls, use wire gauges, strut sizes and welded wire components as shown on the plans.

(1) Geotextile Fabrics

Use geotextile fabrics that meet the requirements of Article 1056-1 of the *2006 Metric Standard Specifications*.

(a) Reinforcing Fabric

The reinforcement direction (RD) is defined as the direction perpendicular to the wall face and the cross-reinforcement direction (CRD) is defined as the direction parallel to the wall face.

Use woven polyester or polypropylene fabric that meets the following properties:

Property	Test Method	Requirement (MARV)
Wide Width Tensile Strength @ Ultimate (RD)	ASTM D4595	Varies – 35 kN/m min
Wide Width Tensile Strength @ Ultimate (CRD)	ASTM D4595	18 kN/m min
Trapezoidal Tear Strength	ASTM D4533	0.44 kN min
CBR Puncture Strength	ASTM D6241	2.67 kN min
UV Resistance after 500 hrs	ASTM D4355	70 %
Apparent Opening Size (AOS), US Sieve	ASTM D4751	0.212 mm min – 0.850 mm max
Permittivity	ASTM D4491	0.20 sec ⁻¹

For standard temporary MSE walls (temporary fabric wall) use reinforcing fabric wide width tensile strengths and lengths in the RD as shown on the plans.

(b) Retention Fabric

Retain shoring backfill at the face of temporary MSE walls with retention fabric. Use fabric that meets the requirements of Class 3 and the UV resistance, AOS and permittivity for separation geotextile in accordance with AASHTO M288.

(2) SierraScape Temporary Wall

Use uniaxial (UX) geogrids composed of high-density polyethylene (HDPE) manufactured by Tensar Earth Technologies. Test geogrids in accordance with ASTM D6637. Use connection rods manufactured by Tensar Earth Technologies to transfer the load between the facings and geogrids.

For standard temporary MSE walls (SierraScape temporary wall) use geogrid types and lengths as shown on the plans.

(3) Terratrel Temporary Wall

Use ribbed reinforcing steel strips manufactured by The Reinforced Earth Company that meet the requirements of ASTM A572, Grade 450. Use connector

rods that meet the requirements of AASHTO M31, Grade 415 and hair pin connectors that meet the requirements of ASTM A1011, Grade 345. Use bolts, nuts and washers that meet the requirements of AASHTO M164.

For standard temporary MSE walls (Terratrel temporary wall) use ribbed steel strip size and lengths, rod lengths and diameters, hairpin connectors, bolts, nuts and washers as shown on the plans.

Embedment

“Embedment” is defined as the depth of shoring below the bottom of the excavation or the grade in front of the shoring. For cantilever shoring, embedment is the depth of the piling below the grade in front of the shoring. For temporary MSE walls, embedment is the difference between the grade elevation in front of the wall and the elevation of the bottom of the reinforced zone.

Portable Concrete Barriers

Provide portable concrete barriers in accordance with the plans and if shoring is located within the clear zone as defined in the *AASHTO Roadside Design Guide*. Use NCDOT portable concrete barriers (PCBs) in accordance with Roadway Metric Standard Drawing No. 1170.01 and Section 1170 of the *2006 Metric Standard Specifications*. Use Oregon Tall F-Shape Concrete Barriers in accordance with detail drawing and special provision obtained from:

<http://www.ncdot.org/doh/preconstruct/wztc/DesRes/English/DesResEng.html>

The clear distance is defined as the horizontal distance from the back face of the barrier to the edge of pavement and the minimum required clear distance is shown on the traffic control plans. At the Contractor’s option or if the minimum required clear distance is not available, set an unanchored PCB against the traffic side of the shoring and design shoring for traffic impact or use the “surcharge case with traffic impact” for the standard temporary shoring. An anchored PCB or Oregon barrier is required for barriers above and behind temporary MSE walls.

Contractor Designed Shoring

“Contractor designed shoring” is defined as non-anchored temporary shoring or temporary MSE walls designed by the Contractor. Unless prohibited or required, Contractor designed shoring is optional. Contractor designed shoring is required when notes on plans prohibit the use of standard shoring. Non-anchored Contractor designed shoring is prohibited when notes on plans require the use of temporary MSE walls and Contractor designed temporary MSE walls are prohibited when notes on plans prohibit the use of temporary MSE walls.

Before beginning design, survey the shoring location to determine existing elevations and actual design heights. Submit design calculations and drawings including typical sections for review and acceptance showing details of the proposed design and construction sequence in accordance with Article 105-2 of the *2006 Metric Standard Specifications*. Have shoring designed, detailed and sealed by a Professional Engineer registered in the State of North Carolina. Submit 3 hard

copies of design calculations and 10 hard copies of drawings and an electronic copy (pdf or jpeg format on CD or DVD) of both the calculations and drawings.

Design non-anchored temporary shoring in accordance with the *AASHTO Guide Design Specifications for Bridge Temporary Works* and temporary MSE walls in accordance with the *AASHTO Allowable Stress Design Standard Specifications for Highway Bridges*. Use the following soil parameters for shoring backfill in the reinforced zone.

Total Unit Weight = 18.8 kN/m³
Friction Angle = 30 degrees
Cohesion = 0 kPa

Design temporary shoring in accordance with the in-situ assumed soil parameters shown on the plans. Design shoring for a 3-year design service life and a traffic surcharge equal to 11.5 kPa. This surcharge is not applicable for construction traffic. If a construction surcharge will be present within a horizontal distance equal to the height of the shoring, design the shoring for the required construction surcharge. If the edge of pavement or a structure to be protected is within a horizontal distance equal to the height of the shoring, design shoring for a maximum deflection of 75 mm. Otherwise, design shoring for a maximum deflection of 150 mm.

For non-anchored temporary shoring, the top of shoring elevation is defined as the elevation where the grade intersects the back face of the shoring. For traffic impact, apply 29.2 kN/m to the shoring 450 mm above the top of shoring elevation. When designing for traffic impact, extend shoring at least 800 mm above the top of shoring elevation. Otherwise, extend shoring at least 150 mm above the top of shoring elevation.

Standard Shoring

Unless notes on plans prohibit the use of one or both types of standard shoring, standard shoring is optional. Submit a "Standard Temporary MSE Wall Selection Form" for each standard temporary MSE wall location and a "Standard Temporary Shoring Selection Form" for up to three standard temporary shoring locations. Submit selection forms at least 14 days before beginning shoring construction. Obtain standard shoring selection forms from:

<http://www.ncdot.org/doh/preconstruct/highway/geotech/formdet/>

(A) Standard Temporary Shoring

Determine the shoring height, traffic impact, groundwater condition and slope or surcharge case for each standard temporary shoring location. Determine the minimum required extension, embedment and sheet pile section modulus or H pile section from the plans for each location.

(B) Standard Temporary MSE Walls

Choose a standard temporary MSE wall from the multiple temporary MSE wall options shown in the plans. Do not use more than one option per wall location.

Step bottom of reinforced zone in increments equal to vertical reinforcement spacing for the wall option chosen. Determine the wall height and slope or surcharge case for each section of standard temporary MSE wall. With the exception of either the first or last section of wall, use horizontal section lengths in increments equal to the following for the wall option chosen.

Standard Temporary MSE Wall Option	Increment
Temporary Fabric Wall	2.7 m min (varies)
Hilfiker Temporary Wall	3.0 m min (varies)
SierraScape Temporary Wall	5.7 m
Retained Earth Temporary Wall	7.3 m
Terratrel Temporary Wall	6.0 m

Determine the appropriate facings and/or forms and reinforcement length, spacing, strength, type, density and/or size from the plans for each wall section.

Construction Methods

When using an anchored PCB, anchor the barrier in accordance with Roadway Metric Standard Drawing 1170.01 and Section 1170 of the *2006 Metric Standard Specifications*. Control drainage during construction in the vicinity of temporary shoring. Collect and direct run off away from temporary MSE walls, shoring and shoring backfill.

(A) Non-anchored Temporary Shoring

Install and interlock sheet piling or install piles as shown on the plans or accepted submittals with a tolerance of 42 mm per meter from vertical. Contact the Engineer if the design embedment is not achieved. If piles are placed in drilled holes, perform pile excavation to the required elevations and backfill excavations with concrete and lean sand grout.

Remove grout as necessary to install timber lagging. Install timber lagging with a minimum bearing distance of 75 mm on each pile flange. Backfill voids behind lagging with shoring backfill.

Perform welding in accordance with the accepted submittals and Article 1072-20 of the *2006 Metric Standard Specifications*.

(1) Pile Excavation

Excavate a hole with a diameter that will result in at least 75 mm of clearance around the entire pile. Use equipment of adequate capacity and capable of drilling through soil and non-soil including rock, boulders, debris, man-made objects and any other materials encountered. Blasting is not permitted to advance excavations. Blasting for core removal is permitted only when approved by the

Engineer. Dispose of drilling spoils in accordance with Section 802 of the *2006 Metric Standard Specifications*. Drilling spoils consist of all excavated material including water removed from excavations by either pumping or drilling tools.

If unstable, caving or sloughing soils are encountered, stabilize excavations with clean watertight steel casing. Steel casings may be either sectional type or one continuous corrugated or non-corrugated piece. Provide casings of ample strength to withstand handling and driving stresses and the pressures imposed by concrete, earth or backfill. Use steel casings with an outside diameter equal to the hole size and a minimum wall thickness of 6 mm.

Before placing concrete, check the water inflow rate in the excavation after any pumps have been removed. If the inflow rate is less than 150 mm per half hour, remove any water and free fall the concrete into the excavation. Ensure that concrete flows completely around the pile. If the water inflow rate is greater than 150 mm per half hour, propose and obtain approval of the concrete placement procedure before placing concrete.

Center the pile in the excavation and fill the excavation with Class A concrete in accordance with Section 1000 of the *2006 Metric Standard Specifications* except as modified herein. Provide concrete with a slump of 150 to 200 mm. Use an approved high-range water reducer to achieve this slump. Place concrete in a continuous manner to the bottom of shoring or the elevations shown on the accepted submittals. Fill the remainder of the excavation with a lean sand grout and remove all casings.

(B) Temporary MSE Walls

The Engineer may require a wall preconstruction meeting to discuss the construction and inspection of the temporary MSE walls. If required, conduct the meeting with the Site Superintendent, the Resident or Bridge Maintenance Engineer, the Bridge Construction Engineer and the Geotechnical Operations Engineer before beginning wall construction.

Perform all necessary clearing and grubbing in accordance with Section 200 of the *2006 Metric Standard Specifications*. Excavate as necessary as shown on the plans or accepted submittals. Notify the Engineer when foundation excavation is complete. Do not place shoring backfill or first reinforcement layer until obtaining approval of the excavation depth and foundation material.

If applicable, install foundations located within the reinforced zone in accordance with the plans or accepted submittals.

Erect and maintain facings and forms as shown on the plans or accepted submittals. Stagger vertical joints of facings and forms to create a running bond when possible unless shown otherwise on the plans or accepted submittals.

Place facings and forms as near to vertical as possible with no negative batter. Construct temporary MSE walls with a vertical and horizontal tolerance of 75 mm when measured with a 3 m straight edge and an overall vertical plumbness (batter) and horizontal alignment of less than 150 mm.

Place reinforcement at locations and elevations shown on the plans or accepted submittals and in slight tension free of kinks, folds, wrinkles or creases. Repair or replace any damaged reinforcement. Contact the Engineer when existing or future structures such as foundations, pavements, pipes, inlets or utilities will interfere with reinforcement. To avoid structures, deflect, skew and modify reinforcement.

Do not splice reinforcement in the reinforcement direction (RD), i.e., parallel to the wall face. Seams are allowed in the cross-reinforcement direction (CRD). Bond or sew adjacent reinforcing fabric together or overlap fabric a minimum of 450 mm with seams oriented perpendicular to the wall face.

Place shoring backfill in 200 to 250 mm thick lifts and compact in accordance with Subarticle 235-4(C) of the *2006 Metric Standard Specifications*. Use only hand operated compaction equipment within 1 m of the wall face. Do not damage reinforcement when placing and compacting shoring backfill. End dumping directly on the reinforcement is not permitted. Do not operate heavy equipment on reinforcement until it is covered with at least 250 mm of shoring backfill. Do not use sheepsfoot, grid rollers or other types of compaction equipment with feet.

Cover reinforcing and retention fabric with at least 75 mm of shoring backfill. Place top reinforcement layer between 100 to 600 mm below top of wall as shown on the plans or accepted submittals.

Bench temporary MSE walls into the sides of excavations where applicable. If the top of wall is within 1.5 m of finished grade, remove top form or facing and incorporate the top reinforcement layer into the fill when placing fill in front of the wall. Temporary MSE walls remain in place permanently unless required otherwise.

Measurement and Payment

Temporary Shoring will be measured and paid for at the contract unit price per square meter of exposed face area at locations shown on the plans or required by the Engineer. For temporary MSE walls, the wall height will be measured as the difference between the top and bottom of wall and does not include the embedded portions of the wall or any pavement thickness above the wall. For all other temporary shoring, the shoring height will be measured as the difference between the top and bottom of shoring elevation. The bottom of shoring elevation is defined as where the grade intersects the front face of the shoring. The top of shoring elevation is defined as where the grade intersects the back face of the shoring. No payment will be made for any extension of shoring above the top of shoring or any embedment below the bottom of shoring. Such price and payment will be full compensation for furnishing all labor, tools, equipment,

materials and all incidentals necessary to design and install the temporary shoring and complete the work as described in this provision.

No payment will be made for temporary shoring not shown on the plans or required by the Engineer including shoring for OSHA reasons or the Contractor's convenience. No value engineering proposals will be accepted based solely on revising or eliminating the shoring locations shown on the plans or the estimated quantities shown in the bid item sheets as a result of actual field measurements or site conditions.

No additional payment will be made for anchoring PCBs or providing Oregon barriers in lieu of unanchored PCBs. Additional costs for anchoring PCBs or providing Oregon barriers will be considered incidental to *Temporary Shoring*.

Payment will be made under:

Pay Item	Pay Unit
Temporary Shoring	Square Meter

CHANGEABLE MESSAGE SIGNS

(11-21-06)

M11 R11

Revise the *2006 Metric Standard Specifications* as follows:

Page 11-7, 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.

PAVEMENT MARKING LINES:

(11-21-06) (Rev. 9-18-07)

M12 R01

Revise the *2006 Metric Standard Specifications* as follows:

Page 12-11, Subarticle 1205-10, Measurement and Payment, delete the first sentence of the first paragraph and replace with the following:

Pavement Marking Lines will be measured and paid for as the actual number of linear meters of pavement marking lines per application that has been satisfactorily placed and accepted by the Engineer.

EXCAVATION, TRENCHING, PIPE LAYING AND BACKFILLING FOR UTILITIES:

(2-17-09)

M15R01

Revise the *2006 Metric Standard Specifications* as follows:

Page 15-4, Article 1505-4 Repair of Pavements, Sidewalks and Driveways, first paragraph, add at the end of the first sentence

in accordance with Section 848

Page 15-5, Article 1505-6

Second paragraph,

Delete (E) Repair of Sidewalks and Driveways in its entirety

Add as the eighth paragraph:

 " Concrete Sidewalk and " Concrete Driveways will be measured and paid for in accordance with Article 848-4.

PERMANENT SEEDING AND MULCHING:

(7-1-95)

M16 R01

The Department desires that permanent seeding and mulching be established on this project as soon as practical after slopes or portions of slopes have been graded. As an incentive to obtain an early stand of vegetation on this project, the Contractor's attention is called to the following:

For all permanent seeding and mulching that is satisfactorily completed in accordance with the requirements of Section 1660, Seeding and Mulching, and within the following percentages of elapsed contract times, an additional payment will be made to the Contractor as an incentive additive. The incentive additive will be determined by multiplying the number of acres of seeding and mulching satisfactorily completed times the contract unit bid price per acre for Seeding and Mulching times the appropriate percentage additive.

Percentage of Elapsed Contract Time	Percentage Additive
0% - 30%	30%
30.01% - 50%	15%

Percentage of elapsed contract time is defined as the number of calendar days from the date of availability of the contract to the date the permanent seeding and mulching is acceptably completed divided by the total original contract time.