

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

(4-6-06) (Rev 3-18-08)

M2 R02

Perform clearing on this project to the limits established by Method “III” shown on Standard No. 200.03 of the *2006 Metric Roadway Standard Drawings*.

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.

SELECT GRANULAR MATERIAL:

(5-19-09)

Select Granular Material shall be in accordance with Section 265 of the *Standard Specifications* with the following revisions:

Revise the *Standard Specifications* as follows:

Page 2-29, Article 265-3 Construction Methods, replace with the following:

Use Class II or III Select Material over fabric for soil stabilization and only Class III Select Material for backfill in water.

Place select granular material to 1 meter above fabric and water level.

Page 2-30, Article 265-4 Measurement and Payment, delete the second paragraph, second sentence and replace with the following:

When the Engineer permits select granular material being obtained from either unclassified excavation or from an approved project borrow source, measurement and payment for select granular material will be made in accordance with Articles 225, 226 or 230 and not under the pay item contained in this Article.

BUILDING AND UNDERGROUND STORAGE TANK REMOVAL:

(1-1-02) (Rev.6-21-05)

M2 R15

Building Removal

Remove the buildings and appurtenances listed below in accordance with Section 215 of the *2006 Metric Standard Specifications* and the following:

Prior to removal of any building, comply with the notification requirements of *Title 40 Code of Federal Regulations*, Part 61, Subpart M, which are applicable to asbestos. Give notification to the North Carolina Department of Health and Human Services, Division of Public Health Epidemiology Branch and/or the appropriate county agency when the county performs

enforcement of the Federal Regulation. Submit a copy of the notification to the Engineer prior to the building removal.

Perform removal and disposal of asbestos in accordance with the requirements of *Title 40 Code of Federal Regulations*; comply with all Federal, State and local regulations when performing building removal and/or asbestos removal and disposal. Any fines resulting from violations of any regulation are the sole responsibility of the Contractor and the Contractor agrees to indemnify and hold harmless the Department against any assessment of such fines.

The Department has performed asbestos assessments for building items identified below. Copies of this report may be obtained through the Division Right-of-Way Agent. When asbestos is discovered after the opening of bids for the project, the Engineer may have the work performed by others or the cost of asbestos removal and disposal will be paid for in accordance with Article 104-7 of the *2006 Metric Standard Specifications*. When a building has had or will have asbestos removed and the Contractor elects to remove the building such that it becomes a public area, the Contractor is responsible for any additional costs incurred including final air monitoring.

Underground Storage Tank Removal

Prior to removal of any Underground Storage Tank (UST), comply with the notification requirements of the *Title 40 Code of Federal Regulations*, Part 280.71(a). Give notification to the appropriate regional office of the North Carolina Department of Environment and Natural Resources, Division of Waste Management, UST Section. Submit a copy of the notification to the Engineer prior to the removal of the underground storage tank.

Permanently close UST systems by removal and disposal in compliance with the regulations set forth in *Title 40, Code of Federal Regulations*, Part 280.71 and *North Carolina Administrative Code (NCAC) Title 15A, Chapter 2, Subchapter 2N* and any applicable local regulations. Assess Underground Storage Tank sites at closure for the presence of contamination as required in *NCAC Title 15A, Chapter 2, Subchapter 2N, Section .0803* and as directed by the appropriate Regional Office of the Division of Waste Management. Remove and dispose of UST systems and contents in a safe manner in conformance with requirements of *American Petroleum Institute Bulletin 1604, Removal and Disposal of Used Underground Petroleum Storage Tanks*, Chapters 3 through 6. (Note: As an exception to these requirements, the filling of the tank with water as a means of expelling vapors from the tank as described in Section 4.2.6.1 of *American Petroleum Institute Bulletin 1604*, will not be allowed. Comply with all Federal, State and local regulations when performing UST removal and contaminated material disposal. Any fines resulting from violations of any regulation are the sole responsibility of the Contractor and the Contractor agrees to indemnify and hold harmless the Department against any assessment of such fines.

Where underground storage tanks are indicated below, there will be no direct payment for the assessment or closure. When the contract does not indicate the presence of storage tanks and storage tanks are discovered after the opening of bids for the project, the Engineer may have the work performed by others or the cost of assessment, closure, and/or removal will be paid for in accordance with Article 104-7 of the *2006 Metric Standard Specifications*.

Disposition of any contaminated material associated with underground storage tanks will be made as provided in Article 107-26 of the 2006 Metric Standard Specifications.

| |
|---------------------------------------|
| Building Removal No. 1 |
| Parcel #2 – Survey Line L, Sta. 11+00 |
| Storage Building |

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|---------------------------------------|
| Building Removal No. 2 |
| Parcel #2 – Survey Line L, Sta. 11+08 |
| Storage Building |

| |
|---|
| Building Removal No. 3 |
| Parcel #2 – Survey Line L, Left of Sta. 11+08 |
| Storage Building |

| |
|---|
| Building Removal No. 4 |
| Parcel #2 – Survey Line L, Left of Sta. 11+08 |
| Storage Building |

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.

UNCLASSIFIED EXCAVATION:

Unclassified Excavation shall be performed in accordance with Section 225 of the Standard Specifications. *Unclassified Excavation* will be paid for at the contract lump sum price. Partial payments will be equal to the percentage of such item that is complete as estimated by the Engineer.

NOTES TO CONTRACTOR:

Extra Handling of Unclassified Excavation (SPECIAL)

Aerate and dry any unclassified excavation material containing moisture content in excess of what is required to achieve embankment stability and specified density.

Lateral Ditches (SPECIAL)

Excavate lateral ditches and/or underdrain to full depth and to designated outlets. Allow drainage to function for 30 days or an adequate time designated by the Engineer prior to undercutting or any embankment construction.

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 |

FABRIC FOR EMBANKMENT STABILIZATION (SPECIAL)

Description

This work consists of furnishing and installing synthetic fabric for stabilizing soil in accordance with this provision or 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 shown in the plans or as directed by the Engineer.

Material

(1) Fabric

The fabric for embankment stabilization shall be made of high-tenacity polyester in the machine 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 affect 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 60°C. 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 | 600 N |
| Min. Bursting Strength | ASTM D-3786 | 4130 kPa |
| Trapezoid Tear | ASTM D-4533 | 600 N |
| AOS, US STD Sieve | ASTM D-4751 | 20-70 |
| Seams, Strength Cross Machine Direction Only | ASTM D-4884 | 35 kN/m |
| Ultraviolet (UV) % Strength Retained | ASTM D-4355 | 70% |
| Permeability | ASTM D-4491 | .02 cm/sec. |
| Fabric Tensile Strength at 5% Strain | ASTM D-4595 (Wide Strip Test) | Machine Direction 175 kN/m |
| Fabric Ultimate Wide Width Tensile Strength | ASTM D-4595 (Wide Strip Test) | Machine Direction 350 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, test, or rejection 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 fabric for embankment stabilization to a depth of 1 meter of select material which meets the requirements of Class III, in Section 1016 of the Standard Specifications.

Construction Methods

The fabric for embankment stabilization shall be placed at locations shown in the plans or as directed by the Engineer. The locations should be cleared and free of obstructions, debris and pockets. Stumps shall be cut smooth at the 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 for embankment stabilization shall be placed with the machine directions as shown on the plans or as directed by the engineer. Fabric shall be laid smooth and free from tension, stress fold, wrinkles or creases. All joints parallel to the machine direction shall be sewn by an approved method to develop the required seam strength. All sewn seams shall be placed facing upward to allow for inspection. No seams will be allowed perpendicular to the machine direction. No equipment will be allowed to operate on the fabric until the fabric layer is covered with 600 mm of select material, class III, or as directed by the Engineer. The select material should be placed and compacted using low ground pressure equipment 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 such that it will not harm the fabric.

A granular layer, of select material, class III, at 1 meter deep shall be placed over each geosynthetic layer. End dumping fill directly on the fabric is not permitted. Spreading and compaction of select material with low ground pressure (<28 kpa) equipment is required until 1 meter of material has 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, Class IIP" 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, Class III”. Such price and payment will be full compensation for furnishing, hauling, placing, compaction, and all incidentals necessary to complete the work.

Pay Item: Fabric for Embankment Stabilization.....Square Meter
Select Material, Class IIICubic Meter

FALSE SUMPS:

(7-1-95)

M2 R40

Construct false sumps in accordance with the details in the plans and at locations shown in the plans or at other locations as directed by the Engineer.

Payment for the work of construction of the false sumps will be made at the contract unit price per cubic meter for *Unclassified Excavation* or *Borrow Excavation* depending on the source of material, or included in *Grading-Lump Sum*.

SHOULDER AND FILL SLOPE MATERIAL:

(5-21-02)

M2 R45 C (Rev.)

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 lump sum 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 lump sum price for *Unclassified Excavation* or the contract unit price for, *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*.

CENTRAL COASTAL PLAIN CAPACITY USE AREA (CCPCUA) RULES:

(11-17-04) (Rev.2-15-06)

SPI (metric)

The Water Use Act of 1967 (*General Statute 143-215.11-.22*) allows for designation of capacity use areas for regulation of water use. Over pumping of important aquifers in the coastal plain has led to the creation of the Central Coastal Plain Capacity Use Area (CCPCUA) and associated rules. The CCPCUA rules became effective on August 1, 2002 and affect a 15 county region (Beaufort, Carteret, Craven, Duplin, Edgecombe, Greene, Jones, Lenoir, Martin, Onslow, Pamlico, Pitt, Washington, Wayne, and Wilson). The CCPCUA rules require registration and reporting of water use for those persons using more than 37,854 liters of ground water and/or surface water per day. A permit is required for persons who withdraw more than 378,541 liters per day of ground water.

NCDOT will apply for CCPCUA permits for all proposed TIP projects requiring sizeable earthwork quantities in the affected fifteen county area.

Each Contractor that utilizes a pump to dewater a borrow pit or utilizes a pump to withdraw surface water in the counties mentioned above will be required to record the volume of water pumped from each site on a daily basis. These daily recorded quantities should then be submitted for each pit on a monthly basis to the Resident Engineer. Included with that monthly submittal should be a record of the static and pumped water surface elevations. These two readings should be taken once each month at least 12 hours apart. The appropriate forms for recording this information are available at the following webpage:

http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/fieldops/downloads/

The pumped water volumes and surface water elevations shall be recorded on the electronic form and submitted to the Resident Engineer along with a hard copy signed by the contractor. Once the Resident Engineer ensures the information is complete and accurate, it will be forwarded to

the Roadside Environmental Field Operations Engineer on a quarterly basis. The Roadside Environmental Field Operations Engineer will compile this data for all pits located in the affected counties within his/her area and forward a complete package to the Roadside Environmental Unit for final review and transmittal to the Division of Water Resources.

The Contractor shall assume all liability for impacts to wells or surface water bodies resulting from dewatering operations.

The Contractor shall submit one additional copy of the development, use and reclamation plan and environmental assessment to the Resident Engineer. Once approved, the Resident Engineer will furnish a copy of the approved plan to the Division of Water Resources. In addition to the current required information, the reclamation plan submittal shall include:

1. The average daily pump discharge (in MLD)
2. The estimated maximum number of days of pumping during the anticipated life of the pit
3. The number and location (latitudinal and longitudinal coordinates) of wells within 457 meters of the pit boundaries
4. A determination as to whether adjoining dwellings are served by a county/municipal water system.

The Resident Engineer will forward the approved package to the Capacity Use Administrator at the following address:

Capacity Use Administrator
 DENR – DWR
 1611 Mail Service Center
 Raleigh, NC 27699-1611

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 |

PREPARATION OF SUBGRADE AND BASE:

(1-16-96)

M5 R05

On mainline portions and ramps of this project, prepare the subgrade and base beneath the pavement structure in accordance with the applicable sections of the *2006 Metric Standard Specifications* except use an automatically controlled fine grading machine utilizing string lines, laser controls, or other approved methods to produce final subgrade and base surfaces meeting the lines, grades, and cross sections required by the plans or established by the Engineer.

No direct payment will be made for the work required by this provision as it will be considered incidental to other work being paid for by the various items in the contract.

ASPHALT PAVEMENTS - SUPERPAVE:

(7-18-06)(Rev 5-19-09)

SP6R01

Revise the *2006 Standard Specifications* as follows:

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

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

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

Page 6-12, Subarticle 609-5(C)2, QUALITY CONTROL MINIMUM SAMPLING AND TESTING SCHEDULE

First paragraph, delete and replace with the following.

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

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

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

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

or ASTM D 2041

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

(i) Option 1

Insert the following immediately after the first paragraph:

(ii) Option 2

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

Second paragraph, delete and replace with the following:

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

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

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

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

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

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 6-16 with the following.

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

CONTROL LIMITS

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

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

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

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

Page 6-17, third full 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.

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

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

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

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

Page 6-18, delete the third and fourth full paragraphs, including the Table for Payment for Mix Produced in the Warning Bands and substitute the following:

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

Page 6-19, First paragraph, delete and replace with the following:

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

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

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

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

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

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

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

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

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

Page 6-25, Article 609-6 Quality Assurance, Density Quality Assurance, insert the following items after item (E):

- (F) By retesting Quality Control core samples from control strips (either core or nuclear) at a frequency of 100% of the frequency required of the Contractor;

- (G) By observing the Contractor perform all standard counts of the Quality Control nuclear gauge prior to usage each nuclear density testing day; or
- (H) By any combination of the above

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Page 6-44, Article 610-8 Spreading and Finishing, third full paragraph, replace the first sentence with the following:

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

Page 6-50, Article 610-13 Density Acceptance, delete the second paragraph and replace with the following:

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

Page 6-53, Article 620-4 Measurement and Payment, sixth paragraph, delete the last sentence.

Page 6-54, Article 620-4 Measurement and Payment, add the following pay item:

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

Page 6-69, Table 660-1 Material Application Rates and Temperatures, add the following:

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

Page 6-75, Subarticle 660-9(B), add the following as sub-item (5)

(5) Sand Seal

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

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

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

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

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

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

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

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

Page 6-53, Article 620-4 Measurement and Payment, seventh paragraph, delete the paragraph and substitute with the following:

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

Page 10-41, Table 1012-1, delete the last row of entries for OG AFC and add the following:

| Mix Type | Coarse 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 |
| OG AFC | 100/100 | N/A | N/A | 10 |
| UBWC | 100/85 | 40 | 45 | 10 |

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

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

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

(1) Mix Design RAS

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

(2) Mix Production RAS

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

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

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

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

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

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

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

| 0-6% RAS | |
|------------------|-----------|
| P _b % | ±1.6% |
| Sieve Size (mm) | Tolerance |
| 9.5 | ±1 |
| 4.75 | ±5 |
| 2.36 | ±4 |
| 1.18 | ±4 |
| 0.300 | ±4 |
| 0.150 | ±4 |
| 0.075 | ±2.0 |

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

(G) Reclaimed Asphalt Pavement (RAP)

(1) Mix Design RAP

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

(a) Millings

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

(b) Processed RAP

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

(c) Fractionated RAP

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

(d) Approved Stockpiled RAP

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

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

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

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

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

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

| P _b % | ±0.3% |
|------------------|-----------------|
| Sieve Size (mm) | Percent Passing |
| 25.0 | ±5% |
| 19.0 | ±5% |
| 12.5 | ±2% |
| 9.5 | ±2% |
| 4.75 | ±5% |
| 2.36 | ±4% |
| 1.18 | ±4% |
| 0.300 | ±4% |
| 0.150 | ±4% |
| 0.075 | ±1.5% |

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

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

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

(2) Mix Production RAP

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

(a) Mix Design RAP

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

(b) New Source RAP

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

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

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

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

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

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

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

| Mix Type | 0-20% RAP | | | 20 ⁺ -30 % RAP | | | 30 ⁺ % 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 |
| 9.5 | - | - | ±8 | - | - | ±5 | - | - | ±4 |
| 4.75 | ±10 | - | ±10 | ±7 | - | ±7 | ±5 | - | ±5 |
| 2.36 | ±8 | ±8 | ±8 | ±5 | ±5 | ±5 | ±4 | ±4 | ±4 |
| 1.18 | ±8 | ±8 | ±8 | ±5 | ±5 | ±5 | ±4 | ±4 | ±4 |
| 0.300 | ±8 | ±8 | ±8 | ±5 | ±5 | ±5 | ±4 | ±4 | ±4 |
| 0.150 | - | - | ±8 | - | - | ±5 | - | - | ±4 |
| 0.075 | ±4 | ±4 | ±4 | ±2 | ±2 | ±2 | ±1.5 | ±1.5 | ±1.5 |

ASPHALT 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 \$ 399.18 per metric ton.

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

FIELD OFFICE (Lump Sum):

(6-1-07)

SPI 8-1 (Rev.)

Description

This work consists of furnishing, erecting, equipping, and maintaining a field office for the exclusive use of Department Engineers and Inspectors at a location on the project approved by the Engineer. Provide a field office that complies with the current A.D.A. Design and Accessibility Standards, the National Electric Code, local, state, and federal regulations, and the following:

Procedures

The field office and equipment shall remain the property of the Contractor upon completion of the contract. The field office must be separated from buildings and trailers used by the Contractor and be erected and functional as an initial operation. Failure to have the field office

functional when work first begins on the project will result in withholding payment of the Contractor's monthly progress estimate. The field office must be operational throughout the duration of the project and be removed upon completion and final acceptance of the project.

Provide a field office that is weatherproof, tightly floored and roofed, constructed with an air space above the ceiling for ventilation, supported above the ground, has a width of at least 10 feet, and the floor-to-ceiling height that is at least 7 feet 6 inches. Provide inside walls and a ceiling that are constructed of plywood, masonite, gypsum board, or other suitable materials. Have the exterior walls, ceiling, and floor insulated.

Provide a field office with a minimum floor space of **1,200 square feet** and that is equipped with the following:

| <u>Number</u> | <u>Item</u> |
|---------------|--|
| 1 | Double-pedestal desk (approximately 60 by 34 inches, at least 2,000 square inches). |
| 1 | Plan and drafting table (approximately 30 by 96 inches) with adjustable stool. |
| 1 | Computer table having a minimum size of 48 by 30 by 29 inches. |
| 1 | Plan rack for 24 by 36 inch drawings with 6 plan clamps. |
| 1 | Printing calculator. |
| 2 | 2-drawer fire protection file, 15 inch drawer width, minimum UL rating of Class 350. |
| 6 | Office chairs with a minimum of two having casters. |
| 2 | Wastebaskets. |
| 1 | Pencil sharpener. |
| 1 | Copy machine (8 inch x 11 inch copies) |
| 1 | Telephone. |
| 1 | Fax Machine. |
| 1 | Answering machine. |

Windows and Doors

Provide a field office with at least three windows, with blinds, each having an area of at least 540 square inches, capable of being easily opened and secured from the inside and having at least two exterior passage doors. Provide doors at least 30 inches in width and 78 inches in height. Provide screens for windows and doors. Equip exterior passage door(s) with lock(s), and furnish at least two keys to the Engineer or inspector.

Steps

Provide accessibility in compliance with the current A. D. A. Design and Accessibility Standards, and the State Building Code and maintain them free from obstructions.

Storage Facility For Nuclear Gage

Furnish the field office with an outside storage facility for the Department's nuclear gage. The storage facility shall not be located within 10 feet of any other structure including the field office.

Lighting, Heating, and Air Conditioning

The field office must have satisfactory lighting, electrical outlets, heating equipment, an exhaust fan, and an air conditioner connected to an operational power source. Provide at least one of the light fixtures that is a fluorescent light situated over the plan and drafting table. Furnish electrical current and fuel for heating equipment.

Fire Extinguishers

Furnish and maintain one fire extinguisher for each required exterior passage door. Fire extinguisher(s) may be chemical or dry powder. UL Classification 10-B:C (minimum), suitable for Type A:B:C: fires. Mount and maintain fire extinguisher(s) in accordance with OSHA Safety and Health Standards.

Toilets

Provide a toilet conforming to the requirements of the state and local boards of health or other bodies or courts having jurisdiction in the area. When separate facilities for men and women are not available, place a sign with the words "Rest Room" (with letters at least 1 inch in height) over the doorway, and provide an adequate positive locking system on the inside of the doorway. Maintain responsibility for the water and sewer connections or the installation and connection of a water well and septic tank and drain field. These facilities must conform to all local and state permits.

Utilities

Except for telephone service, make arrangement for necessary utility connections, maintain utilities, pay utility service fees and bills, and make arrangements for final disconnection of utilities. Furnish a telephone in each field office and permit the work necessary to install it.

Storage Facility for Test Equipment

Provide the field office with a storage facility, separate from the office for storage of test equipment, other than the nuclear gage. Provide a facility that has a minimum floor space of 64 square feet, is weatherproof, tightly floored and roofed, and has a tamper resistant key operated lock.

Miscellaneous Items

The field office must also include the following:

1. A certification that the office is free of asbestos and other hazardous materials.
2. A broom, dust pan, mop and bucket, and general cleaning supplies.
3. Provide and maintain an all weather parking area for six vehicles, including graveled access to the paved surface.

Measurement and Payment

Payment at the contract lump sum bid price for *Field Office* will be full compensation for all work covered by this provision including but not limited to furnishing, erecting, maintaining, and removing the field office as outlined in this provision.

Installation and service fees for the telephone will be paid for by the Department.

Payment will be made under:

| | |
|-----------------|-----------------|
| Pay Item | Pay Unit |
| Field Office | Lump Sum |

150 MM PERFORATED SUBDRAIN PIPE:

150 mm perforated subdrain pipe shall be installed to a maximum depth of 1.8 meters below subgrade or as deep as outfall will allow.

MASONRY DRAINAGE STRUCTURES:

(10-16-07)

M8 R01

Revise the *2006 Standard Specifications* as follows:

Page 8-25, Article 840-4 Measurement and Payment, add the following at the end of the second paragraph:

For that portion of *Masonry Drainage Structure* measured above a height of 3 meters, payment will be made at 1.3 times the contract unit price per linear meter for *Masonry Drainage Structure*.

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.

ENDWALLS:

(5-20-08)

M8 R25

Revise the *Standard Specifications* as follows:

Page 8-23, Article 838-4 Replace the 1st and 2nd paragraph with the following:

Endwalls will be measured and paid for in cubic meters of concrete or brick that have been completed and accepted. This quantity will be computed from the dimensions shown on the plans or from revised authorized dimensions. Where precast concrete units have been approved and are used in lieu of cast-in-place units the quantity to be paid for will be computed the same as if cast-in-place units were used, as no reduction in pay quantity will be made due to the use of precast in lieu of cast in place endwalls.

Reinforced Endwalls will be measured and paid for in cubic meters of concrete or brick that have been completed and accepted. This quantity will be computed from the dimensions shown on the plans or from revised authorized dimensions. Where precast concrete units have been approved and are used in lieu of cast-in-place units the quantity to be paid for will be computed the same as if cast-in-place units were used, as no reduction in pay quantity will be made due to the use of precast in lieu of reinforced cast in place endwalls.

GUARDRAIL ANCHOR UNITS, TYPE M-350:

(4-20-04)

M8 R60

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 following guardrail anchor units.

The guardrail anchor unit (SRT-350) as manufactured by:

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

The guardrail anchor unit (FLEAT) as manufactured by:

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

The guardrail anchor unit (REGENT) as manufactured by:

Energy Absorption Systems, Inc.
One East Wacker Drive
Chicago, Illinois 60601-2076
Telephone: 888-32-ENERGY

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 Metric 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 shall be 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 Article 862-6 of the *2006 Metric Standard Specifications*.

Payment will be made under:

| Pay Item | Pay Unit |
|------------------------------------|-----------------|
| Guardrail Anchor Units, Type M-350 | Each |

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 |

CABLE GUIDERAIL POSTS:

(12-19-06)

M8 R69

Revise the *2006 Metric Standard Specifications* as follows:

Page 8-42, Article 865-1 Description, add the following as the second sentence of the first paragraph:

Install additional double faced cable guiderail posts without cable at median hazards as shown in *2006 Metric Roadway Standard Drawing* No. 865.01 (Sheet 1 of 12)

Page 8-42, Article 865-2 Materials, add the following as the last paragraph:

Additional guiderail posts shall be double faced guiderail intermediate posts.

Page 8-43, Article 865-4 Measurement and Payment, add the following as the fourth paragraph:

Additional Guiderail Posts will be measured and paid for in units of each that have been completed and accepted.

Add the following pay item:

| Pay Item | Pay Unit |
|----------------------------|-----------------|
| Additional Guiderail Posts | 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

PREFORMED SCOUR HOLE WITH LEVEL SPREADER APRON:
(10-15-02) (Rev 6-17-08)

M8 R105

Description

Construct and maintain preformed scour holes with spreader aprons at the locations shown on the plans and in accordance with the details in the plans. Work includes excavation, shaping and maintaining the hole and apron, furnishing and placing filter fabric, rip rap (class as specified in the plans) and permanent soil reinforcement matting.

Materials

| Item | Section |
|---------------|----------------|
| Plain Rip Rap | 1042 |
| Filter Fabric | 1056 |

The permanent soil reinforcement matting shall be permanent erosion control reinforcement mat and shall be constructed of 100% coconut fiber stitch bonded between a heavy duty UV stabilized cusped (crimped) netting overlaid with a heavy duty UV stabilized top net. The

three nettings shall be stitched together on 38 mm centers UV stabilized polyester thread to form a permanent three dimensional structure. The mat shall have the following physical properties:

| <i>Property</i> | <i>Test Method</i> | <i>Value Unit</i> |
|--|--------------------|--------------------------|
| Light Penetration | ASTM D6567 | 15 % |
| Thickness | ASTM D6525 | 13 mm |
| Mass Per Unit Area | ASTM D6566 | 0.339 kg/m ² |
| Tensile Strength | ASTM D6818 | 572 kg/m |
| Elongation (Maximum) | ASTM D6818 | 49 % |
| Resiliency | ASTM D6524 | > 70 % |
| UV Stability* | ASTM D4355 | ≥80 % |
| Porosity (Permanent Net) | Calculated | ≥85 % |
| Minimum Filament | Measured | 0.76 mm |
| Maximum Permissible Shear Stress (Vegetated) | Performance Test | ≥ 39.1 kg/m ² |
| Maximum Allowable Velocity | Performance Test | ≥ 4.9 m/s |

*ASTM D1682 Tensile Strength and % strength retention of material after 1000 hours of exposure.

Submit a certification from the manufacturer showing:

- (A) the chemical and physical properties of the mat used, and
- (B) conformance of the mat with this specification

Soil Preparation

All areas to be protected with the mat shall be brought to final grade and seeded in accordance with Section 1660. The surface of the soil shall be smooth, firm, stable and free of rocks, clods, roots or other obstructions that would prevent the mat from lying in direct contact with the soil surface. Areas where the mat is to be placed will not need to be mulched.

Measurement and Payment

Preformed Scour Holes with Level Spreader Aprons will be measured and paid as the actual number that has been incorporated into the completed and accepted work. Such price and payment will be full compensation for all work covered by this provision.

Payment will be made under:

| Pay Item | Pay Unit |
|---|-----------------|
| Preformed Scour Hole with Level Spreader Aprons | Each |

STEEL U-CHANNEL POSTS:

(7-18-06)

M9 R02

Revise the *2006 Metric Standard Specifications* as follows:

Page 9-12 Subarticle 903-3(D) first paragraph, last sentence, delete the last sentence and add the following:

Use posts of sufficient length to permit the appropriate sign mounting height. Spliced posts are not permitted on new construction.

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/quarryasrprob.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 |

PRECAST DRAINAGE STRUCTURES - MACRO-SYNTHETIC FIBERS

(7-15-08)(Rev 11-18-08)

SP 10 R42

Description

Substitute as an option, macro-synthetic fibers in lieu of 100 mm x 100 mm W1.4 x W1.4 welded wire fabric reinforcement for selected precast concrete products in accordance with the following requirements.

Materials

Item

Section

Portland Cement Concrete

1077-5

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

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

- (2) **Precast Manhole 1.2 Meter' 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.

- (B) **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:

(C) **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.

(D) **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 pounds of fibers per cubic yard, 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 2.97 kg/m³ 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.

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.

77-C

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.