RAILROAD SPECIAL PROVISIONS FOR ROADBED

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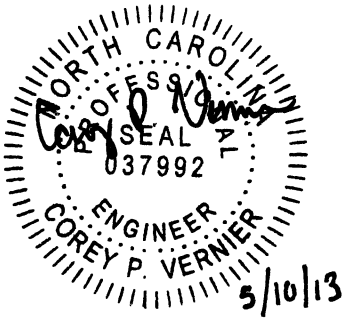
RAILROAD ROADBED



RAILROAD ROADBED

The Standard Specifications for Roads and Structures, January 2012 of the North Carolina Department of Transportation, hereinafter referred to as the Standard Specifications, shall apply to the articles of the Project Special Provisions.

CLEARING AND GRUBBING:

The work shall be performed in accordance with Section 200, "Clearing and Grubbing", of the Standard Specifications, except that grubbing will be performed on all cleared excavation and embankment areas and will include all stumps, roots and other embedded debris. All debris from the clearing and grubbing operations, including stumps and roots, shall be disposed of at an existing public disposal site currently permitted by NCDENR.

OWNERSHIP OF MATERIALS

All salvaged material originally furnished by the Department's Contractor shall remain the property of the Contractor, and he shall give consideration to this when making his bid. All salvaged track materials owned by the Department's Contractor shall be disposed of by the Contractor, and the construction area shall be left in a neat and orderly condition.

All salvaged track material either existing or furnished by NSR is and shall remain the property of the NSR except as noted in the track to be removed section of the special provisions.

EXCAVATION

This work shall be performed in accordance with Section 225, "ROADWAY EXCAVATION" of the Standard Specifications. The applicable typical roadbed template will be maintained throughout the railway portion of the project.

Material excavated within the proximities of existing track(s), as defined in the table below, shall be used in embankment within the railroad right of way. Any of this material that is not used in construction of the project shall be disposed of within the railroad right of way within the project limits, and the contractor shall submit, to the Engineer for approval, a plan showing locations and methods of placement for this disposal.

The limits where this requirement applies are:

Begin Station	End Station	Left Limit	Right Limit
7571+81	7581+00	33' LT of Centerline Existing Main Track(s)	33' RT of Centerline Existing Main Track(s)
7580+00	7782+00	33' LT of Centerline Existing Main Track	20' RT of Centerline Existing Main Track
7782+00	7796+61	33' LT of Centerline Existing Spur Track	33' RT of Centerline Existing Spur Track

Revised 6-11-13

WELDED STEEL PIPE:

330-1 DESCRIPTION

This work shall consist of furnishing and installing welded steel pipe by trenchless methods as shown in the contract, plans and as directed.

330-2 MATERIALS

Refer to Division 10.

Item	**Section**
Welded Steel Pipe	1032-5

Use suppliers of metal pipe culverts, fittings and all other accessories covered by this section that meet the Department's Brand Certification program requirements for metal pipe culverts and are listed on the Materials and Tests Unit's pre-approved list for suppliers of metal pipe culvert. The pre-approved list is available on the Department's website

330-3 PIPE INSTALLATION

Replace section 330-3 of the 2012 Standard Specifications with the following:

The pipe shall be installed by dry boring and jacking under the tracks as shown in the plans. The pipe shall be carefully dry bored true to the line and grade given. The bore shall be held to a minimum to insure that there will be no settlement. All voids around the outside of the pipe shall be completely filled to the satisfaction of the Engineer.

The Contractor shall submit to the Railroad Engineer and the NCDOT Engineer a complete plan and schedule for pipe installation 2 weeks prior to the expected commencement of work. The submission shall include complete details of the sheeting, shoring and bracing for the protection of Railroad roadbed, materials and equipment pertinent to the operation. The Contractor shall not proceed with the pipe installation until he has received acceptance of the plan and schedule from the Railroad Engineer and the NCDOT Engineer.

Conduct a pre-construction meeting in the presence of the Railroad Engineer and the Engineer at least 48 hours before the beginning of the pipe installation to discuss the method of installation to assure the pipe is installed true to line and grade. The methods that will be used to insure there is no settlement of the pipe or the railroad roadbed section above the pipe.

All work shall be done with a RWIC/flagman on site and the work shall be performed during allowable work periods. Work shall stop when a train is passing. The Contractor shall have no claim against the Railroad or the Department for any delays caused by NSR's train operations.

The boring operation shall be progressed without stoppage (except for adding lengths of pipe) during daylight hours until the leading edge of the pipe has reached the receiving pit. The contractor shall plan his work to complete the boring between the influence lines of the track structure without stoppage. For the purpose of this provision, the influence line shall be defined as a 1:1 slope extending away from the track, from the bottom edge of tie. The contractor shall shore the leading end of the pipe when stopping work and shall continue the boring operation the morning of the next day. The installation

shall be carried on without interruption, insofar as practicable, to prevent the pipe from becoming firmly set in the embankment.

The front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger from leading the pipe so that no unsupported excavation is ahead of the pipe.

The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered. If the obstruction cannot be removed without excavation in advance of the pipe, the pipe shall be abandoned in place and immediately filled with grout. A new installation procedure and revised plans must be submitted to, and approved by, the Engineering Representative before work can resume.

The over-cut by the cutting head shall not exceed the outside diameter of the pipe by more than 1/2 inch. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe by more than 1 inch, the voids shall be pressure grouted.

When boring and jacking pipe 36 inches and larger in diameter and the boring is halted within a distance less than 20 feet to the centerline of track, the heading shall be shored and braced if the track is active.

Any pipe damaged during the operation shall be removed and replaced by the Contractor at his expense.

The pits or trenches excavated to facilitate the pipe installation shall be backfilled immediately after the installation has been completed.

330-4 MEASUREMENT AND PAYMENT

__" *Welded Steel Pipe,* __" *Thick, Grade B in Soil* will be measured and paid as the actual number of linear feet of pipe measured along the flow line to the nearest foot, which has been installed in soil.

__" *Welded Steel Pipe,* __" *Thick, Grade B Not in Soil* will be measured and paid as the actual number of linear feet of pipe measured along the flow line to the nearest foot which has been installed in non-soil, as observed and confirmed by the Engineer. Non-soil is defined as all material other than soil. The Contractor shall request and obtain the Engineer's observation and confirmation of the limits of the installation not in soil before and during the installation of the pipe or portion of the pipe not in soil.

Failure of the Contractor to request and obtain the Engineer's observation and confirmation of the limits of the pipe not in soil before and during the installation will result in the payment at the unit price for " *Welded Steel Pipe,* " *Thick, Grade B Not in Soil.*

Such payment will include, but is not limited to, furnishing all labor, tools, equipment, materials and incidentals, miscellaneous grading or excavation necessary to complete the work.

Installations that become damaged or are abandoned will be replaced at no cost to the Department.

Payment will be made under:

Pay Item	**Pay Unit**
__" Welded Steel Pipe, __" Thick, Grade B in Soil	Linear Foot
__" Welded Steel Pipe, __" Thick, Grade B Not in Soil	Linear Foot

WELDED STEEL PIPE (Open Cut):

330-1 CRIPTION

This work shall consist of furnishing and installing welded steel pipe in accordance with Section 300 of the 2012 NCDOT Standard Specifications as shown in the contract, plans and as directed.

330-2 MATERIALS

Refer to Division 10.

Item		**Section**
Welded	Steel	Pipe 1032-5

Use suppliers of metal pipe culverts, fittings and all other accessories covered by this section that meet the Department's Brand Certification program requirements for metal pipe culverts and are listed on the Materials and Tests Unit's pre-approved list for suppliers of metal pipe culvert. The pre-approved list is available on the Department's website

330-3 PIPE INSTALLATION

The pipe shall be installed in accordance with Section 300 of the 2012 NCDOT Standard Specifications.

330-4 MEASUREMENT AND PAYMENT

__" *Welded Steel Pipe,* __" *Thick, Grade B (Open Cut)* will be measured and paid as the actual number of linear feet of pipe measured along the flow line to the nearest foot.

Such payment will include, but is not limited to, furnishing all labor, tools, equipment, materials and incidentals, miscellaneous grading or excavation necessary to complete the work. Installations that become damaged or are abandoned will be replaced at no cost to the Department.

Payment will be made under:

Pay Item	**Pay Unit**
__" Welded Steel Pipe, " Thick, Grade B (Open Cut)	Linear Foot

REMOVE EXISTING HEADWALLS (Special)

Description

The contractor shall remove existing headwalls at locations shown on the plans.

Construction Methods

The contractor shall remove and dispose of existing headwalls at locations shown on the plans after the pipes they are attached to are abandoned and filled with flowable fill in accordance with the Standard Specifications.

Measurement and Payment

Remove Existing Headwalls will be paid for in accordance with Section 226, Grading, of the Standard Specifications.

Pay Item	Pay Unit
Grading	Lump Sum (LS)

EMBANKMENT

This work shall be performed in accordance with Section 235,"EMBANKMENTS", of the Standard Specifications including the following:

All earth fills shall be made in uniform layers of not more than 6 inches thick after compaction. Rock may be placed in compacted layers of not more than 24 inches thick. Each fully compacted layer shall extend the full width of the cross section. Each layer shall be free from mud, snow, ice, or excessive (standing) water before a subsequent layer is placed.

Sandy or rocky material shall be spread in full width layers to form drainage planes from the center through the edge of the embankment. Pockets of open materials surrounded by more impervious material shall be avoided.

The fills shall be formed with suitable materials from on-site cuts and/or necessary suitable material from borrow pits. Organic material such as brush, stumps, roots and trees or other perishable items shall not be placed in embankments. Coal or organic shale shall not be included in the embankment. Bituminous material shall not be used in railroad embankment. In fill sections, after stripping the topsoil and organic material, the entire area which the embankment is to be placed shall be plowed and scarified for a minimum depth of 6 inches.

The initial lift and all future fill layers shall be compacted to 95 percent of maximum density per Standard Proctor in accordance with ASTM D698-T and AASHTO T 99, or 90 percent of maximum density per Modified Proctor in accordance with ASTM

D-1557AASHTO T180, except that a minimum of the top **2 feet of fill shall be compacted to 100 percent Standard Proctor.**

The top 12 inches of the subgrade in all cut sections that will be cut to subgrade elevation shall be plowed, scarified and compacted to 100 percent Standard Proctor. The Engineer shall determine the AASHTO test method to be used after review of the soil analysis.

The Contractor shall notify the Engineer of when fill layers are ready for compaction testing. Successive layers shall not be placed prior to an acceptable density being obtained on each layer. The moisture content of the soil shall be controlled as necessary to obtain the specified densities based upon the optimum moisture content for each material. Water shall be added to the soil when, in the opinion of the Engineer, additional moisture may be necessary to obtain the specified density. Soil that is too wet shall be allowed to dry or be worked by plowing, discing, harrowing, or other means to dry the material to a workable moisture content.

In the event a specified density is not obtained, the Engineer may order additional rolling, watering, or drying of the soil as necessary to obtain the specified density. Fill layers not meeting a specified density after additional working shall be removed and new material shall be placed and compacted to the specified density at no cost to the Department.

The Contractor may be restricted from using partial or completed roadbed as construction haul roads. Any embankment or roadbed that is damaged by hauling activities shall be repaired by the Contractor at no cost to the Department.

BITUMINOUS COATED CORRUGATED METAL PIPE (BCCMP) (Special)

DESCRIPTION

Furnish and install drainage pipe at locations and size called for in the contract documents. The work includes construction of joints and connections to other pipes, endwalls and drainage structures.

MATERIALS

Corrugated Steel Pipe

Corrugated steel culvert pipe and pipe arch shall meet ASTM A760, Type 1 pipe.

Corrugations shall be annular riveted with a profile of 2-2/3 inches x ½ inch unless otherwise specified.

Bituminous coating shall be applied to the inner and outer surfaces of the pipe and conform to

the requirements of AASHTO M 190, Type A.

Coupling bands shall be one or two piece annular corrugated, made from galvanized steel and fully bituminous coated, with a minimum width of 24 inches. Bands may be one gage lighter that the pipe gage. Bands shall be made of steel sheet conforming to ASTM Specification A 525 and AASHTO Designation M 218. Dimple band couplers shall not be used.

Coupling bands shall be fastened using a minimum of three (3) ½ inch diameter galvanized bolts. Culverts 48 inches and larger require 24 inch wide bands with a minimum of four (4) ½ inch diameter rods and "silo" type lugs.

Acceptance
Acceptance of corrugated steel culvert pipe and its accessories will be based on, but not limited to, visual inspections, classification requirements and check samples taken from material delivered to the project and conformance to the annual Brand Registration. Culvert pipe materials not meeting the above requirements will be rejected, unless written approval is obtained from the State Materials Engineer.

310-3 PIPE INSTALLATION

Install pipe, pipe tees and elbows according to Section 300 of NCDOT Standard Specifications including the following:
BCCMP with a diameter of 42 inches or larger shall be field strutted (if not manufacturer strutted). Ties and struts shall be removed by the Contractor upon completion of the embankment.

The Contractor shall submit to the Railroad Engineer and the NCDOT Engineer a complete plan and schedule for pipe installation 2 weeks prior to the expected commencement of work. The submission shall include complete details of the proposed inlet and outlet invert elevations and locations as fit to field conditions, bracing for the protection of Railroad roadbed, materials and equipment pertinent to the operation. The Contractor shall not proceed with the pipe installation until he has received acceptance of the plan and schedule from the Railroad Engineer and the NCDOT Engineer.

Where BCCMP has to be cut to achieve the proper length, such cutting shall be done with an abrasive saw so as to prevent damage to the pipe coating. Flame cutting shall not be permitted. Damage to the shop coating by this or any other work shall be field repaired by the Contractor by using asphalt paint. Repairs shall be at no cost to the Department or the Railroad.

310-6 MEASUREMENT AND PAYMENT

Pipe will be measured and paid as the actual number of linear feet of pipe that has been incorporated into the completed and accepted work. Measurement of pipe will be made by counting the number of joints used and multiplying by the length of the joint to obtain the number of linear feet of pipe installed and accepted. Measurements of partial joints will be made along the longest length of the partial joint to the nearest 0.1 ft. Select bedding and backfill material will be included in the cost of the installed pipe.

Payment will be made under:

Pay Item	**Pay Unit**
__" B.C.C.M.P. Pipe Culverts, " Thick	Linear Foot

SUB-BALLAST **(Special)**

Description

The Contractor will furnish and place sub-ballast as shown in the plans. The sub-ballast shall be placed after the subgrade has been graded, compacted and accepted.

Materials

The sub-ballast shall be composed of crusher-run, meeting the following requirements and the gradation shown in Table 1:

- Sub ballast shall be produced from sound rock meeting the gradations shown in the table 1 (AASHTO T 27 and T 11, AASHTO T 88 as modified for Base Course and Stabilizer).
- The material shall be free from organics and deleterious material (AASHTO T 112).
- The material shall not have a Liquid Limit (LL) in excess of 25 (AASHTO T 89) or a Plasticity Index (PI) in excess of 6 (AASHTO T 90).
- The material shall have a percentage of wear (LA Abrasion, AASHTO T 96) no greater than 50 percent.
- The material shall meet NCDOT's soundness requirements (AASHTO T 104).

	Percent Passing Standard Sieve Size by Weight					
Sieve Size	2"	1"	3/8"	#10	#40	#200
Sub-ballast	100	90-100	50-84	26-50	12-30	5-12

Table 1 **Sub-ballast**

Construction Methods

After the subgrade has been finished to proper grade and cross-section, the sub-ballast shall be placed on the subgrade with a mechanical spreader capable of placing the material in a uniform loose depth and without segregation, except for areas inaccessible to a mechanical spreader. The aggregate material may be placed by other methods approved by the Engineer. The sub-ballast section shall be constructed in two layers of equal thickness. Each layer of sub-ballast shall be fully compacted in lifts not to exceed 6" in thickness after compaction. Each layer of sub-ballast shall be compacted to a density of 100% of the Standard Proctor determined by AASHTO T 180 and maintained to the required cross-section during compaction. Moisture content shall be maintained within 2% +/- of optimum moisture to obtain the desired density. Water shall be added to the material if necessary to obtain the desired density. If the material is to wet to obtain the desired density, the material shall be worked by discing, harrowing or other means to dry the material to a workable moisture content.

Measurement and Payment

The quantity for *Sub-Ballast* to be paid for will be the actual number of tons of sub-ballast which has been used to construct the track roadbed sections, measured as provided for in Article 520-11 of the Standard Specifications. Such price and payment will be full compensation for all furnishing, weighing, hauling, and placing of sub-ballast and for any other work necessary for the construction of the track roadbed section.

Pay Item	**Pay Unit**
Sub-ballast	Ton

MAINTENANCE OF TRACK ROADBED
(Special)

The Contractor shall be responsible for the maintenance of the track roadbed during the construction period. Ditches and temporary pipes shall be provided and maintained as may be necessary to satisfactorily drain the sub-grade. Where previously approved sub-grade is damaged by natural causes, by hauling equipment or other traffic the Contractor shall restore the sub-grade to the required lines, grades and typical sections and to the required density at no additional cost to the Department. There will be no direct payment for maintenance of the track roadbed. All cost associated with maintaining the track roadbed will be incidental to other items of work.

RAILROAD TRACK TO BE REMOVED **(Special)**

The Department's Contractor shall remove the existing main track as shown in the plans and dispose of the materials appropriately in accordance with local regulations.

Description

Furnish the labor, materials, tools and equipment necessary to remove the existing track which includes the rail, crossties, tie plates, anchors, spikes and disposal of the materials.

Ownership of Material

All salvaged material from the removal of the existing main track shall remain the property of the Department's Contractor except for the wooden cross ties. The cross ties will remain the property of NSR and shall be removed and neatly stacked at a location directed by the Railroad Engineer. The contractor shall give consideration to the salvage value of the materials when making his bid.

Measurement and Payment

Railroad Track to be Removed will be measured and paid for the actual number of track feet of track which is acceptably removed, measured between the rails along the center line

of the track prior to the track being removed.

Payment will be made under:

Pay Item	Pay Unit
Railroad Track to be Removed	TF

TEMPORARY ROADBED STABILIZATION

Description

The contractor shall temporarily stabilize the existing railroad roadbed with additional sub-ballast while excavating adjacent to the existing track from station 7736+08 to station 7745+96 left as shown in the plans. The sub-ballast shall be placed in two equal lifts and each lift compacted at the direction of the engineer. The allowable length of existing railroad roadbed left unsupported during excavation work shall be at the discretion of the Norfolk Southern representative.

MEASUREMENT AND PAYMENT

The additional sub-ballast needed to stabilize the existing railroad roadbed will be measured and paid at the contract unit price per ton for sub-ballast in accordance with the Contract Special Provisions for sub-ballast.

Pay Item	Pay Unit
Sub-ballast	Tons

EMBANKMENT STABILIZATION (Station 7663+25 to Station 7673+15)

DESCRIPTION

Construct the rock embankment from Station 7663+25 +/- to 7673+15 +/- in accordance with Section 235 of the 2012 Standard Specifications, to conform to the lines, grades and typical cross section shown in the plans. Work includes preparation, formation, compaction and maintenance of the embankment area.

MATERIALS

Refer to Division 10 of the 2012 Standard Specifications.

Section	Section
Rip Rap, Class B	1042
# 57 Stone	1016
Select Granular Material, Class III	1016
Geotextile for Soil Stabilization	1056

The Geotextile shall be a type 4, meeting the requirements and specifications in accordance with Section 1056 of the 2012 Standard Specifications. The contractor shall use a material on the NCDOT approved products list.

CONSTRUCTION METHODS

Select Granular Material, Class III shall meet the requirements of Section 265 of the *Standard Specifications* for Select Material, Class III.

Rip Rap, Class B shall be placed by either back dumping or using a piece of equipment with a large bucket capable of placing the rip rap without entering the water in the inundated, unstable area shown on the plans. The initial lift shall be placed to an elevation approximately 6" above the water level. The contractor shall compact the rip rap with a large vibratory compactor (84" drum minimum) and 8 – 10 tons (or heavier). The compactor shall be used in the vibratory mode to make minimum of 6 complete passes or as required by the Engineer. Subsequent lifts of rip rap shall be placed in a similar manner and compacted until a stable condition is achieved at an elevation 6" above the water level.

After completing the placement and compaction of the rip rap, a lift of # 57 stone shall be placed over the rip rap approximately 12" deep and compacted with the 8-10 ton compactor making a minimum of 4 passes in the vibratory mode or to the satisfaction of the Engineer. Subsequent layers of #57 stone shall be placed and compacted until a stable condition is achieved at an elevation 12" above the top of the rip rap.

Place the geotextile on top of the # 57 stone layer before placing the Select Granular Material, Class III.

Grade the surface of the #57 stone to lines and grades shown on the plans, unless otherwise directed by the Engineer prior to placing the geotextile materials. The surface must be free of obstructions, debris, and large voids within the #57 stone. Do not leave geotextiles exposed for more than 7 days before covering geotextiles with backfill material.

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

Place geotextiles on surfaces free of obstructions, debris and soft pockets. Install geotextiles with the long dimension parallel to the roadway centerline. Overlap adjacent geotextiles at least 18" unless otherwise directed to sew seams together. Overlap geotextiles in the direction that material will be placed to prevent lifting the edge of the top geotextile. Overlap the previous fabric layer by a minimum of 12 inches. Where a layer of fabric becomes discontinuous, such as at the end of a roll, a minimum overlap of 12 inches is required with the upper fabric placed over the lower fabric. Lay the fabric smooth and free from tension, stress, folds, wrinkles, or creases. Use wire staples as needed to hold the fabric in place until it is covered with fill material. In the event fabric is displaced or damaged, reposition or replace the fabric at no additional cost to the Department.

Place geotextiles in slight tension free of kinks, folds, wrinkles or creases. Use wire staples or

anchor pins, as needed, to hold geotextiles in place until covered. Provide select granular material, Class III in accordance with the contract. Do not operate equipment on geotextiles until covered with material as directed. Do not use vibratory compaction equipment on initial lifts of backfill.

Place the select granular material, Class III in a 12 inch lift and compact with an 8-10 ton roller used in the static condition and compact it to the satisfaction of the Engineer.

Upon placing and compacting the select granular material, Class III continue to build the embankment in accordance with Section 235 of the 2012 Standard Specifications up through and including subgrade.

MEASUREMENT AND PAYMENT:

Rip Rap, Class B will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

#57 Stone will be measured and paid for in accordance with the Special Provision found elsewhere in the contract documents.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

Select Granular Material, Class III will be measured by in place measurement in accordance with Article 230-5 or by weighing material in trucks in accordance with Article 106-7 as determined by the Engineer. When select granular material is weighed in trucks, a unit weight of 135 lb/cf will be used to convert the weight of select granular material to cubic yards. At the Engineer's discretion, truck measurement in accordance with Article 230-5 may be used instead of weighing material in trucks.

The contract unit prices for *Select Granular Material, Class III* as described above will be full compensation for providing, transporting, handling, placing, compacting and maintaining select granular material.

The quantity of Select Granular Material, Class III to be paid for will be the actual number of cubic yards, which has been incorporated into the completed and accepted work. The material will be measured by weighing in trucks on certified platform scales or other certified weighing devices or by methods approved by the Engineer.

PAY ITEM:	**Pay Unit**
Select Granular Material, Class III	Cubic Yard

Project: *TIP C-4901A*

County: Davidson

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SUBSURFACE DRAIN

DESCRIPTION

Construct and install sub-surface drains, outlet pipes and concrete pads for outlet pipes, in accordance with the detail drawing in the plans and requirements of the contract.

MATERIALS

Refer to Division 10 of the 2012 NCDOT Standard Specifications

Item	Section
Shoulder Drain Aggregate, No. 57 Stone	1005
HDPE Subsurface Drain Pipe, Type S	1044-8
HDPE Outlet Pipe, Type S	1044-8
Geotextile for Subsurface Drains, Type 1	1056
Portland Cement Concrete, Class AA	1000

Material for the subsurface drain pipe and fittings shall be perforated 6" HDPE meeting AASHTO M 294, Type S.

CONSTRUCTION METHODS

Place and compact the sub-ballast in accordance with the plans and place and compact the 6" asphalt underlayment (where applicable) as shown on the plans. After placing the asphalt underlayment (where applicable), install the subsurface drain in accordance with the plans.

Excavate the trench to the width shown on the plans, and to the depth, line and grade established by the Engineer.

Place the geotextile in accordance with the detail in the plans. Do not leave fabric uncovered for more than 7 days. Install geotextile such that all splice joints are provided with a minimum overlap of 2 feet. Overlap the closure at the top of the trench at least 6 " and secure with mechanical ties. Where outlet pipe passes through the fabric, wrap a separate piece of fabric around the outlet pipe, flare against the side of the filled drain, and secure with anchor pins.

Anchor field splices of geotextile with anchor pins to ensure that required overlap is maintained.

Place 3" of the No. 57 stone as shown in the detail in the plans. Lay perforated pipe with the perforations down. Perform the remainder of the aggregate placement operations to prevent damage to the geotextile and pipe. Replace damaged sections of geotextile and pipe at no cost to the Department.

Outlet pipe shall meet the requirements of Article 1044-8. Connect the HDPE pipe with watertight neoprene connectors that are suitable for gravity flow conditions. Obtain approval for all pipe fittings from the Engineer prior to delivery. Protect the open end of all outlet pipes with a galvanized rodent screen.

Install outlet fittings and outlet pipes every 500' or as otherwise directed by the Engineer. Establish positive drainage within 72 hours of beginning trenching for installation of a given section of aggregate subsurface drain /shoulder drain. Failure to comply with this requirement may result in the Engineer restricting installation of additional sections of aggregate subsurface drain /shoulder drain until such time as the Contractor completes appropriate outlet installations.

Compact the aggregate to a degree acceptable to the Engineer by the use of a vibratory compactor before making the geotextile closure at the top of the trench.
Carefully place the No. 57 stone backfill material after the pipe has been laid and the geotextile is closed at the top, so that the pipe will not be disturbed by the backfilling operation. Compact the remainder of the backfill material (No. 57) stone to a degree acceptable to the Engineer by the use of a vibratory compactor.

Connect the outlet pipes to concrete pads at the outlet end of the subsurface drain. Construct the concrete pad in accordance with Section 825 and give an ordinary surface finish. Use Class AA concrete.

MEASUREMENT AND PAYMENT

Subsurface Drain will be measured and paid as the actual number of linear feet that has been completed and accepted, measured to the nearest foot along the centerline of the completed subsurface drain pipe. No measurement will be made along the outlet pipe.

Such price and payment includes, but is not limited to, furnishing, hauling, and placing all subsurface drain pipe, fittings, aggregate, geotextile, and other materials; making all joint connections and all excavation and backfilling.

Subdrain Pipe Outlet and *6" Outlet Pipe* will be measured and paid for in accordance with Article 815-4 of the *Standard Specifications*.
Payment will be made under:

Pay Item	**Pay Unit**
Subsurface Drain	Linear Foot

ENDWALLS

The work shall be performed in accordance with Section 838, "Endwalls", of the Standard Specifications, except that the contractor shall not use Class B concrete or masonry to construct plain or reinforced endwalls located on the railroad right-of-way. All endwalls on the railroad right-of-way, cast-in-place or precast, shall be constructed of Class AA concrete.

ARTICULATING CONCRETE BLOCK

DESCRIPTION

Construct and install articulating concrete block mat in accordance with the detail drawing in the plans and requirements of the contract.

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MATERIAL S

Refer to Division 10 of the 2012 NCDOT Standard Specifications

Item	Section
Geotextile for Drainage, Type 2	1056
Seed	1060-4

The articulating concrete block material shall be ARMORFLEX® Class 70 as manufactured by ARMORTEC, SHORELOC® as manufactured by SHORETEC, L.L.C., or an approved equal.

CONST RUCTI ON METHOD S

Areas on which filter fabric and articulating concrete blocks are to be placed shall be constructed to the lines and grades shown on the plans. The subgrade for the articulating concrete blocks shall be free of voids, pits, or depressions and shall be compacted to 90% of the ASTM D 698 density. All obstructions, such as roots and projecting stones larger than one (1) inch remaining on the surface shall be removed and all of the soft or low density pockets of material removed must be filled with selected material and compacted to a minimum of 90% of the ASTM D 698 density. Excavation and preparation of embedment trenches shall be done in accordance to the lines, grades and dimensions shown in the plans.

Place the geotextile in accordance with the detail in the plans. Do not leave geotextile uncovered for more than 7 days. Install geotextile such that all splice joints are provided with a minimum overlap of 2 feet and secure with anchor pins.

The articulating concrete blocks shall be placed within the limits shown on the plans in such a manner as to produce a relatively planar surface. No overlapping of blocks will be accepted and no blocks shall project vertically more than one (1) inch beyond the adjacent blocks.

The voids of the articulating concrete blocks, for the limits shown on the plans, shall be filled with topsoil. The topsoil shall then be seeded in accordance with Section 1660 "Seeding and Mulching", of the Standard Specifications.

MEASUREMENT AND PAYMENT

Articulating Concrete Block will be measured and paid as the actual number of square yards that has been completed and accepted.

Such price and payment includes, but is not limited to, furnishing, hauling, and placing all concrete block, topsoil, seed, and other materials; making all joint connections and all excavation and backfilling.

Geotextile for Drainage will be measured and paid for in accordance with article 876-4 of the *Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
Articulating Concrete Block	Square Yard