

Permit Information for Proposed Directional Bore

AT&T Project Number	A025BR6
Project Name:	CCR PH 1 I-26 STA 407-438 Relocation
Project / Bore Location:	I-26 STA 407-409; STA 429-438
Proposed Installation Date:	03/30/2022
Proposed Boring Company:	ANSCO

SITE LAYOUT PLAN

Entry & Exit Points, Access Pit Locations, Equipment & Pipe Layout Areas, Existing
Utilities to be crossed, Depth of cover, R/W Lines, Controlled Access Lines,
Property Lines and/or Utility Easements

See
Attached
Drawings

BORING / DRILLING CRITERIA

Bore Length	1170	feet with	4	bore pits
Proposed Casing				
Specifications on Casing	n/a			
Pilot Hole Size	4"			
Pre-Ream Size	n/a			
Back-Ream Size	n/a			
Soil Type as Per USGS Map	CeC (Cecil Fine Sandy Loam)			
Theoretical Amount of Fluid to be Utilized	2,153 gallons (approx)			
Proposed Source of Fluid & pH Value	City of Columbia 7.10 pH			
Proposed Drilling Product To Be Utilized	Soda Ash, Bore-Gel, EZ-Mud and Con Det			

DRILLING EQUIPMENT

Proposed Drilling Machine	Vermeer D16X20 SERIES II / see attached spec. sheet
Proposed Tracking System	Vermeer Spot Detect 4 Computer
Proposed Mud Mixing System	Vermeer MX125
Electrical Strike Safety Package	Mounted on Boring Unit
Monitoring For Surface Movement	Visual Inspection, Prior to, During and After Process

CONTINGENCY PLAN IN CASE OF FAC-OUT OR DRILL HOLE FAILURE

Vacuum Unit will be utilized to cleanup Drilling Fluids as needed with Temporary repairs being made the day of occurrence. Permanent repairs will be made as per SCDOT Specifications.

TRAFFIC CONTROL

SCDOT work zone safety plans will be utilized for traffic control.	Yes, see attached sheet
Proposed Detour Routes	n/a for this bore
Assistance from Local Law Enforcement	emergency only
Assistance from SC Highway Patrol	emergency only

DISPOSAL OF DRILLING FLUIDS

Excess Fluids will be disposed on Private Property

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Boring Fluid Products Needed for Project: A025BR6

Soda Ash

0.25 to 0.5 lbs per 100 gallons of fresh water
Totals lbs needed: 5.38 10.764
Total 50lb bags needed:

Bore-Gel

10 to 20 lbs per 100 gallons of freshwater
Total lbs needed: 215.28 to 430.56
Total 50 lbs bags needed: 4.31 to 8.61

EZ-Mud

0.5 lbs per 100 gallons of of drilling fluid
Total lbs needed: 10.76
Total 14 lb pails needed: 0.8

Suggested Additives for Difficult Formations (clay)

Con Det

2 to 4 qts per 100 gallons of drilling fluid
Total qts needed: 43.06 to 50.42
Total 5 gallon Pails Needed: 2.2 to 2.5

Mixing Order for drilling fluid products

1. Soda Ash (add when filling water)
2. Bore-Gel
3. EZ-Mud (after drilling fluid has completely yielded)
4. Con Det (after polymer has been fully blended into the system)

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Boring Fluids Program

Project Number: **A025BR6**

Project Name: **CCR PH 1 I-26 STA 407-438 Relocation**

Soil Conditions: **CeC (Cecil**

Recycling Fluids: **NO**

Pilot Hole Fluid Requirements:

Gallons per Linear Foot Required: **1.84**
Total Volume Required: **2,153** gallons

Pre-Ream #1 Diameter: **Not Required**

Gallons per Linear Foot Required: **NA**
Total Volume Required for Pre-Ream #1: **NA**

Note: Multiply gallons per lineear foot by length of drill stem to get pumping requirements per drill stem.
Divide pumping volume requirements per drill stem by the mud pumping rate to get pull-back time in
minutes per drill stem.

Total Volume of Drilling fluids required: **2,153** gallons

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Pre-Bore Log for Directional Bore

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Boring Company: **ANSCO**

BORE / DRILLING INFORMATION

Final Bore Length 1170 feet with 4 bore pits
Pilot Hole Size 4"
Pre-Ream Size 1st n/a 2nd n/a 3rd n/a
Final Back-Ream Size n/a
Soil Type Encountered

BORE / DRILLING FLUID INFORMATION

Amount of Fluids Utilized 2,153 Gallons (approx)
Source of Fluid City of Columbia
Fluid pH Value 7.1
Drilling Fluid Products Utilized Soda Ash, Bore-Gel, Ez-Mud And Con-Det: see attached sheets
Drilling Fluid Composition see attached sheets
Drilling Fluid Viscosity n/a
Drilling Fluid Density n/a
Observed Fluid Pumping Rates

PRODUCT / CASING INSTALLED

Casing Installed 0
Product Installed Direct Boring of Cable 3/4" OD

DRILL ROD DEPTH LOG

rod	inches
1	
2	
3	
4	
5	
6	
7	
8	
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10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

rod	inches
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rod	inches
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Notes:

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CRITERIA TO ALLOW HORIZONTAL DIRECTIONAL DRILLING USING A CUTTING HEAD

This guideline is for perpendicular crossing of roadways and does not apply to utility installations that run parallel to the roadway within the Right-of-Way

All lines under pressure or transporting a hazardous material will require a steel casing or approved equal with vents installed at the Right-of-Way limits

A Performance Bond is required for a period of 5 years from the completion date of the installation to cover any roadway failures. The value of the bond shall be related to the pipe diameter installed and is shown in Table 1. Should the repairs exceed this amount then the utility company is still responsible for the cost of the repairs and no new permits shall be issued to the utility until the repair costs have been satisfied. The utility has the option to supply individual bonds, a yearly bond or have SCDOT named as an additional insurer on their general liability insurance.

Notify the Resident Maintenance Engineer for the county in which the work is to be done by fax or email 48 hours before performing the boring operation

Only perpendicular crossings will be allowed. Any other type crossing will be evaluated on a case by case basis for non controlled access roads only.

The permit application submittal must include at a minimum the following information:

Checklist (4 Pages)

1. Site layout plan, project schedule and company experience record
**SEE ATTACHED SKETCH FOR SITE LAYOUT.
ANSCO AND ASSOCIATES IS THE CONTRACTOR WITH
SEVERAL YEARS EXPERIENCE IN TELEPHONY
CONSTRUCTION AND YEARS EXPERIENCE WITH
DIRECTIONAL BORING. ANSCO IS TO ADHERE TO THE
SPECS OF SCDOT AND WILL ABIDE BY THE UTILITY
MANUAL RECENTLY RECEIVED BY DOT.
CONSTRUCTION TO COMMENCE ONCE PERMIT
APPROVAL IS RECEIVED WITH A 2-3 DAY START TO
FINISH SCHEDULE FOR EACH LOCATION.**

2. Location of entry and exit points, access pit locations, and equipment and pipe layout areas. **SEE ATTACHED SKETCH.**
3. Proposed drill path alignment (both horizontal and vertical) to include the lowest point of the roadway cross section
SEE ATTACHED SKETCH
4. Location and clearances of all existing utility crossings and structures
DATA WILL BE PROVIDED WITH AS-BUILTS. ALL EXISTING UTILITIES WILL BE LOCATED BY PUPS 72 HOURS PRIOR TO CONSTRUCTION START
5. Depth of cover over the casing SEE ATTACHED SKETCH
6. Soil analysis to a depth of five feet below the proposed drill elevation
SEE ATTACHED SOIL PROFILE PLAN FROM USDA WEBSITE
7. Supply the theoretical amount of drilling fluid to be used during the drilling operation (calculation based on drilling diameter and number of pre-reams)
APPROXIMATELY 2153 GALLONS
8. Supply data sheet showing the actual amount of drilling fluid used during the drilling operation
TO BE PROVIDED ON AS-BUILTS
9. Provide the source of the make up water for the drilling fluids
City of Columbia
10. Supply field pH and hardness reading for the make up water, drilling fluids on the data sheet each time new fluids are mixed
PROVIDED ON AS-BUILTS
11. On systems that recycle drilling fluids, complete testing logs shall be filled out to verify that the drilling fluids are being maintained in accordance with the original mix or to demonstrate the reason for changing the drilling fluid mix during the completion of the pull
PROVIDED ON AS-BUILTS
12. Length, product pipe diameter, pipe material, pipe wall thickness, and pipe ream diameter for proposed directional drill
SEE ATTACHED DATA SHEET FOR POLYPIPE
13. Detailed pipe calculations confirming ability of product pipe or casing pipe to withstand installation loads
SEE ATTACHED SHEET FOR POLYPIPE
14. Proposed and actual viscosity, density, and composition of drilling fluids whether they are bentonite or polymer based (based on soil analysis)
SEE ATTACHED SHEET FOR BAROID

15. Name of drilling fluids being used for boring (Company Name), Name of the field Representative (drilling fluids manufacturer) that will provide the technical support, fluids testing and recommendations as needed during the drilling and pulling phase
**BORE-GEL FROM BAROID IS THE FLUID TO BE USED.
SEE ATTACHED DATA SHEET FOR BAROID
FIELD REP IS JIM MABREY @ 281-871-4871**
16. Construction method including diameter of pilot hole, number. (Pre-reams only required when Railroad permit is req'd)
THERE WILL BE (1) 4" PILOT HOLE
17. Drilling fluid pumping capacity in gallons per minute (gpm), and gallons per rod (gpr), pressures, and flow rates proposed and actual pumping rates (rates may change as soil conditions and soil types change)
DRILLING FLUID PUMPING CAPACITY IS 25 GAL PER MIN AND 150 GAL PER ROD. MAXIMUM PRESSURE CAPACITY IS 1500 PSI.
18. Show all right-way-lines, controlled access lines, property lines and other utility right-of-way or easements
SEE ATTACHED SKETCH
19. Show all elevations
SEE ATTACHED SKETCH
20. Type and capacity of drilling machine to include the manufacturer, model number, thrust/pullback (in lbs.), maximum torque, drilling speed, drill pipe length, drilling distance and power source
DRILLING EQUIPMENT IS A D16x20 SERIES II (POWERED BY A 65 HP/48KW KUBOTA DIESEL ENGINE) GIVING YOU 2,000FT-LB/2,700 NM OF ROTATIONAL TORQUE AND 16,000 LBS/ 71 KN OF THRUST/ PULL BACK.
21. Type of tracking method/system, operation range and accuracy
SUB-SITE DIGITRAK MARK V SYSTEM WITH AN OPERATION RANGE OF 30' AND AN ACCURACY RATE OF +/- 1%.
22. Type and capacity of mud mixing system
13MM AT 500 GALLONS
23. A detailed plan for monitoring ground surface movement (settlement or heave) due to the drilling operation at the time of drilling and subsequent to the drilling operation being completed
MONITOR BORE PATH FROM BEGINNING TO END DURING AND AFTER BORE TO ENSURE NO DISTURBANCE
24. Contingency plan for frac-out or drilling hole failure
MILL 20' ON EITHER SIDE OF DISTURBANCES AND REPAVE ACCORDING TO SCDOT GUIDELINES

25. Traffic control plan when applicable

SEE ATTACHED PLAN

26. Disposal plan for spent drilling fluids, ie: (land farming, landfill, etc.)
27. Upon completion of the drilling operation supply accurate as built drawing within 30 days to the Resident Maintenance Engineer. The As-Built drawings must include the following information: Actual path alignment, depth of cover for the casing, actual length, product diameter, casing diameter, actual viscosity, density and composition of drilling fluid, actual fluid pumping capacity, pressure and flow rates, and all final elevations

BORING CONTRACTOR WILL PROVIDE UPON COMPLETION OF JOB

Confirm the drilling unit is equipped with an electrical strike safety package and a safety plan in the event of an electrical strike

ALL DRILLS ARE EQUIPPED WITH A STRIKE ALERT SYSTEM AND WORKERS EQUIPPED WITH SHOES AND GLOVES IN THE EVENT OF A STRIKE

The following Table details the recommended minimum depths below the lowest point on the road cross-section:

PERFORMANCE BOND AMOUNTS FOR DIFFERENT PIPE DIAMETERS

For pipes 2 inches to 6 inches in diameter the minimum cover shall be 6 feet. Performance Bond value \$10,000.
For pipes greater than 6 inches to 14 inches in diameter the minimum cover shall be 10 feet. Performance Bond value \$20,000.
For pipes greater than 14 inches to 24 inches in diameter the minimum cover shall be 15 feet. Performance Bond value \$40,000.
For pipes greater than 24 inches to 48 inches in diameter the minimum cover shall be 25 feet. Performance Bond value \$75,000.



United States
Department of
Agriculture

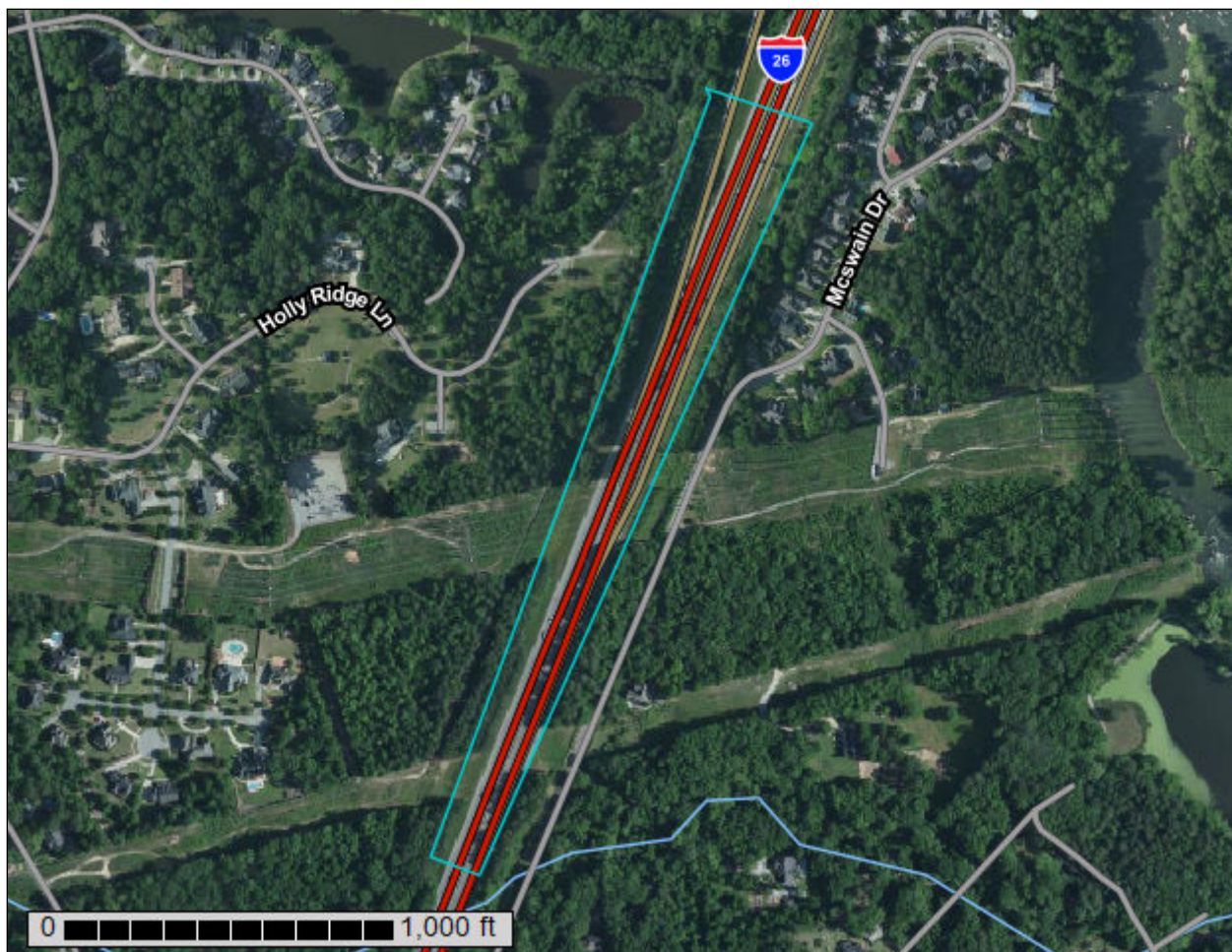
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Lexington County, South Carolina**

A025BR6 - CCR PH1 STA 407-438



September 8, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

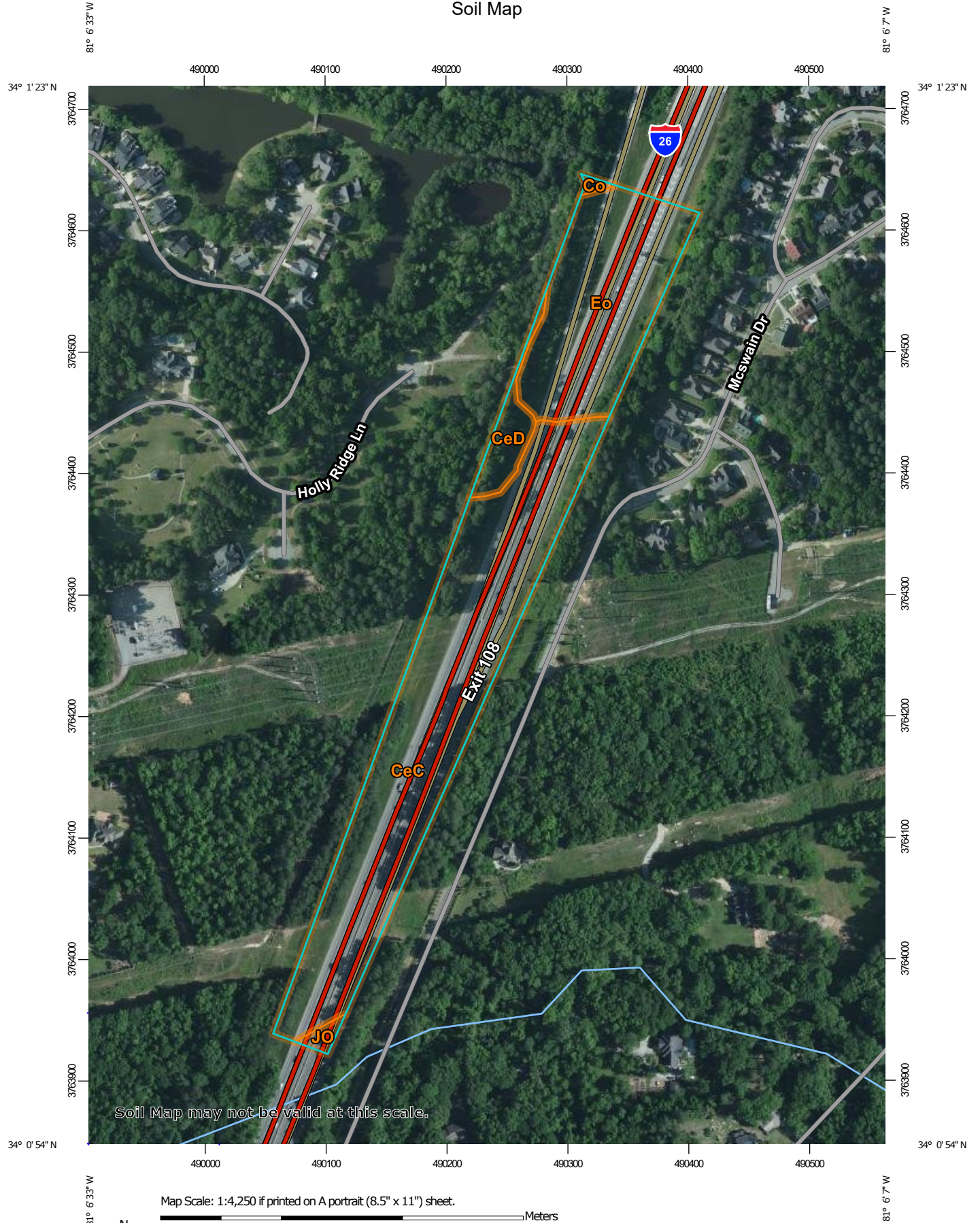
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


Custom Soil Resource Report Soil Map



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MAP LEGEND


Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip

 Sodic Spot


 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lexington County, South Carolina
Survey Area Data: Version 19, Jun 3, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 28, 2020—May 7, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CeC	Cecil fine sandy loam, 6 to 10 percent slopes	8.5	62.6%
CeD	Cecil fine sandy loam, 10 to 15 percent slopes	0.6	4.6%
Co	Congaree silt loam	0.1	0.4%
Eo	Enoree silt loam, 0 to 2 percent slopes, frequently flooded	4.3	31.4%
JO	Johnston soils	0.1	1.0%
Totals for Area of Interest		13.6	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lexington County, South Carolina

CeC—Cecil fine sandy loam, 6 to 10 percent slopes

Map Unit Setting

National map unit symbol: 4csj

Elevation: 200 to 600 feet

Mean annual precipitation: 26 to 74 inches

Mean annual air temperature: 50 to 73 degrees F

Frost-free period: 210 to 230 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Cecil and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cecil

Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Clayey residuum weathered from granite

Typical profile

Ap - 0 to 6 inches: fine sandy loam

BE - 6 to 8 inches: sandy clay loam

Bt1 - 8 to 43 inches: clay

Bt2 - 43 to 50 inches: clay loam

BC - 50 to 75 inches: sandy clay loam

Properties and qualities

Slope: 6 to 10 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Hydric soil rating: No

CeD—Cecil fine sandy loam, 10 to 15 percent slopes

Map Unit Setting

National map unit symbol: 4csk
Elevation: 200 to 600 feet
Mean annual precipitation: 26 to 74 inches
Mean annual air temperature: 50 to 73 degrees F
Frost-free period: 210 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Cecil and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cecil

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey residuum weathered from granite

Typical profile

Ap - 0 to 6 inches: fine sandy loam
BE - 6 to 8 inches: sandy clay loam
Bt1 - 8 to 43 inches: clay
Bt2 - 43 to 50 inches: clay loam
BC - 50 to 75 inches: sandy clay loam

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Co—Congaree silt loam

Map Unit Setting

National map unit symbol: 4csq

Elevation: 120 to 450 feet

Mean annual precipitation: 26 to 74 inches

Mean annual air temperature: 50 to 73 degrees F

Frost-free period: 210 to 230 days

Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Congaree and similar soils: 96 percent

Minor components: 4 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Congaree

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy alluvium

Typical profile

Ap - 0 to 7 inches: silt loam

A - 7 to 10 inches: silt loam

C1 - 10 to 24 inches: silt loam

C2 - 24 to 50 inches: sandy clay loam

C3 - 50 to 62 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: About 30 inches

Frequency of flooding: Occasional

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Enoree

Percent of map unit: 4 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Eo—Enoree silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2sclt
Elevation: 200 to 550 feet
Mean annual precipitation: 40 to 69 inches
Mean annual air temperature: 50 to 66 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Enoree, frequently flooded, and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Enoree, Frequently Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 4 inches: silt loam
Cg1 - 4 to 35 inches: sandy loam
Cg2 - 35 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: A/D

Hydric soil rating: Yes

Minor Components

Cartecay, frequently flooded

Percent of map unit: 5 percent

Landform: Flood plains

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Toccoa, frequently flooded

Percent of map unit: 3 percent

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Chewacla, frequently flooded

Percent of map unit: 3 percent

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Riverview, frequently flooded

Percent of map unit: 2 percent

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

JO—Johnston soils

Map Unit Setting

National map unit symbol: 4ct9

Elevation: 120 to 520 feet

Mean annual precipitation: 26 to 74 inches

Mean annual air temperature: 50 to 73 degrees F

Frost-free period: 210 to 230 days

Farmland classification: Not prime farmland

Map Unit Composition

Johnston and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Johnston

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy alluvium

Typical profile

A1 - 0 to 13 inches: mucky loam

A2 - 13 to 36 inches: mucky sandy loam

Cg - 36 to 70 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Runoff class: Negligible

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 5.95 in/hr)*

Depth to water table: About 0 to 1 inches

Frequency of flooding: FrequentNone

Frequency of ponding: Occasional

Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: A/D

Hydric soil rating: Yes

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PolyPipe® EHMW PE3608 Pipe



Extra High Molecular Weight (EHMW) High Density Polyethylene for use in industrial applications such as underground fire mains, mining, landfill, water reclamation or sewer.

➤ Other dimensional standards or custom requirements available.

TYPICAL PHYSICAL PROPERTIES			
PROPERTY	ASTM TEST METHOD	*NOMINAL VALUES	
		SI UNITS	ENGLISH UNITS
Density, Natural	D1505	0.946 gm/cc	--
Density, Black	D1505	0.955 gm/cc	--
Melt Index (190°C/2.16 kg)	D1238	0.07 gm/10 min.	--
Flow Rate (190°C/21.6 kg)	D1238	8.5 gm/10 min.	--
Tensile Strength @Ultimate	D638	34.5 MPa	5,000 psi
Tensile Strength @ Yield	D638	24.1 MPa	3,500 psi
Ultimate Elongation	D638	>800%	>800%
Flexural Modulus	D790	938 MPa	136,000 psi
2% Secant			
Environmental Stress Crack Resistance (ESCR)			
F ₀ , Condition C	D1693	>10,000 hrs.	>10,000 hrs.
PENT	F1473	>100 hrs.	>100 hrs.
Brittleness Temperature	D746	<-117°C	<-180°F
Hardness, Shore D	D2240	64	64
Vicat Softening Temperature	D1525	124°C	255°F
Izod Impact Strength (Notched)	D256	0.37 KJ/m	7 ft – lb _f /in
Volume Resistivity	D991	>10 ¹⁵ ohm-cm	--
Thermal Expansion Coefficient		2x10 ⁻⁴ cm/cm/°C	1.0x10 ⁻⁴ in/in/°F
CELL CLASSIFICATION:	D3350	345464C	Grade PE36
MATERIAL CLASSIFICATION:	D1248	Type III	Class C
		Category 5	
PPI HYDROSTATIC DESIGN BASIS (HDB)	D2837	11.0 MPa @ 23°C	1,600 psi @ 73.4°F
(As listed in PPI TR-4)		5.5 MPa @ 60°C	800 psi @ 140°F
PPI HYDROSTATIC DESIGN STRESS (HDS)		5.5 MPa @ 23°C	800 psi @ 73.4°F
(As established by the Hydrostatic Stress Board (HSB) of the Plastics Pipe Institute (PPI))			

*Nominal values are intended to be guides only, and not as specification limit.

PolyPipe, Inc.

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 Phone 940.665.1721 | 800.433.5632 | Facsimile 940.668.8612
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PolyPipe® EHMW PE3608 Pipe

Pipe Data and Pressure Ratings – IPS

PolyPipe®

Pressure Rating		Class 265 DR7		Class 200 DR9		Class 160 DR11		Class 130 DR13.5		Class 100 DR17		Class 80 DR21		Class 65 DR26		Class 50 DR32.5	
Nominal Pipe Size	OD Size, inches	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft
½"	0.840	0.120	0.12	0.093	0.10	0.076	0.08	---	---	---	---	---	---	---	---	---	---
¾"	1.050	0.150	0.18	0.117	0.15	0.095	0.13	---	---	---	---	---	---	---	---	---	---
1"	1.315	0.188	0.29	0.146	0.23	0.120	0.20	---	---	---	---	---	---	---	---	---	---
1 ¼"	1.660	0.237	0.46	0.184	0.37	0.151	0.31	0.123	0.26	---	---	---	---	---	---	---	---
1 ½"	1.900	0.271	0.60	0.211	0.49	0.173	0.41	0.141	0.34	---	---	---	---	---	---	---	---
2"	2.375	0.339	0.94	0.264	0.76	0.216	0.64	0.176	0.53	0.140	0.43	---	---	---	---	---	---
3"	3.500	0.500	2.05	0.389	1.66	0.318	1.39	0.259	1.15	0.206	0.93	0.167	0.76	0.135	0.62	---	---
4"	4.500	0.643	3.38	0.500	2.74	0.409	2.29	0.333	1.91	0.265	1.54	0.214	1.26	0.173	1.03	0.138	0.83
5"	5.375	0.768	4.83	0.597	3.91	0.489	3.27	0.398	2.72	0.316	2.20	0.256	1.80	0.207	1.47	0.165	1.19
5"	5.563	0.795	5.17	0.618	4.18	0.506	3.51	0.412	2.91	0.327	2.35	0.265	1.93	0.214	1.57	0.171	1.27
6"	6.625	0.946	7.34	0.736	5.93	0.602	4.97	0.491	4.13	0.390	3.34	0.315	2.74	0.255	2.23	0.204	1.80
7"	7.125	1.018	8.49	0.792	6.86	0.648	5.75	0.528	4.78	0.419	3.86	0.339	3.17	0.274	2.58	0.219	2.08
8"	8.625	1.232	12.43	0.958	10.05	0.784	8.43	0.639	7.00	0.507	5.66	0.411	4.64	0.332	3.78	0.265	3.05
10"	10.750	1.536	19.31	1.194	15.62	0.977	13.09	0.796	10.88	0.632	8.79	0.512	7.20	0.413	5.88	0.331	4.74
12"	12.750	1.821	27.17	1.417	21.97	1.159	18.41	0.944	15.30	0.750	12.36	0.607	10.13	0.490	8.27	0.392	6.67
14"	14.00	2.000	32.76	1.556	26.49	1.273	22.20	1.037	18.45	0.824	14.91	0.667	12.22	0.538	9.97	0.431	8.04
16"	16.00	2.286	42.79	1.778	34.60	1.455	28.99	1.185	24.09	0.941	19.47	0.762	15.96	0.615	13.02	0.492	10.51
18"	18.00	2.571	54.15	2.000	43.79	1.636	36.70	1.333	30.49	1.059	24.64	0.857	20.20	0.692	16.48	0.554	13.30
20"	20.00	2.857	66.85	2.222	54.06	1.818	45.30	1.481	37.64	1.176	30.42	0.952	24.94	0.769	20.35	0.615	16.42
22"	22.00	---	---	2.444	65.41	2.000	54.82	1.630	45.55	1.294	36.81	1.048	30.17	0.846	24.62	0.677	19.86
24"	24.00	---	---	2.667	77.85	2.182	65.24	1.778	54.21	1.412	43.80	1.143	35.99	0.923	29.30	0.738	23.64
28"	28.00	---	---	---	---	2.545	88.80	2.074	73.78	0.647	59.62	1.333	48.87	1.077	39.88	0.862	32.17
30"	30.00	---	---	3.333	121.63	2.727	101.93	2.222	84.70	1.765	68.44	1.429	56.11	1.154	45.78	0.923	36.93
32"	32.00	---	---	---	---	---	---	2.370	96.37	1.882	77.87	1.524	63.84	1.231	52.09	0.985	42.02
36"	36.00	---	---	---	---	3.273	146.78	2.667	121.96	2.118	98.55	1.714	80.79	1.385	65.92	1.108	53.19
42"	42.00	---	---	---	---	---	---	---	---	2.471	134.14	2.000	109.97	1.615	89.73	1.292	72.39
48"	48.00	---	---	---	---	---	---	---	---	---	---	2.286	143.63	1.846	117.19	1.477	94.55
54"	54.00	---	---	---	---	---	---	---	---	---	---	2.571	181.78	2.077	148.32	1.662	119.67
63"	63.00	---	---	---	---	---	---	---	---	---	---	3.000	247.42	2.423	201.89	1.938	162.88
65"	65.00	---	---	---	---	---	---	---	---	---	---	3.095	263.38	2.500	214.91	2.000	173.39

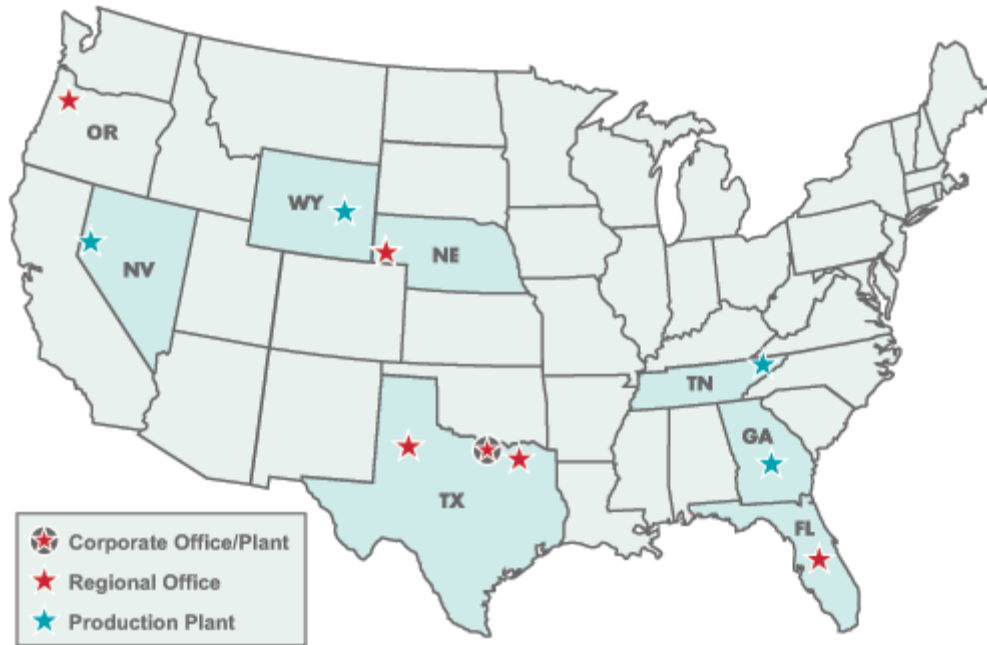
*See notes on Page 3 for product information and pressure rating information.

PolyPipe® EHMW PE3608 Pipe

Pipe Data and Pressure Ratings – DIPS

Pressure Rating		Class 265 DR7		Class 200 DR9		Class 160 DR11		Class 130 DR13.5		Class 100 DR17		Class 80 DR21		Class 65 DR26		Class 50 DR32.5	
Nominal Pipe Size	OD Size, inches	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches	Weight, lbs/ft
3"	3.96	0.566	2.62	0.440	2.12	0.360	1.78	0.293	1.48	0.233	1.19	0.189	0.98	0.152	0.80	0.122	0.64
4"	4.80	0.686	3.85	0.533	3.11	0.436	2.61	0.356	2.17	0.282	1.75	0.229	1.44	0.185	1.17	0.148	0.95
6"	6.90	0.986	7.96	0.767	6.43	0.627	5.39	0.511	4.48	0.406	3.62	0.329	2.97	0.265	2.42	0.212	1.95
8"	9.05	1.293	13.69	1.006	11.07	0.823	9.28	0.670	7.71	0.532	6.23	0.431	5.11	0.348	4.17	0.278	3.36
10"	11.10	1.586	20.59	1.233	16.65	1.009	13.95	0.822	11.60	0.653	9.37	0.529	7.81	0.427	6.27	0.342	5.06
12"	13.20	1.886	29.12	1.467	23.55	1.200	19.73	0.978	16.40	0.776	13.25	0.629	10.86	0.508	8.86	0.406	7.15
14"	15.30	2.186	39.12	1.700	31.64	1.391	26.51	1.133	22.03	0.900	17.80	0.729	14.59	0.588	11.91	0.471	9.61
16"	17.40	2.486	50.60	1.933	40.92	1.582	34.29	1.289	28.49	1.024	23.02	0.829	18.87	0.669	15.40	0.535	12.43
18"	19.50	2.786	63.55	2.167	51.39	1.773	43.07	1.444	35.79	1.147	28.92	0.929	23.70	0.750	19.34	0.600	15.61
20"	21.60	3.086	77.98	2.400	63.06	1.964	52.84	1.600	43.91	1.271	35.48	1.029	29.09	0.831	23.73	0.665	19.15
24"	25.80	---	---	2.867	89.96	2.345	75.39	1.911	62.64	1.518	50.62	1.229	41.50	0.992	33.86	0.794	27.32
30"	32.00	---	---	---	---	---	---	2.370	96.37	1.882	77.87	1.524	63.84	1.231	52.09	0.985	42.02
36"	38.30	---	---	---	---	---	---	---	---	2.253	111.55	1.824	91.45	1.473	74.61	1.178	60.20
42"	44.50	---	---	---	---	---	---	---	---	2.618	150.59	2.119	123.45	1.712	100.73	1.369	81.27
48"	50.80	---	---	---	---	---	---	---	---	---	---	2.419	160.88	1.954	131.27	1.563	105.91
54"	57.56	---	---	---	---	---	---	---	---	---	---	2.741	206.54	2.214	168.53	1.771	135.97
60"	61.61	---	---	---	---	---	---	---	---	---	---	---	---	2.370	193.07	1.896	155.77
64"	65.67	---	---	---	---	---	---	---	---	---	---	---	---	2.526	219.36	2.021	176.98

- NOTES : ➤ PolyPipe® EHMW Pipe is manufactured in accordance with the following standards:
- ◆ ½" IPS through 3" IPS products are manufactured in accordance with ASTM D3035.
 - ◆ 4" IPS through 64" DIPS products are manufactured in accordance with ASTM F714.
 - ◆ Metric sizes also available.
 - ◆ Coiled pipe available through 6" OD and straight lengths available in 40' and 50' lengths. For custom lengths, contact a Customer Service Representative.
 - ◆ Products tested and certified to NSF Standard 61 are available upon request.
 - ◆ Factory Mutual (FM) pipe available upon request (*Refer to A-1005 for approved sizes*).
- Pressures are based on using water at 23°C (73.4°F) and are determined per ASTM D3035 or F714.
- Service factors should be utilized to compensate for the effect of substances other than water and for higher temperatures.
- The above weights for IPS and DIPS sizes are calculated in accordance with Plastics Pipe Institute (PPI) TR-7, using a value of 0.955 for density.
- Available with color-coded striping.
- Some sizes listed are special order. Call for availability on sizes.



Erwin, TN

P.O. Box 199
1050 Industrial Drive South
Erwin, TN 37650
(423) 743-9116
Fax: (423) 743-8419

Evansville, WY

P.O. Box 1147
6790 Santa Fe Circle
Evansville, WY 82636
(307) 234-9114
Fax: (307) 234-9116

Fernley, NV

230 Lyon Drive
Fernley, NV 89408
(775) 575-5454
Fax: (775) 575-6960

Gainesville, TX

P.O. Box 390
2406 N. I-35
Gainesville, TX 76241-0390
(940) 665-1721
(800) 433-5632
Fax: (940) 668-8612
Sales Fax: (940) 668-2704

Sandersville, GA

P.O. Box 784
995 Waco Mill Road
Sandersville, GA 31082
(478) 553-0576
Fax: (478) 553-0579



PLASTICS·PIPE·INSTITUTE



PolyPipe® is an active member of the Plastics Pipe Institute, AWWA, AGA and ASTM.

PolyPipe, Inc.

2406 N. I-35 | P.O. Box 390 | Gainesville, TX 76241
Phone 940.665.1721 | 800.433.5632 | Facsimile 940.668.8612
Sales Facsimile 940.668.2704 | www.polypipeinc.com

ISO 9001:2000



B-1004
09/08

BORE-GEL™

Description

BORE-GEL™ is a single sack, boring fluid system specially formulated for use in horizontal directional drilling (HDD) applications. BORE-GEL is a proprietary blended product using high-yielding Wyoming sodium bentonite. When BORE-GEL is mixed with fresh water, it develops an easy-to-pump slurry with desirable fluid properties for HDD.

Applications/Functions

- Improve borehole stability in poorly consolidated/cemented sands and gravel formations
- Reduce filtration rate thus improving stability of water sensitive clays and shales
- Provide optimum viscosity with maximum clay platelets for hole cleaning
- Provide optimum gel strength for cuttings suspension and transport



[Click to enlarge](#)

[Click to enlarge](#)

Advantages

- Minimizes the number of boring fluid products required
- Easy to mix and fast to yield
- Pumpable slurry with maximum amount of reactive solids for borehole stability
- Tolerant to moderate amount of hardness and low pH
- ANSI/NSF Standard 60 certified
- Provides lubricity for pulling product line

Typical Properties

- Appearance - Tan to gray powder
- Grind size - 200 mesh
- Specific gravity - 2.6
- pH (4% slurry or 15 lb/bbl) - 10.2
- Bulk density, lb/ft³ - 68 to 72 (as packaged)

Recommended Treatment

Add slowly and uniformly through a high-shear jet type mixer over one or more cycles of the volume of slurry. Continue to circulate and agitate the slurry until all lumps are dispersed.

Recommended application amounts		
Boring Application	lb/100 gal	kg/m ³
Normal boring conditions	15 - 35	18 - 42
Poorly consolidated sand/gravel	35 - 60	42 - 72

Packaging

BORE-GEL is packaged in a 50-lb (22.7-kg) multiwall paper bag. The bag is sturdy, moisture resistant and easy to handle, store and transport.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N Sam Houston Pkwy E
Houston, TX 77032 Technical Service (877)379-7412

D16x20 Series II



Big Power in a Small Footprint. The D16x20 Series II is powered by a 65 hp/48 kW Kubota diesel engine, giving you 2,000 ft-lb/2,700 Nm of rotational torque and 16,000 lbs/71 kN of thrust/pullback. The onboard pump provides high flow in large-diameter bores for more efficient backreaming. The D16x20 Series II brings performance to a wide range of bores. The unit's compact footprint allows for entry into confined jobsites and side-by-side trailering with many modular mix systems.

Dimensional

Transport Length	200.5"	509.27 cm
Width: Transport Mode	41"	104.14 cm
Height	75"	190.5 cm

Engine

Make & Model	Kubota 3600
--------------	-------------

Operational

Pullback	16000 lbs	7257.48 kg
Maximum Spindle Torque	2000 ft-lb	2711.64 Nm

Drilling Fluid System

Maximum Flow	25 gpm	94.64 L/min
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Specifications Last Revised 04/19/2011

D24x40 Specifications

The D24x40 Series II is engineered to power through with a 125 hp/93kW John Deere 4045 diesel engine. That's 4200 ft.-lb./5,423 Nm of rotational torque and 24,000 lbs./107 kN of thrust/pullback.

General Dimensions and Weights

Length	228"	579.12 cm
Width	74"	187.96 cm
Height	75"	190.5 cm
Weight	18440 lbs	8364.24 kg
Breakout System	Yes- side load vise	
Drilling Lights	Standard: 1 on gearbox, 2 on stakedown	
Stakedown System	Standard: stationary	

Engine

Make and Model	John Deere PowerTech 4045HF275	
Fuel Type	Diesel	
Gross Horsepower	125 hp	93.21 kw

Operational

Thrust	24000 lbs	10886.22 kg
Pullback	24000 lbs	10886.23 kg
Maximum Spindle Torque (Low at Maximum Engine RPM)	4200 ft-lb	5694.44 Nm
Maximum Spindle Torque (Medium at Maximum Engine RPM)	3200 ft-lb	4338.62 Nm
Maximum Spindle Torque (High at Maximum Engine RPM)	2100 ft-lb	2847.22 Nm
Maximum Spindle Speed at Max Engine RPM	270 rpm	
Minimum Bore Diameter	3.5"	8.89 cm
Transport speed	1.5 mph	2.42 km/h
Automated Rod Loader	Yes	

Fluid Capacities

Fuel Tank	45 gal 170.34 L	
Hydraulic Tank	45 gal 170.34 L	Hydraulic System 55 gal 208.2L

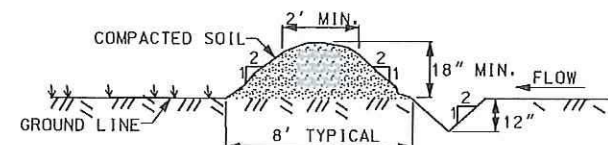
Hydraulic System

Auxiliary Pump Flow at Maximum Engine RPM	47 gpm	
Auxiliary Pump Relief Pressure	3000 psi	206.84 bar
Thrust/Pullback Pump Flow at Max Engine RPM	33 gpm	124.92 L/min
Thrust/Pullback Pump Relief Pressure	6000 psi	413.69 bar
Rotation Pump Flow at Maximum Engine RPM	33 gpm	124.92 L/min
Rotation Pump Relief Pressure	6000 psi	413.69 bar

Drilling Fluid System Option One

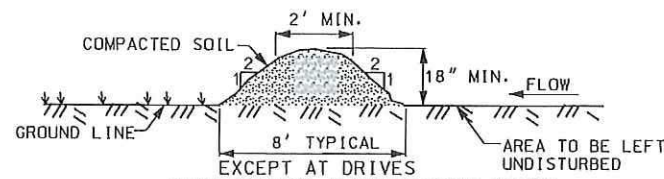
Maximum Flow	50 gpm	189.27 L/min	Maximum Flow	1300 psi	89.63 bar
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TEMPORARY DIVERSION DIKE WITH DITCH

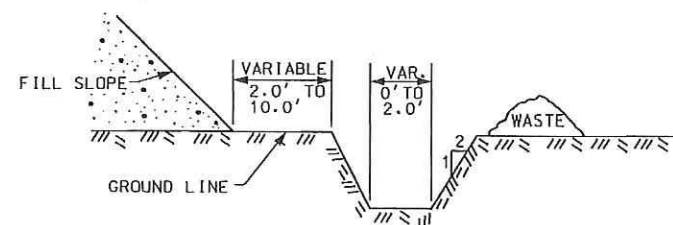
THE PAY ITEM SHALL BE TEMPORARY DIVERSION DIKE WITH DITCH.....L.F.



TEMPORARY DIVERSION DIKE

NOTES

1. THIS ITEM IS FOR DIVERTING CLEAN WATER AROUND A CONSTRUCTION AREA.
2. CLEAR AND GRUB ALL TREES, BRUSH, STUMPS AND OTHER OBJECTIONABLE MATERIAL.
3. ENSURE THAT THE MINIMUM CONSTRUCTED CROSS SECTION MEETS ALL DIMENSIONS SHOWN.
4. IMMEDIATELY AFTER CONSTRUCTION ESTABLISH VEGETATION, PLACING TEMPORARY EROSION CONTROL BLANKET ON THE DIKE. (AS APPLICABLE).
5. PAYMENT FOR TEMPORARY DIVERSION DIKE INCLUDES ALL MATERIALS IN PLACE, REMOVAL AND DISPOSAL OF MATERIALS AND RESHAPING DIKE TO DRAIN. SEEDING TO BE PAID FOR SEPARATELY.
6. THE PAY ITEM SHALL BE: TEMPORARY DIVERSION DIKE.....L.F.

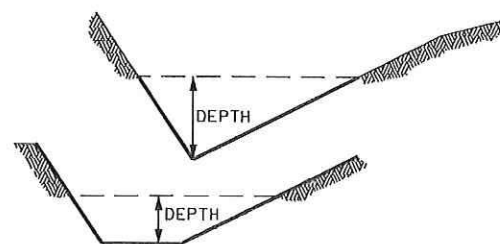


TEMPORARY SILT DITCH

NOTES

1. THIS ITEM IS TO MOVE SEDIMENT LADEN WATER FROM A CONSTRUCTION SITE TO A SEDIMENT CONTROL STRUCTURE.
2. SEED DITCH AND WASTE AREA WITH TEMPORARY SEEDING IMMEDIATELY AFTER CONSTRUCTION.
3. IMMEDIATELY AFTER CONSTRUCTION ESTABLISH VEGETATION, PLACING TEMPORARY EROSION CONTROL BLANKET ON THE DITCH (AS APPLICABLE).
4. THE PAY ITEM SHALL BE: SILT DITCHES.....C.Y.

ROLLED EROSION CONTROL PRODUCT



NOTES

1. THE DEPTH OF THE EROSION CONTROL PRODUCTS ARE TO BE DETERMINED BY DESIGN AND PLACED ON PLAN SHEETS.
2. INSTALL IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
3. COST OF INSTALLATION AND MATERIALS SHALL BE INCLUDED IN THE PAY ITEM FOR ROLLED EROSION CONTROL PRODUCT.
4. PAY ITEMS:
TEMPORARY EROSION CONTROL BLANKET.....SY
PERMANENT TURF REINFORCEMENT MAT.....SY

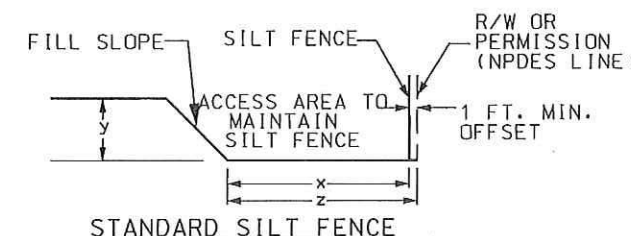
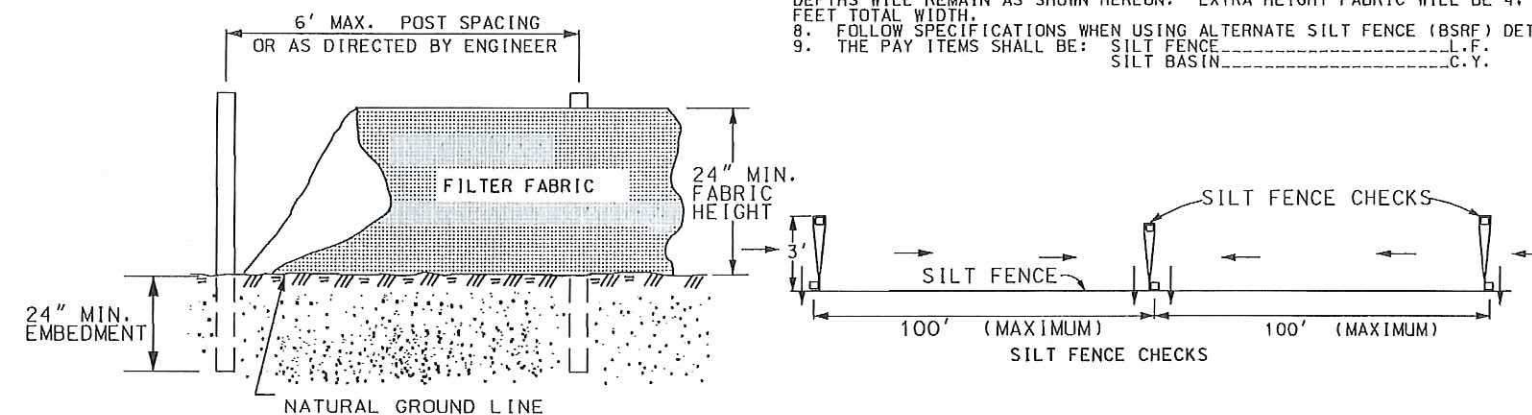
THIS DRAWING IS NOT TO SCALE

SILT FENCE

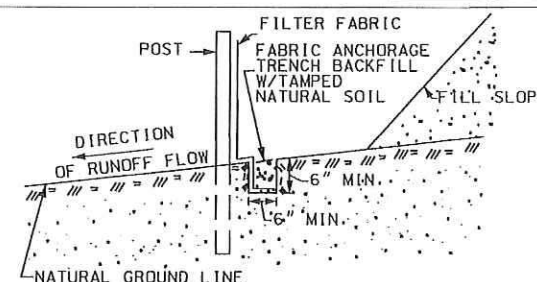
HEIGHT OF FILL (y) IN FEET	FILL SLOPE	MINIMUM SILT FENCE OFFSET FROM TOE OF SLOPE (x) IN FEET	MINIMUM RIGHT OF WAY OFFSET FROM TOE OF SLOPE (NPDES LINE) IN FEET	CHECK LENGTH IN FEET**
<6	2:1 4:1 6:1	2	3	2
6-10	2:1 4:1 6:1	12*	13*	5
>10	2:1 4:1 6:1	12*	13*	5

*THESE MINIMUM OFFSETS MAY BE REDUCED WHEN CURB AND GUTTER OR SOME OTHER FEATURE REDUCES THE FLOW OF WATER DOWN THE SLOPE. THE SMALL OFFSETS OF EACH GROUP OF HEIGHT OF FILL CANNOT BE REDUCED.

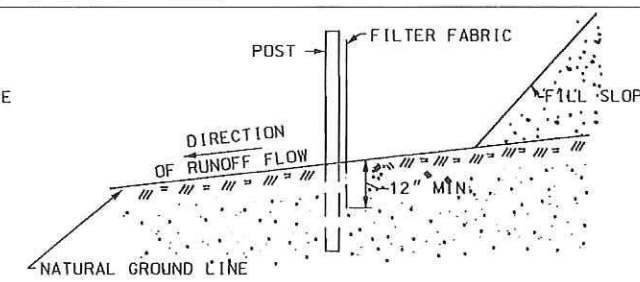
**SILT FENCE CHECKS WILL HAVE A MAXIMUM LENGTH OF FIVE (5) FEET OR UNTIL THEY TIE BACK INTO THE SLOPE.



STANDARD SILT FENCE

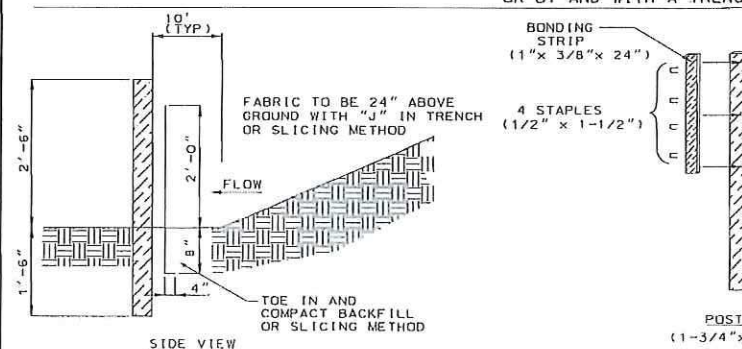


TRENCH METHOD



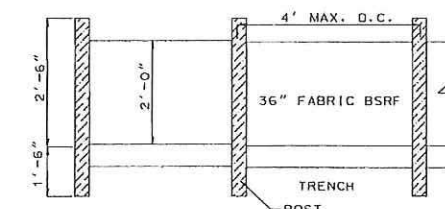
PNEUMATIC METHOD

12 INCHES OF THE FABRIC SHALL BE BURIED REGARDLESS, IF PLACED PNEUMATICALLY OR BY AND WITH A TRENCHER. BOTH METHODS SHOWN HERE.



SIDE VIEW

POST (OAK)
(1-3/4" x 1-1/4" x 48")



FRONT ELEVATION

ALTERNATE SILT FENCE - BELTED SILT RETENTION FENCE (BSRF)

NOTES

1. SILT FENCE CHECKS MUST BE LOCATED EVERY 100 FT. MAXIMUM AND AT LOW POINTS. FILTER FABRICS SHALL CONFORM TO SCDOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (LATEST EDITION).
2. USE POSTS CONFORMING TO SCDOT STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS. POSTS SHALL BE A MINIMUM OF 5 FEET LONG AND INSTALLED TO A MINIMUM DEPTH OF 24 INCHES WITH NO MORE THAN 3 FEET OF THE POST ABOVE GROUND. AT LEAST 1 TO 2 INCHES OF THE POSTS SHALL EXTEND ABOVE THE TOP OF THE FABRIC. POST SPACING WILL BE A MAXIMUM OF 6 FEET ON CENTER.
3. POSTS SHALL HAVE PROJECTIONS FOR FASTENING THE FABRIC TO THE POST. POSTS SHALL ALSO HAVE A SOIL PLATE NEAR THE BOTTOM OF THE POST, EXCEPT WHEN HEAVY CLAY SOILS ARE PRESENT ON-SITE.
4. ATTACH FABRIC TO POSTS USING HEAVY-DUTY PLASTIC TIES THAT ARE EVENLY SPACED AND PLACED IN A MANNER TO PREVENT SAGGING OR TEARING OF THE FABRIC. IN ALL CASES, TIES SHOULD BE AFFIXED IN NO LESS THAN 4 PLACES.
5. SILT SHALL BE REMOVED AND DISPOSED OF WHEN SILT ACCUMULATES TO 1/3 THE HEIGHT OF THE FENCE. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON-SITE. MAINTENANCE OF SILT FENCE WILL BE MEASURED AND PAID FOR BY THE ITEM OF SILT BASIN.
6. TYPICAL SILT FENCE APPLICATIONS REQUIRE 24 INCHES OF THE FABRIC TO BE ABOVE GROUND. WHEN NEEDED, THE HEIGHT OF SILT FENCE FABRIC ABOVE THE GROUND MAY BE GREATER THAN 24". SEE PLANS FOR APPLICATION OF HIGHER SILT FENCE. PAY ITEMS AND INSTALLATION METHODS.
7. IN TIDAL AREAS, EXTRA SILT FENCE HEIGHT MAY BE REQUIRED. THE LENGTH OF POST WILL BE TWICE THE EXPOSED POST HEIGHT. POST SPACING AND BURIED DEPTHS WILL REMAIN AS SHOWN HEREON. EXTRA HEIGHT FABRIC WILL BE 4, 5 OR 6 FEET TOTAL WIDTH.
8. FOLLOW SPECIFICATIONS WHEN USING ALTERNATE SILT FENCE (BSRF) DETAILS.
9. THE PAY ITEMS SHALL BE: SILT FENCE.....L.F.
SILT BASIN.....C.Y.

REFERENCES

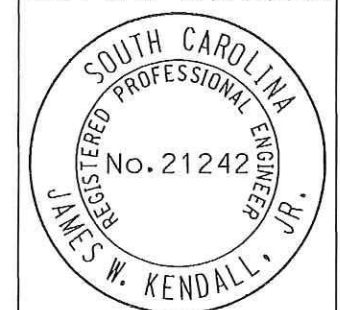
NATIONAL DOCUMENTS

SCDOT DOCUMENTS

SC-M-815-2, SC-M-815-9

RELATED DRAWINGS & KEYWORDS

PRECONSTRUCTION SUPPORT ENGINEER



James W. Kendall
SIGNATURE

AUGUST 23, 2012
DATE

4			
3			
2			
1	8/2012	KNB	ADDED SCDOT DOCUMENTS, REMOVED STEEL, CHANGED NOTES
0	3/2008	DSO	GENERAL REVISIONS
#	DATE	CHK	DESCRIPTION

SCDOT
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
DESIGN STANDARDS OFFICE
955 PARK STREET
ROOM 405
COLUMBIA, SC 29201

STANDARD DRAWING

TEMPORARY
EROSION &
SEDIMENTATION
CONTROL

815-605-00

EFFECTIVE LETTING DATE | JAN., 2013

FIGURE 1: UPPER AND LOWER STATE MAP

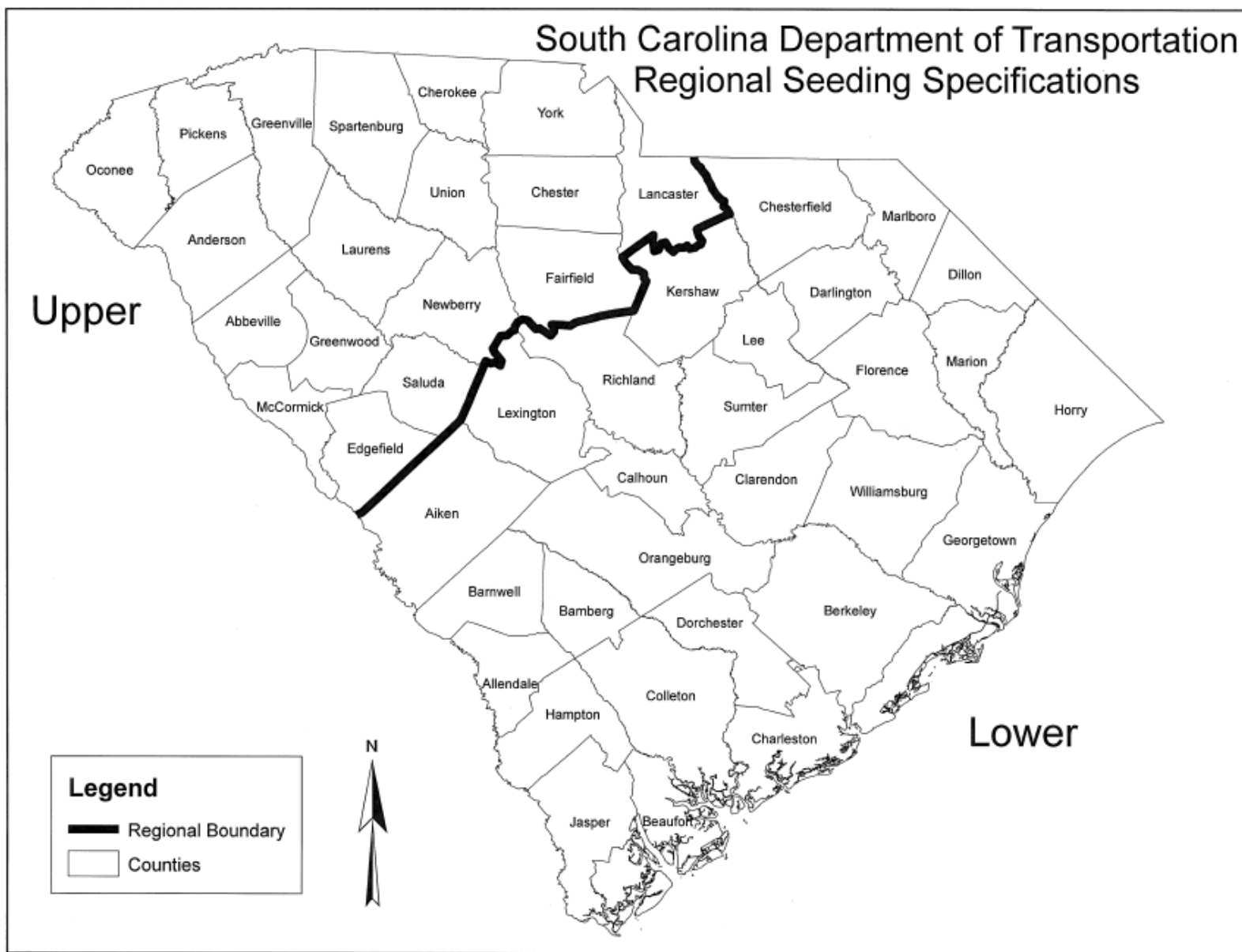


TABLE 1: PERRENIALS * Months shaded in gray represent applicable planting dates.

COMMON NAME ⁶	BOTANICAL NAME	APPROVED SITE(S)	PLANTING RATE (lbs/acre)	PLANTING LOCATION	Planting Dates*											
					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TURF-TYPE GRASSES (SELECT ONE)																
Bahia ¹	Paspalum notatum	Shoulders, Slopes, or Medians	30	Upper State												
				Lower State												
Common Bermudagrass ² (hulled = hull absent)	Cynodon dactylon	Shoulders, Slopes, or Medians	50	Upper State												
				Lower State												
Common Bermudagrass ² (unhulled = hull present)	Cynodon dactylon	Shoulders, Slopes, or Medians	60	Upper State												
				Lower State												
Carpet Grass / Centipedegrass Combo	Axonopus affinis Eremochloa ophiuroides	Shoulders, Slopes or Medians	15	Upper State												
			10	Lower State												
Tall Fescue (KY-31) ³	Festuca arundinacea	Shoulders, Slopes, or Medians	75	Upper State												
				Lower State												
GRASSES																
Weeping Lovegrass	Erograstis curvula	Slopes	10	Upper State												
				Lower State												
Indiangrass	Sorghastrum nutans	Slopes	10	Upper State												
				Lower State												
Little Bluestem	Andropogon scoparius	Slopes	10	Upper State												
				Lower State												
Coastal Panicgrass	Panicum amarum	Slopes	20	Upper State												
				Lower State												
Switchgrass	Panicum virgatum	Slopes	10	Upper State												
				Lower State												
Perennial Rye Grass ⁴	Lolium perrene	Shoulders, Slopes, or Medians	15	Upper State												
				Lower State												
Virginia Wild Rye	Elymus virginicus	Shoulders, Slopes, or Medians	6	Upper State												
				Lower State												
LEGUMES ⁴																
White Clover	Trifolium repens	Shoulders, Slopes, or Medians	5	Upper State												
				Lower State												
Crownvetch	Coronilla varia	Slopes	25	Upper State												
				Lower State												
Sericea Lespedeza (Scarified seed)	Lespedeza cuneata	Slopes	50	Upper State												
				Lower State												
Sericea Lespedeza (Unscarified seed)	Lespedeza cuneata	Slopes	80	Upper State												
				Lower State												

¹Bahia¹: Use at discretion of RCE based on project location.

²Common Bermudagrass: *Do not use Giant Bermudagrass (NK-37).*

³Tall Fescue (KY-31): *Do not use Tall Fescue (Lolium arundinacea).*

⁴Perennial Rye Grass: *Do not use Annual Italian Rye grass (Lolium multiflorum).*

* Months shaded in gray represent applicable planting dates.

⁵Only use pre-inoculated legumes or use an appropriate inoculant with the seed at plant

⁶If Common Name of seed is not available, use seed with the listed Botanical Name.

TABLE 2: ANNUALS

* Months shaded in gray represent applicable planting dates.

COMMON NAME ⁵	BOTANICAL NAME	APPROVED SITE(S)	NURSE CROP RATE (lbs/acre)	TEMP COVER RATE (lbs/acre)	PLANTING LOCATION	Planting Dates*											
						JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Crimson Clover ¹	Trifolium incarnatum	Shoulders, Slopes, or Medians	20	20	Upper State												
					Lower State												
Lespedeza ¹ Kobe / Korean	Lespedeza striata / stipulacea	Shoulders, Slopes	15	60	Upper State												
					Lower State												
Browntop Millet ²	Panicum ramosum	Shoulders, Slopes, or Medians	10	40	Upper State												
					Lower State												
German Millet ² (Foxtail Millet)	Setaria italica	Shoulders, Slopes, or Medians	10	40	Upper State												
					Lower State												
Japanese Millet ²	Echinochloa crusgalli	Slopes	10	50	Upper State												
					Lower State												
Oats	Avena sativa	Slopes	40	110	Upper State												
					Lower State												
Hairy Vetch ¹	Vicia villosa	Slopes	15	50	Upper State												
					Lower State												
Pearl Millet	Pennisetum glaucum	Slopes	15	50	Upper State												
					Lower State												
Sudangrass	Sorghum bicolor	Slopes, Buffers	20	60	Upper State												
					Lower State												
Barley	Hordeum vulgare	Slopes	55	110	Upper State												
					Lower State												
Wheat ⁴	Triticum spp.	Slopes, Buffers	35	110	Upper State												
					Lower State												
Rye Grain ^{3,4}	Secale cereale	Shoulders, Slopes, or Medians	40	110	Upper State												
					Lower State												

¹ Only use pre-inoculated legumes or an appropriate inoculant with the seed at planting.

* Months shaded in gray represent applicable planting dates.

² Mow Millet (no lower than 3 inches) once it reaches a height of 18 - 24 inches or at the discretion of the RCE to reduce competitiveness with permanent vegetation.

³ Rye Grain: Do not use Annual Italian Rye Grass (Lolium multiflorum).

⁴ Mow Wheat and Rye Grain (no lower than 3 inches) once they reach a height of 18 - 24 inches or at the discretion of the RCE to reduce competitiveness with permanent vegetation.

⁵ If the Common Name of the seed listed is not available, use seed with the listed Botanical Name. Do not use Wild Bird, Wild Animal, or Domestic Feed Seed.