OVER ALL TOTALS

PRIMARY ROADS

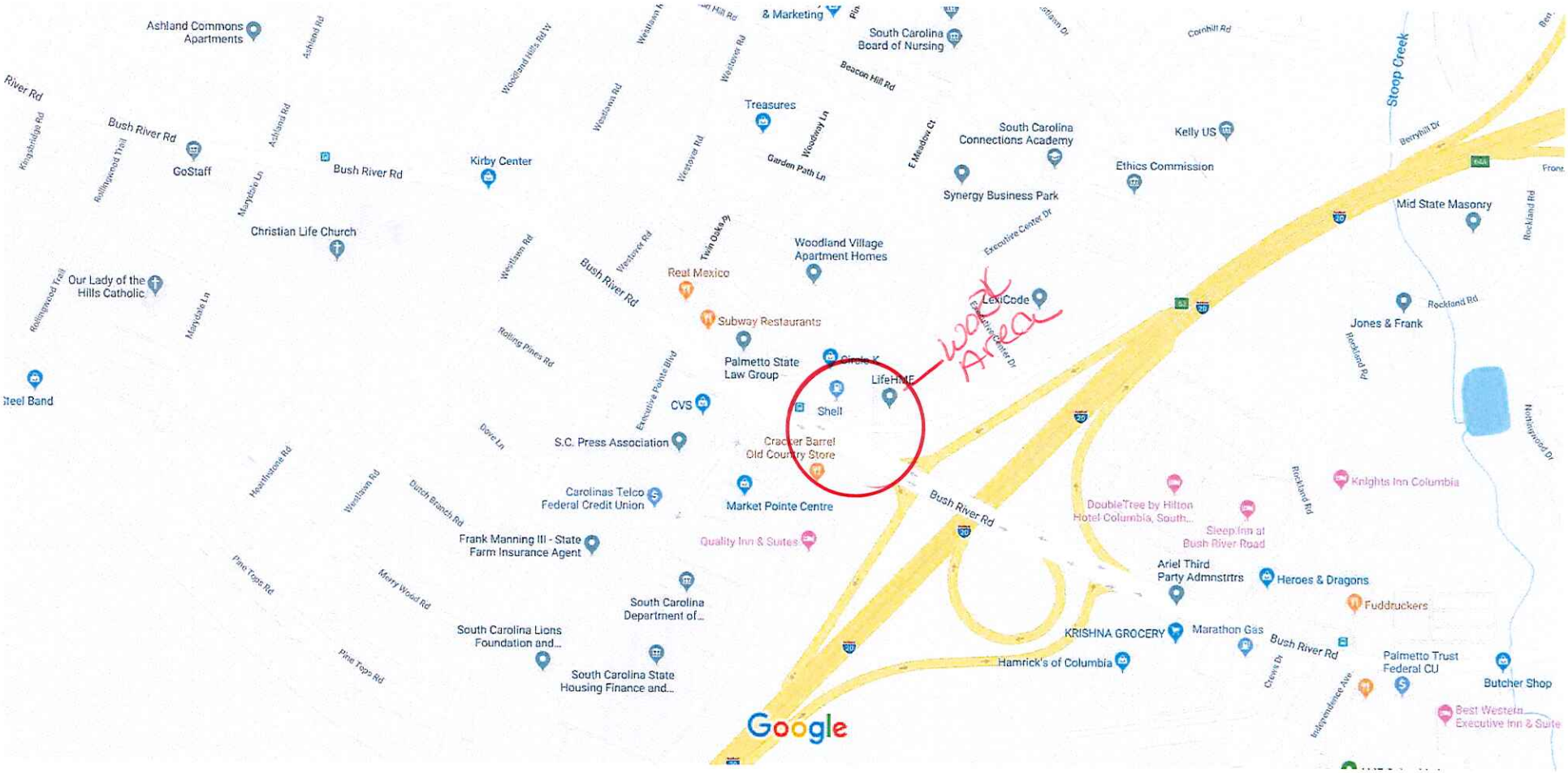
AERIAL	_____	FT.	OR _____	MILES
UNDERGROUND	_____	FT.	OR _____	MILES

SECONDARY ROADS

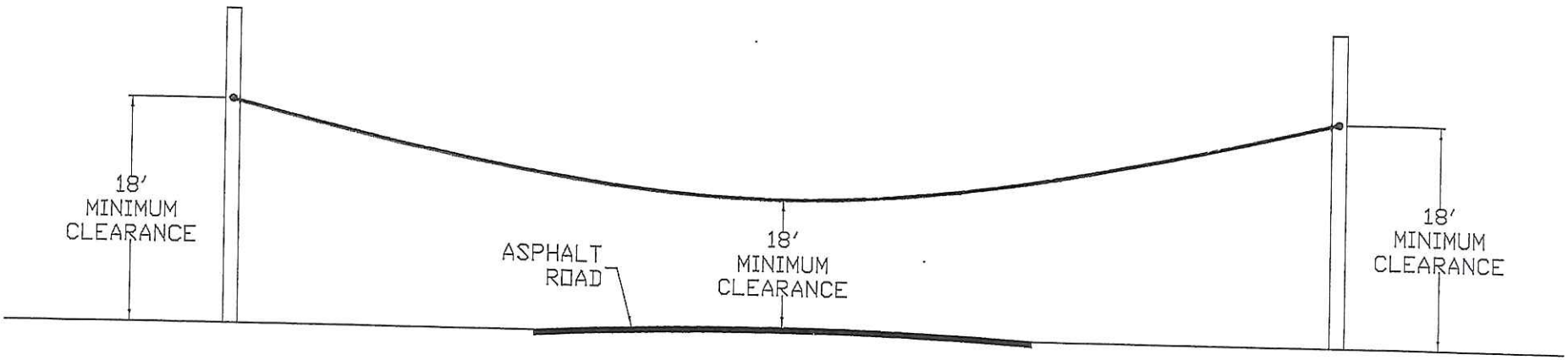
AERIAL	85	FT.	OR 0.0161	MILES
UNDERGROUND	1169	FT.	OR 0.2214	MILES

TOTAL	1254	FT.	OR 0.238	MILES

Revised 6/25/01



Map data ©2019 Google 200 ft



NOTES:

1. ALL FIBER ATTACHMENTS ARE TO BE AT A MINIMUM HEIGHT OF 18' INCLUDING SPAN SWAG TO THE TOP OF THE ASPHALT.

2. THE PERMITEE SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGES THAT OCCUR AS A DIRECT RESULT OF THIS INSTALLATION.

Spectrum

SCALE: N/A	APPROVED BY	DRAWN BY: TELICS
DATE:		DATE:

POLE ATTACHMENT

TABLE 1: PERRENIALS

** Months shaded in gray represent applicable planting dates.*

COMMON NAME[5]	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)																
Bahiagrass[1]	Paspalumnotatum	Slopes	30	UpperState												
				LowerState												
Common Bermudagrass[2] (hulled = hull absent)	Cynodondactylon	Shoulders, Slopes, or Medians	25	UpperState												
				LowerState												
Common Bermudagrass[2] (unhulled = hull present)	Cynodondactylon	Shoulders, Slopes, or Medians	30	UpperState												
				LowerState												
Carpet Grass	Axonopusaffinis	Shoulders, Slopes or Medians	15	UpperState												
				LowerState												
Tall Fescue	Festucaaruninacea.	Shoulders, Slopes, or Medians	50	UpperState												
				LowerState												
Centipedegrass	Eremochloaophiuroides	Shoulders, Medians	10	UpperState												
				LowerState												
GRASSES																
Weeping Lovegrass	Erograstiscurvula	Slopes	5	UpperState												
				LowerState												
Indiangrass	Sorghastrumnutans	Slopes	10	UpperState												
				LowerState												
Little Bluestem	Andropogonscoparius	Slopes	10	UpperState												
				LowerState												
Coastal Panicgrass	Panicumamarum	Slopes	20	UpperState												
				LowerState												
Switchgrass	Panicumvirgatum	Slopes	10	UpperState												
				LowerState												
Perennial Rye Grass[3]	Loliumperrene	Shoulders, Slopes, or Medians	15	UpperState												
				LowerState												
Virginia Wild Rye	Elymusvirginicus	Shoulders, Slopes, or Medians	6	UpperState												
				LowerState												
LEGUMES[4]																
White Clover	Trifoliumrepens	Shoulders, Slopes	5	UpperState												
				LowerState												
Sericea Lespedeza (Scarified seed)	Lespedeza cuneta	Slopes	50	UpperState												
				LowerState												
Sericea Lespedeza (Unscarified seed)	Lespedeza cuneta	Slopes	80	UpperState												
				LowerState												

[1]Bahiagrass:Bahiagrass may be used as an optional turf-type permanent cover at the discretion of the RCE. ** Months shaded in gray represent applicable planting dates.*
[2]Common Bermudagrass: *Do not use Giant Bermudagrass(NK-37).*
[3]Perennial Rye Grass: *Do not use Annual Italian Rye grass (Loliummultiforum).*
[4]Only use pre-inoculated legumes or use an appropriate inoculant with the seed at planting.
[5]If the Common Name of the seed listed in Table 1 is not available, use seed with the listed Botanical Name.

TABLE 2: ANNUALS

** Months shaded in gray represent applicable planting dates.*

COMMON NAME[3]	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]	Trifoliumincarnatum	Shoulders, Slopes, or Medians	20	20	UpperState												
					LowerState												
Korean Lespedeza[1]	Lespedeza stipulacea	Shoulders, Slopes	30	NA	UpperState												
					LowerState												
Korean Lespedeza[1] (unhulled = hull present)	Lespedeza stipulacea	Shoulders, Slopes	30	60	UpperState												
					LowerState												
Kobe Lespedeza[1]	Lespedeza striata	Shoulders, Slopes	30	NA	UpperState												
					LowerState												
Kobe Lespedeza[1](unhulled = hull present)	Lespedeza striata	Shoulders, Slopes	30	60	UpperState												
					LowerState												
Browntop Millet	Panicumramosum	Shoulders, Slopes, or Medians	10	50	UpperState												
					LowerState												
German Millet (Foxtail Millet)	Setariaitalica	Shoulders, Slopes, or Medians	25	40	UpperState												
					LowerState												
Japanese Millet	Echinochloacrus galli	Slopes	10	50	UpperState												
					LowerState												
Oats	Avena sativa	Slopes	65	110	UpperState												
					LowerState												
Hairy Vetch[1]	Viciavillosa	Shoulders, Slopes, or Medians	15	50	UpperState												
					LowerState												
Pearl Millet	Pennisetumglaucum	Slopes	15	50	UpperState												
					LowerState												
Sudangrass	Sorghum bicolor	Shoulders, Slopes, or Medians	30	60	UpperState												
					LowerState												
Barley	Hordeumvulgare	Shoulders, Slopes	55	110	UpperState												
					LowerState												
Wheat	Triticum spp.	Shoulders, Slopes	75	110	UpperState												
					LowerState												
Rye Grain[2]	Secalecereale	Shoulders, Slopes	75	110	UpperState												
					LowerState												

[1]Only use pre-inoculated legumes or an appropriate inoculant with the seed at planting.
[2]Rye Grain: *Do not use Annual Italian Rye Grass (Loliummultiforum).*
[3]If the Common Name of the seed listed in Table 2 is not available, use seed with the listed Botanical Name.

** Months shaded in gray represent applicable planting dates.*

TABLE 815-605A

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) (z) IN FEET	CHECK LENGTH IN FEET**
<6	2:1 4:1 6:1	2	3	2
6–10	2:1	12*	13*	5
	4:1 6:1	3	4	3
>10	2:1	12*	13*	5
	4:1 6:1	4	5	4

*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.

SEE 815-605-10 FOR TEMPORARY DIVERSION DIKE

SEE 815-605-20 FOR TEMPORARY SILT DITCH

SEE 815-605-30 FOR ROLLED EROSION CONTROL PRODUCT

NOTES:

1. SILT FENCE CHECKS MUST BE LOCATED EVERY 100 FEET 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.

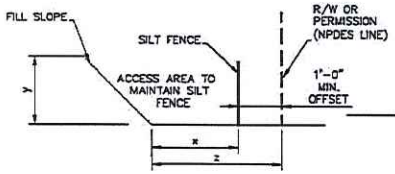
4. ATTACH FABRIC TO POSTS USING HEAVY-DUTY PLASTIC TIES THAT ARE EVENLY SPACED AND PLACED IN A MANNER TO PREVENT SAGGING OR TEARING OF THE FABRIC. IN ALL CASES TIES SHOULD BE AFFIXED IN NO LESS THAN 4 PLACES.

5. SILT SHALL BE REMOVED AND DISPOSED OF WHEN SILT ACCUMULATES TO ⅓ 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 REMOVAL OF SILT RETAINED BY SILT FENCE.

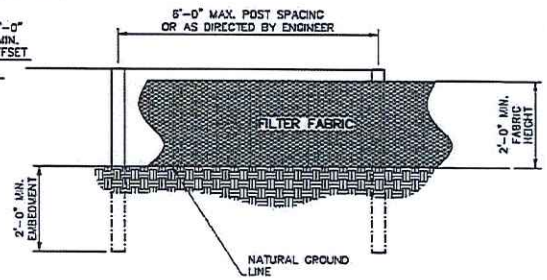
6. TYPICAL SILT FENCE APPLICATIONS REQUIRE 24 INCHES OF THE FABRIC TO BE ABOVE GROUND. WHEN NEEDED, THE HEIGHT OF SILT FENCE FABRIC ABOVE THE GROUND MAY BE GREATER THAN 24". SEE PLANS FOR APPLICATION OF HIGHER SILT FENCE, PAY ITEMS, AND INSTALLATION METHODS.

7. IN TIDAL AREAS, EXTRA SILT FENCE MAY BE REQUIRED. THE LENGTH OF POST WILL BE TWICE THE EXPOSED POST HEIGHT. POST SPACING WILL REMAIN AS SHOWN HEREON. EXTRA HEIGHT FABRIC WILL BE 4, 5, OR 6 FEET TOTAL WIDTH.

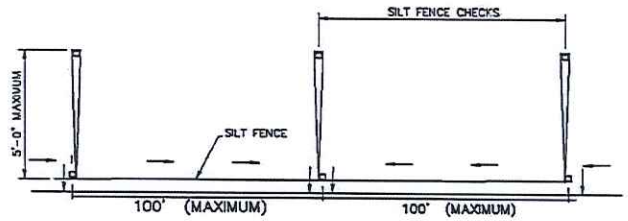
8. PAY ITEMS:
8153000 SILT FENCE _____ LF
8153005 SILT FENCE EXTRA HEIGHT _____ LF
8153090 REPLACE/REPAIR SILT FENCE _____ LF
8154050 REMOVAL OF SILT RETAINED BY SILT FENCE _____ LF



DETAIL 3
ACCESS AREA TABLE 815-605A

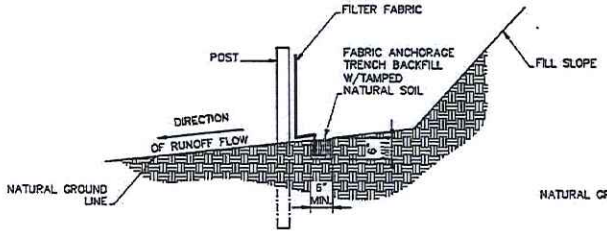


DETAIL 1
TYPICAL POST SPACING

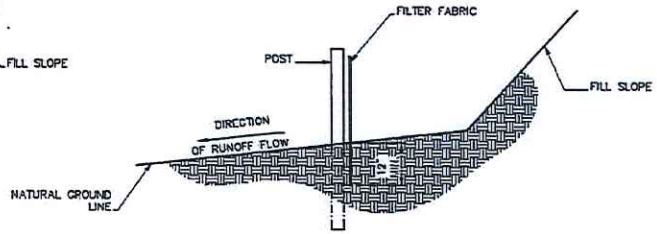


DETAIL 2
SILT FENCE CHECKS

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



DETAIL 4
TRENCH METHOD



DETAIL 5
PNEUMATIC METHOD

NOT TO SCALE

REFERENCES

NATIONAL DOCUMENTS

SCDOT DOCUMENTS
SC-M-815-2, QPL 34

RELATED DRAWINGS & KEYWORDS

THIS DRAWING IS ONLY VALID FOR CONSTRUCTION WHEN SEALED AND SIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF SOUTH CAROLINA. CHECK WWW.SCDOT.ORG FOR LATEST UPDATE.

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER NO. 21242 JAMES W. KENDALL, JR.

James W. Kendall, Jr.
SIGNATURE

11/10/2016
DATE

#	DATE	CHK	DESCRIPTION
5			
4			
3	11/2016	DSO	GENERAL REVISIONS
2	8/2016	DSO	GENERAL REVISIONS
1	8/2012	KNB	ADDED SCDOT DOCUMENTS, REMOVED STEEL, CHANGED NOTES
0	3/2008	DSO	GENERAL REVISIONS

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

STANDARD DRAWING

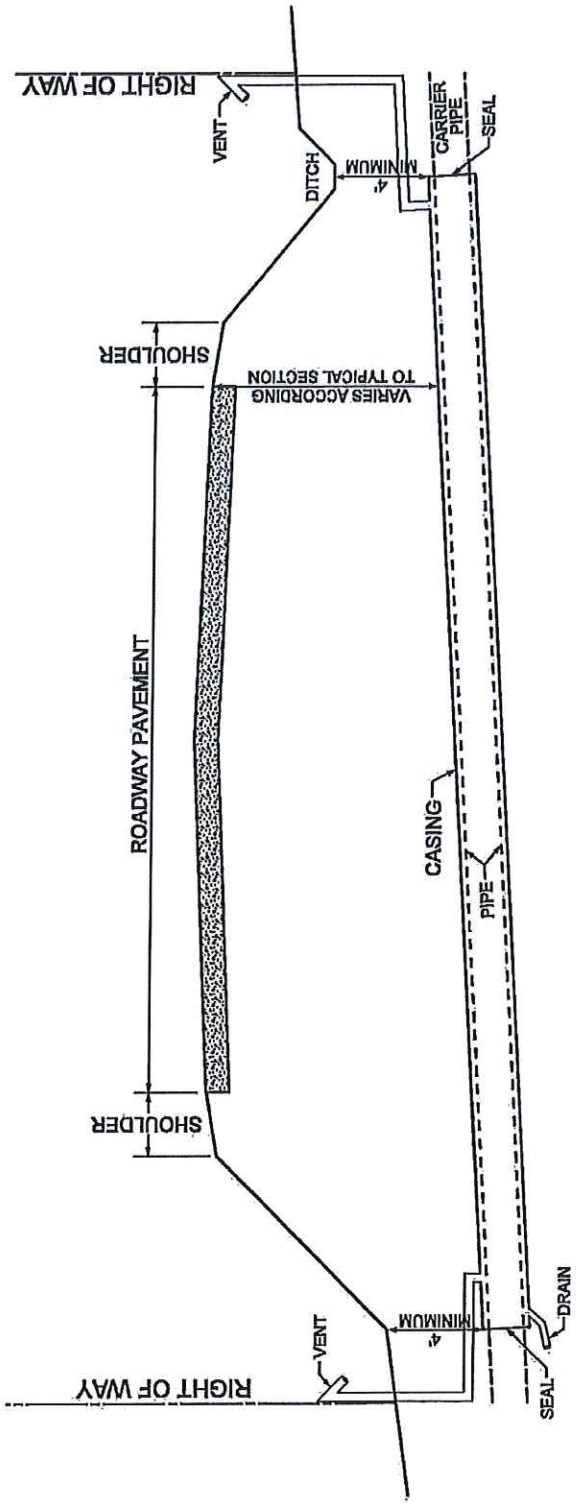
TEMPORARY SILT FENCE

815-605-00

EFFECTIVE LETTING DATE JULY, 2017

Appendix B: Pipelines

Figure 1 – Example of Features for Encased Pipeline Crossings

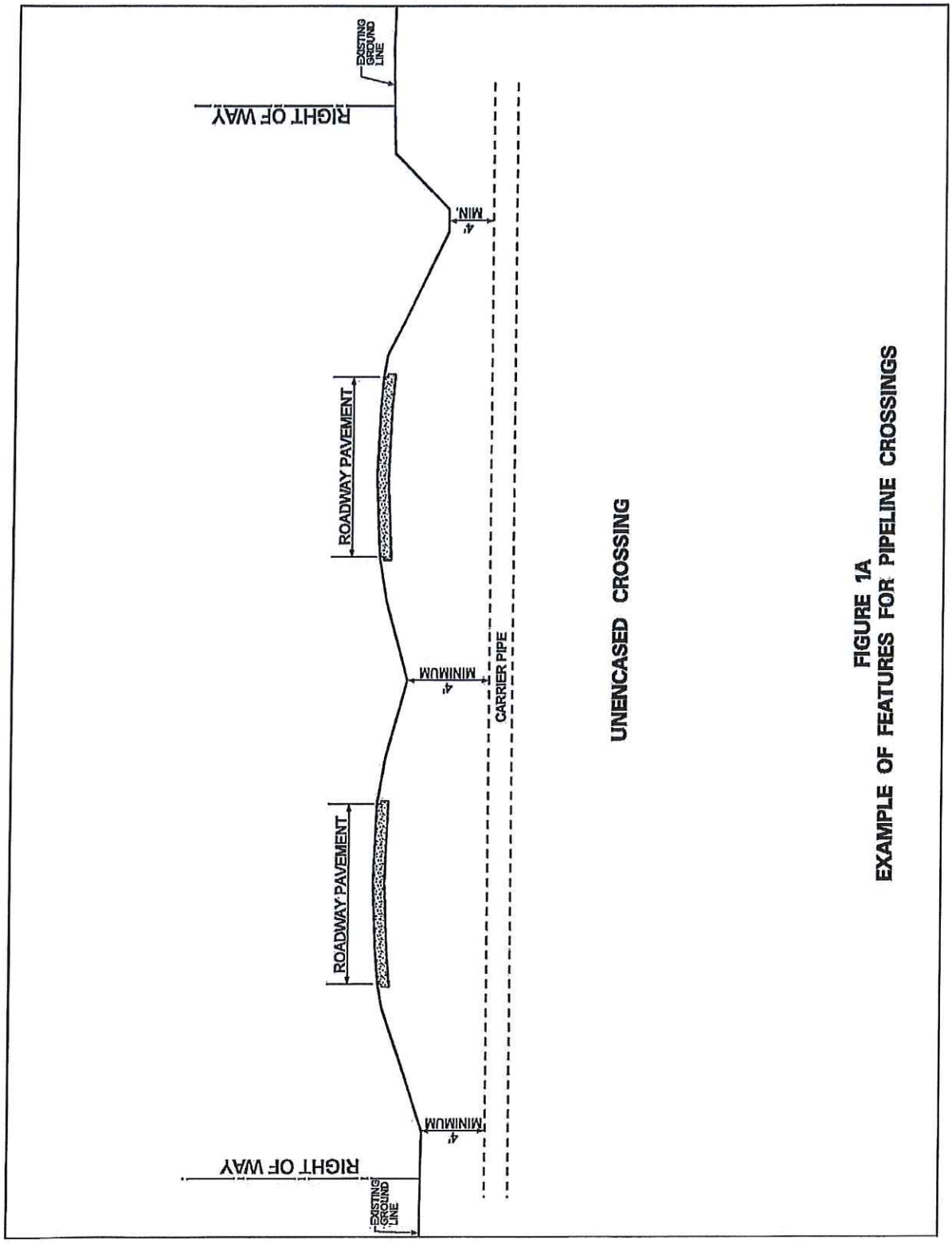


ENCASED CROSSING

FIGURE 1
EXAMPLE OF FEATURES FOR PIPELINE CROSSINGS

Appendix B: Pipelines

Figure 1A – Example of Features for Unencased Pipeline Crossings



Appendix B: Pipelines
Figure 3 – Examples of Protection of Existing Pipelines

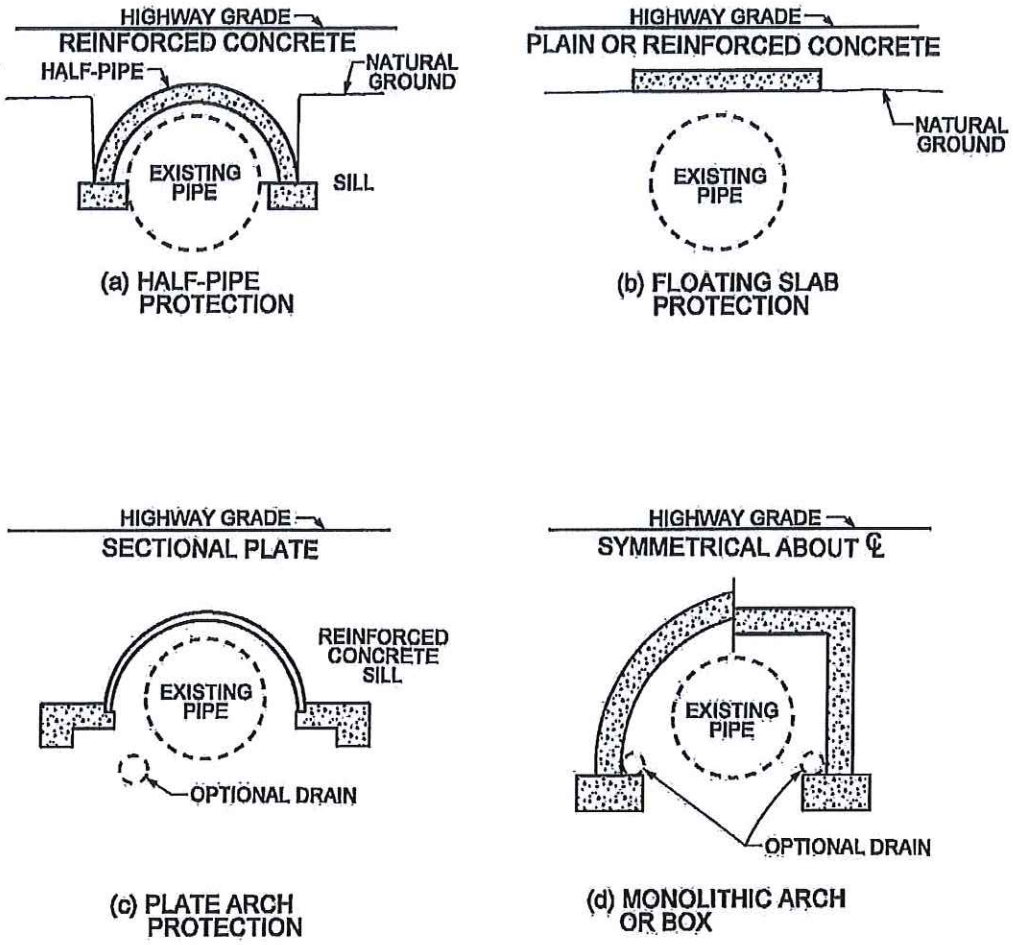


FIGURE 3
EXAMPLES OF PROTECTION OF EXISTING PIPELINES

Appendix B: Pipelines
Figure 4 – Pavement Repairs

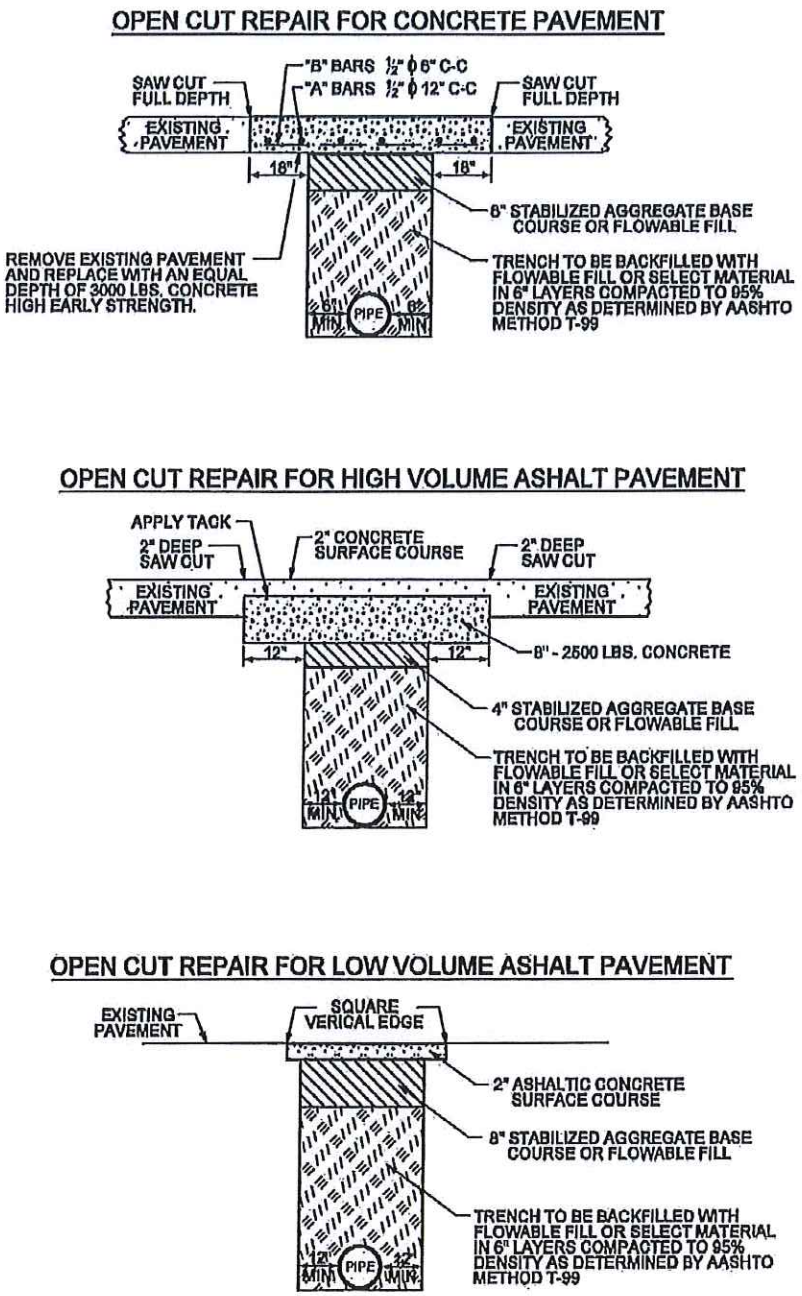


FIGURE 4
PAVEMENT REPAIRS

Appendix B: Pipelines
Figure 5 – Detail for Boring Pit Location

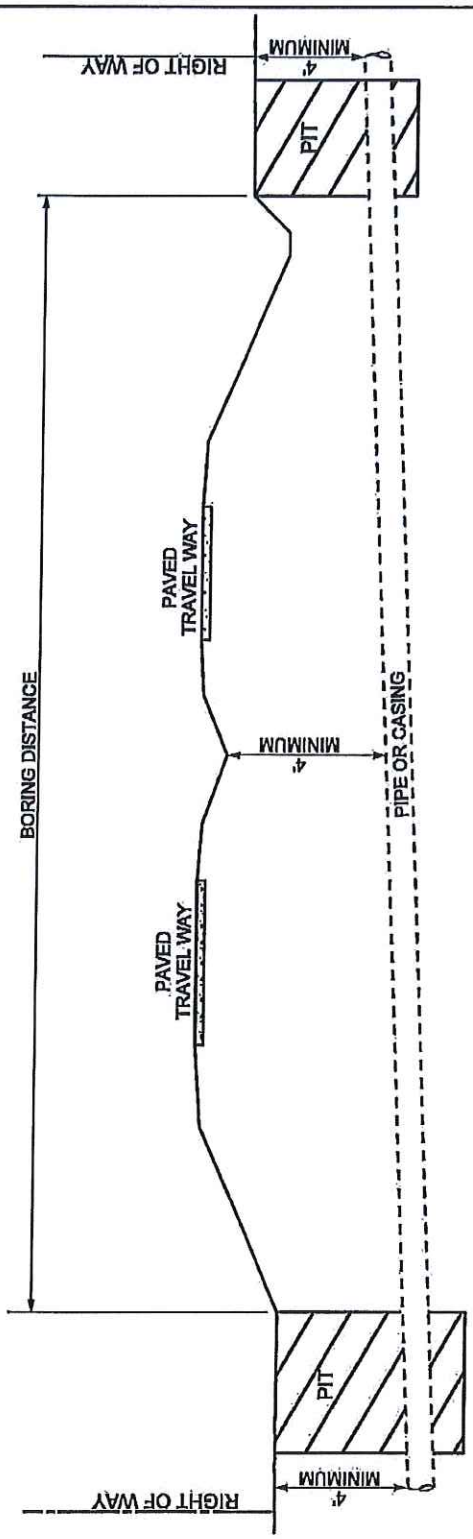


FIGURE 5
DETAIL FOR BORING PIT LOCATION

Appendix B: Pipelines

Figure 6 – Longitudinal Installation of Utilities in Roadway Shoulders

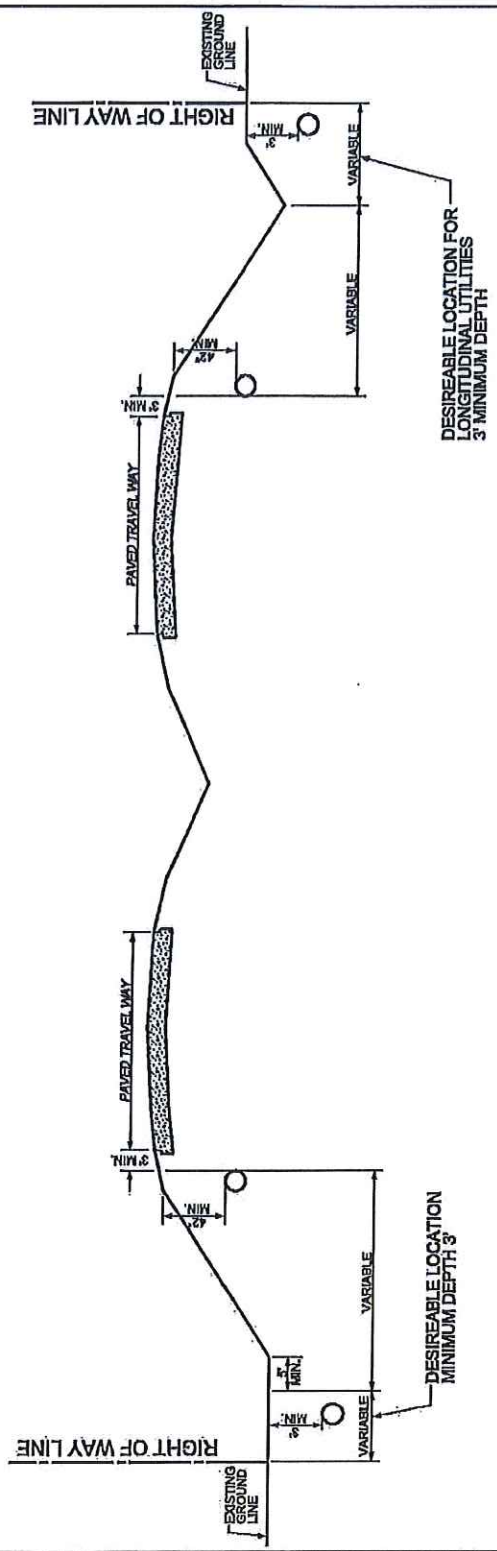


FIGURE 6
CROSS SECTION SHOWING
LONGITUDINAL INSTALLATION OF
UTILITIES IN ROADWAY SHOULDERS

SCDOT RIGHTS OF WAY

HORIZONTAL DIRECTIONAL DRILLING CHECK LIST

1.) PERFORMANCE BOND

☐ Bond required for a period of 5 years from the completion date of installation to cover any roadway failures.

2.) NAME OF BORING COMPANY

☐ Name of company and company experience record. Project schedule.

3.) SITE LAYOUT PLAN

☐ Location of entry and exit points, access pit locations, and equipment and pipe layout areas.

☐ Location and clearances of all existing utility crossings and structures. Show all elevations.

☐ Depth of cover over casing.

☐ Show all R/W lines, controlled access lines, property lines, and other utility R/W or easements.

4.) DRILLING CRITERIA

☐ Length, product pipe diameter, pipe material, pipe wall thickness, and pipe ream diameter for proposed directional drill.

☐ Detailed pipe calculations confirming ability of product pipe or casing pipe to withstand installation loads.

☐ Soil analysis. USGS maps can be used for depths up to 6 feet.

☐ Theoretical amount of drilling fluid to be used during the drilling operation. Source, pH, and hardness of makeup water for the drilling fluids.

☐ Name of drilling fluids being used (Company Name), name of field representative (drilling fluids manufacturer) that will provide the technical support, fluid testing and recommendations if needed during the drilling and pulling phase.

☐ Drilling fluid pumping capacity in gallons per minute (gpm), and gallons per rod (gpr), pressures, and flow rates proposed.

☐ Proposed density, composition of drilling fluids whether they are bentonite or polymer based (based on soil sample).

☐ Construction method including diameter of pilot hole, number and size of pre-reams.

5.) DRILLING EQUIPMENT

☐ 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.

☐ Type of tracking method/system, operation range, and accuracy.

☐ Type and capacity of mud mixing system.

☐ 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.

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

6.) CONTINGENCY PLAN IN CASE OF FRAC-OUT OR DRILLING HOLE FAILURE

☐ Equipment available and location of resources to make repairs.

7.) TRAFFIC CONTROL PLAN

☐ Indicate proposed detour routes. Show or describe additional measures not included in the MUTCD such as assistance from the Highway Patrol.

8.) DISPOSAL PLAN FOR SPENT DRILLING FLUIDS

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 (5 pages)

☐ 1. Site layout plan, project schedule and company experience record.

Site is located at approximately 330 feet or .063 miles NE of Bush River (S-32-273) working along Berryhill Rd & along Bush River Rd to end at the corner of Bush Rd & Executive Pointe Blvd. in Lexington County. The Drill setups will not impede on SCDOT ROW. Total boring distance is 329′ or .062 miles. Please see the attached drawing TWC-9175-01 for Spectrum permit request.

This project will start and end within a 30 day window of receiving the approved permit. To allow for current locates by PUPS, material availability and scheduling the boring contractor. An 8 hour schedule is planned from 8am to 5pm.

Boring Contractor: Moore's Cable Construction, LLC
105 Falling Creek Road, Rockingham NC 28379

For over two years, this company has successfully completed numerous directional drilling projects for TWC under high pressure gas lines, interstates, SC and US Highways, as well as, secondary roads.

☐ 2. Location of entry and exit points, access pit locations, and equipment and pipe layout areas.

The equipment setup with pipe layout, as well as, entry pit will be in the SCDOT Right of Way, not being within 5′ EOP. Please see detail site layout on the attached drawing for Spectrum permit request TWC-9175-01.

☐ 3. Proposed drill path alignment (both horizontal and vertical) to include the lowest point of the roadway cross section.

Please see detail site layout on the attached drawing for Spectrum permit request TWC-9175-01.

☐ 4. Location and clearances of all existing utility crossings and structures.

Please see detail site layout on the attached drawing for Spectrum permit request TWC-9175-01.

As-built drawings will be provided when work is complete.

☐ 5. Depth of cover over the casing.

Minimum of Six feet depth will be maintained while in the SCDOT Right-of-way.

☐ 6. Soil analysis to a depth of five feet below the proposed drill elevation.

To be supplied on the As-Builts upon completion of the work.

☐ 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).

1.96 Gallons per linear foot required. Total Volume required for 4" pilot hole = 313 Gallons. See attached CETCO Drilling Products-Drilling Fluids Program calculations.

☐ 8. Supply data sheet showing the actual amount of drilling fluid used during the drilling operation.

To be supplied on the As-Builts upon completion of the work.

☐ 9. Provide the source of the make- up water for the drilling fluids.

Columbia Water Department

☐ 10. Supply field pH and hardness reading for the make- up water, drilling fluids on the data sheet each time new fluids are mixed.

To be supplied on the As-Builts upon completion of the work.

☐ 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.

To be supplied on the As-Builts upon completion of the work.

☐ 12. Length, product pipe diameter, pipe material, pipe wall thickness, and pipe ream diameter for proposed directional drill.

Pipe length = 81'; Product Pipe Diameter =2"; Pipe Material = HDPE; Wall Thickness = .216; Pipe Ream Diameter = 4"

☐ 13. Detailed pipe calculations confirming ability of product pipe or casing pipe to withstand installations loads.

Blue Diamond Industries, LCC-3399 Tates Creek Road, Suite 110, Lexington, KY 40502
(859) 224-0415 office or (859) 224-0543 fax
Size + 2" SDR 11 Weight/LF (lbs) .639 – Pipe Dimensions = 2.375 (OD) -1.917 (ID) .216 (Wall) See attached Manufacturers Specs.

☐ 14. Proposed and actual viscosity, density, and composition of drilling fluids whether they are bentonite or polymer based (based on soil analysis).

Hydraul-EZ=High-yield, 200-mesh sodium bentonite with a special dry polymer additive.
Super Pac Xtra-Low = Low viscosity, liquid multi-purpose polymer.
Suspend-It easy mixing biopolymer additive used to control drilling fluid rheology.
See attached CETCO Drilling Products Drilling Program calculations with product information. Actual to be supplied on the As-Builts upon completion of the work.

☐ 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.

See attached CETCO Drilling Products - Drilling Fluids Program calculations with product Information. George Dugan (Field Rep) (281) 705-7794

☐ 16. Construction method including diameter of pilot hole, number, and size of pre-reams.

The method of boring will consist of one forward shot with a conventional paddle style bit at a depth of no less than 6 feet cover within SCDOT Right-of-way using a 2" HDPE pipe with 4" pilot hole no pre-reaming or back reaming will be required.

☐ 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).

13 gpm & 13 gpr = Maximum for the Ditch Witch JT920L
Anticipated Pressures = 300-500 psi
Anticipated Flow Rates = 3-4 gpm
Actual to be supplied on the As-Builts upon completion of the work.

☐ 18. Show all right-way lines, controlled access lines, property lines and other utility right-of-way or easements.

Please see detail site layout on the attached drawing for Spectrum permit TWC-9175-01.

☐ 19. Show all elevations.

Please see detail site layout on the attached drawings for Spectrum permit TWC-9175-01.

☐ 20. Type and capacity of drilling machine to include the manufacturer, model number, thurst/pullback (in lbs.), maximum torque, drilling speed, drill pipe length, drilling distance and power source.

Ditch Witch JT920L
Thrust = 8600 lbs / Pullback = 8600 lbs
Maximum Torque = 1100ft/lb; Drilling speed=182 RPM's;
Drill Pipe Length = 10'; Drilling distance = up to 400'
Power Source = Lister-Petter Diesel 55 HP Turbo Diesel.

☐ 21. Type of tracking method/system, operation range and accuracy.

DW 750 Tracker & 750 Display 86 Beacon

☐ 22. Type and capacity of mud mixing system.

DW MMS 300 gal.

☐ 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.

To monitor bore path from beginning to end, during and after bore to insure there is no disturbance.

☐ 24. Contingency plan for frac-out or drilling hole failure.

Mill 20 ft on either side of disturbance and repair according to SCDOT Guidelines.

☐ 25. Traffic control plan when applicable.

See attached page from SCDOT Work Zone Safety Handbook.

☐ 26. Disposal plan for spent drilling fluids, ie: (land farming, landfill, etc.).

The local county landfill.

☐ 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.

Per the As-Builts the Boring Contractor to provide upon the completion of the job.

☐ 28. Confirm the drilling unit 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 operators provided with shoes and gloves in the event of a strike.

The following Table details the recommended minimum depths below the lowest point of 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 pipe 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.

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 12/28/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Marsh USA, INC.
701 Market Street, Suite 1100
St. Louis, MO 63101

CONTACT NAME: Steve Miranda
PHONE (A/C, No, Ext): 803-251-5308 FAX (A/C, No): 803-251-5433
E-MAIL ADDRESS: steve.miranda@charter.com

INSURER(S) AFFORDING COVERAGE		NAIC #
COMPANY A:	National Union Fire Ins Co Pittsburgh PA	19445
COMPANY B:	New Hampshire Insurance Company	23841
COMPANY C:	Commerce and Industry Insurance Company	19410
COMPANY D:	Ace Property & Casualty Insurance Company	20699
COMPANY E:	AIU Insurance Company	19399
COMPANY F:	American Home Assurance Company	19380

INSURED
Charter Communications, Inc.
400 Atlantic Street
Stamford, CT 06901

COVERAGES **CERTIFICATE NUMBER:** 287922 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
C	X COMMERCIAL GENERAL LIABILITY			GL 3629906	1/1/2019	1/1/2020	EACH OCCURRENCE	$ $1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ $500,000
							MED EXP (Any one person)	$ $10,000
							PERSONAL & ADV INJURY	$ $1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ $3,000,000
	X POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$ $1,000,000
	OTHER:							$
A	AUTOMOBILE LIABILITY			CA 1921838 (AOS)	1/1/2019	1/1/2020	COMBINED SINGLE LIMIT (Ea accident)	$ $1,000,000
A	X ANY AUTO			CA 1921839 (MA)	1/1/2019	1/1/2020	BODILY INJURY (Per person)	$
A	OWNED AUTOS ONLY / SCHEDULED AUTOS			CA 1921840 (VA)	1/1/2019	1/1/2020	BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
D	X UMBRELLA LIAB X OCCUR			G28119616 004	1/1/2019	1/1/2020	EACH OCCURRENCE	$ $10,000,000
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$ $10,000,000
	DED RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY			See second page for specific policy information.	1/1/2019	1/1/2020	X PER STATUTE OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N N (Mandatory in NH)	N/A			1/1/2019	1/1/2020	E.L. EACH ACCIDENT	$ $5,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below				1/1/2019	1/1/2020	E.L. DISEASE - EA EMPLOYEE	$ $5,000,000
					1/1/2019	1/1/2020	E.L. DISEASE - POLICY LIMIT	$ $5,000,000
B	Excess WC OH ($5M Retention)			XWC 45955666 (QSI OH)	1/1/2019	1/1/2020	Employers Liability	$5,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Please see page 2 for additional insureds and any additional language.

CERTIFICATE HOLDER

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
955 PARK STREET
COLUMBIA, SC 29201

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
Joseph M. Lee

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AGENCY CUSTOMER ID: _____

LOC #: _____

ADDITIONAL REMARKS SCHEDULE

Page ____ of ____

AGENCY	NAMED INSURED
One Federal Street Boston, MA 02110 USA	Charter Communications, Inc. 400 Atlantic Street Stamford, CT 06901
	EFFECTIVE DATE: 01/01/2019

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: 25 FORM TITLE: Certificate of Liability Insurance

Certificate Reference: 287922

WORKERS COMPENSATION POLICY INFORMATION

Insurer	Policy Number	Effective Date	Expiration Date
E	WC 12716987 (NY)	1/1/2019	1/1/2020
B	WC 14122396 (MA,ND,WA,WI,WY)	1/1/2019	1/1/2020
B	WC 14122397 (AZ, IL,KY,NC,NH,NJ,PA,UT,VA,VT)	1/1/2019	1/1/2020
F	WC 14122398 (CA)	1/1/2019	1/1/2020
B	WC 14122399 (AOS)	1/1/2019	1/1/2020
G	WC 14122400 (FL)	1/1/2019	1/1/2020

Insurer G: Illinois National Insurance Company

Charter Communications, Inc. branded Spectrum, Spectrum Business and Spectrum Enterprise and their

- Subsidiaries, associated, affiliated and inter-related companies;
- Controlled or majority (more than 50%) owned partnerships, limited liability companies;
- Interest only in (or its subsidiaries' interest in) any other partnerships or joint ventures or limited liability companies;
- Interest in (or its subsidiaries' interest in) any company or organization coming under its active management or control;
- Any entity or party required to be insured under any contract or agreement which may now exist, may have previously existed, or may hereafter be created or acquired.

Bresnan Broadband Holdings, LLC, Bresnan Broadband of Colorado, LLC, Bresnan Broadband of Montana, LLC, Bresnan Broadband of Utah, LLC, Bresnan Broadband of Wyoming, LLC, Bresnan Communications, LLC, Bresnan Digital Services, LLC, Bresnan Microwave of Montana, LLC, Bright House Networks Information Services (Alabama), LLC, Bright House Networks Information Services (California), LLC, Bright House Networks Information Services (Florida), LLC, Bright House Networks Information Services (Indiana), LLC, Bright House Networks Information Services (Michigan), LLC, Bright House Networks, LLC, Cable Equities Colorado, LLC, CC Michigan, LLC , CC Systems, LLC, CC VIII Fiberlink, LLC, CC VIII Operating, LLC , CCO SoCal I, LLC, CCO SoCal II, LLC, Charter Advanced Services (AL), LLC, Charter Advanced Services (CA), LLC, Charter Advanced Services (CO), LLC, Charter Advanced Services (CT), LLC, Charter Advanced Services (GA), LLC, Charter Advanced Services (IL), LLC, Charter Advanced Services (LA), LLC, Charter Advanced Services (MA), LLC, Charter Advanced Services (MD), LLC, Charter Advanced Services (MI), LLC, Charter Advanced Services (MN), LLC, Charter Advanced Services (MO), LLC, Charter Advanced Services (MS), LLC, Charter Advanced Services (MT), LLC, Charter Advanced Services (NC), LLC, Charter Advanced Services (NE), LLC, Charter Advanced Services (NH), LLC, Charter Advanced Services (NV), LLC, Charter Advanced Services (NY), LLC, Charter Advanced Services (OR), LLC, Charter Advanced Services (SC), LLC, Charter Advanced Services (TN), LLC, Charter Advanced Services (TX), LLC, Charter Advanced Services (UT), LLC, Charter Advanced Services (VA), LLC, Charter Advanced Services (VT), LLC, Charter Advanced Services (WA), LLC, Charter Advanced Services (WI), LLC, Charter Advanced Services (WY), LLC, Charter Advanced Services VIII (MI), LLC, Charter Advanced Services VIII (MN), LLC, Charter Advanced Services VIII (WI), LLC, Charter Cable Partners, LLC , Charter Communications Entertainment I, LLC , Charter Communications Entertainment II, LLC , Charter Communications Entertainment VII, LLC, Charter Communications Operating, LLC, Charter Communications Properties LLC, Charter Communications VI, L.L.C., Charter Communications, LLC , Charter Fiberlink - Alabama, LLC, Charter Fiberlink - Georgia, LLC, Charter Fiberlink - Illinois, LLC, Charter Fiberlink - Maryland II, LLC, Charter Fiberlink - Michigan, LLC, Charter Fiberlink - Missouri, LLC, Charter Fiberlink - Nebraska, LLC, Charter Fiberlink - Pennsylvania, LLC, Charter Fiberlink - Tennessee, LLC, Charter Fiberlink AR-CCVII, LLC, Charter Fiberlink CA-CCO, LLC , Charter Fiberlink CC VIII, LLC, Charter Fiberlink CCO, LLC , Charter Fiberlink CT-CCO, LLC, Charter Fiberlink LA-CCO, LLC, Charter Fiberlink MA-CCO, LLC , Charter Fiberlink MS-CCVI, LLC, Charter Fiberlink NC-CCO, LLC , Charter Fiberlink NH-CCO, LLC, Charter Fiberlink NV-CCVII, LLC, Charter Fiberlink NY-CCO, LLC, Charter Fiberlink OH-CCO, LLC, Charter Fiberlink OR-CCVII, LLC, Charter Fiberlink SC-CCO, LLC , Charter Fiberlink TX-CCO, LLC , Charter Fiberlink VA-CCO, LLC, Charter Fiberlink VT-CCO, LLC , Charter Fiberlink WA-CCVII, LLC, Charter Video Electronics, LLC , DukeNet Communications, LLC , Falcon Cable Media, a California Limited Partnership , Falcon Cable Systems Company II, L.P., Falcon Cablevision, a California Limited Partnership , Falcon Community Cable, L.P., Falcon Community Ventures I Limited Partnership, Falcon First Cable of the Southeast, LLC , Falcon Telecable, a California Limited Partnership , Falcon Video Communications, L.P., Hometown T.V., LLC , HPI Acquisition Co. LLC, Insight Communications Midwest, LLC, Insight Communications of Central Ohio, LLC, Insight Kentucky Partners II, L.P., Interlink Communications Partners, LLC, Long Beach LLC, Marcus Cable Associates, L.L.C., Marcus Cable of Alabama, L.L.C., Midwest Cable Communications, LLC , NaviSite LLC , Oceanic Time Warner Cable LLC , Renaissance Media LLC, Rifkin Acquisition Partners, LLC, Robin Media Group, LLC, Scottsboro TV Cable, LLC , Spectrum Gulf Coast, LLC, Spectrum Mid-America, LLC , Spectrum Pacific West, LLC, Spectrum Security, LLC, Spectrum Southeast, LLC , The Helicon Group, L.P., Time Warner Cable Enterprises LLC, Time Warner Cable Information Services (Alabama), LLC, Time Warner Cable Information Services (Arizona), LLC , Time Warner Cable Information Services (California), LLC, Time Warner Cable Information Services (Colorado), LLC, Time Warner Cable Information Services (Hawaii), LLC, Time Warner Cable Information Services (Idaho), LLC, Time Warner Cable Information Services (Illinois), LLC, Time Warner Cable Information Services (Indiana), LLC, Time Warner Cable Information Services (Kansas), LLC, Time Warner Cable Information Services (Kentucky), LLC , Time Warner Cable Information Services (Maine), LLC, Time Warner Cable Information Services (Massachusetts), LLC, Time Warner Cable Information Services (Michigan), LLC, Time Warner Cable Information Services (Missouri), LLC, Time Warner Cable Information Services (Nebraska), LLC, Time Warner Cable Information Services (New Hampshire), LLC, Time Warner Cable Information Services (New Jersey), LLC, Time Warner Cable Information Services (New Mexico), LLC, Time Warner Cable Information Services (New York), LLC , Time Warner Cable Information Services (North Carolina), LLC, Time Warner Cable Information Services (Ohio), LLC, Time Warner Cable Information Services (Pennsylvania), LLC , Time Warner Cable Information Services (South Carolina), LLC, Time Warner Cable Information Services (Tennessee), LLC, Time Warner Cable Information Services (Texas), LLC , Time Warner Cable Information Services (Virginia), LLC, Time Warner Cable Information Services (Washington), LLC, Time Warner Cable Information Services (West Virginia), LLC, Time Warner Cable Information Services (Wisconsin), LLC, Time Warner Cable Internet LLC , Time Warner Cable Media LLC , Time Warner Cable New York City LLC, Time Warner Cable Northeast LLC, Time Warner Cable Sports LLC , TWC Administration LLC, TWC Digital Phone LLC, TWC Digital Phone LLC, TWC News and Local Programming LLC, TWC Regional Sports Network I LLC

...and any corporation or other business organization other than a joint venture in which the Named Insured shown in the declarations has or acquires during the policy period an ownership of more than 50% and which is domiciled within the United States of America, its territories or possessions, Puerto Rico or Canada.

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Smoothwall Specifications

dura-line

SDR-9 Dimensions per ASTM D-3035

Nominal Duct Size	Min. Inside Diameter	Avg. Outside Diameter	Minimum Wall	Maximum Wall	Bend Radius	Safe Working Pull Strength	Average Weight lbs/ft
1"	0.978	1.315±0.005	0.146	0.166	14"	1,465 lbs	0.233
1 1/4"	1.243	1.660±0.005	0.184	0.206	17"	2,336 lbs	0.369

SDR-11 Dimensions per ASTM D-3035

Nominal Duct Size	Min. Inside Diameter	Avg. Outside Diameter	Minimum Wall	Maximum Wall	Bend Radius	Safe Working Pull Strength	Average Weight lbs/ft
1/2"	0.644	0.840±0.004	0.076	0.096	9"	497 lbs	0.084
3/4"	0.816	1.050±0.004	0.095	0.115	11"	787 lbs	0.128
1"	1.030	1.315±0.005	0.120	0.140	14"	1,223 lbs	0.199
1 1/4"	1.313	1.660±0.005	0.151	0.171	17"	1,962 lbs	0.312
1 1/2"	1.506	1.900±0.006	0.173	0.194	19"	3,211 lbs	0.407
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2 1/2"	2.282	2.875±0.007	0.261	0.293	29"	5,976 lbs	0.929
3"	2.780	3.500±0.008	0.318	0.356	35"	8,706 lbs	1.376
4"	3.575	4.500±0.009	0.409	0.458	45"	14,392 lbs	2.276
6"	5.266	6.625±0.011	0.602	0.674	67"	31,186 lbs	4.932

SDR-13.5 Dimensions per ASTM D-3035

Nominal Duct Size	Min. Inside Diameter	Avg. Outside Diameter	Minimum Wall	Maximum Wall	Bend Radius	Safe Working Pull Strength	Average Weight lbs/ft
1/2"	0.672	0.840±0.004	0.062	0.082	9"	497 lbs	0.071
3/4"	0.850	1.050±0.004	0.078	0.098	11"	662 lbs	0.109
7/8"	0.958	1.183±0.005	0.090	0.110	12"	728 lbs	0.140
1"	1.076	1.315±0.005	0.097	0.117	14"	1,037 lbs	0.167
1 1/4"	1.369	1.660±0.005	0.123	0.143	17"	1,626 lbs	0.262
1 1/2"	1.572	1.900±0.006	0.141	0.161	19"	2,136 lbs	0.341
2"	1.975	2.375±0.006	0.176	0.197	24"	3,330 lbs	0.527
2 1/2"	2.392	2.875±0.007	0.213	0.238	29"	4,873 lbs	0.771
3"	2.912	3.500±0.008	0.259	0.290	35"	7,222 lbs	1.143
4"	3.745	4.500±0.009	0.333	0.373	45"	11,933 lbs	1.890
6"	5.514	6.625±0.011	0.491	0.550	67"	25,906 lbs	4.103

SDR-15.5 Dimensions per ASTM D-3035

Nominal Duct Size	Min. Inside Diameter	Avg. Outside Diameter	Minimum Wall	Maximum Wall	Bend Radius	Safe Working Pull Strength	Average Weight lbs/ft
1"	1.102	1.315±0.005	0.084	0.104	14"	891 lbs	0.148
1 1/4"	1.401	1.660±0.005	0.107	0.127	17"	1,426 lbs	0.233
4"	3.841	4.500±0.009	0.290	0.325	45"	10,494 lbs	1.665

ETCO DRILLING PRODUCTS
DRILLING FLUIDS ▪ GROUTS & SEALANTS ▪ POLYMERS & ADDITIVES ▪ WELL REHABILI

Drilling Fluids Program

ect Name:

: 3/5/2009

Conditions: Sand

Length: 160 feet

cling Fluid: No

Hole Fluid Requirements
ons per linear foot required: 1.96
Volume Required for Pilot Hole: 313 gallons

: Multiply gallons per linear 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.

Volume of Drilling Fluid Required: 313 gallons

Drilling Fluid Products Needed for Project

ı Ash

to 0.50 lbs per 100 gallons of freshwater
lbs needed: 1 to 2
50 lb bags needed 1 to 1

aul-EZ®

30 lbs per 100 gallons of freshwater
lbs needed: 78 to 94
50 lb bags needed: 2 to 2

r Pac™ Xtra Low

gallons per 100 gallons of drilling fluid
gallons needed: 2
5 gallon pails needed: 1

Suggested Additive(s) for Difficult Formations

end-IT™

bs per 100 gallons of drilling fluid
lbs needed: 2
25 lb pails needed: 1

g Order for Drilling Fluid Products

da Ash (add when filling water)
draul-EZ®
ber Pac™ Xtra Low (after drilling fluid has completely yielded)
spend-IT™ (after polymer has been fully blended into the system)

>>> Select a location

diversified environmental and construction technologies

Vaterproofing Products

Drilling Products

Construction Drilling Products

Lining Technologies

Pond Products

Remediation Technologies

Contracting Services

Liquid Boot

Strongseal Roofing Products

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>> Sitemap >>>

CETCO Oilfield Services Co.
>Water Treatment
>Pipeline Services
>Well Testing Services
>Industrial Wastewater
>Rental Services
>Nitrogen Services

http://www.cetco.com/

WELCOME TO CETCO

CETCO provides products and services worldwide, extending to customers in a diverse range of industries including industrial applications, concrete waterproofing for underground structures, lining systems for liquid containment on projects ranging from landfills to flood control, and non-oil and gas related drilling applications including foundation, water well, and horizontal drilling. CETCO is backed by AMCOL International, with more than 80 years of bentonite mining and manufacturing experience.

Our corporate technical center provides the setting for comprehensive research and development as well as technical support necessary to provide the quality products and services you expect.

CETCO manufacturing facilities located in North America, Europe, and Asia are supported by a global sales and distribution network. So wherever you are located, there is likely to be a CETCO office or distributor nearby.

CETCO NEWS

7.15.08 - St. Louis Mayor Cuts Ribbon at CETCO GreenScapes™ Greenroof Opening

7.15.08 - CETCO Construction Drilling's Shore Pac® Receives Oregon Department of Transportation Approval

Field Rep - George Dugan (281) 705-7791

HYDRAUL-EZ®

HORIZONTAL DIRECTIONAL DRILLING FLUID

NSF Certified to NSF/ANSI 60

DESCRIPTION

HYDRAUL-EZ is a high-yield, 200-mesh sodium bentonite with a special dry polymer additive. It is designed to maintain borehole integrity in horizontally drilled boreholes. HYDRAUL-EZ is certified to NSF/ANSI Standard 60, Drinking Water Treatment Chemicals - Health Effects.

RECOMMENDED USE

HYDRAUL-EZ is specially designed for conditions encountered in angle and horizontal drilling. It can be used for all types of freshwater mud rotary drilling and as a jacking lubricant.

CHARACTERISTICS

- Concentrated for high yield
- Eliminates clay and shale swelling, bit balling and sticking problems
- Forms a tight, thin filter cake in unstable formations
- Maintains borehole integrity in horizontal and vertically drilled holes
- Mixes quickly
- Requires less material due to low fluid loss properties

MIXING AND APPLICATIONS

Mixing ratios are based on the use of freshwater. Water purity will affect bentonite performance. For best results, make-up water should be pre-treated with SODA ASH to a pH of 8.5-9.5. HYDRAUL-EZ should be added slowly through a jet/hopper mixer.

HYDRAUL-EZ mixing ratios in pounds per 100 gallons of water:

Normal Conditions	20-30 lbs
Sand and Gravel	30-40 lbs
Fluid loss Control	40-60 lbs

BULK DENSITY

54 lbs/ft^3

PACKAGING

50 lb bags, 48 per pallet. All pallets are plastic-wrapped.

All weights are approximate. The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information. REV 1/09

SUPER PAC™ XTRA-LOW

LIQUID POLYANIONIC CELLULOSIC POLYMER

DESCRIPTION

SUPER PAC XTRA-LOW is a low viscosity, liquid multi-purpose polymer. SUPER PAC XTRA-LOW enhances the beneficial properties of bentonite and polymer drilling fluids.

ADVANTAGES

This low viscosity polymer aids in the control of reactive and unconsolidated formations by reducing filtrate and whole fluid loss. SUPER PAC XTRA-LOW assists hole cleaning in HDD work and increases penetration rates in vertical wells by not significantly raising viscosities.

CHARACTERISTICS

- Helps prevent hydration of shales and clays
- Highly dispersible and mixes at low shear
- Minimized viscosity increase for increased flow
- Reduces filtrate and fluid loss to reactive and permeable or unconsolidated formations
- Suitable for use in fresh and saltwater drilling fluids

MIXING AND APPLICATION

Mix directly into a well circulated mud pit or through venturi hopper. Add 0.5 to 1 quart per 100 gallons of existing bentonite drilling fluid for hole stabilization.

PACKAGING

42 lb pail, 32 per pallet. All pallets are plastic-wrapped.

2870 Forbs Avenue ■ Hoffman Estates, IL 60192 ■ P 800.527.9948 ■ F 847.851.1332 ■ www.cetco.com/dpg

All weights are approximate. The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information. REV 1/09

SUSPEND-IT™

SUSPENSION ENHANCER

DESCRIPTION

SUSPEND-IT is an easy mixing biopolymer additive used to control drilling fluid rheology.

RECOMMENDED USE

Designed to enhance gel strength of the drilling fluid for improved suspension and transporting of drill cuttings on long bores. SUSPEND-IT will perform effectively in fresh or saltwater.

CHARACTERISTICS

- Easily dispersed in drilling fluids
- Enhances gel strength with little increase of viscosity
- Performs well in fresh and saltwater
- Transports cuttings easily on long bores

MIXING AND APPLICATION

Pour slowly through a hopper at maximum shear to avoid lumping and to minimize waste. Add 0.5 to 1 pound of SUSPEND-IT per 100 gallons of existing drilling fluid.

PACKAGING

25-2 lb bags per case, 20 per pallet or 25 lb pail, 36 per pallet. All pallets are plastic-wrapped.

2870 Forbs Avenue ■ Hoffman Estates, IL 60192 ■ P 800.527.9948 ■ F 847.851.1332 ■ www.cetco.com/dpg

All weights are approximate. The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information. REV 1/09

BLUE DIAMOND
Industries, LLC

The following tables represent the dimensional specifications for ASTM D3035, ASTM F714 and ASTM F2160 for OD controlled innerduct.

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
½"	½" SDR 11	BDI063xx-xx	.085	.840	.667	.076
	½" SDR 13.5	BDI064xx-xx	.072	.840	.696	.062

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
¾"	¾" SDR 7	BDI091xx-xx	.182	1.050	.750	.150
	¾" SDR 9	BDI092xx-xx	.152	1.050	.797	.117
	¾" SDR 11	BDI093xx-xx	.130	1.050	.839	.095
	¾" SDR 13.5	BDI094xx-xx	.110	1.050	.874	.078
	¾" SDR 15.5	BDI096xx-xx	.098	1.050	.895	.068
	¾" SDR 17	BDI098xx-xx	.092	1.050	.906	.062

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
1"	1" SDR 7	BDI111xx-xx	.286	1.315	.939	.188
	1" SDR 9	BDI112xx-xx	.235	1.315	1.003	.146
	1" SDR 11	BDI113xx-xx	.200	1.315	1.051	.120
	1" SDR 13.5	BDI114xx-xx	.169	1.315	1.100	.097
	1" SDR 15.5	BDI116xx-xx	.151	1.315	1.147	.084
	1" SDR 17	BDI118xx-xx	.139	1.315	1.140	.077

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
1 ¼"	1 ¼" SDR 7	BDI131xx-xx	.454	1.660	1.186	.237
	1 ¼" SDR 9	BDI132xx-xx	.372	1.660	1.270	.184
	1 ¼" SDR 11	BDI133xx-xx	.314	1.660	1.338	.151
	1 ¼" SDR 13.5	BDI134xx-xx	.264	1.660	1.394	.123
	1 ¼" SDR 15.5	BDI136xx-xx	.235	1.660	1.426	.107
	1 ¼" SDR 17	BDI138xx-xx	.217	1.660	1.445	.098

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
1 ½"	1½" SDR 7	BDI161xx-xx	.595	1.900	1.358	.271
	1½" SDR 9	BDI162xx-xx	.488	1.900	1.452	.211
	1½" SDR 11	BDI163xx-xx	.409	1.900	1.534	.173
	1½" SDR 13.5	BDI164xx-xx	.343	1.900	1.599	.141
	1½" SDR 15.5	BDI166xx-xx	.305	1.900	1.635	.123
	1½" SDR 17	BDI168xx-xx	.282	1.900	1.656	.112

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	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
2"	2" SDR 9	BDI212xx-xx	.762	2.375	1.816	.264
	2" SDR 11	BDI213xx-xx	.639	2.375	1.917	.216
	2" SDR 13.5	BDI214xx-xx	.531	2.375	2.002	.176
	2" SDR 15.5	BDI216xx-xx	.469	2.375	2.049	.153
	2" SDR 17	BDI218xx-xx	.433	2.375	2.095	.140

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
2 ½"	2 ½" SDR 9	BDI262xx-xx	1.117	2.875	2.198	.319
	2 ½" SDR 11	BDI263xx-xx	.936	2.875	2.321	.261
	2 ½" SDR 13.5	BDI264xx-xx	.778	2.875	2.424	.213

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
3"	3" SDR 9	BDI312xx-xx	1.655	3.500	2.676	.389
	3" SDR 11	BDI313xx-xx	1.387	3.500	2.825	.318
	3" SDR 13.5	BDI314xx-xx	1.153	3.500	2.951	.259
	3" SDR 15.5	BDI316xx-xx	1.105	3.500	3.021	.226

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
4"	4" SDR 9	BDI412xx-xx	2.737	4.500	3.440	.500
	4" SDR 11	BDI413xx-xx	2.293	4.500	3.633	.409
	4" SDR 13.5	BDI414xx-xx	1.906	4.500	3.794	.333
	4" SDR 15.5	BDI416xx-xx	1.678	4.500	3.885	.290

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
5"	5" SDR 11	BDI513xx-xx	3.505	5.562	4.490	.506
	5" SDR 13.5	BDI514xx-xx	2.912	5.562	4.689	.412
	5" SDR 15.5	BDI516xx-xx	2.563	5.562	4.801	.359

	Size	Part #	Weight/LF (lbs)	Pipe Dimensions		
				OD	ID	Wall
6"	6" SDR 11	BDI613xx-xx	4.971	6.625	5.348	.602
	6" SDR 13.5	BDI614xx-xx	4.130	6.625	5.585	.491

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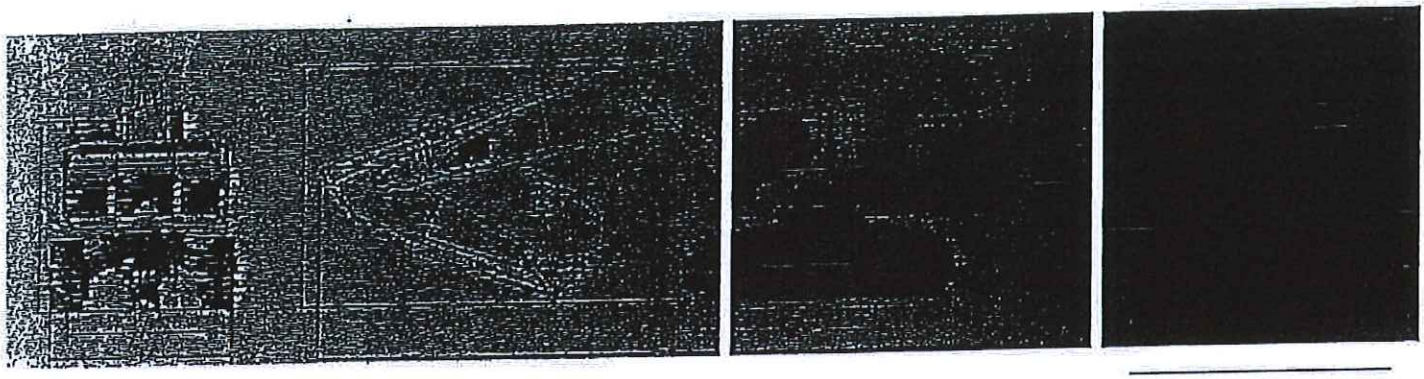

Equipment Specifications Library

Equipment Library

View A Different Ditch Witch Model

View A Different Manufacturer

Manufacturer:	Ditch Witch
Model:	JT920L
Rig Size:	0 - 10,000 lbs Pullback

	US/Imperial	Metric
Drill Stem:	10' 0"	
Engine:	Lister-Petter	
Height:	87"	
Length:	15' 6"	
Pullback:	8,600 lbs.	
Pump Output:	13 gpm	
Pump Pressure:	750 psi	
Rack Capacity:	400'	
Thrust:	8,600 lbs.	
Torque:	1,100 lb.ft	
Weight:	7,560 lbs.	
Width:	50"	

Additional Info:

DIMENSIONS
Length: 200 in
Height: 87 in
Width: 50 in
Operating weight: 7560 lb

DRILL PIPE
Length: 120 in
Joint diameter: 2 in
Tubing diameter: 1.625 in
Min. bend radius: 100 ft

OPERATIONAL

Spindle
Speed: 0-182 rpm
Torque: 1100 ft-lb
Thrust: 8600 lb
Pullback: 8600 lb
Bore diameter: 2.5-4 in
Backream diameter (soil dependent): 12 in
Ground drive speed
Forward: 0-1.8 mph
Reverse: 0-1.8 mph

POWER
Engine: Lister-Petter Turbo LPWT4
Fuel: diesel
Cooling medium: water
Number of cylinders: 4
Displacement: 113.6 cubic inches
Bore: 3.4 in
Stroke: 3.1 in
Gross power @ 3000 rpm: 55.4 hp
Maximum governed speed (no load): 3000 rpm
Operating power @ 2750 rpm: 45 hp

HYDRAULIC SYSTEM
Flow rate: 36 gpm
Relief setting: 2750 psi

FLUID CAPACITIES
Fuel tank: 11.5 gal
Hydraulic reservoir: 16.5 gal
Engine oil with filter: 6 qt

DRILLING FLUID SYSTEM (ON-BOARD)
Flow rate: 13 gpm

BATTERY
SAE reserve capacity 120 min. SAE cold crank @ 0° F (-18° C)
800 amps

NOISE LEVEL
Operator 89 dbA sound pressure per ISO 6394
Exterior 106 dbA sound power per ISO 6393

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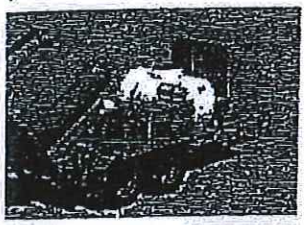
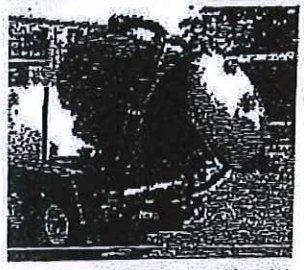
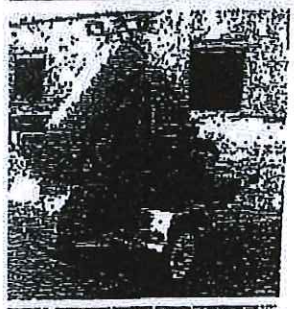


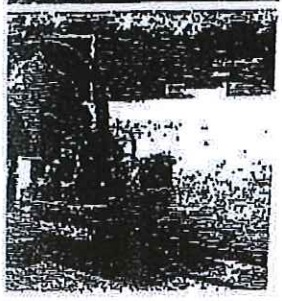
Mini-Combo Series



PMD Series



FlowMaster Series



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RT FILTRATION STEM	• Power Tower (TM): over 60 sq ft of filtration media • 10-gallon water trap • Triple set of washable, reusable filters designed for wet or dry industrial use • Rated at sub microns • Located between the tank and vacuum pump to prevent damage
SES	• Lightweight, easy to use • Variety of attachments for different uses • 33 ft of 3-inch suction hose • Two 3-inch lightweight, di-electric suction wands
H-PRESSURE WATER TEM	• 225 polyethylene tank • 4000 PSI high-pressure water pump • 50-ft high-pressure hose • Locking hose reel
UUM TANK	• Speed-Spin (TM) quick open rear door that can be opened and closed in 15 seconds • Mega-Mouth (TM) full open rear door opens to 48-inch diameter so operator can completely empty tank • Superslick (TM) polymer liner allows quick and clean dump-out • 6-inch rear dump valve for quick liquid discharge • 6-inch stainless steel portal safety shut-off stops loading tank when full
BILITY & SAFETY URES	• Enclosure protects the engine, vacuum pump and water pump from weather and debris • Heat shield for silencer protects

operator from
being burned
• Interstate (TM) 4-coat paint process, including
epoxy primer and polyurethane paint
• 10-gallon aluminum fuel tank prevents rust and
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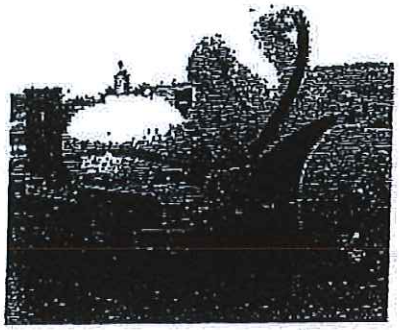

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United States Department of Agriculture

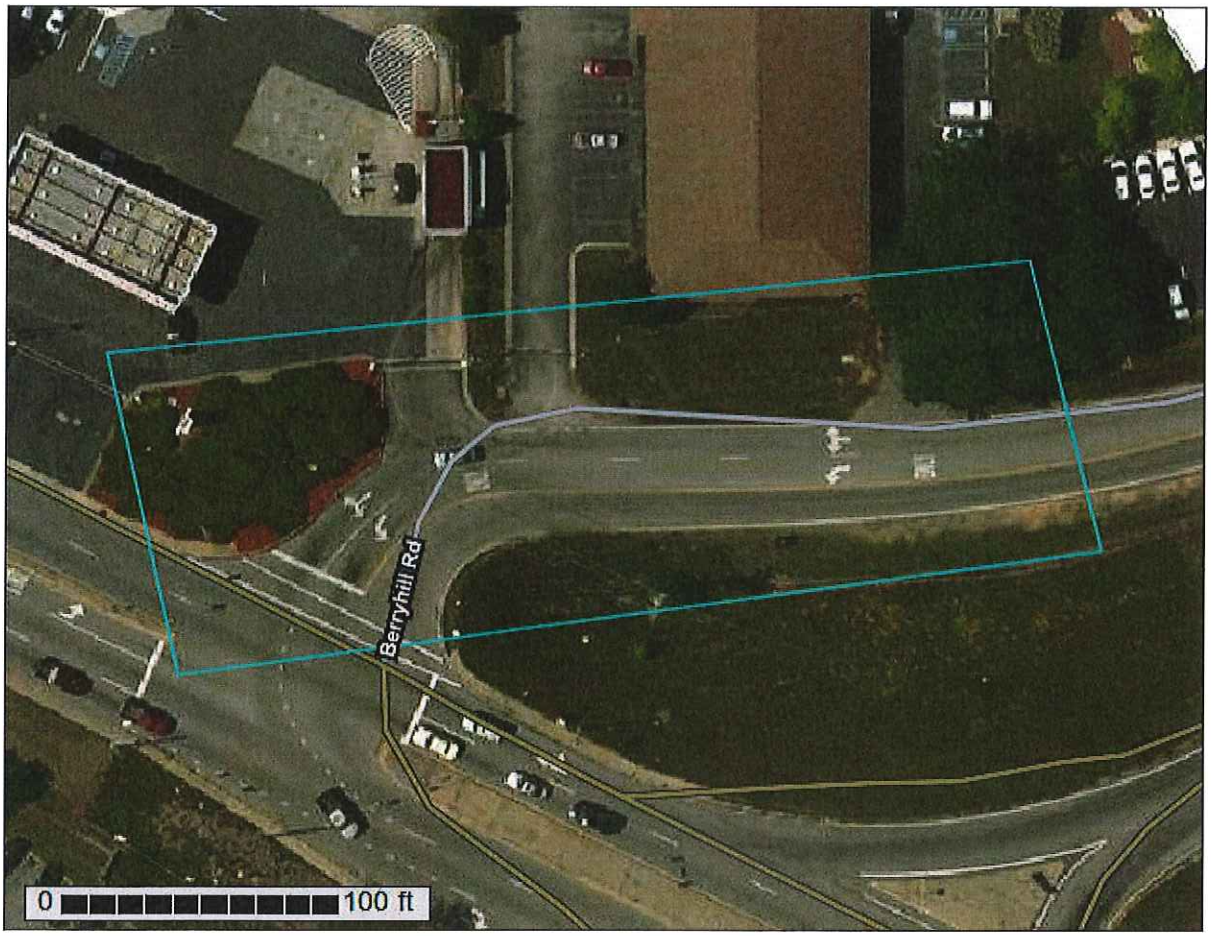
NRCS

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

113 Executive Pointe Blvd (TWC-9175)



October 11, 2019

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.

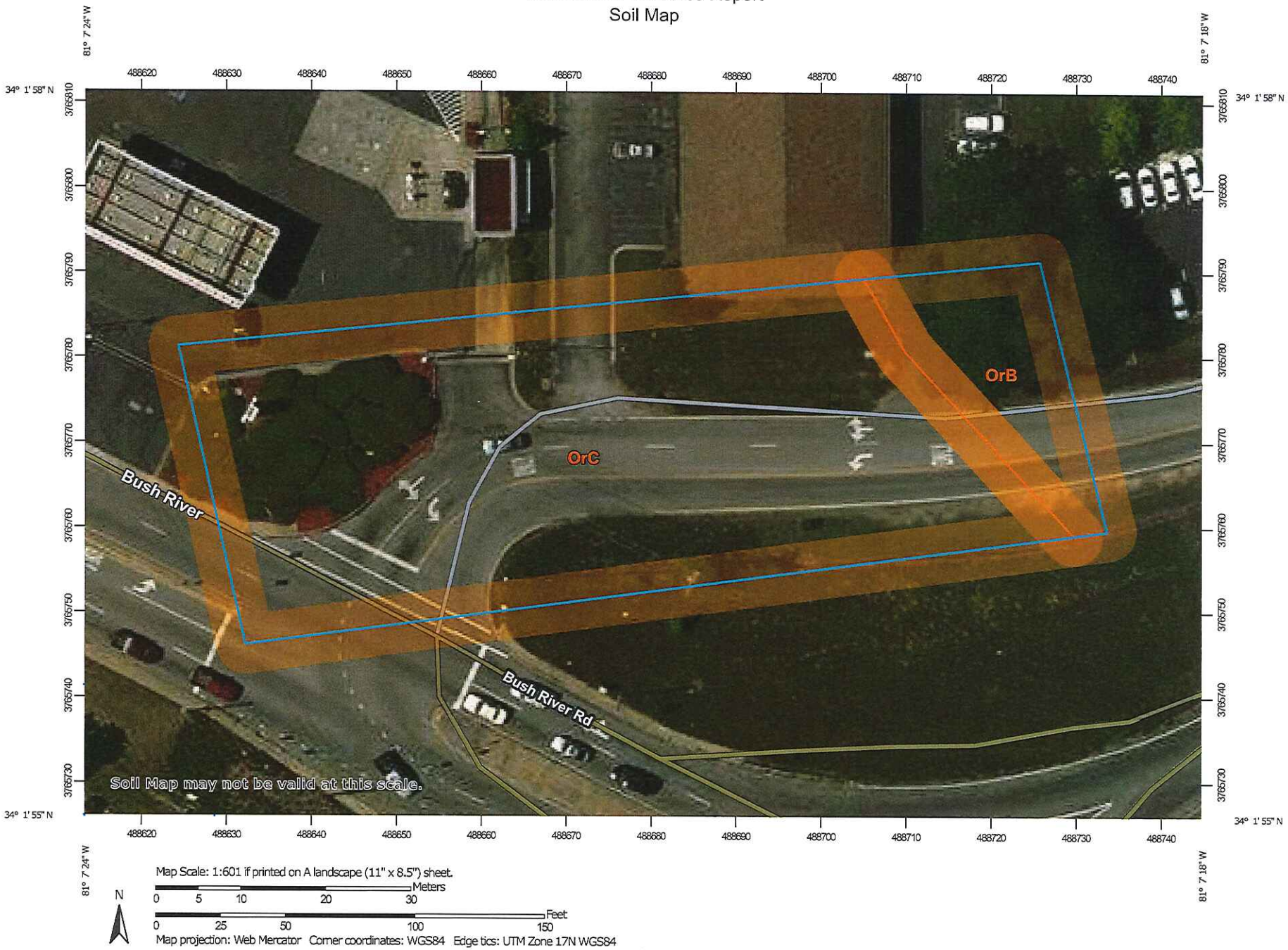
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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.

Soil Map



Map Scale: 1:601 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 25 50 100 150

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

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 18, Sep 16, 2019

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

Date(s) aerial images were photographed: May 14, 2013—Jun 14, 2013

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
OrB	Orangeburg loamy sand, 2 to 6 percent slopes	0.1	12.5%
OrC	Orangeburg loamy sand, 6 to 10 percent slopes	0.8	87.5%
Totals for Area of Interest		**0.9**	**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.

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

OrB—Orangeburg loamy sand, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 4ctq
Elevation: 250 to 650 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: All areas are prime farmland

Map Unit Composition

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

Description of Barnwell

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

Ap - 0 to 10 inches: loamy sand
E - 10 to 12 inches: loamy sand
Bt - 12 to 34 inches: sandy clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural 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 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

OrC—Orangeburg loamy sand, 6 to 10 percent slopes

Map Unit Setting

National map unit symbol: 4ctr
Elevation: 250 to 650 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

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

Description of Cowarts

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

Ap - 0 to 10 inches: loamy sand
E - 10 to 12 inches: loamy sand
Bt - 12 to 34 inches: sandy clay loam

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: Loamy Backslope Woodland - PROVISIONAL (F137XY006GA)
Hydric soil rating: No

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