North Carolina
Department of Environment and Natural Resources

Division of Waste Management

Michael F. Easley, Governor
William G. Ross Jr., Secretary
Dexter R. Matthews, Director

Re-SCANNED 3/13/14

NCDENR

July 22, 2002

Carmen Johnson

Doc ID# Date 8/14/13 DIN

MEMORANDUM

TO: Jim Barber

FROM: Bobby Lutfy BL

RE: Site Plan Application & Construction Plan Application
Highway 55 C&D Landfill and Recycling Center
Wake County

With the additional revisions received today, the Site Plan Application and Construction Plan Application for the Highway 55 C&D Landfill and Recycling Center meet the hydrogeologic requirements in the Solid Waste Management Rules. It is still not clear to me how we should handle the Property Survey since the survey plot includes acreage in addition to that evaluated for the Facility applications.

CC: Jim Coffey

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone: 919-733-4996 \ FAX: 919-715-3605 \ Internet: www.enr.state.nc.us

AN EQUAL OPPORTUNITY \ AFFIRMATIVE ACTION EMPLOYER - 50% RECYCLED / 10% POST CONSUMER PAPER

North Carolina
Department of Environment and Natural Resources

Division of Waste Management

Michael F. Easley, Governor
William G. Ross Jr., Secretary
Dexter R. Matthews, Director

Post-it® Fax Note 7671	Date 8-1-02	# of pages ▶ 1
To Ron Gilkerson	From Bobby Lutfy	
Co./Dept.	Co. NC SWS	
Phone #	Phone #	
Fax # 704-896-2960	Fax #	

July 22, 2002

MEMORANDUM

TO: Jim Barber

FROM: Bobby Lutfy BL

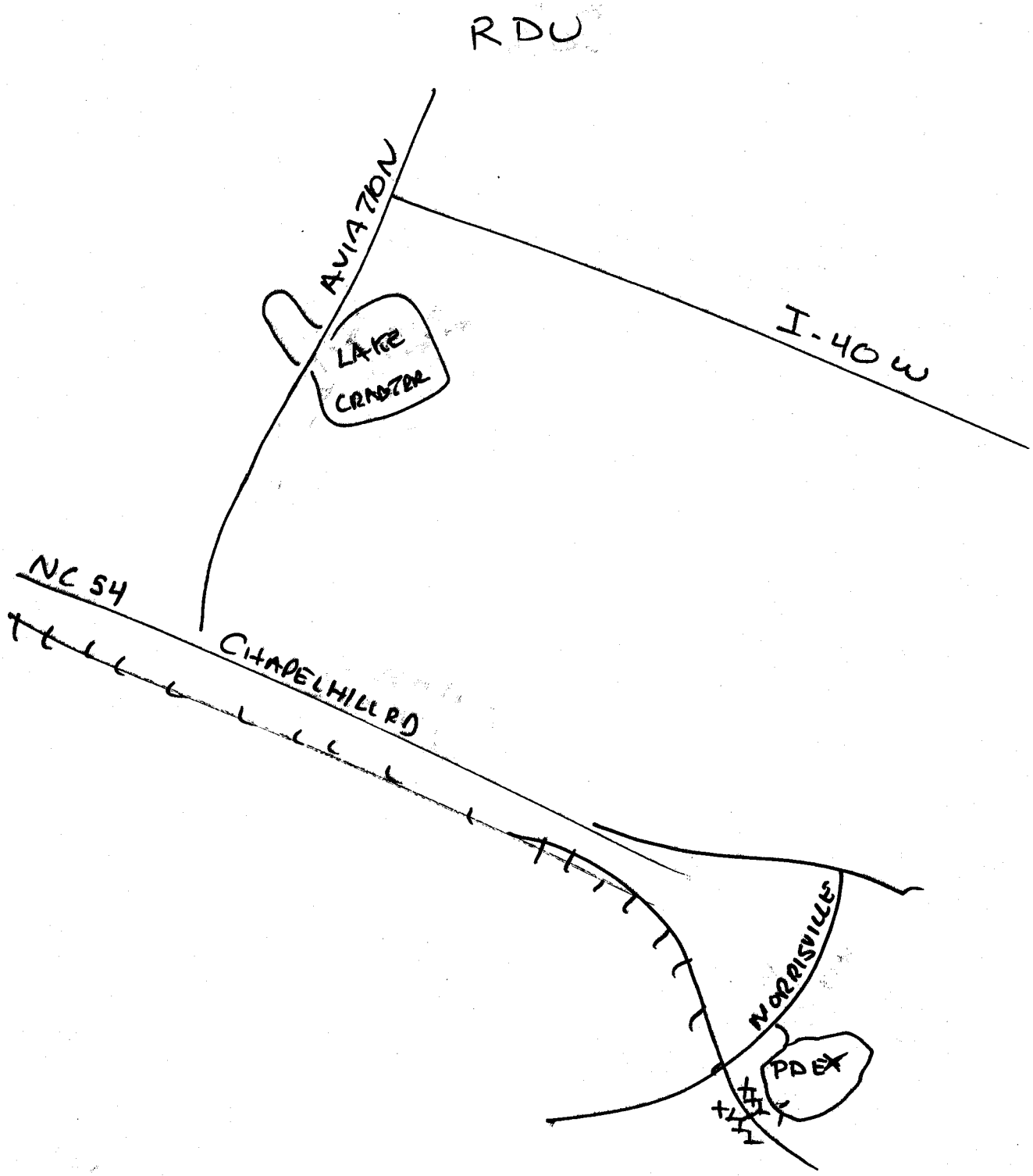
RE: Site Plan Application & Construction Plan Application
Highway 55 C&D Landfill and Recycling Center
Wake County

With the additional revisions received today, the Site Plan Application and Construction Plan Application for the Highway 55 C&D Landfill and Recycling Center meet the hydrogeologic requirements in the Solid Waste Management Rules. It is still not clear to me how we should handle the Property Survey since the survey plot includes acreage in addition to that evaluated for the Facility applications.

CC: Jim Coffey

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone: 919-733-4996 \ FAX: 919-715-3605 \ Internet: www.enr.state.nc.us

AN EQUAL OPPORTUNITY \ AFFIRMATIVE ACTION EMPLOYER -- 50% RECYCLED / 10% POST CONSUMER PAPER


RDU
AVIATION
LAKE CRABTREE
I-40 W
NC 54
CHAPEL HILL RD
MORRISVILLE
PDEX

sion channel of a relocated stream at the Holly Springs quarry, operated by Teer Aggregates. The channel cuts through a low ridge and creates an excellent exposure of the rocks on both sides of the fault. The Jonesboro fault is a major normal fault that is the southeastern border fault of the Triassic basin. To the southeast, there are felsic metavolcanic rocks of the Cary formation (Stop 1A) and to the northwest, there are Triassic conglomerates (Stop 2). Figure 1-2 depicts these relationships. The metavolcanic rocks are brecciated and strongly hydrothermally altered near the fault. The alteration defines a zone at least 20 meters thick. Thin sections show that the rock is brecciated, plagioclase is sericitized, biotite is partly chloritized, and there are numerous veinlets of quartz and calcite. Some samples have a network of calcite veinlets, and calcite has partly replaced the matrix of the breccia. The calcite typically has a deep red, but weak, fluorescence under short-wave ultraviolet light. Small exposures of brecciated rocks have been observed at two other localities on the Jonesboro fault along strike to the southwest of this exposure.

STOP 2: TRIASSIC ALLUVIAL FAN DEPOSITS ADJACENT TO THE JONESBORO FAULT

LEADERS: Kathleen Farrell and Bill Hoffman

Railroad cut, Norfolk and Southern Railway at Morrisville Parkway, Cary 7.5' Quadrangle

The outcrop is located in a narrow cut along an active railroad right-of-way having limited sight distance for train operators as well as field trip participants. East-bound trains are typically moving rapidly as they travel down grade along this stretch. To ensure safety for field trip participants, it is imperative that the field trip party evacuate the right-of-way if a train is approaching. Trip leaders will be able to provide only very short notice in such a case. Thus, it is important to move quickly if an evacuation is requested.

This outcrop, whose location is indicated on Figure 2-1, shows examples of architectural elements comprising the Trcs/c map unit (Lithofacies Association III) described by Hoffman and Gallagher (1989) and Hoffman (this guidebook). The Trcs/c map unit contains conglomerates and sandstones interpreted to be alluvial fan deposits adjacent to the southeastern border fault of the Durham basin. The outcrop, sketched in Figure 2-2 from a photomosaic, trends north-south, faces west, and exposes about 3.5 m of sedimentary section that is dipping northwestward at a shallow angle.

Two main lithofacies occur at this outcrop: (1) clast-supported, sandy conglomerate, and (2) sandstone, which is massive, graded or mixed with conglomerate to form matrix-supported conglomeratic units. Both lithofacies include a small percentage of silt- and possibly clay-sized sediment which may in part be attributed to the diagenetic alteration of

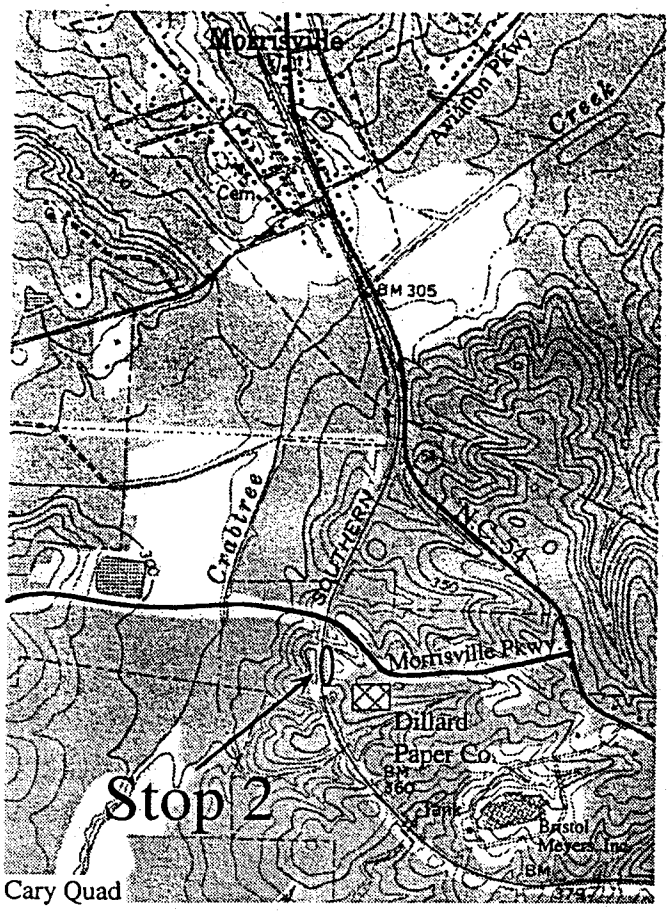


Figure 2-1. Location of Stop 2.

unstable minerals. The conglomerates and sandstones form a series of fining-upward sequences, each of which is up to one meter thick (Figure 2-3). Figure 2-2 shows several depositional sequences (delineated by heavy lines) and examples of features described and referenced below as "a" through "h". Sandy siltstone, a minor lithofacies component at this outcrop, occurs locally at the tops of the fining upward cycles. Bioturbation was not observed, but this could simply be an artifact of preservation within the outcrop.

Clast-supported conglomerates form discontinuous, lens-shaped beds about 0.5 m thick that commonly have a basal cobble lag. Scour-and-fill surfaces or reactivation surfaces are common so that a single, laterally continuous lens-shaped bed may be composed of several smaller lens-shaped, internally cross-stratified, possibly imbricated or massive units. These clast-supported conglomerates range in shape and grain size from rounded, equant, cobble conglomerates that fill in trough-shaped depressions (a, Figure 2-2) to finer-grained, flat-pebble, sandy conglomerates with well-developed foresets (b, Figure 2-2). Locally, such as in the cobble conglomerates (a, Figure 2-2) stratification may be obscure. In addition to cross stratification, clast-supported conglomerates exhibit a component of marginal (?) accretion or infill as drapes in topographic lows, shown in outcrop as a

North Carolina
Department of Environment and Natural Resources

Division of Waste Management

Michael F. Easley, Governor
William G. Ross Jr., Secretary
Dexter R. Matthews, Director

Post-it® Fax Note 7671	Date 7-03-02	# of pages ▸ 3
To Ron Gilkerson	From Bobby Lutfy	
Co./Dept.	Co. NC SWS	
Phone #	Phone #	
Fax # 704-896-2960	Fax #	

July 3, 2002

Mr. Ron Gilkerson
Griffin Brothers Companies
19109 W. Catawba Ave, Suite 118
Cornelius, North Carolina 28031

RE: Revised Site Plan Application Report of April 19, 2002, And Construction Plan Application of May 6, 2002, for the Highway 55 C&D Landfill & Recycling Center in Wake County

Dear Mr. Gilkerson,

The above referenced permit applications have been reviewed for hydrogeologic considerations. There are still a few items in the Site Plan Application where additional information and/or revisions are necessary. There is also one item in the Construction Plan Application that requires additional information. Please respond to the following questions and comments:

SITE PLAN APPLICATION

✓ Pg. 1 Flood plain areas are not identified on the one-fourth mile map. Nor have I been able to locate a FEMA 100 year floodway map in the report.

✓ Pg. 9 The statement that "there is little evidence of structural control" seems misleading. While the site does not appear to exhibit a lot of major structural features, structure seems to play a significant role in preferential ground-water flow in this Triassic geologic environment.

✓ Pg. 12 The discussion of purging and sampling with pumps and/or bailers is somewhat confusing. It sounds like pumps will probably be used for purging, but bailers will probably be used for sampling. If this is the case, in what sense are the pumps "dedicated". Since recharge rates are likely to be slow, are pumps needed for purging? The Solid Waste Section encourages dedicated pumps, (especially bladder pumps) permanently installed in the wells, for purging and sampling. (However, these are not required.)

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone: 919-733-4996 \ FAX: 919-715-3605 \ Internet: www.enr.state.nc.us

AN EQUAL OPPORTUNITY \ AFFIRMATIVE ACTION EMPLOYER - 50% RECYCLED / 10% POST CONSUMER PAPER

Table 3 Although the screen for well MW-10 is screened across the PWR - bedrock interface, historic water levels would seem to indicate the hydraulic conductivity would be exclusive to the bedrock. I have not been able to locate documentation for the laboratory permeability tests. A table is needed that clearly distinguishes representative values for hydraulic conductivity and porosity, including effective porosity, for each major lithologic unit, as referenced in Rule .0504(1)(c)(i)(E).

Table 4 I continue to have reservations about identifying the lab porosity values as "effective" porosity. I have not been able to locate support documentation in Appendix E for much of the data that appears in Table 4.

Table 4A

SS-1 → SS-3 Remolded

Table 5 The Ground Surface Elevation for SB-3 is different from that reported on the Boring Log in Appendix B.

Fig. 2 The Field Survey appears to be for the entire property owned, rather than the portion of the property to be recorded as the landfill facility.

Fig. 8 The cross-sections should include the streams that serve as potential discharge features. The cross-sections for Phase I do not show the screen intervals for the wells.

Fig 11

Fig. 12 It would be less confusing if the piezometers used in the hydrogeologic investigation were not shown on this drawing. However, the base grades and erosion control features would be useful. Surface water location SW-4 should be moved downstream so as to be located just above the confluence with Little Branch. It appears Groundwater monitoring location MW-7 should be moved slightly to the West, so as to be located more in the mouth of the drainage feature.

Apx. E Some of the laboratory documentation appears to be missing.

CONSTRUCTION PLAN APPLICATION

Drawings Sheet Number C 3, Phase I Grading Plan, should show the locations of the piezometers used in the hydrogeologic study in order to facilitate the evaluation of the vertical separation requirements.

Please respond to the comments and questions raised above. These will need to be addressed before we can complete the review of the Site Plan Application and Construction Plan Application for the Highway 55 C&D Landfill and Recycling Center.

If you have any questions regarding this letter, or you would like to arrange for a meeting to discuss these issues, please contact me at (919) 733-0692, extension 258.

Sincerely,

Bobby Lutfy

Bobby Lutfy
Hydrogeologist
Solid Waste Section

cc:	Jim Coffey,	Solid Waste Section
	Jim Barber,	Solid Waste Section
	Robert Hearn,	SWS - Raleigh Regional Office
	Tom Bolyard,	Enviro-Pro

ENVIRO-PRO
PROFESSIONAL CORPORATION

September 25, 2001

Mr. Mike Griffin
Highway 55 C&D Landfill, LLC
19109-118 West Catawba Avenue
Cornelius, North Carolina 28031

RE: Preliminary Groundwater Assessment
Proposed Highway 55 C&D Landfill
Wake County, North Carolina
Project No. EP-1306

Dear Mr. Griffin:

Enviro-Pro, P.C. (EP) was contracted by Mr. Mike Griffin of Highway 55 C&D Landfill, LLC to conduct a preliminary groundwater assessment on the above referenced site. The subject property consists of approximately 200 acres of undeveloped land which is situated 0.5 miles west of the intersection of Old Smithfield Road and Hwy 55 in the southwest portion of Wake County, North Carolina (Figure 1).

To date, a total of 21 groundwater monitor wells have been installed on the subject property to characterize subsurface conditions. EP personnel purged and sampled four of these wells (MW-7, MW-12, MW-13 and MW-15) on September 14, 2001. The approximate well locations are indicated on Figure 1. Well MW-7 was selected due to its location topographically upgradient on the site. Monitor wells MW-12 and MW-13 are located on the southern downgradient portion of the site, and well MW-15 is situated in the southwestern downgradient area of the property. These downgradient monitor wells were also selected for sampling as a result of their proximity to the South Wake Municipal Solid Waste Landfill on the adjacent property to the south.

EP personnel purged and sampled the four monitor wells using disposable Teflon bailers. The groundwater samples obtained were poured into clean, laboratory-supplied containers, labeled, placed on ice in a portable cooler, and transported to Shealy Environmental Services, Inc. in Cayse, South Carolina for volatile organic compounds

15101 Regena Lane • Charlotte, NC 28278 • (704) 583-0075 • FAX (704) 583-2673

(VOCs) and the 8 RCRA metals analysis. The VOCs were analyzed by EPA Method 8260B and the RCRA metals by Methods 6010B and 7470A (mercury). For quality assurance/quality control (QA/QC) purposes, a trip blank was also tested for VOCs by the lab.

Analytical test results (attached in the Appendix) indicate that no VOCs were detected above their respective practical quantitation limits. Barium was detected in all four wells tested, arsenic was detected in MW-15, chromium and lead were detected in MW-12 and MW-15, and mercury was detected in MW-12. The only metal exceeding its North Carolina DENR drinking water standard of 0.015 parts per million (ppm) was the lead identified in MW-15 (0.019 ppm). This concentration was undoubtedly the result of the high turbidity present in this sample.

Based on the results of this Preliminary Groundwater Assessment, it appears that no adverse impacts have occurred to the groundwater on the subject property.

Sincerely,
ENVIRO-PRO, P.C.

Thomas H. Bolyard

Thomas H. Bolyard, P.G.
Senior Hydrogeologist

NOTES:

1. THERE ARE NO COMMUNITY WATER SUPPLY WELLS LOCATED WITHIN 1000' OF THE SITE.
2. THE SCALE HOUSE AND SCALES ARE LOCATED IN AN AREA THAT WILL BE ACCESSED THROUGH THE 30' PAVED ACCESS ROAD.
3. THE SITE IS WOODED. SREEENING REQUIREMENTS WILL BE MET BY UTILIZING THE 200', 100', AND 50' BUFFERS AS SHOWN ON THIS MAP.
4. TOPOGRAPHIC CONTOURS ARE AT 5' INTERVALS.
5. THE PARCEL IS NOT LOCATED IN THE 100-YEAR FLOODWAY OR FLOODWAY FRINGE. (REFERENCE USACOE/FEMA RESTUDY WORKSHEETS #'S 296, 297 317 & 318 & FEMA FIRM PANELS - 0490, 0495, 0675 & 0660.
6. PROPOSED WATER AND SEWER FOR THE FACILITY WILL BE PROVIDED BY THE TOWN OF APEX.
7. THERE WILL BE FIVE (5) EMPLOYEES. THE HOURS OF OPERATION WILL BE 6 AM TO 6 PM MONDAY THROUGH FRIDAY & 7 AM TO NOON ON SATURDAY.
8. LANDFILL AND HOURS OF OPERATION SIGNS WILL BE PLACED AT THE ACCESS ROAD ENTRANCE. THE SIGNS WILL BE 4' x 8' IN SIZE, EACH SIDE AND AT GROUND LEVEL.

BUFFERS:

STREAM: 50'

WESTERN WAKE EXPRESSWAY ROAD CORRIDOR: 200'

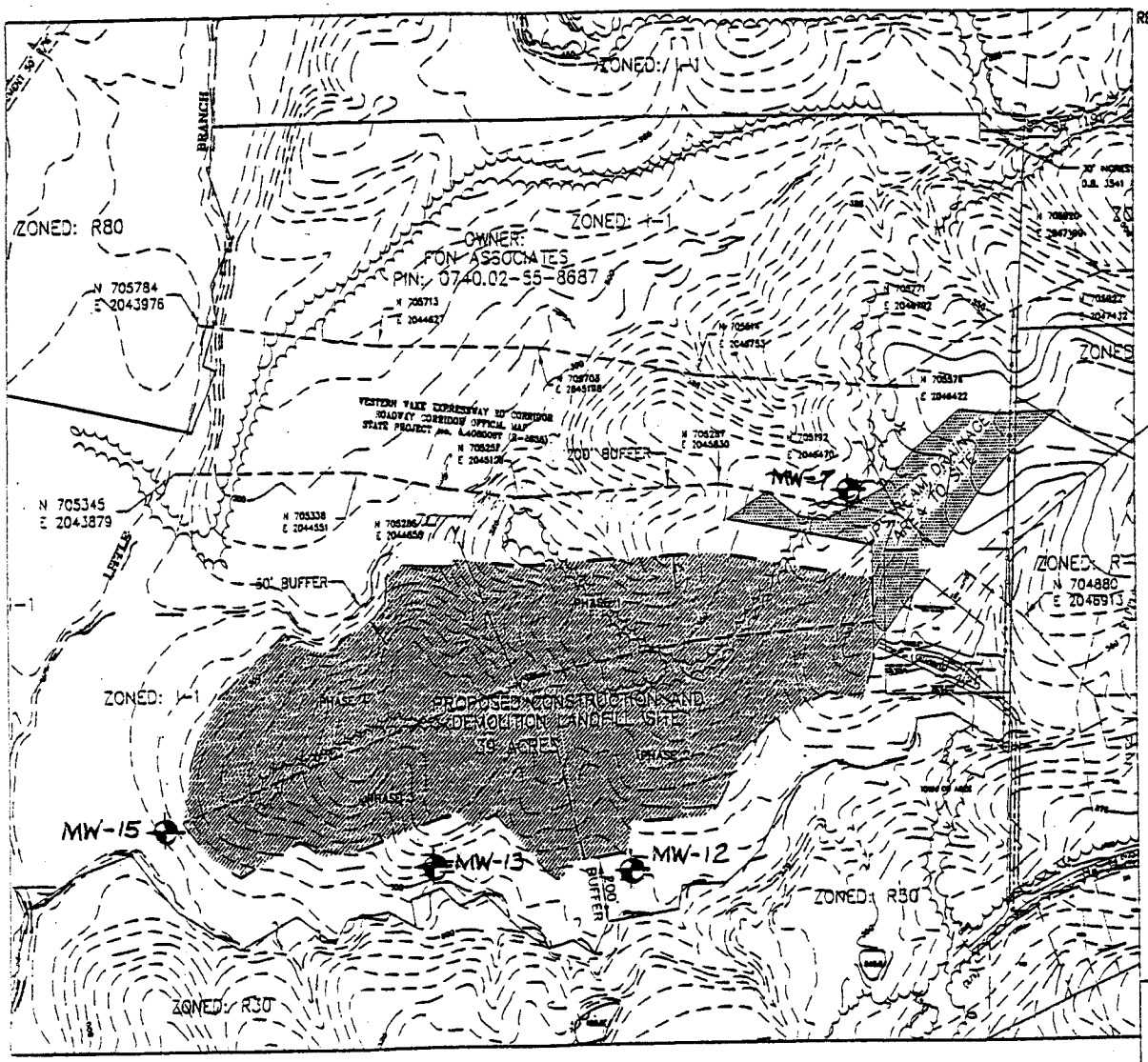
PROPERTY: 200'

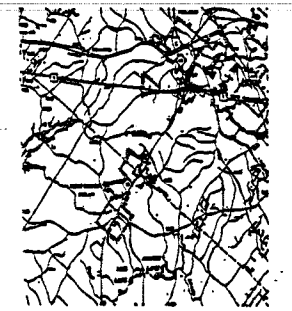
RECYCLING AND PROCESSING AREA: 100'

200' PERIMETER BUFFER WILL REMAIN WOODED

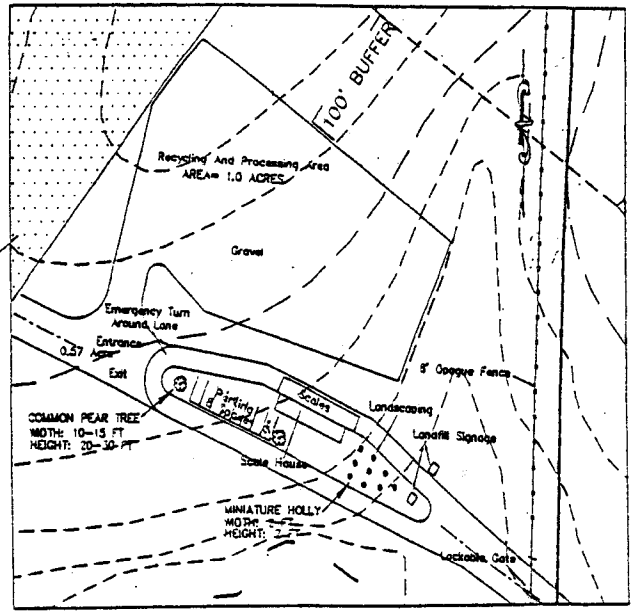
IMPERVIOUS SURFACE

ASPHALT	0.57 ACRES	25211 SQ FT
RECYCLING AREA (GRAVEL)	0.93 ACRES	40787 SQ FT





VICINITY MAP



ENTRANCE ROAD

SCALE 1" = 50

LEGEND:

—325— — = EXISTING ELEVATION CONTOUR

— — — = LANDFILL LIMITS

MW-1 APPROX. MONITORING WELL LOCATION

GRAPHIC SCALE

(IN FEET)
1 inch = 300 ft.

REV. 2: 7/10/01 PER WAKE CO. PLANNING DEPT. COMMENTS RECEIVED ON 7/9/01.

REV 1: 6/3/01 CHANGES PER WAKE CO. PLANNING DEPT

PATTERSON BREWER & Associates
Engineering • Surveying • Planning
Post Office Box 1387 • Wearsville, NC 28115
704/862-0100 • Fax 704/862-0101

JOB NAME:
PRELIMINARY SPECIAL USE PERMIT SITE PLAN
PROPOSED HWY 55 C&D LANDFILL
& RECYCLING CENTER

LOCATION: 3445 OLD HOLLY SPRINGS- APEX RD WAKE COUNTY, NORTH CAROLINA	DRAWN BY: TPB	CHECKED BY: DEB
	SCALE: 1"=200'	
OWNERS: FON & ASSOCIATES MAILING ADDRESS: P.O. BOX 31712 RALIEGH, NC 27622-1712 PIN# 0740.02-55-8687	DATE OF FIELD SURVEY:	
	DATE OF MAP: 5/28/01	
	JOB NUMBER: N0117	SHEET NUMBER: FIG. 1

APPENDIX

Report of Analysis

Enviro-Pro, P.C.
15101 Regena Lane
Charlotte, NC 28278
Attention : T. Bolyard

Project Name : **Hwy 55 C&D Landfill**

Project Number : **EP-1306**

Lot Number : **CI17029**

Date Completed : **09/19/2001**

Daniel J. Wright
Project Manager

Total number of pages in report : **11**

This report has been prepared and reviewed in accordance with Shealy's Quality Assurance Management Plan. Any data qualifiers associated with sample analysis are footnoted on the analytical results page(s). This report shall not be reproduced, except in its entirety, without the written approval of Shealy Environmental Services, Inc.

The following non-paginated documents are considered part of this report: Chain Of Custody Record and Sample Receipt Checklist.

SHEALY ENVIRONMENTAL SERVICES, INC.

Report of Analysis

SC DHEC No. 32010 NC DEHNR No. 329

Client : **Enviro-Pro, P.C.**
15101 Regena Lane
Charlotte, NC 28278

Attention : **T. Bolyard**
Project Name : **Hwy 55 C&D Landfill** Project Number : **EP-1306**

Description : MW-7
Lot Number : CI17029-001
Date Received : 09/17/2001
Date Sampled : 09/14/2001 0930
Matrix : Aqueous

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Volatile Organic Compounds by GC/MS									
Acetone	5030B	8260B	ND		20	ug/L		09/18/2001 0153	RED
Benzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Bromodichloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Bromoform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Bromomethane (Methyl bromide)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
2-Butanone (MEK)	5030B	8260B	ND		10	ug/L		09/18/2001 0153	RED
Carbon disulfide	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Carbon tetrachloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Chlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Chloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Chloroform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Chloromethane (Methyl chloride)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,2-Dibromo-3-chloropropane (DBCP)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Dibromochloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,2-Dibromoethane (EDB)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,2-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,3-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,4-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,1-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,2-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,1-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
cis-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
trans-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,2-Dichloropropane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
cis-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
trans-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Ethylbenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
2-Hexanone	5030B	8260B	ND		10	ug/L		09/18/2001 0153	RED

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

Description	:	MW-7	Date Sampled	: 09/14/2001 0930
Lot Number	:	CI17029-001	Matrix	: Aqueous
Client	:	Enviro-Pro, P.C.		
Date Received	:	09/17/2001		

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Volatile Organic Compounds by GC/MS									
Methyl tertiary butyl ether (MTBE)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
4-Methyl-2-pentanone	5030B	8260B	ND		10	ug/L		09/18/2001 0153	RED
Methylene chloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Naphthalene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Styrene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,1,2,2-Tetrachloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Tetrachloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Toluene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,1,1-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
1,1,2-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Trichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Vinyl chloride	5030B	8260B	ND		2.0	ug/L		09/18/2001 0153	RED
Xylenes (total)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0153	RED
Surrogates									
1,2-Dichloroethane-d4	5030B	8260B	95		70-130	%		09/18/2001 0153	RED
Bromofluorobenzene	5030B	8260B	98		70-130	%		09/18/2001 0153	RED
Toluene-d8	5030B	8260B	116		70-130	%		09/18/2001 0153	RED
RCRA Metals									
Arsenic		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1511	FTS
Barium		6010B	0.95		0.025	mg/L	09/18/2001 1030	09/18/2001 1511	FTS
Cadmium		6010B	ND		0.0020	mg/L	09/18/2001 1030	09/18/2001 1511	FTS
Chromium		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1511	FTS
Lead		6010B	ND		0.0030	mg/L	09/18/2001 1030	09/18/2001 1511	FTS
Mercury		7470A	ND		0.00010	mg/L	09/18/2001 1100	09/18/2001 1513	NGG
Selenium		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1511	FTS
Silver		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1511	FTS

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

Description : MW-12
Lot Number : CI17029-002
Client : Enviro-Pro, P.C.
Date Received : 09/17/2001

Date Sampled : 09/14/2001 1000
Matrix : Aqueous

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Volatile Organic Compounds by GC/MS									
Acetone	5030B	8260B	ND		20	ug/L		09/18/2001 0226	RED
Benzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Bromodichloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Bromoform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Bromomethane (Methyl bromide)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
2-Butanone (MEK)	5030B	8260B	ND		10	ug/L		09/18/2001 0226	RED
Carbon disulfide	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Carbon tetrachloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Chlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Chloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Chloroform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Chloromethane (Methyl chloride)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,2-Dibromo-3-chloropropane (DBCP)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Dibromochloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,2-Dibromoethane (EDB)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,2-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,3-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,4-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,1-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,2-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,1-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
cis-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
trans-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,2-Dichloropropane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
cis-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
trans-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Ethylbenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
2-Hexanone	5030B	8260B	ND		10	ug/L		09/18/2001 0226	RED
Methyl tertiary butyl ether (MTBE)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
4-Methyl-2-pentanone	5030B	8260B	ND		10	ug/L		09/18/2001 0226	RED
Methylene chloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Naphthalene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Styrene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,1,2,2-Tetrachloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Tetrachloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Toluene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,1,1-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
1,1,2-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Trichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED
Vinyl chloride	5030B	8260B	ND		2.0	ug/L		09/18/2001 0226	RED
Xylenes (total)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0226	RED

Surrogates

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

Description : MW-12
Lot Number : CI17029-002
Client : Enviro-Pro, P.C.
Date Received : 09/17/2001

Date Sampled : 09/14/2001 1000
Matrix : Aqueous

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Surrogates									
1,2-Dichloroethane-d4	5030B	8260B	95		70-130	%		09/18/2001 0226	RED
Bromofluorobenzene	5030B	8260B	97		70-130	%		09/18/2001 0226	RED
Toluene-d8	5030B	8260B	110		70-130	%		09/18/2001 0226	RED
RCRA Metals									
Arsenic		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1519	FTS
Barium		6010B	**0.22**		0.025	mg/L	09/18/2001 1030	09/18/2001 1519	FTS
Cadmium		6010B	ND		0.0020	mg/L	09/18/2001 1030	09/18/2001 1519	FTS
Chromium		6010B	**0.014**		0.0050	mg/L	09/18/2001 1030	09/18/2001 1519	FTS
Lead		6010B	**0.0038**		0.0030	mg/L	09/18/2001 1030	09/18/2001 1519	FTS
Mercury		7470A	**0.00018**		0.00010	mg/L	09/18/2001 1100	09/18/2001 1514	NGG
Selenium		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1519	FTS
Silver		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1519	FTS

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

Description	:	MW-13	Date Sampled	: 09/14/2001 1030
Lot Number	:	CI17029-003	Matrix	: Aqueous
Client	:	Enviro-Pro, P.C.		
Date Received	:	09/17/2001		

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Volatile Organic Compounds by GC/MS									
Acetone	5030B	8260B	ND		20	ug/L		09/18/2001 0259	RED
Benzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Bromodichloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Bromoform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Bromomethane (Methyl bromide)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
2-Butanone (MEK)	5030B	8260B	ND		10	ug/L		09/18/2001 0259	RED
Carbon disulfide	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Carbon tetrachloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Chlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Chloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Chloroform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Chloromethane (Methyl chloride)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,2-Dibromo-3-chloropropane (DBCP)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Dibromochloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,2-Dibromoethane (EDB)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,2-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,3-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,4-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,1-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,2-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,1-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
cis-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
trans-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,2-Dichloropropane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
cis-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
trans-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Ethylbenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
2-Hexanone	5030B	8260B	ND		10	ug/L		09/18/2001 0259	RED
Methyl tertiary butyl ether (MTBE)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
4-Methyl-2-pentanone	5030B	8260B	ND		10	ug/L		09/18/2001 0259	RED
Methylene chloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Naphthalene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Styrene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,1,2,2-Tetrachloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Tetrachloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Toluene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,1,1-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
1,1,2-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Trichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Vinyl chloride	5030B	8260B	ND		2.0	ug/L		09/18/2001 0259	RED
Xylenes (total)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0259	RED
Surrogates									

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

Description	:	MW-13	Date Sampled	: 09/14/2001 1030
Lot Number	:	CI17029-003	Matrix	: Aqueous
Client	:	Enviro-Pro, P.C.		
Date Received	:	09/17/2001		

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Surrogates									
1,2-Dichloroethane-d4	5030B	8260B	95		70-130	%		09/18/2001 0259	RED
Bromofluorobenzene	5030B	8260B	100		70-130	%		09/18/2001 0259	RED
Toluene-d8	5030B	8260B	114		70-130	%		09/18/2001 0259	RED
RCRA Metals									
Arsenic		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1522	FTS
Barium		6010B	0.050		0.025	mg/L	09/18/2001 1030	09/18/2001 1522	FTS
Cadmium		6010B	ND		0.0020	mg/L	09/18/2001 1030	09/18/2001 1522	FTS
Chromium		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1522	FTS
Lead		6010B	ND		0.0030	mg/L	09/18/2001 1030	09/18/2001 1522	FTS
Mercury		7470A	ND		0.00010	mg/L	09/18/2001 1100	09/18/2001 1515	NGG
Selenium		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1522	FTS
Silver		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1522	FTS

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

Description : MW-15
Lot Number : CI17029-004
Client : Enviro-Pro, P.C.
Date Received : 09/17/2001

Date Sampled : 09/14/2001 1100
Matrix : Aqueous

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Volatile Organic Compounds by GC/MS									
Acetone	5030B	8260B	ND		20	ug/L		09/18/2001 0333	RED
Benzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Bromodichloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Bromoform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Bromomethane (Methyl bromide)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
2-Butanone (MEK)	5030B	8260B	ND		10	ug/L		09/18/2001 0333	RED
Carbon disulfide	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Carbon tetrachloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Chlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Chloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Chloroform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Chloromethane (Methyl chloride)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,2-Dibromo-3-chloropropane (DBCP)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Dibromochloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,2-Dibromoethane (EDB)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,2-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,3-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,4-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,1-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,2-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,1-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
cis-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
trans-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,2-Dichloropropane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
cis-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
trans-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Ethylbenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
2-Hexanone	5030B	8260B	ND		10	ug/L		09/18/2001 0333	RED
Methyl tertiary butyl ether (MTBE)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
4-Methyl-2-pentanone	5030B	8260B	ND		10	ug/L		09/18/2001 0333	RED
Methylene chloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Naphthalene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Styrene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,1,2,2-Tetrachloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Tetrachloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Toluene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,1,1-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
1,1,2-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Trichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Vinyl chloride	5030B	8260B	ND		2.0	ug/L		09/18/2001 0333	RED
Xylenes (total)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0333	RED
Surrogates									

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

Description : MW-15
Lot Number : CI17029-004
Client : Enviro-Pro, P.C.
Date Received : 09/17/2001

Date Sampled : 09/14/2001 1100
Matrix : Aqueous

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Surrogates									
1,2-Dichloroethane-d4	5030B	8260B	92		70-130	%		09/18/2001 0333	RED
Bromofluorobenzene	5030B	8260B	94		70-130	%		09/18/2001 0333	RED
Toluene-d8	5030B	8260B	115		70-130	%		09/18/2001 0333	RED
RCRA Metals									
Arsenic		6010B	**0.020**		0.0050	mg/L	09/18/2001 1030	09/18/2001 1525	FTS
Barium		6010B	**0.24**		0.025	mg/L	09/18/2001 1030	09/18/2001 1525	FTS
Cadmium		6010B	ND		0.0020	mg/L	09/18/2001 1030	09/18/2001 1525	FTS
Chromium		6010B	**0.034**		0.0050	mg/L	09/18/2001 1030	09/18/2001 1525	FTS
Lead		6010B	**0.019**		0.0030	mg/L	09/18/2001 1030	09/18/2001 1525	FTS
Mercury		7470A	ND		0.00010	mg/L	09/18/2001 1100	09/18/2001 1519	NGG
Selenium		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1525	FTS
Silver		6010B	ND		0.0050	mg/L	09/18/2001 1030	09/18/2001 1525	FTS

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

Description : **Trip Blank**
Lot Number : CI17029-005
Client : **Enviro-Pro, P.C.**
Date Received : 09/17/2001

Date Sampled : 09/14/2001
Matrix : Aqueous

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Volatile Organic Compounds by GC/MS									
Acetone	5030B	8260B	ND		20	ug/L		09/18/2001 0406	RED
Benzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Bromodichloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Bromoform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Bromomethane (Methyl bromide)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
2-Butanone (MEK)	5030B	8260B	ND		10	ug/L		09/18/2001 0406	RED
Carbon disulfide	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Carbon tetrachloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Chlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Chloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Chloroform	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Chloromethane (Methyl chloride)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,2-Dibromo-3-chloropropane (DBCP)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Dibromochloromethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,2-Dibromoethane (EDB)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,2-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,3-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,4-Dichlorobenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,1-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,2-Dichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,1-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
cis-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
trans-1,2-Dichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,2-Dichloropropane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
cis-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
trans-1,3-Dichloropropene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Ethylbenzene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
2-Hexanone	5030B	8260B	ND		10	ug/L		09/18/2001 0406	RED
Methyl tertiary butyl ether (MTBE)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
4-Methyl-2-pentanone	5030B	8260B	ND		10	ug/L		09/18/2001 0406	RED
Methylene chloride	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Naphthalene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Styrene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,1,2,2-Tetrachloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Tetrachloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Toluene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,1,1-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
1,1,2-Trichloroethane	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Trichloroethene	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED
Vinyl chloride	5030B	8260B	ND		2.0	ug/L		09/18/2001 0406	RED
Xylenes (total)	5030B	8260B	ND		5.0	ug/L		09/18/2001 0406	RED

Surrogates

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

Description : **Trip Blank**
Lot Number : CI17029-005
Client : **Enviro-Pro, P.C.**
Date Received : 09/17/2001

Date Sampled : 09/14/2001
Matrix : Aqueous

Parameter	Prep Method	Analytical Method	Result	Q	PQL	Units	Prep Date	Analysis Date	Analyst
Surrogates									
1,2-Dichloroethane-d4	5030B	8260B	93		70-130	%		09/18/2001 0406	RED
Bromofluorobenzene	5030B	8260B	98		70-130	%		09/18/2001 0406	RED
Toluene-d8	5030B	8260B	108		70-130	%		09/18/2001 0406	RED

PQL = Practical quantitation limit
ND = Not detected at or above the PQL
B = Detected in the method blank
J = Estimated result less than the PQL
E = Quantitation of compound exceeded the calibration range
Soils reported on a dry weight basis unless flagged with a "W"

SHEALY

Chain of Custody Record

SHEALY ENVIRONMENTAL SERVICES, INC.
106 Vantage Point Drive
Cayce, South Carolina 29033
Telephone No. (803) 791-9700 Fax No. (803) 791-9111

Number 07278

Client: Enviro-Pro, P.C.	Project Manager: T. Bolyard	Telephone No. / Fax No. / E-mail: 704-583-0075	Quote No. 7926
Address: 15101 Regena Ln.	Sampler's Signature: X T. Bolyard	Waybill No.	Page 1 of 1
City: Charlotte; State: NC; Zip Code: 28278	Printed Name: T. Bolyard	Analysis (Attach list if more space is needed.)	
Project Name: Hwy 55 C&D Landfill			
Project No.: EP-1306	P.O. No.		Lot No. CI17029

Sample ID / Description (Containers for each sample may be combined on one line.)	Date	Time	G=Grab C=Composite	Matrix: Aqueous	Solid	Non-Aqueous	No. of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	5035 Kit	8260B	RCRA Metals	Remarks / Cooler I.D.
MW-7	9/14/01	9:30	G	X					1	3			✓	✓	Need 2-Day Rush T-A-T
MW-12	"	10:00	G	X					1	3			✓	✓	
MW-13	"	10:30	G	X					1	3			✓	✓	
MW-15	"	11:00	G	X					1	3			✓	✓	
Trip Blank				X						3			✓		

Possible Hazard Identification: ☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

Sample Disposal: ☐ Return to Client ☑ Disposal by Lab

Note: All samples are retained for six weeks from receipt unless other arrangements are made.

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☐ Standard ☑ Rush (Specify) 2-DAY TAT

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: T. Bolyard	9/17/01	935	1. Received by: [illegible]	9/17/01	935
2. Relinquished by: [illegible]	9/17/01	1015	2. Received by: Scott Miller	9/17/01	10:15
3. Relinquished by: Scott Miller	9/17/01	1500	3. Laboratory received by: [illegible]	9/17/01	1500

Comments

LAB USE ONLY
Received on ice (Circle) Yes No Ice Pack
Receipt Temp. 1.3 °C

North Carolina
Department of Environment and Natural Resources

Division of Waste Management

Michael F. Easley, Governor
William G. Ross Jr., Secretary
Dexter R. Matthews, Director

NCDENR

Re- SCANNED 3/13/14

Carmen Johnson
Fac/Perm/Co ID# 92-30 Date 8/14/13 Doc ID# DIN

March 19, 2002

Mr. Ron Gilkerson
Griffin Brothers Companies
19109 W. Catawba Ave, Suite 118
Cornelius, North Carolina 28031

RE: Site Plan Application Report Of February 12, 2002
Highway 55 C&D Landfill and Recycling Center
Wake County

Dear Mr. Gilkerson,

The hydrogeologic review has been completed for the above referenced Site Plan Application. There are several items that require clarification, revision, or additional information. Please consider the following questions and comments and respond as necessary:

On Page 8 it is not clear how the seasonal high water table elevations were established. For a number of the piezometers the water table seemed to fluctuate above and below the ten foot level used to separate shallow and intermediate depth wells, so it is not clear how this distinction was made. Table 6 appears to indicate fluctuations greater than those indicated on Page 8 for each of the different categories of wells.

More information is needed in order to evaluate the Water Quality Monitoring Plan. Since most of the aquifer is in the fractured bedrock, it is critical that the fractured controlled ground-water flow be understood. Fracture Trace Analyses, Very Low Frequency (VLF) Geophysical Surveys, and/or other means may be necessary in order to better understand the ground-water flow regime at the site. I would suggest that we arrange a meeting with Rick Wooten and/or Tyler Clark of the N.C. Geological Survey in order to get a better understanding of fractured bedrock ground-water flow in the Triassic Basin.

Table 1: It would help to have the ground-water depths as well as the ground-water elevations for Table 1. There are some minor discrepancies between the Ground Surface Elevations for the various Tables (and the Boring Logs).

Table 2A: There are some minor discrepancies between the Casing Stick-up values and the Top Of Casing Elevations.

Table 3: It appears that the screened intervals for some of the wells bridge more than one hydrogeologic unit. The Hydraulic Conductivity for well MW-13 is expressed incorrectly. The (screen interval) Depth for well MW-31 is incorrect. Well MW-37 is screened in the bedrock, not the PWR. For a number of the borings the total depth extends below the bottom of the screen... How was the annular space below the bottom of the screen filled? How could this affect the Hydraulic Conductivity test values?

Table 4: Typically, laboratory test values for Effective Porosity are not feasible because of the excessive amounts of time involved for accurate testing. Total Porosity values are more common for laboratory testing, and are more consistent with the values listed in Table 4. Total and Effective Porosity values are needed representative of each Hydrogeologic Unit.

Table 5: There is a discrepancy between the Depth To Rock and the Bedrock Elevation for well MW-39.

Table 7: Refer to previous comments regarding Seasonal High Ground-water Elevations.

Figure 2: The Field Survey appears to be for the entire property owned rather than the portion of the property to be recorded as the landfill facility.

Figures 3 and 4: The Flood Plains information does not appear on the Quarter Mile Radius Maps.

Figures 7 and 8: The Cross-sections are adequate for Site Suitability, however additional Cross-sections for Phase 1 are needed for the Design Plan.

Figure 9: There is a minor discrepancy for the Ground-water Elevation for well MW-18. The Ground-water Contours are slightly in error in the vicinity of wells MW-23 and MW-30.

Figure 10: Refer to previous comments regarding Seasonal High Water Table Elevations.

Figure 12: Refer to previous comments regarding Water Quality Monitoring Plan.

Appendix C: For a number of the wells the screen is set well above the bottom of the borehole. How is the bottom of the borehole filled? If a new borehole was drilled, how was the initial borehole abandoned?

Appendix E: Refer to previous comments regarding Effective Porosity values.

Please respond to the comments and questions raised above. These will need to be addressed before we can complete the review of the Site Plan Application. If you have any questions regarding this letter, or you would like to arrange for a meeting to discuss these issues, please contact me at (919) 733-0692, extension 258.

Sincerely,

Bobby Lutfy

Bobby Lutfy
Hydrogeologist
Solid Waste Section

cc: Jim Coffey, Solid Waste Section
Jim Barber, SWS - Fayetteville
Robert Hearn, SWS - Raleigh
Tom Bolyard, Enviro-Pro, P.C.

Re-SCANNED 3/13/14

APPROVED
DIVISION OF SOLID WASTE MANAGEMENT
DATE 8/9/02 BY

SITE SUIT.
92-30
CENT. FILE COPY

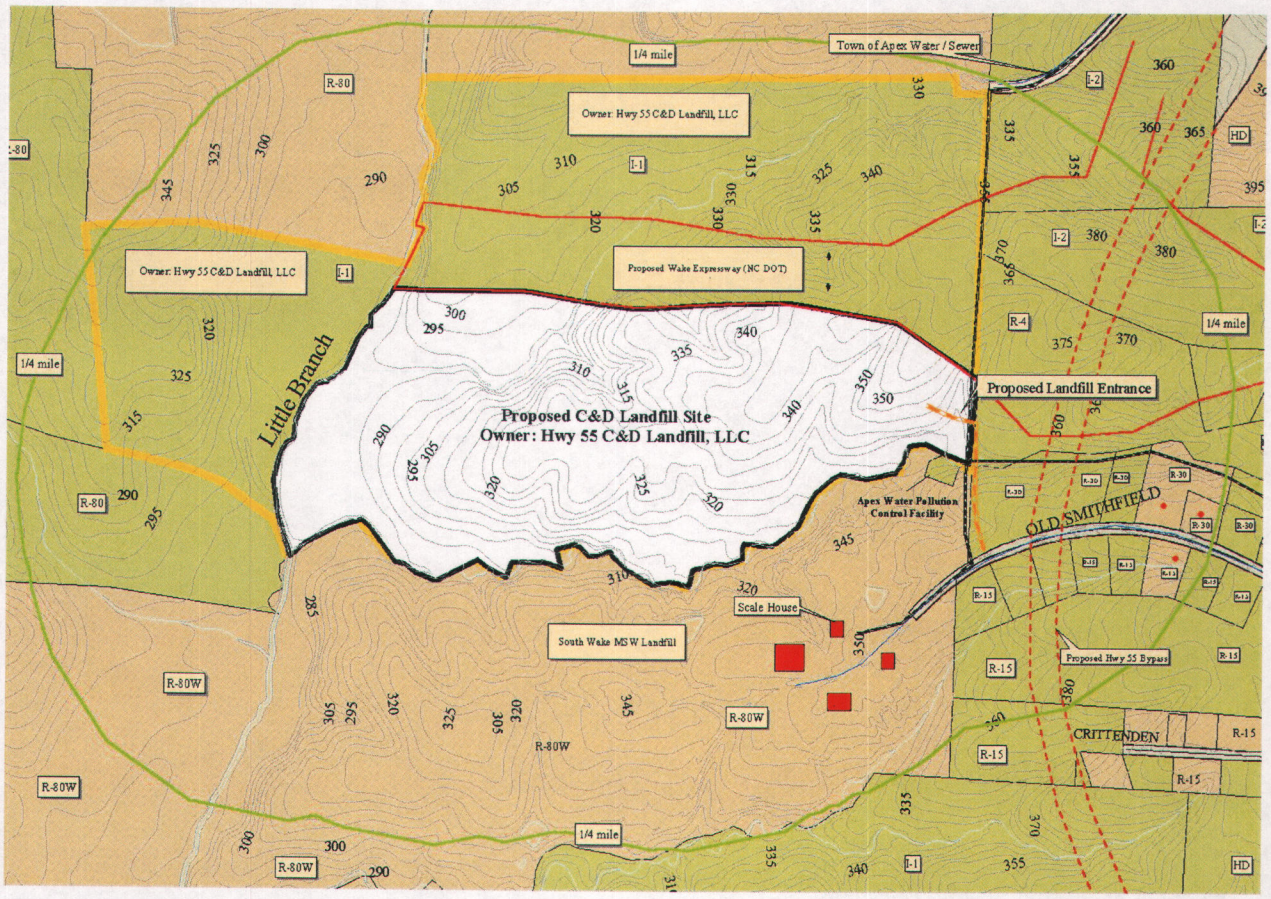
APR 2002
Received
Solid Waste
Section

Carmen Johnson
Fac/Perm/Co ID # 92-30
Date 8/14/13
Doc ID#
DIN

Highway 55 C&D Landfill & Recycling Center

SITE PLAN APPLICATION

WAKE COUNTY, NORTH CAROLINA



REVISED • APRIL 2002

ENVIRO-PRO
PROFESSIONAL CORPORATION

REVISED SITE PLAN APPLICATION REPORT

SCANNED 3/13/14

Re-

Highway 55 C&D Landfill and Recycling Center
Wake County, North Carolina

Cameron Johnson
Fac/Perm/Co ID# 92-30 | Date 8/14/13 | Doc ID# DIN

APR 2002
Received
Solid Waste
Section

Prepared for:

Highway 55 C&D Landfill, LLC
19109 West Catawba Avenue
Suite 118
Cornelius, North Carolina 28031

Prepared by:

Enviro-Pro, P.C.
15101 Regena Lane
Charlotte, North Carolina 28278

Thomas H. Bolyard

Project No. EP-1306

April 19, 2002

ENVIRO-PRO
PROFESSIONAL CORPORATION

April 19, 2002

APR 2002
Received
Solid Waste
Section

Mr. Bobby Lutfy
Solid Waste Section
Division of Waste Management
North Carolina DENR
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

RE: Revisions to Site Plan Application Report
Hwy 55 C&D Landfill and Recycling Center
Wake County, North Carolina

Dear Mr. Lutfy:

The attached information is being provided in response to the questions and comments contained in your March 19, 2002 letter to Mr. Ron Gilkerson with Griffin Brothers Companies.

A more detailed discussion describing the calculation of seasonal high water table elevations for this site has been included in Section 5.6 of the Site Plan Application Report text. Table 6A has also been provided to help clarify the establishment of the revised seasonal high water table depths and elevations indicated in Table 7.

As a result of our meeting with North Carolina Geological Survey personnel on March 7, 2002, additional discussion has been included in Section 6.0 of the text. The proposed permanent groundwater monitor wells for Phase I of the landfill operation have been slightly re-positioned and re-numbered.

Table 1 has been revised to include groundwater depths as well as groundwater elevations. The minor discrepancies between some of the Ground Surface Elevations in the various Tables and Boring Logs have been corrected and are attached.

15101 Regena Lane • Charlotte, NC 28278 • (704) 583-0075 • FAX (704) 583-2673

Table 2A has been corrected to resolve the Casing Stick-up values and the Top of Casing Elevations discrepancies.

Table 3 is attached with the appropriate revisions. Due to lithologic conditions, some of the screened intervals do bridge more than one hydrogeologic unit. In these cases the hydrogeologic unit containing the majority of the saturated screened interval is listed in the Table, with the corresponding calculated hydraulic conductivity values best representing these units. Many of the initial soil borings were over drilled until groundwater levels could be established. Wells were then installed in offset borings, and the initial borings were filled with grout.

Table 4 has been revised to include laboratory test results for SS-1, SS-2, and SS-3, potential soil cover material. A letter from Shield Engineering explaining their position regarding the Total and Effective Porosity relationship has been attached for inclusion in Appendix E. Effective porosities estimated using the grain size analysis and the textural classification triangle (Fetter, 1988) have been provided in Section 5.4 of the text.

Table 5 has been corrected so that the Depth to Rock and the Bedrock Elevation for well MW-39 agree.

Table 7 has been revised to reflect some re-calculated seasonal high groundwater elevations.

Two additional Hydrogeologic Cross Sections (Figures 8C and 8D) have been constructed to provide additional subsurface characterization for the Phase I area of landfilling.

Figure 9 has been corrected to resolve the previous minor discrepancies.

Figure 10 has been revised to reflect slightly higher Seasonal High Water Table Elevations for the intermediate (10-25 feet bgs) category groundwater monitor wells.

The locations of proposed Phase I permanent groundwater monitor wells have been adjusted slightly on Figure 12, and have been re-numbered as MW-1 through MW-7.

Many of the initial soil borings were over drilled until groundwater levels could be established. Wells were then installed in offset borings and the initial borings were filled with grout. This explains the Well Construction Records in Appendix C.

A discussion provided by Shield Engineering concerning the Total and Effective Porosity relationships has been added to Appendix E. The textural classification triangles (Fetter,

1988) used to estimate effective porosities for some of the soil samples collected for geotechnical laboratory analysis have also been included in Appendix E.

We hope the additional information provided in this submittal will be sufficient for you to complete your review of our Site Plan Application Report. Please contact either Ron Gilkerson at (704) 895-0329 or myself at (704) 583-0075 if you have any questions or comments regarding any of the information submitted.

Sincerely,
ENVIRO-PRO, P.C.

Thomas H. Bolyard

Thomas H. Bolyard, P.G.
Senior Hydrogeologist

cc: Mr. Ron Gilkerson, Griffin Brothers Companies.

TABLE OF CONTENTS

Page

1.0 PROJECT INFORMATION 1

2.0 AREA RECONNAISSANCE 1

3.0 SITING REQUIREMENTS 2

4.0 REGIONAL HYDROGEOLOGY 3

4.1 Geology 3
4.2 Hydrogeology 3

5.0 GEOTECHNICAL AND HYDROGEOLOGICAL EVALUATION 4

5.1 Soil Borings 4
5.2 Monitor Well Installation 5
5.3 Field Testing 5
5.4 Laboratory Testing 5
5.5 Subsurface Conditions 6
5.6 Site Hydrogeology 7

6.0 WATER QUALITY MONITORING PLAN 9

6.1 Surface Water Monitoring Plan 10
6.2 Groundwater Monitoring Plan 11

7.0 REFERENCES 14

TABLES:

1) Initial Groundwater Depths
2) Groundwater Depths
2A) Groundwater Elevations
3) Hydraulic Data For Hydrogeologic Units
4) Geotechnical Data
5) Top of Bedrock Elevations
6) Groundwater Elevations From Feltonsville Landfill
6A) Seasonal High Groundwater Elevation Calculations Utilizing Feltonsville Landfill Data (1/96-4/01)
7) Seasonal High Groundwater Depths and Elevations

TABLE OF CONTENTS (Cont.)

FIGURES:

1) Project Location Map
2) Boundary and Topographical Survey
3) Quarter-Mile Radius Aerial Photograph
4) Quarter-Mile Radius Survey Map
5) Two-Mile Radius Map
5A) Two-Mile Radius Aerial Photograph
6) Monitoring Well/Boring Location Plan
7) Hydrogeologic Cross Section Profile Map
8) Hydrogeologic Cross Section A-A'
8A) Hydrogeologic Cross Section A-A'
8B) Hydrogeologic Cross Section B-B'
8C) Hydrogeologic Cross Section C-C'
8D) Hydrogeologic Cross Section D-D'
9) Groundwater Contour Map 1/10/02
10) Seasonal High Groundwater Contour Map
11) Top of Bedrock Contour Map
12) Water Quality Monitoring Map

APPENDICIES:

A) Permit Correspondence
B) Lithologic Logs
C) Well Construction Records
D) Field Permeability Test Data Sheets
E) Geotechnical Laboratory Test Data Sheets
F) Geophysical Survey Report

1.0 PROJECT INFORMATION

The Highway 55 C&D Landfill & Recycling Center site consists of approximately 88.6 acres of undeveloped land located 0.5 mile west of the intersection of Old Smithfield Road and Highway 55 in the Southwest portion of Wake County, North Carolina (Figures 1 and 2). A total of 43.6 acres will be utilized for actual landfilling operations (Figure 6). The Recycling Center will consist of a one acre paved drop-off area located adjacent to the Scale House and a 5.1 acre area for land clearing, inert debris, and curb-side product recycling (see Figure 2).

The C&D Landfill will be developed in three phases. Phase I involves 17.8 acres and is located in the western section of the property. Remaining Phases II and III include 14.6 and 11.2 acres, respectively. The Scale House and office area will be located in the easternmost section of the property. The access entrance road to the landfill will extend from Highway 55 Bypass to our paved access road located just north of Old Smithfield Road. The paved access road will extend beyond the Scale House and into the Phase I landfill area as a dust control measure. Figure 12 indicates the proposed site construction layout.

The information provided in this report is intended to address the geologic and hydrogeologic siting requirements specified in Section .0504 of the North Carolina DENR-Solid Waste Management Rules.

2.0 AREA RECONNAISSANCE

As required by the DENR-Soil Waste Management Rules, a Quarter-Mile Radius Aerial Photograph with a scale of 1"= 400' has been included for review (Figure 3). This photograph indicates the following: 1) locations of all homes; 2) land use; 3) zoning districts; 4) industrial buildings; 5) public and private utilities; 6) roads; 7) creeks; 8) general topography; and 9) flood plain areas.

The Quarter-Mile Radius Survey Map (included as Figure 4) with a scale of 1"=400' identifies all private drinking water wells and properties being served by the Apex/Holly Springs Water and Sewer Authority. Based on our Quarter-Mile survey is appears that no private drinking water wells are located within 0.25 mile of the subject property. This figure also indicates topography for your review. The three residences identified within

a Quarter-Mile radius located along Old Smithfield Road east of our area of study are all connected to municipal water and sewer provided by the Town of Apex.

The Two-Mile Radius Map, with a scale of 1"-1000', is included as Figure 5, and identifies local topography, schools, residential areas, public utilities, industrial sites, creeks, and flood plain areas. No schools, airports or runways were identified within two miles of the subject site. The only potential source of surface and/or groundwater contamination in the vicinity of the subject site is the South Wake MSW Feltonville Landfill situated immediately south as indicated on Figure 5. Groundwater contamination has been documented at this MSW facility, but not in the monitor wells along the northern perimeter of the site closest to the proposed landfilling area. No significant groundwater users such as industrial or large irrigation wells were identified during our survey. According to the Town of Apex and the Town of Holly Springs, there are no water intakes on either Falls Branch, or Little Branch within two miles of the proposed landfill site.

In order to provide further characterization of the surrounding vicinity, a Two-Mile Radius Aerial Photograph is provided as Figure 5A.

3.0 SITING REQUIREMENTS

The subject property and its proposed use as a C&D landfill and recycling center received unanimous approval from the Wake County Board of Adjustment on August 14, 2001. The Notice of Special Use Approval is attached in Appendix A. The Wake County Board of Commissioners granted Franchise Agreement approval (first vote) on November 19, 2001. The final vote for Franchise approval was granted by the Board on December 3, 2001. The executed Application for Construction and Demolition Debris (C&D) Landfill Franchise is included in Appendix A for your review.

A copy of the Wetland Determination and Request for Concurrence prepared by The Brigman Company, Inc. is attached in Appendix A. The 401 Certification Approval received by the North Carolina Division of Water Quality and the General Permit Verification received by the U.S. Army Corps of Engineers has also been included for your review.

4.0 REGIONAL HYDROGEOLOGY

4.1 Geology

The subject site is underlain by Triassic age fanglomerates of the Chatham Group deposited near the southeastern edge of the Durham Triassic Basin. These deposits represent alluvial fan materials deposited within the basin from the surrounding upland areas in response to displacement along the Jonesboro Fault, which delineates the southeastern margin of the Basin. Bedrock in this area consists of poorly sorted mixtures of metamorphic and igneous rock fragments within a matrix of reddish brown clayey, sandy siltstone with occasional mudstone or clayey sandstone interbedding. These deposits are generally weakly indurated and dip gently to the southeast. The total thickness of these conglomeratic deposits is unknown, but has been reported to exceed 10,000 feet near the eastern edge of the Basin. The Jonesboro Fault is located off site to the east.

Since a diabase dike was identified on the South Wake MSW Landfill to the south, a geophysical survey was conducted as part of the subsurface investigation for the proposed landfill site. A copy of the Geophysical Survey Report by Geophex Services, Ltd. in Raleigh, North Carolina is attached as Appendix F. No diabase dikes were identified on the subject site as a result of this study.

4.2 Hydrogeology

The proposed landfill site consists primarily of Piedmont type topography, which exhibits gentle to moderate slopes. In this area the water table is an undulating surface that generally reflects the topographic irregularities in a more subdued manner. Depth to the water table in this region is a function of the climate, lithology, and most importantly, topography. Extensive studies of the adjacent South Wake MSW Feltonville Landfill indicate that groundwater discharge patterns are similar to surface water discharge patterns in the Little Branch drainage basin.

Seasonal fluctuations of the water table may be considerable during wet or dry seasons. However, the net change in water level elevation is generally small on average, indicating that the average annual discharge of groundwater is approximately equal to the average annual recharge.

Regional groundwater flow appears to be to the west with localized flow patterns to the streams, which border the subject site to the north, south, and west. These streams generally appear to serve as discharge points for the groundwater from the shallow aquifer. The onsite groundwater flow characteristics are discussed in Section 5.6.

The resource value of the aquifer underlying and adjacent to this proposed landfill property is rated low, as the surrounding residences are served by either the Town of Apex or the Town of Holly Springs public water distribution systems.

5.0 GEOTECHNICAL AND HYDROGEOLOGICAL EVALUATION

5.1 Soil Borings

A total of 49 soil test borings were drilled at the subject site to evaluate the subsurface lithology and geotechnical characteristics (Figure 6). Monitor wells were installed in all the borings upon their completion except for SB-1 through SB-6. Boring locations were positioned both within the planned area of landfilling and within the buffer zones around the perimeter of the site in various topographic settings. Horizontal and vertical control for these borings/monitor wells was determined by Patterson, Brewer & Associates, P.A. located in Greensboro, North Carolina.

Standard penetration tests were performed at 5-foot intervals in the soil test borings in general accordance with ASTM D1586-84 to obtain information characterizing soil strength and relative density. Lithologic logs constructed from the soil test borings are included as Appendix B. Hollow stem augers were used to advance the soil borings to either refusal or to their termination depth. Approximately 40 feet of HX-size bedrock core was obtained from MW-1 (35-75 feet), 23 feet from MW-15 (35-58 feet), and 30 feet from MW-18 (20-50 feet). All coring was performed using a Canterra CT-450 drill rig. The percent recovery and RQD values for the core recovered are recorded on the Lithologic Logs for MW-1, MW-15, and MW-18 in Appendix B.

Attempts were made at numerous boring locations to obtain split-spoon samples of the subsurface material after PWR material with blow counts of 50/6 inches or greater was encountered. In all cases, no material was recovered in the spoon.

5.2 Monitor Well Installation

Well Completion Logs characterizing the 43 monitor wells installed on site are included as Appendix C. Each well was constructed of 2-inch diameter PVC screen and riser, with a washed sand filter pack installed to approximately 2 feet above the top of the well screen, followed by a bentonite seal approximately 2 feet thick, and grout to the ground surface. The monitor wells were used to determine groundwater elevations and to establish groundwater flow directions and gradients across the site. Wells were situated to characterize the various topographic settings present at the site, including flood plain, upland knolls, and slopes. Time of boring (TOB), 24-hour, and 7-day water levels for the wells are presented in Table 1. Summaries of monthly groundwater depths and elevations collected to date are provided in Table 2 and Table 2A, respectively.

5.3 Field Testing

In order to evaluate hydraulic conductivity characteristics of the subsurface lithologies present at the site, in-situ field permeability ("slug") testing was performed in monitor wells MW-4, MW-10, MW-13, MW-13D, MW-15, MW-29, MW-31, MW-36 and MW-37. The tests were conducted using the rising head technique, with the test data analyzed by the Bouwer and Rice Method. Test data sheets and calculations are included in Appendix D, with a summary of calculated field permeability test results presented in Table 3.

Based on the field permeability tests performed in the monitor wells screened primarily in the PWR (MW-10, MW-15, MW-29 and MW-37), the hydraulic conductivity of the PWR material averages 1.6 X 10-6 cm/sec. The average hydraulic conductivity of the bedrock material as calculated from testing in MW-4, MW-13, MW-13D, MW-31 and MW-36 is 1.8 X 10-6 cm/sec.

5.4 Laboratory Testing

Representative samples of on-site soils obtained during the field exploration were tested in Shield Engineering's soil testing laboratory. Soil classification tests including natural moisture content, unit weight, grain size distribution with hydrometers, Atterberg limits effective porosity and specific gravity were performed. In addition, standard Proctor compaction tests were performed on potential structural fills or cover soil samples.

USCS soil classifications from the laboratory test results are presented on the representative boring logs in Appendix B. Results of the geotechnical laboratory

classification tests are presented in Table 4. Laboratory test data sheets are included in Appendix E.

In general, the saprolitic soil is classified primarily as a clayey silt, with lesser amounts of slightly clayey silty fine sand and slightly sandy silty clay. The underlying PWR zone generally contained slightly more silt and less clay with increasing depth.

Undisturbed (UD) soil samples were obtained with Shelby tubes on November 6, 2001 from soil borings MW-26, MW-29, SB-1 and SB-3. Several attempts were made to obtain UD samples of the PWR material at various on-site locations, but were unsuccessful, as the tubes buckled before a sufficient sample of the material could be collected. Laboratory permeability results, as shown in Table 4, indicate that the vertical permeability of the UD soil samples ranges from 3.65 X 10-8 cm/sec to 9.29 X 10-7 cm/sec. Additional laboratory tests conducted on the UD samples include Atterburg limits, grain size distribution, specific gravity, effective porosity, dry density, and moisture content. However, flexible wall permeability and effective porosity were not performed on sample SB-3 (5'-6') because the sample broke into pieces during removal from the Shelby tube. This may have been due to the dryness of the sample. Additional soil samples were obtained from MW-25, SB-1, SB-2 and SB-4 for laboratory analysis. Potential cover soil samples (SS-1, SS-2 and SS-3) were also sampled. All test results are summarized in Table 4, with laboratory data included in Appendix E.

Effective porosities were estimated for all the soil samples collected in Table 4 utilizing their grain size distribution and the textural classification triangle from Fetter (1988). These values ranged from 0.01 to 0.07 percent, which were much lower than laboratory generated porosities for some of the samples. The textural classification triangles used in deriving these estimated values are included in Appendix E.

5.5 Subsurface Conditions

Native soils in this area are saprolitic, representing the major product of weathering of bedrock. Saprolite consists of rock that has been subjected to in-situ chemical weathering, resulting in the removal of up to 60% of the rock mass by solution without affecting volume (Horton and others 1991). These residual soils grade with depth into zones of partially weathered rock (PWR) that overlie the bedrock. Similar soils were grouped according to lithologies on the soil test boring logs to construct the hydrogeologic cross sections (Figures 8, 8A, 8B, 8C, and 8D). These cross sections have been generalized and may not depict the actual subsurface conditions that exist between the boring locations. The transition between lithologies is typically gradual (both horizontally and vertically) and actual lithologic changes may be more gradational than

depicted on Cross Sections A-A', B-B', C-C', D-D' or on the soil test boring logs. The attached Lithologic Logs (Appendix B) contain more specific descriptions of the material encountered at each boring location.

As indicated on the cross sections in Figures 8, 8A, 8B, 8C, and 8D, saprolitic soils consist primarily of clayey silt. The depths of these residual soils range from approximately 4 feet below ground surface (bgs) to 9 feet bgs. PWR, sampled primarily as slightly clayey sandy silt with rock fragments, was encountered beneath the saprolitic soils in every boring. The base of the PWR ranged from approximately 12 feet bgs to 30 feet bgs. PWR classifications were based on soils exhibiting hardness greater than 50 blows per 6 inches (or 100 blows per foot). Attempts were made at several locations to obtain a split-spoon sample at the next 5-foot depth increment. However, no material was recovered in any of these spoons.

In order to characterize bedrock at the site, approximately 40 feet of HX-size rock coring was obtained from MW-1, 23 feet from MW-15, and 30 feet from MW-18. Bedrock at all three locations was very similar, consisting of a massive reddish-brown fanglomerate. Only a few small weathered zones and fractures were evident in these cores, as evidenced by the high percent recovery and RQD values recorded on the Lithologic Logs for MW-1, MW-15, and MW-18 (Appendix B).

The estimated configuration of the top of competent, relatively unweathered bedrock is presented on Figure 11, Top of Bedrock Contour Map. Bedrock contours indicated on this map are based on the auger refusal depths and topography. The top of bedrock depths and elevations are summarized in Table 5.

The configuration of the top of competent bedrock is generally similar to the surface topography of the site, with the higher bedrock elevations occurring beneath the areas of highest topographic elevation. The bedrock surface elevation ranges from approximately 258.22 feet above MSL at MW-9 to 342.50 feet above MSL at SB-5.

5.6 Site Hydrogeology

Water levels have been measured on a monthly basis in the 43 monitor wells installed on the proposed landfill site. Groundwater depths recorded from October 2001 through March 2002 are presented in Table 2, with corresponding groundwater elevations presented in Table 2A. The January 10, 2002 elevations were used to construct the Groundwater Contour Map (Figure 9). This map indicates the strong correlation between topography and groundwater flow at this site. The average hydraulic gradient calculated

across the site from east to west using the January 10, 2002 data was approximately 0.019.

Vertical gradients were evaluated in two pairs of shallow and deep nested monitor wells by dividing the difference in the shallow/deep well groundwater elevations by the difference in the midpoint elevations of the saturated portion of each well's sandpack. The January 10, 2002 data indicated an upward vertical gradient of 0.0309 in the MW-13/MW-13D well pair and an upward vertical gradient of 0.0183 in the MW-35/MW-35D well pair. Both sets of data are characteristic of groundwater discharge conditions, which corresponds to their position near drainage features.

As indicated on the cross sections on Figures 8, 8A, 8B, 8C, and 8D, the water table primarily occurs within the fanglomerate bedrock material throughout this study area, except in the very western area of the site. Groundwater flow rates within this material are very slow – less than 10 feet per year based on the calculated hydraulic conductivities (from in-situ permeability tests), estimated effective porosities, and the horizontal hydraulic gradients measured from the Groundwater Contour Map (Figure 9). No groundwater seeps or springs have been identified within the area of proposed landfilling operations.

No long-term historical water level data is currently available for our specific site. However, water levels in 13 groundwater monitor wells on the adjacent South Wake MSW (Feltonsville) Landfill facility have been recorded at least twice a year since January 12, 1995. This data has been summarized in Table 6. Only the 12 monitor wells having over five years of water level data were considered since this data recording began prior to the current drought period beginning in 1988. Well MW-6 records were not used since the water level increased 15.91 feet during the past 5 years, which is not representative of typical groundwater conditions during this time. In fact, the highest water levels recorded for 10 of the 12 wells utilized occurred between January 1966 and May 1998, while the lowest water levels for all 12 wells were recorded after May 1998, indicating the effects of the drought (Table 6A). The difference between the highest and lowest water level elevation was obtained for each of these wells (i.e., maximum fluctuation from 1995 to 2001) and is indicated in Table 6A. Based on the depth to the water table, monitor wells were classified as shallow (water table less than 10 feet bgs), intermediate (water table from 10-25 feet bgs), or deep (water table greater than 25 feet bgs). The wells were classified based on which depth interval the measured water levels occurred in the majority of the time during the 5 years of recorded data. The resulting maximum fluctuation for the shallow wells (MW-9) is 3.10 feet, for the intermediate wells (MW-15) is 5.09 feet, and for the deep wells (MW-2) is 6.79 feet.

In order to calculate more conservative seasonal high groundwater elevations for the proposed landfill area, the appropriate maximum fluctuation numbers calculated above were increased to the next 0.5-foot and added to the highest water levels measured in the on-site monitor wells during the past 6 months. Wells with water levels less than 10 feet bgs were increased by 3.5 feet, wells with water levels from 10 to 25 feet were increased by 5.5 feet, and wells with water levels greater than 25 feet were increased by 7 feet. The resulting projected seasonal high groundwater depths and corresponding elevations are summarized in Table 7. This data was used to construct the attached Seasonal High Groundwater Contour Map (Figure 10).

6.0 WATER QUALITY MONITORING PLAN

In order to gain a better understanding of groundwater flow within the conglomeritic bedrock occurring in this area of the Triassic Basin, a meeting with Mr. Rick Wooten and Mr. Tyler Clark of the North Carolina Geological Survey (NCGS) was conducted on March 7, 2002. Based on their extensive field work within the Triassic Basin, NCGS personnel reported that the massive conglomerate (or fanglomerate) unit encountered throughout our study area contained very few fractures and virtually no bedding planes. They concurred with our observations that groundwater movement is extremely slow within this unit, and that there is little evidence of structural control. However, their findings have indicated a general correlation between the orientation of first order tributaries and preferred fracture orientations in this area. The most prevalent trend encountered appears to be northwest to southeast (NW-SE).

An examination of topography in the proposed Phase I of landfilling operations indicated no first order drainage features with a NW-SE orientation. Any such features will be further evaluated for groundwater monitoring prior to initiating landfilling in proposed Phases II and III.

Bedrock was observed in the walls of an access road on the southeastern portion of the subject site, in a sewer line trench along the eastern property line to a depth of 10-15 feet, and in a weathered outcrop within the steep northwest area of the site. All bedrock consisted of a massive conglomerate with no visible fractures or bedding planes that would indicate structural control of groundwater.

This Plan for the proposed Highway 55 C&D Landfill and Recycling Center was developed to meet the requirement of the NCDENR Solid Waste Section. The purpose of this Plan is to identify the methods and procedures to be used to effectively monitor

groundwater quality in the uppermost aquifer present at the subject site downgradient of proposed landfilling operations. This Plan includes sections describing: 1) monitor well locations, installation procedures, and construction details; 2) well purging and sampling procedures; 3) analytical methods; and 4) data evaluation and reporting requirements set forth by the NCDENR.

6.1 Surface Water Monitoring Plan

Two surface water monitor stations will be established along both Falls Branch and Little Branch at the approximate locations indicated on Figure 12, in order to evaluate potential impact to surface water quality from surface runoff or groundwater discharge from the proposed area of landfilling. The upstream locations (SW-1 and SW-3) will be situated just above the property lines, while stations SW-2 and SW-4 will be located downstream of the landfilling areas.

The actual sampling points within Falls Branch and Little Branch will be in areas of minimum turbulence and aeration. A single grab sample will be obtained by dipping a laboratory-supplied sample container into the creek. The sample container will be rinsed with the water to be sampled prior to filling the container. Care will be exercised so as not to allow sediment or other debris to enter the sample container. Samples will be obtained at mid-depth near the landfill side of the creek, and in an area that is characterized by cross-sectional homogeneity. Sample containers will be properly labeled, placed on ice in a portable cooler, and transported to Shealy Environmental Services, Inc., in Cayse, South Carolina or to another North Carolina certified laboratory. About one-half inch of airspace will be left in the plastic bottles for metals analysis. The containers for volatile organic compound analysis will be filled to the top with no air bubbles or headspace.

One of the primary concerns during the collection of surface water samples is to insure that they are not altered or contaminated by sediment or other debris that may affect the analytical results. This is especially true in the case of metals analysis. A 500mL sample bottle that has been pre-cleaned in the laboratory will be removed from the portable cooler and the surface water sample will be collected from the creek using this container. At this time, the sample will be immediately transferred into the laboratory prepared bottles containing required preservatives.

Field parameters (pH, temperature, and specific conductance) will be measured and recorded for both the upstream and downstream samples on Falls Branch and Little Branch utilizing a YSI-85 meter. The initial surface water sampling event will be conducted during construction of the landfill and prior to initial waste placement. Unless

otherwise directed by the NCDENR Solid Waste Section, subsequent surface water sampling will be performed on a semi-annual basis.

6.2 Groundwater Monitoring Plan

Proposed permanent monitor well locations for the Highway 55 C&D Landfill and Recycling Center are indicated on Figure 12, Water Quality Monitoring Map. Proposed monitor well MW-1 is located upgradient from all proposed areas of landfilling. The proposed Phase I compliance wells (MW-2 through MW-7) are all located downgradient of the proposed area of landfilling. These compliance wells were selected to provide characterization of downgradient groundwater quality and detection of changes in this quality in the Phase I area of the landfilling during and after its operation. Well locations were selected on the basis of existing groundwater flow directions, drainage features, and planned sump locations.

All borings/monitor wells that have been completed for the purpose of this study that have not been or will not be converted to permanent monitor wells will be properly abandoned in accordance with procedures specified by the NCDENR. Each of the monitor wells proposed for permanent use at the site will be constructed using 2-inch diameter Schedule 40 PVC, flush-joint casing and 0.01-inch slotted screen. The annular space between the borehole wall (approximately 8-inch diameter) and the well casing will be backfilled with a washed, medium-grained sand to a level approximately 2 feet above the top of the screen. Upon completion of the filter pack installation, pelletized bentonite will be placed in the annular space to a thickness of 2 feet and water added to allow hydration. The remainder of the annular space will then be filled with a cement/bentonite grout mix. Steel protective casings with locking caps will be placed over each monitor well's riser pipe. A concrete pad will be installed around the outside of each casing. Each lockable protective casing will be painted and identified with a nameplate detailing well construction information. A vented well cap will be placed on top of each PVC well casing to allow equilibration with atmospheric pressures. The top of casing (TOC) and ground surface elevations for proposed wells MW-1 through MW-7 will be surveyed and indicated on a Site Plan, and Well Completion Logs for these wells will be included in an Appendix to the first semi-annual sampling report submitted to the DENR. The boring logs and well completion logs for the new monitoring wells to be installed will be submitted to the Solid Waste Section within 30 days of well installation. Groundwater levels for each of the wells will also be provided.

Proposed upgradient well MW-1 will be completed to a depth of approximately 55 feet below ground surface (bgs) with 20 feet of screen to allow for seasonal fluctuation. Proposed downgradient monitor wells MW-2 through MW-7 will all be constructed with

15-foot screens and will be completed to approximate depths of 20 to 30 feet bgs. An attempt will be made to keep the top of screen elevation higher than the projected seasonal high groundwater elevation at each well location.

The monitor wells proposed for permanent use will be developed to remove suspended solids and reduce turbidity. Prior to sampling, each well will be purged using either a disposable teflon bailer or dedicated pump. Pumps used will be Grundfos stainless steel Redi Flow II with variable speed flow control. The pump tubing used will be half-inch teflon. Tubing will be discarded after development. The protective casing will be unlocked and opened, and the monitor well cap will be removed. An electronic water level indicator will be used to record the depth to groundwater from the top of casing reference point to the nearest 0.01 foot. The resulting measurement will be subtracted from the total well depth to determine the height of the water column (h) in feet. For a two-inch diameter monitor well, the volume of water present will be determined using the following equation:

$$\text{Well Volume (Gallons)} = 0.163h$$

Field parameters (pH, temperature, and specific conductance) will be measured and recorded at the initiation of purging and upon the removal of each well volume, and will be incorporated into the Water Quality Monitoring Report. Purging may need to be extended beyond three well volumes if field parameters have not stabilized.

Wells that demonstrate sufficient recharge will be purged of a least three volumes of standing water in the well. Some wells may be bailed or pumped dry. In this case the well will be allowed to recharge a minimum of 60 percent of its static water level prior to collecting the sample. Purging will be conducted using new disposable teflon bailers. These bailers contain a bottom metal weight encased in teflon. Bailers will not be field cleaned and reused in other wells. One rinse blank will be collected for analysis per each sampling event. All samples will be collected within 24 hours of the completion of well purging. Disposable bailers will be used. Therefore, no decontamination will be needed.

Samples will be collected by lowering a bailer gently into the water column and allowing the weighted bailer to sink until full. The bailer will be retrieved slowly and the groundwater sample will be poured into clean, laboratory supplied sample bottles in a manner that will limit aeration and the potential loss of volatile organic compounds (VOCs). For samples to be analyzed for VOCs, the sample jars will be filled to the top with no air bubbles or headspace. The glass VOC containers will contain hydrochloric acid as a preservative, while the plastic RCRA metal containers will be preserved with nitric acid.

Groundwater samples will be placed into clean, laboratory-supplied containers, labeled, packed on ice in a portable cooler, and transported to Shealy Environmental Services, Inc., in Cayse, South Carolina or to another approved North Carolina laboratory. One trip blank will be analyzed for volatile organic compounds (VOCs) for each sampling event. The equipment rinse blank will be analyzed for VOCs and the 8 RCRA metals.

Proper chain of custody documentation will be maintained from field sample collection through laboratory analysis. After sample collection, each well will be capped and the steel protective casing will be secured with a lock.

An initial sampling event for the 7 proposed monitor wells (MW-1 through MW-7) will be conducted prior to any waste placement within Phase I of the landfill. Unless otherwise directed by the NCDENR Solid Waste Section, subsequent sampling will be performed on a semi-annual basis.

Analytical testing of the groundwater samples will consist of EPA Method 8260 for VOCs and the 8 RCRA metals. The laboratory method for arsenic, selenium, cadmium, chromium, lead, silver, and barium will be SW-846-6010B. The laboratory method for mercury total and digestion will be SW-846-7470. A dual view trace ICP instrument will be used to provide detection limits of 1 ppb for all metals except mercury, which will have a detection limit of 0.2 ppb. Sample analyses will be performed by a North Carolina "certified" laboratory. All laboratory data will be subjected to strict laboratory quality assurance/quality control (QA/QC) protocol.

As described in this Plan, groundwater sampling and analysis will be used to detect any releases from the proposed landfill area. Well gauging data will be included for each sampling event, along with a summary of all analytical results. The results of each semi-annual sampling event will be submitted to the North Carolina DENR within 45 days after the date of sample collection.

7.0 REFERENCES

Bouwer, H., and Rice, R.C., 1976, A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells, American Geophysical Union.

Brown, et. al., 1985, Geologic Map of North Carolina: North Carolina Department of Natural Resources and Community Development, Raleigh, North Carolina.

Fetter, C.W., 1988, Applied Hydrogeology (2nd Edition): Merrill Publishing Company, 592p.

Horton, J.W., J., Zullo, V.A., and others, 1991, The Geology of the Carolinas: The University of Tennessee Press, 11 p., 25p.

Site Plan Application Revisions

Wake County, North Carolina

Highway 55 C&D Landfill & Recycling Center

April 2002

TABLES

FIGURES

APPENDIX A
Permit Correspondence

APPENDIX B
Lithologic Logs

APPENDIX C
Well Construction Records

APPENDIX D
Field Permeability Test Data Sheets

APPENDIX E
Geotechnical Laboratory Test Data Sheets

TABLE 1
INITIAL GROUND WATER ELEVATIONS
HIGHWAY 55 C&D LANDFILL, LLC.

NO.	WELL ID	GROUND SURFACE ELEVATION	T.O.B GW DEPTH	T.O.B. GW ELEVATION	24-HOUR GW DEPTH	24-HOUR GW ELEVATION	7-Day GW DEPTHS	7-DAY GW ELEVATION
1	MW-1	352.85	Dry	Dry	Dry	Dry	Dry	Dry
2	MW-2	328.14	Dry	Dry	52.30	275.84	40.37	287.77
3	MW-3	318.49	Dry	Dry	52.20	266.29	48.63	269.86
4	MW-4	344.25	Dry	Dry	24.50	319.75	22.96	321.29
5	MW-5	330.92	Dry	Dry	Dry	Dry	Dry	Dry
6	MW-6	325.87	Dry	Dry	39.50	286.37	36.02	289.85
7	MW-7	353.23	Dry	Dry	56.20	297.03	48.40	304.83
8	MW-8	343.11	Dry	Dry	Dry	Dry	Dry	Dry
9	MW-9	358.35	Dry	Dry	Dry	Dry	Dry	Dry
10	MW-10	348.87	Dry	Dry	39.80	309.07	37.95	310.92
11	MW-11	332.38	Dry	Dry	Dry	Dry	Dry	Dry
12	MW-12	307.59	Dry	Dry	6.86	300.44	7.09	300.50
13	MW-13	310.99	29.00	281.99	18.42	292.57	17.11	293.88
14	MW-13D	310.51	32.00	278.51	20.50	290.01	18.20	292.31
15	MW-14	314.06	Dry	Dry	Dry	Dry	Dry	Dry
16	MW-15	292.25	29.00	263.25	14.90	277.35	13.49	278.76
17	MW-16	311.84	Dry	Dry	Dry	Dry	Dry	Dry
18	MW-17	336.43	Dry	Dry	Dry	Dry	Dry	Dry
19	MW-18	335.09	Dry	Dry	Dry	Dry	Dry	Dry
20	MW-19	326.20	54.00	272.20	39.50	286.70	36.83	289.37
21	MW-20	330.10	Dry	Dry	Dry	Dry	Dry	Dry
22	MW-21	351.07	Dry	Dry	Dry	Dry	Dry	Dry
23	MW-22	304.09	Dry	Dry	49.42	254.67	46.20	257.89
24	MW-23	339.63	Dry	Dry	Dry	Dry	Dry	Dry
25	MW-24	343.55	Dry	Dry	Dry	Dry	Dry	Dry
26	MW-25	290.32	22.20	268.12	13.80	276.52	11.90	278.42
27	MW-26	289.89	21.50	268.39	13.20	276.69	11.42	278.47
28	MW-27	328.50	24.40	304.10	20.00	308.50	16.85	311.65
29	MW-28	348.20	Dry	Dry	Dry	Dry	44.60	303.60
30	MW-29	332.14	18.00	314.14	10.20	321.94	6.73	325.41
31	MW-30	297.82	Dry	Dry	32.50	265.32	22.00	275.82
32	MW-31	313.35	Dry	Dry	Dry	Dry	Dry	Dry
33	MW-32	306.50	Dry	Dry	45.20	261.30	32.69	273.81
34	MW-33	316.47	Dry	Dry	Dry	Dry	44.60	271.87
35	MW-34	293.47	41.00	252.47	31.00	262.47	19.50	273.97
36	MW-35	283.22	26.00	257.22	14.50	268.72	6.70	276.52
37	MW-35D	283.37	40.00	243.37	33.46	249.91	21.15	262.22
38	MW-36	292.24	24.20	268.04	22.03	270.21	16.80	275.44
39	MW-37	320.27	Dry	Dry	39.20	281.07	30.00	290.27
40	MW-38	326.79	Dry	Dry	Dry	Dry	47.30	279.49
41	MW-39	317.81	Dry	Dry	44.80	273.01	36.70	281.11
42	MW-40	319.34	Dry	Dry	30.40	288.94	21.20	298.14
43	MW-41	326.82	Dry	Dry	32.30	294.52	24.62	302.20

NOTES:
T.O.B. - Time of Boring
GW- Groundwater
All elevations are presented in feet above mean sea level.

TABLE 2

GROUNDWATER DEPTHS

HIGHWAY 55 C&D LANDFILL, LLC.

NO.	WELL ID	GROUND SURFACE ELEVATION	10/17/2001 GW DEPTH	11/27/2001 GW DEPTH	12/20/2001 GW DEPTH	01/10/2002 GW DEPTH	02/19/2002 GW DEPTH	03/07/02 GW DEPTH
1	MW-1	352.85	62.76	48.24	32.63	29.50	**28.51**	28.74
2	MW-2	328.14	16.72	17.90	**13.98**	14.05	14.07	14.29
3	MW-3	318.49	33.58	25.56	20.54	**20.27**	20.35	20.59
4	MW-4	344.25	**21.93**	22.13	22.63	22.63	22.48	22.55
5	MW-5	330.92	38.65	32.35	**26.45**	26.50	26.52	26.60
6	MW-6	325.87	35.83	30.25	26.52	25.50	**25.23**	25.45
7	MW-7	353.23	46.98	38.38	30.98	30.00	**29.95**	30.02
8	MW-8	343.11	33.21	28.46	26.52	26.10	**25.95**	26.02
9	MW-9	358.35	28.48	27.52	26.05	26.00	**25.84**	26.05
10	MW-10	348.87	23.87	22.09	21.52	21.00	**20.72**	20.90
11	MW-11	332.38	26.85	19.37	18.00	**17.50**	17.93	17.99
12	MW-12	307.59	6.61	6.95	5.75	4.98	**4.97**	5.11
13	MW-13	310.99	16.85	17.37	16.07	15.53	**15.28**	15.37
14	MW-13D	310.51		16.91	14.82	**14.27**	14.90	15.02
15	MW-14	314.06	47.24	33.41	**22.20**	23.37	23.32	23.47
16	MW-15	292.25	12.75	12.17	9.43	8.68	**8.62**	8.70
17	MW-16	311.84	32.35	27.58	**26.48**	26.68	26.60	26.64
18	MW-17	336.43	50.14	41.47	31.89	29.00	**28.90**	28.98
19	MW-18	335.09	38.42	32.62	30.25	28.00	**27.72**	28.01
20	MW-19	326.20	35.45	32.65	28.38	**26.50**	27.05	28.45
21	MW-20	330.10	37.86	32.96	26.79	24.00	**23.87**	24.01
22	MW-21	351.07	34.65	28.46	**22.32**	23.00	23.42	23.55
23	MW-22	304.09	35.60	25.48	**19.34**	20.42	20.18	20.33
24	MW-23	339.63	40.15	33.21	27.10	**24.50**	24.67	24.65
25	MW-24	343.55	48.80	38.65	27.22	27.05	**26.94**	27.00
26	MW-25	290.32		**9.65**	10.68	10.59	10.50	10.55
27	MW-26	289.89		10.98	10.48	**9.00**	9.76	9.90
28	MW-27	328.50		**13.17**	14.10	13.87	13.88	13.95
29	MW-28	348.20		25.24	24.14	**24.10**	24.13	24.15
30	MW-29	332.14		5.81	5.75	**5.45**	5.56	5.61
31	MW-30	297.82		13.57	13.40	12.75	**12.68**	12.70
32	MW-31	313.35		35.20	25.61	**23.50**	24.16	24.42
33	MW-32	306.50		**21.83**	22.46	22.45	22.37	22.38
34	MW-33	316.47		27.48	26.70	26.70	**26.50**	26.84
35	MW-34	293.47		14.10	12.69	12.16	12.26	12.35
36	MW-35	283.22		**4.20**	5.19	4.57	4.69	4.76
37	MW-35D	283.37		4.51	4.58	**4.20**	4.34	4.39
38	MW-36	292.24		15.68	12.06	**11.97**	13.06	13.39
39	MW-37	320.27		21.73	19.87	**18.00**	18.16	18.39
40	MW-38	326.79		28.47	**19.65**	19.92	20.36	20.49
41	MW-39	317.81		22.45	13.72	**13.00**	13.12	13.25
42	MW-40	319.34		**13.40**	13.45	14.00	13.88	13.89
43	MW-41	326.82		13.65	**13.51**	13.76	14.14	14.29

NOTES:
GW- Groundwater
All elevations are presented in feet above mean sea level.
All depths are presented in feet below ground surface.
All seasonal high groundwater depths are highlighted.

Table 2A
GROUNDWATER ELEVATIONS
HIGHWAY 55 C&D LANDFILL, LLC.

NO.	WELL ID	GROUND SURFACE ELEVATION	TOP OF CASING	CASING STICK-UP (FT.)	10/17/2001 GW DEPTH	11/27/2001 GW DEPTH	12/20/2001 GW DEPTH	01/10/2002 GW DEPTH	02/19/2002 GW DEPTH	03/07/02 GW DEPTH
1	MW-1	352.85	355.41	2.56	290.09	304.61	320.22	323.35	**324.34**	324.11
2	MW-2	328.14	329.94	1.80	311.42	310.24	**314.16**	314.09	314.07	313.85
3	MW-3	318.49	321.38	2.89	284.91	292.93	297.95	**298.22**	298.14	297.81
4	MW-4	344.25	346.60	2.35	**322.32**	322.12	321.62	321.62	321.77	321.70
5	MW-5	330.92	332.65	1.73	292.27	298.57	**304.47**	304.42	304.40	304.32
6	MW-6	325.87	328.16	2.29	290.04	295.62	299.35	300.37	**300.64**	300.42
7	MW-7	353.23	355.46	2.23	306.25	314.85	322.25	323.23	**323.28**	323.21
8	MW-8	343.11	345.63	2.52	309.90	314.65	316.59	317.01	**317.16**	317.09
9	MW-9	358.35	360.60	2.25	329.87	330.83	332.30	332.35	**332.51**	332.30
10	MW-10	348.87	351.08	2.21	325.00	326.78	327.35	327.87	**328.15**	327.97
11	MW-11	332.38	334.73	2.35	305.53	313.01	314.38	**314.88**	314.45	314.39
12	MW-12	307.59	310.38	2.79	300.98	300.64	301.84	302.61	**302.62**	302.48
13	MW-13	310.99	313.67	2.68	294.14	293.62	294.92	295.46	**295.71**	295.62
14	MW-13D	310.51	313.27	2.76		293.60	295.69	**296.24**	295.61	295.49
15	MW-14	314.06	316.79	2.73	266.82	280.65	**291.86**	290.69	290.74	290.59
16	MW-15	292.25	294.15	1.90	279.50	280.08	282.82	283.57	**283.63**	283.55
17	MW-16	311.84	314.62	2.78	279.49	284.26	**285.36**	285.16	285.24	285.20
18	MW-17	336.43	339.49	3.06	286.29	294.96	304.54	307.43	**307.53**	307.45
19	MW-18	335.09	337.32	2.23	296.67	302.47	304.84	307.09	**307.37**	307.08
20	MW-19	326.20	328.40	2.20	290.75	293.55	297.82	**299.70**	299.15	297.75
21	MW-20	330.10	332.82	2.72	292.24	297.14	303.31	306.10	**306.23**	306.09
22	MW-21	351.07	353.80	2.73	316.42	322.61	**328.75**	328.07	327.65	327.52
23	MW-22	304.09	306.60	2.51	268.49	278.61	**284.75**	283.67	283.91	283.76
24	MW-23	339.63	341.88	2.25	299.48	306.42	312.53	**315.13**	314.96	314.98
25	MW-24	343.55	347.48	3.93	294.75	304.90	316.33	316.50	**316.61**	316.55
26	MW-25	290.32	291.90	1.58		**280.67**	279.64	279.73	279.82	279.77
27	MW-26	289.89	291.95	2.06		278.91	279.41	**280.89**	280.13	279.99
28	MW-27	328.50	331.28	2.78		**315.33**	314.40	314.63	314.62	314.55
29	MW-28	348.20	350.80	2.60		322.96	324.05	**324.10**	324.07	324.05
30	MW-29	332.14	334.71	2.57		326.33	326.39	**326.69**	326.58	326.53
31	MW-30	297.82	300.29	2.47		284.25	284.42	285.07	**285.14**	285.12
32	MW-31	313.35	315.72	2.37		278.15	287.74	**289.85**	289.19	288.93
33	MW-32	306.50	308.78	2.28		**284.67**	284.04	284.05	284.13	284.18
34	MW-33	316.47	320.06	3.59		288.99	289.77	289.77	**289.97**	289.63
35	MW-34	293.47	295.55	2.08		279.37	280.78	**281.31**	281.21	281.12
36	MW-35	283.22	285.27	2.05		**279.02**	278.03	278.65	278.53	278.46
37	MW-35D	283.37	285.29	1.92		278.86	278.79	**279.17**	279.03	278.98
38	MW-36	292.24	294.63	2.39		276.56	280.18	**280.27**	279.18	278.85
39	MW-37	320.27	323.36	3.09		298.54	300.40	**302.27**	302.11	301.88
40	MW-38	326.79	330.00	3.21		298.32	**307.14**	306.87	306.43	306.30
41	MW-39	317.81	320.31	2.50		295.36	304.09	**304.81**	304.69	304.56
42	MW-40	319.34	322.52	3.18		**305.94**	305.89	305.34	305.46	305.45
43	MW-41	326.82	329.38	2.56		313.17	**313.31**	313.06	312.68	312.53

NOTES:
GW- Groundwater
All elevations are presented in feet above mean sea level.
All seasonal high groundwater elevations are highlighted.

TABLE 3
HYDRAULIC DATA FOR HYDROGEOLOGIC UNITS
HIGHWAY 55 C&D LANDFILL, LLC.

WELL ID	HYDROGEOLOGIC UNIT	DEPTH (FT.)	HYDRALIC CONDUCTIVITY (CM/SEC)
MW-4	BEDROCK	20-35'	3.89X10-6
MW-10	PWR/BEDROCK	10-25'	3.06X10-7
MW-13	BEDROCK	15-30'	8.50X10-7
MW-13D	BEDROCK	45-50'	1.08X10-6
MW-15	PWR	9-24'	1.98X10-6
MW-26	SAPROLITE	3-5'	7.42X10-8
MW-29	SAPROLITE	3-4'	3.65X10-8
MW-29	PWR	5-20'	2.96X10-7
MW-31	BEDROCK	30-45'	<3.0X10-7
MW-36	BEDROCK	12-27'	2.87X10-6
MW-37	BEDROCK	7-22'	3.83X10-6
SB-1	SAPROLITE	3-5'	9.29X10-7

NOTES:
Effective porosity values estimated from grain size analysis (Fetter 1998).
PWR-Partially Weathered Rock

TABLE 4

SUMMARY OF LABORATORY TEST DATA
Highway 55 C&D Landfill
Wake County, North Carolina
SHIELD Engineering, Inc.

GEOTECHNICAL DATA
HIGHWAY 55 C&D LANDFILL, LLC.

Boring No./ Sample Depth	USCS Classification	% Gravel	% Sand	% Silt	% Clay	Atterburg Limits		Proctor Data		In Situ Conditions				Hydraulic Conductivity k (cm/sec)
						Liquid Limit %	Plasticity Index %	Max Dry Density (pcf)	Optimum Moisture Content (%)	Specific Gravity	Effective Porosity	Dry Density (pcf)	Moisture Content (%)	
MW-25 (5'-7')	SC	10.6	53.5	21.1	14.8	25	10	N/A	N/A	2.681	N/A	N/A	4.3	N/A
MW-25 (16'-17')	CL	3.1	22.7	55.1	19.1	29	9	N/A	N/A	2.691	N/A	N/A	3.8	N/A
MW-26 (3'-5')	CL	0.0	5.4	48.5	46.1	45	21	N/A	N/A	2.618	0.3775	101.7	22.1	7.42E-08
MW-29 (3'-4')	CL	0.3	25.6	49.4	24.7	28	11	N/A	N/A	2.727	0.2595	126	10.1	3.65E-08
SB-1 (3'-5')	SC	5.2	48.1	25.3	21.4	31	9	N/A	N/A	2.608	0.2755	117.9	9.7	9.29E-07
SB-1 (14'-15')	CL	0.1	22.7	54.3	22.9	25	9	N/A	N/A	2.662	N/A	N/A	3.5	N/A
SB-2 (3'-4')	CH	0.2	7.4	36.5	55.9	69	47	N/A	N/A	2.611	N/A	N/A	19.8	N/A
SB-2 (13'-14')	CL	1.2	22.9	45.4	30.5	30	15	N/A	N/A	2.662	N/A	N/A	5.3	N/A
SB-3 (5'-6')	CL	1.3	16.8	38.2	43.7	42	23	N/A	N/A	2.697	*	*	5.9	*
SB-4 (4'-5')	CL	0.1	10.0	47.0	42.9	44	25	N/A	N/A	2.672	N/A	N/A	15.9	N/A
SB-4 (8'-9')	CL	0.5	18.2	45.8	35.5	32	18	N/A	N/A	2.711	N/A	N/A	7.7	N/A
SS-1	CH	1.2	19.7	33.6	45.5	68	43	105.1	16.6	2.606	0.3748	101.7	18.9	2.60E-08
SS-2	CL	1.3	29.3	39.2	30.2	41	22	114.3	13.3	2.608	0.3332	108.5	16.5	1.35E-08
SS-3	CL	11.8	12.9	42.3	33.0	42	23	108.6	17.1	2.642	0.3735	103.3	19.6	2.27E-08

* Sample SB-3 (5-6') too dry to run permeability test.

TABLE 5

TOP OF BEDROCK ELEVATIONS

NO.	WELL ID	GROUND SURFACE ELEVATION	DEPTH OF ROCK (FT.)	BEDROCK ELEVATION
1	MW-1	352.85	20.5	332.35
2	MW-2	328.14	17	311.14
3	MW-3	318.49	14	304.49
4	MW-4	344.25	18	326.25
5	MW-5	330.92	15.5	315.42
6	MW-6	325.87	16	309.87
7	MW-7	353.23	18	335.23
8	MW-8	343.11	19	324.11
9	MW-9	358.35	17.5	340.85
10	MW-10	348.87	17	331.87
11	MW-11	332.38	18	314.38
12	MW-12	307.59	16	291.59
13	MW-13	310.99	15	295.99
14	MW-13D	310.51	15	295.51
15	MW-14	314.06	16	298.06
16	MW-15	292.25	30	262.25
17	MW-16	311.84	27	284.84
18	MW-17	336.43	18	318.43
19	MW-18	335.09	17	318.09
20	MW-19	326.20	18	308.20
21	MW-20	330.10	17	313.10
22	MW-21	351.07	19	332.07
23	MW-22	304.09	23	281.09
24	MW-23	339.63	18	321.63
25	MW-24	343.55	21.5	322.05
26	MW-25	290.32	25	265.32
27	MW-26	289.89	30	259.89
28	MW-27	328.50	15	313.50
29	MW-28	348.20	17.5	330.70
30	MW-29	332.14	12	320.14
31	MW-30	297.82	12.5	285.32
32	MW-31	313.35	20	293.35
33	MW-32	306.50	18	288.50
34	MW-33	316.47	18.5	297.97
35	MW-34	293.47	12	281.47
36	MW-35	283.22	25	258.22
37	MW-35D	283.37	25	258.37
38	MW-36	292.24	12.5	279.74
39	MW-37	320.27	15	305.27
40	MW-38	326.79	15	311.79
41	MW-39	317.81	14.5	303.31
42	MW-40	319.34	12	307.34
43	MW-41	326.82	12.5	314.32
	SB-1	325.98	16	309.98
	SB-2	348.78	22	326.78
	SB-3	344.80	20	324.80
	SB-4	347.77	17	330.77
	SB-5	362.50	20	342.50
	SB-6	348.00	18	330.00

NOTE: All elevations are presented in feet above mean sea level.

TABLE 6

GROUNDWATER ELEVATIONS
FELTONSVILLE LANDFILL – WAKE COUNTY

Monitoring Well Designation	TOC Elevation (AMSL)	1/29/96 Groundwater Elevation (AMSL)	11/30/96 Groundwater Elevation (AMSL)	4/26/97 Groundwater Elevation (AMSL)	11/3/97 Groundwater Elevation (AMSL)	5/12-13/98 Groundwater Elevation (AMSL)	11/30/98 Groundwater Elevation (AMSL)	4/27/99 Groundwater Elevation (AMSL)	12/9/99 Groundwater Elevation (AMSL)	4/19/00 Groundwater Elevation (AMSL)	12/14/00 Groundwater Elevation (AMSL)	4/12/01 Groundwater Elevation (AMSL)
MW-2	369.12	333.31	333.21	334.19	332.50	329.40	332.89	329.48	334.13	336.19	332.52	333.58
MW-4												
MW-6	319.60	291.30	297.74	296.12	297.15	297.90	298.03	298.19	304.69	307.21	298.70	306.97
MW-8	286.88	276.65	276.48	275.82	274.28	276.67	274.15	274.36	275.18	275.85	274.18	275.52
MW-9	285.72	277.39	276.81	276.52	274.85	277.11	274.29	274.51	275.46	276.69	274.97	276.27
MW-10	287.64	278.20	277.68	277.07	275.58	277.98	275.57	275.69	276.30	277.70	275.54	277.00
MW-11	282.75	277.64	277.70	277.15	275.93	277.77	275.35	275.54	276.90	277.65	275.25	276.87
MW-12	306.39	300.38	300.29	299.71	299.46	299.50	299.39	299.69	299.52	299.68	298.69	299.59
MW-13	305.91	296.06	294.95	295.49	292.35	295.55	291.99	292.06	293.57	294.80	291.87	294.58
MW-14	305.68	296.34	295.81	296.24	292.88	296.47	292.61	292.74	294.30	295.49	292.48	295.30
MW-15	305.31	296.45	294.77	295.49	292.09	295.50	291.86	292.30	293.31	294.67	291.72	294.57
MW-16	315.05	284.86	284.69	284.84	283.65	286.73	283.28	283.59	284.38	285.75	283.25	285.25
MW-17	291.41	276.88	275.00	276.27	274.29	277.19	273.64	273.79	273.20	277.30	274.21	277.41
MW-18	300.85	287.73	288.45	288.87	286.83	288.53	285.93	286.11	286.71	288.15	286.15	287.67
MW-19	286.19								276.07	277.02	275.34	276.57
MW-20	285.91								276.16	280.33	275.31	280.43
MW-21	339.05								319.40	320.84	315.40	316.25
MW-22	299.17								282.04	285.38	282.55	284.38
MW-23	286.69								258.94	275.63	269.94	271.34
MW-24	294.96								278.56	283.71	278.31	280.92
MW-25	295.89								276.69	281.21	277.11	278.24
MW-26	282.81								277.76	277.06	274.41	276.21
MW-27	297.30								280.30	286.23	277.60	276.80
MW-28d	319.73								DRY	DRY	DRY	DRY

NOTES:
- - Data Not Available
TOC Top of Casing
AMSL Above Mean Sea Level

REFERENCE: CAMP DRESSER & McKee, GROUNDWATER MONITORING REPORT; REPORT DATED MAY 2001

Table 6A

SEASONAL HIGH GROUNDWATER ELEVATION CALCULATIONS UTILITZING FELTONSVILLE LANDFILL DATA (1/96-4/01)

HIGHWAY 55 C&D LANDFILL, LLC.

NO.	WELL ID	WELL DEPTH DESIGNATION	TOP OF CASING	HIGHEST GW ELEVATION	LOWEST GW ELEVATION	MAXIMUM FLUCTUATION	SEASONAL HIGH FACTOR
1	MW-2	D	369.12	336.19	329.40	6.79	7.0
2	MW-8	I	286.88	276.67	274.15	2.52	5.5
3	MW-9	S	285.72	277.39	274.29	3.10	3.5
4	MW-10	I	287.64	278.20	275.54	2.66	5.5
5	MW-11	S	282.75	277.77	275.25	2.52	3.5
6	MW-12	S	306.89	300.38	298.69	1.69	3.5
7	MW-13	I	305.91	296.06	291.87	4.19	5.5
8	MW-14	I	305.68	296.47	292.48	3.99	5.5
9	MW-15	I	305.31	296.45	291.36	5.09	5.5
10	MW-16	D	315.05	286.73	283.25	3.48	7.0
11	MW-17	I	291.41	277.41	273.20	4.21	5.5
12	MW-18	I	300.85	288.87	285.93	2.94	5.5

MAY 2002
Received
Solid Waste
Section

NOTES:
GW-Groundwater
All elevations are presented in feet above mean sea level.
T.O.C.-Top of Casing
D-Water level depths >25 ft. below T.O.C
I-Water level depths from 10ft. to 25ft. below T.O.C.
S-Water level depths <10ft. below T.O.C.

TABLE 7

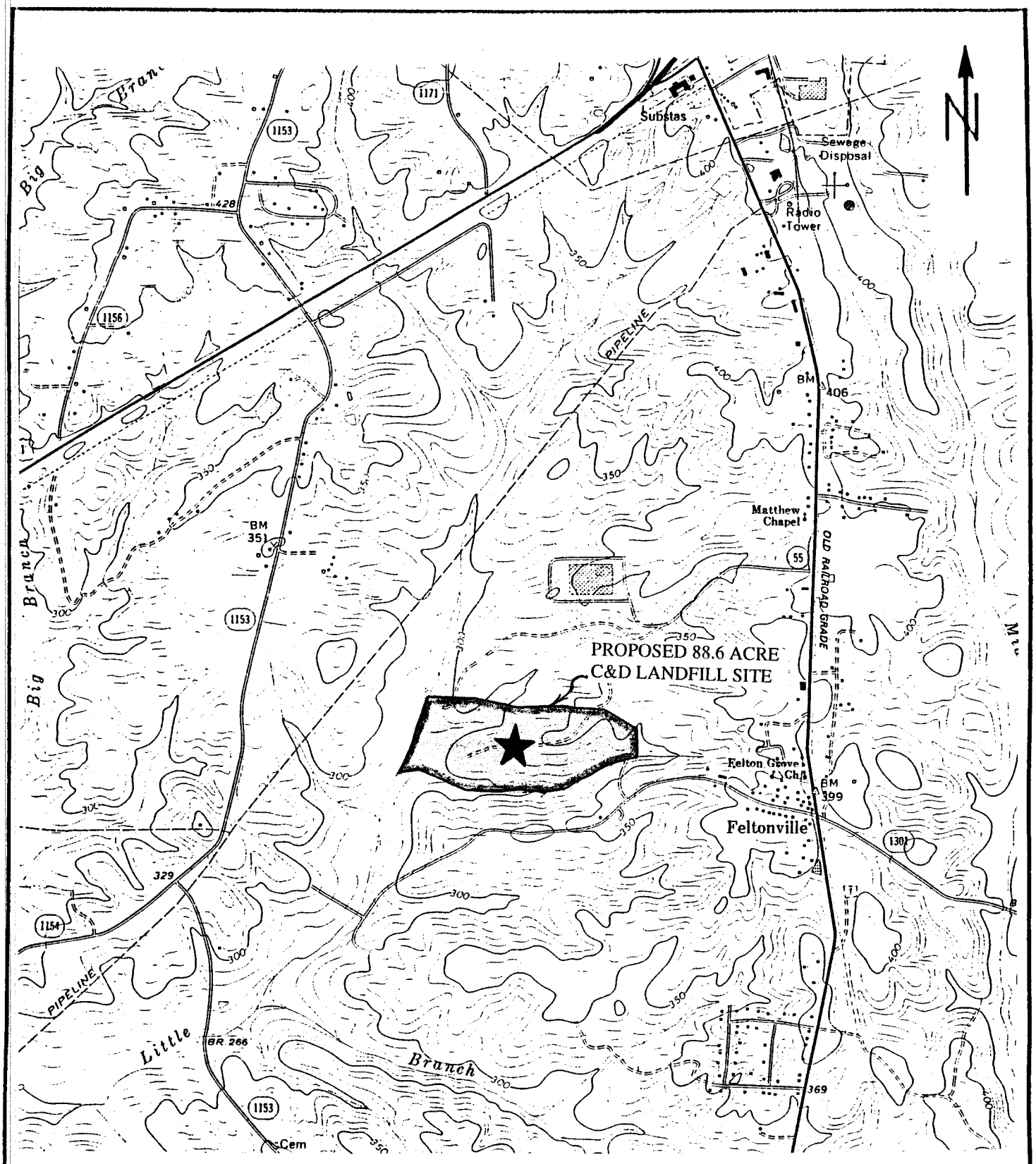
SEASONAL HIGH GROUNDWATER DEPTHS & ELEVATIONS

HIGHWAY 55 C&D LANDFILL, LLC.

NO.	WELL ID	SEASONAL HIGH GW ELEVATION (ACTUAL)	SEASONAL HIGH GW ELEVATION (CALCULATED)	SEASONAL HIGH WATER LEVEL DEPTH (ACTUAL)	SEASONAL HIGH WATER LEVEL DEPTH BELOW GS (CALCULATED)	MAXIMUM SEASONAL FLUCTUATION FACTOR*
1	MW-1	324.34	331.34	28.51	21.51	7.00
2	MW-2	314.16	319.66	13.98	8.48	5.50
3	MW-3	298.22	303.72	20.27	14.77	5.50
4	MW-4	322.32	327.82	21.93	16.43	5.50
5	MW-5	304.47	311.47	26.45	19.45	7.00
6	MW-6	300.64	307.64	25.23	18.23	7.00
7	MW-7	323.28	330.28	29.95	22.95	7.00
8	MW-8	317.16	324.16	25.95	18.95	7.00
9	MW-9	332.51	339.51	25.84	18.84	7.00
10	MW-10	328.15	333.65	20.72	15.22	5.50
11	MW-11	314.88	320.38	17.50	12.00	5.50
12	MW-12	302.62	306.12	4.97	1.47	3.50
13	MW-13	295.71	301.21	15.28	9.78	5.50
14	MW-13D	296.24	301.74	14.27	8.77	5.50
15	MW-14	291.86	297.36	22.20	16.70	5.50
16	MW-15	283.63	287.13	8.62	5.12	3.50
17	MW-16	285.36	292.36	26.48	19.48	7.00
18	MW-17	307.53	314.53	28.90	21.90	7.00
19	MW-18	307.37	314.37	27.72	20.72	7.00
20	MW-19	299.70	306.70	26.50	19.50	7.00
21	MW-20	306.23	311.73	23.87	18.37	5.50
22	MW-21	328.75	334.25	22.32	16.82	5.50
23	MW-22	284.75	290.25	19.34	13.84	5.50
24	MW-23	315.13	320.63	24.50	19.00	5.50
25	MW-24	316.61	323.61	26.94	19.94	7.00
26	MW-25	280.67	286.17	9.65	4.15	5.50
27	MW-26	280.89	286.39	9.00	3.50	5.50
28	MW-27	315.33	320.83	13.17	7.67	5.50
29	MW-28	324.10	329.60	24.10	18.60	5.50
30	MW-29	326.69	330.19	5.45	1.95	3.50
31	MW-30	285.14	290.64	12.68	7.18	5.50
32	MW-31	289.85	295.35	23.50	18.00	5.50
33	MW-32	284.67	290.17	21.83	16.33	5.50
34	MW-33	289.97	296.97	26.50	19.50	7.00
35	MW-34	281.31	286.81	12.16	6.66	5.50
36	MW-35	279.02	282.52	4.20	0.70	3.50
37	MW-35D	279.17	282.67	4.20	0.70	3.50
38	MW-36	280.27	285.77	11.97	6.47	5.50
39	MW-37	302.27	307.77	18.00	12.50	5.50
40	MW-38	307.14	312.64	19.65	14.15	5.50
41	MW-39	304.81	310.31	13.00	7.50	5.50
42	MW-40	305.94	311.44	13.40	7.90	5.50
43	MW-41	313.31	318.81	13.51	8.51	5.00

NOTES:
GW - Groundwater
GS - Ground Surface

Elevations are presented in feet above mean sea level.
Depths are presented in feet below ground surface.
*This factor is based on maximum seasonal fluctuations calculated from Table 6.



REFERENCE: APEX, NC, 1988, TOPOGRAPHIC QUAD

SCALE: 1:24000

DATE: FEBRUARY 2002

ENVIRO-PRO, P.C.
15101 REGENA LANE, CHARLOTTE, NC 28278
(704) 583-0075 • Fax (704) 583-2873

PROJECT LOCATION MAP
HWY55 C&D LANDFILL & RECYCLING CTR.
WAKE COUNTY, NC

FIGURE 1

WAKE COUNTY
SPECIAL USE PERMIT
&
FRANCHISE AGREEMENT

Return To: Tom Worth Jr
P.O. Box 1799
Raleigh, N.C. 27602

STATE OF NORTH CAROLINA

COUNTY OF WAKE

NOTICE OF SPECIAL USE APPROVAL

PETITION NO BA: SU-1923-01

Property recorded in Deed Book 9099, Page 1039 - 1044, Wake County Register of Deeds.

NAME OF PROPERTY OWNER (s): Griffin Brothers Companies dba Highway 55 C&D Landfill L.L.C. and Ray Markham Stewart, Ruth B. Stewart, Anthony K. Woodell and Melissa S. Woodell

KNOW ALL PERSONS BY THESE PRESENTS, that Griffin Brothers, 19109-118 West Catawba Avenue, Cornelius, North Carolina 28031-5613, applied to Wake County for Special Use Approval for the use and development of the property described above which permit was granted by Wake County on August 14, 2001.

To construct and operate a Construction and Demolition Debris (C&D) landfill and a recycling facility.

GRIFFIN BROTHERS COMPANIES
By: Mike L Griffin
PETITIONER

Highway 55 C&D LANDFILL, LLC
By: Mike L Griffin MANAGER
OWNER (if other than petitioner)

Ray Markham Stewart
Ruth B. Stewart
Anthony K. Woodell
Melissa S. Woodell

I, MIRIAM J MOORE, a Notary Public in and for said County and State do hereby certify that MIKE L GRIFFIN, RAY MARKHAM STEWART, ANTHONY K WOODELL, RUTH B. STEWART, MELISSA S WOODELL personally appeared before me and acknowledge the execution of this document.
Witness my hand and official stamp or seal, this 14th day of November, 2001.

MIRIAM J. MOORE NOTARY PUBLIC WAKE COUNTY, N.C.

Miriam J. Moore
Notary Public
My Commission Expires: 5-07-06

(Seal)

WAKE COUNTY

BY

Becky Smith
Becky Smith, Clerk to the Wake County Board of Adjustment

Melinda Clark
Melinda Clark, Wake County Land Development Administrator

I, Brenda F. Coats, a Notary Public in and for said County and State do hereby certify that Melinda Clark, Land Development Administrator of Wake County, and Becky Smith, Clerk to the Wake County Board of Adjustment personally appeared before me and duly sworn says each for himself/herself that he/she knows that this document is a true and accurate account of the Order of The Board of Adjustment to the Land Development Administrator to issue said special use approval subject the any terms or conditions specified in the order.

IN WITNESS WHEREOF, I have hereunto set my hand and Notarial Seal this the 6th, day of September, 2001.

Brenda F. Coats
Notary Public
My Commission Expires: 9-1-2003

BRENDA F. COATS NOTARY PUBLIC WAKE COUNTY, N.C.

Wake County,NC 124
Laura M Riddick, Register Of Deeds
Presented & Recorded 12/20/2001 09:53:08
Book : 009218 Page : 00197 - 00198

Laura M Riddick
Register of Deeds
Wake County, NC

Book : 009218 Page : 00197 - 00198

Yellow probate sheet is a vital part of your recorded document.
Please retain with original document and submit for rerecording.

WAKE COUNTY NORTH CAROLINA

Wake County Register of Deeds
Laura M. Riddick
Register of Deeds

North Carolina - Wake County

The foregoing certificate S of Miriam J. Moore
Brenda F. Coats

_____ Notary(ies) Public is (are) certified to be correct. This instrument and this certificate are duly registered at the date and time and in the book and page shown on the first page hereof.

Laura M. Riddick, Register of Deeds
By: Frederick C. Baymon
Assistant/Deputy Register of Deeds

This Customer Group
_____ # of Time Stamps Needed

This Document
_____ New Time Stamp
2 # of Pages

SU-1898-01 C. D. McClure - Construction and Demolition Recycling/Reuse and Residuals Landfill

WAKE COUNTY NORTH CAROLINA

SPECIAL USE PERMIT PETITION

File No.

(Rev. #)

Complete with required information (write "n/a" if information not applicable to proposal).

Note: The Wake County Zoning Ordinance and Land Use Plan may be viewed from the Planning Department's web site: www.co.wake.nc.us/planning.

Type of Special Use (be as specific as possible and cite Zoning Ordinance provision listing use as permitted special use)

Section 1-1-13 Construction and Demolition Landfill

Modification of previously issued Special Use Permit?: ( ) Yes (XX) No

Property

Parcel Identification Number: 0740.02-55-8687

Address: _____

Location: _____ side of _____, at/between
(north, east, south, west) (street)

_____ and _____
(street) (street)

Total site area: 200.10 Acres sf

Zoning District(s) and land area within each: I-1

Conditions of any Conditional Use Zoning Districts: N/A

Present land use(s): _____

Proposal

Max. floor area ratio (see applicable district/use regulation): N/A

Proposed total floor area: None sf Proposed floor area ratio (floor area/site area): None

Max. impervious surface coverage (see applicable district/use regulation): N/A

Proposed impervious surfaces area: None sf

Proposed Impervious surface coverage (impervious surfaces area/site area x 100): None %

Required transitional bufferyard types and depths (see Sec. 1-1-29):

Front (__) 100 ft Left (__) 100 ft Right (__) 100 ft Rear (__) 100 ft

Proposed transitional bufferyard types and depths (see Sec. 1-1-29):

Front (__) 200 ft Left (__) 200 ft Right (__) 100 ft Rear (__) 200 ft

Min. yard depths (see applicable district/use regulation):

Wastewater collection/treatment provided by: ( ) municipal system (N/A)

( ) community system ( ) individual on-site system

Est. total wastewater discharge N/A gpd

Solid waste collection provided by: N/A

Electrical service provided by: CP&L Underground ( ) yes ( ) no

Natural gas service provided by: None

Telephone service provided by: None Underground ( ) yes ( ) no

Cable television service provided by: None Underground ( ) yes ( ) no

Fire protection provided by: Served by local fire department

Miscellaneous:

Generalized slope of site 10% to 15%

Valuable natural features (rare plant community, wildlife habitat, lake, stream, geology, etc.) on or adjoining site: None Observed

Valuable historic resources (homestead, mill, archeological site) on or adjoining site: None Observed

Land Use Plan Classifications

General Classification (note associated municipality and/or watershed):

( ) Short-Range Urban Services Area/Water Supply Watershed

The undersigned property owner(s) hereby authorize the filing of this petition (and any subsequent revisions thereto), and authorize(s) on-site review by authorized staff.

Signature: T Demuttas Date: 11/29/00

Signature: _____ Date: _____

Signature: _____ Date: _____

The undersigned petitioner hereby certifies that, to the best of his or her knowledge and belief, all information supplied with this application is true and accurate.

Signature: Calvin O. McCleary Date: 11-29-2000

7/11/00

Statement of Justification

1. The proposed development will not materially endanger the public health or safety.

Considerations:

Traffic conditions in the vicinity will not change considerably from what exists at the present time because of the Construction and Demolition Landfills that are in

2. The proposed development will comply with all regulations and standards generally applicable within the zoning district and specifically applicable to the particular type of special use or class of special uses.

Considerations:

Landfills are not required to be located within a node as shown on the Wake County Land Use Plan; therefore, the proposed use is consistent with the Land Use Plan and requires a Special Use Permit.

3. The proposed development will not substantially injure the value of adjoining property, or is a public necessity.

Considerations:

The adjoining properties that are immediately adjacent to this property are zoned either I-1 or I-2. The actual landfill will be restricted to the eastern part of the overall parcel and it is bounded by the proposed outer loop and interchange as well as the South Wake County Landfill. The nearest residential dwelling is over 1,000 feet from the landfill area.

The Recycling/Reuse Facility and Residuals Landfill will provide a site where Construction and Demolition debris can either be recycled or reused and where residuals can be disposed in the landfill. It is planned that 10% of the waste will be recycled or reused in the first year with 12% the second year and 15% by the third year of operation. This facility will provide the citizens of Wake County with a facility that can recycle/reuse the waste or dispose in a landfill at a reasonable cost. The County is in need of construction and demolition disposal capacity. Also, the recycling/reuse will assist the County in reaching its waste reduction

5. The proposed development will be consistent with the Wake County Land Use Plan.

Considerations:

Landfills are not required to be located within a node as shown on the Wake County Land Use Plan; therefore, the proposed use is consistent with the Land Use Plan and requires a Special Use Permit. The site is not located in any municipality's jurisdiction.

Attachment

Person responsible for operation and maintenance:

C.D. McClure
P.O. Box 19381
Charlotte, NC 28219

Ph: (704) 394-5761

Proposed use of the site after closing: Parks and Recreation

MEMORANDUM

To: Wayne Sullivan

From: Martha Moore
Public Water Supply Section

Subject: Location of water systems

Date: January 13, 1999

I received a request from Lisa Hampton to see if there are any public water systems within a certain area of latitudes 354052 and 354137 and longitudes 0785021 and 0785140 since our home page/web server has been down for a while.

I ran a check and did not find any public water systems within that boundary based on the information we have in our database at this time.

Our home page is back up and running now, except for option #1 which may never be back on-line unfortunately.

SENT BY: CHARLES BLYTHE CO.; 3- 5-99 14:48; 919 448 1664 => 919 772 1176; #2/2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.
GOVERNOR

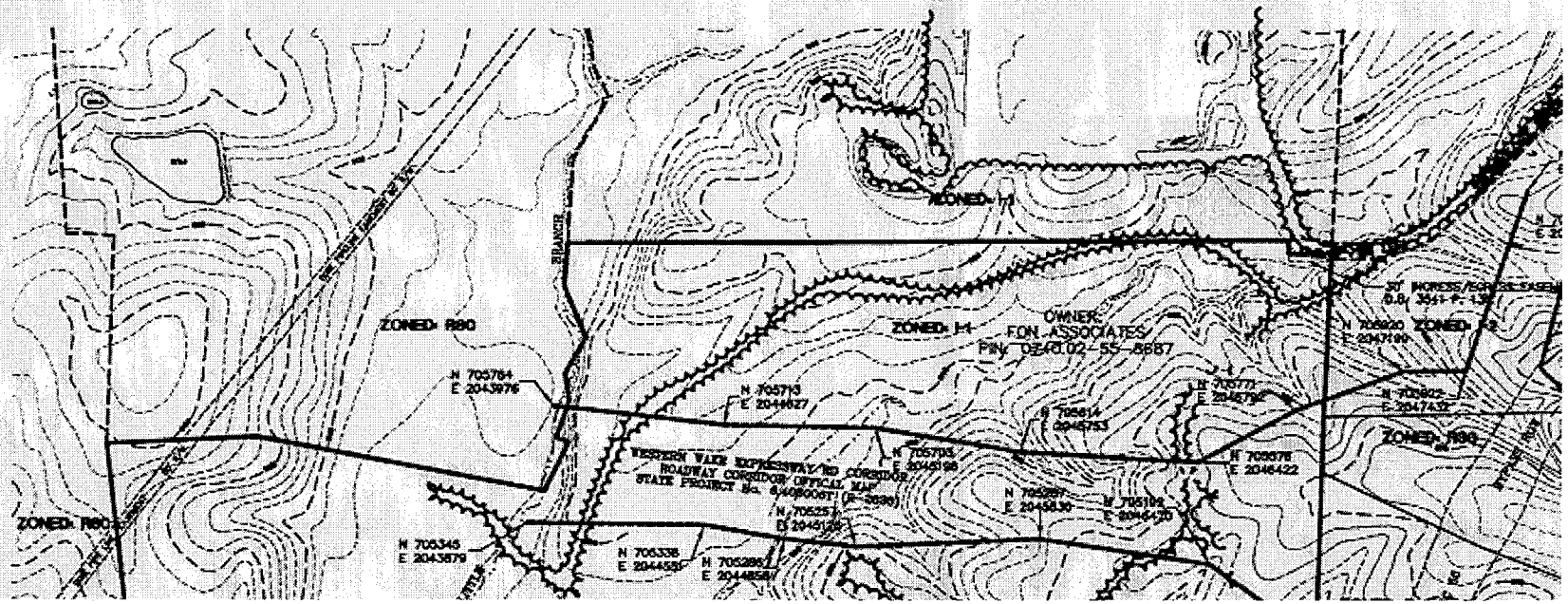
PO BOX 25201 RALEIGH N.C. 27611-5201

E. NORRIS TOLSON
SECRETARY

May 20, 1998

= ADJOINERS BOUNDARY LINES.
= EASEMENTS
= PROJECT BOUNDARY LINES
= STREAMS
= TREE LINE

2. PROPERTY LINES ARE SHOWN ON THIS MAP.
3. ZONING DISTRICTS, BOUNDARIES AND NAMES ARE SHOWN ON THIS MAP.
4. CURRENT LAND USE IS WOODLANDS.
5. EXISTING ROADWAYS SHOWN ON THIS MAP ARE PUBLIC.
6. TOPOGRAPHIC CONTOURS ARE AT 5' INTERVALS.
7. THE PARCEL IS NOT LOCATED IN THE 100-YEAR FLOODWAY OR FLOODWAY FRINGE.



= ADJOINERS BOUNDARY LINES.

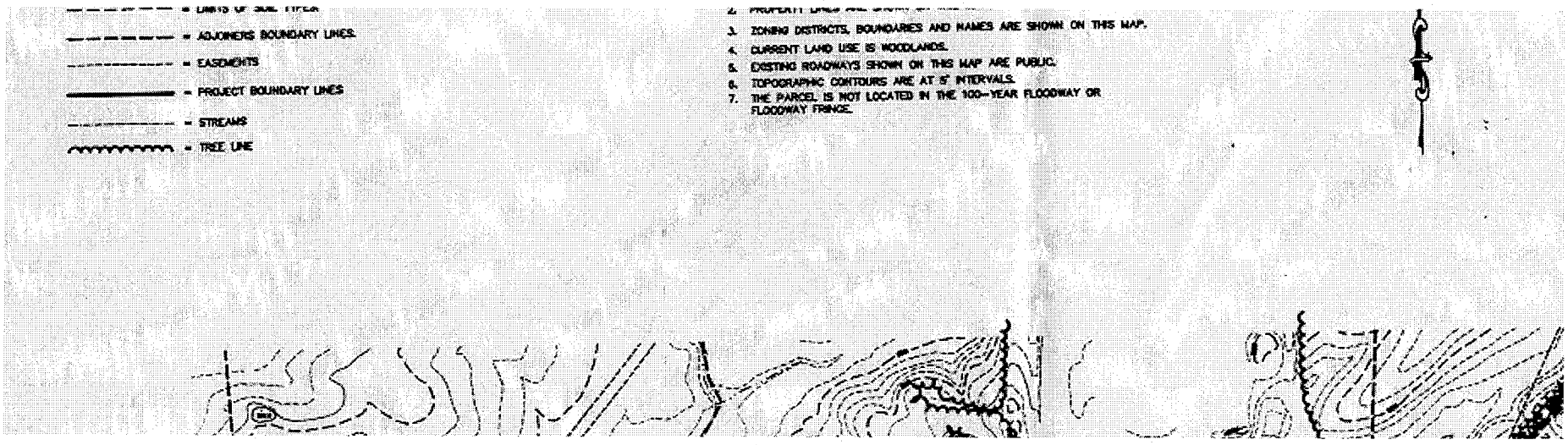
= EASEMENTS

= PROJECT BOUNDARY LINES

= STREAMS

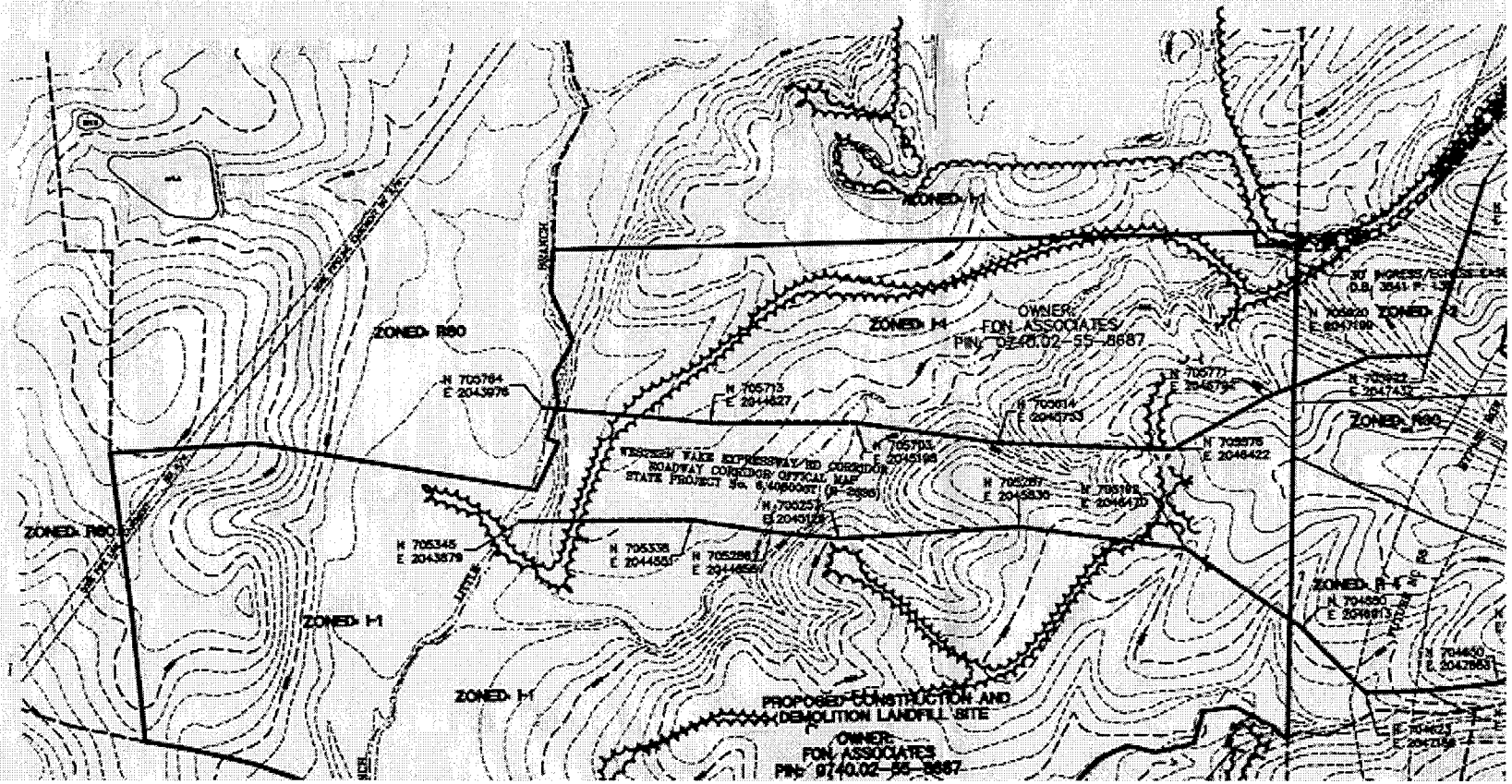
= TREE LINE

3. ZONING DISTRICTS, BOUNDARIES AND NAMES ARE SHOWN ON THIS MAP.
4. CURRENT LAND USE IS WOODLANDS.
5. EXISTING ROADWAYS SHOWN ON THIS MAP ARE PUBLIC.
6. TOPOGRAPHIC CONTOURS ARE AT 5' INTERVALS.
7. THE PARCEL IS NOT LOCATED IN THE 100-YEAR FLOODWAY OR FLOODWAY FRINGE.



= LIMITS OF SUB PARCEL
= ADJOINERS BOUNDARY LINES
= EASEMENTS
= PROJECT BOUNDARY LINES
= STREAMS
= TREE LINE

2. PROPERTY LINES ARE BASED ON [illegible]
3. ZONING DISTRICTS, BOUNDARIES AND NAMES ARE SHOWN ON THIS MAP.
4. CURRENT LAND USE IS WOODLANDS.
5. EXISTING ROADWAYS SHOWN ON THIS MAP ARE PUBLIC.
6. TOPOGRAPHIC CONTOURS ARE AT 5' INTERVALS.
7. THE PARCEL IS NOT LOCATED IN THE 100-YEAR FLOODWAY OR FLOODWAY FRINGE.



[illegible] EACH SIDE AND AT GROUND LEVEL

WAKE COUNTY
NORTH CAROLINA

Board of Commissioners

P.O. Box 550 • Raleigh, NC 27602

TEL 919 856 6160
FAX 919 856 5699

LINDA D. COLEMAN, CHAIRMAN
HERBERT H. COUNCIL, VICE-CHAIRMAN
KENNETH M. GARDNER
VERNON MALONE
BETTY O. MANGUM
BETTY LOU WARD
MICHAEL A. WEEKS

WAKE COUNTY)

NORTH CAROLINA)

I, Gwendolyn I. Reynolds, Clerk to the Board of County Commissioners, County of Wake, State of North Carolina, hereby certify that the attached is a true and complete copy of **Excerpts from minutes of Board of Commissioners' meeting – Granting franchise to Griffin Brothers Companies, D/B/A Highway 55 C&D Landfill, LLC, for operation of a construction and demolition debris landfill in Wake County, North Carolina (2nd vote)**, dated December 3, 2001.

Witness my hand as Clerk to the Board, and the Seal of the County of Wake, this the 19th day of December, 2001.

Gwendolyn I. Reynolds

Gwendolyn I. Reynolds
Clerk to the Board of Commissioners
Wake County, North Carolina

GRANT OF LANDFILL FRANCHISE GRIFFIN BROTHERS COMPANIES DOING BUSINESS AS HIGHWAY 55 C&D LANDFILL, LLC

Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, has filed an application for a franchise to operate a construction and demolition debris landfill in Wake County. The site contains approximately 85 acres and is located west of the NC-55 By-pass, north of SR-1172 (Old Smithfield Road) south of the proposed right of way of the Western Wake Expressway and just east of the existing Wake County Landfill. The application is being filed pursuant to the franchise ordinance for C&D landfills enacted by the Board of Commissioners September 7, 1999.

On November 19, 2001, the Board of Commissioners voted to approve the franchise request. State law requires that a franchise be approved at two regular meetings before it may be finally adopted.

Upon motion of Commissioner Gardner, seconded by Commissioner Council, the Board unanimously approved granting a landfill franchise to Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC to operate a C&D landfill in Wake County.

ORDINANCE GRANTING FRANCHISE TO GRIFFIN BROTHERS COMPANIES, D/B/A HIGHWAY 55 C&D LANDFILL, LLC FOR OPERATION OF CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL

WHEREAS, Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, has applied for a franchise for the operation of a construction and demolition debris landfill in Wake County; and,

WHEREAS, the application filed by Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, contains all of the information required by the Wake County franchise ordinance for construction debris (C&D) landfills; and,

WHEREAS, the applicant has received a special use permit from the Wake County Planning Board for operation of a C&D landfill on the site identified in the application.

NOW THEREFORE BE IT ORDAINED THAT, Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, is hereby granted a franchise to operate a construction and demolition debris landfill in Wake County in accordance with the representations made on the application submitted by Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC a copy of which is maintained in the permanent files of the Clerk to the Board. This franchise shall be in effect for a period of 20 years.

****

WAKE COUNTY
NORTH CAROLINA

Board of Commissioners

P.O. Box 550 • Raleigh, NC 27602

TEL 919 856 6160
FAX 919 856 5699

LINDA D. COLEMAN, CHAIRMAN
HERBERT H. COUNCIL, VICE-CHAIRMAN
KENNETH M. GARDNER
VERNON MALONE
BETTY O. MANGUM
BETTY LOU WARD
MICHAEL A. WEEKS

WAKE COUNTY)

NORTH CAROLINA)

I, Gwendolyn I. Reynolds, Clerk to the Board of County Commissioners, County of Wake, State of North Carolina, hereby certify that the attached is a true and complete copy of **Excerpts from minutes of Board of Commissioners' meeting – Granting franchise to Griffin Brothers Companies, D/B/A Highway 55 C&D Landfill, LLC, for operation of a construction and demolition debris landfill in Wake County, North Carolina (1st vote)**, dated November 19, 2001.

Witness my hand as Clerk to the Board, and the Seal of the County of Wake, this the 19th day of December, 2001.

Gwendolyn I. Reynolds
Clerk to the Board of Commissioners
Wake County, North Carolina

GRANT OF LANDFILL FRANCHISE
HIGHWAY 55 C&D LANDFILL, LLC

Chairman Weeks recognized the County Attorney to give an overview of Griffin Brothers Companies request for landfill franchise. He stated that Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, has filed an application for a franchise to operate a construction and demolition debris landfill in Wake County. The site contains approximately 85 acres and is located west of the NC 55-Bypass, north of SR-1172 (Old Smithfield Road) south of the proposed right of way of the Western Wake Expressway (I-540), and just east of the existing Wake County Landfill. The application has been filed pursuant to the franchise ordinance for C&D landfills enacted by the Board of Commissioners September 7, 1999.

The County Attorney stated that the Board of Commissioners may but is not required to hold a public hearing prior to acting on a request for a C&D franchise. He also stated that State law requires that a franchise be approved at two regular meetings before it may be adopted.

Mr. Tom Worth, Post Office Box 1799, Raleigh, NC, representing the applicant, Griffin Brothers, stated that the required items have been submitted by the applicant. He introduced the following persons: Larry Griffin, principal of Griffin Brother Companies; Ron Gilkerton, geologist with Griffin Brothers; Steve Williams, land appraiser; and Jonathan Reed, Traffic/Transportation Engineer. He then outlined the items that have been submitted pursuant to the franchise ordinance for C&D landfills:

1. The name and address of the applicant and owner of the proposed site.
2. The trade and other fictitious names, if any, under which the applicant does business, along with a certified copy of an assumed name certificate stating such name or articles of incorporation stating such name.
3. A legal description and map of the property proposed to be included in the C&D landfill.
4. A statement of the population to be served by the C&D landfill, including a description of the geographic area.
5. A description of the volume and characteristics of the waste stream.
6. A projection of the useful life of the C&D landfill; and
7. Evidence that the Wake County Board of Adjustment has granted a special use permit for the proposed C&D landfill.

Mr. Worth further stated that the C&D also has a recycling component to it; that the applicant has held discussions with the Town of Apex both before and after consideration by the Wake County Board of Adjustment, as well as with the Town of Holly Springs. He also noted that there was public input at the public hearing conducted by the Board of Adjustment August 14, 2001, and the applicant has addressed those issues brought forward at that time.

Chairman Weeks noted that the site is industrially zoned, the applicant has planned for additional buffers, there is no residential impact, the operation will have a recycling function; that access to the site will be limited to the new bypass—a four-lane road, thus the landfill will not be in operation until a portion of the 55 Bypass is open.

Following much discussion, **Commissioner Gardner moved approved of granting a franchise to Griffin Brothers Companies, D/B/A Highway 55 C&D Landfill, LLC for operation of a construction and demolition debris landfill. The motion was seconded by Commissioner Council and was unanimously approved.**

ORDINANCE
GRANTING FRANCHISE TO GRIFFIN BROTHERS COMPANIES D/B/A
HIGHWAY 55 C&D LANDFILL, LLC FOR OPERATION OF
CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL

WHEREAS, Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, has applied for a franchise for the operation of a construction and demolition debris landfill in Wake County; and

WHEREAS, the application filed by Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, contains all of the information required by the Wake County franchise ordinance for construction debris (C&D) landfills; and

WHEREAS, the applicant has received a special use permit from the Wake County Board of Adjustment for operation of a C&D landfill on the site identified in the application.

NOW, THEREFORE, BE IT ORDAINED THAT, Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, is hereby granted a franchise to operate a construction and demolition debris landfill in Wake County in accordance with the representations made on the application submitted by Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, a copy of which is maintained in the permanent files of the Clerk to the Board. This franchise shall be in effect for a period of 20 years.

Return To: Tom Worth Jr
P.O. Box 1799
Raleigh, N.C. 27602

STATE OF NORTH CAROLINA

COUNTY OF WAKE

NOTICE OF SPECIAL USE APPROVAL

PETITION NO BA: SU-1923-01

Property recorded in Deed Book 9099, Page 1039 - 1044, Wake County Register of Deeds.

NAME OF PROPERTY OWNER (s): Griffin Brothers Companies dba Highway 55 C&D Landfill L.L.C. and Ray Markham Stewart, Ruth B. Stewart, Anthony K. Woodell and Melissa S. Woodell

KNOW ALL PERSONS BY THESE PRESENTS, that Griffin Brothers, 19109-118 West Catawba Avenue, Cornelius, North Carolina 28031-5613, applied to Wake County for Special Use Approval for the use and development of the property described above which permit was granted by Wake County on August 14, 2001.

To construct and operate a Construction and Demolition Debris (C&D) landfill and a recycling facility.

GRIFFIN BROTHERS COMPANIES
By: Mike L Griffin
PETITIONER

HIGHWAY 55 C&D LANDFILL, LLC
By: Mike L Griffin MANAGER
OWNER (if other than petitioner)

Ray Markham Stewart
Ruth B. Stewart
Anthony K. Woodell
Melissa S. Wood

I, MIRIAM J MOORE, a Notary Public in and for said County and State do hereby certify that MIKE L GRIFFIN, RAY MARKHAM STEWART, ANTHONY K WOODELL, RUTH B. STEWART, MELISSA S WOODELL personally appeared before me and acknowledge the execution of this document. Witness my hand and official stamp or seal, this 14th day of November, 2001.

MIRIAM J. MOORE NOTARY PUBLIC WAKE COUNTY, N.C.

Miriam J Moore
Notary Public
My Commission Expires: 5-07-06

(Seal)

WAKE COUNTY

BY

Becky Smith
Becky Smith, Clerk to the Wake County Board of Adjustment

Melinda Clark
Melinda Clark, Wake County Land Development Administrator

I, Brenda F. Coats, a Notary Public in and for said County and State do hereby certify that Melinda Clark, Land Development Administrator of Wake County, and Becky Smith, Clerk to the Wake County Board of Adjustment personally appeared before me and duly sworn says each for himself/herself that he/she knows that this document is a true and accurate account of the Order of The Board of Adjustment to the Land Development Administrator to issue said special use approval subject the any terms or conditions specified in the order.

IN WITNESS WHEREOF, I have hereunto set my hand and Notarial Seal this the 6th, day of September, 2001.

Brenda F. Coats
Notary Public
My Commission Expires: 9-1-2003

BRENDA F. COATS NOTARY PUBLIC WAKE COUNTY, N.C.

Wake County,NC 124
Laura M Riddick, Register Of Deeds
Presented & Recorded 12/20/2001 09:53:08
Book : 009218 Page : 00197 - 00198

Laura M Riddick
Register of Deeds
Wake County, NC

Book : 009218 Page : 00197 - 00198

Yellow probate sheet is a vital part of your recorded document.
Please retain with original document and submit for rerecording.

WAKE COUNTY NORTH CAROLINA

Wake County Register of Deeds
Laura M. Riddick
Register of Deeds

North Carolina - Wake County

The foregoing certificate S of Miriam J. Moore
Brenda F. Coats

_____ Notary(ies) Public is (are) certified to be correct. This instrument and this certificate are duly registered at the date and time and in the book and page shown on the first page hereof.

Laura M. Riddick, Register of Deeds
By: Hedrick C. Bayron
Assistant/Deputy Register of Deeds

This Customer Group
_____ # of Time Stamps Needed

This Document
_____ New Time Stamp
2 # of Pages

WAKE COUNTY
NORTH CAROLINA

Board of Commissioners

P.O. Box 550 • Raleigh, NC 27602

TEL 919 856 6160
FAX 919 856 5699

LINDA D. COLEMAN, CHAIRMAN
HERBERT H. COUNCIL, VICE-CHAIRMAN
KENNETH M. GARDNER
VERNON MALONE
BETTY O. MANGUM
BETTY LOU WARD
MICHAEL A. WEEKS

I, Gwendolyn I. Reynolds, Clerk to the Wake County Board of Commissioners, do hereby certify that the attached pages are true and accurate copy of the following:

1. Pages 1-6 from the agenda package of the November 19, 2001, meeting provided to the Wake County Board of Commissioners relating to the *Application for Construction and Demolition Debris (C&D) Landfill Franchise for Griffin Brothers Companies doing business as Highway 55 C&D Landfill, LLC,* said landfill to be located west of the NC-55 Bypass, north of SR-1172 (Old Smithfield Road), south of the proposed right-of-way of the Western Wake Expressway (I-540), and just east of the existing Wake County Landfill.

Gwendolyn I. Reynolds
Gwendolyn I. Reynolds
Clerk to the Board of Commissioners

February 11, 2002
Date

APPROVED

11/19/2001

ITEM # 10

Item Title:
Request for Grant of Landfill Franchise

Item Summary:
Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, has filed an application for a franchise to operate a construction and demolition debris (C&D) landfill in Wake County. The site contains approximately 85 acres and is located west of the NC-55 By-pass, north of SR-1172 (Old Smithfield Road) south of the proposed right of way of the Western Wake Expressway (I-540), and just east of the existing Wake County Landfill (map attached). The application is filed pursuant to the franchise ordinance for C&D landfills enacted by the Board on September 7, 1999. The ordinance provides that the Board shall issue a franchise upon the presentation of the following information to the County:

1. The name and address of the applicant and owner of the proposed site.

2. The trade or other fictitious names, if any, under which the applicant does business, along with a certified copy of an assumed name certificate stating such name or articles of incorporation stating such name.

3. A legal description and a map of the property proposed to be included in the C&D landfill.

4. A statement of the population to be served by the C&D landfill, including a description of the geographic area.

5. A description of the volume and characteristics of the waste stream.

6. A projection of the useful life of the C&D landfill; and

7. Evidence that the Wake County Board of Adjustment has granted a special use permit for the proposed C&D landfill.

The Board may, but is not required to, hold a public hearing prior to acting on a request for a C&D franchise. A proposed ordinance granting a franchise is attached for consideration. State law requires that a franchise be approved at two regular meetings before it may be adopted. A copy of the application (w/o attachments) is attached.

Attachments:3

Specific Action Requested:
Consideration of application of Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC for grant of franchise to operate a C&D landfill.

APPROVED

APPLICATION FOR CONSTRUCTION AND DEMOLITION DEBRIS (C&D) LANDFILL FRANCHISE

NOW COMES Applicant Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC, Property Owner and Landfill Operator and submits this application for a C&D Landfill Franchise to the Wake County Board of Commissioners on this lst day of November, 2001.

In support of this Application there is hereby presented the following information:

1. The name of the Applicant is Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC of 19109-118 W. Catawba Ave, Cornelius, NC 28031 property owner and proposed landfill operator.

2. Applicant Highway 55 C&D Landfill, LLC's Articles of Organization are attached hereto as Exhibit A. (Note: Griffin Brothers Companies is doing business as [(d/b/a)] Highway 55 C&D Landfill, LLC.

3. A legal description of the tract which includes the proposed C&D landfill is set forth in the Deed recorded in Book 9099, page 1039-1044, Wake Registry attached as Exhibit B and the proposed Access Road, which is under contract for purchase by Applicant, is shown upon Exhibit B1. The landfill area is shown on the preliminary Special Use Permit Site Plan attached as Exhibit C and is proposed to be located within the portion of the tract which contains approximately 85 acres and lies south of the proposed right of way of the Western Wake Expressway (I-540) and east of Little Branch.

4. The area to be served by the site is Wake County and its municipalities, including without limitation the municipalities of Apex, Cary, Fuquay-Varina, Holly Springs, and Raleigh. The population of Wake County and the municipalities specified in this paragraph is estimated to be approximately 1.2 million people.

   The Wake County Board of Adjustment unanimously approved this landfill site to accept C&D waste on August 14, 2001. The landfill site is located west of the new NC Highway 55 Bypass, east of Little Branch, north of Old Smithfield Road, and south of the future Western Wake Expressway (I-540). The site is well buffered with trees on all sides. Access to the site will be from a special lane adjacent to Old Smithfield Road from NC Highway 55 Bypass for approximately 300 feet to our entrance as shown upon Exhibit B1. Traffic from our site will exit onto Old Smithfield Road. The South Wake County (Feltonville) Landfill is the only entity that shares Old Smithfield Road to the NC Highway 55 Bypass. All truck traffic will be required to exit onto NC Highway 55 Bypass from this portion of Old Smithfield Road.

   Attached as Exhibit D is the Traffic Study report performed by Parsons Brinckerhoff, Quade & Douglas, Inc. dated August 10, 2001 which updated the attached Traffic Impact Assessment dated May 29, 2001. Attached as Exhibit E is the letter dated August 13, 2001

from Williams Appraisers, Inc. stating the site is well suited for this landfill. Both exhibits were entered into evidence at the Wake County Board of Adjustment on August 14, 2001.

5. It is projected over the life of the proposed C&D landfill to receive approximately 3 to 4 million tons of C&D waste. The annual tons are projected to be approximately 300,000 tons. The proposed landfill site will operate six days per week. The waste stream will be strictly limited by its State Permit to be issued by the North Carolina Department of Environmental and Natural Resources (NC DEHNR), Division of Waste Management, prior to construction. The waste stream will include the following types of waste materials: inert debris similar to types deposited in LCID landfills, asphalt, solid waste resulting from construction, remodeling, repair of demolition operations on pavement, buildings or other structures (such as furniture, carpet remnants and any other waste materials resulting from the demolition of a structure) and other materials approved by NC DEHNR.

6. The projected useful life of this C&D landfill is anticipated to be approximately 20 years.

7. Applicant attaches as Exhibit F a copy of the Notice of Special Use Approval, which confirms that the Wake County Board of Adjustment approved the issuance of a Special Use Permit Request No. BA SU-1923-01 for this proposed landfill on August 14, 2001.

WHEREFORE, Applicant, Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC, through their undersigned attorney, respectfully request that the Wake County Board of Commissioners, after such notices, consideration and deliberation as said Board deems appropriate and in accordance with all applicable statutes, ordinances and regulations, issue the Franchise as requested by the Applicant.

GRIFFIN BROTHERS COMPANIES, d/b/a
HIGHWAY 55 C&D LANDFILL, LLC

By: Thomas C. Worth, Jr.

Thomas C. Worth, Jr.
Attorney for Applicant
16 West Martin Street, Suite 700
Raleigh, North Carolina 27601
Telephone (919) 831-1125
Facsimile (919) 831-1205

APPROVED

ORDINANCE GRANTING FRANCHISE TO
GRIFFIN BROTHERS COMPANIES, D/B/A HIGHWAY 55 C&D LANDFILL, LLC
FOR OPERATION OF CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL

WHEREAS, Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, has applied for a franchise for the operation of a construction and demolition debris landfill in Wake County; and

WHEREAS, the application filed by Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, contains all of the information required by the Wake County franchise ordinance for construction debris (C&D) landfills; and

WHEREAS, the applicant has received a special use permit from the Wake County Board of Adjustment for operation of a C&D landfill on the site identified in the application.

NOW, THEREFORE, BE IT ORDAINED THAT, Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, is hereby granted a franchise to operate a construction and demolition debris landfill in Wake County in accordance with the representations made on the application submitted by Griffin Brothers Companies, doing business as Highway 55 C&D Landfill, LLC, a copy of which is maintained in the permanent files of the Clerk to the Board. This franchise shall be in effect for a period of 20 years.

Adopted November 19, 2001.

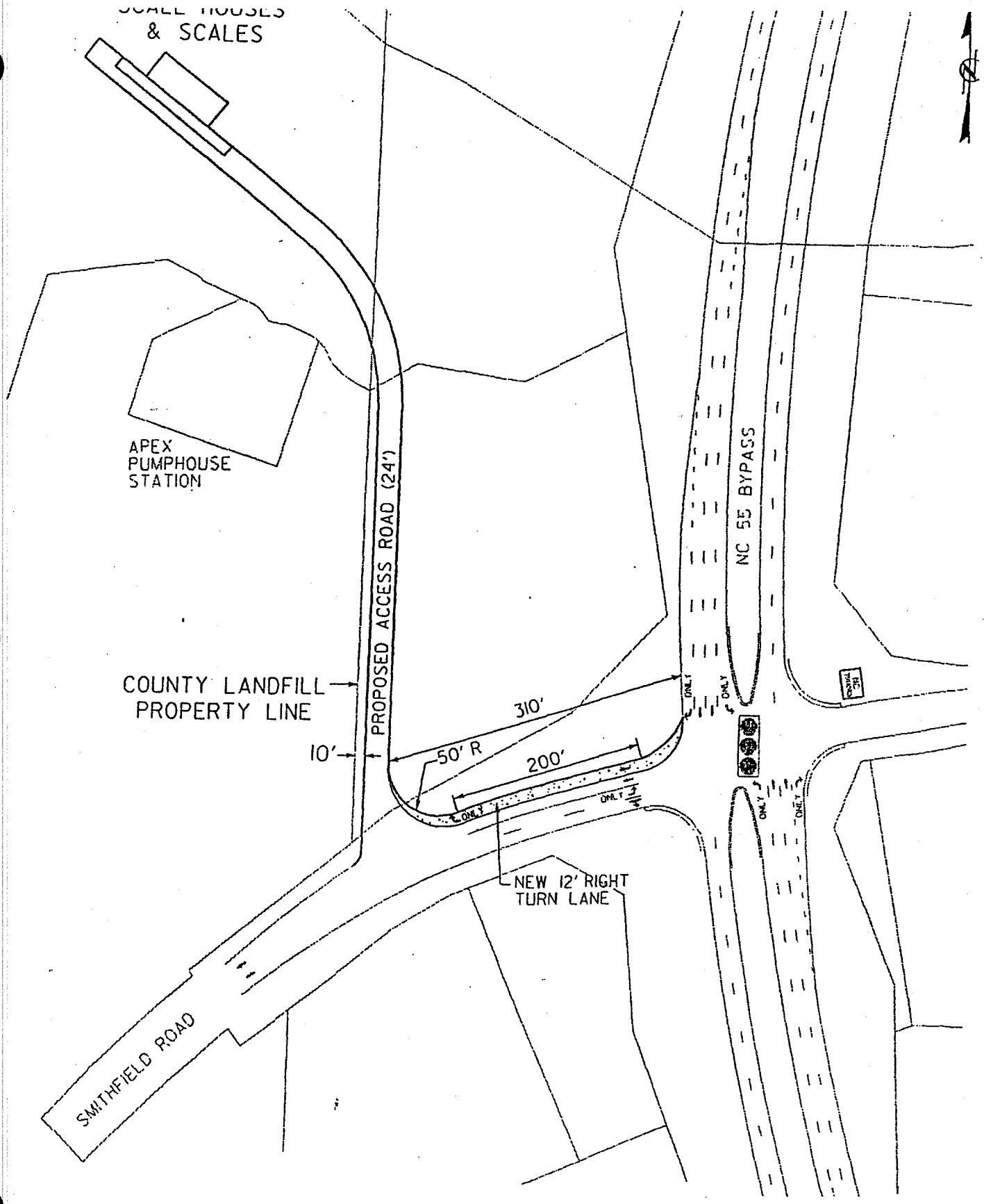


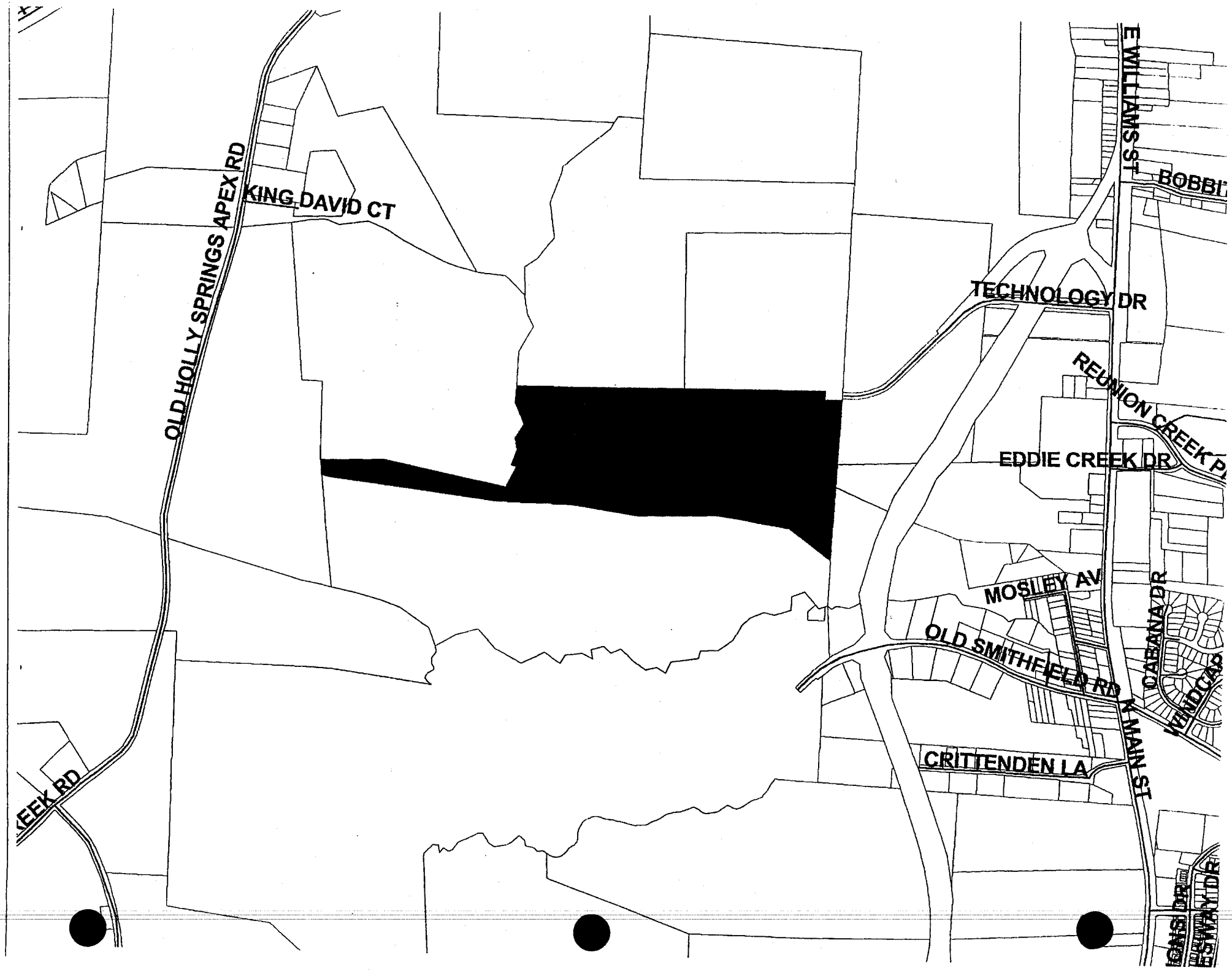
EXHIBIT B1

0 75 150

PARSONS BRINCKERHOFF

FIGURE 1

PROPOSED WAKE COUNTY C&D LANDFILL


OLD HOLLY SPRINGS APEX RD
KING DAVID CT
E WILLIAMS ST
BOBBL
TECHNOLOGY DR
REUNION CREEK P
EDDIE CREEK DR
MOSILEY AV
OLD SMITHFIELD RD
CABANA DR
WINDCAS
CRITTENDEN LA
N MAIN ST
EEK RD

WETLAND PERMIT APPLICATION

NC DIVISION OF WATER QUALITY
&
US ARMY CORPS OF ENGINEER
PERMIT APPROVALS

Michael F. Easley
Governor

William G. Ross, Jr., Secretary
Department of Environment and Natural Resources

Gregory J. Thorpe, Ph.D., Acting Director
Division of Water Quality

January 2, 2002
DWQ# 01-1489
Wake County

Ron Gilkerson
Griffin Brothers Companies
19109 West Catawba Avenue
Cornelius, NC, 28031

APPROVAL of 401 Water Quality Certification

Dear Mr. Gilkerson:

You have our approval, in accordance with the attached conditions, to place fill in 149 linear feet of streams in order to construct the Highway 55 C&D Landfill and Recycling Center in Wake County, as described in your application received by the Division of Water Quality on October 12, 2001, and in additional correspondence received December 21, 2001. After reviewing your application, we have determined that this fill is covered by General Water Quality Certification Number 3287, which can be downloaded from our web site at http://h2o.enr.state.nc.us . This Certification allows you to use Nationwide Permit Number 39 when it is issued by the U.S. Army Corps of Engineers. In addition, you should get any other federal, state or local permits before you go ahead with your project including (but not limited to) Sediment and Erosion Control, Non-Discharge and Water Supply Watershed regulations. You should send an application to the Division of Land Resources for their review of your project under dam safety rules as well as erosion and sediment control. Also this approval will expire when the accompanying 404 permit expires unless otherwise specified in the General Certification.

This approval is only valid for the purpose and design that you described in your application. If you change your project, you must notify us in writing and you may be required to send us a new application for a new certification. If the property is sold, the new owner must be given a copy of the Certification and approval letter and is thereby responsible for complying with all conditions. If total wetland fills for this project (now or in the future) exceed one acre, compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h). For this approval to be valid, you must follow the conditions listed in the attached certification.

If you do not accept any of the conditions of this certification, you may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. To ask for a hearing, send a written petition which conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, P.O. Box 27447, Raleigh, N.C. 27611-7447. This certification and its conditions are final and binding unless you ask for a hearing.

This letter completes the review of the Division of Water Quality under Section 401 of the Clean Water Act. If you have any questions, please telephone Steve Mitchell in our Raleigh Regional Office at 919-571-4700 or Cyndi Karoly in Raleigh at 919-733-1786.

Sincerely,

Cyndi Karoly

for Gregory J. Thorpe, Ph.D.,

Attachment

cc: Corps of Engineers Raleigh Regulatory Field Office
Raleigh DWQ Regional Office
Central Files
File Copy
Britt Feldner, P.O. Box 1532, Conway, SC, 29528

011489

U.S. ARMY CORPS OF ENGINEERS
Wilmington District

Action ID: 200220297 **County:** Wake

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Property Owner Highway 55 C&D Landfill, LLC

Address 19109 West Catawba Ave., Ste 118
Cornelius, NC 28031

Telephone Number 843-248-9388

Authorized Agent The Brigman Company, Inc.
Attn: Britt Feldner

Address P.O. Box 1532
Conway, SC 29528

Telephone Number 843-248-9388

Size and Location of Property (waterbody, Highway name/number, town, etc.): The site is located on the north side of Sunset Lake Road (SR 1301), approximately 0.7 miles west of its intersection with N.C. Hwy 55, in Holly Springs, Wake County, North Carolina.

Description of Activity: This permit authorizes the installation of culverts and the placement of fill associated with the construction of a C&D (construction and debris) landfill and associated road crossings. Impacts to waters authorized by this permit include 85 linear feet of stream channel for four road crossings and 64 linear feet of stream channel for proposed fill. Total impacts to waters are 149 linear feet of stream channel to Little Branch an its unnamed tributaries in the Cape Fear River Basin.

Applicable Law: X **Section 404 (Clean Water Act, 33 USC 1344) only.**
_____ **Section 10 (River and Harbor Act of 1899) only.**

Authorization: _____ **Regional General Permit Number**
39 **Nationwide Permit Number**

Any violation of the conditions of the Regional General or Nationwide Permit referenced above may subject the permittee to a stop work order, a restoration order, and/or appropriate legal action. This Department of the Army Regional General Permit or Nationwide Permit verification does not relieve the permittee of the responsibility to obtain any other required Federal, State, or local approvals/permits. The permittee may need to contact appropriate State and local agencies before beginning work. If you have any questions regarding the Corps of Engineers regulatory program, please contact Amanda D. Jones **at telephone number** (919) 876 - 8441 extension 30.

Regulatory Project Manager Signature Amanda D. Jones

Date December 14, 2001 **Expiration Date** December 14, 2003

SURVEY PLATS, FIELD SKETCH, WETLAND DELINEATION FORM, ETC., MUST BE ATTACHED TO THE YELLOW (FILE) COPY OF THIS FORM, IF REQUIRED OR AVAILABLE.

Permit Number: **200220297 – Nationwide Permit Number 39**

Name of Permittee: **Highway 55 C&D Landfill, LLC**

Project Manager: **Amanda D. Jones**

Issuance: **December 14, 2001**

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

US ARMY CORPS OF ENGINEERS
RALEIGH REGULATORY FIELD OFFICE
6508 FALLS OF NEUSE ROAD, SUITE 120
RALEIGH, NORTH CAROLINA 27615

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and condition of the said permit, and required mitigation was completed in accordance with the permit conditions.

Ronald C. Kitterman 12/18/01

Signature of Permittee

COPY

U.S. ARMY CORPS OF ENGINEERS
Wilmington District

Action ID: 200220297 **County:** Wake

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner Highway 55 C&D Landfill, LLC

Address 19109 West Catawba Ave., Ste. 118
Cornelius, NC 28031

Telephone Number 843-248-9388

Authorized Agent The Brigman Company, Inc.
Attn: Jamie McLain

Address P.O. Box 1532
Conway, SC 29528

Telephone Number 843-248-9388

Size and Location of Property (waterbody, Highway name/number, town, etc.): The site is located on the north side of Sunset Lake Road (SR 1301), approximately 0.7 miles west of its intersection with N.C. Hwy 55, in Holly Springs, Wake County, North Carolina.

Basis for Determination: The site contains wetlands and stream channels with indicators of ordinary high water marks, located adjacent to and including Little Branch and its unnamed tributaries, above headwaters, in the Cape Fear River Basin.

Indicate Which of the Following Apply:

____ There are waters of the U.S., to include wetlands, on the above described property which we strongly suggest should be delineated and surveyed. The surveyed wetland lines must be verified by our staff before the Corps will make a final jurisdictional determination on your property.

____ Because of the size of your property and our present workload, our identification and delineation of your wetlands cannot be accomplished in a timely manner. You may wish to obtain a consultant to obtain a more timely delineation of the wetlands. Once the consultant has flagged a wetland line on the property, Corps staff will review it, and, if it is accurate, we strongly recommend that you have the line surveyed for final approval by the Corps. The Corps will not make a final jurisdictional determination on your property without an approved survey.

X The waters of the U.S., to include wetlands, on your lot have been delineated, and the limits of the Corps jurisdiction have been explained to you. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

____ There are no waters of the U.S., to include wetlands, present on the above described property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

Placement of dredged or fill material in wetlands on this property without a Department of the Army Permit is in most cases a violation of Section 301 of the Clean Water Act (33 USC 1311). A permit is not required for work on the property restricted entirely to existing high ground. If you have any questions regarding the Corps of Engineers regulatory program, please contact Amanda D. Jones **at telephone number** (919) 876 - 8441 extension 30.

Project Manager Signature Amanda D. Jones

Date December 14, 2001 **Expiration Date** December 14, 2006

SURVEY PLAT OR FIELD SKETCH OF THE DESCRIBED PROPERTY AND THE WETLAND DELINEATION FORM MUST BE ATTACHED TO THE YELLOW (FILE) COPY OF THIS FORM.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Highway 55 C&D Landfill, LLC	File Number: 200220297	Date: 12-14-01
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
X	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION

If you have questions regarding this decision and/or the appeal process you may contact: Mr. Todd Tugwell, Regulatory Specialist Raleigh Regulatory Field Office 6508 Falls of the Neuse Road, Suite 120 Raleigh, North Carolina 27615	If you only have questions regarding the appeal process you may also contact: Mr. Arthur Middleton, Administrative Appeal Review Officer CESAD-ET-CO-R U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 9M15 Atlanta, Georgia 30303-8801

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

DIVISION ENGINEER:
Commander
U.S. Army Engineer Division, South Atlantic
60 Forsyth Street, Room 9M15
Atlanta, Georgia 30303-3490

THE BRIGMAN COMPANY INCORPORATED

ENVIRONMENTAL SERVICES
P.O. BOX 1532
CONWAY, SC 29528
(843) 248-9388
FAX (843) 248-9596
wetlandmen@aol.com

October 1, 2001

Mr. Todd Tugwell
U.S. Army Corps of Engineers
6508 Falls of the Neuse Road, Suite 120
Raleigh, NC 27615

RE: Highway 55 C&D Landfill
Wake County, North Carolina

Dear Mr. Tugwell:

The Brigman Company, Inc. has conducted a wetland determination of the referenced project. Based on our reconnaissance the study area was determined to contain areas subject to the jurisdiction of your office.

Acting as agent for Griffin Brothers Companies, on the highway 55 C&D Landfill Project, we are requesting an audit and that an wetland verification letter be received.

Enclosed please find a "Request for Concurrence" form along with the following:

- Project Location Map
- Soil Survey
- USGS 7.5 Min. Quadangle
- Upland/ Wetland Determination Sheets

Please notify us when you schedule your on-site inspection so we can be available to accompany you. Should you have any questions or require additional information to facilitate your review, please advise.

Sincerely,

Jamie McLain
Wetland Ecologist
cc: Ron Gilkerson

Raleigh District - Corps of Engineers - 6508 Falls of the Neuse Rd. - Raleigh, NC 27615

Request for Wetlands Concurrence

Date:	10/1/2001	**County:**	Wake	**Latitude:**	
Wetland Acreage:	10	**Upland Acreage:**	82	**Longitude:**	
Project Name:	Hwy. 55 C&D Landfill			**Total Acreage of Tract:**	92

Property Owner:
(name, address, phone):
Griffin Brothers Companies
19109 West Catawba Ave. Suite 118
Cornelius, NC 28031
Attn: Ron Gilkerson

Agent/Developer/Engineer
(name, address, phone):
The Brigman Company, Inc.
P.O. Box 1532
Conway, SC 29528
843-248-9388

Status of Project: *(Check One)*

( ) On-going site work for development purposes.
(X) Development in planning stages.
( ) No specific development planned at this time.

Project Type: *(Indicate the proposed use of the land in question or, if no specific work is planned at present, indicate the current zoning or land use at the site.)*

( ) Residential ( ) Commercial ( ) Mixed use (resid. & com.)
( ) Industrial ( ) Agriculture ( ) Public Works
( ) Silviculture ( ) Aquaculture (X) Other: Landfill

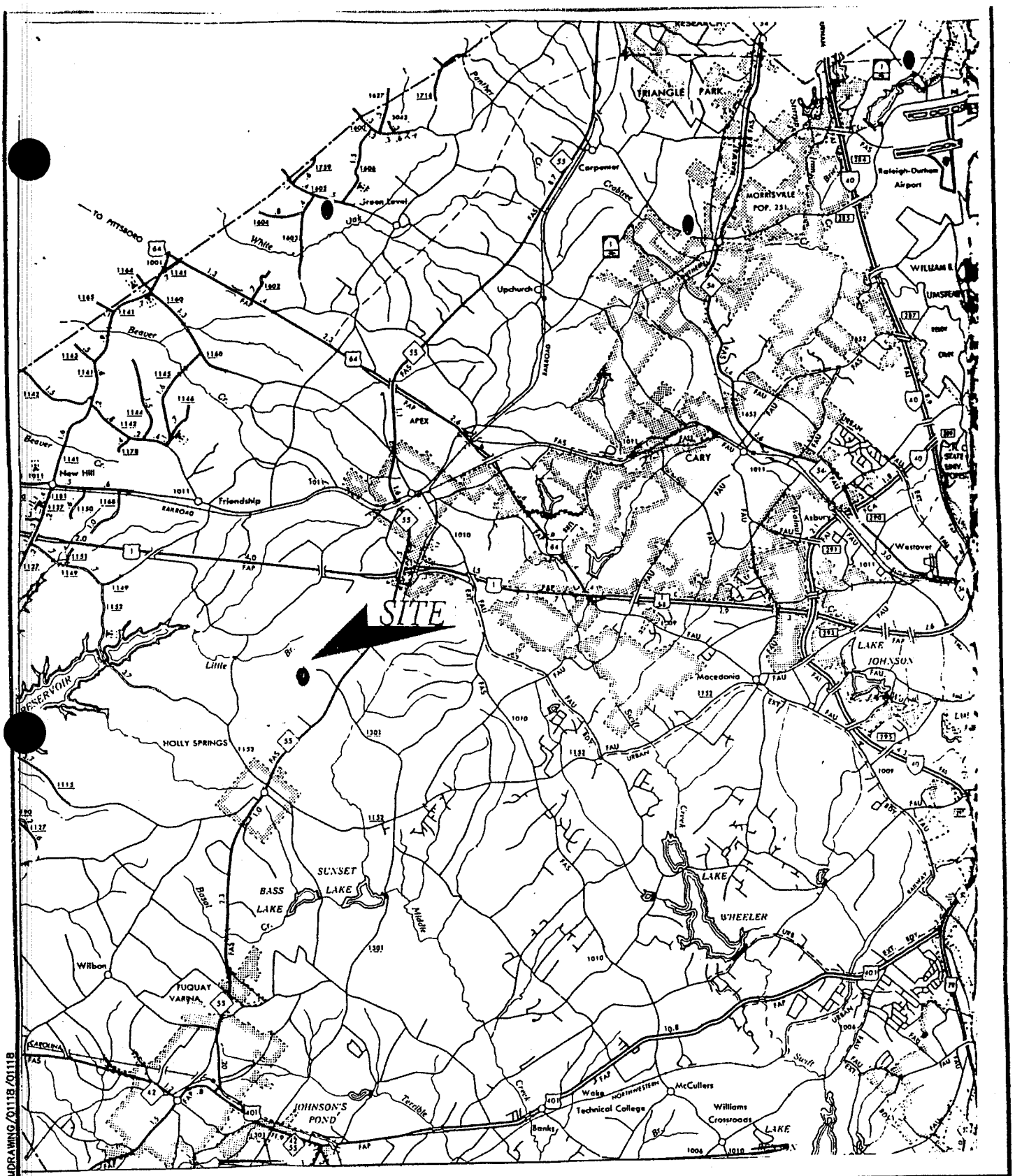
Information Required to Accompany Request: *(Check the items submitted. Forward as much information as is available. At a minimum, the first two items must be forwarded.)*

(X) Accurate Location Map *(from County Map, USGS Quad Sheet, etc.)*
(X) Soil Survey Sheet *(from SCS)* or Aerial Photograph *(from County Assessors Office or other source - property boundaries shown on soil survey photo would be very helpful.)*
( ) National Wetlands Inventory Map *(if available)*.
(X) Wetland/Upland Data Sheets
(X) Survey Plat or Tax Map of the property in question.

Signature of Property Owner or Authorized Agent: _____

(The person signing this form must have the authority of the owner to authorize Corps of Engineers employees or their agents to enter onto the property for on-site investigations if such is deemed necessary. Do not sign unless you have the specific authority of the owner.)

nc2RWC



C:/MDRAWING/01118/01118

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

THE BRIGMAN COMPANY INCORPORATED

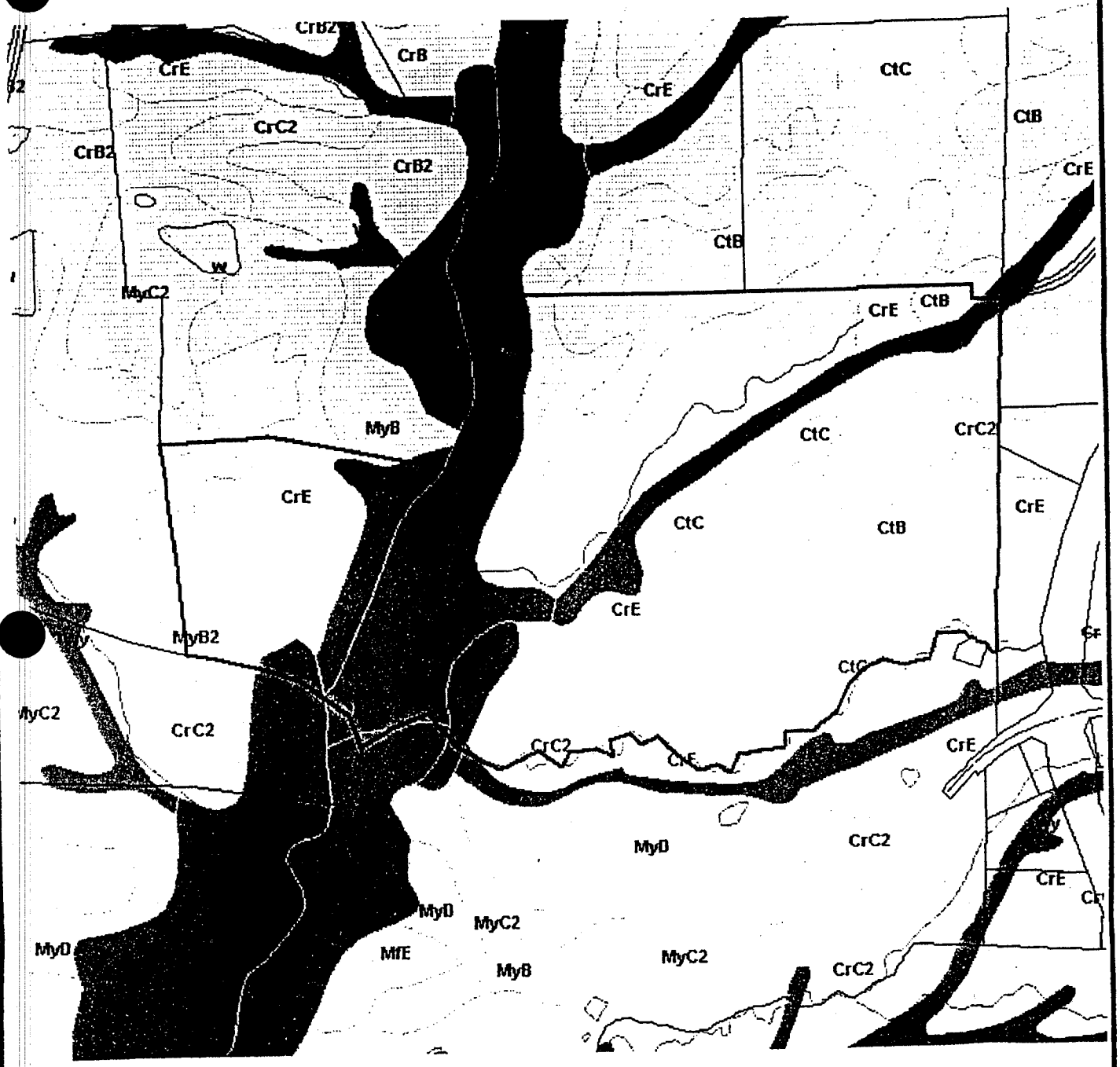
LOCATION MAP

PROJECT/SITE
HIGHWAY 55 C&D LANDFILL

APPLICANT/OWNER
GRIFFIN BROTHERS

SCALE:	1" = 2 MILES
DATE:	9-28-01
JOB NO.:	01118
DWG. NO.:	01118

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526 (843) 248-9388 FAX: (843) 248-9596



NORTH CAROLINA GIS DATABASE

THE BRIGMAN COMPANY INCORPORATED

SOILS SURVEY

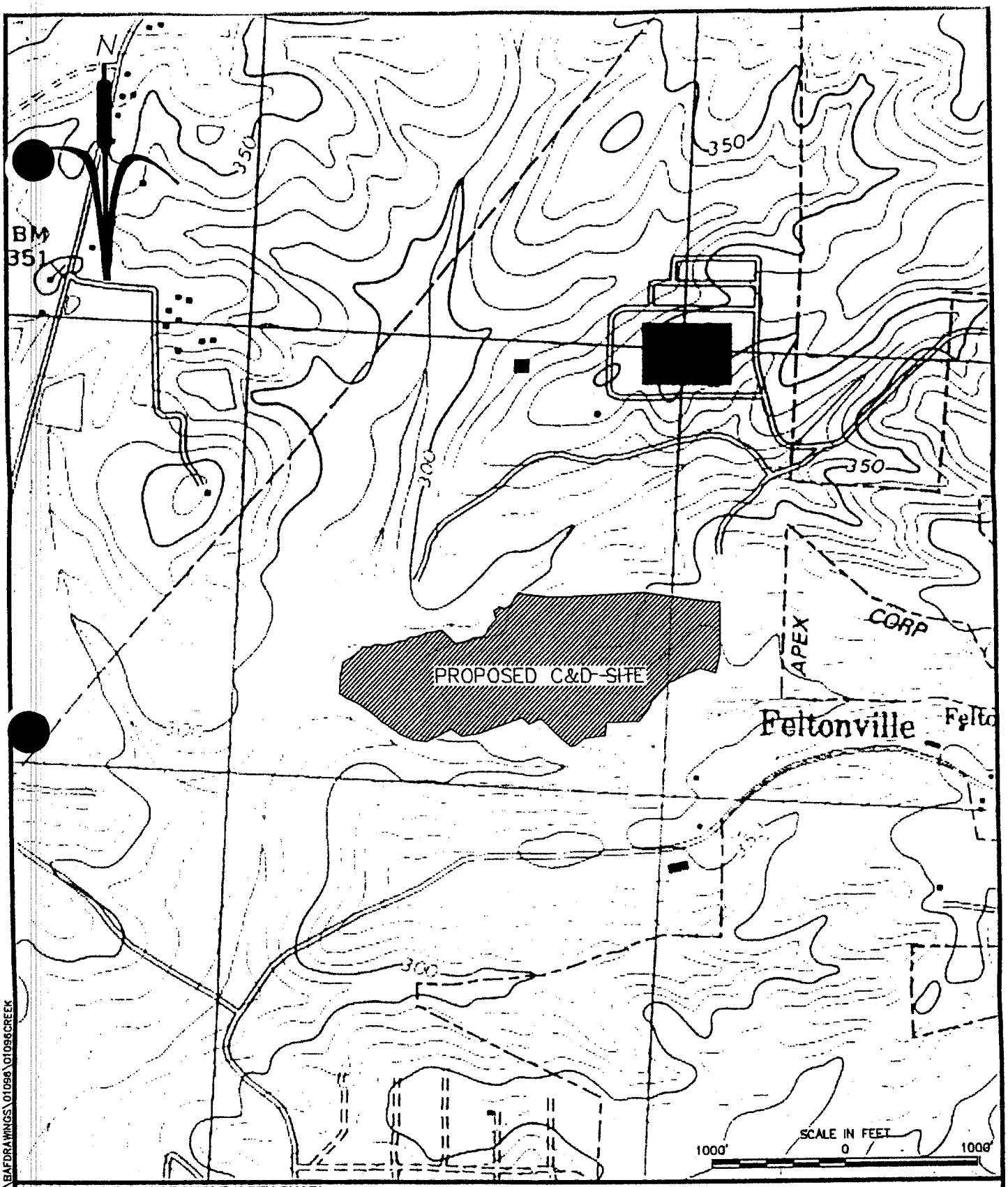
PROJECT/SITE
HIGHWAY 55 C&D LANDFILL

APPLICANT/OWNER
GRIFFIN BROTHERS

SCALE:	1" = 2 MILES
DATE:	9-28-01
JOB NO.:	01118
DWG. NO.:	01118

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526 (843) 248-9388 FAX: (843) 248-9596

C:/AMDRAWING/01118/01118



C:\BAFDRAWINGS\01096\01096CREEK

USGS 7.5 MIN QUADRANGLE (APEX QUAD)

THE BRIGMAN COMPANY INCORPORATED

USGS QUADRANGLE

PROJECT/SITE
WAKE COUNTY C&D LANDFILL

APPLICANT/OWNER
GRIFFIN BROTHERS

SCALE:	1"=1000'
DATE:	8/10/01
JOB NO.:	01096
DWG. NO.:	01096CREEK

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526 (843) 248-9388 FAX: (843) 248-9596

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Highway 55 C&D Landfill	**Project No:** 01-118	**Date:** 3-Oct-2001
Applicant/Owner: Griffin Brothers		**County:** Wake
Investigators: The Brigman Company, Inc.		**State:** North Carolina
		Plot ID: 1

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** R2SB
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:**

VEGETATION **(USFWS Region No. 2)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Acer rubrum Maple,Red	Tree	FAC	*Pinus taeda* Pine,Loblolly	Tree	FAC
Viburnum dentatum Arrow-Wood	Tree	FAC	*Onoclea sensibilis* Fern,Sensitive	Herb	FACW
Platanus occidentalis Sycamore,American	Tree	FACW-	*Polystichum acrostichoides* Fern,Christmas	Herb	FAC
Betula nigra Birch,River	Tree	FACW	*Athyrium pycnocarpon* Fern,Narrow-Leaf Lady	Herb	FAC

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 8/8 = 100.00%

FAC Neutral: 3/3 = 100.00%
Numeric Index: 21/8 = 2.63

Remarks:
The hydrophytic vegetation criteria was meet.

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water: = 3-8" *(in.)*

Depth to Free Water in Pit: N/A *(in.)*

Depth to Saturated Soil: = 0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- YES **Water Marks**
- YES **Drift Lines**
- YES **Sediment Deposits**
- YES **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- YES **Water-Stained Leaves**
- YES **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:
The hydrology criteria was meet.

WetForm™

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Highway 55 C&D Landfill **Applicant/Owner:** Griffin Brothers **Investigators:** The Brigman Company, Inc.	**Project No:** 01-118	**Date:** 3-Oct-2001 **County:** Wake **State:** North Carolina **Plot ID:** 1

SOILS

Map Unit Name (Series and Phase): Augusta
Map Symbol: Au **Drainage Class:** Poorly drained
Taxonomy (Subgroup):

Mapped Hydric Inclusion?
Field Observations Confirm Mapped Type? (Yes) No

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-8"	A	10YR2/2	N/A	N/A	N/A	Sandy loam, Subangular
8"-18"	E	10YR7/1	N/A	N/A	N/A	Sandy clay loam, Subangular blocky

Hydric Soil Indicators:

- NO **Histosol**
- NO **Histic Epipedon**
- NO **Sulfidic Odor**
- NO **Aquic Moisture Regime**
- NO **Reducing Conditions**
- NO **Gleyed or Low Chroma Colors**
- NO **Concretions**
- NO **High Organic Content in Surface Layer in Sandy Soils**
- NO **Organic Streaking in Sandy Soils**
- YES **Listed on Local Hydric Soils List**
- YES **Listed on National Hydric Soils List**
- NO **Other (Explain in Remarks)**

Remarks:
The hydric soils criteria was meet.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:
This area meets all the criteria for jurisdictional wetlands.

WetForm™

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Highway 55 C&D Landfill	**Project No:** 01-118	**Date:** 3-Oct-2001
Applicant/Owner: Griffin Brothers		**County:** Wake
Investigators: The Brigman Company, Inc.		**State:** North Carolina
		Plot ID: 2

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Upland
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:**

VEGETATION **(USFWS Region No. 2)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Cornus florida Dogwood,Flowering	Tree	FACU	*Quercus nigra* Oak,Water	Tree	FAC
Pinus taeda Pine,Loblolly	Tree	FAC	*Pteridium aquilinum* Fern,Bracken	Herb	FACU
Liquidambar styraciflua Gum,Sweet	Tree	FAC+	*Vitis rotundifolia* Grape,Muscadine	Vine	FAC
Acer rubrum Maple,Red	Tree	FAC	*Smilax rotundifolia* Greenbrier,Common	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 6/8 = 75.00%

FAC Neutral: 0/2 = 0.00%
Numeric Index: 26/8 = 3.25

Remarks:
The hydrophytic vegetation criteria was meet.

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water: N/A *(in.)*

Depth to Free Water in Pit: N/A *(in.)*

Depth to Saturated Soil: N/A *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- NO **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- NO **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- NO **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:
The hydrology criteria was not meet.

WetForm™

DATA FORM

ROUTINE WETLAND DETERMINATION

(1987 COE Wetlands Delineation Manual)

Project/Site: Highway 55 C&D Landfill **Applicant/Owner:** Griffin Brothers **Investigators:** The Brigman Company, Inc.	**Project No:** 01-118	**Date:** 3-Oct-2001 **County:** Wake **State:** North Carolina **Plot ID:** 2

SOILS

Map Unit Name (Series and Phase): Creedmore
Map Symbol: CtB **Drainage Class:** Well drained
Taxonomy (Subgroup):

Mapped Hydric Inclusion?
Field Observations Confirm Mapped Type? (Yes) No

Profile Description

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-6"	A	10YR4/3	N/A	N/A	N/A	Clay loam, Subangular blocky
6"-18"	E	10YR5/4	N/A	N/A	N/A	Clay loam, Subangular blocky

Hydric Soil Indicators:

- NO **Histosol**
- NO **Histic Epipedon**
- NO **Sulfidic Odor**
- NO **Aquic Moisture Regime**
- NO **Reducing Conditions**
- NO **Gleyed or Low Chroma Colors**
- NO **Concretions**
- NO **High Organic Content in Surface Layer in Sandy Soils**
- NO **Organic Streaking in Sandy Soils**
- NO **Listed on Local Hydric Soils List**
- NO **Listed on National Hydric Soils List**
- NO **Other (Explain in Remarks)**

Remarks:
The hydric soils criteria was not meet.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? Yes (No)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	

Remarks:
This area does npot meet all the criteria for jurisdictional wetlands.

WetForm[tm]

THE BRIGMAN COMPANY INCORPORATED

ENVIRONMENTAL SERVICES
P.O. BOX 1532
CONWAY, SC 29528
(843) 248-9388
FAX (843) 248-9596
wetlandman@aol.com

October 4, 2001

Todd Tugwell
US Army Corps Of Engineers
Raleigh Regulatory Field Office
6508 Falls of the Neuse Road
Suite 120
Raleigh, NC 27615

RE: Highway 55 C&D Landfill, LLC
Proposed Hwy 55 C&D Landfill & Recycling Center
Wake County, North Carolina

Dear Mr. Tugwell:

The Brigman Company, Inc., acting as agent for the applicant, seeks the issuance of a Nationwide Permit # 39 to accomplish the deposition of fill within Waters of the US required to construct the referenced project and fulfill NCDENR requirements.

Enclosed herewith the application, is the following supporting information:

- Project Location Map
- USGS Quadrangle
- Wetland Master Plan

If you have any questions concerning the application or require additional information to complete the approval process, please do not hesitate to call me.

Sincerely,

Britt A. Feldner
Project Manager

cc: Ron Gilkerson
John Dorney - NCDENR

Office Use Only: Form Version April 2001

USACE Action ID No. _____ **DWQ No.** _____

If any particular item is not applicable to this project, please enter "Not Applicable" or "N/A" rather than leaving the space blank.

I. Processing

1. Check all of the approval(s) requested for this project:
   - ☒ Section 404 Permit
   - ☐ Section 10 Permit
   - ☒ 401 Water Quality Certification
   - ☐ Riparian or Watershed Buffer Rules

2. Nationwide, Regional or General Permit Number(s) Requested: 39

3. If this notification is solely a courtesy copy because written approval for the 401 Certification is not required, check here: ☐

4. If payment into the North Carolina Wetlands Restoration Program (NCWRP) is proposed for mitigation of impacts (see section VIII – Mitigation), check here: ☐

II. Applicant Information

1. Owner/Applicant Information

   Name: Highway 55 C&D Landfill, LLC
   Mailing Address: 19109 West Catawba Ave.
   Suite 118
   Cornelius, NC 28031

   Telephone Number: (843) 248-9388 Fax Number: (843) 248-9596
   E-mail Address: wetlandman@aol.com

2. Agent Information (A signed and dated copy of the Agent Authorization letter must be attached if the Agent has signatory authority for the owner/applicant.)

   Name: Britt A. Feldner
   Company Affiliation: The Brigman Company, Inc.
   Mailing Address: 900B Main Street
   Conway, SC 29526

   Telephone Number: (843) 248-9388 Fax Number: (843) 248-9596
   E-mail Address: wetlandman@aol.com

III. Project Information

Attach a **vicinity map** clearly showing the location of the property with respect to local landmarks such as towns, rivers, and roads. Also provide a detailed **site plan** showing property boundaries and development plans in relation to surrounding properties. Both the vicinity map and site plan must include a scale and north arrow. The specific footprints of all buildings, impervious surfaces, or other facilities must be included. If possible, the maps and plans should include the appropriate USGS Topographic Quad Map and NRCS Soil Survey with the property boundaries outlined. Plan drawings, or other maps may be included at the applicant's discretion, so long as the property is clearly defined. For administrative and distribution purposes, the USACE requires information to be submitted on sheets no larger than 11 by 17-inch format; however, DWQ may accept paperwork of any size. DWQ prefers full-size construction drawings rather than a sequential sheet version of the full-size plans. If full-size plans are reduced to a small scale such that the final version is illegible, the applicant will be informed that the project has been placed on hold until decipherable maps are provided.

1. Name of project: Highway 55 C&D Landfill & Recycling Center

2. T.I.P. Project Number (NCDOT Only): _____

3. Property Identification Number (Tax PIN): 0740.02-55-8687

4. Location
   County: Wake Nearest Town: Apex
   Subdivision name (include phase/lot number): _____
   Directions to site (include road numbers, landmarks, etc.): Travel north on highway 55 from Holly Springs in Wake County approximately 2 miles and turn left on to Old Smithfield Road (Hwy 1172) traveling about ½ miles and the site is on the right.

5. Site coordinates, if available (UTM or Lat/Long): Lat:35°41'10" Long:78°50'40"
   (Note – If project is linear, such as a road or utility line, attach a sheet that separately lists the coordinates for each crossing of a distinct waterbody.)

6. Describe the existing land use or condition of the site at the time of this application: The site Consist of mostly 15 to 20 year old Loblolly pines with some shortleaf pine and mixed hardwoods.

7. Property size (acres): 89.1

8. Nearest body of water (stream/river/sound/ocean/lake): Little Branch

9. River Basin: Cape Fear River Basin
   (Note – this must be one of North Carolina's seventeen designated major river basins. The River Basin map is available at http://h2o.enr.state.nc.us/admin/maps/.)

10. Describe the purpose of the proposed work: The purpose of the proposed work is to Construct a C&D Landfill and Recycling Center.

11. List the type of equipment to be used to construct the project: Typical land grading Equipment: back-hoe, trac-hoe and bulldozers etc.

12. Describe the land use in the vicinity of this project: Commercial

IV. Prior Project History

If jurisdictional determinations and/or permits have been requested and/or obtained for this project (including all prior phases of the same subdivision) in the past, please explain. Include the USACE Action ID Number, DWQ Project Number, application date, and date permits and certifications were issued or withdrawn. Provide photocopies of previously issued permits, certifications or other useful information. Describe previously approved wetland, stream and buffer impacts, along with associated mitigation (where applicable). If this is a NCDOT project, list and describe permits issued for prior segments of the same T.I.P. project, along with construction schedules.

V. Future Project Plans

Are any additional permit requests anticipated for this project in the future? If so, describe the anticipated work, and provide justification for the exclusion of this work from the current application: At this time we are unable to determine any definite future impacts to wetlands or Waters of the United States.

VI. Proposed Impacts to Waters of the United States/Waters of the State

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to wetlands, open water, and stream channels associated with the project. The applicant must also provide justification for these impacts in Section VII below. All proposed impacts, permanent and temporary, must be listed herein, and must be clearly identifiable on an accompanying site plan. All wetlands and waters, and all streams (intermittent and perennial) must be shown on a delineation map, whether or not impacts are proposed to these systems. Wetland and stream evaluation and delineation forms should be included as appropriate. Photographs may be included at the applicant's discretion. If this proposed impact is strictly for wetland or stream mitigation, list

and describe the impact in Section VIII below. If additional space is needed for listing or description, please attach a separate sheet.

1. Wetland Impacts

Wetland Impact Site Number (indicate on map)	Type of Impact*	Area of Impact (acres)	Located within 100-year Floodplain** (yes/no)	Distance to Nearest Stream (linear feet)	Type of Wetland***

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: mechanized clearing, grading, fill, excavation, flooding, ditching/drainage, etc. For dams, separately list impacts due to both structure and flooding.

** 100-Year floodplains are identified through the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM), or FEMA-approved local floodplain maps. Maps are available through the FEMA Map Service Center at 1-800-358-9616, or online at http://www.fema.gov.

*** List a wetland type that best describes wetland to be impacted (e.g., freshwater/saltwater marsh, forested wetland, beaver pond, Carolina Bay, bog, etc.)

List the total acreage (estimated) of existing wetlands on the property: +/- 4.3 acres

Total area of wetland impact proposed: 0

2. Stream Impacts, including all intermittent and perennial streams

Stream Impact Site Number (indicate on map)	Type of Impact*	Length of Impact (linear feet)	Stream Name**	Average Width of Stream Before Impact	Perennial or Intermittent? (please specify)
1	Culv. Rd X-sing	30	N/A	15	Perennial
2	Culv. Rd X-sing	25	N/A	5	Intermittent
3	Fill	64	N/A	5	Intermittent
4	Culv. Rd X-sing	15	N/A	20	Perennial
5	Culv. Rd X-sing	15	Little Branch	25	Perennial

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: culverts and associated rip-rap, dams (separately list impacts due to both structure and flooding), relocation (include linear feet before and after, and net loss/gain), stabilization activities (cement wall, rip-rap, crib wall, gabions, etc.), excavation, ditching/straightening, etc. If stream relocation is proposed, plans and profiles showing the linear footprint for both the original and relocated streams must be included.

** Stream names can be found on USGS topographic maps. If a stream has no name, list as UT (unnamed tributary) to the nearest downstream named stream into which it flows. USGS maps are available through the USGS at 1-800-358-9616, or online at www.usgs.gov. Several internet sites also allow direct download and printing of USGS maps (e.g., www.topozone.com, www.mapquest.com, etc.).

Cumulative impacts (linear distance in feet) to all streams on site: 149

3. Open Water Impacts, including Lakes, Ponds, Estuaries, Sounds, Atlantic Ocean and any other Water of the U.S.

Open Water Impact Site Number (indicate on map)	Type of Impact*	Area of Impact (acres)	Name of Waterbody (if applicable)	Type of Waterbody (lake, pond, estuary, sound, bay, ocean, etc.)

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: fill, excavation, dredging, flooding, drainage, bulkheads, etc.

4. Pond Creation
If construction of a pond is proposed, associated wetland and stream impacts should be included above in the wetland and stream impact sections. Also, the proposed pond should be described here and illustrated on any maps included with this application.
Pond to be created in (check all that apply): ☐ uplands ☐ stream ☐ wetlands
Describe the method of construction (e.g., dam/embankment, excavation, installation of draw-down valve or spillway, etc.): N/A

Proposed use or purpose of pond (e.g., livestock watering, irrigation, aesthetic, trout pond, local stormwater requirement, etc.): N/A

Size of watershed draining to pond:_____ Expected pond surface area:_____

VII. Impact Justification (Avoidance and Minimization)

Specifically describe measures taken to avoid the proposed impacts. It may be useful to provide information related to site constraints such as topography, building ordinances, accessibility, and financial viability of the project. The applicant may attach drawings of alternative, lower-impact site layouts, and explain why these design options were not feasible. Also discuss how impacts were minimized once the desired site plan was developed. If applicable, discuss construction techniques to be followed during construction to reduce impacts.

VIII. Mitigation

DWQ - In accordance with 15A NCAC 2H .0500, mitigation may be required by the NC Division of Water Quality for projects involving greater than or equal to one acre of impacts to freshwater wetlands or greater than or equal to 150 linear feet of total impacts to perennial streams.

USACE – In accordance with the Final Notice of Issuance and Modification of Nationwide Permits, published in the Federal Register on March 9, 2000, mitigation will be required when necessary to ensure that adverse effects to the aquatic environment are minimal. Factors including size and type of proposed impact and function and relative value of the impacted aquatic resource will be considered in determining acceptability of appropriate and practicable mitigation as proposed. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland and/or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferable in the same watershed.

If mitigation is required for this project, a copy of the mitigation plan must be attached in order for USACE or DWQ to consider the application complete for processing. Any application lacking a required mitigation plan or NCWRP concurrence shall be placed on hold as incomplete. An applicant may also choose to review the current guidelines for stream restoration in DWQ's Draft Technical Guide for Stream Work in North Carolina, available at http://h2o.enr.state.nc.us/ncwetlands/strmgide.html.

1. Provide a brief description of the proposed mitigation plan. The description should provide as much information as possible, including, but not limited to: site location (attach directions and/or map, if offsite), affected stream and river basin, type and amount (acreage/linear feet) of mitigation proposed (restoration, enhancement, creation, or preservation), a plan view, preservation mechanism (e.g., deed restrictions, conservation easement, etc.), and a description of the current site conditions and proposed method of construction. Please attach a separate sheet if more space is needed.

_____
_____
_____
_____
_____
_____
_____

2. Mitigation may also be made by payment into the North Carolina Wetlands Restoration Program (NCWRP) with the NCWRP's written agreement. Check the box indicating that you would like to pay into the NCWRP. Please note that payment into the NCWRP must be reviewed and approved before it can be used to satisfy mitigation requirements. Applicants will be notified early in the review process by the 401/Wetlands Unit if payment into the NCWRP is available as an option. For additional information regarding the application process for the NCWRP, check the NCWRP website at http://h2o.enr.state.nc.us/wrp/index.htm. If use of the NCWRP is proposed, please check the appropriate box on page three and provide the following information:

   Amount of stream mitigation requested (linear feet):_____
   Amount of buffer mitigation requested (square feet):_____
   Amount of Riparian wetland mitigation requested (acres):_____
   Amount of Non-riparian wetland mitigation requested (acres):_____
   Amount of Coastal wetland mitigation requested (acres):_____

X. Environmental Documentation (DWQ Only)

Does the project involve an expenditure of public funds or the use of public (federal/state/local) land?

Yes ☐ No ☒

If yes, does the project require preparation of an environmental document pursuant to the requirements of the National or North Carolina Environmental Policy Act (NEPA/SEPA)? Note: If you are not sure whether a NEPA/SEPA document is required, call the SEPA coordinator at (919) 733-5083 to review current thresholds for environmental documentation.

Yes ☐ No ☐

If yes, has the document review been finalized by the State Clearinghouse? If so, please attach a copy of the NEPA or SEPA final approval letter.

Yes ☐ No ☐

X. Proposed Impacts on Riparian and Watershed Buffers (DWQ Only)

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to required state and local buffers associated with the project. The applicant must also provide justification for these impacts in Section VII above. All proposed impacts must be listed herein, and must be clearly identifiable on the accompanying site plan. All buffers must be shown on a map, whether or not impacts are proposed to the buffers. Correspondence from the DWQ

Regional Office may be included as appropriate. Photographs may also be included at the applicant's discretion.

Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify_____)?

Yes ☐ No ☒ If you answered "yes", provide the following information:

Identify the square feet and acreage of impact to each zone of the riparian buffers. If buffer mitigation is required calculate the required amount of mitigation by applying the buffer multipliers.

Zone*	Impact (square feet)	Multiplier	Required Mitigation
1		3	
2		1.5	
Total			

* Zone 1 extends out 30 feet perpendicular from near bank of channel; Zone 2 extends an additional 20 feet from the edge of Zone 1.

If buffer mitigation is required, please discuss what type of mitigation is proposed (i.e., Donation of Property, Conservation Easement, Riparian Buffer Restoration / Enhancement, Preservation or Payment into the Riparian Buffer Restoration Fund). Please attach all appropriate information as identified within 15A NCAC 2B .0242 or .0260.

_____

_____

_____

_____

XI. Stormwater (DWQ Only)

Describe impervious acreage (both existing and proposed) versus total acreage on the site. Discuss stormwater controls proposed in order to protect surface waters and wetlands downstream from the property.

_____

_____

_____

XII. Sewage Disposal (DWQ Only)

Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility.

Water and Sewer for the facility will be met by the use of a port-a-john and bottled water
For construction. The town of Apex water and sewer will be utilized once the facility is opened.

_____

XIII. Violations (DWQ Only)

Is this site in violation of DWQ Wetland Rules (15A NCAC 2H .0500) or any Buffer Rules?

Yes ☐ No ☒

Is this an after-the-fact permit application?

Yes ☒ No ☐

XIV. Other Circumstances (Optional):

It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g., draw-down schedules for lakes, dates associated with Endangered and Threatened Species, accessibility problems, or other issues outside of the applicant's control).

_____

_____

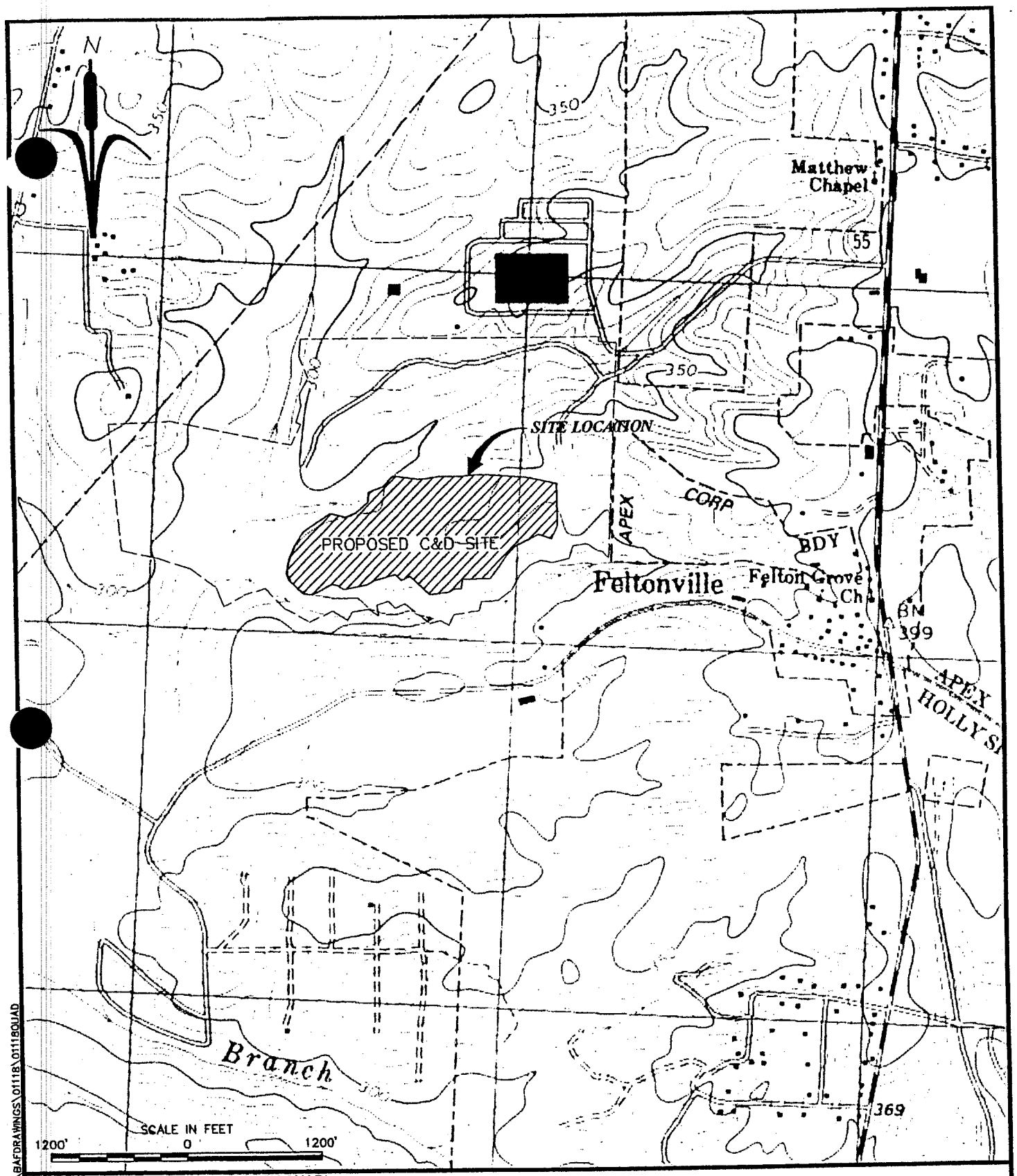
_____

_____

_____ 10/9/01

Applicant/Agent's Signature Date

(Agent's signature is valid only if an authorization letter from the applicant is provided.)



C:\BAFDRAWINGS\01118\01118QUAD

USGS 7.5 MIN QUADRANGLE (APEX QUAD)

THE BRIGMAN COMPANY INCORPORATED

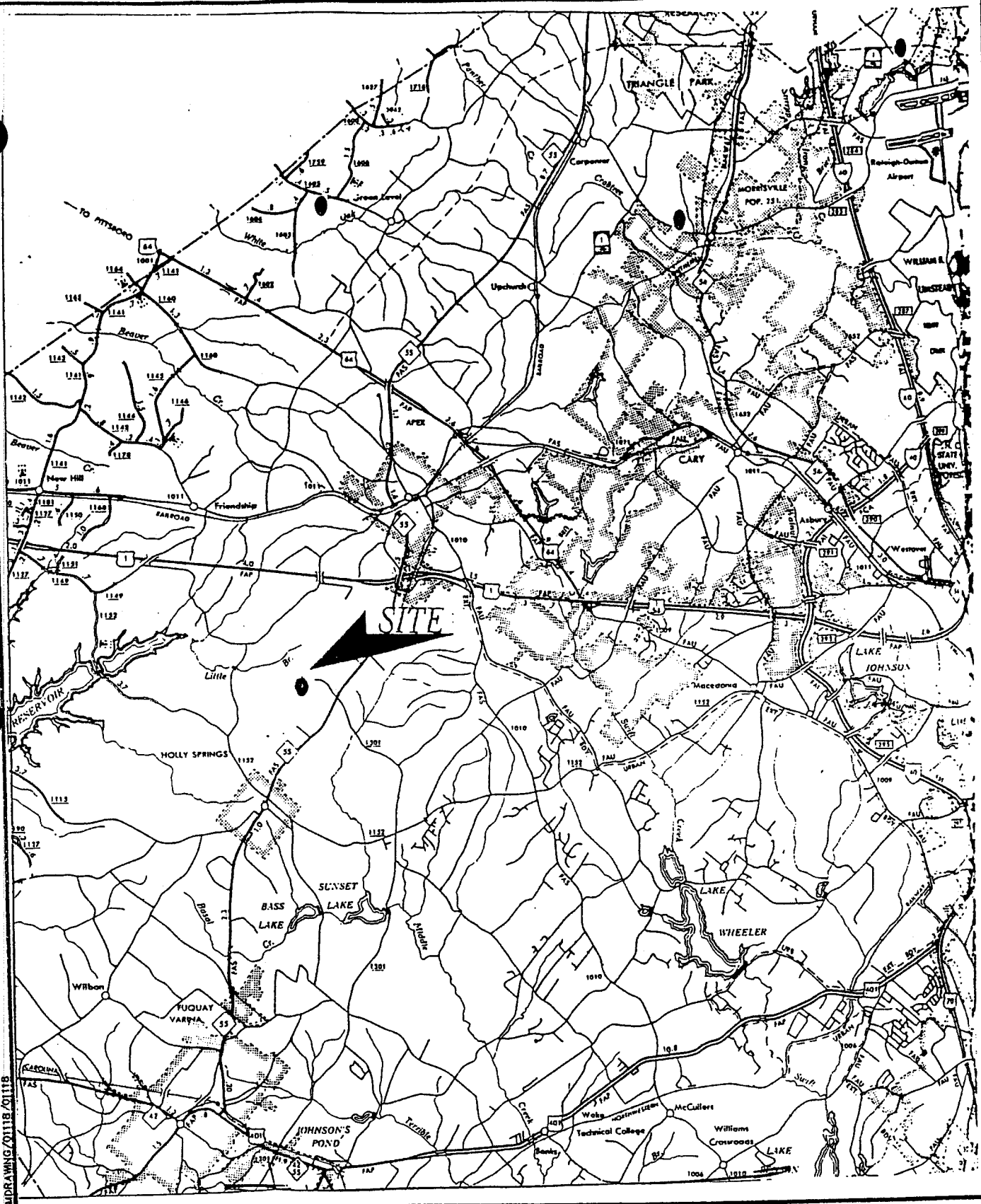
USGS QUADRANGLE

PROJECT/SITE
PROPOSED HIGHWAY 55 C&D LANDFILL

APPLICANT/OWNER
HWY 55 C&D LANDFILL, LLC

SCALE:	1"=1200'
DATE:	8/10/01
JOB NO.:	01118
DWG. NO.:	01118QUAD

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526 (843) 248-9388 FAX: (843) 248-9596



C:\MDRAWING\01118\01118

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

THE BRIGMAN COMPANY INCORPORATED

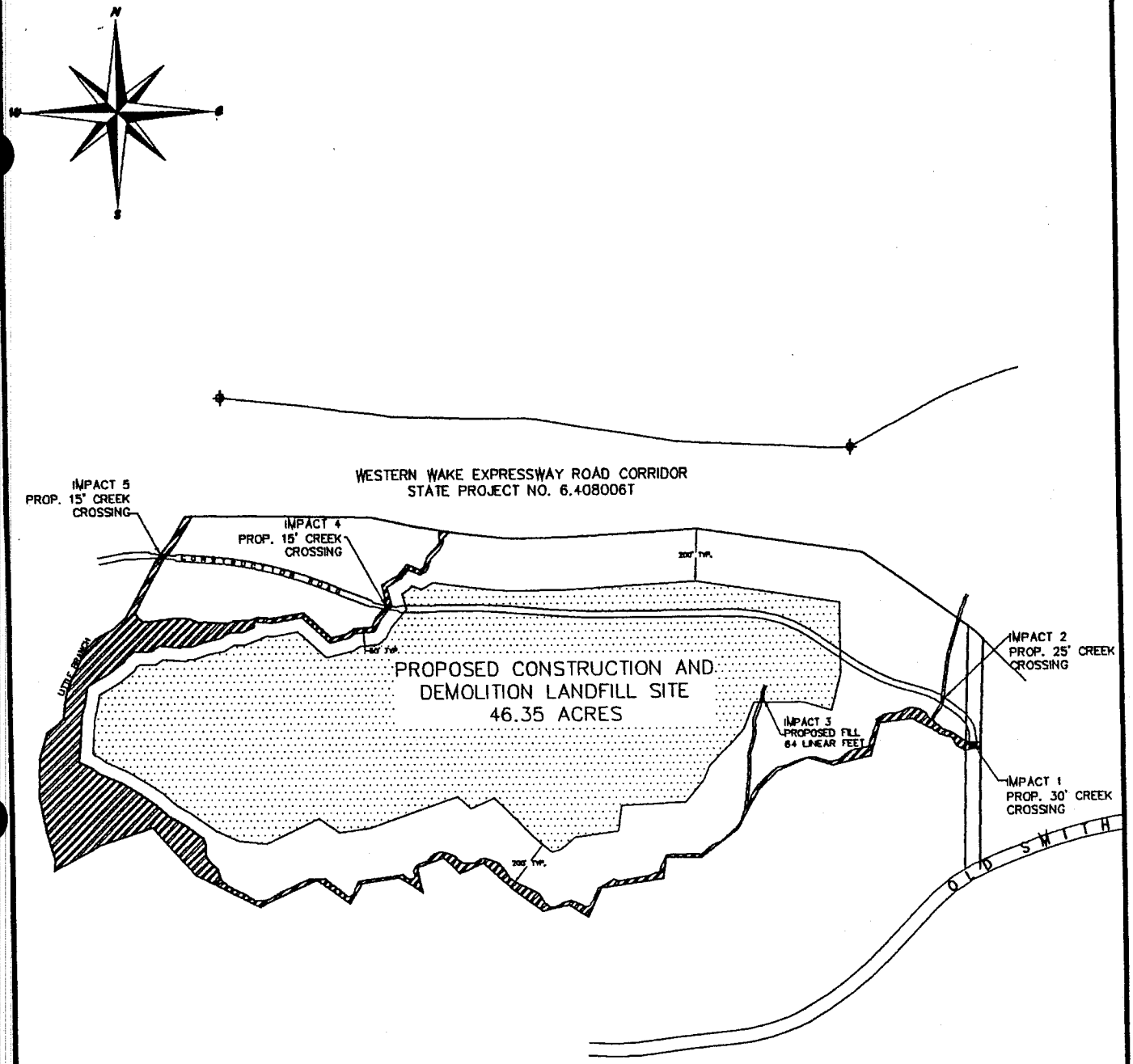
LOCATION MAP

PROJECT/SITE
HIGHWAY 55 C&D LANDFILL

APPLICANT/OWNER
GRIFFIN BROTHERS

SCALE:	1" = 2 MILES
DATE:	9-28-01
JOB NO.:	01118
DWG. NO.:	01118

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526 (843) 248-9388 FAX: (843) 248-9596



TOTAL PROP. AREA	89.10 ACRES
WETLANDS/WATERS	8.11 ACRES
CREEK FILL (FEET)	149 FEET

SCALE IN FEET
600' 0 600'

LAT: 35D41'10" LONG:78D50'40"

WETLAND MASTER PLAN

PROPOSED HIGHWAY 55 C&D LANDFILL
WAKE COUNTY, NORTH CAROLINA

NATIONWIDE PERMIT #14 APPLICATION

DATE: 10/2/01 **PAGE 3/3**

APPLICATION NO. _____

PROPOSED ACTIVITY:	WATERS/WETLAND FILL
PURPOSE:	C&D LANDFILL
LOCATION:	APEX COMMUNITY
APPLICANT:	GRIFFIN BROTHERS COMPANIES

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526 (843) 248-9388 FAX: (843) 248-9596

C:\BAFDRAWINGS\01118\01118PERM

NCDENR

THREATENED AND ENDANGERED SPECIES

ARCHAEOLOGIC AND HISTORIC SURVEY

STATE NATURE AND HISTORIC PRESERVE

INFORMATION

North Carolina
Department of Environment and Natural Resources
Division of Parks and Recreation

Michael F. Easley, Governor
William G. Ross Jr., Secretary
Philip K. McKnelly, Director

NCDENR

September 24, 2001

Mr. Dan E. Brewer
Patterson, Brewer, & Associates
P.O. Box 1387
Mooresville, NC 28115

Subject: Proposed Highway 55 C&D Landfill Site near Holly Springs, Wake County

Dear Mr. Brewer:

The Natural Heritage Program has no record of rare species, significant natural communities, or priority natural areas at the site nor within a mile of the site.

You may wish to check the Natural Heritage Program database website at <www.ncsparks.net/nhp/search.html> for a listing of rare plants and animals and significant natural communities in the county and on the topographic quad map. Please do not hesitate to contact me at 919-715-8687 if you have questions or need further information.

Sincerely,

Harry E. LeGrand, Jr.

Harry E. LeGrand, Jr., Zoologist
Natural Heritage Program

HEL/hel

1615 Mail Service Center, Raleigh, North Carolina 27699-1615
Phone: 919-733-4181 FAX: 919-715-3085 Internet: www.enr.state.nc.us/ENR
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER - 50% RECYCLED / 10% POST CONSUMER PAPER

North Carolina Department of Cultural Resources

State Historic Preservation Office

David L. S. Brook, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary

Division of Archives and History
Jeffrey J. Crow, Director

October 11, 2001

Dan E. Brewer
Patterson & Brewer
PO Box 137
Mooresville, NC 28115

Re: Proposed Hwy 55 C&D Landfill & Recycling Center, Wake County, ER 02-7731

Dear Mr. Brewer:

Thank you for your letter of September 17, 2001, concerning the above project.

We have conducted a review of the project and are aware of no historic resources, which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

Renee Gledhill-Earley

David Brook

DB:kgc

North Carolina Department of Cultural Resources
State Historic Preservation Office
David L. S. Brook, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary

Division of Archives and History
Jeffrey J. Crow, Director

October 11, 2001

Dan E. Brewer
Patterson & Brewer
PO Box 137
Mooresville, NC 28115

Re: Proposed Hwy 55 C&D Landfill & Recycling Center, Wake County, ER 02-7731

Dear Mr. Brewer:

Thank you for your letter of September 17, 2001, concerning the above project.

We have conducted a review of the project and are aware of no historic resources, which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

Renee Gledhill-Earley

David Brook

DB:kgc

September 17, 2001

NCDENR, Division of Parks and Recreation
P.O. Box 27687
Raleigh, North Carolina 27611-7687

Attention: Ms. Susan Jiles

Reference: **Threatened and Endangered Species Inquiry**
Proposed Highway 55 C&D Landfill & Recycling Center
Wake County, North Carolina

Dear Ms. Jiles:

Patterson, Brewer & Associates, P.A. submits this request to the North Carolina Division of Parks and Recreation for information on any threatened or endangered species located on the proposed C&D landfill site as required by Rule .0564(2) and (3) of the North Carolina Solid Waste Management Rules.

The Proposed C&D landfill site encompasses 85 acres of which approximately 40 acres will be utilized for landfilling operations. The site is located near the intersection of Old Smith Field Road and the new NC 55 Bypass north of Holly Springs in Wake County, North Carolina. A site location map is attached for reference.

We would appreciate any pertinent information regarding this site. If you have any questions, please feel free to contact us at (704) 662-0100.

Sincerely,
Patterson, Brewer & Associates, P.A.

Dan E. Brewer, P.E.
Principal

cc: Mr. Ron Gilkerson

September 17, 2001

N.C. Dept. of Cultural Resources
Division of Archives and History
109 East Jones Street
Raleigh, North Carolina 27601-2807

Attention: Mrs. Renee Gledhill-Earley

Reference: **Archaeologic and Historic Survey Inquiry**
Proposed Hwy 55 C&D Landfill & Recycling Center
Wake County, North Carolina

Dear Mrs. Gledhill-Earley:

Patterson, Brewer & Associates, P.A. submits this request to the North Carolina Department of Cultural Resources for information on any archaeologic or historic sites located on the proposed C&D landfill site as required by Rule .0564(4) of the North Carolina Solid Waste Management Rules.

The Proposed C&D landfill site encompasses 85 acres of which approximately 40 acres will be utilized for landfilling operations. The site is located near the intersection of Old Smith Field Road and the new NC 55 Bypass north of Holly Springs in Wake County, North Carolina. A site location map is attached for reference.

We would appreciate any pertinent information regarding this site. If you have any questions, please feel free to contact us at (704) 662-0100.

Sincerely,
Patterson, Brewer & Associates, P.A.

Dan E. Brewer, P.E.
Principal

cc: Mr. Ron Gilkerson

September 17, 2001

NCDENR, Division of Parks and Recreation
Natural Heritage Program
P.O. Box 27687
Raleigh, North Carolina 27611-7687

Attention: Ms. Linda Pearsall

Reference: **State Nature and Historic Preserve Inquiry**
Proposed Highway 55 C&D Landfill & Recycling Center
Wake County, North Carolina

Dear Ms. Pearsall:

Patterson, Brewer & Associates, P.A. submits this request to the North Carolina Division of Parks and Recreation for information on any state park, recreation or scenic area, or any other lands included in the state nature and historic preserve located on the proposed C&D landfill site as required by Rule .0564(5) of the North Carolina Solid Waste Management Rules.

The Proposed C&D landfill site encompasses 85 acres of which approximately 40 acres will be utilized for landfilling operations. The site is located near the intersection of Old Smith Field Road and the new NC 55 Bypass north of Holly Springs in Wake County, North Carolina. A site location map is attached for reference.

We would appreciate any pertinent information regarding this site. If you have any questions, please feel free to contact us at (704) 662-0100.

Sincerely,
Patterson, Brewer & Associates, P.A.

Dan E. Brewer, P.E.
Principal

cc: Mr. Ron Gilkerson

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-1 Job No: EP-1306 Client: Hwy 55 CSD Landfill, LLC

ect Location: Wake Co. State: NC Total Depth: 75'

TB Soil Sample Method: Split-Spoon Date Started: 9-10-01 Date Complete: 9-10-01

Simmons Drill Method: HSA/Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 352.85 Measuring Point Elev. (MP): LS Remarks:

vation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. clayey Silt				
	5	24,31,32		Rd-brn clayey Silt				
	10	48, 50/3"						
	15			PWR - Sampled as tan-brn. sandy Silt w/ Rx frag.				
	20			Auger Refusal @ 20.5' bgs				
				Air drilled through weathered fanglomerate to 35' bgs				
	25							
	30							
	35			Began 1st Coring Run @ 35' bgs (35.0'-48.2') 36.5'-42.0' - Rd-brn fanglomerate w/ 0.5"-1" metamorphic/igneous rock inclusions				98% Rec. 56% RQD

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-1 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

Project Location: Wake Co. State: NC Total Depth: 75'
Driller: TB Soil Sample Method: Split-spoon Date Started: 9-10-01 Date Complete: 9-10-01
Geologist: R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra - CT-250 Boring Diameter: 8¼/6"
Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Ground Surface Elevation (LS): 352.85 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
	45			44.5'-49.0' - Highly fractured weathered zone				
				Began 2nd Core Run (48.2'-62.6')				99% Rec. 63% RQD
	50							
	55			53'-59' - 0.25"-1" metamorphic/igneous rock inclusions				
	60			61.0'-62.5' - Highly weathered clayey siltstone w/ rock fragments				
				Began 3rd Core Run (62.6'-75.0')				100% Rec. 89% RQD
	65			63.5'-67.0' - 0.5"-2" rock inclusions				
	70			67'-75' - 0.25"-1" rock inclusions				
	75			Terminated Coring @ 75' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-2 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

Project Location: Wake Co. State: NC Total Depth: 56'
[illegible] TB Soil Sample Method: Split-Spoon Date Started: 9-10-01 Date Complete: 9-10-01
[illegible] R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Boring Diameter: 8"/6"
Oil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Land Surface Elevation (LS): 328.14 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. clayey Silt				
		4,6,10						
	5			Rd-brn. sl. clayey Silt				
		16,28,50/6"						
	10			PWR - Sampled as rd-brn sl. sandy Silt w/ Rx. frag.				
	15	50/1"						
				Auger Refusal @ 17' bgs				
				Air Drilled to 56'				
	20							
	25			Rd-brn. Fanglomerate				
	30							
	55			Terminated Air Drilling @ 56' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-3 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ect Location: Wake Co. State: NC Total Depth: 55'
TB Soil Sample Method: Split-Spoon Date Started: 9-10-01 Date Complete: 9-10-01
R. Simmons Drill Method: HSA/ Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
d Surface Elevation (LS): 318.49 Measuring Point Elev. (MP): LS Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel.-brn Clayey Silt				
		25,35,50/1"						
	5							
				PWR - Sampled as Tan-brn sl. clayey sandy silt w/ Rx frag.				
	10							
				Auger Refusal @ 14' bgs Switched to Air Rotary				
	15							
	20							
				Rd-brn Fanglomerate				
	25							
	30							
				Terminated Air Drilling @ 55' bgs				
	55							

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-4 Job No: EP-1306 Client: Hwy 55 CLD Landfill, LLC

Project Location: Wake Co. State: NC Total Depth: 55'

Logged By: TB Soil Sample Method: Split-Spoon Date Started: 9-10-01 Date Complete: 9-10-01

R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra - CT-250 Boring Diameter: 8"/6"

Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Land Surface Elevation (LS): 344.25 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-tan brn clayey Silt				
		9,19,30						
	5							
				Rd-brn. sl. clayey Silt				
		50/1"						
	10							
				PWR- Sampled as rd-tan brn sl. clayey Sandy Silt w/ Rx frag.				
	15							
		50/1"						
				Auger Refusal @ 18'				
	20			Switched to Air Rotary				
	25			Rd-brn Fanglomerate				
	30							
	55			Terminated Air Drilling @ 55'				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-5 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

Location: Wake Co. State: NC Total Depth: 70'
TB Soil Sample Method: Split-Spoon Date Started: 9-10-01 Date Complete: 9-10-01
Simmons Drill Method: HSA/Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
as Sample Method: Groundwater (bmp): 0 hrs 24 hrs
urface Elevation (LS): 330.92 Measuring Point Elev. (MP): LS Remarks:

tion	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
	5	18, 34, 50/2"						
	10	50/1"		PWR - sampled as tan-brn sl. clayey sandy Silt w/ Rx frag.				
	15			Auger Refusal @ 15.5' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn Fanglomerate				
	30							
	70			Terminated Drilling @ 70'				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-6 Job No: EP-1306 Client: Hwy 55 CLD Landfill, LLC

t Location: Wake Co. State: NC Total Depth: 55

TB Soil Sample Method: Split-Spoon Date Started: 9-10-01 Date Complete: 9-10-01

Simmons Drill Method: HSA / Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"

as Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 325.87 Measuring Point Elev. (MP): LS Remarks:

tion	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey Silt				
		40, 50/5"						
	5							
		50/1"		PWR - Sampled as tan-rd-brn sl. clayey Sandy Silt w/ Rx frag.				
	10							
	15			Auger Refusal @ 16' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn Fanglomerate				
	30							
				Terminated Air Drilling @ 55' bgs				
	55							

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-7 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

l Location: Wake Co. State: NC Total Depth: 75'
TB Soil Sample Method: Split-Spoon Date Started: 9-11-01 Date Complete: 9-11-01
, Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
as Sample Method: Groundwater (btop): 0 hrs 24 hrs
Surface Elevation (LS): 353.23 Measuring Point Elev. (MP): LS Remarks:

tion	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. sl. clayey Silt				
	5	20, 50/5"						
	10	50/2"		PWR - Sampled as tan-rd brn sl. clayey sandy silt w/ Rx frag.				
	15							
				Auger Refusal @ 18' bgs				
	20			Switched to Air Rotary				
	25			Rd-brn Fanglomerate				
	30							
	75			Terminated Air Drilling @ 75' bgs				

ENVIRO-PRO, P.C.
Charlotte, North Carolina

LITHOLOGIC LOG

Boring No.: MW-8 Job No: EP-1306
Client: Hwy 55 C&D Landfill, LLC

Project Location: Wake Co. State: NC Total Depth: 59'
FB Soil Sample Method: Split-Spoon Date Started: 9-11-01 Date Complete: 9-11-01
R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Ground Surface Elevation (LS): 343.11 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
		22,30,44		Rd-brn clayey Silt				
	5							
		50/1"						
	10			PWR - Sampled as tan-brn sl. clayey sandy Silt w/ Rx frag.				
	15							
				Auger Refusal @ 19' bgs				
	20			Switched to Air Rotary				
	25			Rd-brn Fanglomerate				
	30							
				Terminated Air Drilling @ 59' bgs				
	60							

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-9 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 50'

B Soil Sample Method: Split-Spoon Date Started: 9-11-01 Date Complete: 9-11-01

R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 358.35 Measuring Point Elev. (MP): LS Remarks:

ation L	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
		28,39,50/4"		Rd-brn. clayey Silt				
	5							
		50/1"						
	10			PWR-Sampled as tan-brn. silty Sand w/ Rx frag.				
	15							
				Auger Refusal @ 17.5' bgs				
	20							
	25			Rd-brn Fanglomerate				
	30							
	50			Terminated Air Drilling @ 50' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-10 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 40'
TB Soil Sample Method: Split-Spoon Date Started: 9-12-01 Date Complete: 9-12-01
R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Cauterra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 348.87 Measuring Point Elev. (MP): LS Remarks:

vation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
		12,16,24		Yel-brn clayey Silt				
	5							
		30,50/1"						
	10			PWR - Sampled as tan-rd brn. sl. clayey sandy Silt w/ Rx frag.				
	15							
				Auger Refusal @ 17' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn Fanglomerate				
	30							
				Terminated Air Drilling @ 40' bgs				
	40							

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-11 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ect Location: Wake Co. State: NC Total Depth: 55'

TB Soil Sample Method: Split-Spoon Date Started: 9-12-01 Date Complete: 9-12-01

R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

d Surface Elevation (LS): 332.38 Measuring Point Elev. (MP): LS Remarks:

evation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey Silt				
		22, 39, 50/3"						
	5							
		35, 50/1"		PWR-Sampled as tan-rd brn clayey Silt w/ Rx frag.				
	10							
	15							
				Auger Refusal @ 18' bgs				
				Switched to Air Rotary				
	20							
	25							
				Rd-brn Fanglomerate				
	30							
	55			Terminated Air Drilling @ 55' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-12 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

Project Location: Wake Co. State: NC Total Depth: 30

By: FB Soil Sample Method: Split-Spoon Date Started: 9-12-01 Date Complete: 9-12-01

R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"

Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Land Surface Elevation (LS): 307.59 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
		22, 37, 43		Yel-brn sl. clayey Silt				
	5							
		50/2"						
	10			PWR - Sampled as tan-brn sl. clayey Sandy Silt w/ Rx frag.				
	15			Auger Refusal @ 16' bgs				
				Switched to Air Rotary				
	20							
				Rd-brn Fanglomerate				
	25							
	30			Terminated Air Drilling @ 30' bgs				

ENVIRO-PRO, P.C.
Charlotte, North Carolina

LITHOLOGIC LOG

Boring No.: MW-13 Job No: EP-1306
Client: Hwy 55 CLD Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 40'
TB Soil Sample Method: Split-Spoon Date Started: 9-12-01 Date Complete: 9-12-01
. Simmons Drill Method: HSA/Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 310.99 Measuring Point Elev. (MP): LS Remarks:

ation L	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
		27, 50/3"						
	5							
		50/1"		PWR-sampled as tan-brn sl. clayey fine sandy Silt w/ Rx frag.				
	10							
				Auger Refusal @ 15' bgs				
	15			Switched to Air Rotary				
	20							
				Rd-brn. Fanglomerate				
	25							
	30							
				Terminated Air Drilling @ 40' bgs				
	40							

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-13D Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 50

TB Soil Sample Method: Split-Spoon Date Started: 11-8-01 Date Complete: 11-8-01

R. Simmons Drill Method: Air Rotary Equipment Type: Cauterra CT-250 Boring Diameter: 6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 310.51 Measuring Point Elev. (MP): LS Remarks:

vation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
	5			PWR - Tan-brn sl. clayey fine sandy Silt w/ Rx frag.				
	10							
	15			Bedrock encountered @ 15' bgs				
	20							
	25			Rd-brn Fanglomerate				
	30							
	50			Air Drilling Terminated @ 50' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-14 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

Project Location: Wake Co. State: NC Total Depth: 55

Logged by: TB Soil Sample Method: Split-Spoon Date Started: 9-12-01 Date Complete: 9-12-01

Drill Crew: R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"

Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Land Surface Elevation (LS): 314.06 Measuring Point Elev. (MP): Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. sl. clayey Silt				
	5	32, 50/2"						
	10	50/1"		PWR - Sampled as tan-brn. sl. clayey fine sandy Silt w/ Rx frag.				
	15			Auger Refusal @ 16' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn Fanglomerate				
	30							
	55			Terminated Air Drilling @ 55' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-15 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

oject Location: Wake Co. State: NC Total Depth: 38'
TB Soil Sample Method: Split-Spoon Date Started: 9-12-01 Date Complete: 9-12-01
R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
il Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
nd Surface Elevation (LS): 292.25 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey Silt				
		40, 50/3"						
	5							
		50/2"						
	10							
		50/1"		PWR-Sampled as Tan-rd brn sl. clayey fine sandy Silt w/ Rx frag.				
	15							
	20							
	25							
	30			Auger Refusal @ 30' bgs				
				Weathered rd-brn. Fanglomerate				
	35			Began 1st Coring run (35.0'-48.9')				95% Rec. 65% RQD

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-15 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 58'

FB Soil Sample Method: Split-Spoon Date Started: 9-12-01 Date Complete: 9-12-01

Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 292.25 Measuring Point Elev. (MP): Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				37.5'-39.5' - Weathered zone w/ high angle fracture				
	40			40.5' - medium angle fracture				
				42.0'-42.5' - Highly weathered zone				
	45			Rd-brn Fanglomerate				
				Began 2nd coring run (48.9'-58')				99% Rec. 88% RQD
	50			52.5'-53.5' - Highly weathered zone w/ vertical fracture				
	55			Terminated coring / subsequent air rotary drilling @ 58' bgs				
	60							

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-16 Job No: FP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 45'
r: TB Soil Sample Method: Split-Spoon Date Started: 9-13-01 Date Complete: 9-13-01
Simmons Drill Method: HSA/Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 311.84 Measuring Point Elev. (MP): LS Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. sl. clayey Silt				
	5	12,14,27		Rd-brn. clayey Silt				
	10	50/5"						
	15	50/1"		PWR - Sampled as lt. tan-brn. sl. clayey fine sandy Silt w/ Rx frag.				
	20							
	25			Auger Refusal @ 27' bgs				
	30			Rd-brn. Fanglomerate				
	45			Terminated Air Drilling @ 45' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-17 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ect Location: Wake Co. State: NC Total Depth: 60'

TB Soil Sample Method: Split-Spoon Date Started: 9-13-01 Date Complete: 9-13-01

R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Craftterra CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs _____ 24 hrs _____

Surface Elevation (LS): 336.43 Measuring Point Elev. (MP): LS Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. sl. clayey Silt				
	5	33,50/3"						
		50/1"		PWR - Sampled as tan-rd. brn sl. clayey sandy silt w/ Rx frag.				
	10							
	15			Auger Refusal @ 18' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn. Fanglomerate				
	30							
	60			Terminated Air Drilling @ 60' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-18 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ect Location: Wake Co. State: NC Total Depth: 65'
B Soil Sample Method: Split-Spoon Date Started: 9-13-01 Date Complete: 9-13-01
R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Cayterra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs _____ 24 hrs _____
l Surface Elevation (LS): 335.09 Measuring Point Elev. (MP): LS Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
				Tan-brn clayey Silt				
		16,38,50/2"						
	5							
		50/1"		PWR - Sampled as tan-rd brn. sl. clayey sandy Silt w/ Rx frag.				
	10							
	15							
				Auger Refusal @ 17' bgs				
				Rd-brn Fanglomerate				
	20			Began 1st Coring Run (20.0'-33.6')				93% Rec. 90% RQD
				22.5'-23.5' - 0.25"-1" metamorphic/igneous rock inclusions				
	25							
				23.5'-30.5' - 0.5"-2" metamorphic/igneous rock inclusions				
	30							
				31.0'-47.2' - 0.25"-1" rock inclusions				
	35			Began 2nd coring run (33.6'-47.2')				96% Rec. 89% RQD

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-18 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ect Location: Wake Co. State: NC Total Depth: 65'
TB Soil Sample Method: Split-Spoon Date Started: 9-13-01 Date Complete: 9-13-01
R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Cantera CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
d Surface Elevation (LS): 335.09 Measuring Point Elev. (MP): Remarks:

...vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Rd-brn. Fanglomerate				
				43.0'-44.0' - Highly weathered zone				
	45							
				Coring Terminated @ 49.9' bgs				
				Began 3rd coring run (47.2'-49.9')				96% Rec.
				Switched to Air Rotary				89% RQD
	50							
	55							
				Rd-brn Fanglomerate				
	60							
	65			Terminated Air Drilling @ 65' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-19 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ect Location: Wake Co. State: NC Total Depth: 60'

B Soil Sample Method: Split-Spoon Date Started: 9 Date Complete:

R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Cantern CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 326.20 Measuring Point Elev. (MP): Remarks:

vation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
				Brn. clayey Silt				
		28,50/3"						
	5							
		50/1"		PWR - Sampled as tan-brn. sl. clayey sandy Silt				
	10							
	15							
				Auger Refusal @ 18' bgs				
	20			Switched to Air Rotary				
	25			Rd-brn Fanglomerate				
	30							
	60			Terminated Air Drilling @ 60' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-20 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ect Location: Wake Co. State: NC Total Depth: 61'
TB Soil Sample Method: Split-Spoon Date Started: 9-13-01 Date Complete: 9-13-01
R. Simmons Drill Method: HSA/ Air Rotary Equipment Type: Conterra - CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
d Surface Elevation (LS): 330.10 Measuring Point Elev. (MP): LS Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey silt				
		40, 50/6"		Rd-brn clayey silt				
	5							
		50/2"						
	10			PWR - Sampled as tan-brn sl. clayey fine sandy silt w/ Rx frag.				
	15							
				Auger refusal @ 17' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn Fanglomerate				
	30							
	60			Terminated Air Drilling @ 61' bgs				

ENVIRO-PRO, P.C.
Charlotte, North Carolina

LITHOLOGIC LOG

Boring No.: MW-21 Job No: EP-1306
Client: Hwy 55 C&D Landfill, LLC

oject Location: Wake Co. State: NC Total Depth: 55
TB Soil Sample Method: Split-Spoon Date Started: 9-14-01 Date Complete: 9-14-01
R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"
il Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
nd Surface Elevation (LS): 351.07 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey silt				
		22,31,39						
	5			Rd-brn clayey silt				
	10	50/2"						
				PWR- Sampled as tan-rd. brn. sl. clayey fine sandy Silt w/ Rx frag.				
	15							
				Auger Refusal @ 19' bgs				
	20			Switched to Air Rotary				
	25			Rd-brn Fanglomerate				
	30							
	55			Terminated Air Drilling @ 55' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-22 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 50'
TB Soil Sample Method: Split-Spoon Date Started: 9-27-01 Date Complete: 9-27-01
R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 304.09 Measuring Point Elev. (MP): LS Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey Silt				
	5	19,40,45		Rd-brn clayey Silt				
	10	40, 50/3"						
	15	50/2"		PWR - Sampled as tan-brn sl. clayey fine sandy Silt w/ Rx frag.				
	20	50/1"						
				Auger Refusal @ 23' bgs				
	25			Switched to Air Rotary				
				Rd-brn Fanglomerate				
	30							
	50			Terminated Air Drilling @ 50' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-23 Job No: EP-1306 Client:

ct Location: Wake Co. State: NC Total Depth: 71'
CB Soil Sample Method: Split-Spoon Date Started: 9-27-01 Date Complete: 9-27-01
Simmons Drill Method: HSA/Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 339.63 Measuring Point Elev. (MP): LS Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
		18,35,45						
	5			Rd-brn clayey silt				
		50/1"						
	10			PWR-Sampled as tan-brn sl. clayey fine sandy Silt w/ Rx frag.				
		50/1"						
	15			Auger Refusal @ 18' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn Fanglomerate				
	30							
	70			Terminated Air Drilling @ 71' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-24 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 60'
B Soil Sample Method: Split-Spoon Date Started: 9-28-01 Date Complete: 9-28-01
R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 343.55 Measuring Point Elev. (MP): LS Remarks:

ation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey silt				
	5	25,35,38		Tan-rd-brn clayey silt				
	10	40,50/3"						
	15			PWR - Sampled as tan-red-brn. fine sandy silt w/ Rx frag.				
	20			Auger Refusal @ 21.5' bgs Switched to Air Rotary				
	25			Rd-brn. Fanglomerate				
	30							
	60			Terminated Air Drilling @ 60' bgs				

ENVIRO-PRO, P.C.
Charlotte, North Carolina

LITHOLOGIC LOG

Boring No.: MW-25 Job No: EP-1306
Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 25'
CB Soil Sample Method: Split-spoon Date Started: 11-6-01 Date Complete: 11-6-01
Simmons Drill Method: HSA Equipment Type: Cafterra CT-250 Boring Diameter:
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 290.32 Measuring Point Elev. (MP): LS Remarks:

ation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
	5	28,33,50/4"					SC	
	10	50/1"		PWR-Sampled as tan-rd. brn. sl. clayey sandy Silt w/ Rx frag.				
	15						CL	
	20							
	25			Auger Refusal @ 25' bgs				
	30							

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-26 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 35'

B Soil Sample Method: Split-spoon Date Started: 11-6-01 Date Complete: 11-6-01

Simmons Drill Method: HSA/Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 289.89 Measuring Point Elev. (MP): LS Remarks:

ation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt			CL	
	5	30,41,44						
	10	50/2"						
	15	50/1"		PWR - Sampled as tan-rd brn. sl. clayey Sandy Silt w/ Rx frag.				
	20							
	25							
	30			Auger Refusal @ 30' bgs Switched to Air Rotary				
	35			Terminated Air Drilling @ 35'				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-27 Job No: EP-1306 Client: Hwy 55 CKD Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 35'
[redacted]B Soil Sample Method: Split-spoon Date Started: 11-7-01 Date Complete: 11-7-01
[redacted]. Simmons Drill Method: HSA/Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 328.50 Measuring Point Elev. (MP): LS Remarks:

ation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. clayey Silt				
	5	28,35,41		Rd-brn. clayey Silt				
	10	42,50/2"		PWR-Sampled as tan-rd brn. sl. clayey fine Sandy Silt w/ Rx frag.				
	15	50/1"		Auger Refusal @ 15' bgs Switched to Air Rotary				
	20							
	25			Rd-brn Fanglomerate				
	30							
	35			Terminated Air Drilling @ 35' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-28 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 50'
TB Soil Sample Method: Split-Spoon Date Started: 11-7-01 Date Complete: 11-7-01
R. Simmons Drill Method: HSA/Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 348.20 Measuring Point Elev. (MP): LS Remarks:

ation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. clayey Silt				
	5	32, 41, 50/5"						
	10	50/1"		PWR - Sampled as tan-brn. fine sandy Silt w/ Rx frag.				
	15			Auger Refusal @ 17.5' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn. Fanglomerate				
	30							
	50			Terminated Air Drilling @ 50' bgs				

ENVIRO-PRO, P.C.
Charlotte, North Carolina

LITHOLOGIC LOG

Boring No.: MW-29 Job No: EP-1306
Client: Hwy 55 C&D Landfill, LLC

Project Location: Wake Co. State: NC Total Depth: 30'
TB Soil Sample Method: Split-spoon Date Started: 11-7-01 Date Complete: 11-7-01
R. Simmons Drill Method: HSA/ Air Rotary Equipment Type: Centerra CT-25 Boring Diameter: 8"/6"
Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Ground Surface Elevation (LS): 332.14 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. clayey Silt				
	5	22,27,38		Rd-brn clayey Silt			CL	
	10	39, 50/2"		PWR-Sampled as tan-rd brn. sl. clayey sandy Silt w/ Rx frag.				
				Auger Refusal @ 12' bgs				
	15	50/1"		Switched to Air Rotary				
	20			Rd-brn Fanglomerate				
	25							
	30			Terminated Air Drilling @ 30' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-30 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 35'
TB Soil Sample Method: Split-Spoon Date Started: 11-7-01 Date Complete: 11-7-01
R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 297.82 Measuring Point Elev. (MP): LS Remarks:

ation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn sl. clayey Silt				
		32,44,50/2"						
	5							
				PWR - Sampled as tan - rd brn. sl. clayey sandy Silt w/ Rx frag.				
		50/1"						
	10							
				Auger Refusal @ 12.5' bgs				
				Switched to Air Rotary				
	15							
	20							
				Rd-brn Fanglomerate				
	25							
	30							
	35			Terminated Air Drilling @ 35' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-31 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 55'

CB Soil Sample Method: Split-Spoon Date Started: 11-7-01 Date Complete: 11-7-01

Simmons Drill Method: HSA/Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 313.35 Measuring Point Elev. (MP): LS Remarks:

ation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey Silt				
	5	33, 38, 50/2"						
	10	50/1"		PWR- Sampled as tan-brn sl. clayey sandy Silt w/ Rx frag.				
	15							
	20			Auger Refusal @ 20' bgs Switched to Air Rotary				
	25							
				Rd-brn Fanglomerate				
	30							
	55			Terminated Air Drilling @ 55' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-32 Job No: EP-1306 Client: Hwy 55 Crb Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 50'

TB Soil Sample Method: Split-Spoon Date Started: 11-8-01 Date Complete: 11-8-01

Simmons Drill Method: HSA / Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 306.50 Measuring Point Elev. (MP): LS Remarks:

vation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. clayey Silt				
	5	30, 50/3"						
	10	50/1"		PWR - Sampled as tan-rd brn. sl. clayey fine sandy Silt w/ Rx frag.				
	15							
				Auger Refusal @ 18' bgs				
	20			Switched to Air Rotary				
	25			Rd-brn. Fanglomerate				
	30							
	50			Terminated Air Drilling @ 50' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-33 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ect Location: Wake Co. State: NC Total Depth: 50'
TB Soil Sample Method: Split-Spoon Date Started: 11-8-01 Date Complete: 11-8-01
, Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
l Surface Elevation (LS): 316.47 Measuring Point Elev. (MP): LS Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey silt				
		18,32,50/5"		Rd-brn clayey silt				
	5							
		50/2"						
	10			PWR-Sampled as tan-brn sl. clayey sandy silt w/ Rx frag.				
	15							
				Auger Refusal @ 18.5' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn Fanglomerate				
	30							
	50			Terminated Air Drilling @ 50' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-34 Job No: EP-1306 Client: Hwy 55 CLD Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 45'

B Soil Sample Method: Split-Spoon Date Started: 11-8-01 Date Complete: 11-8-01

Simmons Drill Method: HSA/Air Rotary Equipment Type: Cantera CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 293.47 Measuring Point Elev. (MP): LS Remarks:

ation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. Clayey Silt				
	5	32, 50/3"						
		50/1"		PWR - Sampled as tan-rd brn. sl. clayey sandy Silt w/ Rx frag.				
	10			Auger Refusal @ 12' bgs				
				Switched to Air Rotary				
	15							
	20			Rd-brn Fanglomerate				
	25							
	30							
	45			Terminated Air Drilling @ 45' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-35 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 30'
B Soil Sample Method: Split-Spoon Date Started: 11-8-01 Date Complete: 11-8-01
R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 283.22 Measuring Point Elev. (MP): LS Remarks:

ation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey silt				
	5	28,35,42						
	10	37, 50/2"						
				PWR - Sampled as Tan - rd brn sl. clayey Sandy Silt w/ Rx frag.				
	15	50/1"						
	20							
	25			Auger Refusal @ 25' bgs				
				Switched to Air Rotary				
				Rd-brn Fanglomerate				
	30			Terminated Air Drilling @ 30' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-35D Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 50'

B Soil Sample Method: Split-Spoon Date Started: 11-9-01 Date Complete: 11-9-01

R. Simmons Drill Method: Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 283.37 Measuring Point Elev. (MP): LS Remarks:

ation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
	5							
	10			[Refer to MW-35 Lithologic Log for Description of Lithology from 0-30' bgs.]				
	15							
	20							
	25							
	30							
	50			Terminated Air Drilling @ 50' bgs				

ENVIRO-PRO, P.C.
Charlotte, North Carolina

LITHOLOGIC LOG

Boring No.: MW-36 Job No: EP-1306
Client: Hwy 55 C&D Landfill, LLC

ject Location: Wake Co. State: NC Total Depth: 30'
FB Soil Sample Method: Split-Spoon Date Started: 11-8-01 Date Complete: 11-8-01
R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
l Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
d Surface Elevation (LS): 292.24 Measuring Point Elev. (MP): LS Remarks:

evation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. clayey Silt				
	5	28,38,50/4"						
		50/1"		PWR-Sampled as tan-rd.brn sl. clayey sandy Silt w/ Rx frag.				
	10			Auger Refusal @ 12.5' bgs				
				Switched to Air Rotary				
	15							
	20			Rd-brn. Fanglomerate				
	25							
	30			Terminated Air Drilling @ 30' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-37 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 45

B Soil Sample Method: Split-spoon Date Started: 11-8-01 Date Complete: 11-8-01

. Simmons Drill Method: HSA/Air Rotary Equipment Type: Canterra CT-250 Boring Diameter: 8"/6"

Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Surface Elevation (LS): 320.27 Measuring Point Elev. (MP): LS Remarks:

vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey Silt				
	5	23,33,45		Rd-brn Clayey Silt				
		50/2"						
	10			PWR-Sampled as tan-brn - rd-brn. sl. Clayey Sandy Silt w/ Rx frag.				
	15			Auger Refusal @ 15' bgs				
				Switched to Air Rotary				
	20							
				Rd-brn Fanglomerate				
	25							
	30							
	45			Terminated Air Drilling @ 45' bgs				

ENVIRO-PRO, P.C.
Charlotte, North Carolina

LITHOLOGIC LOG

Boring No.: MW-38 Job No: EP-1306
Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 55'
TB Soil Sample Method: Split-Spoon Date Started: 11-8-01 Date Complete: 11-8-01
Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 326.79 Measuring Point Elev. (MP): LS Remarks:

ation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn, sl. clayey Silt				
		32, 50/3"						
	5							
		50/1"		PWR - Sampled as tan-brn sl. clayey sandy Silt w/ Rx frag.				
	10							
	15			Auger Refusal @ 15' bgs				
				Switched to Air Rotary				
	20							
	25			Rd-brn Fanglomerate				
	30							
	55			Terminated Air Drilling @ 55' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-39 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

ct Location: Wake Co. State: NC Total Depth: 50'
B Soil Sample Method: Split-spoon Date Started: 11-9-01 Date Complete: 11-9-01
Simmons Drill Method: HSA/Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 317.81 Measuring Point Elev. (MP): Remarks:

ation ft	Depth ft	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. sl. clayey Silt				
	5	26,33,46						
	10	50/2"		PWR - Sampled as tan-rd brn. sl. clayey sandy Silt w/ Rx frag				
		50/1"		Auger Refusal @ 14.5' bgs				
	15			Switched to Air Rotary				
	20			Rd-brn Fanglomerate				
	25							
	30							
	50			Terminated Air Drilling @ 50' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-4D Client:	Job No: EP-1306

ct Location: Wake Co.
TB
Simmons
Gas Sample Method:
Surface Elevation (LS): 319.34

State: NC
Soil Sample Method: Split-Spoon
Drill Method: HSA/Air Rotary
Measuring Point Elev. (MP): LS

Date Started: 11-9-01
Equipment Type: Canterra CT-250
Groundwater (bmp): 0 hrs
Remarks:

Total Depth: 35'
Date Complete: 11-9-01
Boring Diameter: 8 1/4"
24 hrs

ation L	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey Silt				
	5	31,44,50/3"						
		50/1"		PWR-Sampled as tan-brn sl. clayey fine sandy Silt w/ Rx frag.				
	10			Auger Refusal @ 12' bgs				
				Switched to Air Rotary				
	15							
	20			Rd-brn. Fanglomerate				
	25							
	30							
	35			Terminated Air Drilling @ 35' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: MW-41 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

Project Location: Wake Co. State: NC Total Depth: 35'
Logged By: TB Soil Sample Method: Split-spoon Date Started: 11-9-01 Date Complete: 11-9-01
Driller: R. Simmons Drill Method: HSA / Air Rotary Equipment Type: Centerra CT-250 Boring Diameter: 8"/6"
Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Land Surface Elevation (LS): 326.82 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey silt				
	5	26, 33, 48		Rd-brn clayey silt				
	10	50/2"		PWR-Sampled as tan - rd. brn. sl. clayey Auger Refusal @ 12.5' bgs				
	15							
	20			Rd-brn Fanglomerate				
	25							
	30							
	35			Terminated Air Drilling @ 35' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: SB-1 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

Project Location: Wake Co. State: NC Total Depth: 16'
TB Soil Sample Method: Split Spoon Date Started: 11-6-01 Date Complete: 11-6-01
R. Simmons Drill Method: HSA Equipment Type: Centerra CT-250 Boring Diameter: 8"
Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Land Surface Elevation (LS): 325.98 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. sl. clayey silt			SC	
	5							
				PWR-Sampled as tan-brn. sl. clayey sandy silt				
	10							
							CL	
	15			Auger Refusal @ 16' bgs				
	20							

Page 1 of 1

ENVIRO-PRO, P.C.
Charlotte, North Carolina

LITHOLOGIC LOG

Boring No.: SB-2 Job No: EP-1306
Client: Hwy 55 C&D Landfill, LLC

Location: Wake Co. State: NC Total Depth: 22'
Soil Sample Method: Split-Spoon Date Started: 11-6-01 Date Complete: 11-6-01
Drill Method: HSA Equipment Type: Boring Diameter: 8"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Surface Elevation (LS): 348.78 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. clayey Silt				
	5	33, 50/3"						
	10	50/1"		PWR-Sampled as tan-brn. sl. clayey sl. Sandy Silt			CL	
	15							
	20			Auger Refusal @ 22' bgs				
	25							

ENVIRO-PRO, P.C.
Charlotte, North Carolina

LITHOLOGIC LOG

Boring No.: SB-3 Job No: EP-1306
Client: Hwy 55 CLD Landfill, LLC

Location: Wake Co. State: NC Total Depth: 20'
TB Soil Sample Method: Split-Spoon Date Started: 11-6-01 Date Complete: 11-6-01
R. Simmons Drill Method: HSA Equipment Type: Centerra CT-250 Boring Diameter:
Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
Ground Surface Elevation (LS): 334.80 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey Silt				
	5	33,42,48		Rd-brn clayey Silt			CL	
	10	50/2"		PWR-Sampled as tan-brn. sl. clayey sandy Silt w/ Rx frag.				
	15	50/1"						
	20			Auger Refusal @ 20' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: SB-4 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

...ion: Wake Co. State: NC Total Depth: 17'
...TB Soil Sample Method: Split-spoon Date Started: 11-6-01 Date Complete: 11-6-01
...ler. R. Simmons Drill Method: HSA Equipment Type: Canterra CT-250 Boring Diameter: 8"
Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs
...d Surface Elevation (LS): 347.77 Measuring Point Elev. (MP): LS Remarks:

...vation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. Clayey Silt				
	5	32,38,50/4"		Rd-brn Clayey Silt			CL	
		50/1"					CL	
	10			PWR-Sampled as Tan-rd brn. sl. clayey fine sandy Silt w/ Rx frag.				
	15							
				Auger Refusal @ 17' bgs				
	20							

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: SB-5 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

Location: Wake Co. State: NC Total Depth: 20'

Driller: TB Soil Sample Method: split-spoon Date Started: 12-10-01 Date Complete: 12-10-01

Drill Method: R. Simmons Drill Method: HSA Equipment Type: Canterra - CT-250 Boring Diameter: 8"

Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

Land Surface Elevation (LS): 362.50 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn clayey Silt				
	5	28, 38, 45		Rd-brn clayey Silt				
	10	50/2"						
				PWR - Sampled as tan-brn. sl. clayey sandy Silt				
	15	50/1"						
	20			Auger Refusal @ 20' bgs				

ENVIRO-PRO, P.C. Charlotte, North Carolina	LITHOLOGIC LOG	Boring No.: SB-6 Job No: EP-1306 Client: Hwy 55 C&D Landfill, LLC

Location: Wake Co. State: NC Total Depth: 18'

Driller: TB Soil Sample Method: Split-Spoon Date Started: 12-10-01 Date Complete: 12-10-01

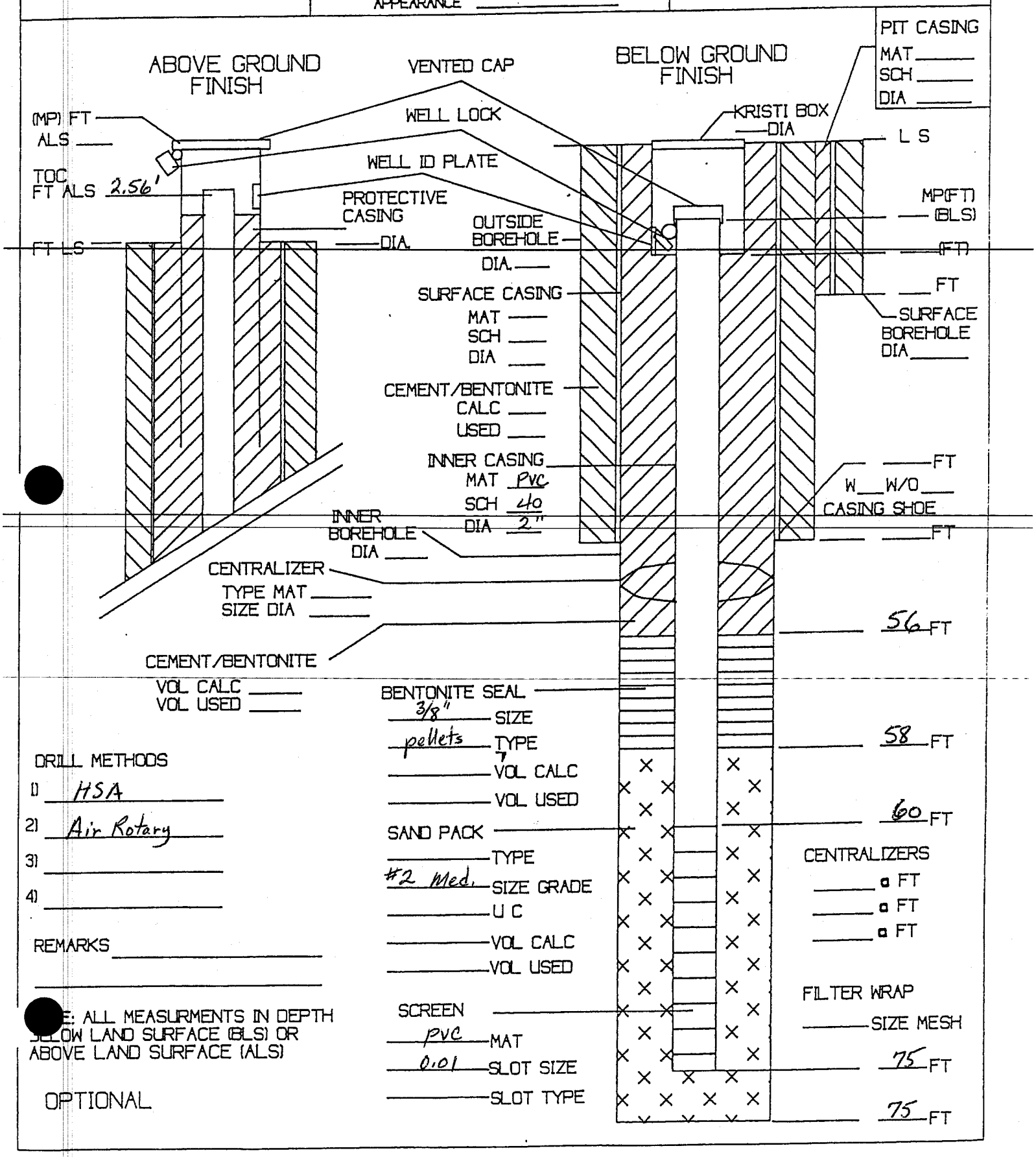
Drill Rig: R. Simmons Drill Method: HSA Equipment Type: Cantern CT-250 Boring Diameter: 8"

Soil Gas Sample Method: Groundwater (bmp): 0 hrs 24 hrs

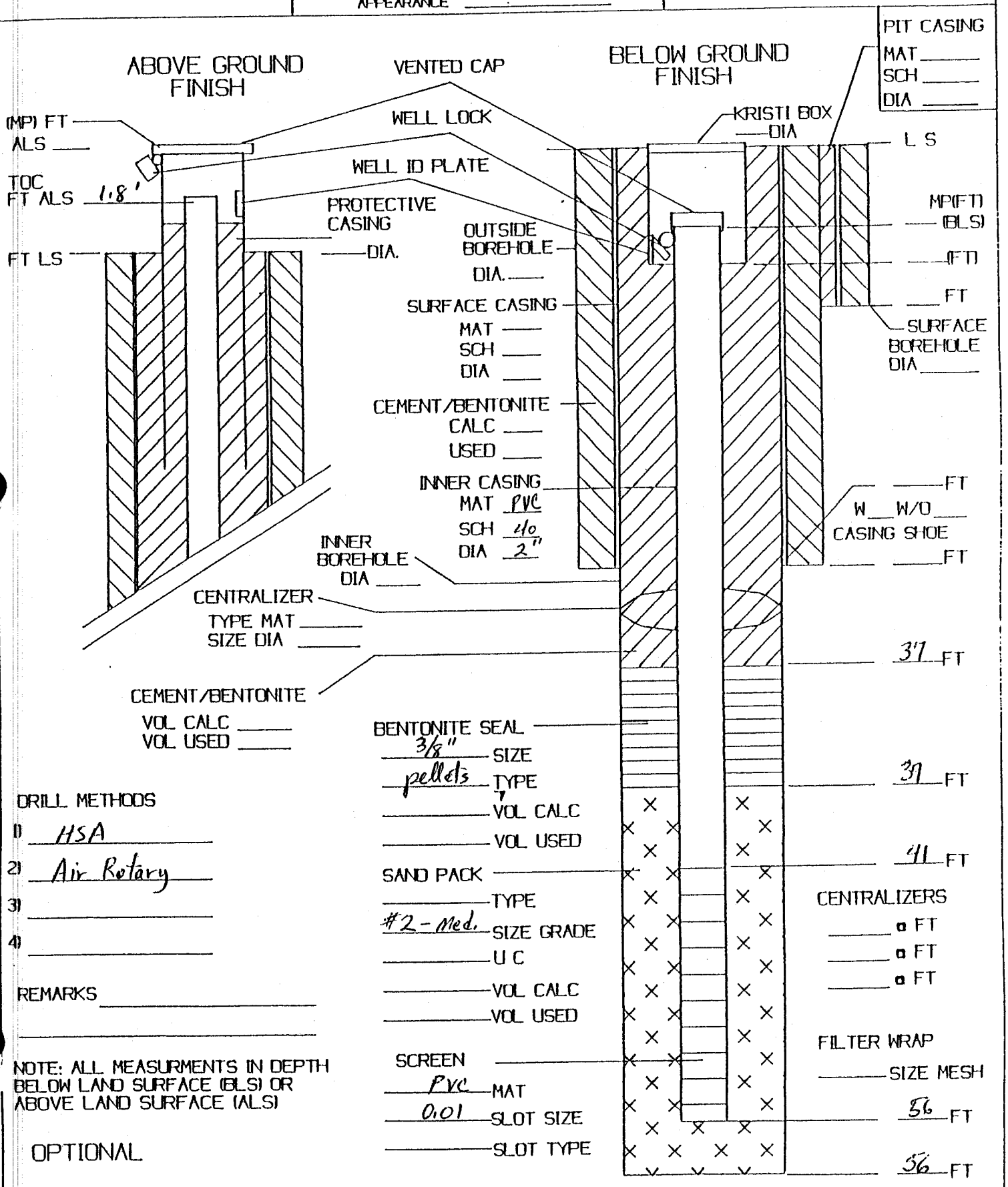
Land Surface Elevation (LS): 348.00 Measuring Point Elev. (MP): LS Remarks:

Elevation ft.	Depth ft.	SPT/Interval	Sample ID No.	Description	Soil Gas	Moisture	USCS Log	Comments
				Yel-brn. clayey silt				
		32, 44, 50/5"						
	5							
		50/2"						
	10			PWR- Sampled as Tan-brn - rd.-brn. sl. clayey sandy silt w/ Rx frag.				
		50/1"						
	15							
				Auger Refusal @ 18' bgs				
	20							

ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-1 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
GRND SURFACE ELEV. 352.85	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-10-01 DATE COMPLETED 9-10-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-2 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
LAND SURFACE ELEV. 328.14	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-10-01 DATE COMPLETED 9-10-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



DRILL METHODS

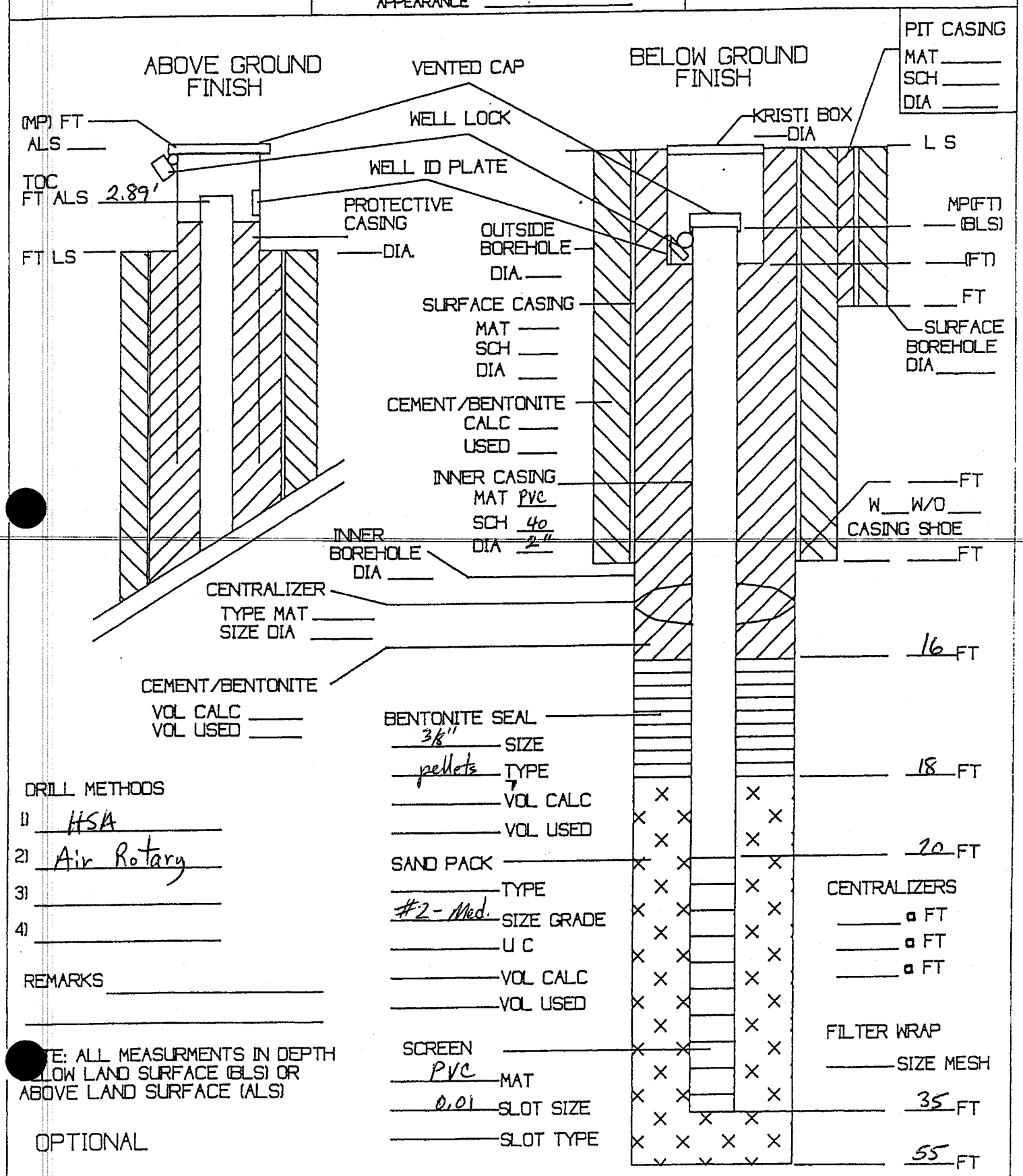
1) HSA
2) Air Rotary
3) ____
4) ____

REMARKS ____

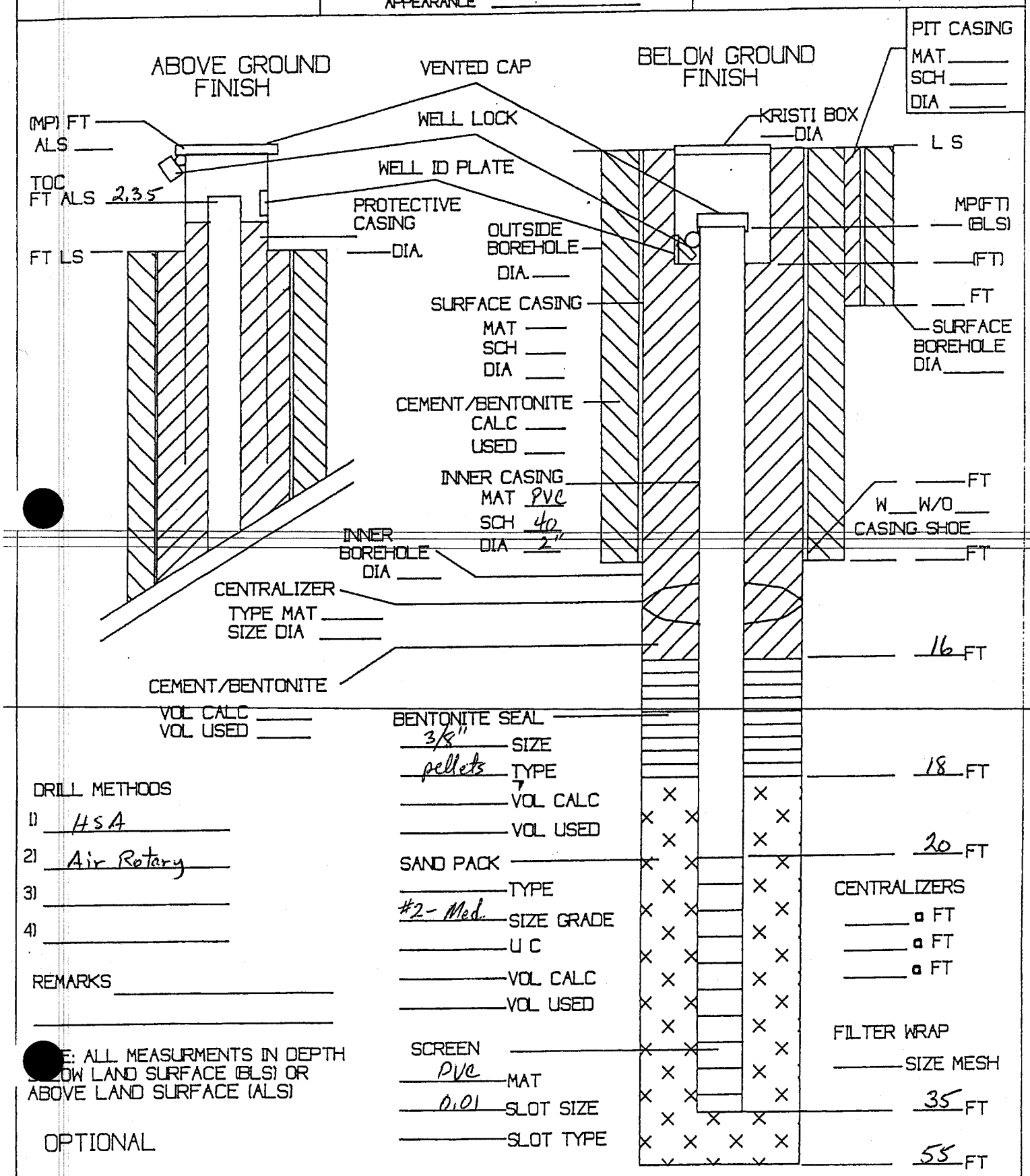
NOTE: ALL MEASURMENTS IN DEPTH BELOW LAND SURFACE (BLS) OR ABOVE LAND SURFACE (ALS)

OPTIONAL

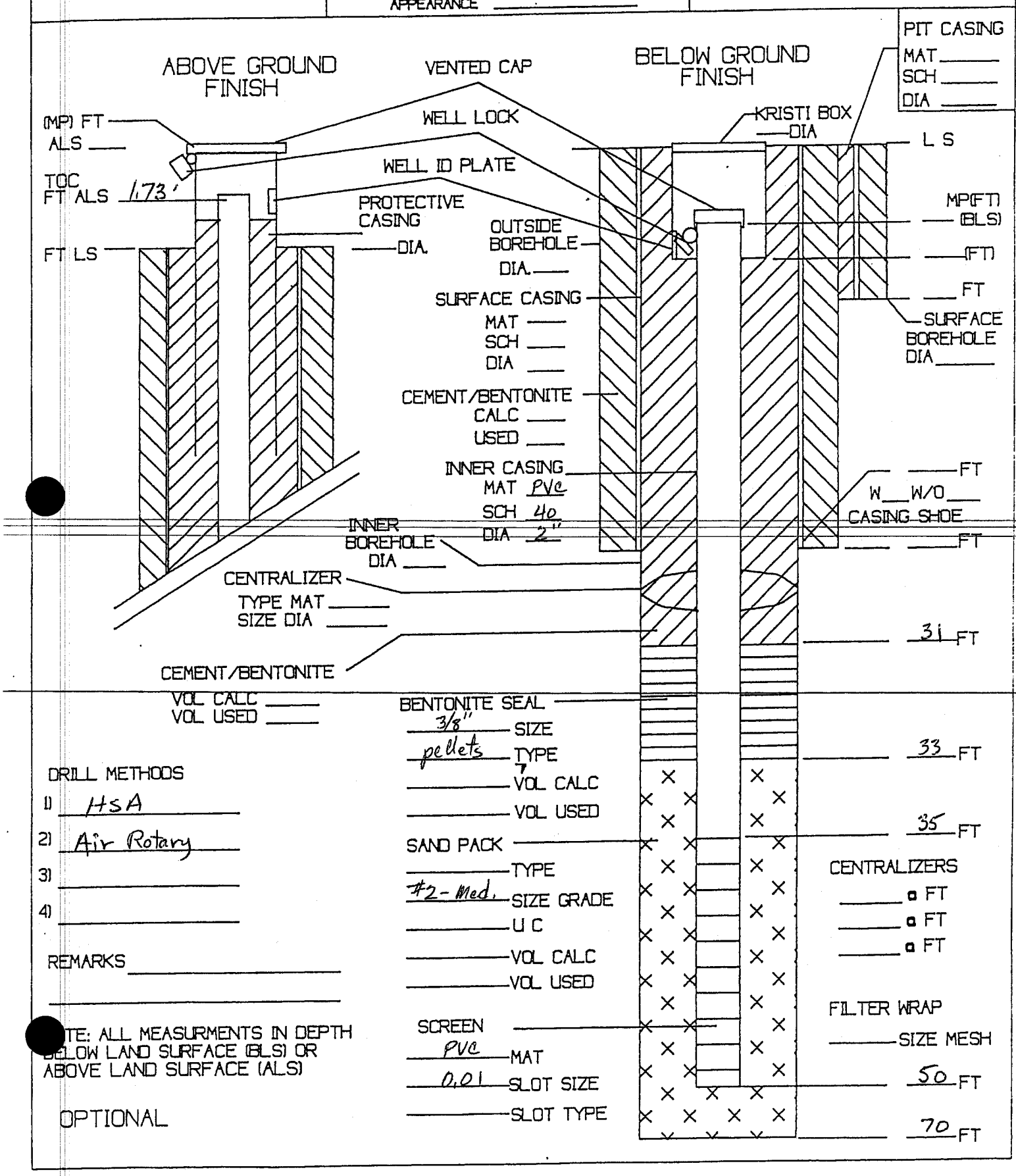
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-3 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fuquayville	COUNTY Wake STATE NC	LOG BY TB
LAND SURFACE ELEV. 318.49	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-10-01 DATE COMPLETED 9-10-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



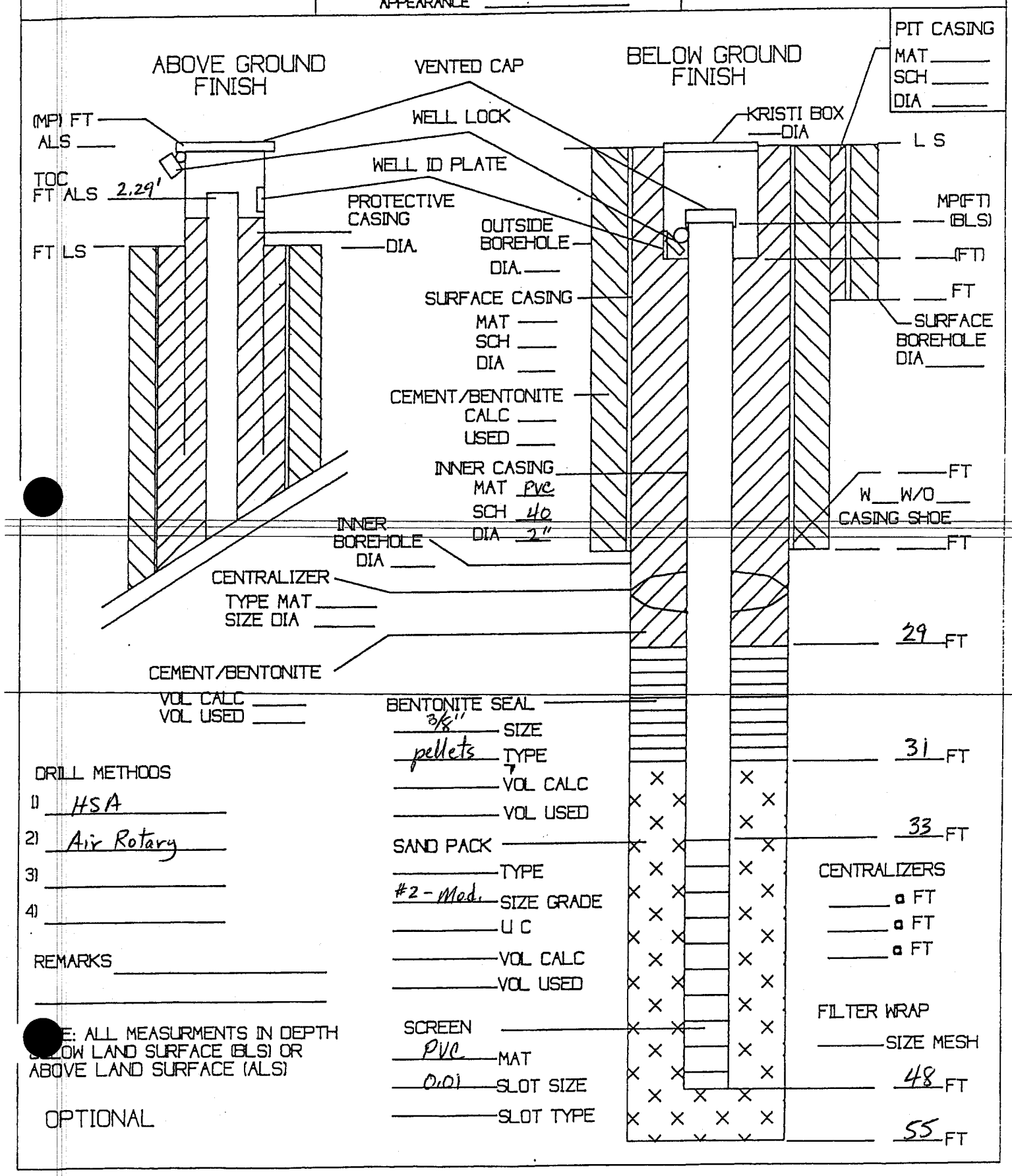
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-4 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC.
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
GRND SURFACE ELEV. 344.25	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-10-01 DATE COMPLETED 9-10-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



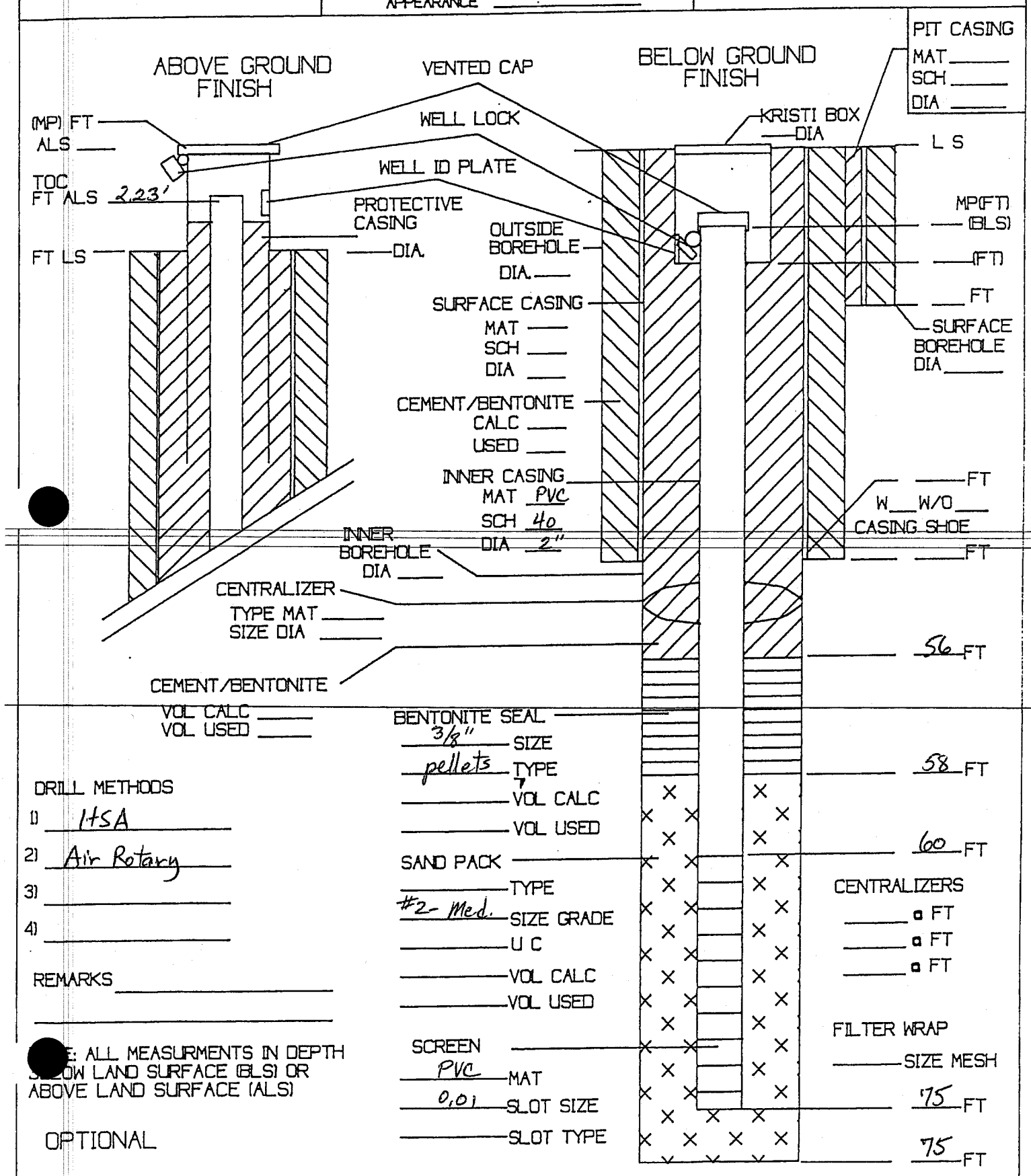
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-5 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
LAND SURFACE ELEV. 330.92	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-10-01 DATE COMPLETED 9-10-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



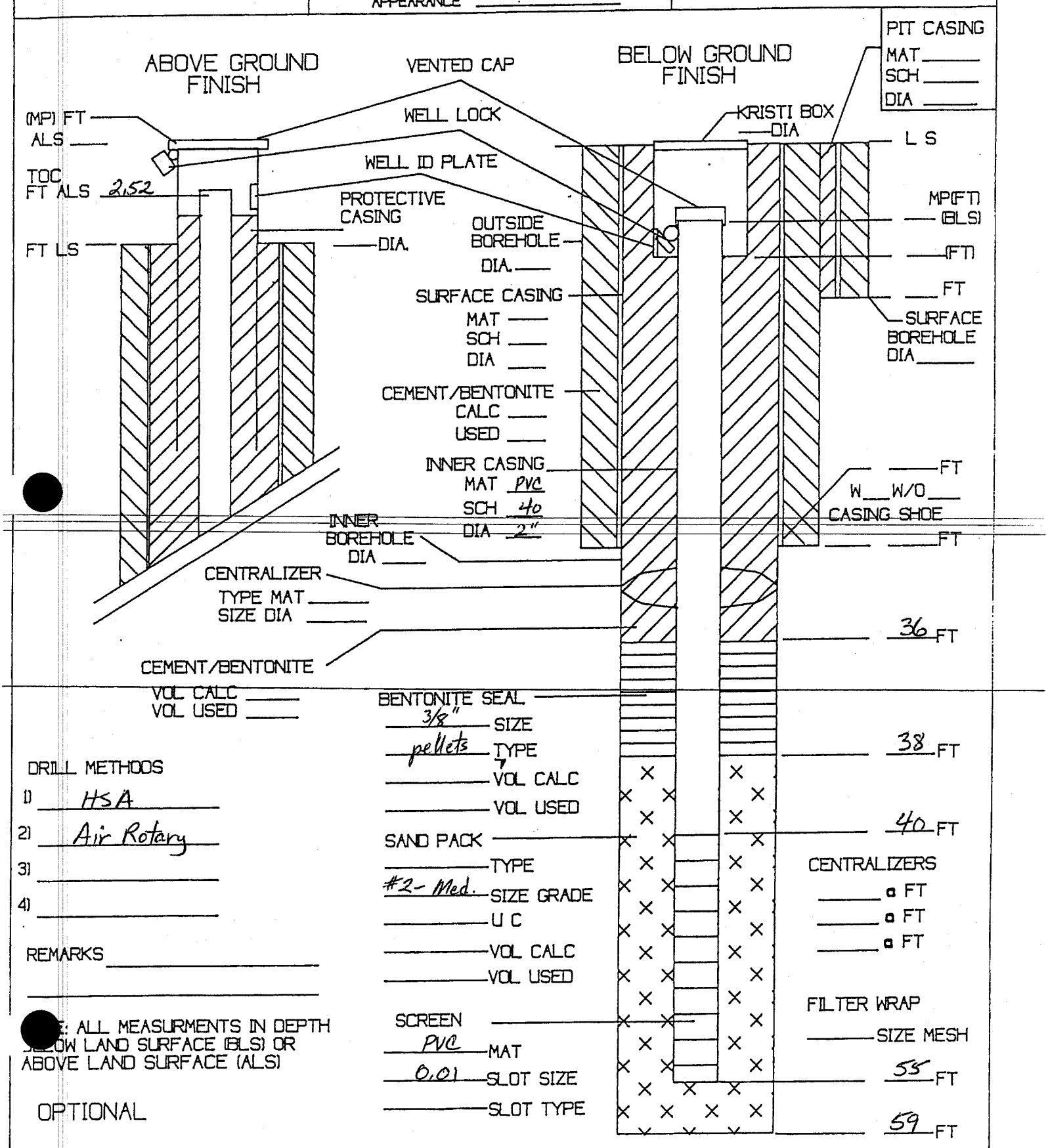
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-6 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
GROUND SURFACE ELEV. 325.87	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-10-01 DATE COMPLETED 9-10-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



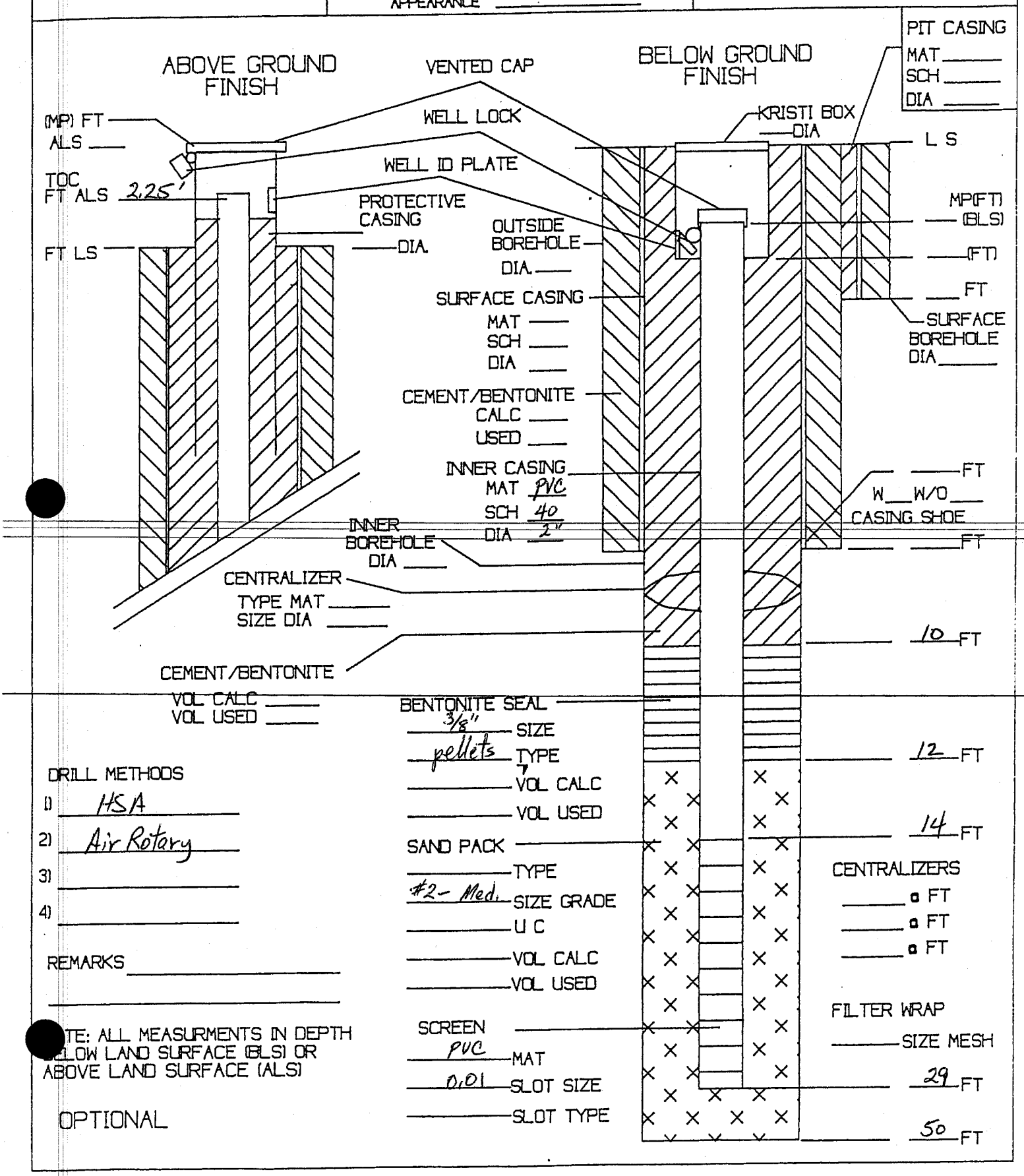
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-7 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fuquayville	COUNTY Wake STATE NC	LOG BY FB
LAND SURFACE ELEV. 353.23	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-11-01 DATE COMPLETED 9-11-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



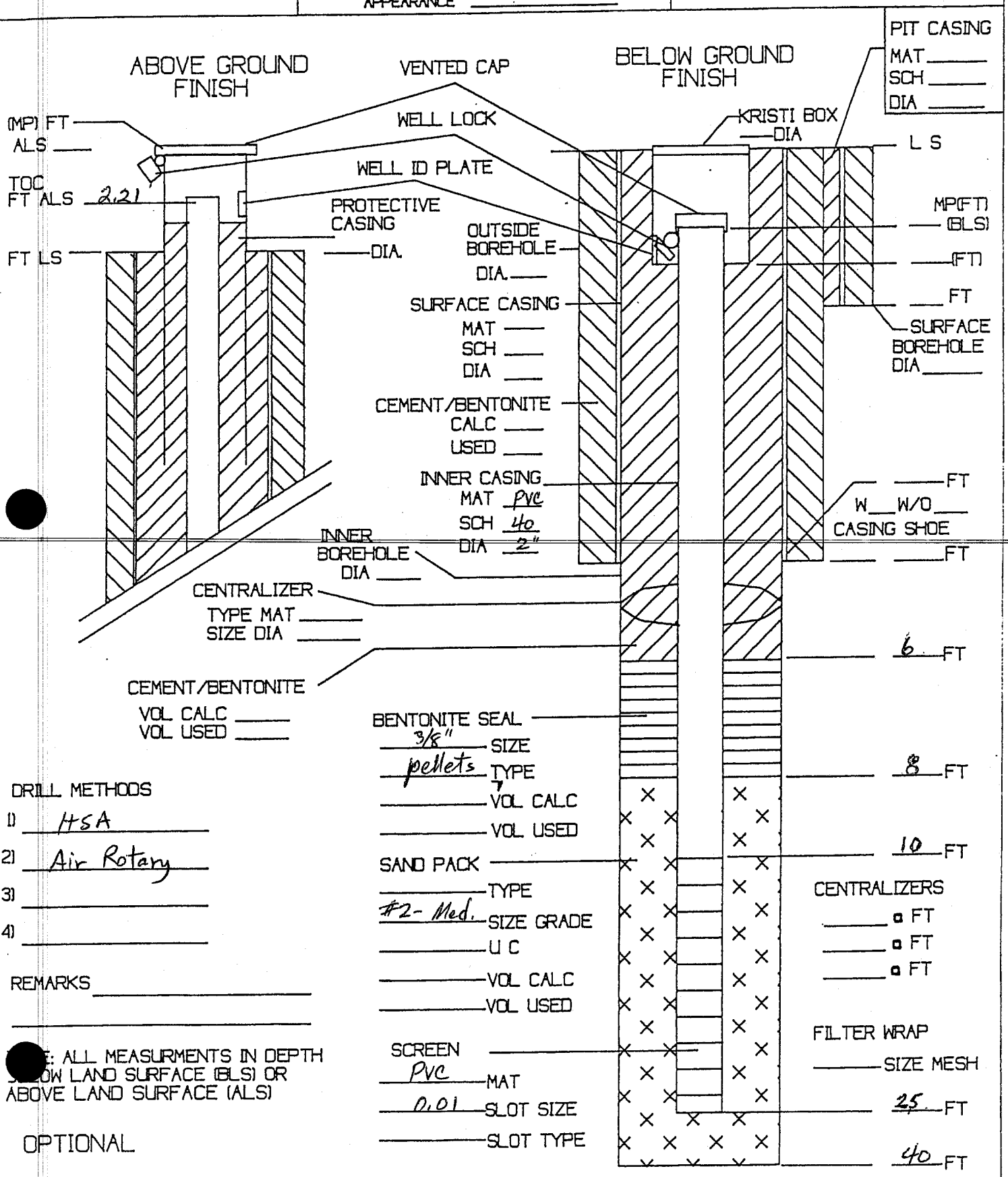
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-8 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 343.11	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-11-01 DATE COMPLETED 9-11-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



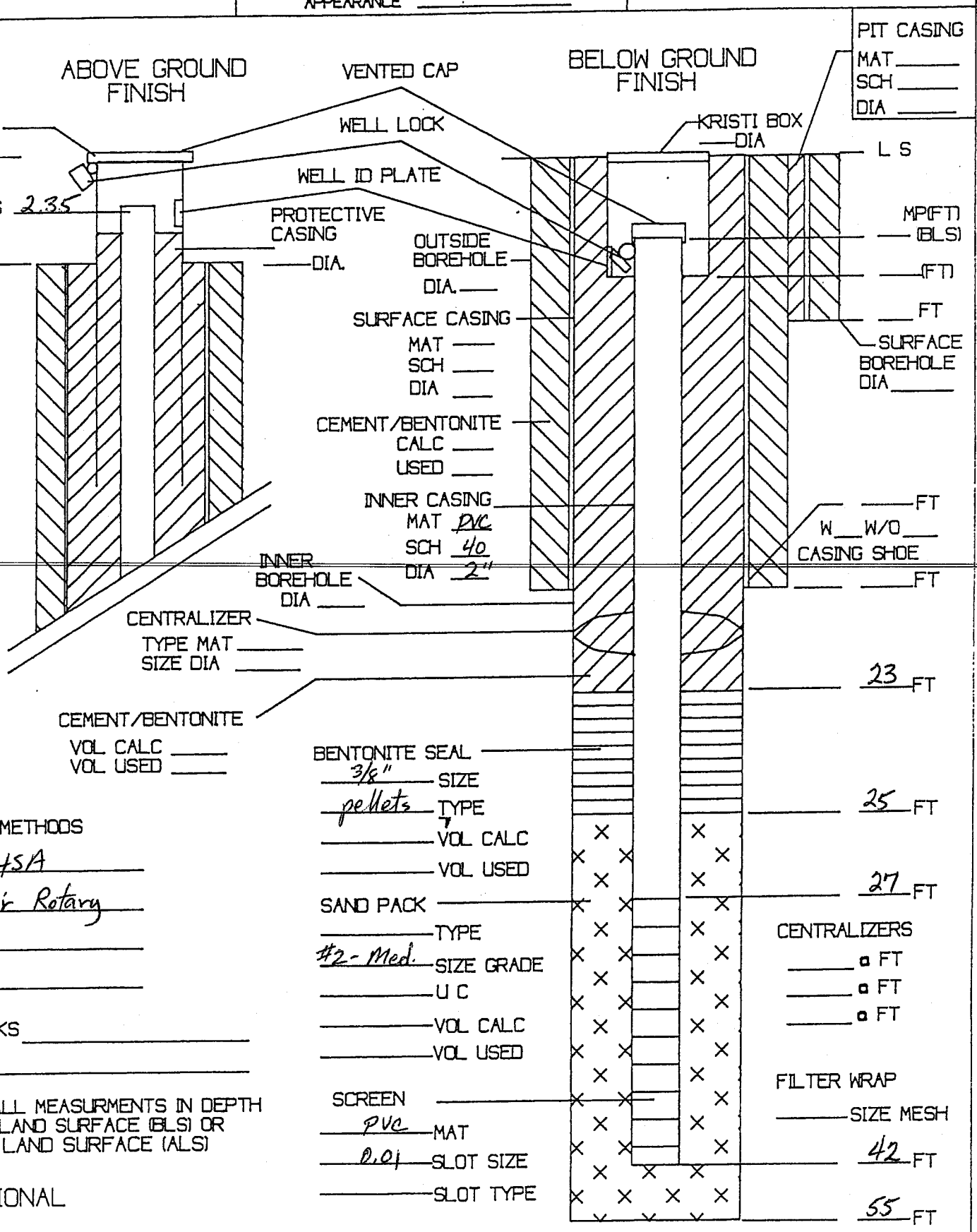
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-9 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
LAND SURFACE ELEV. 358.35	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-11-01 DATE COMPLETED 9-11-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



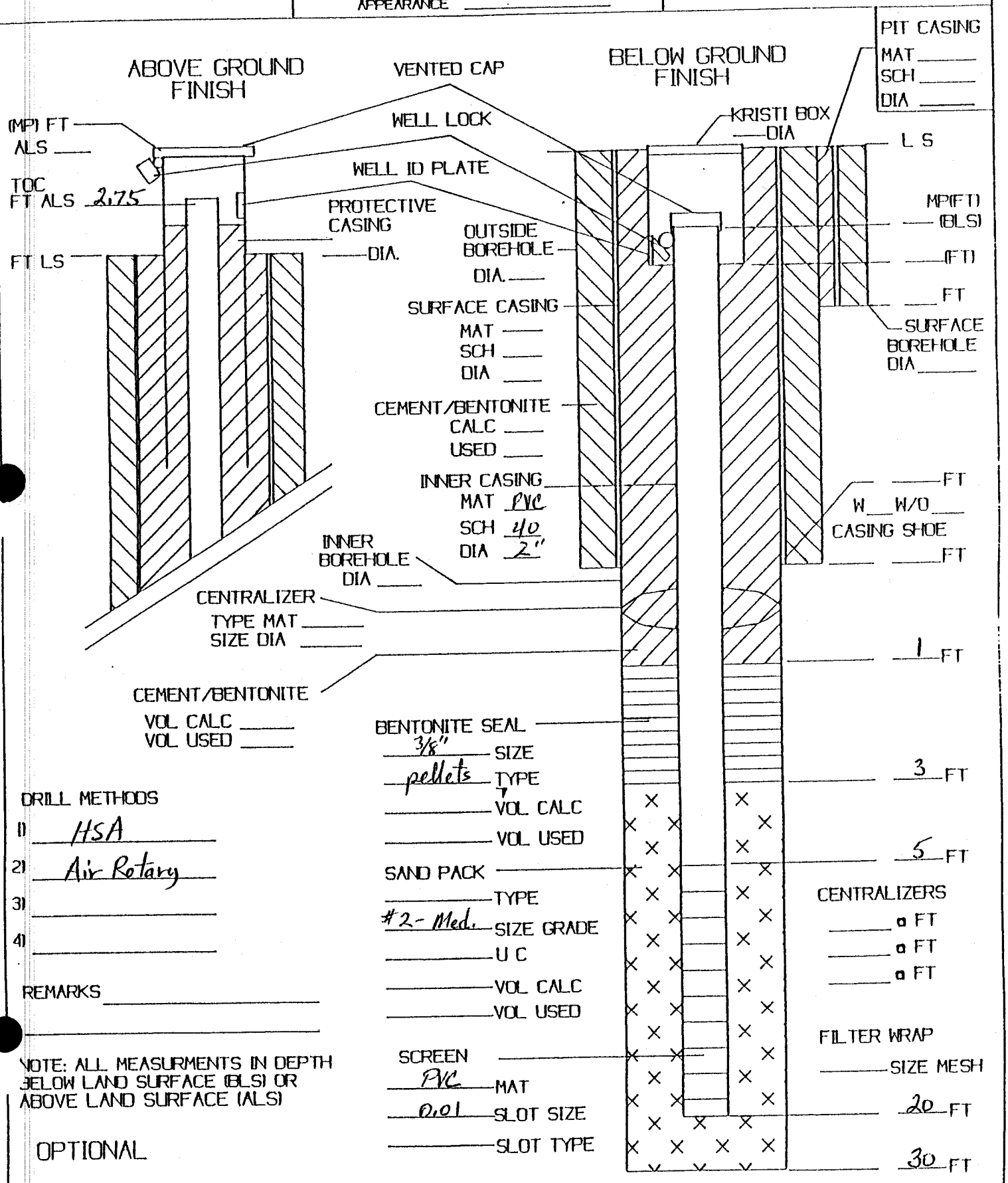
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-10 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fuquay-Varina	COUNTY Wake STATE NC	LOG BY TJB
TOP OF SURFACE ELEV. 348.87	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-12-01 DATE COMPLETED 9-12-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



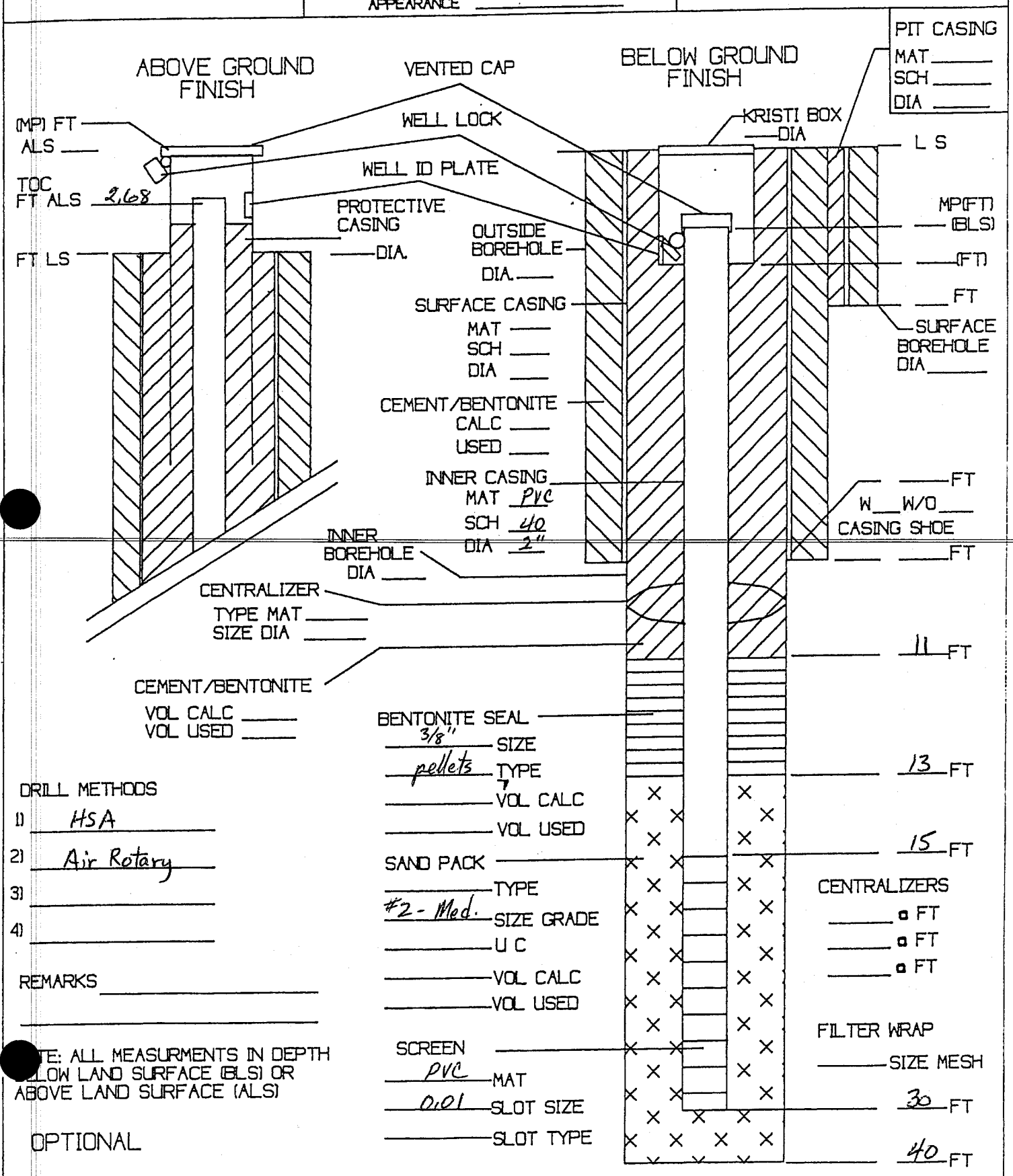
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-11 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 332.38	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-12-01 DATE COMPLETED 9-12-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



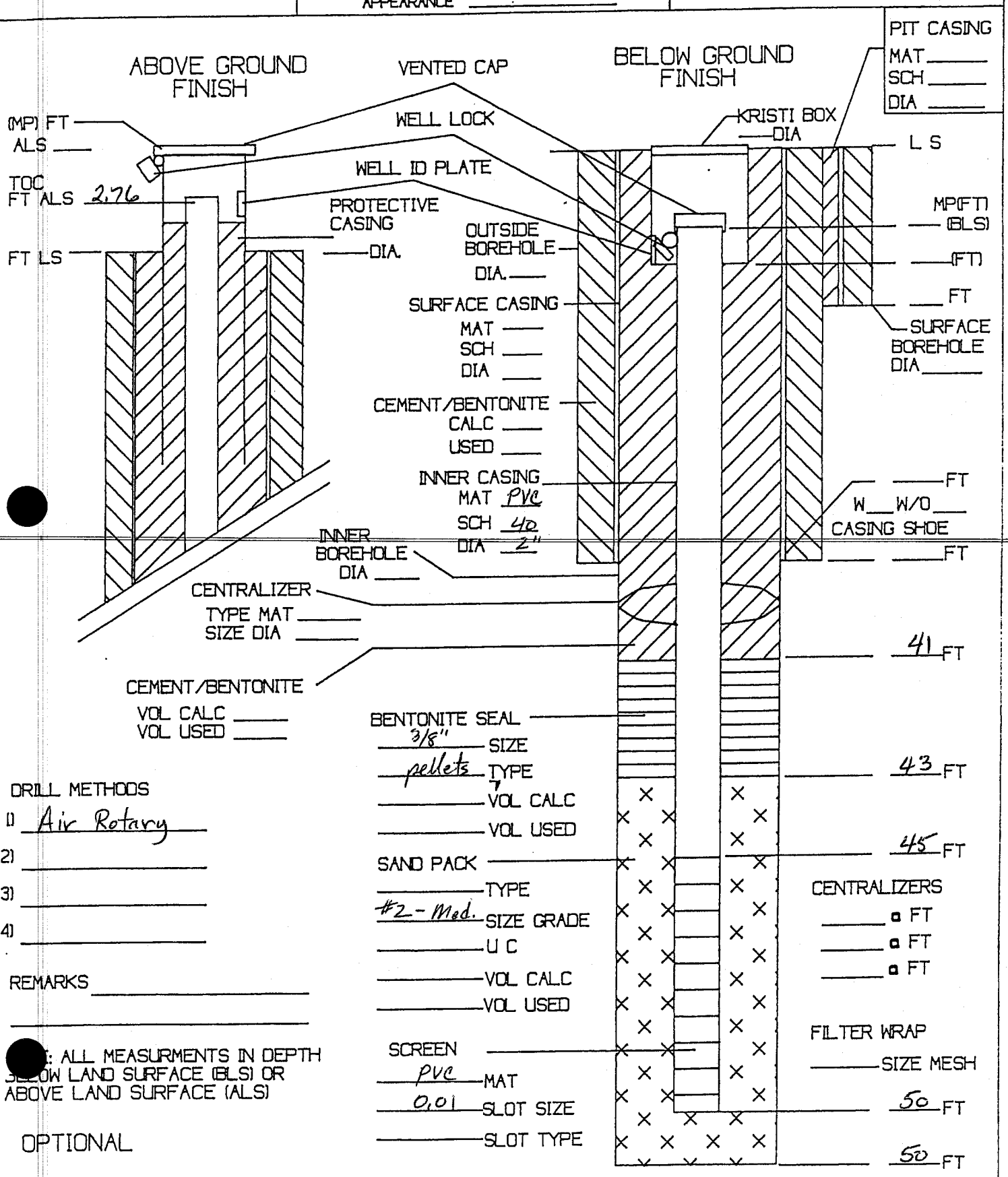
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-12 JOB # EP-1306 CLIENT Hwy #5 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
GND SURFACE ELEV. 307.59	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-12-01 DATE COMPLETED 9-12-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



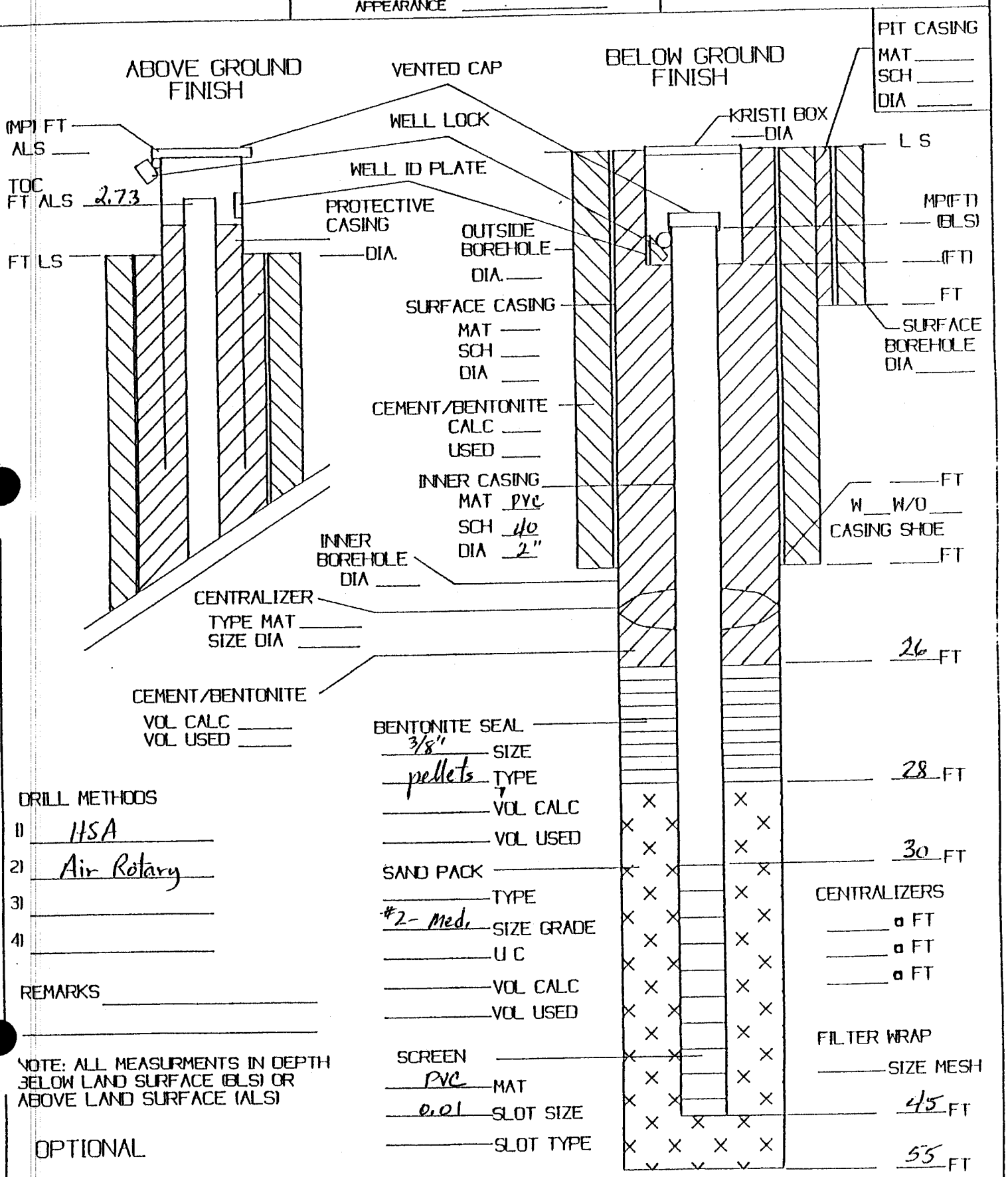
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-13 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fe Honsville	COUNTY Wake STATE NC	LOG BY TB
LAND SURFACE ELEV. 310.99	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-12-01 DATE COMPLETED 9-12-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



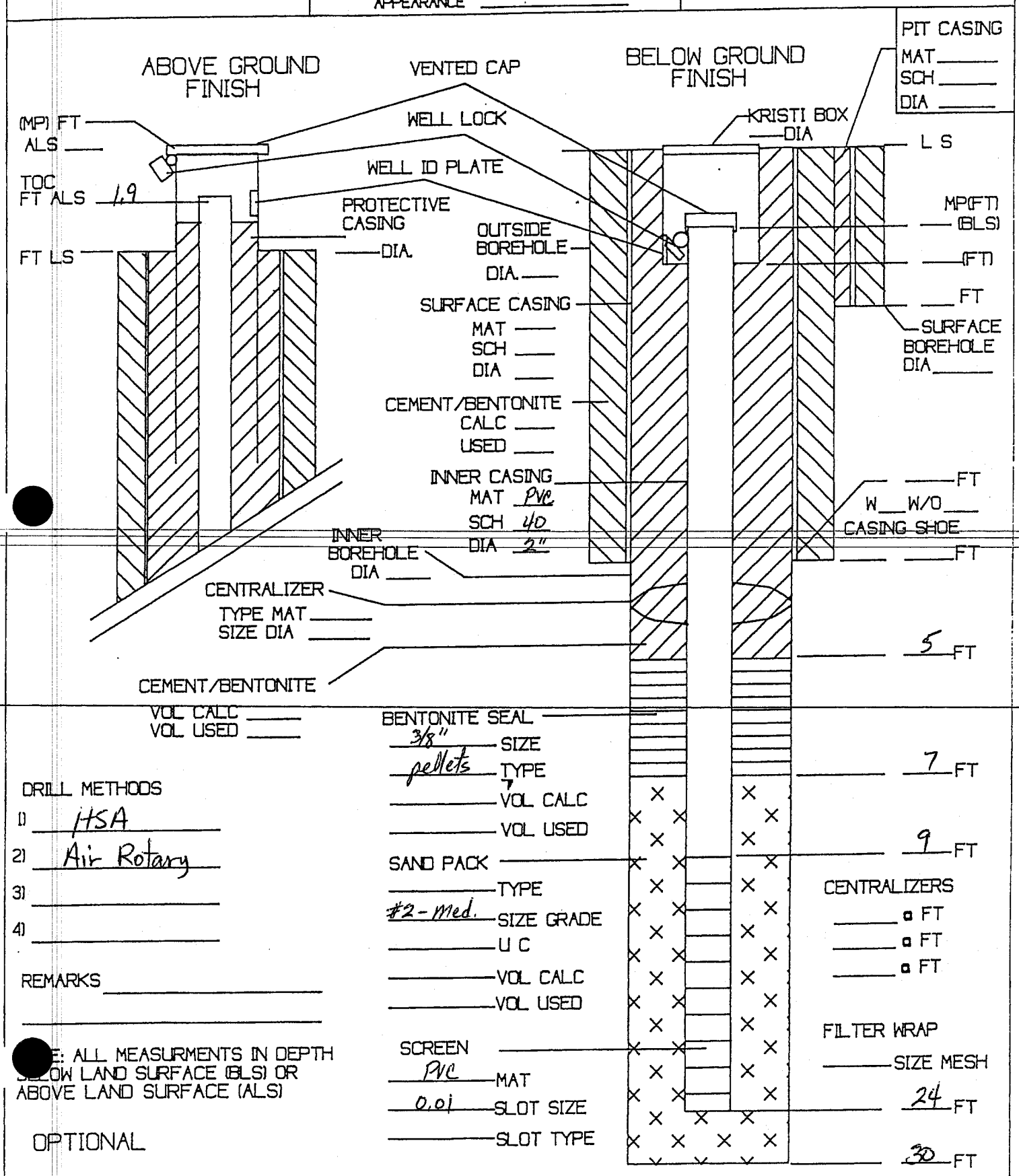
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-13D JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 310.51	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-8-01 DATE COMPLETED 11-8-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



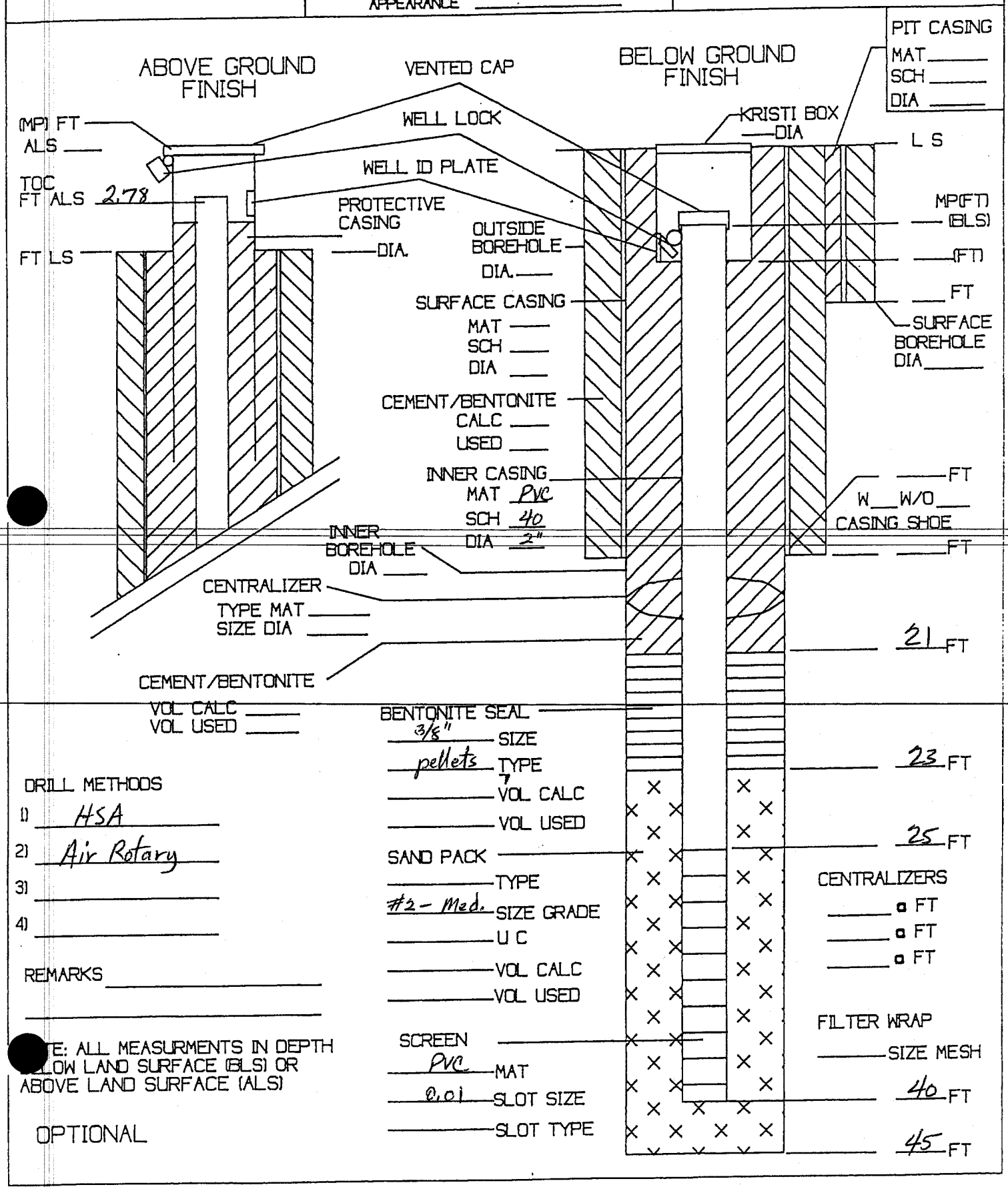
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (ID)	WELL # MW-14 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TJB
GROUND SURFACE ELEV. 314.06	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-12-01 DATE COMPLETED 9-12-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



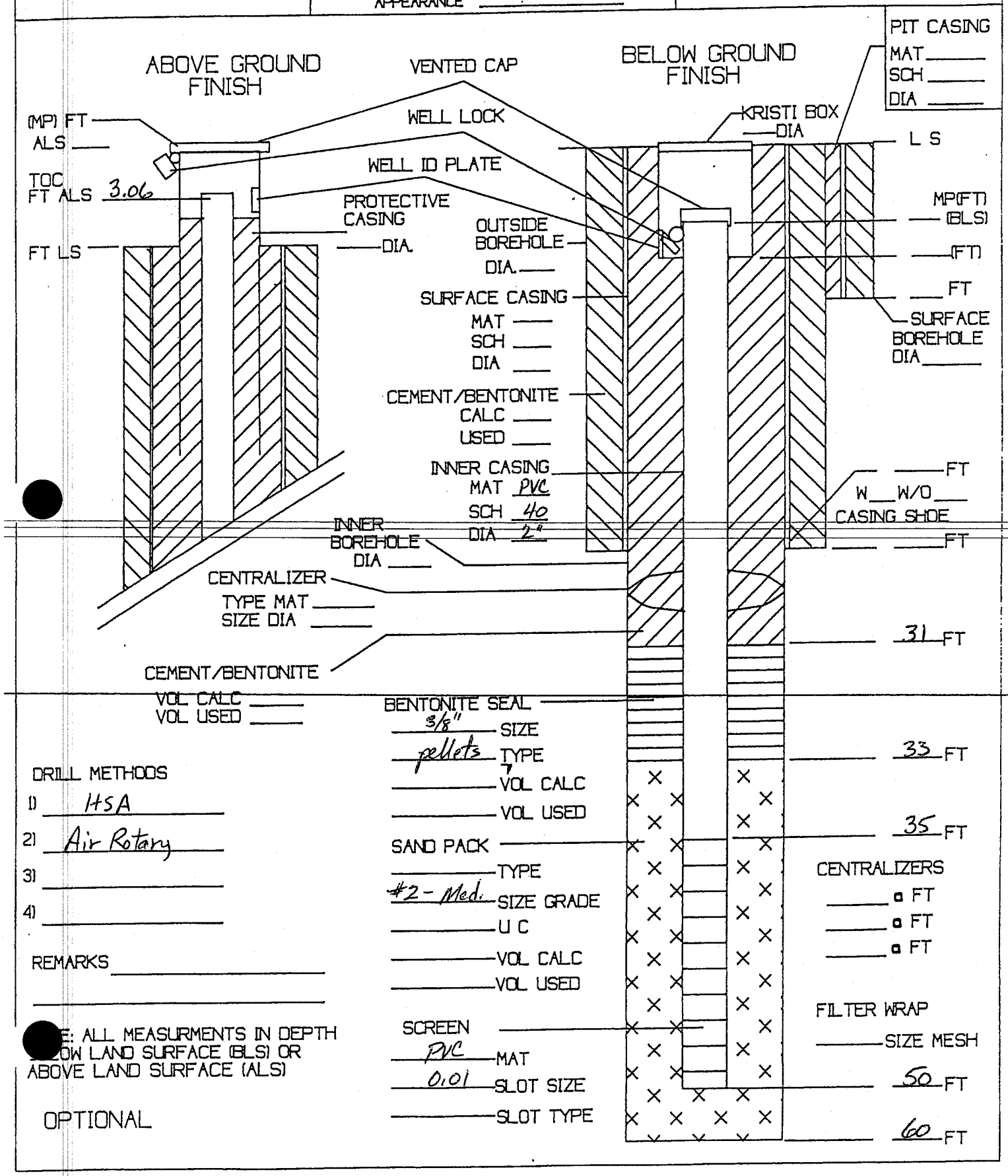
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-15 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
D SURFACE ELEV. 292.25	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-12-01 DATE COMPLETED 9-12-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



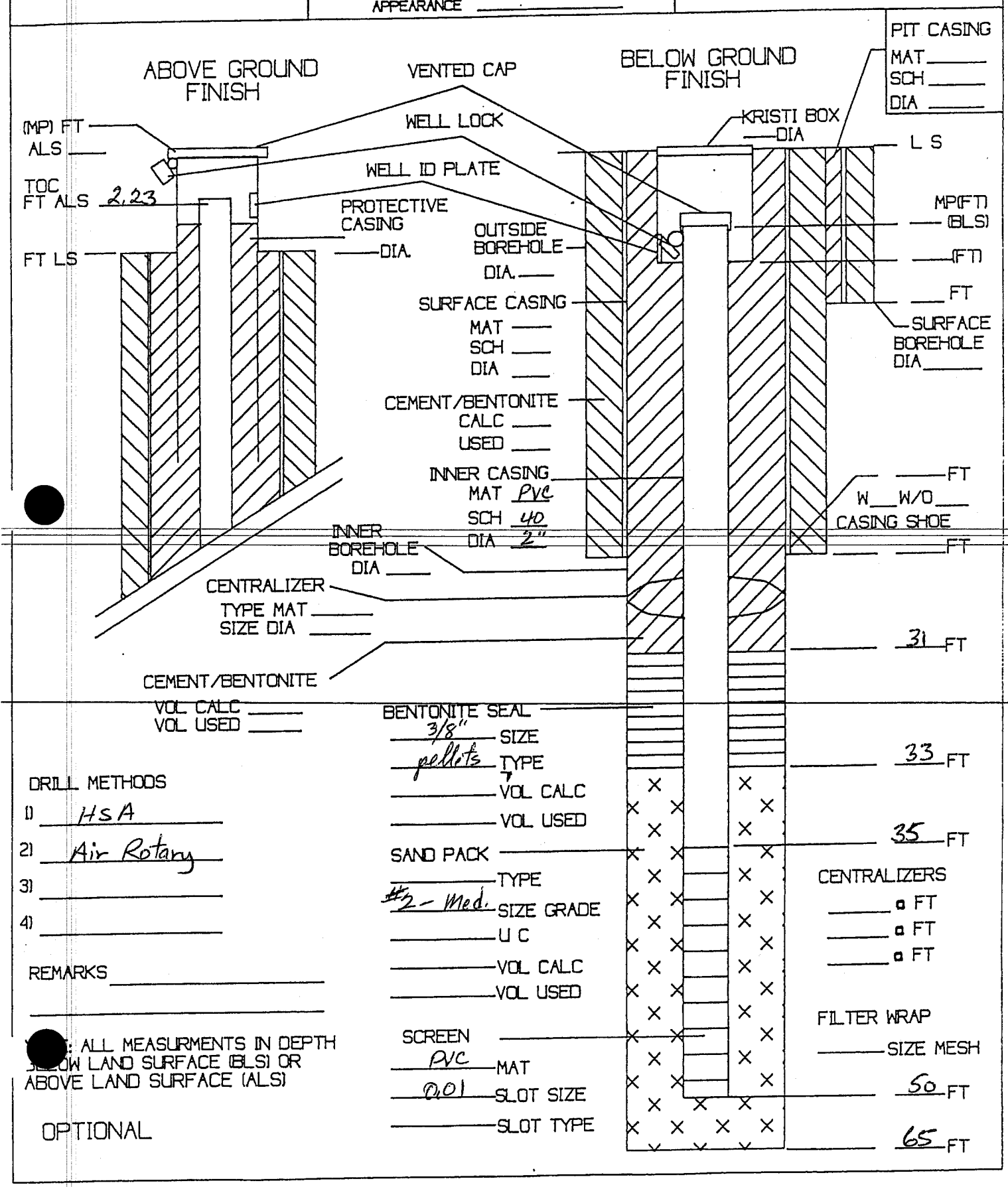
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-16 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
LAND SURFACE ELEV. 311.84	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-13-01 DATE COMPLETED 9-13-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



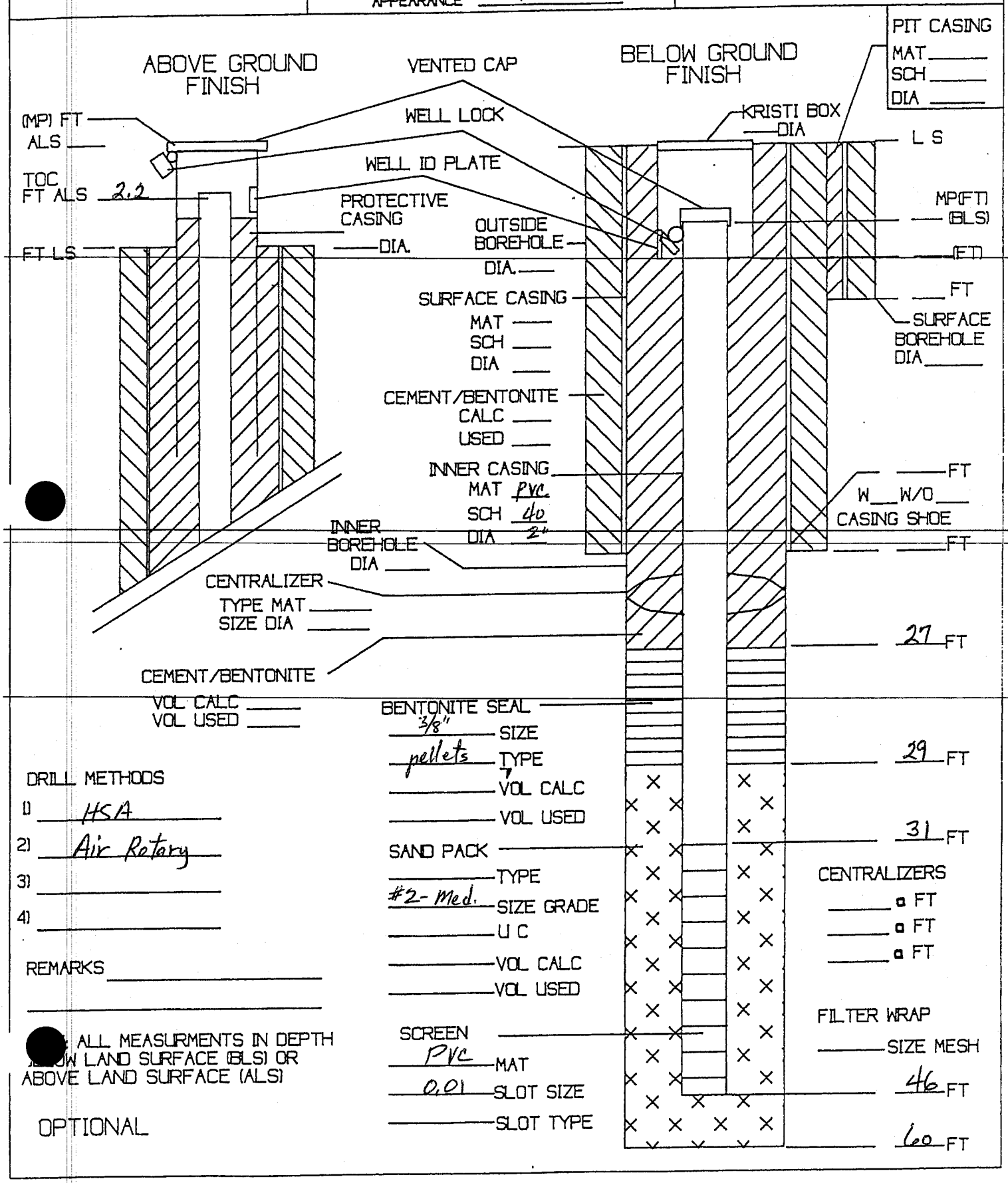
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-17 JOB # EP-1306 CLIENT Hwy 55 C&D Land fill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TB
D SURFACE ELEV. 336.43	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-13-01 DATE COMPLETED 9-13-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-18 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonsville	COUNTY Wake STATE NC	LOG BY TFB
SURFACE ELEV. 335.09	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-13-01 DATE COMPLETED 9-13-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-19 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 326.20	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-13-01 DATE COMPLETED 9-13-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C.
CHARLOTTE, NC

PROJECT LOCATION Fellenville

GROUND SURFACE ELEV. 330.10

WELL DEV. METHOD

WELL COMPLETION LOG TYPE (III)

COUNTY Wake STATE NC

MEASURING PT. ELEV. (MP) LS

VOLUME EVAC. _____

APPEARANCE _____

WELL # MW-20 JOB # EP-13x6

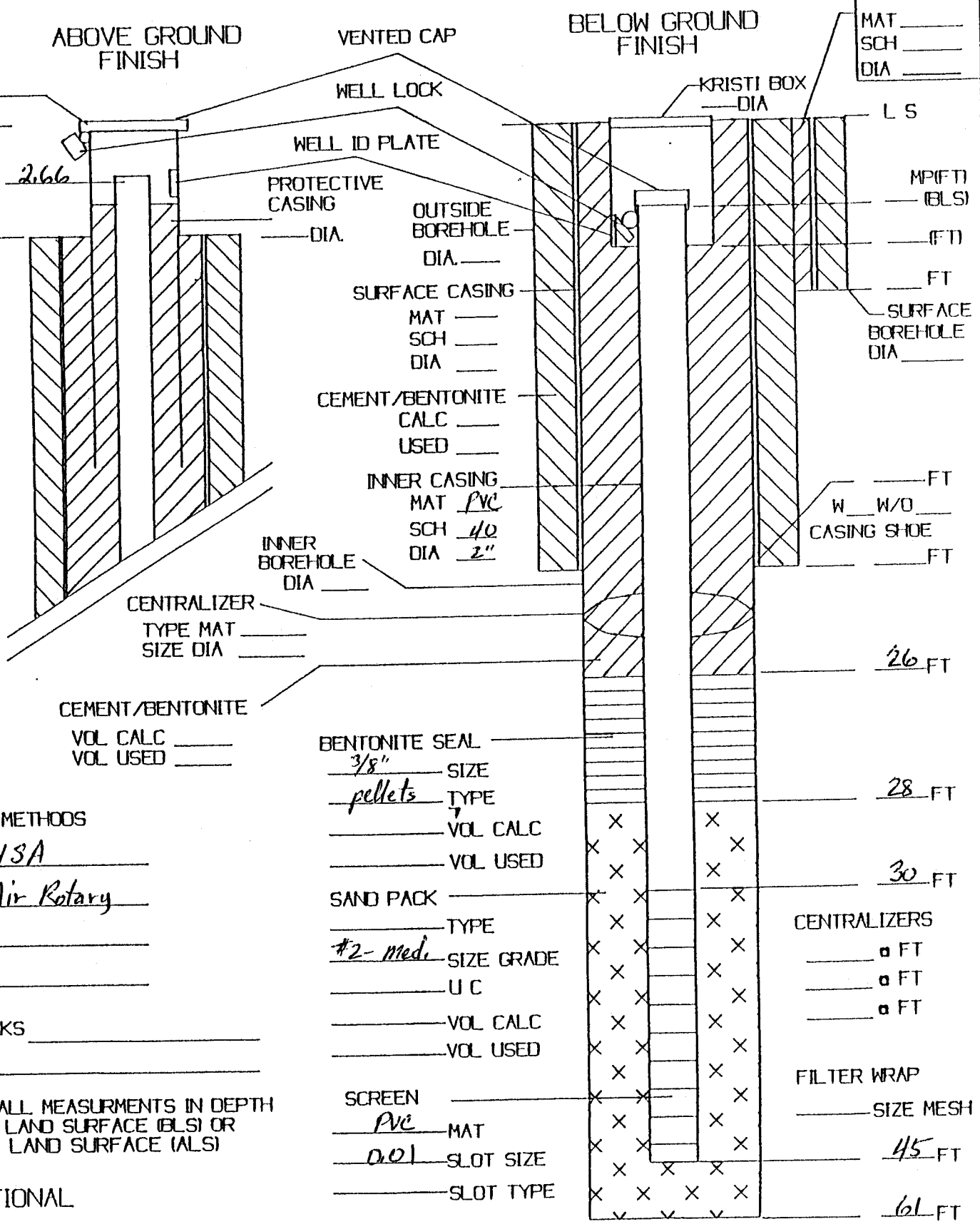
CLIENT Hwy 55 C&D Landfill, LLC

LOG BY TB

DATE BEGAN 9-13-01

DATE COMPLETED 9-13-01

MONITORED FORMATION



DRILL METHODS

1) HSA

2) Air Rotary

3)

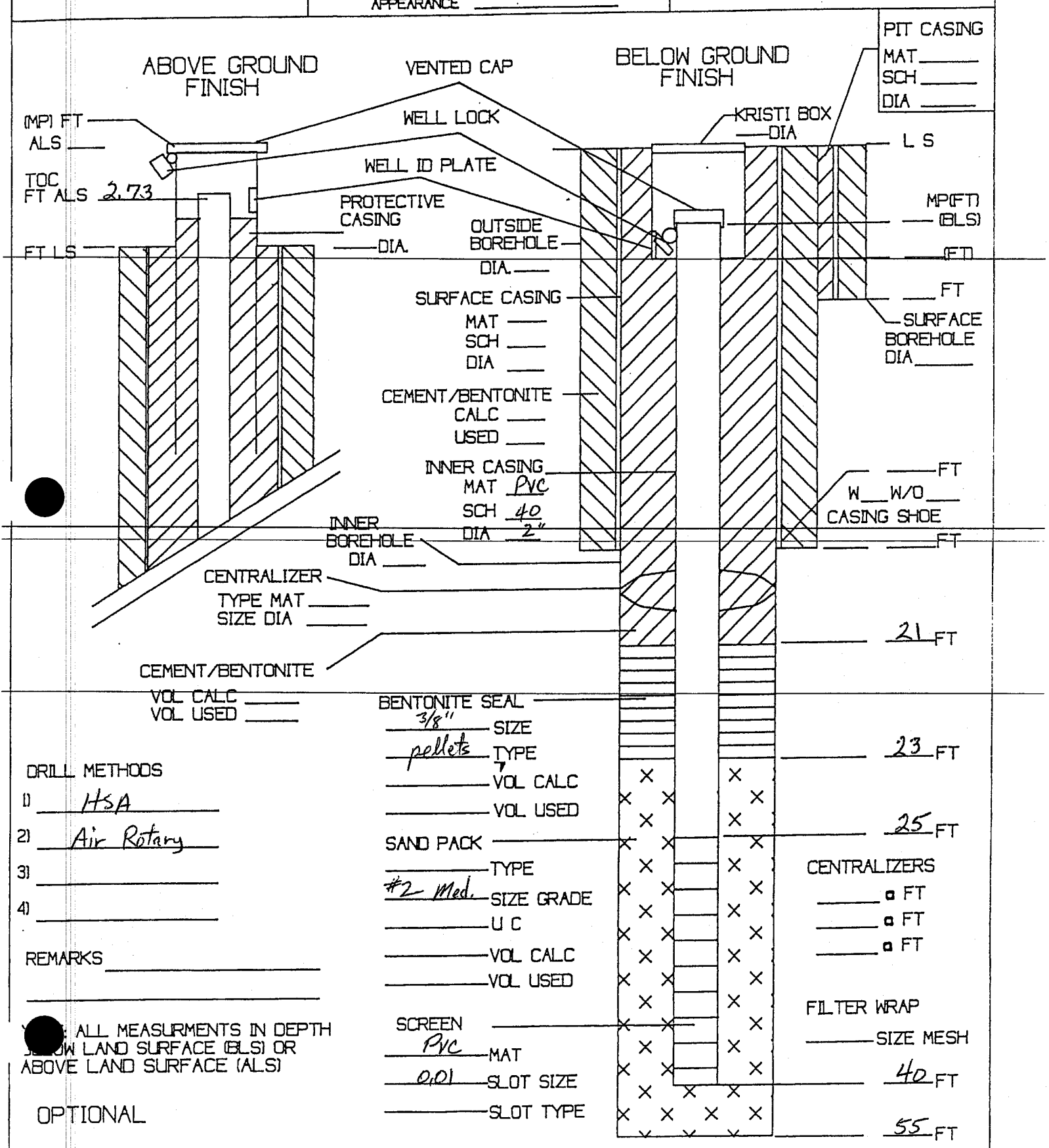
4)

REMARKS

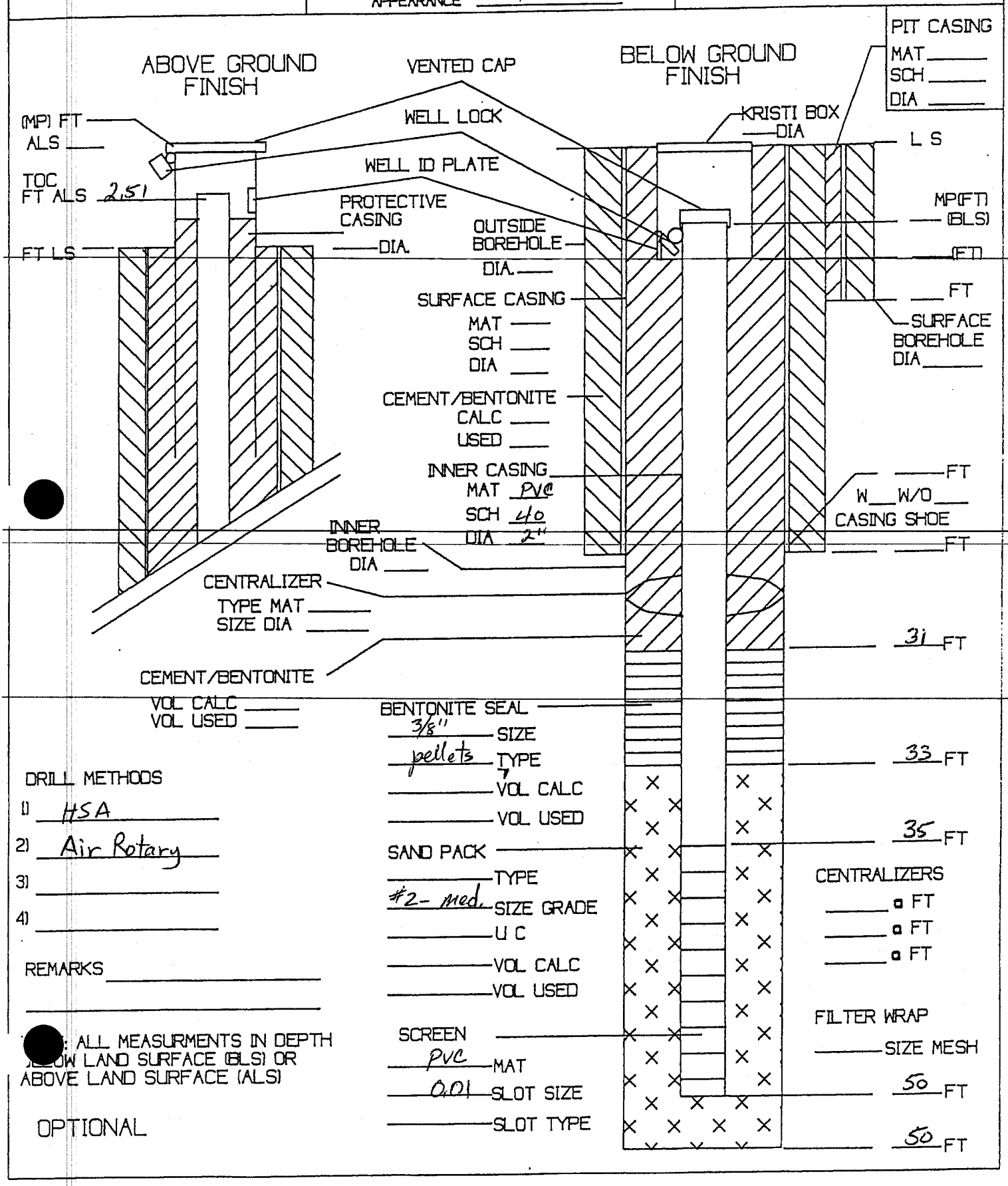
NOTE: ALL MEASURMENTS IN DEPTH BELOW LAND SURFACE (BLS) OR ABOVE LAND SURFACE (ALS)

OPTIONAL

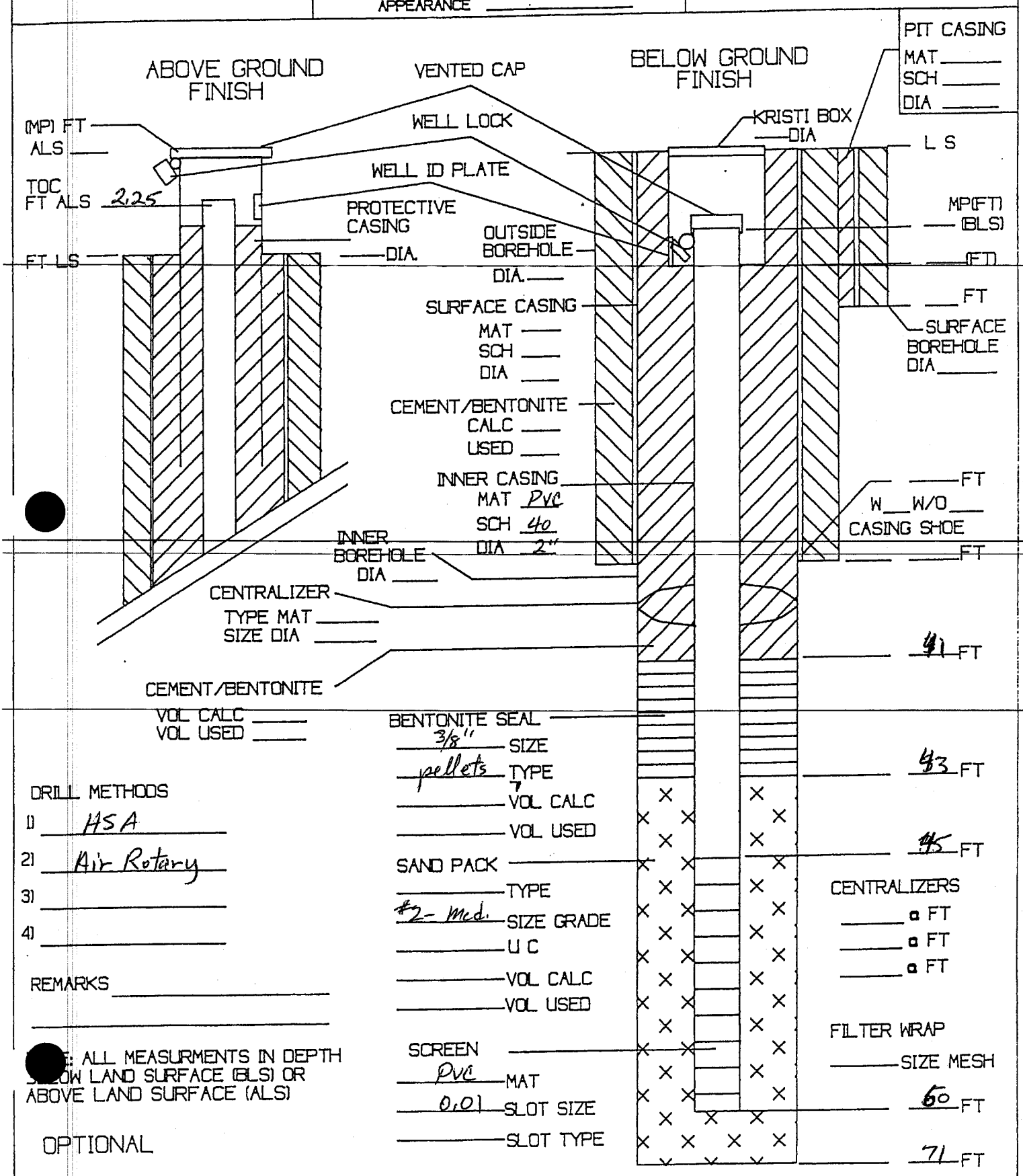
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-21 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 351.07	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-14-01 DATE COMPLETED 9-14-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



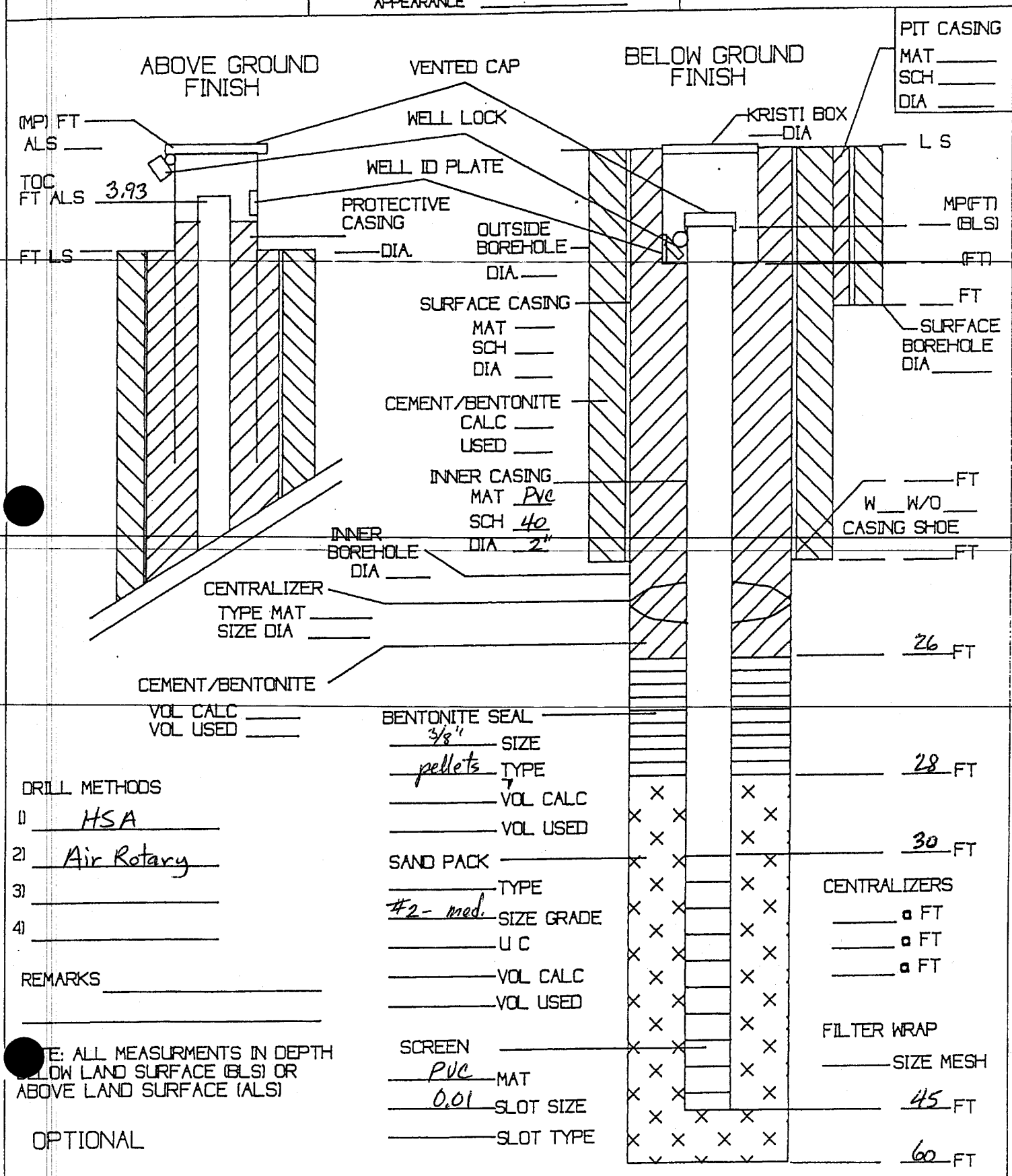
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-22 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 304.09	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-27-01 DATE COMPLETED 9-27-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



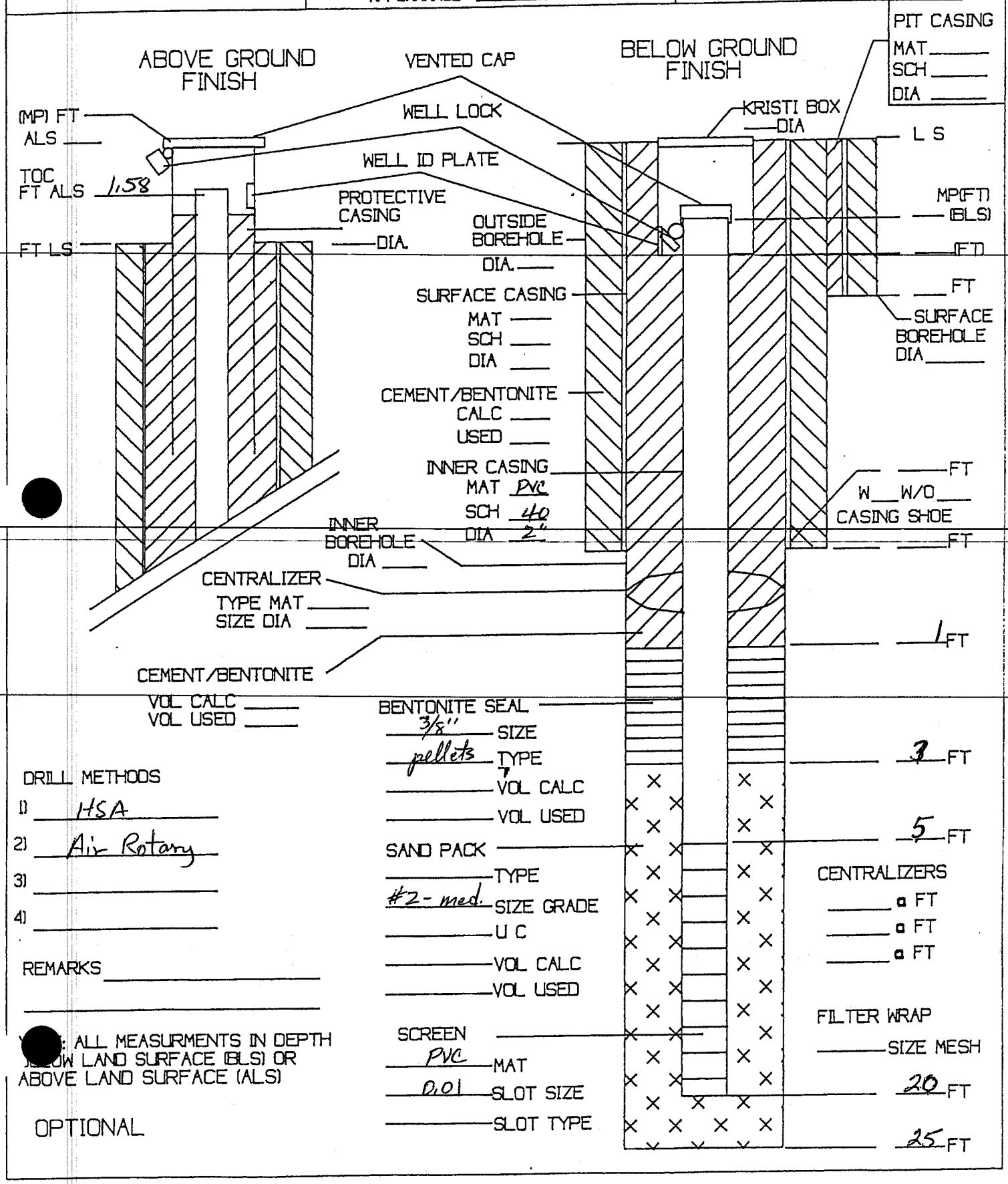
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-23 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY RB
LAND SURFACE ELEV. 339.63	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-27-01 DATE COMPLETED 9-27-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-24 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
LAND SURFACE ELEV. 343.55	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 9-28-01 DATE COMPLETED 9-28-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-25 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fellonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 290.32	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-6-01 DATE COMPLETED 11-6-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



DRILL METHODS

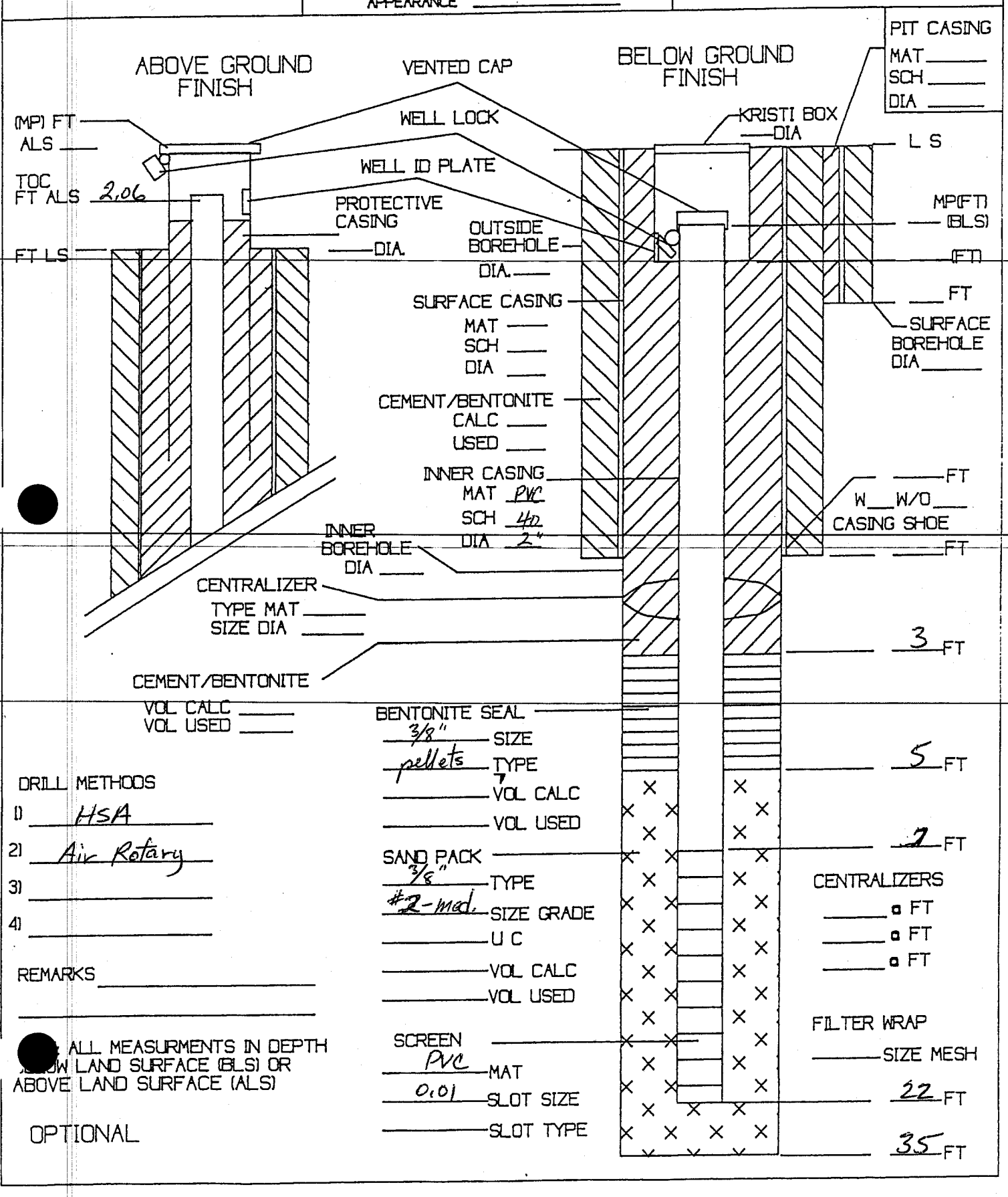
1) HSA
2) Air Rotary
3)
4)

REMARKS

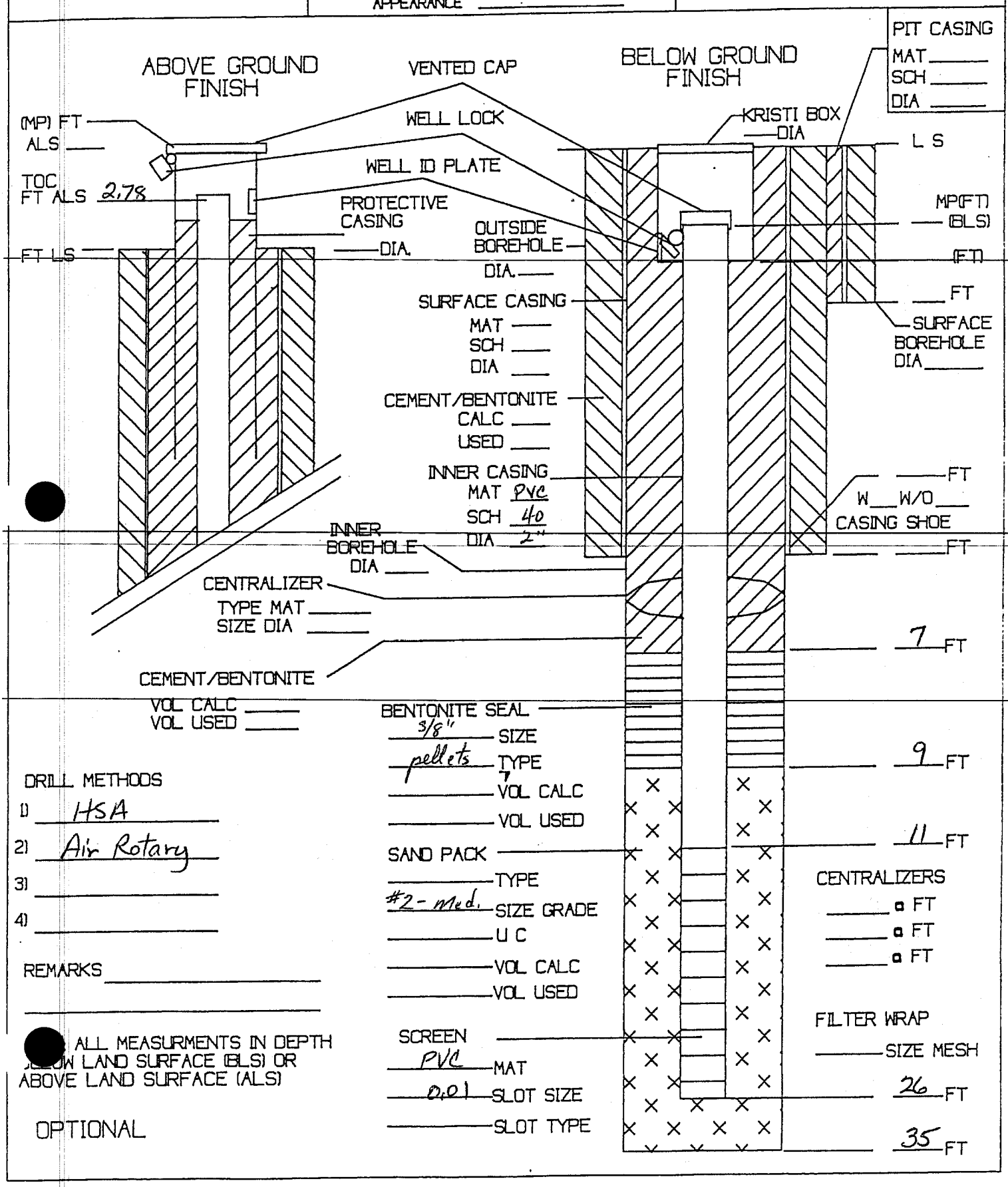
NOTE: ALL MEASURMENTS IN DEPTH BELOW LAND SURFACE (BLS) OR ABOVE LAND SURFACE (ALS)

OPTIONAL

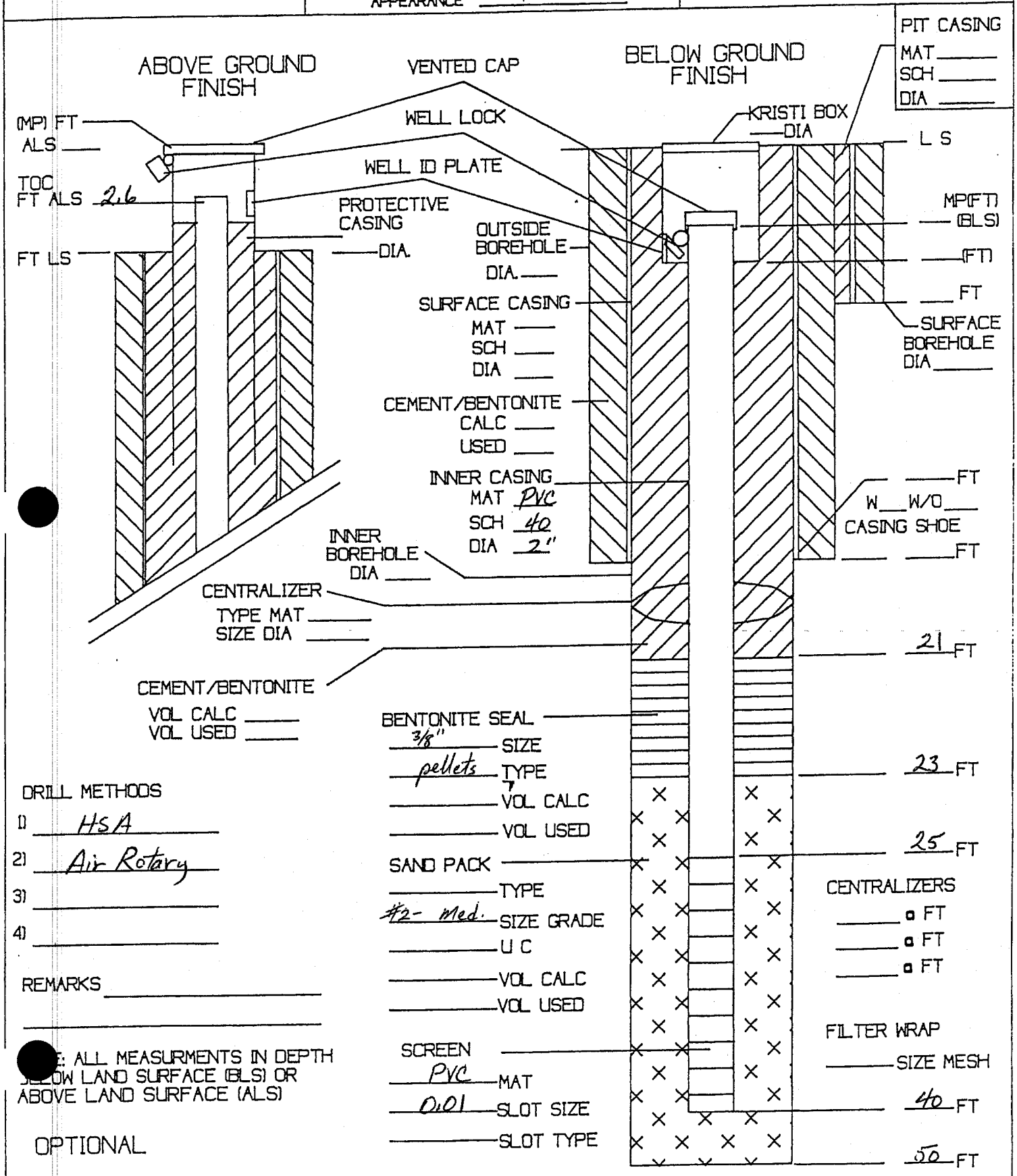
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-26 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fellonville	COUNTY Wake STATE NC	LOG BY FB
SURFACE ELEV. 289.89	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-6-01 DATE COMPLETED 11-6-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



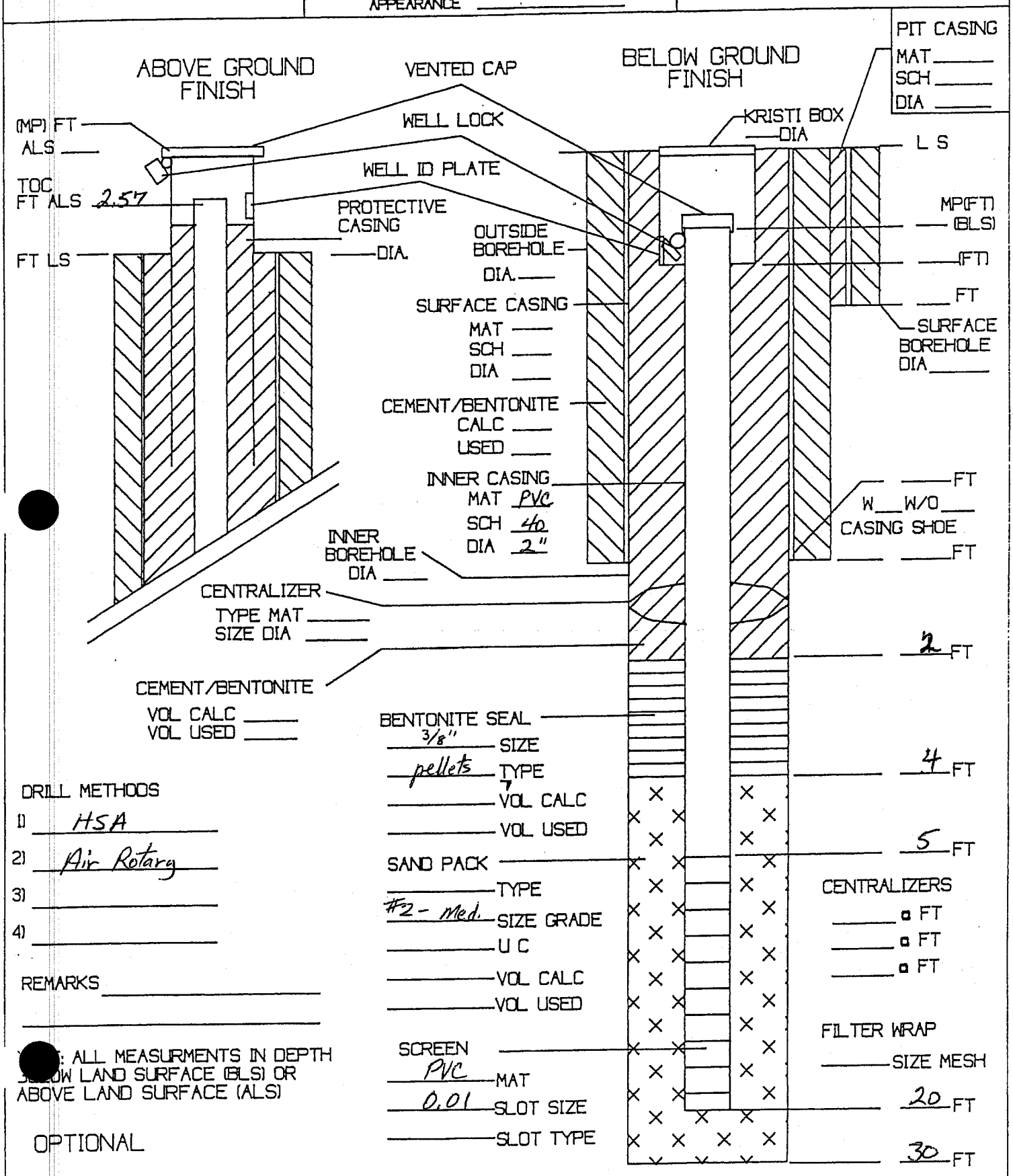
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-27 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 328.50	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-7-01 DATE COMPLETED 11-7-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



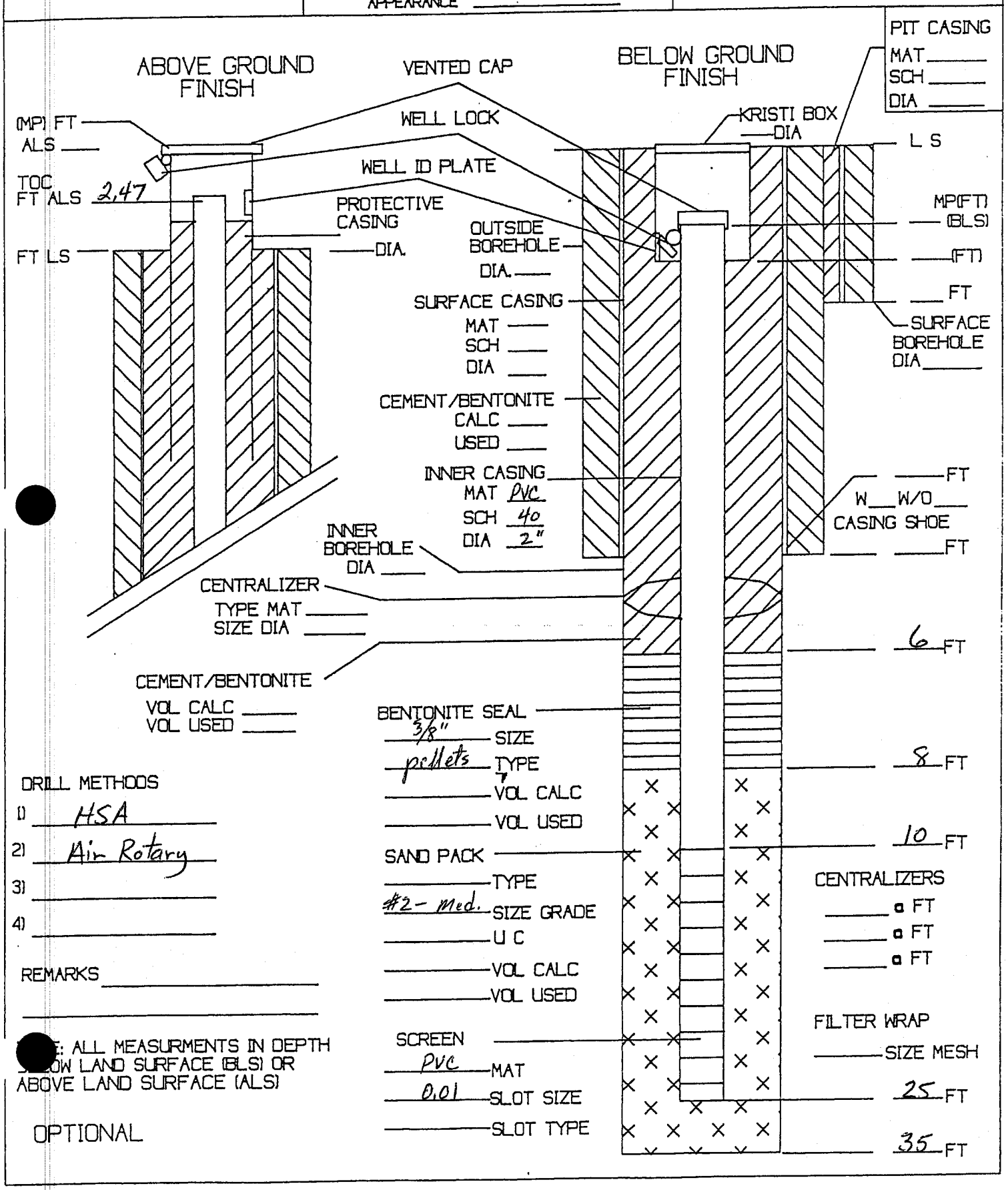
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-28 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 348.20	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-7-01 DATE COMPLETED 11-7-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



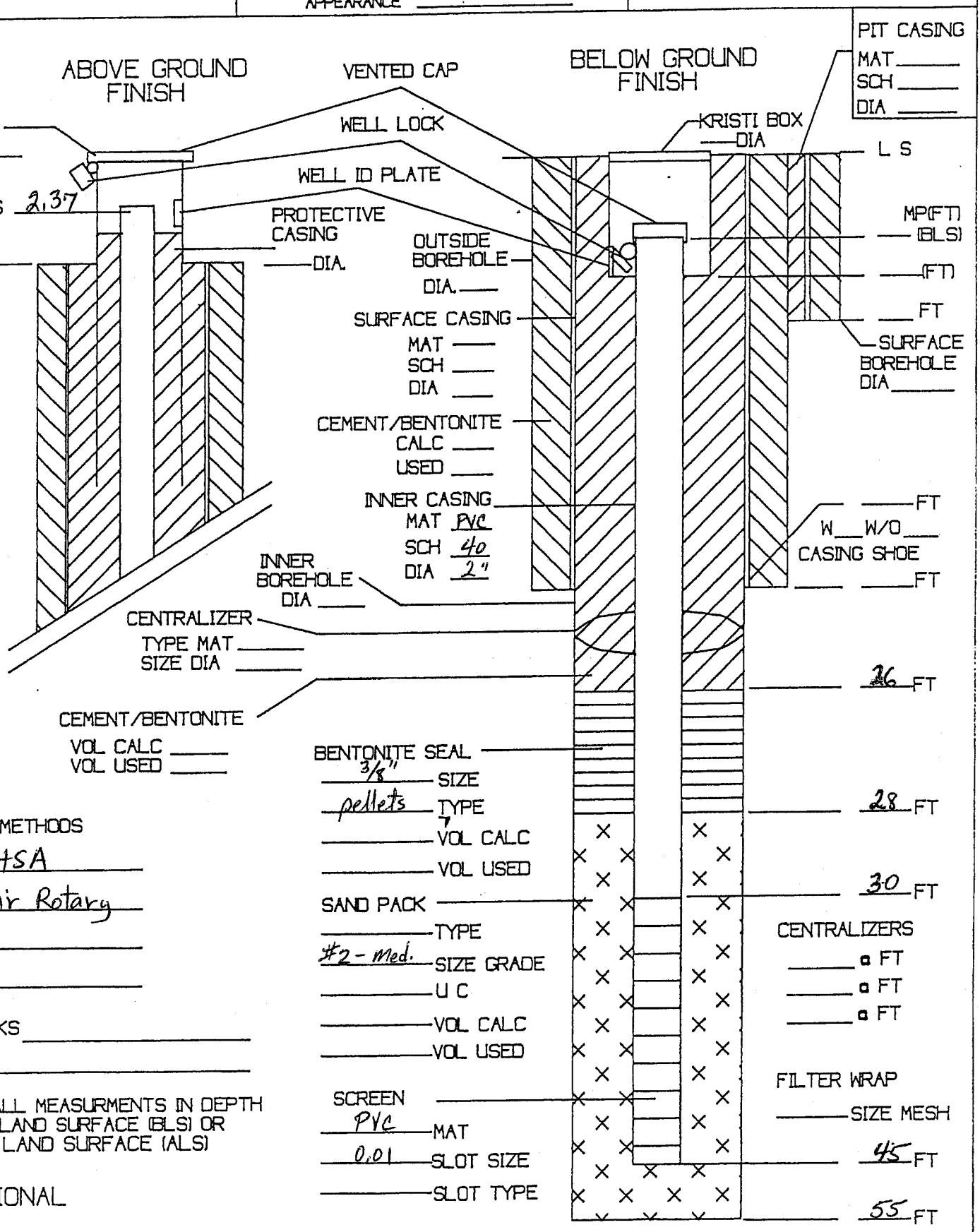
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-29 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fuquayville	COUNTY Wake STATE NC	LOG BY TB
TOC SURFACE ELEV. 332.14	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-7-01 DATE COMPLETED 11-7-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-30 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fettonville	COUNTY Wake STATE NC	LOG BY TB
LAND SURFACE ELEV. 297.82	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-7-01 DATE COMPLETED 11-7-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-31 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
GROUND SURFACE ELEV. 313.35	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-7-01 DATE COMPLETED 11-7-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



DRILL METHODS

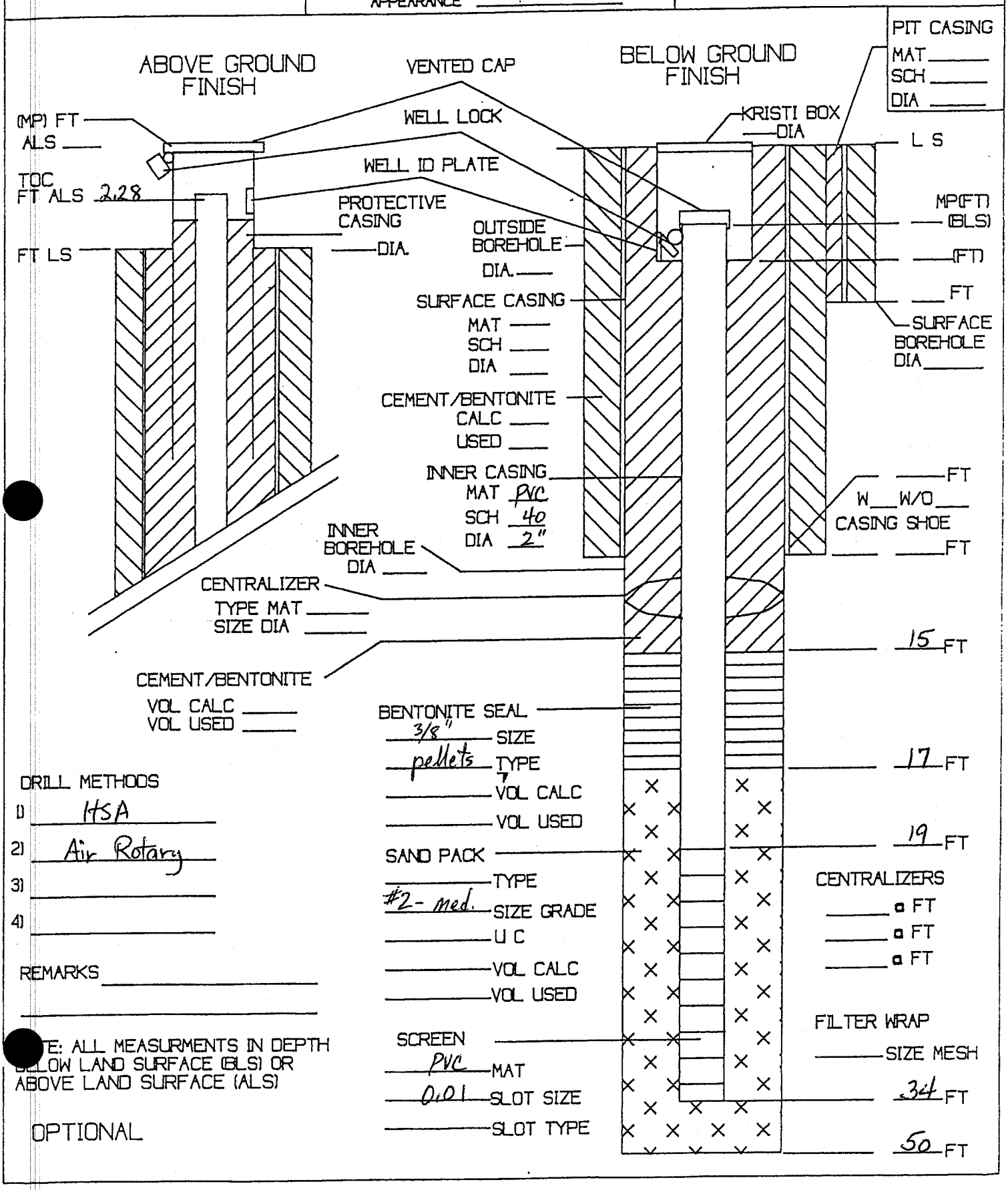
1) HSA
2) Air Rotary
3)
4)

REMARKS

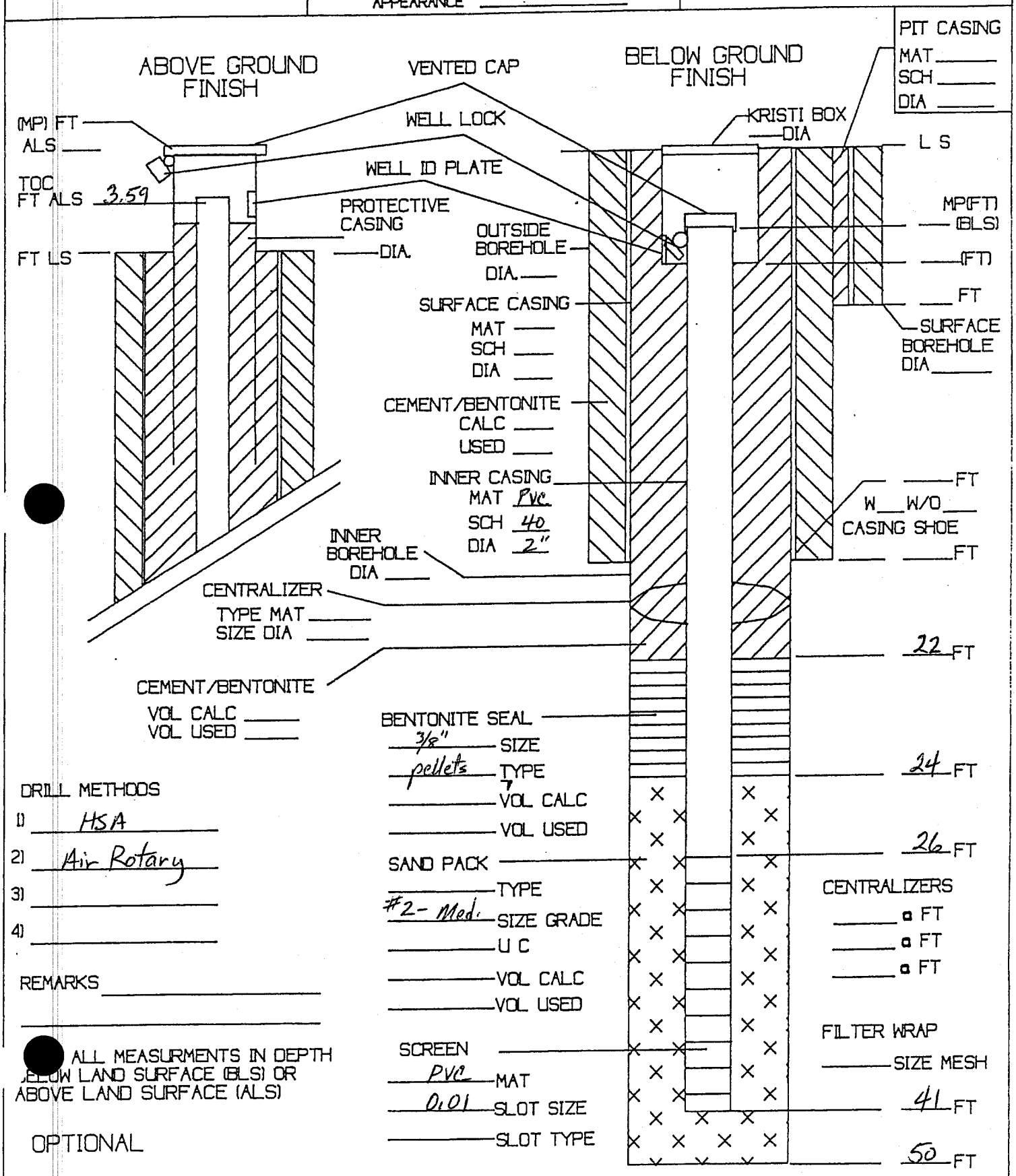
NOTE: ALL MEASURMENTS IN DEPTH BELOW LAND SURFACE (BLS) OR ABOVE LAND SURFACE (ALS)

OPTIONAL

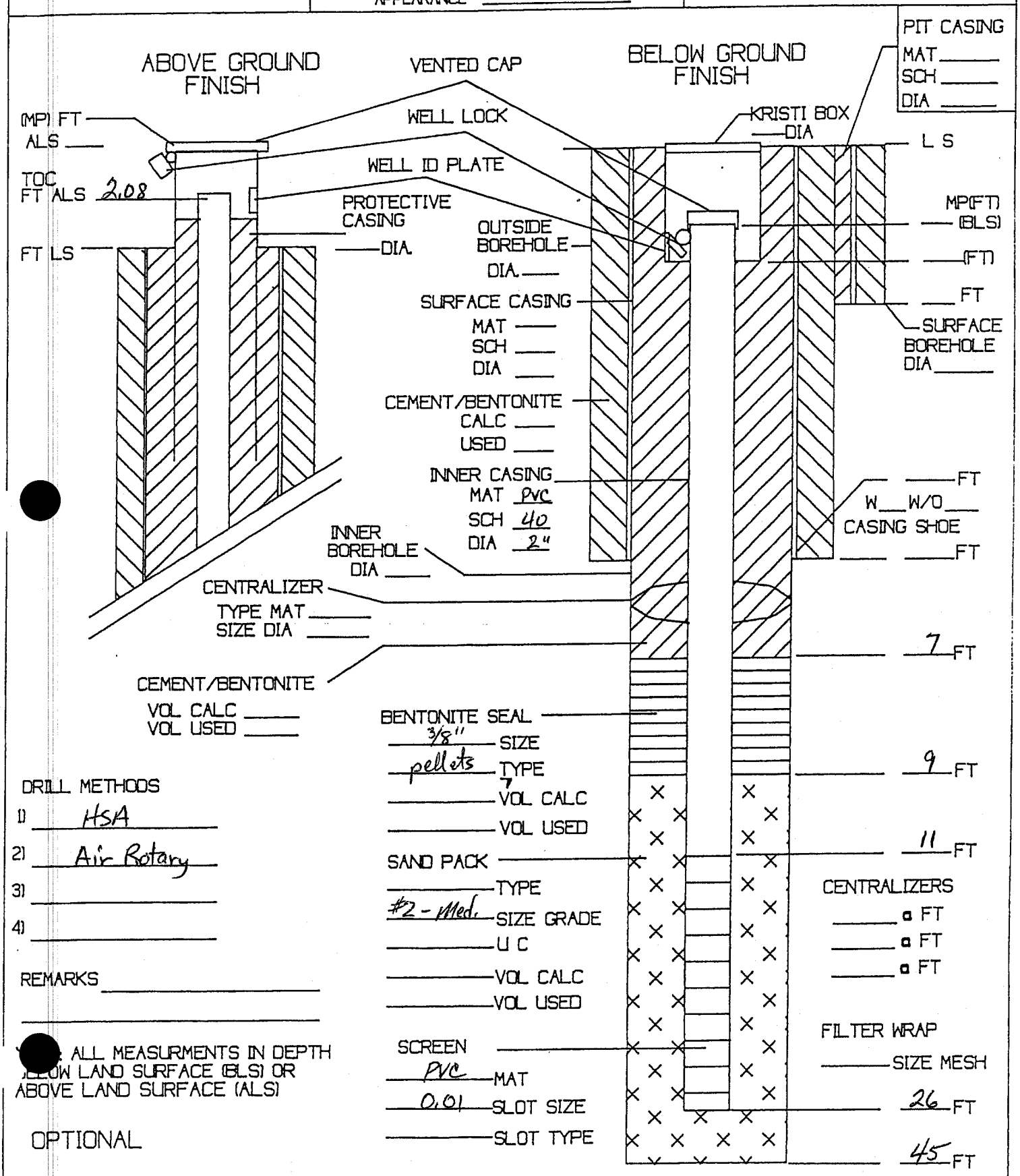
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-32 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
GROUND SURFACE ELEV. 306.50	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-8-01 DATE COMPLETED 11-8-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



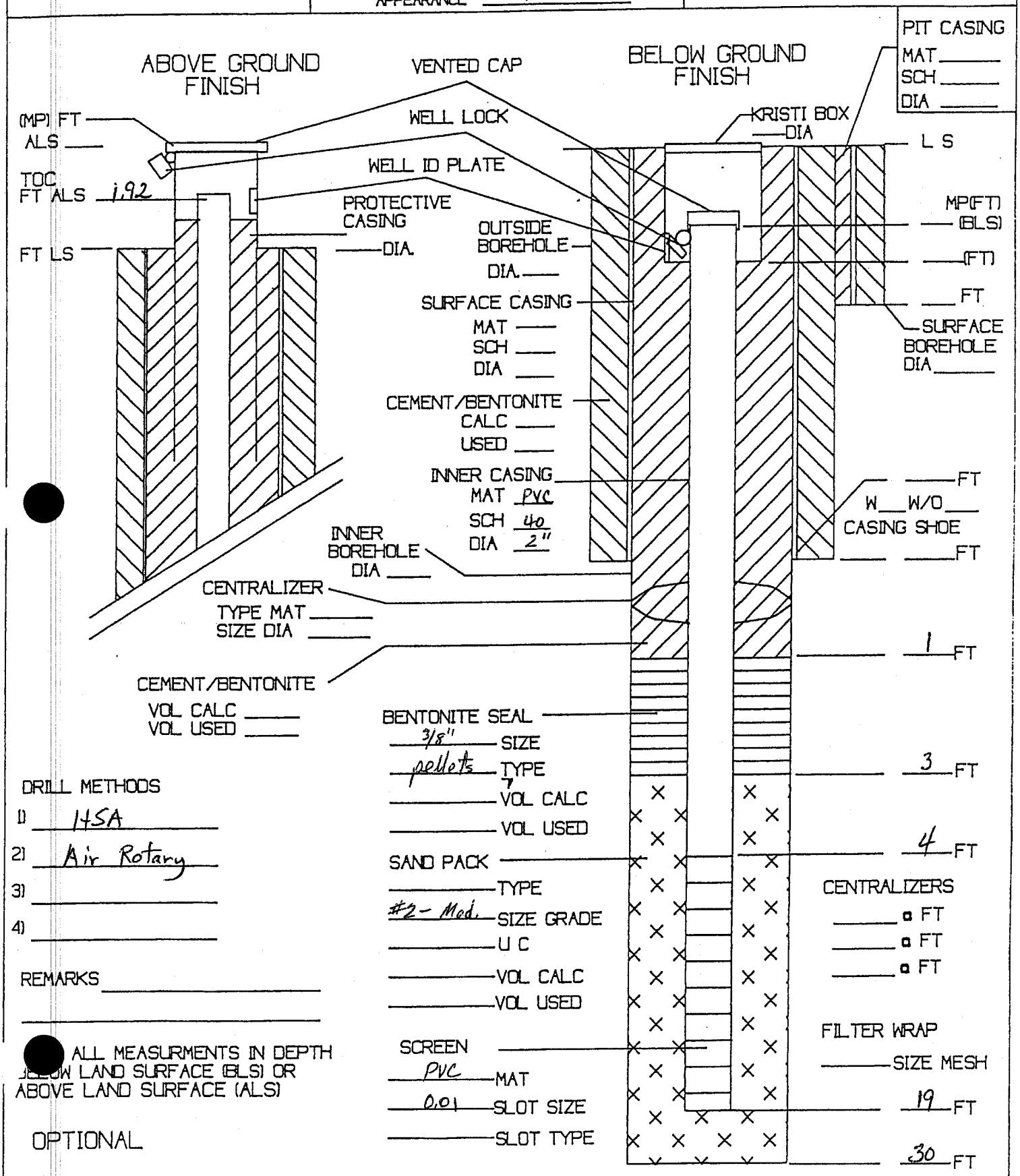
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-33 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fellonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 316.47	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-8-01 DATE COMPLETED 11-8-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



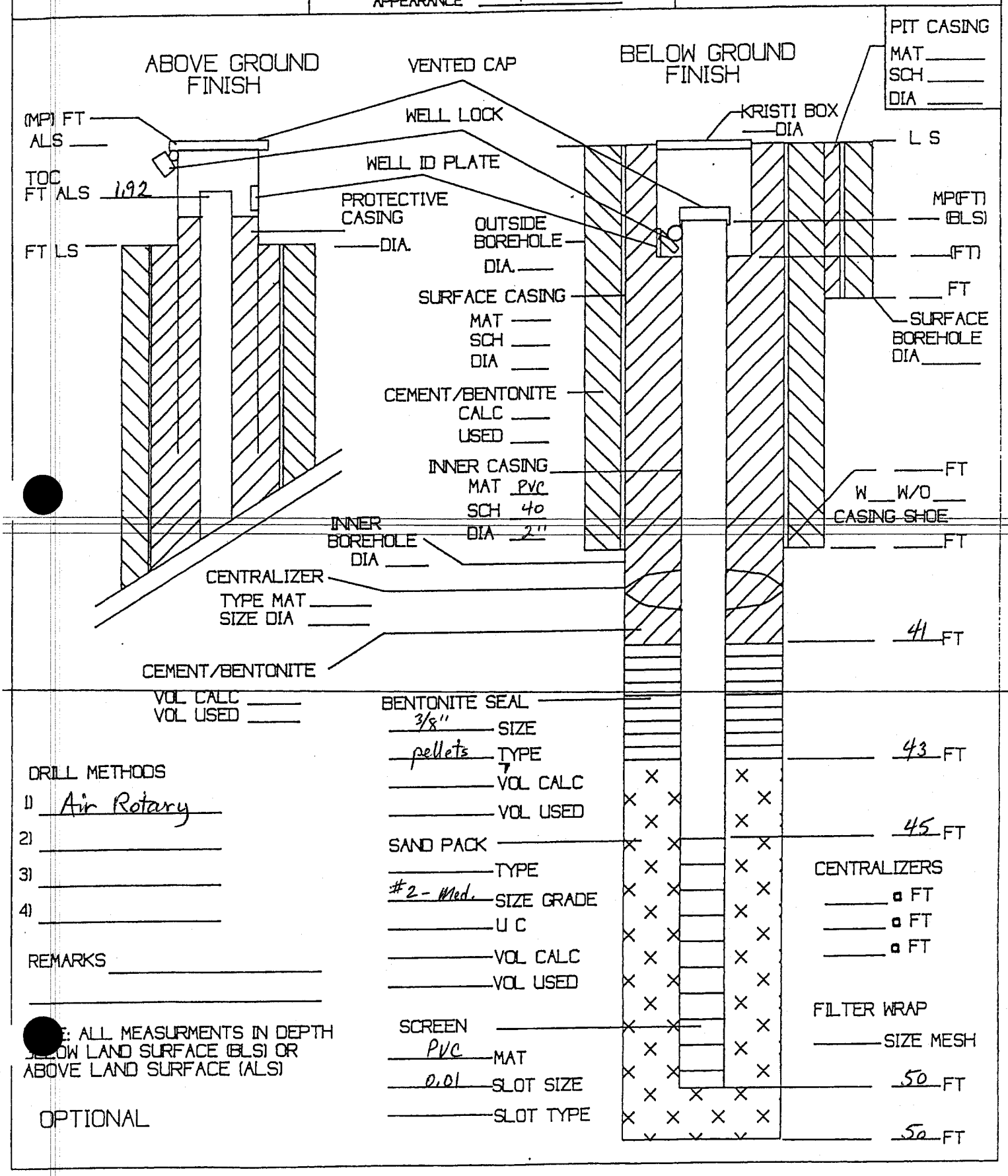
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-34 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 293.47	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-8-01 DATE COMPLETED 11-8-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



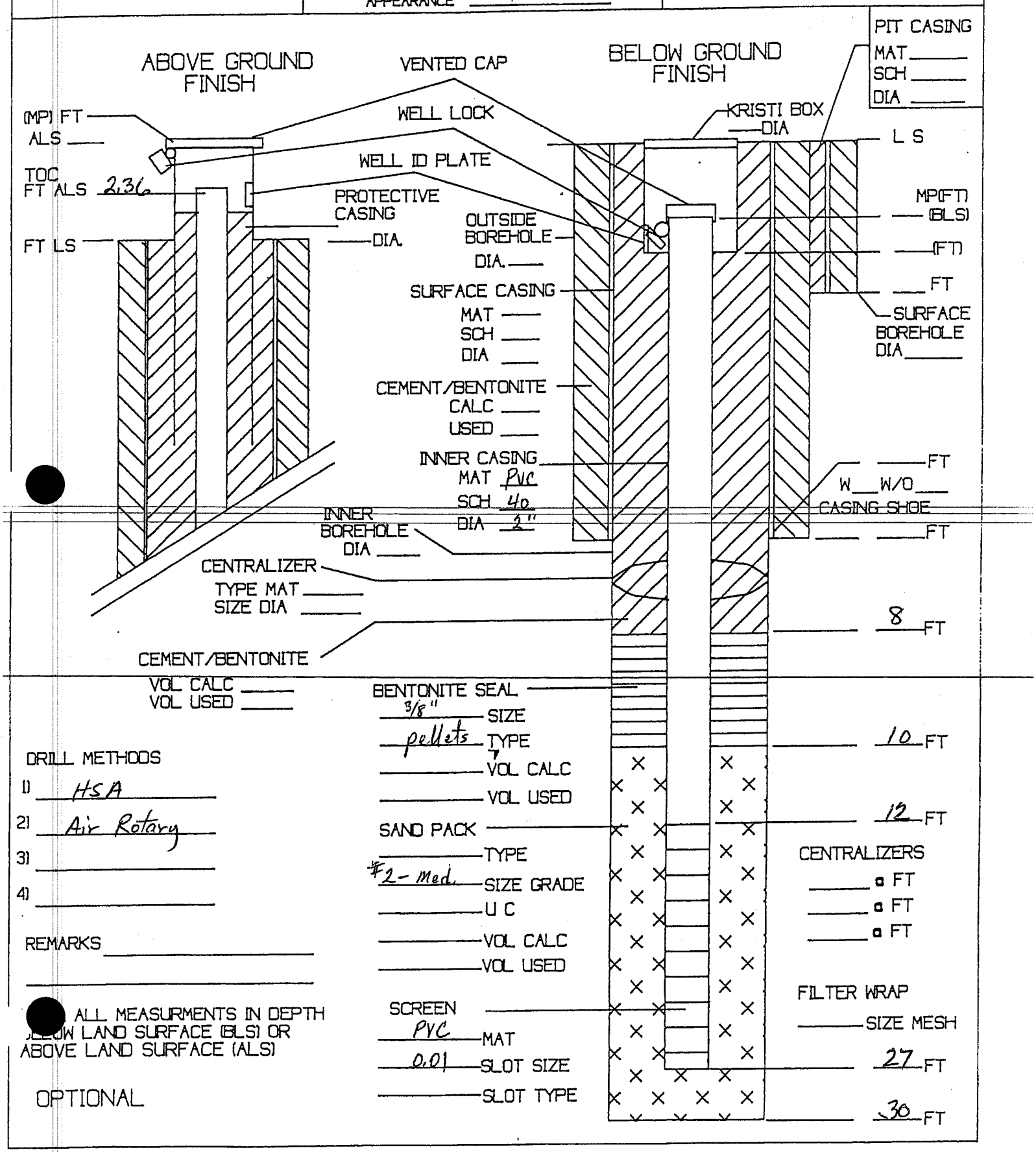
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE III	WELL # MW-35 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 283.22	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-8-01 DATE COMPLETED 11-8-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



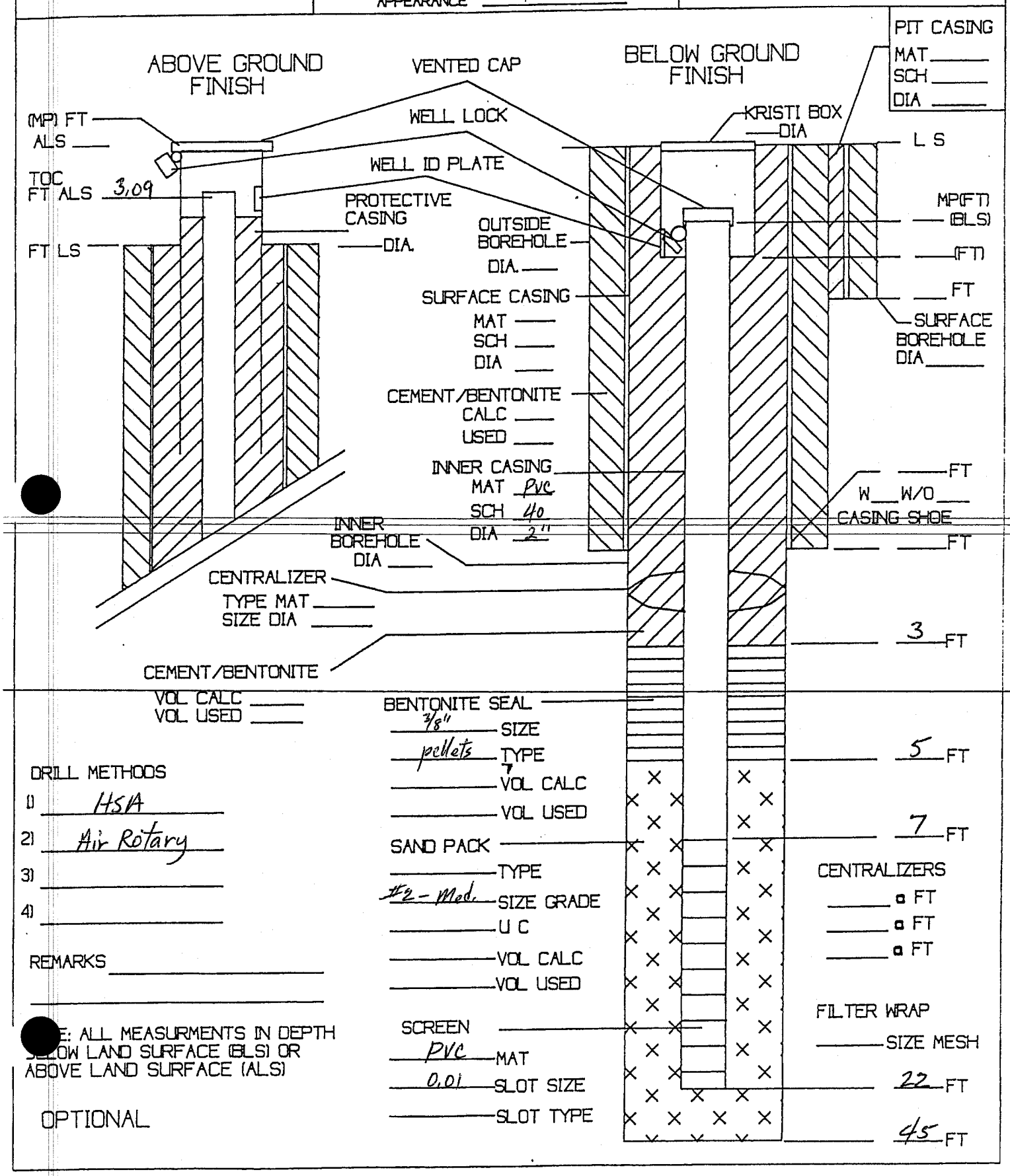
ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-35D JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 283.37	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-9-01 DATE COMPLETED 11-9-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-3b JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fettenville	COUNTY Wake STATE NC	LOG BY TB
SURFACE ELEV. 292.24	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-8-01 DATE COMPLETED 11-8-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-37 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY TB
D SURFACE ELEV. 320.27	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-8-01 DATE COMPLETED 11-8-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



DRILL METHODS

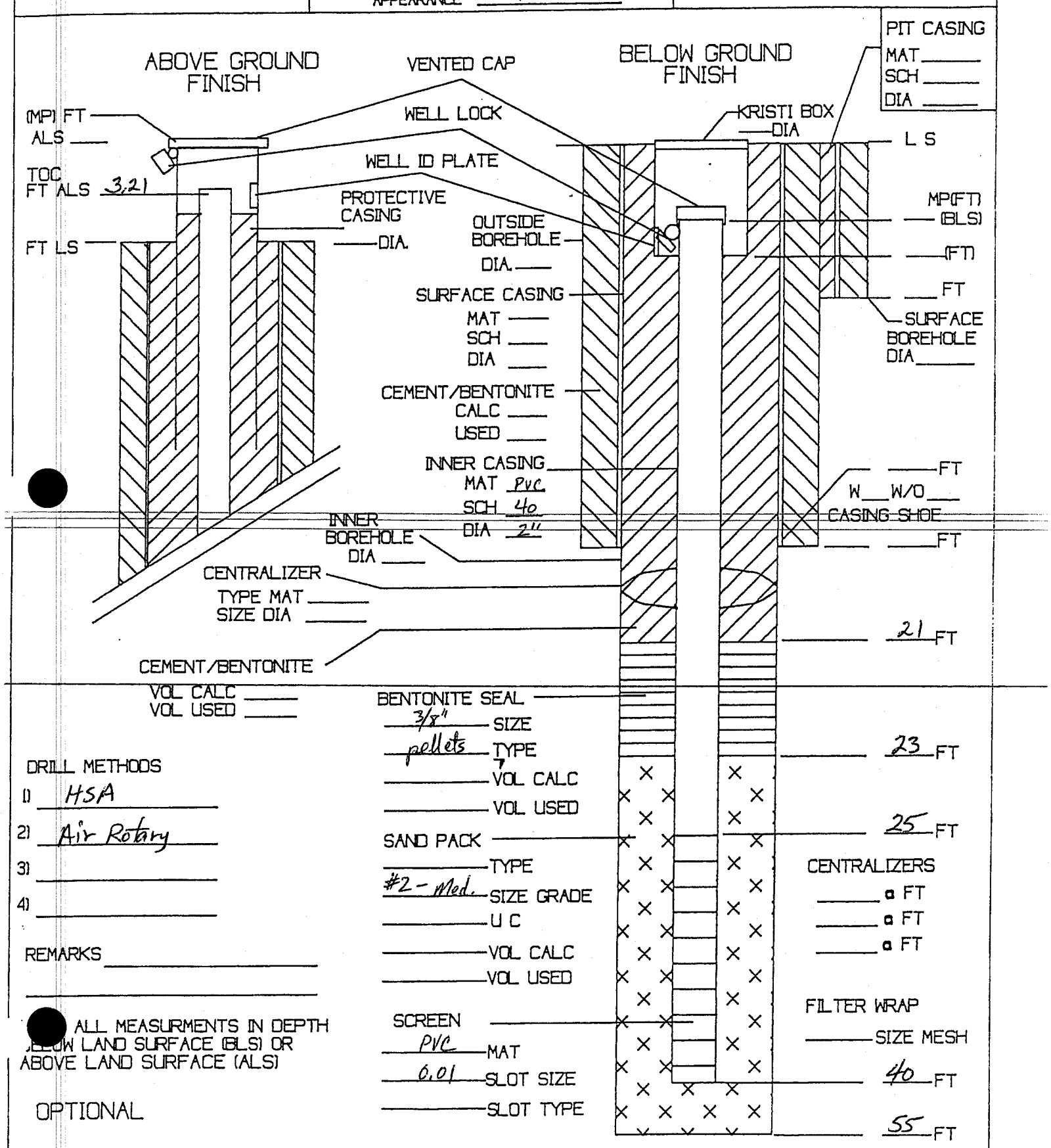
1) HSA
2) Air Rotary
3)
4)

REMARKS

E: ALL MEASURMENTS IN DEPTH
LOW LAND SURFACE (BLS) OR
ABOVE LAND SURFACE (ALS)

OPTIONAL

ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-38 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY YB
SURFACE ELEV. 326.79	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-8-01 DATE COMPLETED 11-8-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



DRILL METHODS

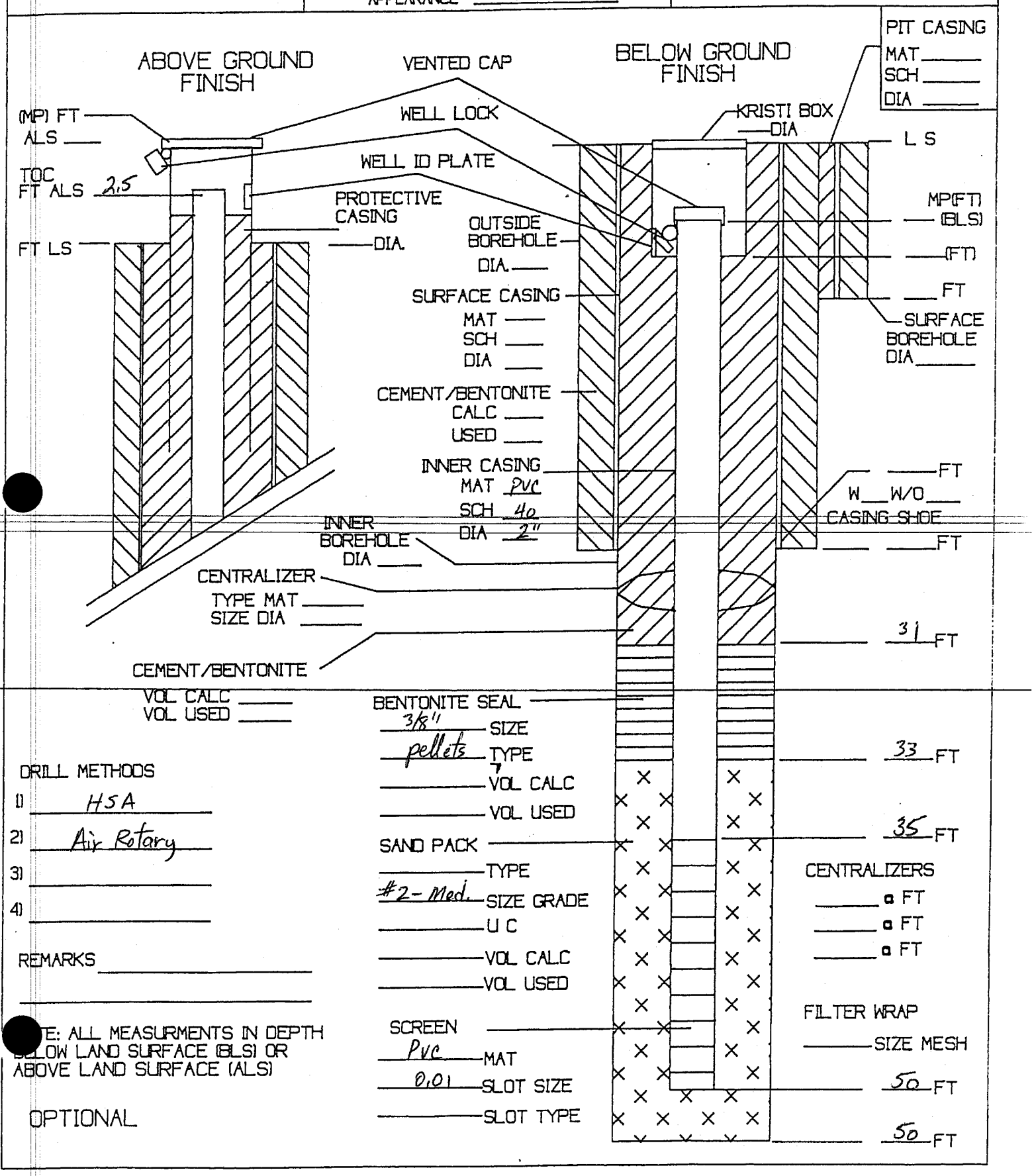
1) HSA
2) Air Rotary
3)
4)

REMARKS

ALL MEASURMENTS IN DEPTH BELOW LAND SURFACE (BLS) OR ABOVE LAND SURFACE (ALS)

OPTIONAL

ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-39 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Fellowville	COUNTY Wake STATE NC	LOG BY TB
LAND SURFACE ELEV. 317.81	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-9-01 DATE COMPLETED 11-9-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



DRILL METHODS

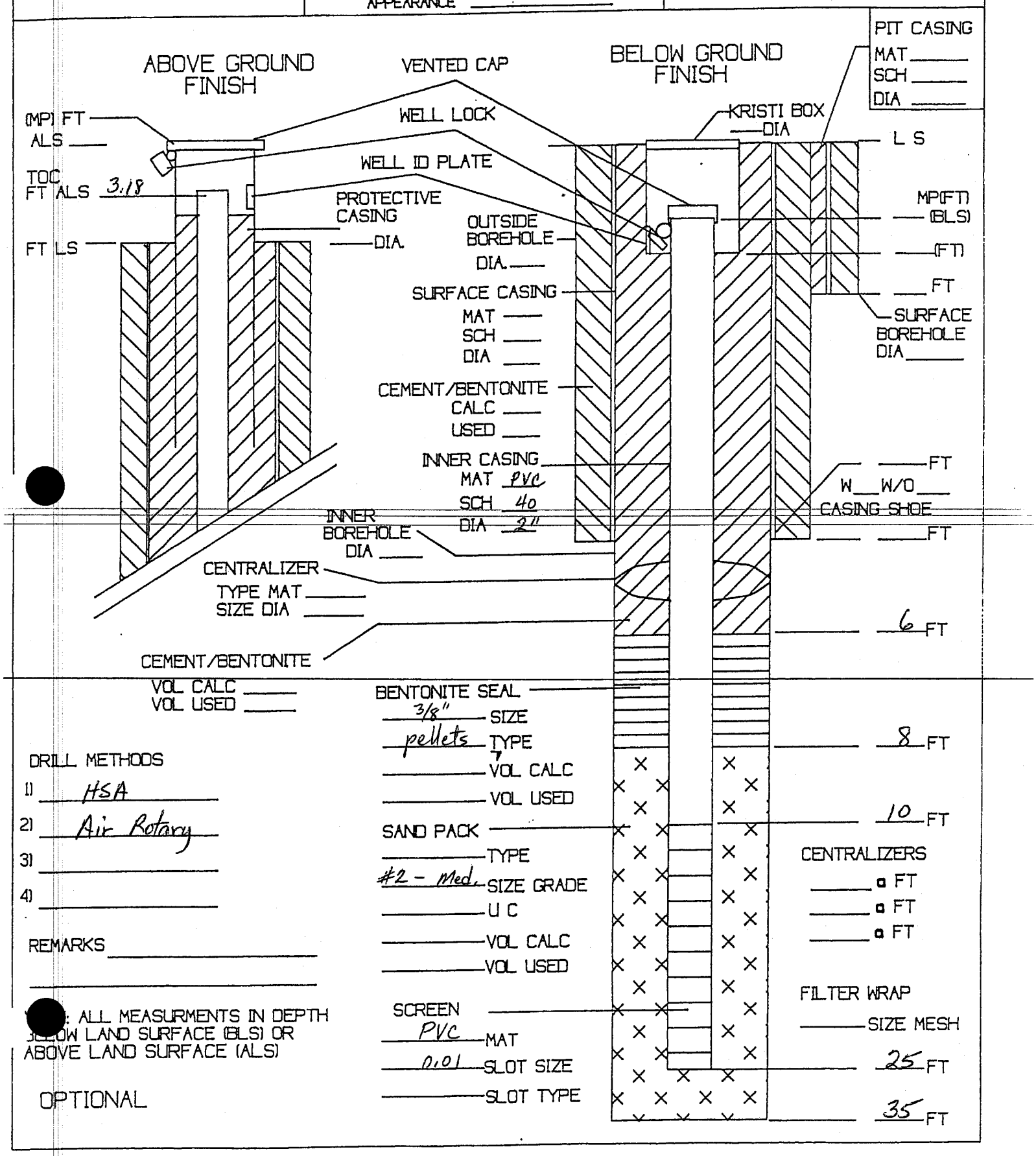
1) HSA
2) Air Rotary
3)
4)

REMARKS

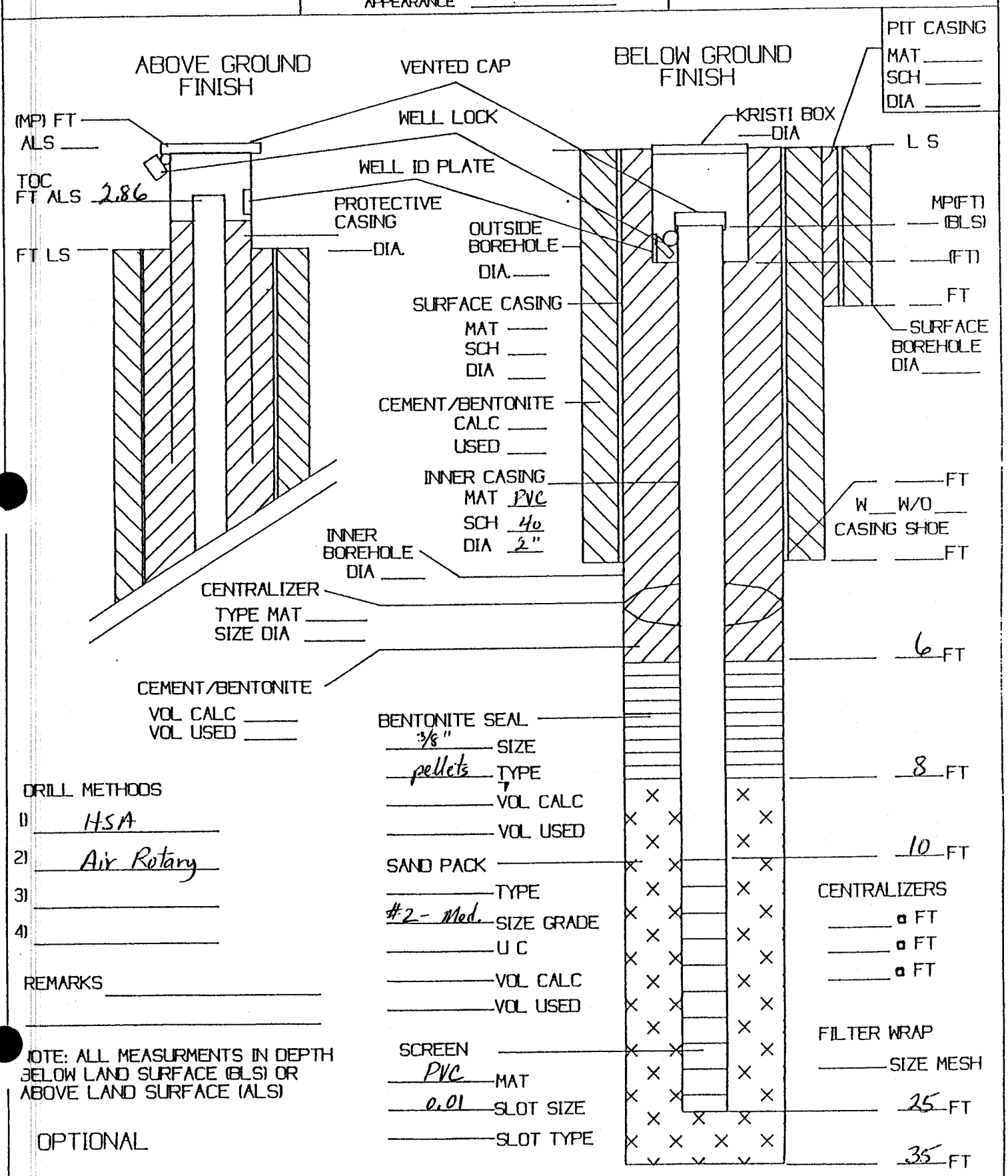
NOTE: ALL MEASURMENTS IN DEPTH BELOW LAND SURFACE (BLS) OR ABOVE LAND SURFACE (ALS)

OPTIONAL

ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-40 JOB # EP-1306 CLIENT Hux, 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY FB
SURFACE ELEV. 319.34	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-9-01 DATE COMPLETED 11-9-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



ENVIRO-PRO, P.C. CHARLOTTE, NC	WELL COMPLETION LOG TYPE (III)	WELL # MW-41 JOB # EP-1306 CLIENT Hwy 55 C&D Landfill, LLC
PROJECT LOCATION Feltonville	COUNTY Wake STATE NC	LOG BY FB
LAND SURFACE ELEV. 326.82	MEASURING PT. ELEV. (MP) LS	DATE BEGAN 11-9-01 DATE COMPLETED 11-9-01
WELL DEV. METHOD	VOLUME EVAC. ____ APPEARANCE ____	MONITORED FORMATION



BOUWER RIC THOD
SLUG (BAIL-OUT) TESTING ANALYSIS

PAGE 1

Site Information

Project Number:	EP-1306
Site Location:	HWY 55 C&D LANDFILL
Client:	
Site Name:	

Well and Aquifer Information

Well Number:	MW-36
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	29.36
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	11.17
Static WT - Bottom of Intake (H) (ft):	11.17
Saturated Aquifer Thickness (D) (ft):	100

WORKSHEET GENERATED VALUES

L/rw:	44.68
D-H:	88.83
H/rw:	44.68

Analysis Input (From Coefficient Curves)

Coefficient A	2.8
Coefficient B	0.5

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	2.47
Drawdown at time t (Yt) (ft):	1.56
Time (t) (min):	60

Analysis

$$\ln Re/rw = [1.1/\ln(H/rw)+(A+B\ln[(D-H)/rw]/(L/rw))]-1$$

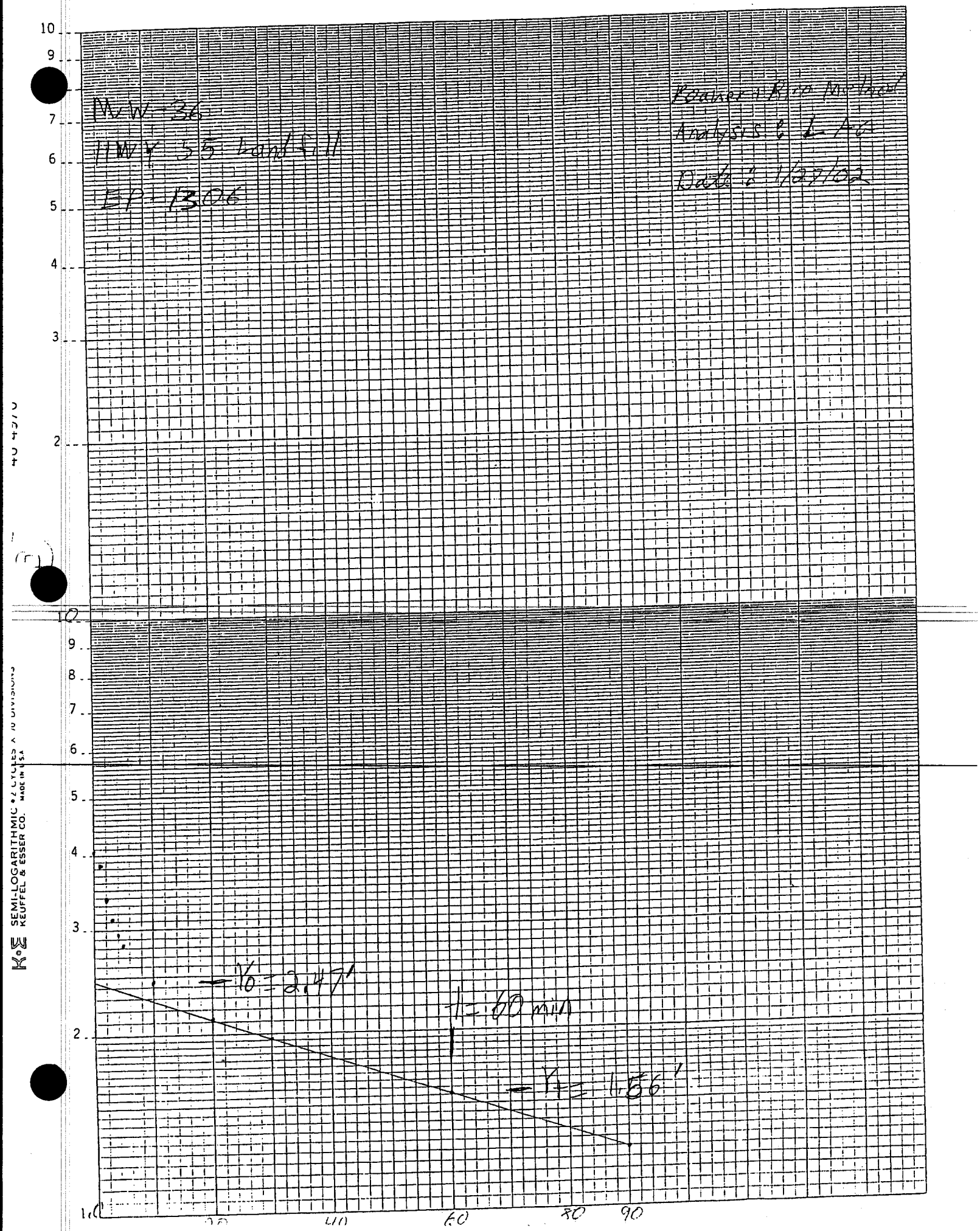
= 2.39

$$K = rc^2 \ln(Re/rw)/2L * 1/t * \ln(Yo/Yt)$$

= 5.65E-06 Ft/min
= 0.008 Ft/day

$$T = Kb$$

= 0.81 Ft^2/day


MW-36
HWY 55 Landfill
EP-1306
Boaner + Rice Method
Analysis: LAG
Date: 1/27/02
Y0 = 2.47'
t = 60 min
Yt = 1.56'
10
9
8
7
6
5
4
3
2
1.0
20
40
60
80
90
SEMI-LOGARITHMIC • 2 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

SLUG TEST DATA SHEET

PROJECT NAME	HWY 55 C&D LANDFILL	DATE	1/10/2002
PROJECT NUMBER	EP-1306	PERSONNEL	THB

METHOD USED: BAIL X VOL. REMOVED

SLUG VOL. REMOVED

DEPTH OF WELL (FT BGS)	27	WELL I.D.	MW-36
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	18.19
SCREEN INTERVAL (FT BGS)	12-27	WATER LEVEL @ t=0 (Ho)	22.27
SCREEN DIAMETER (IN)	2	MP DESCRIPTION	TOC
BORING DIAMETER (IN)	6	STICKUP AGS (FT)	2.36
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (FT BGS)	12.5
FULLY PENETRATING		AQUIFER THICKNESS (FT)	100

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	22.27	4.08	
1	0.5	22.03	3.84	
2	1	21.88	3.69	
3	1.5	21.73	3.54	
4	2	21.57	3.38	
5	3	21.30	3.11	
6	4	21.14	2.95	
7	5	21.00	2.81	
8	10	20.64	2.45	
9	20	20.31	2.12	
10	30	20.15	1.96	
11	60	19.75	1.56	
12	90	19.43	1.24	
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

PAGE 2 ,

Site Information	
Project Number:	EP-1306
Site Location:	HWY 55 C&D LANDFILL
Client:	0
Site Name:	0
Well and Aquifer Information	
Well Number:	MW-4
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	37.35
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	12.25
Static WT - Bottom of Intake (H) (ft):	12.25
Saturated Aquifer Thickness (D) (ft):	100
WORKSHEET GENERATED VALUES	
L/rw:	49.00
D-H:	87.75
H/rw:	49.00
Analysis Input (From Coefficient Curves)	
Coefficient A	2.9
Coefficient B	0.6
Coefficient C(if necessary)	
If H<D then use A & B	
If fully penetrating H=D, then use C	
Note:must change worksheet formula if using C	
Analysis Input (From Recovery Graph)	
Initial Drawdown (Yo) (ft):	4
Drawdown at time t (Yt) (ft):	1.7
Time (t) (min):	76

Analysis

ln Re/rw= [1.1/ln(H/rw)+(A+Bln[(D-H)/rw]/(L/rw))]-2

= **2.42**

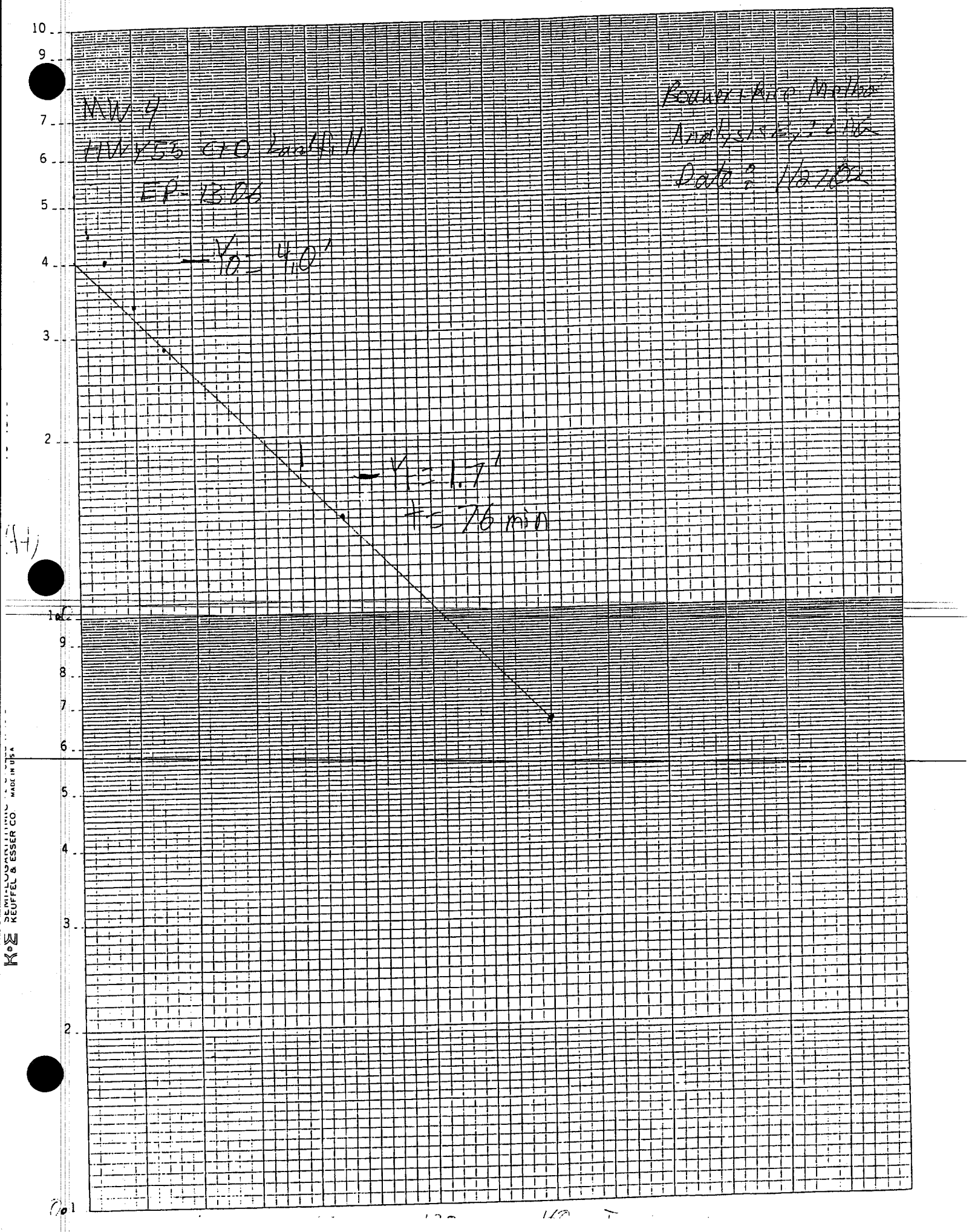
K= rc^2ln(Re/rw)/2L *1/t*ln(Yo/Yt)

= **7.65E-06** **Ft/min**

= **0.01** **Ft/day**

T= Kb

= **1.10** **Ft^2/day**


MW-4
HWY 55 CTO Landfill
EP-1306
Bouwer+Rice Method
Analysis by: [illegible]
Date: 1/27/02
$Y_0 = 4.0'$
$Y_1 = 1.7'$
t = 76 min
10
9
7
6
5
4
3
2
1.0
9
8
7
6
5
4
3
2
0.1
SEMI-LOGARITHMIC
KEUFFEL & ESSER CO. MADE IN U.S.A.

SLUG TEST DATA SHEET

PROJECT NAME	HWY 55 C&D LANDFILL	DATE	1/10/2002
PROJECT NUMBER	EP-1306	PERSONNEL	THB

METHOD USED: BAIL X VOL. REMOVED

SLUG VOL. REMOVED

DEPTH OF WELL (FT BGS)	35	WELL I.D.	MW-4
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	25.10
SCREEN INTERVAL (FT BGS)	20-35	WATER LEVEL @ t=0 (Ho)	30.32
SCREEN DIAMETER (IN)	2	MP DESCRIPTION	TOC
BORING DIAMETER (IN)	6	STICKUP AGS (FT)	2.35
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (FT BGS)	18
FULLY PENETRATING		AQUIFER THICKNESS (FT)	100

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	30.32	5.22	
1	0.5	30.15	5.05	
2	1	30.04	4.94	
3	2	29.90	4.8	
4	3	29.76	4.66	
5	4	29.66	4.56	
6	5	29.56	4.46	
7	10	29.11	4.01	
8	15	28.78	3.68	
9	20	28.47	3.37	
10	30	27.97	2.87	
11	90	26.71	1.61	
12	160	25.75	0.65	
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

PAGE 3

Site Information

Project Number:	EP-1306
Site Location:	HWY 55 C&D LANDFILL
Client:	0
Site Name:	0

Well and Aquifer Information

Well Number:	MW-15
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	25.9
Boring Radius (rw) (ft):	0.333
Length of Intake(L) (ft):	15
Static WT - Bottom of Intake (H) (ft):	15.34
Saturated Aquifer Thickness (D) (ft):	21.34

WORKSHEET GENERATED VALUES

L/rw:	45.05
D-H:	6.00
H/rw:	46.07

Analysis Input (From Coefficient Curves)

Coefficient A	2.8
Coefficient B	0.5

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	5.7
Drawdown at time t (Yt) (ft):	3.4
Time (t) (min):	80

Analysis

ln Re/rw= [1.1/ln(H/rw)+(A+Bln[(D-H)/rw]/(L/rw))]-3

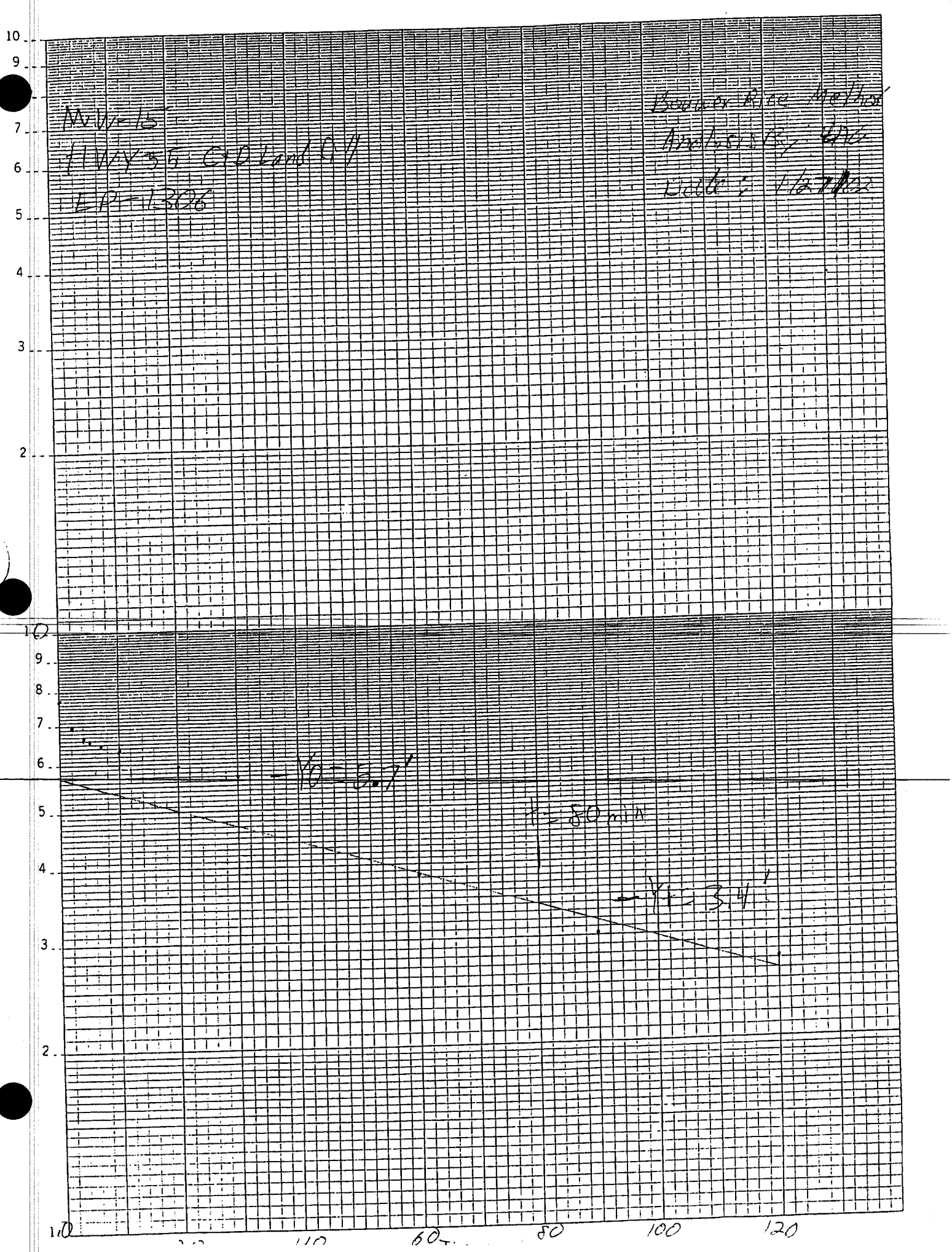
= **2.62**

K= rc^2ln(Re/rw)/2L *1/t*ln(Yo/Yt)

= **3.89E-06** **Ft/min**
= **0.006** **Ft/day**

T= Kb

= **0.12** **Ft^2/day**


MW-15
HWY 55 C&D Landfill
EP-1306
Bouwer Rice Method
Analysis By: [illegible]
Date: 1/27/02
Y0 = 5.7'
t = 80 min
Yt = 3.4'
10
60
80
100
120
SEMI-LOGARITHMIC • 2 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 4970

SLUG TEST DATA SHEET

PROJECT NAME	HWY 55 C&D LANDFILL	DATE	1/10/2002
PROJECT NUMBER	EP-1306	PERSONNEL	THB

METHOD USED: BAIL X VOL. REMOVED

SLUG VOL. REMOVED

DEPTH OF WELL (FT BGS)	24	WELL I.D.	MW-15
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	10.56
SCREEN INTERVAL (FT BGS)	9-24	WATER LEVEL @ t=0 (Ho)	18.30
SCREEN DIAMETER (IN)	2	MP DESCRIPTION	TOC
BORING DIAMETER (IN)	8	STICKUP AGS (FT)	1.90
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (FT BGS)	30
FULLY PENETRATING		AQUIFER THICKNESS (FT)	21.34

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	18.30	7.74	
1	0.5	17.97	7.41	
2	1	17.79	7.23	
3	1.5	17.63	7.07	
4	2	17.52	6.96	
5	2.5	17.41	6.85	
6	3	17.35	6.79	
7	4	17.22	6.66	
8	5	17.15	6.59	
9	7	17.02	6.46	
10	10	16.88	6.32	
11	20	16.47	5.91	
12	30	16.25	5.69	
13	60	14.40	3.84	
14	90	13.62	3.06	
15	120	13.28	2.72	
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

PAGE 4

Site Information

Project Number:	EP-1306
Site Location:	HWY 55 C&D LANDFILL
Client:	0
Site Name:	0

Well and Aquifer Information

Well Number:	MW-37
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	25.09
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	12.26
Static WT - Bottom of Intake (H) (ft):	12.26
Saturated Aquifer Thickness (D) (ft):	100

WORKSHEET GENERATED VALUES

L/rw:	49.04
D-H:	87.74
H/rw:	49.04

Analysis Input (From Coefficient Curves)

Coefficient A	2.9
Coefficient B	0.6

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	4.7
Drawdown at time t (Yt) (ft):	1.85
Time (t) (min):	84

Analysis

$$\ln Re/rw = [1.1/\ln(H/rw)+(A+B\ln[(D-H)/rw]/(L/rw))]-4$$

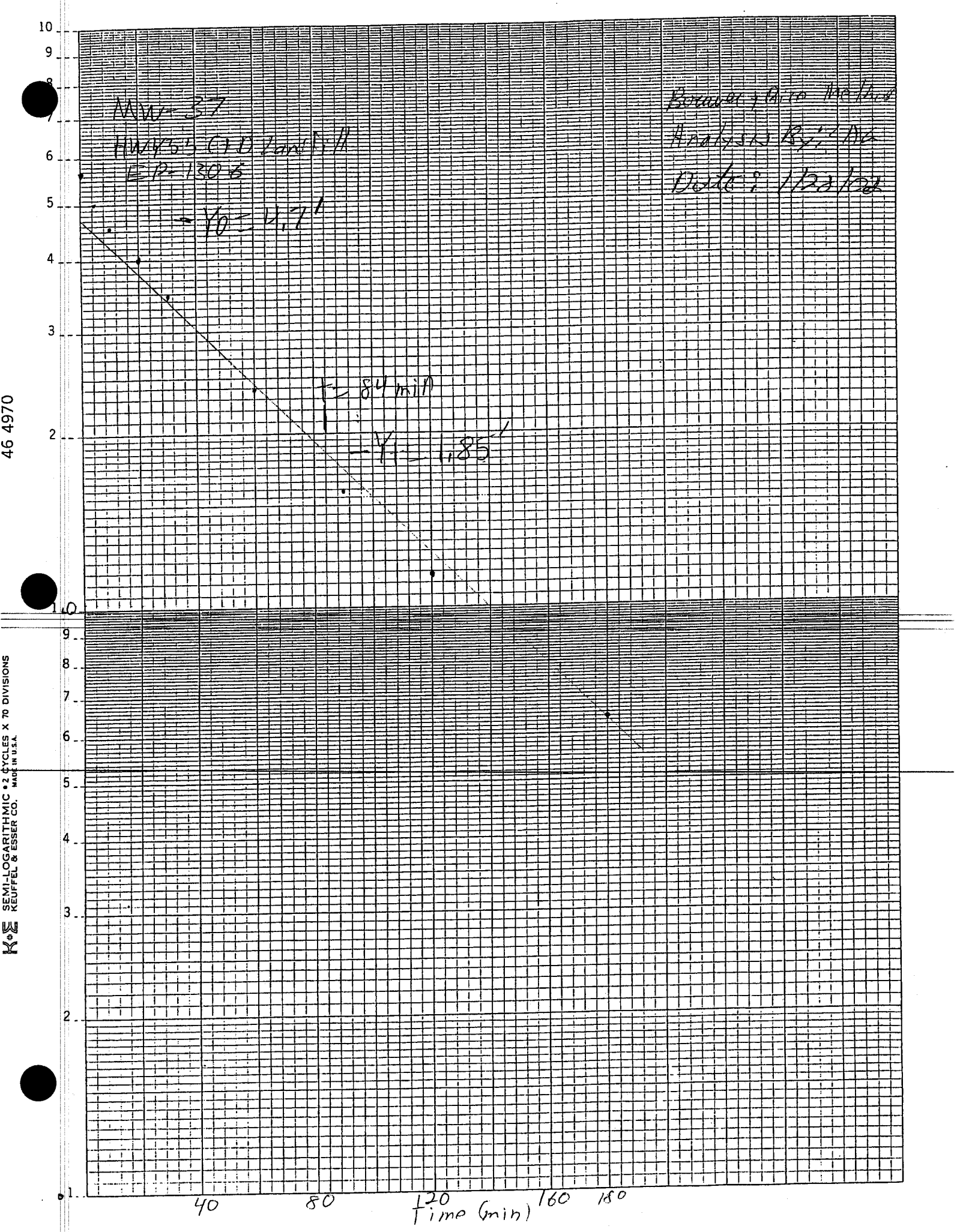
= **2.42**

$$K = rc^2 \ln(Re/rw)/2L * 1/t * \ln(Yo/Yt)$$

= **7.54E-06** **Ft/min**
= **0.01** **Ft/day**

$$T = Kb$$

= **1.09** **Ft^2/day**


MW-37
HWY 55 CTD Landfill
EP-1306
Y0 = 4.7'
t = 84 min
Y1 = 1.85'
Bouwer & Rice Method
Analysis By: Ma
Date: 1/23/02
40
80
120
160
180
Time (min)
46 4970
SEMI-LOGARITHMIC • 2 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

PAGE 5

Site Information

Project Number:	EP-1306
Site Location:	HWY 55 C&D LANDFILL
Client:	0
Site Name:	0

Well and Aquifer Information

Well Number:	MW-13D
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	52.76
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	5
Static WT - Bottom of Intake (H) (ft):	34.95
Saturated Aquifer Thickness (D) (ft):	100

WORKSHEET GENERATED VALUES

L/rw:	20.00
D-H:	65.05
H/rw:	139.80

Analysis Input (From Coefficient Curves)

Coefficient A	2
Coefficient B	0.4

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	9.9
Drawdown at time t (Yt) (ft):	8.1
Time (t) (min):	150

Analysis

$$\ln Re/rw = [1.1/\ln(H/rw)+(A+B\ln[(D-H)/rw]/(L/rw))]-5$$

= **2.30**

$$K = rc^2 \ln(Re/rw)/2L * 1/t * \ln(Yo/Yt)$$

= **2.12E-06** **Ft/min**
= **0.003** **Ft/day**

$$T = Kb$$

= **0.31** **Ft^2/day**

SLUG TEST DATA SHEET

PROJECT NAME	HWY 55 C&D LANDFILL	DATE	1/10/2002
PROJECT NUMBER	EP-1306	PERSONNEL	THB

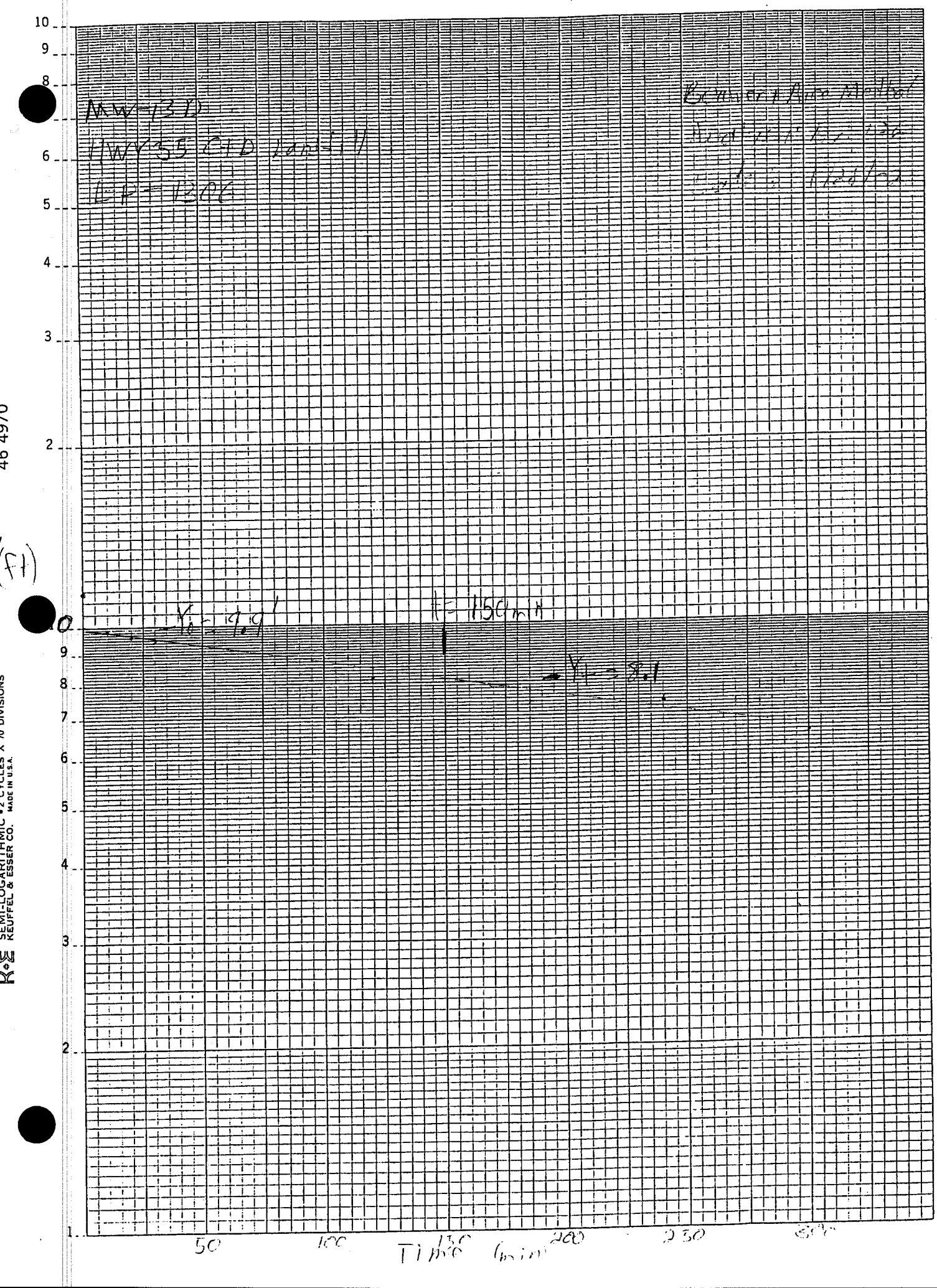
METHOD USED: BAIL X VOL. REMOVED

SLUG VOL. REMOVED

DEPTH OF WELL (FT BGS)	22	WELL I.D.	MW-37
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	12.83
SCREEN INTERVAL (FT BGS)	7-22	WATER LEVEL @ t=0 (Ho)	18.44
SCREEN DIAMETER (IN)	2	MP DESCRIPTION	TOC
BORING DIAMETER (IN)	6	STICKUP AGS (FT)	3.09
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (FT BGS)	15
FULLY PENETRATING		AQUIFER THICKNESS (FT)	100.00

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	18.44	5.61	
1	0.5	18.30	5.47	
2	1	18.20	5.37	
3	2	18.14	5.31	
4	3	18.03	5.20	
5	4	17.92	5.09	
6	5	17.83	5.00	
7	10	17.36	4.53	
8	20	16.83	4.00	
9	30	16.29	3.46	
10	60	15.21	2.38	
11	90	14.41	1.58	
12	120	13.97	1.14	
13	180	13.47	0.64	
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				



46 4970
SEMI-LOGARITHMIC 2 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

SLUG TEST DATA SHEET

PROJECT NAME	HWY 55 C&D LANDFILL	DATE	1/10/2002
PROJECT NUMBER	EP-1306	PERSONNEL	THB

METHOD USED: BAIL X VOL. REMOVED

SLUG VOL. REMOVED

DEPTH OF WELL (FT BGS)	50	WELL I.D.	MW-13D
SCREEN LENGTH (ft)	5	STATIC WATER LEVEL (Hi)	17.81
SCREEN INTERVAL (FT BGS)	45-50	WATER LEVEL @ t=0 (Ho)	27.95
SCREEN DIAMETER (IN)	2	MP DESCRIPTION	TOC
BORING DIAMETER (IN)	6	STICKUP AGS (FT)	2.76
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (FT BGS)	15
FULLY PENETRATING		AQUIFER THICKNESS (FT)	100.00

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	27.95	10.14	
1	0.5	27.90	10.09	
2	1	27.88	10.07	
3	2	27.84	10.03	
4	3	27.80	9.99	
5	4	27.77	9.96	
6	5	27.74	9.93	
7	10	27.67	9.86	
8	20	27.47	9.66	
9	30	27.26	9.45	
10	120	25.95	8.14	
11	240	25.20	7.39	
12	300	24.26	6.45	
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

PAGE 6

Site Information

Project Number:	EP-1306
Site Location:	HWY 55 C&D LANDFILL
Client:	0
Site Name:	0

Well and Aquifer Information

Well Number:	MW-13
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	32.68
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	15
Static WT - Bottom of Intake (H) (ft):	15.25
Saturated Aquifer Thickness (D) (ft):	100

WORKSHEET GENERATED VALUES

L/rw:	60.00
D-H:	84.75
H/rw:	61.00

Analysis Input (From Coefficient Curves)

Coefficient A	3.2
Coefficient B	0.6

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	2.1
Drawdown at time t (Yt) (ft):	1.55
Time (t) (min):	110

Analysis

$$\ln Re/rw = [1.1/\ln(H/rw)+(A+B\ln[(D-H)/rw]/(L/rw))]-6$$

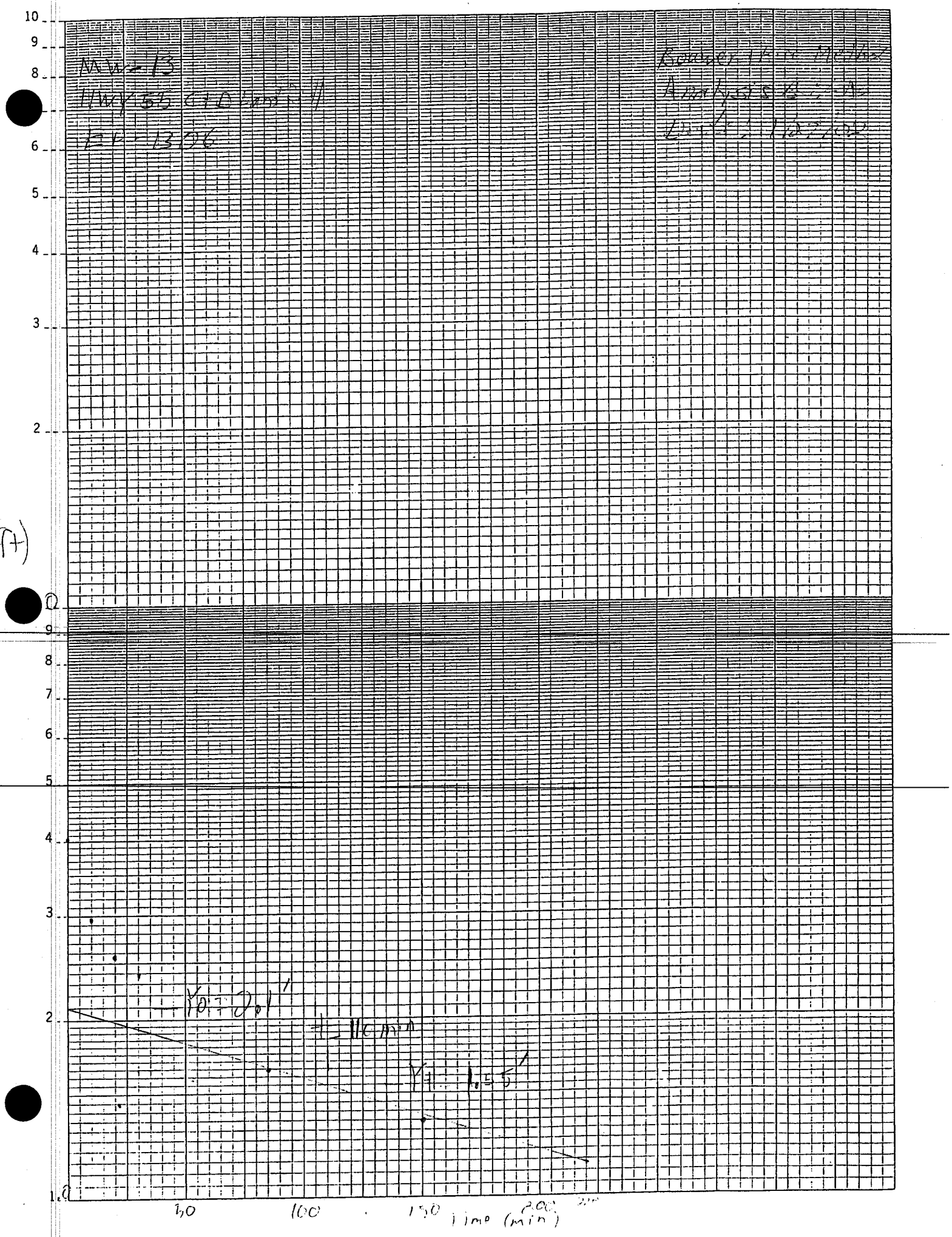
= **2.64**

$$K = rc^2 \ln(Re/rw)/2L * 1/t * \ln(Yo/Yt)$$

= **1.67E-06** **Ft/min**
= **0.002** **Ft/day**

$$T = Kb$$

= **0.24** **Ft^2/day**


MW-13
Bouwer Rice Method
Analysis
Date: 1/02/02
Y0 = 2.1'
t = 110 min
Yt = 1.55'
(ft)
50
100
150
200
Time (min)
KEUFFEL & ESSER CO.
MADE IN U.S.A.

SLUG TEST DATA SHEET

PROJECT NAME	HWY 55 C&D LANDFILL	DATE	1/10/2002
PROJECT NUMBER	EP-1306	PERSONNEL	THB

METHOD USED: BAIL X VOL. REMOVED
SLUG VOL. REMOVED

DEPTH OF WELL (FT BGS)	30	WELL I.D.	MW-13
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	17.43
SCREEN INTERVAL (FT BGS)	15-30	WATER LEVEL @ t=0 (Ho)	21.45
SCREEN DIAMETER (IN)	2	MP DESCRIPTION	TOC
BORING DIAMETER (IN)	6	STICKUP AGS (FT)	2.68
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (FT BGS)	15
FULLY PENETRATING		AQUIFER THICKNESS (FT)	100.00

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	21.45	4.02	
1	0.5	21.25	3.82	
2	1	21.15	3.72	
3	2	21.00	3.57	
4	3	20.88	3.45	
5	4	20.79	3.36	
6	5	20.70	3.27	
7	10	20.39	2.96	
8	20	19.97	2.54	
9	30	19.81	2.38	
10	90	19.07	1.64	
11	150	18.78	1.35	
12	220	18.56	1.13	
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

PAGE 7

Site Information

Project Number:	EP-1306
Site Location:	HWY 55 C&D LANDFILL
Client:	0
Site Name:	0

Well and Aquifer Information

Well Number:	MW-10
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	27.21
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	10.13
Static WT - Bottom of Intake (H) (ft):	10.13
Saturated Aquifer Thickness (D) (ft):	100

WORKSHEET GENERATED VALUES

L/rw:	40.52
D-H:	89.87
H/rw:	40.52

Analysis Input (From Coefficient Curves)

Coefficient A	2.7
Coefficient B	0.4

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	4.78
Drawdown at time t (Yt) (ft):	4.3
Time (t) (min):	140

Analysis

$$\ln Re/rw = [1.1/\ln(H/rw)+(A+B\ln[(D-H)/rw]/(L/rw))]-6$$

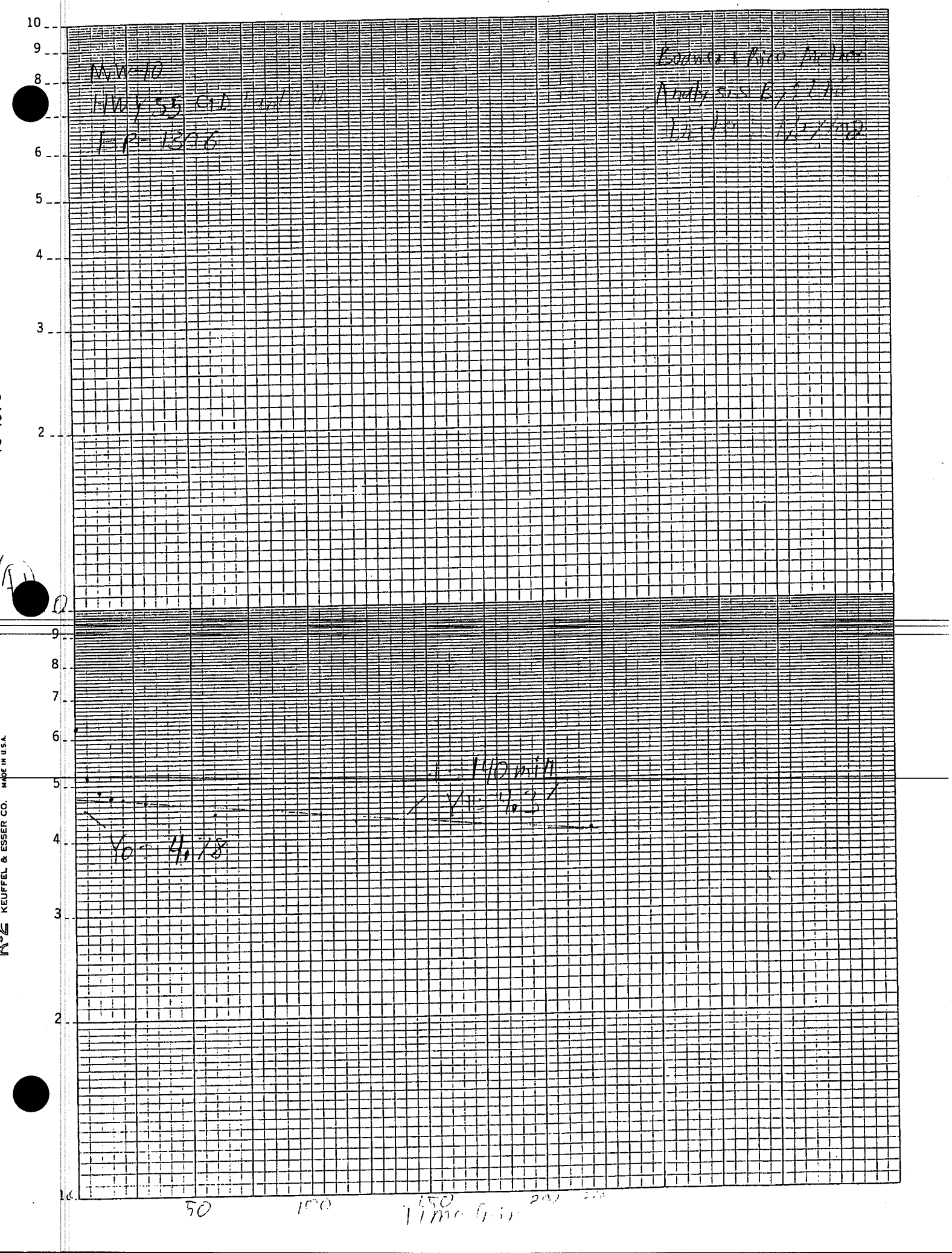
= **2.37**

$$K = rc^2 \ln(Re/rw)/2L * 1/t * \ln(Yo/Yt)$$

= **6.09E-07** **Ft/min**
= **0.001** **Ft/day**

$$T = Kb$$

= **0.088** **Ft^2/day**


MW-10
140 min
Y0 = 4.78
50
100
150
200
Time Min

SLUG TEST DATA SHEET

PROJECT NAME	HWY 55 C&D LANDFILL	DATE	1/10/2002
PROJECT NUMBER	EP-1306	PERSONNEL	THB

METHOD USED: BAIL X VOL. REMOVED

SLUG VOL. REMOVED

DEPTH OF WELL (FT BGS)	25	WELL I.D.	MW-10
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	17.08
SCREEN INTERVAL (FT BGS)	10-25	WATER LEVEL @ t=0 (Ho)	23.32
SCREEN DIAMETER (IN)	2	MP DESCRIPTION	TOC
BORING DIAMETER (IN)	6	STICKUP AGS (FT)	2.21
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (FT BGS)	17
FULLY PENETRATING		AQUIFER THICKNESS (FT)	100.00

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	23.32	6.24	
1	0.5	23.00	5.92	
2	1	22.86	5.78	
3	2	22.65	5.57	
4	3	22.47	5.39	
5	4	22.33	5.25	
6	5	22.21	5.13	
7	10	21.97	4.89	
8	15	21.86	4.78	
9	20	21.79	4.71	
10	30	21.72	4.64	
11	60	21.50	4.42	
12	120	21.35	4.27	
13	220	21.19	4.11	
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

PAGE 8

Site Information

Project Number:	EP-1306
Site Location:	HWY 55 C&D LANDFILL
Client:	0
Site Name:	0

Well and Aquifer Information

Well Number:	MW-29
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	22.57
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	14.55
Static WT - Bottom of Intake (H) (ft):	14.55
Saturated Aquifer Thickness (D) (ft):	100

WORKSHEET GENERATED VALUES

L/rw:	58.20
D-H:	85.45
H/rw:	58.20

Analysis Input (From Coefficient Curves)

Coefficient A	3.1
Coefficient B	0.6

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	5.3
Drawdown at time t (Yt) (ft):	4.6
Time (t) (min):	150

Analysis

$$\ln Re/rw = [1.1/\ln(H/rw)+(A+B\ln[(D-H)/rw]/(L/rw))]-6$$

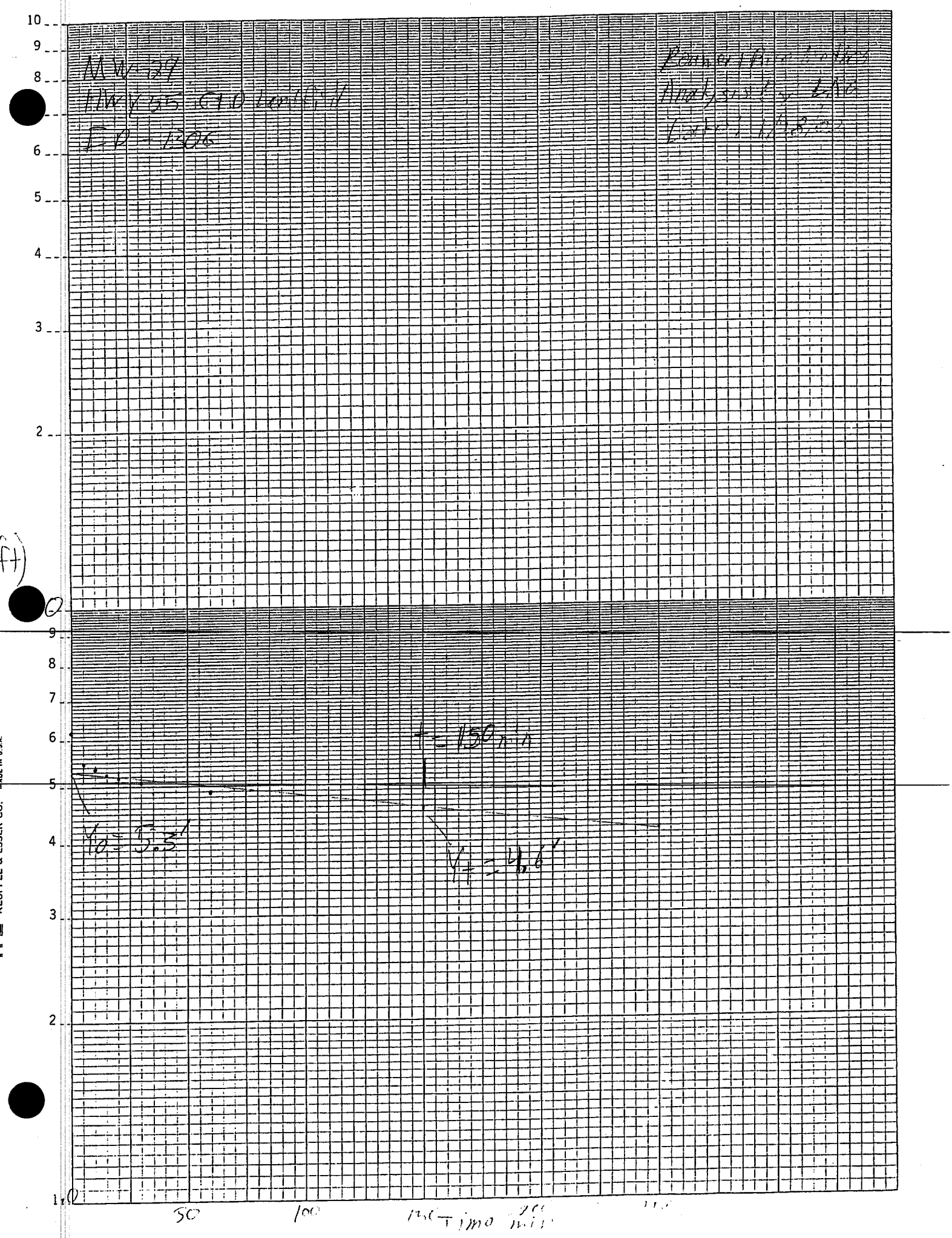
= **2.60**

$$K = rc^2 \ln(Re/rw)/2L * 1/t * \ln(Yo/Yt)$$

= **5.82E-07** **Ft/min**
= **0.001** **Ft/day**

$$T = Kb$$

= **0.084** **Ft^2/day**


MW-29
HWY 55 CID Landfill
ED-1306
Analysis by LAC
t = 150 min
Y0 = 5.3'
Yt = 4.6'
50
100
150
Time min

SLUG TEST DATA SHEET

PROJECT NAME	HWY 55 C&D LANDFILL	DATE	1/10/2002
PROJECT NUMBER	EP-1306	PERSONNEL	THB

METHOD USED: BAIL X VOL. REMOVED
SLUG VOL. REMOVED

DEPTH OF WELL (FT BGS)	20	WELL I.D.	MW-29
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	8.02
SCREEN INTERVAL (FT BGS)	5-20	WATER LEVEL @ t=0 (Ho)	14.2
SCREEN DIAMETER (IN)	2	MP DESCRIPTION	TOC
BORING DIAMETER (IN)	6	STICKUP AGS (FT)	2.57
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (FT BGS)	12
FULLY PENETRATING		AQUIFER THICKNESS (FT)	100.00

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	14.20	6.18	
1	0.5	13.98	5.96	
2	1	13.82	5.80	
3	1.5	13.74	5.72	
4	2	13.66	5.64	
5	3	13.60	5.58	
6	4	13.54	5.52	
7	5	13.49	5.47	
8	10	13.35	5.33	
9	15	13.25	5.23	
10	20	13.19	5.17	
11	30	13.09	5.07	
12	60	12.91	4.89	
13	150	12.56	4.54	
14	250	12.21	4.19	
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

SLUG TEST DATA SHEET

PROJECT NAME	HWY 55 C&D LANDFILL	DATE	1/10/2002
PROJECT NUMBER	EP-1306	PERSONNEL	THB

METHOD USED: BAIL X VOL. REMOVED
SLUG VOL. REMOVED

DEPTH OF WELL (FT BGS)	55	WELL I.D.	MW-31
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	32.28
SCREEN INTERVAL (FT BGS)	30-45	WATER LEVEL @ t=0 (Ho)	40.35
SCREEN DIAMETER (IN)	2	MP DESCRIPTION	TOC
BORING DIAMETER (IN)	6	STICKUP AGS (FT)	2.37
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (FT BGS)	20
FULLY PENETRATING		AQUIFER THICKNESS (FT)	100.00

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	40.35	8.07	
1	0.5	40.3	8.02	
2	1	40.28	8.00	
3	2	40.26	7.98	
4	5	40.23	7.95	
5	10	40.21	7.93	
6	20	40.2	7.92	
7	60	40.17	7.89	
8	120	40.12	7.84	
9	180	40.07	7.79	
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

SHIELD
ENGINEERING, INC.

4301 Taggart Creek Road
Charlotte, NC 28208
Phone: (704) 394-6913
Phone: (800) 395-5220
Fax: (704) 394-6968

FACSIMILE TRANSMITTAL SHEET

To: Ron Gilkerson

From: Chrissie Raymer

Company: Griffin Brothers

Fax No: (704) 896-2960

Date: April 1, 2002

# of pages
including this page: 2

Re: Total Porosity Vs. Effective Porosity

Comments:

If you have any questions or need more information, give me a call.

C. Raymer

Please notify us as soon as possible of any transmission problems.

*The information contained in this facsimile message is legally **privileged and confidential information** intended only for the use of the individual or entity named above. If the reader of this message is not the intended recipient (or the employee or agent responsible to deliver it to the intended recipient), you are hereby notified that any dissemination, distribution or copy of this communication is strictly prohibited. If you have received this communication in error, please notify us **immediately** by telephone and return the original message to us at the above address. Thank you.*

SHIELD ENVIRONMENTAL ASSOCIATES, INC.

BY CRR DATE 04/01/02

CHKD. BY _____ DATE _____

CLIENT	GRIFFIN BROTHERS	SHEET 1	OF 1
PROJECT	HIGHWAY 55 C&D LANDFILL	PROJECT NO.	1012081-01
SUBJECT	TOTAL POROSITY VS. EFFECTIVE POROSITY	TASK NO.	

TOTAL POROSITY & EFFECTIVE POROSITY

TOTAL POROSITY, n_T IS GIVEN BY:

$$n_T = n_e + n_u \qquad (1)$$

WHERE; n_e = EFFECTIVE POROSITY

n_u = PORE-WATER POROSITY DUE TO WATER PRESSURE

FOR FULLY SATURATED SOIL SAMPLES,

$$n_T = n_e + n_u$$

WHERE GROUNDWATER LEVEL IS ABOVE THE SAMPLE DEPTH AND THE SAMPLES ARE SUBMERGED.

HOWEVER, FOR PARTIALLY SATURATED SAMPLES, WHERE GROUNDWATER IS BELOW THE DEPTH OF SAMPLING,

$$n_u = 0 \quad \text{THEREFORE} \quad n_T = n_e \qquad (2)$$

THE SAMPLES MW-26(3'-5'), MW-29(3'-4'), AND SB-1(3'-5') WERE PARTIALLY SATURATED. NO GROUNDWATER TABLE WAS OBSERVED DURING SAMPLE COLLECTION. THEREFORE, EQUATION (2) HOLDS.

THEREFORE, $n_e = n_T$

Geophysical Survey at The Proposed HWY 55 C&D Landfill & Recycling Center Wake County, NC

Geophex Job No. 1136

SCANNED 3/13/14

Submitted to:

Griffin Brothers Companies
19109-118 West Catawba Ave.
Cornelius, NC 28031-5613

Headquarters

Geophex Services, Ltd.
622 Maywood Avenue
Raleigh, NC 27603-2343

Tel: (919) 839-8515
Fax: (919) 839-8528
Website: www.geophex.com
Email: geophex@geophex.com

September 2001

Geophex, Ltd.
terram et mare exploramus

Table of Contents

Table of Contents i
List of Figures i
Executive Summary ii
1.0 Introduction 1
2.0 Magnetic Survey Results 2
Appendix A – Magnetic Method A-1

List of Figures

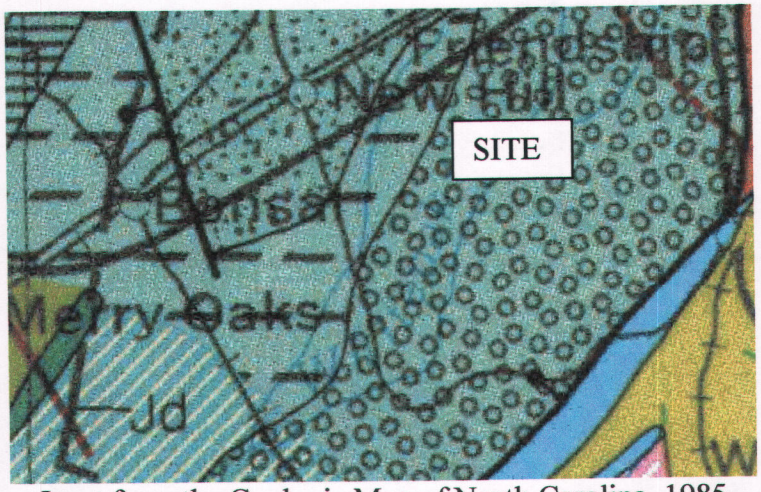
Figure 1. Vicinity map showing general location of the site. 1
Figure 2. G-858 walked in search mode along the southern boundary 2
Figure 3. G-858 survey along access road 2
Figure 4. Site map showing magnetic survey lines 3
Figure 5. Line 1 was run East-West along the dirt access road cut E-W through the center of the site 3
Figure 6. Line 2 was run North -South along the western most N-S access road 4
Figure 7. Line 3 was run North-South along the next N-S access road 4
Figure 8. Line 4 was run North-South along the next N-S access road 5
Figure 9. Line 5 was run North-South along the next N-S access road 5
Figure 10. Line 6 was run North-South along the next N-S access road 6
Figure 11. Line 7 was North-South along the dirt access road from Old Smithfield Road 6

Executive Summary

During September 2001, Geophex, Ltd. conducted a geophysical survey to identify any diabase dikes at the proposed Hwy 55 C&D Landfill & Recycling Center located in south Wake County, NC. No diabase dikes were identified at this site.

As a precursor to our geophysical survey, we conducted a simple review of published sources for references to mapped dikes in the vicinity of the site. The Geologic Map of North Carolina (1985) does not indicate any mapped dikes through this site.

Geophex used a Geometrics G-858 portable magnetometer to collect magnetic profile data along all boundaries of this site to determine if any diabase dikes traverse the area. Our procedure called for the instrument operator to walk a traverse in either search mode (no data recorded), or in continuous survey mode (recording data), while reviewing the real-time graphical display for a response that would be indicative of a diabase dike. If an anomaly was found, it was investigated in a circular fashion to determine if the anomaly had any linear extent. We found no magnetic anomaly to indicate a diabase dike in this site area.



Inset from the Geologic Map of North Carolina, 1985

LEGEND: TRIASSIC BASINS

CHATHAM GROUP

- TRC — CHATHAM GROUP, UNDIVIDED — Conglomerate, fanglomerate, sandstone, and mudstone. Conglomerate and fanglomerate shown by pattern
- Arkosic sandstone, tan, medium- to very coarse-grained, micaceous
- Sandstone and mudstone with thin interbeds of chert and impure limestone
- Arkosic sandstone and clayey sandstone, brown; interbedded with brown to dark-gray sandstone and mudstone
- TRCS — SANFORD FORMATION — Conglomerate, fanglomerate, sandstone, and mudstone
- TRCD — CUMNOCK FORMATION — Sandstone and mudstone, gray to black; coal beds and carbonaceous shale. Grades into Pekin and Sanford formations.
- TRCP — PEKIN FORMATION — Conglomerate, sandstone, and mudstone

INTRUSIVE ROCKS

- Jd — DIABASE — Dikes and sills, gray to black

1.0 Introduction

On September 12 & 13, 2001, Geophex, Ltd. conducted a magnetic survey at the proposed Hwy 55 C&D Landfill & Recycling Center located in south Wake County, NC (Figure 1). The objective of the survey was to locate any diabase dike(s) on the site.

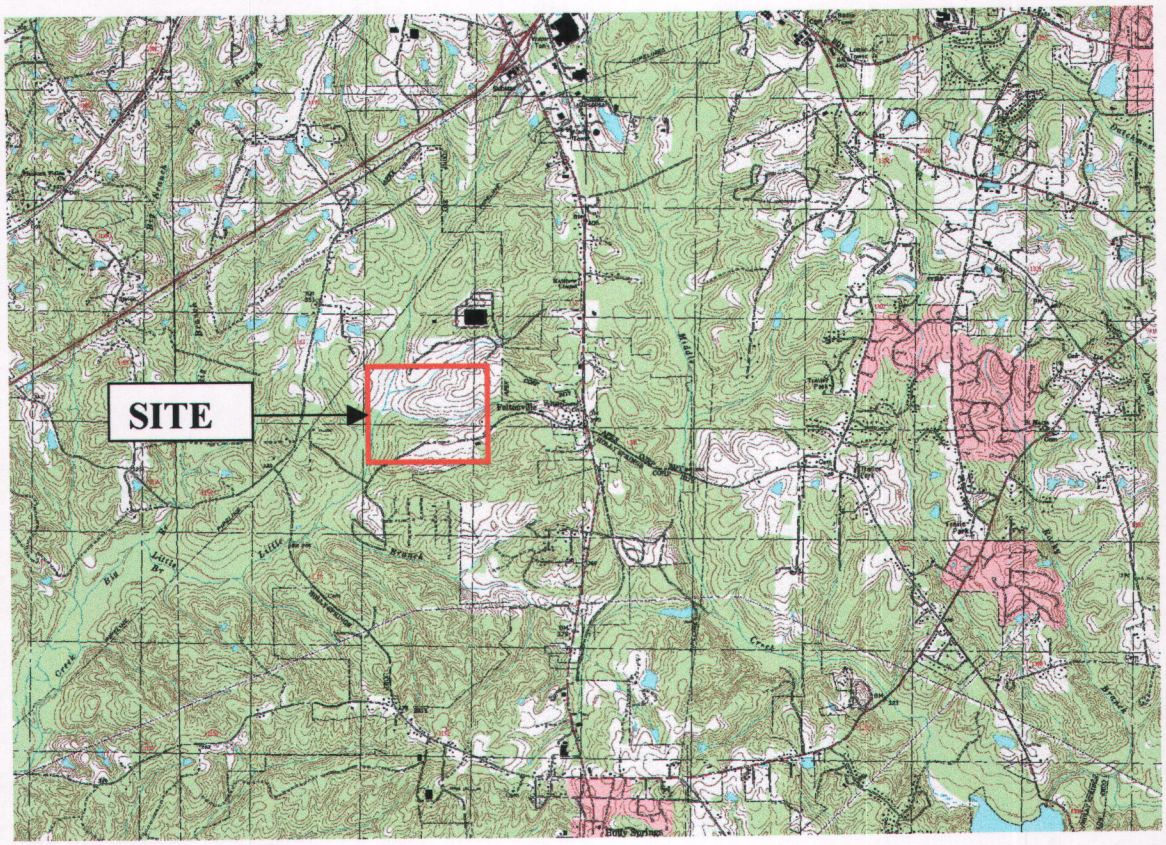


Figure 1. Vicinity map showing general location of the site.

A cesium vapor magnetometer model G-858, built by Geometrics, Inc., was used to collect continuous total magnetic field data. The G-858 has a graphics screen for real-time plotting of the data, and can also store the data for download to a PC. Stored data were downloaded to a laptop computer in the field for immediate processing. Spatial (i.e., x-y) coordinates were assigned to each sensor reading using standard dead-reckoning procedures. The magnetic profiles were then viewed to identify any anomalies that might be indicative of a diabase dike. The locations of magnetic profile lines were measured using differentially corrected global positioning sensor (DGPS) data.

2.0 Magnetic Survey Results

The magnetic method involves measuring the magnitude of the earth's magnetic field at regular intervals along a surveyed line. The earth's ambient magnetic field interacts with materials of high magnetic susceptibility and magnetizes the material. The magnetic field measured is the magnitude of the vector sum of the earth's magnetic field and the field from the magnetized object. The magnetic susceptibility of geologic materials is proportional to the amount of ferrous iron in the material. Sedimentary rocks, containing little iron, generally have low magnetic susceptibility, while rocks containing magnetite and other iron-rich minerals are highly susceptible to magnetization.

The contrast between the high magnetic susceptibility of diabase dikes and the low susceptibility sedimentary rocks results in magnetic anomalies along the interface. In areas with no dikes, the sedimentary rocks are not magnetized and do not contribute significantly to the total field measured. In these areas, the total field is exclusively derived from the earth's ambient field of 51,500 nanotesla (nT), a function of magnetic latitude and elevation.

The predominate trend of diabase dikes in this area is generally north-south; east-west trending dikes do occur, but to a lesser degree. These dikes are expected to produce a magnetic anomaly of 200 nT to 1000 nT, and extend for thousands of feet. To detect any dikes that might intersect this site, we walked the northern and southern boundaries of the site using the G-858 magnetometer in search mode (data is not stored) looking for a response that would be indicative of a diabase dike (Figure 2). If an anomaly was found it was investigated in a circular fashion to determine if the anomaly had any linear extent. We also walked all of the drill access roads (Figure 3) in the same manner. Finally, we recorded magnetic total field profiles along seven survey lines: six north-south lines and one east-west line (these lines were run along the drill access roads) (Figure 4).

The results from magnetic profile lines 1-7 are presented in Figures 5-11. No diabase dikes were mapped at this site.

Figure 2. G-858 walked in search mode along the southern boundary

Figure 3. G-858 survey along access road

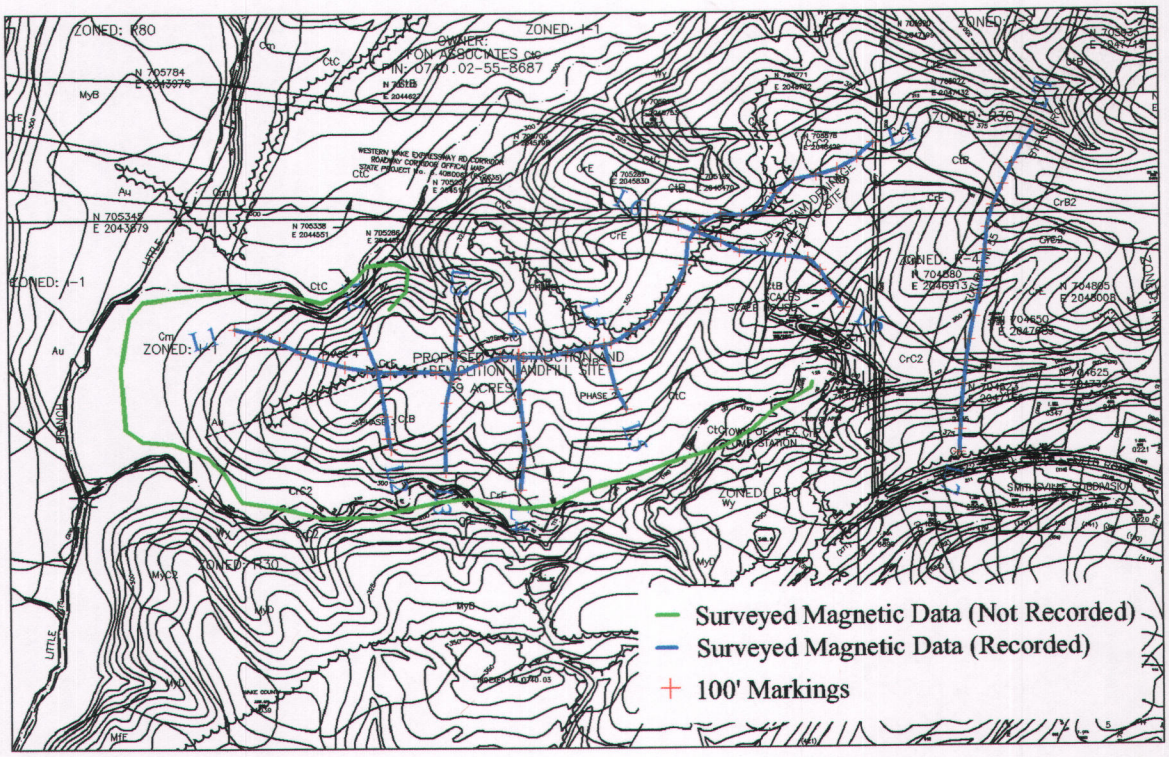


Figure 4. Site map showing magnetic survey lines

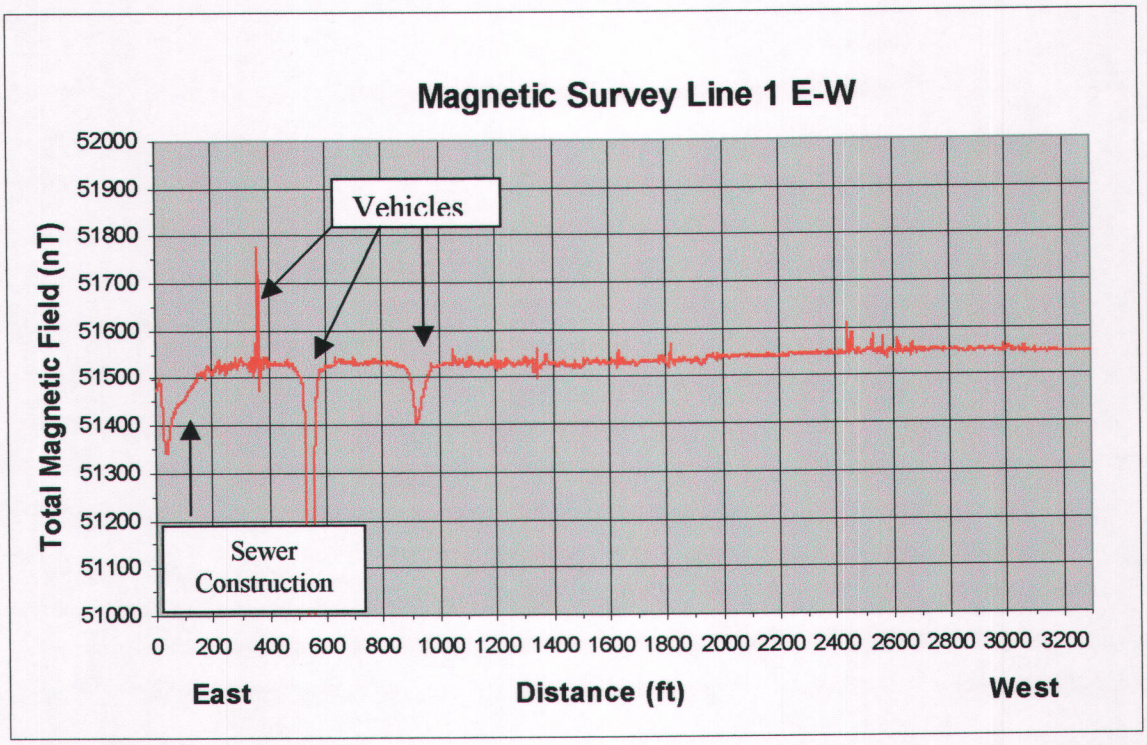


Figure 5. Line 1 was run East-West along the dirt access road cut E-W through the center of the site

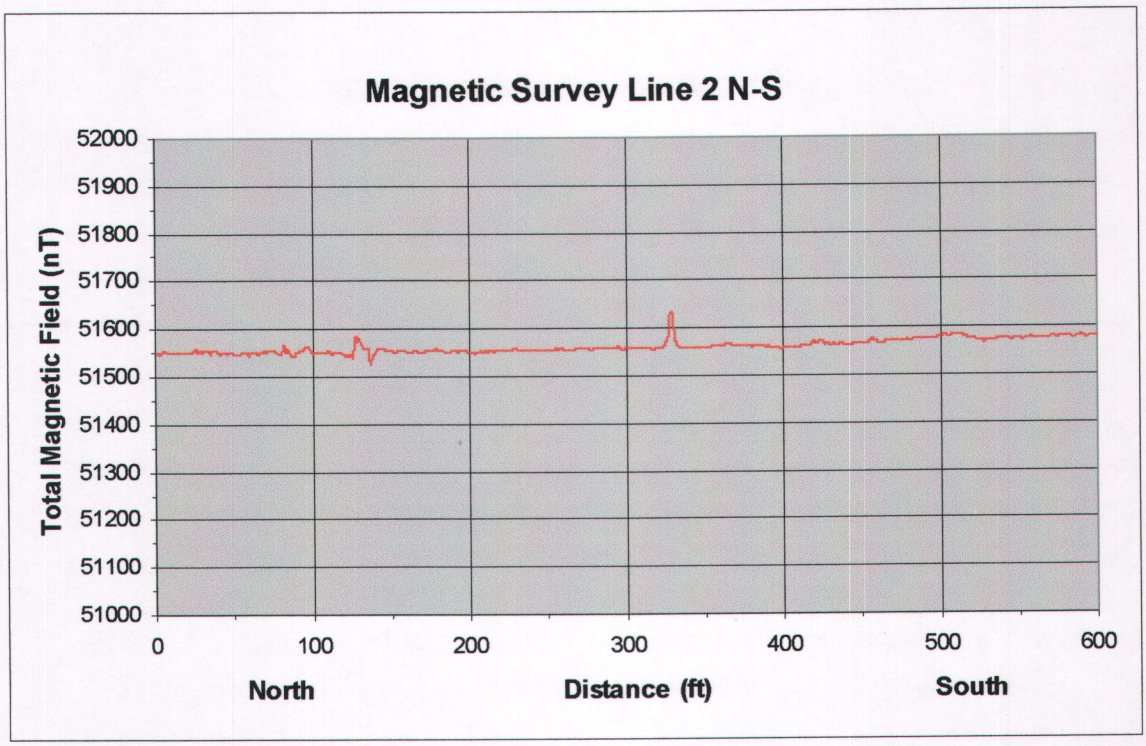


Figure 6. Line 2 was run North -South along the western most N-S access road

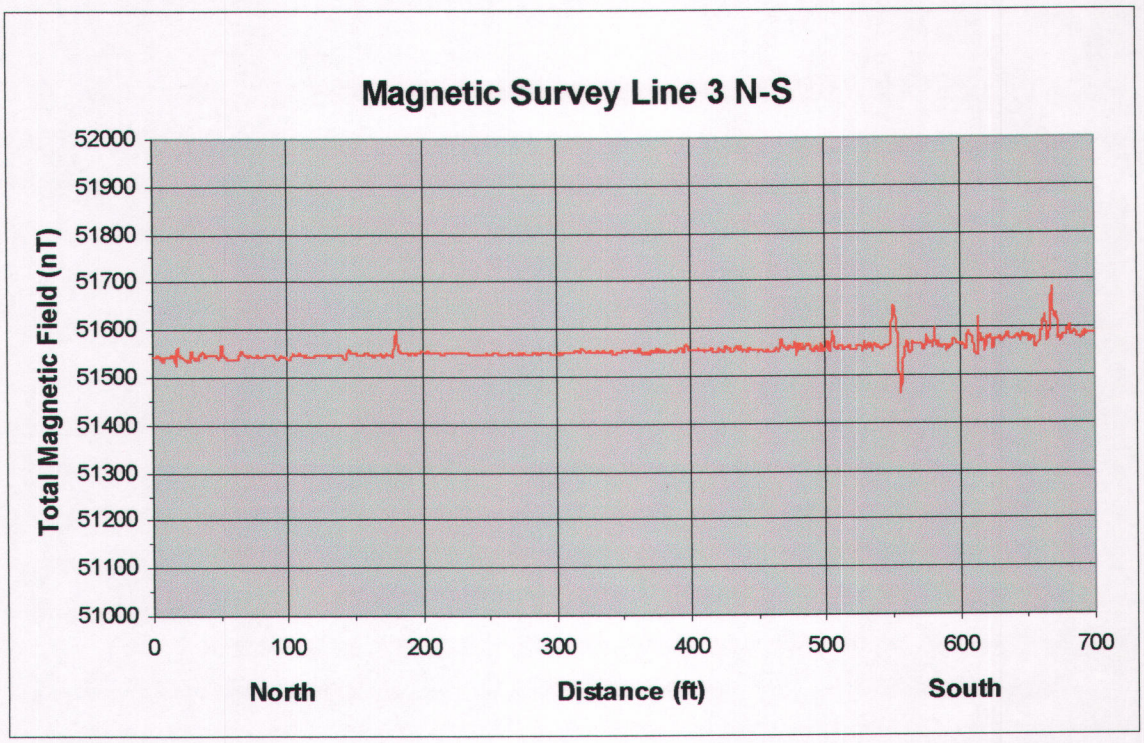


Figure 7. Line 3 was run North-South along the next N-S access road

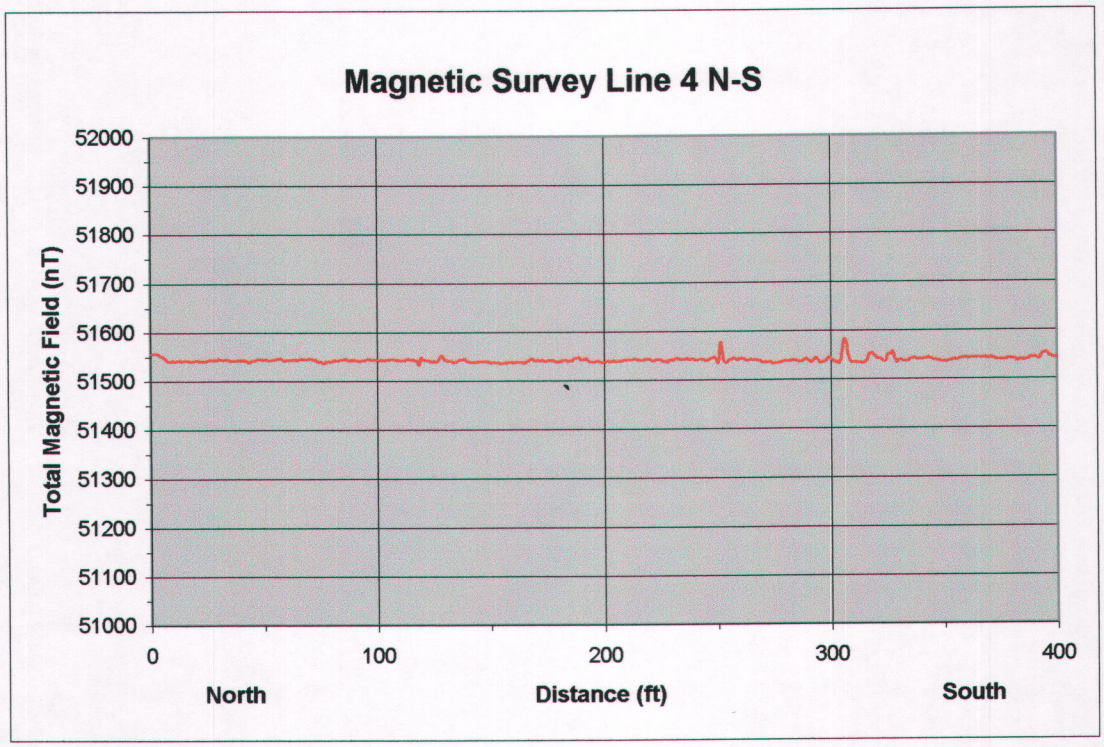


Figure 8. Line 4 was run North-South along the next N-S access road

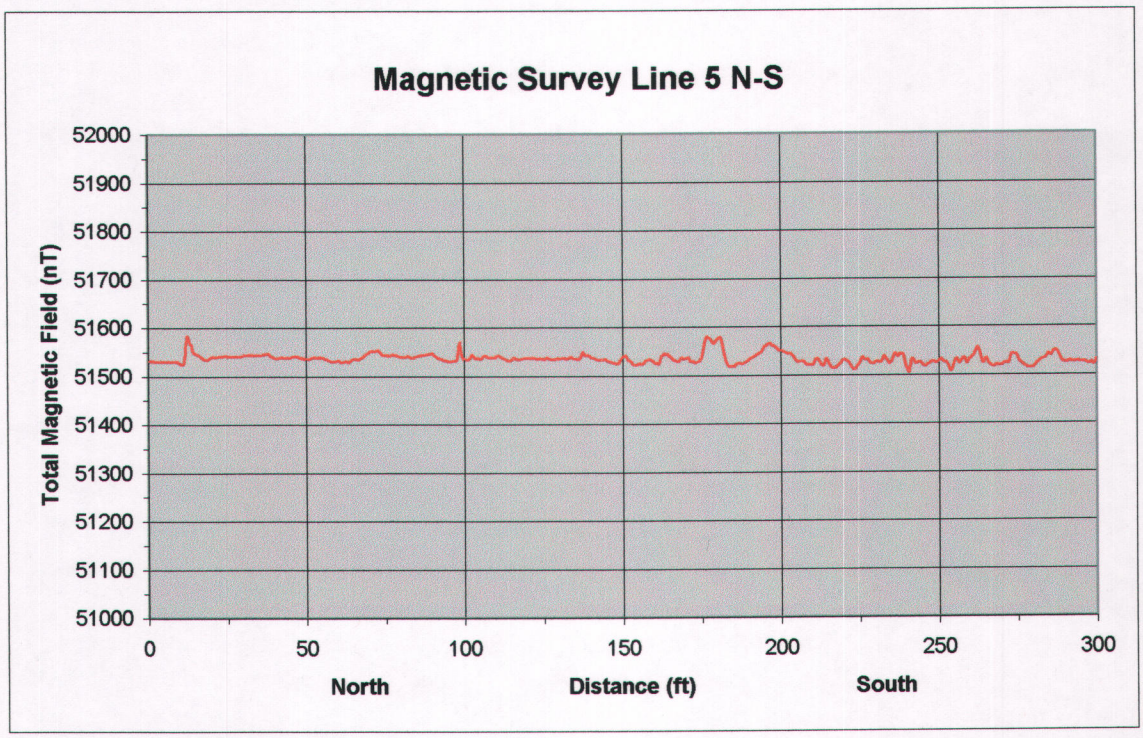


Figure 9. Line 5 was run North-South along the next N-S access road

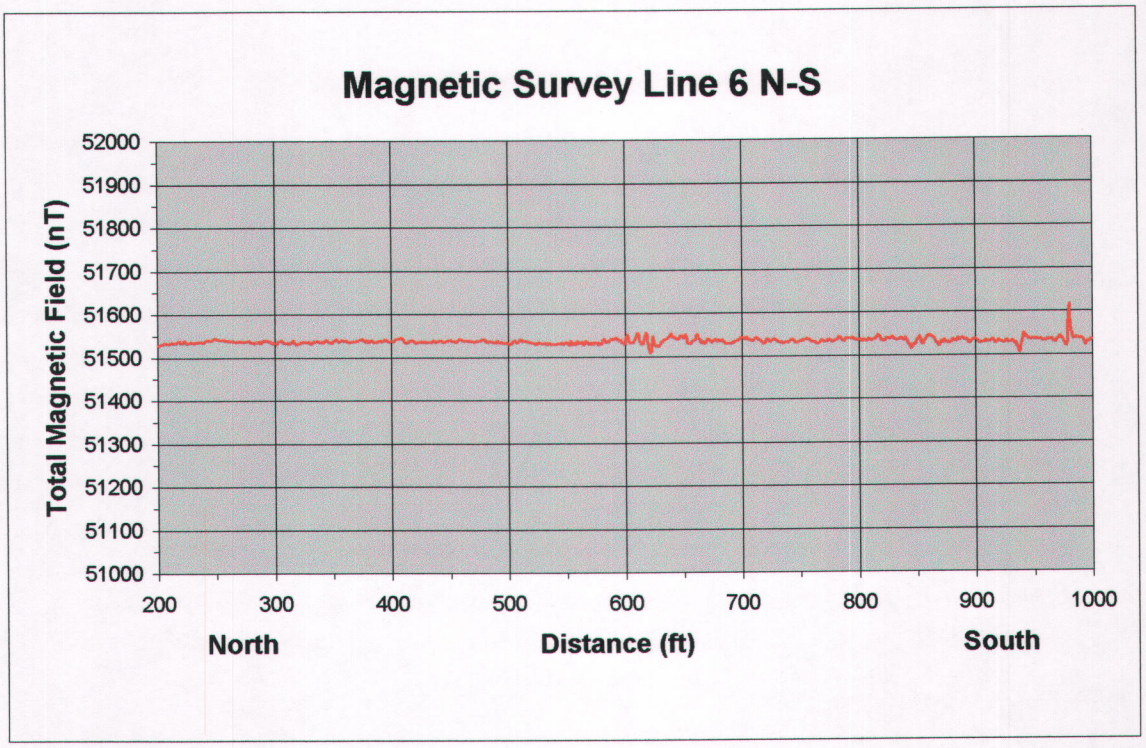


Figure 10. Line 6 was run North-South along the next N-S access road

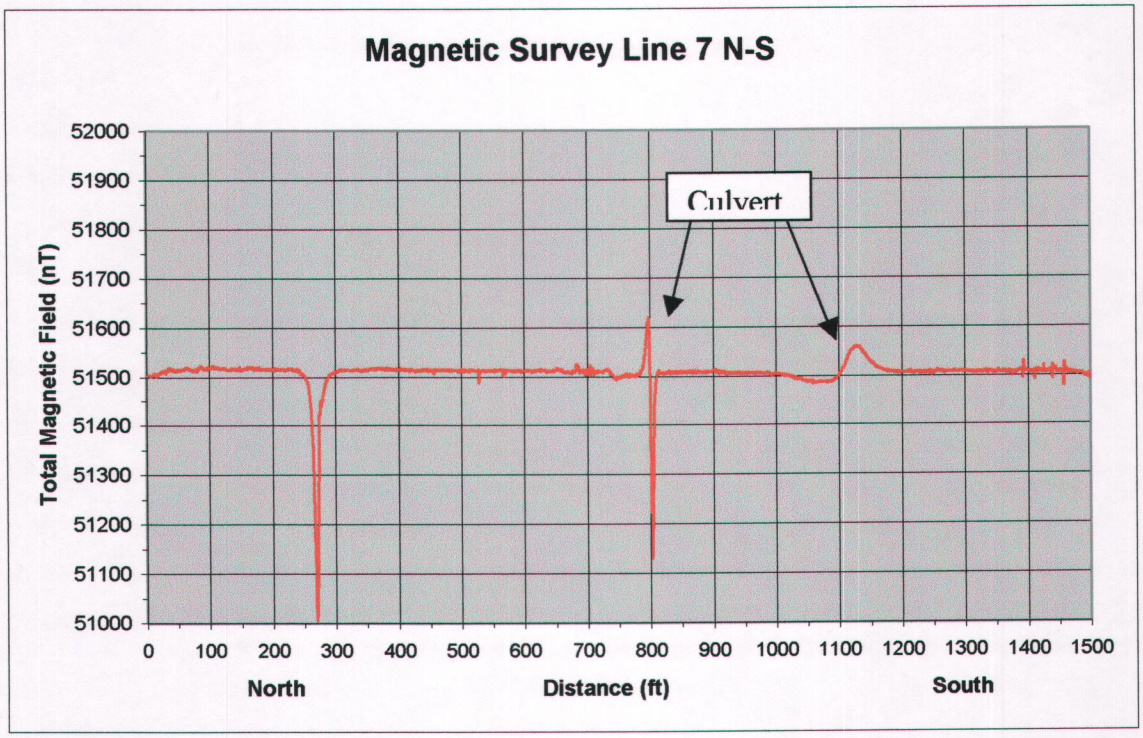


Figure 11. Line 7 was North-South along the dirt access road from Old Smithfield Road

Appendix A - Magnetic Method

Magnetic methods provide a fast, efficient, and cost-effective technique to identify and characterize local high magnetic susceptibility targets that produce deviations in the Earth's magnetic field. Magnetic susceptibility is a basic material property and represents the degree of magnetization of a material placed in an external magnetic field. Magnetic susceptibility of a geologic material is proportional to its content of iron-bearing minerals, principally magnetite: the most abundant magnetic mineral in the Earth. The principal applications of magnetic surveys in site assessments are for:

- Locating buried drums, USTs, and pipes;
- Delineating pits and trenches containing ferrous materials;
- Delineating boundaries of landfills with ferromagnetic debris; and
- Mapping subsurface geology.

The signals measured in a magnetic survey are influenced by the ambient magnetic field of the Earth. The Earth's magnetic field resembles that of a single dipole whose axis deviates about 10 degrees from geographic north. The strength of the Earth's magnetic field is about 60,000 nanoteslas (nT) near the north pole where it is directed vertically into the Earth, and about 30,000 nanoteslas near the equator where it is parallel to the Earth's surface.

Buried steel objects cause local perturbations in the Earth's magnetic field (Figure B-1). The Earth's magnetic field magnetizes ferrous material (either man-made or natural) in parallel with and proportional to the local Earth's magnetic field. Therefore, the intensity and shape of perturbations caused by a buried drum, for example, is a function of latitude (Figure B-2). The total magnetic field measured is the vector sum of the ambient Earth's magnetic field and the local perturbation.

Two types of magnetic surveys are commonly conducted: 1) measurement of the total field, or 2) measurement of the vertical gradient. Although the field procedures are very similar for the two surveys, the measured data and interpretation methods can sometimes be quite different. The vertical gradient, measured by recording the magnetic field at two, vertically separated sensors and calculating the difference, is to detect and locate small and shallow-buried objects, such as drums. Because vertical gradient anomalies decay inversely proportional to distance from the object raised to the fourth power, as opposed to the third power for the total field anomaly, vertical gradient anomalies are more sharply defined in the immediate area of the ferrous object. In contrast, the total field anomaly of a small shallow ferrous object will be broad, and hence, possibly unidentified during an actual survey. Commercially available magnetic instruments (e.g., the G-858 Magnetometer from Geometrics) allow the simultaneous recording of the total field and the vertical gradient.

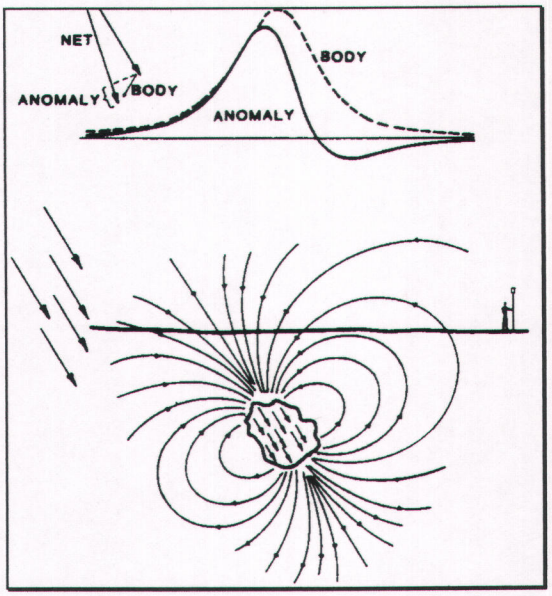


Figure B-1. The Earth's magnetic field induces a magnetic moment in buried ferromagnetic materials (bottom). This induced field, in turn, causes local perturbations (anomaly) in the measured total magnetic field (top).

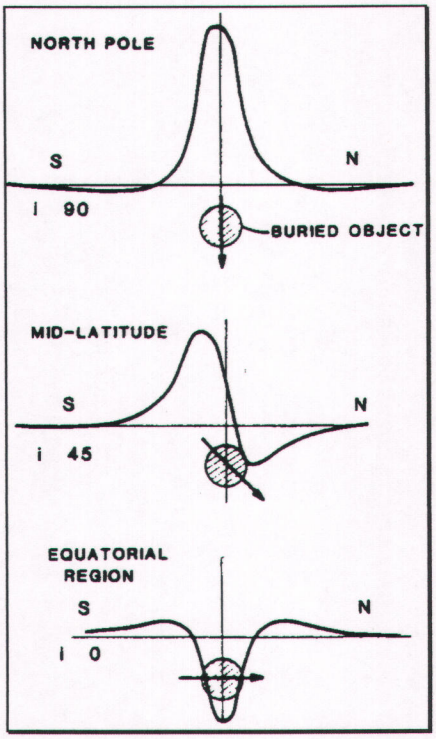


Figure B-2. Schematic illustration of the shape of magnetic anomalies (local perturbations) as a function of latitude

SHIELD
ENGINEERING, INC.

March 1, 2002

Mr. Ronald Gilkerson
Griffin Brothers
19109-118 West Catawba Avenue
Cornelius, NC 28031-5613

Subject: **Laboratory Test Results**
Highway 55 C&D Landfill
Wake County, North Carolina
Shield Job Number 1012081-01

Dear Mr. Gilkerson:

As requested Shield Engineering Inc., has completed the laboratory testing on the samples labeled SS-1A, SS-2A, and SS-3A for the above referenced project. Attached to this letter are the laboratory test results for Flexible Wall Permeability, Specific Gravity, Atterberg Limits, Hydrometer, Effective Porosity, and Moisture Content.

The laboratory testings were provided in accordance with the applicable ASTM Standards. The test samples were obtained by a representative of Griffin Brothers and then delivered to Shield's Charlotte, North Carolina laboratory for testing.

If you have any questions concerning our test results, please do not hesitate to call our office at (704) 394-6913.

Sincerely,

Shield Engineering, Inc.

Christina R. Raymer
Lab Manager

Thomas M. Vick, P.E.
Senior Engineer

Attachment

4301 Taggart Creek Road
Charlotte, NC 28208

www.shieldengineering.com

Telephone 704.394.6913
Fax 704.394.6968

SUMMARY OF LABORATORY TEST DATA
Highway 55 C&D Landfill
Wake County, North Carolina
SHIELD Engineering, Inc.

Boring No./ Sample Depth	USCS Classification	% Gravel	% Sand	% Silt	% Clay	Atterburg Limits		Proctor Data		In Situ Conditions				Hydraulic Conductivity k (cm/sec)
						Liquid Limit %	Plasticity Index %	Max Dry Density (pcf)	Optimum Moisture Content (%)	Specific Gravity	Effective Porosity	Dry Density (pcf)	Moisture Content (%)	
MW-25 (5'-7')	SC	10.6	53.5	21.1	14.8	25	10	N/A	N/A	2.681	N/A	N/A	4.3	N/A
MW-25 (16'-17')	CL	3.1	22.7	55.1	19.1	29	9	N/A	N/A	2.691	N/A	N/A	3.8	N/A
MW-26 (3'-5')	CL	0.0	5.4	48.5	46.1	45	21	N/A	N/A	2.618	0.3775	101.7	22.1	7.42E-08
MW-29 (3'-4')	CL	0.3	25.6	49.4	24.7	28	11	N/A	N/A	2.727	0.2595	126	10.1	3.65E-08
SB-1 (3'-5')	SC	5.2	48.1	25.3	21.4	31	9	N/A	N/A	2.608	0.2755	117.9	9.7	9.29E-07
SB-1 (14'-15')	CL	0.1	22.7	54.3	22.9	25	9	N/A	N/A	2.662	N/A	N/A	3.5	N/A
SB-2 (3'-4')	CH	0.2	7.4	36.5	55.9	69	47	N/A	N/A	2.611	N/A	N/A	19.8	N/A
SB-2 (13'-14')	CL	1.2	22.9	45.4	30.5	30	15	N/A	N/A	2.662	N/A	N/A	5.3	N/A
SB-3 (5'-6')	CL	1.3	16.8	38.2	43.7	42	23	N/A	N/A	2.697	*	*	5.9	*
SB-4 (4'-5')	CL	0.1	10.0	47.0	42.9	44	25	N/A	N/A	2.672	N/A	N/A	15.9	N/A
SB-4 (8'-9')	CL	0.5	18.2	45.8	35.5	32	18	N/A	N/A	2.711	N/A	N/A	7.7	N/A
SS-1	CH	1.2	19.7	33.6	45.5	68	43	105.1	16.6	2.606	0.3748	101.7	18.9	2.60E-08
SS-2	CL	1.3	29.3	39.2	30.2	41	22	114.3	13.3	2.608	0.3332	108.5	16.5	1.35E-08
SS-3	CL	11.8	12.9	42.3	33.0	42	23	108.6	17.1	2.642	0.3735	103.3	19.6	2.27E-08

* Sample SB-3 (5-6') too dry to run permeability test.

Shield Engineering, Inc.

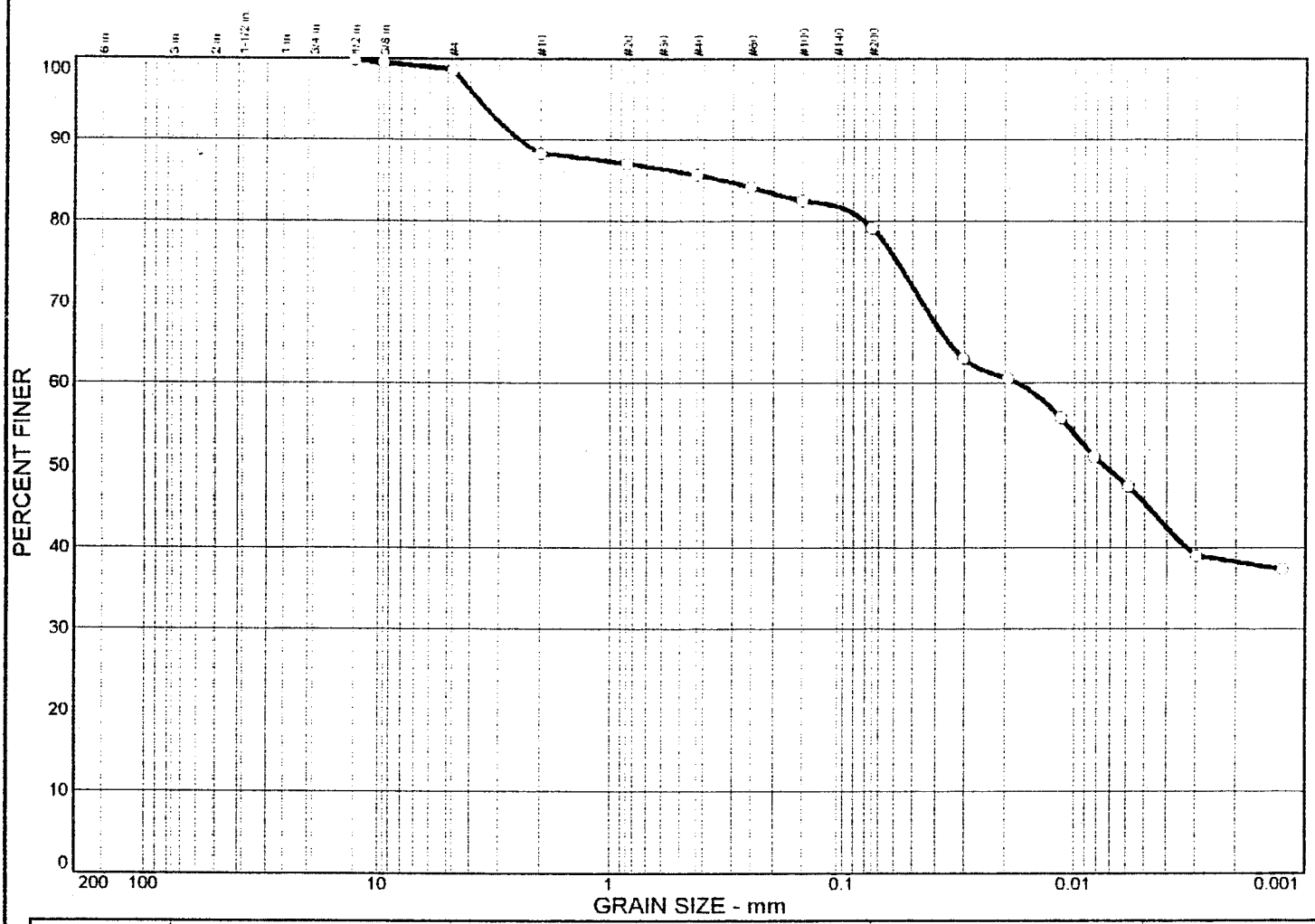
SUMMARY OF LABORATORY TESTING

Flexible Wall Permeability Test
ASTM D 5084-90

Project Name:	HWY. 55 C&D Landfill
Project No:	1012081-01
Date:	2/27/2002
Sample ID:	SS-1A
Material Description:	Light Brown Clay with Sand
Sample Condition:	Remolded Sample

Proctor Data:	
Maximum Dry Density (pcf) :	105.1
Optimum Moisture Content (%) :	16.6
Test Data:	
Initial Dry Density (pcf) :	101.7
Initial Moisture Content (%) :	18.9
Sample Length (cm) :	11.6
Sample Area (cm^2) :	81.1
Average Temperature (^oC) :	21.4
Hydraulic Conductivity K (cm/sec) @ 20^oC:	**2.60E-08**
Saturated:	Yes
Porosity:	0.3748

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.2	19.7	33.6	45.5

LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
68	25	0.349	0.0177	0.0075					

MATERIAL DESCRIPTION	USCS	AASHTO
Light Brown Clay with Sand	CH	

Project No. 1012081-01 **Client:** Griffin Brothers

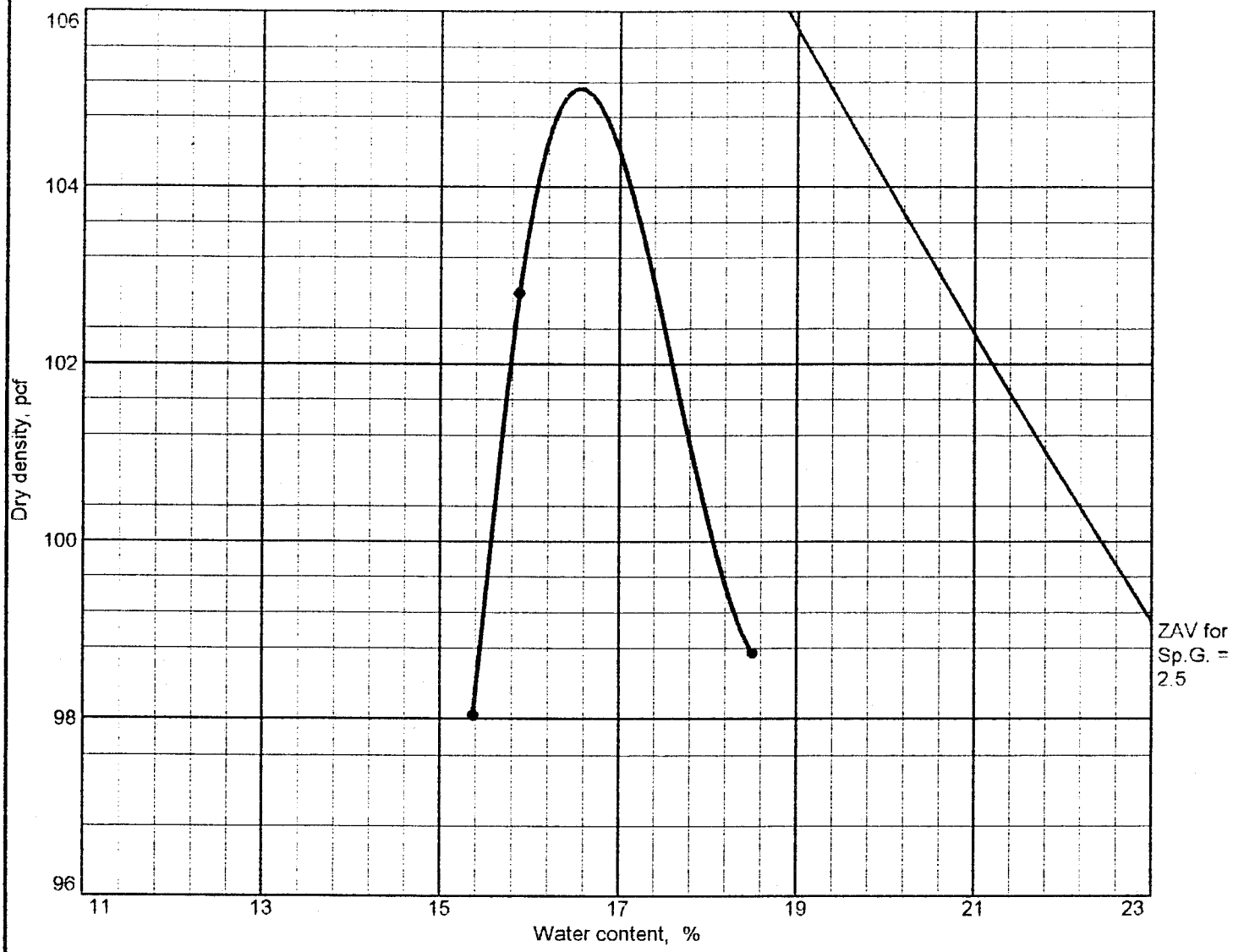
Project: HWY. 55 C&D Landfill, LLC.

Source: HWY. 55 C&D Landfill **Sample No.:** SS-1A

Remarks:

2/28/02

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CH		17.0%	2.606	68	43	1.2	79.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 105.1 pcf Optimum moisture = 16.6 %	Light Brown Clay with Sand

Project No. 1012081-01 **Client:** Griffin Brothers
Project: HWY. 55 C&D Landfill, LLC.

● **Source:** HWY. 55 C&D Landfill **Sample No.:** SS-1A

Remarks:
2/25/02

COMPACTION TEST REPORT

SHIELD ENGINEERING

Figure SS-1A

Shield Engineering, Inc.

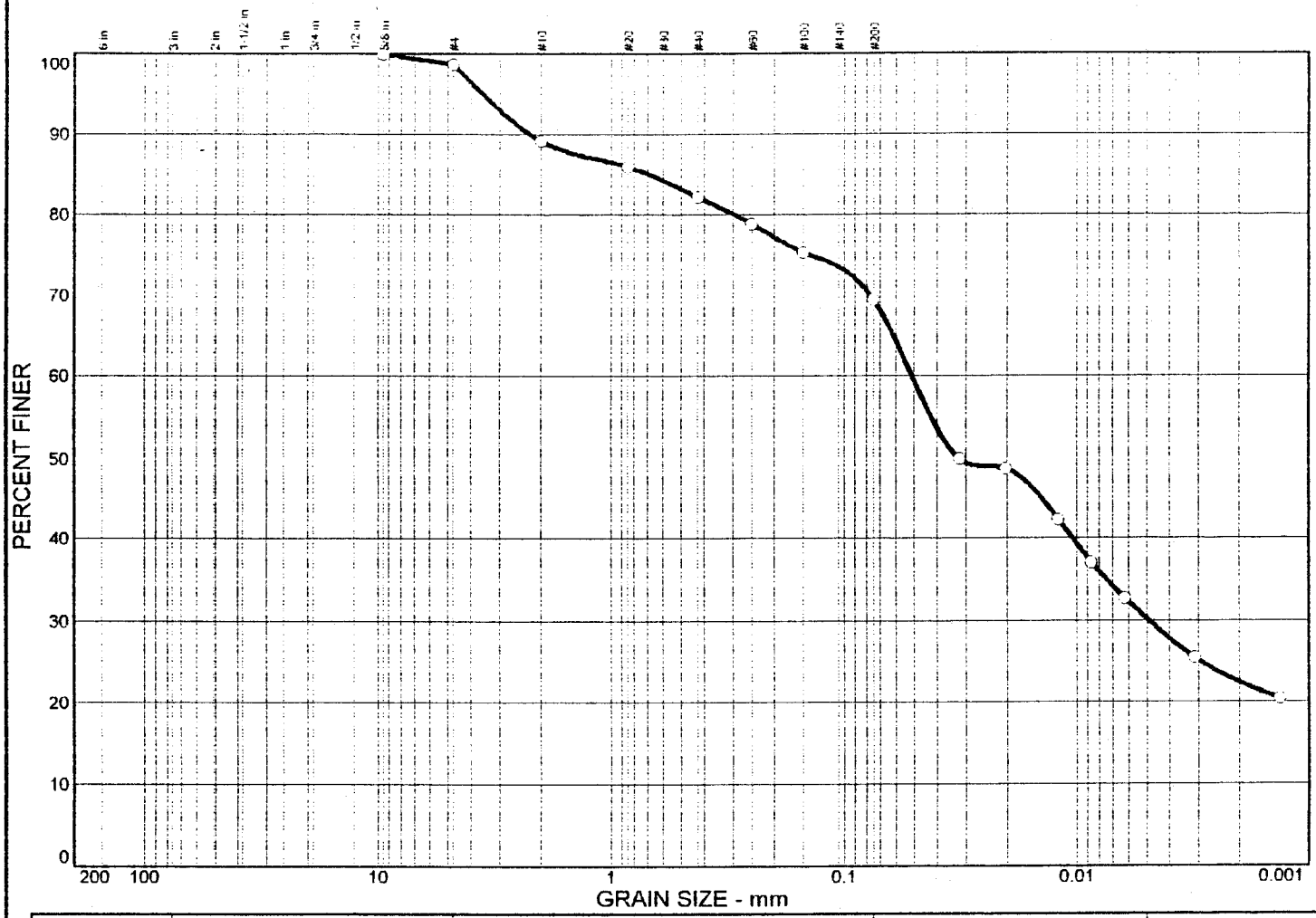
SUMMARY OF LABORATORY TESTING

Flexible Wall Permeability Test
ASTM D 5084

Project Name:	HWY. 55 C&D Landfill
Project No:	1012081-01
Date:	2/28/2002
Sample ID:	SS-2a
Material Description:	Brown Sandy Clay
Sample Condition:	Remolded Sample

Proctor Data:	
Maximum Dry Density (pcf) :	114.3
Optimum Moisture Content (%) :	13.3
Test Data:	
Initial Dry Density (pcf) :	108.5
Initial Moisture Content (%) :	16.5
Sample Length (cm) :	11.0
Sample Area (cm^2) :	83.3
Average Temperature (^oC) :	20.6
Hydraulic Conductivity K (cm/sec) @ 20^oC:	**1.35E-08**
Saturated:	Yes
Porosity:	0.3332

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	1.3	29.3	39.2	30.2

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	41	19	0.697	0.0513	0.0322	0.0049				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Brown Sandy Clay	CL	

Project No. 1012081-01 **Client:** Griffin Brothers

Project: HWY. 55 C&D Landfill, LLC.

○ **Source:** HWY. 55 C&D Landfill **Sample No.:** SS-2A

Remarks:

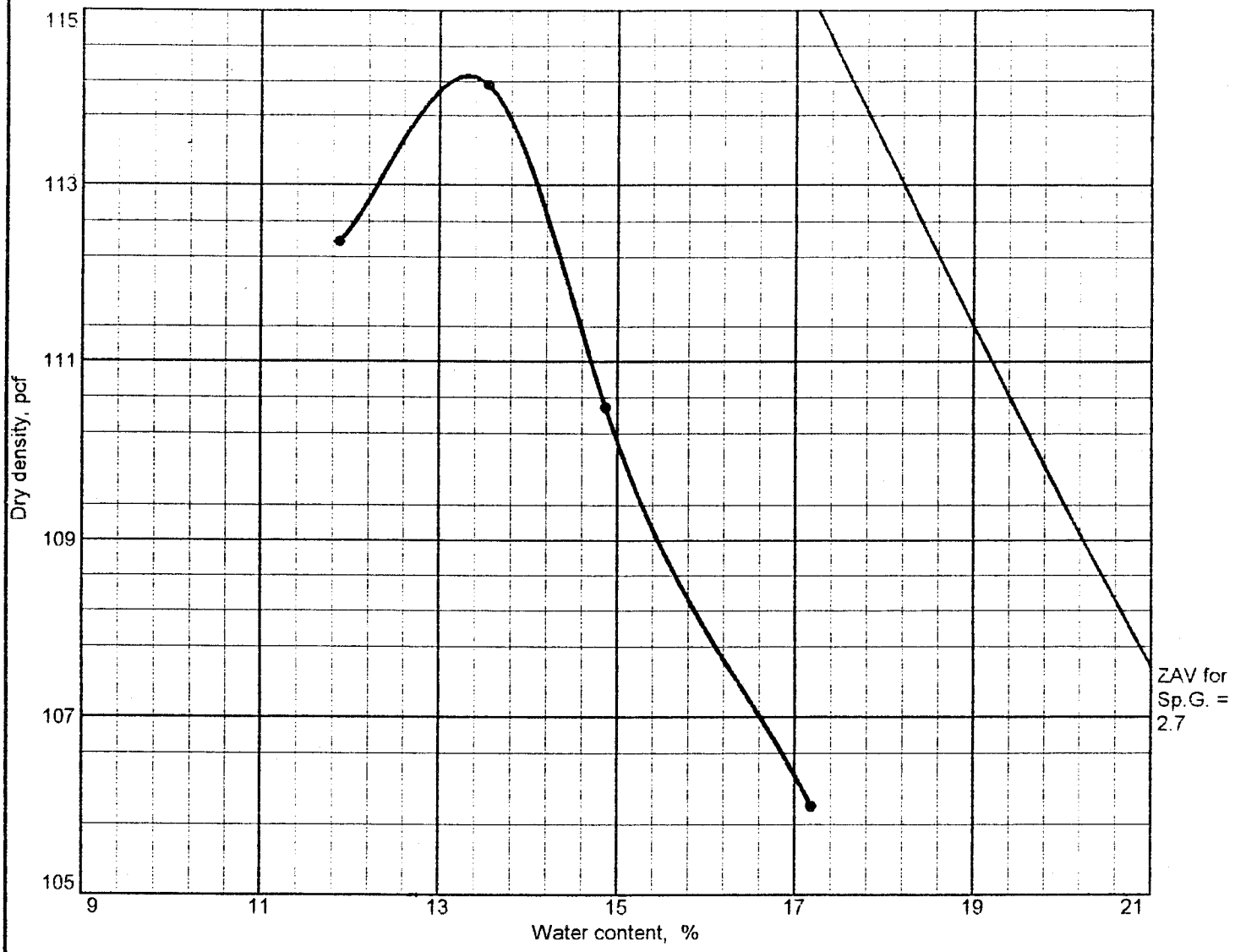
○ 2/28/02

Particle Size Distribution Report

SHIELD ENGINEERING

Figure SS-2A

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL		15.6%	2.608	41	22	1.3	69.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 114.3 pcf Optimum moisture = 13.3 %	Brown Sandy Clay

Project No. 1012081-01 **Client:** Griffin Brothers
Project: HWY. 55 C&D Landfill, LLC.

● **Source:** HWY. 55 C&D Landfill **Sample No.:** SS-2A

Remarks:
2/25/02

COMPACTION TEST REPORT

SHIELD ENGINEERING

Figure SS-2A

Shield Engineering, Inc.

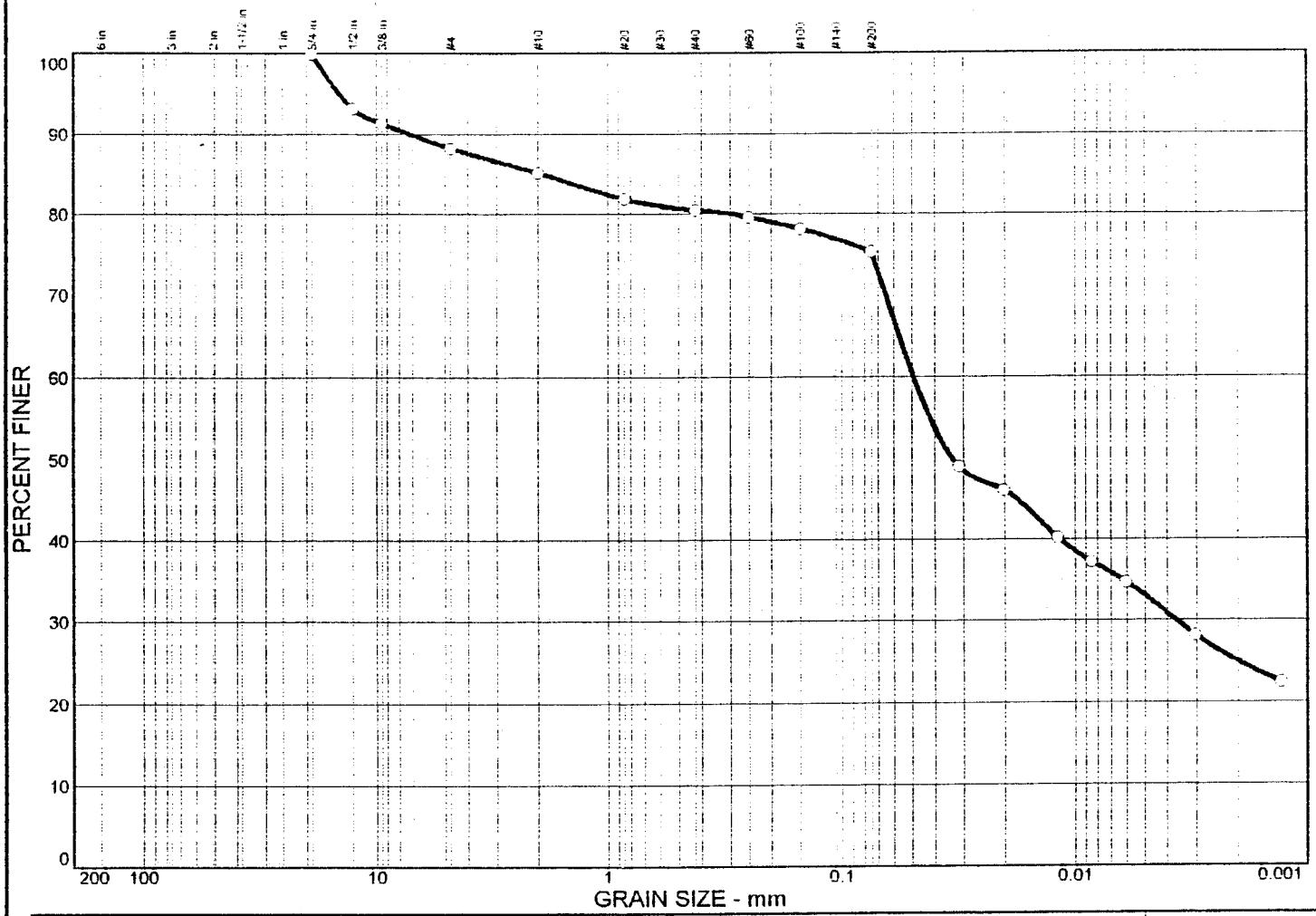
SUMMARY OF LABORATORY TESTING

Flexible Wall Permeability Test
ASTM D 5084

Project Name:	HWY. 55 C&D Landfill
Project No:	1012081-01
Date:	2/28/2002
Sample ID:	SS-3a
Material Description:	Light Brown Clay with Sand
Sample Condition:	Remolded Sample

Proctor Data:	
Maximum Dry Density (pcf) :	108.6
Optimum Moisture Content (%) :	17.1
Test Data:	
Initial Dry Density (pcf) :	103.3
Initial Moisture Content (%) :	19.6
Sample Length (cm) :	11.7
Sample Area (cm^2) :	80.9
Average Temperature (°C) :	20.5
Hydraulic Conductivity K (cm/sec) @ 20°C:	**2.27E-08**
Saturated:	Yes
Porosity:	0.3735

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	11.8	12.9	42.3	33.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	42	19	1.95	0.0494	0.0335	0.0037				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Light Brown Clay with Sand	CL	

Project No. 1012081-01 **Client:** Griffin Brothers

Project: HWY. 55 C&D Landfill, LLC.

○ **Source:** HWY. 55 C&D Landfill **Sample No.:** SS-3A

Remarks:

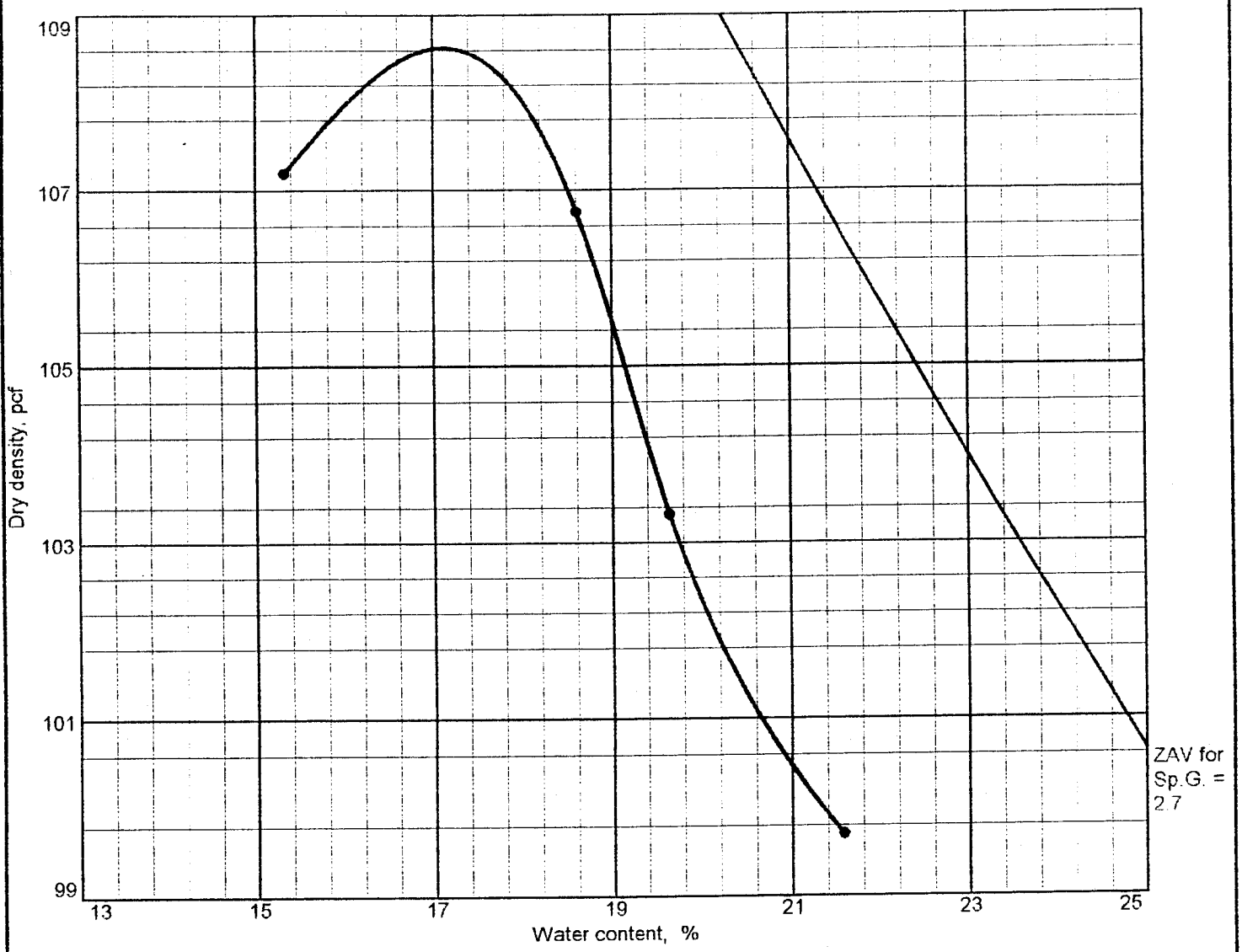
○ 2/28/02

Particle Size Distribution Report

SHIELD ENGINEERING

Figure SS-3A

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL		20.2%	2.642	42	23	11.8	75.3

TEST RESULTS

Maximum dry density = 108.6 pcf

Optimum moisture = 17.1 %

MATERIAL DESCRIPTION

Light Brown Clay with Sand

Project No. 1012081-01 **Client:** Griffin Brothers

Project: HWY. 55 C&D Landfill, LLC.

● **Source:** HWY. 55 C&D Landfill **Sample No.:** SS-3A

Remarks:

2/25/02

COMPACTION TEST REPORT

SHIELD ENGINEERING

Figure SS-3A

SS-1

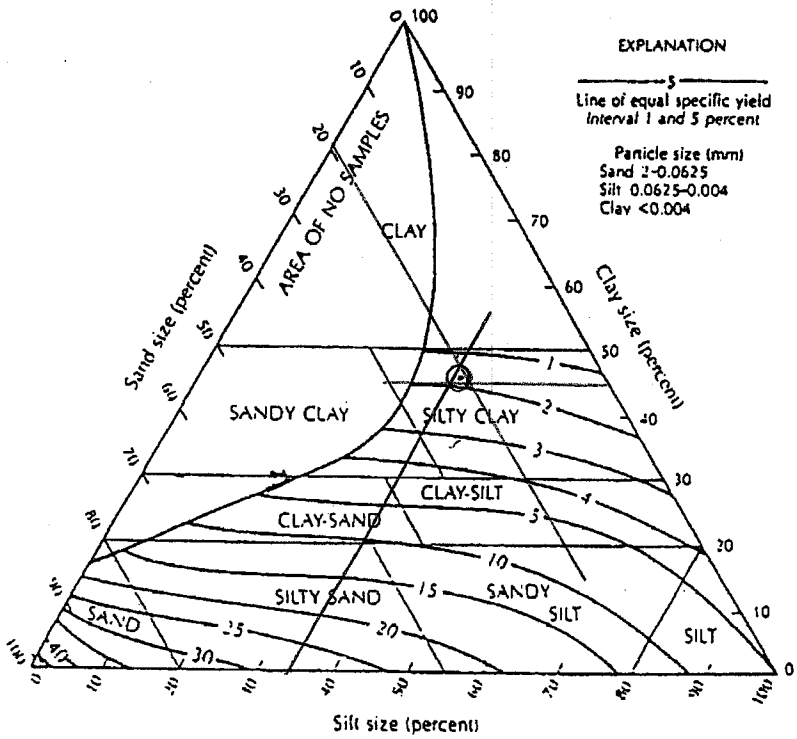


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

SS-2

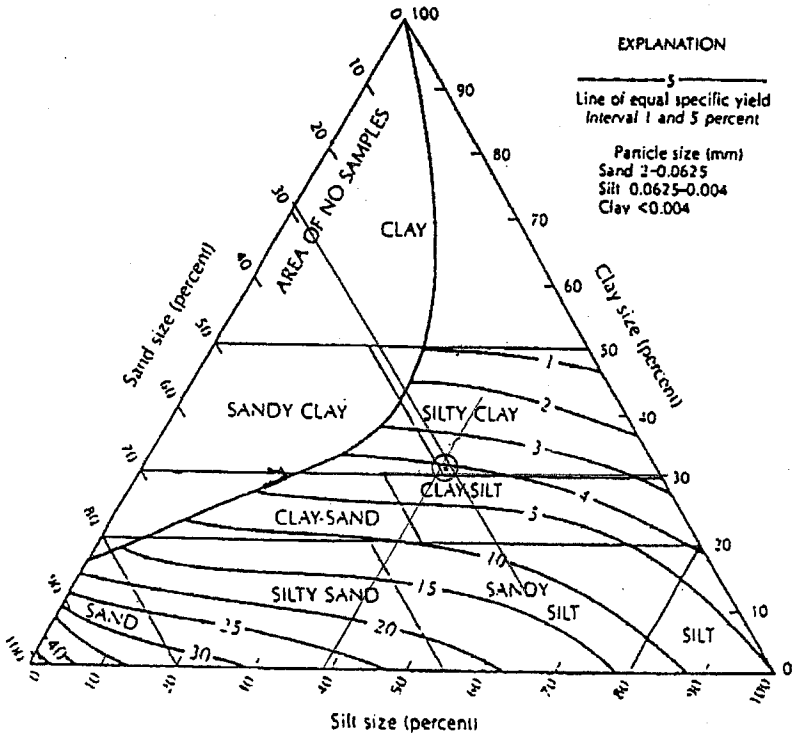


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

SB-4 (8'-9')

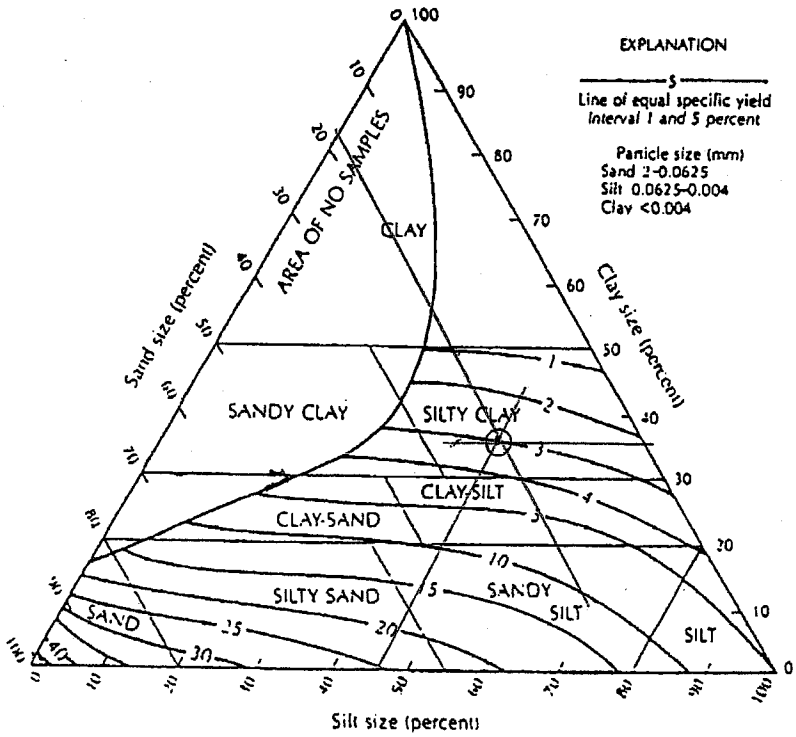


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

MW-25 (16'-17')

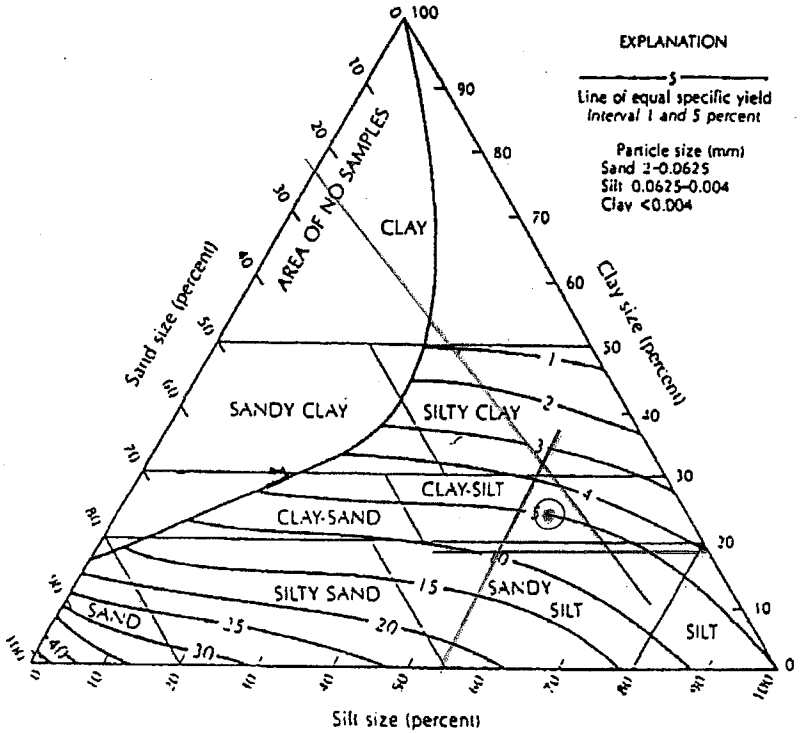


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

MW-26 (3'-5')

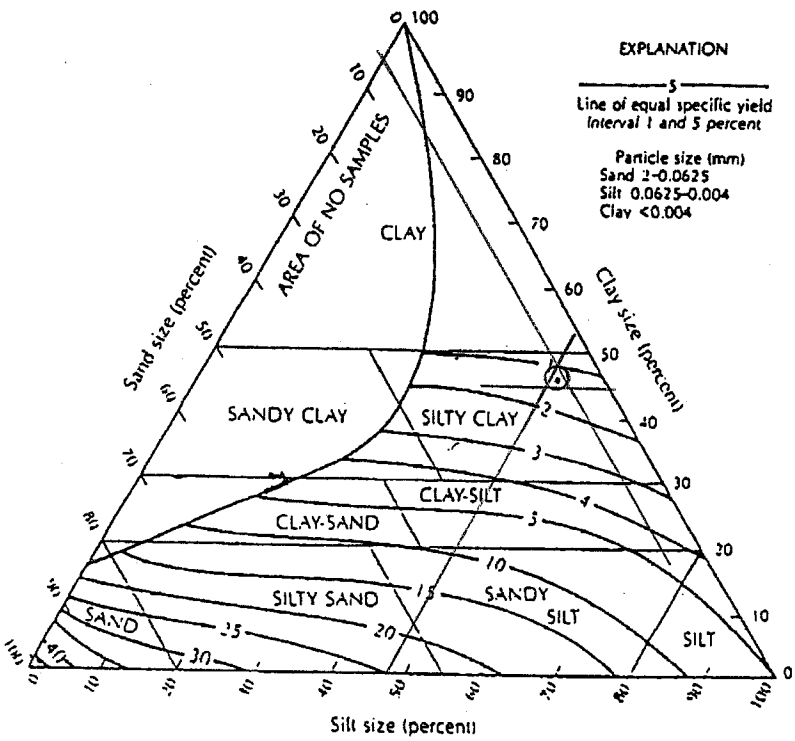


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

MW-29 (3'-4')

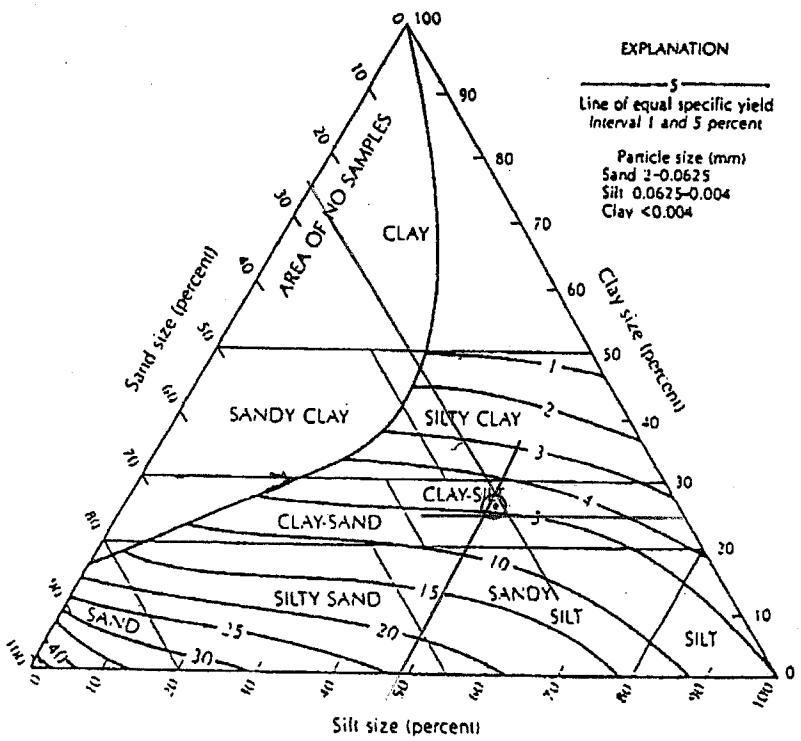


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

SB-4 (4'-5')

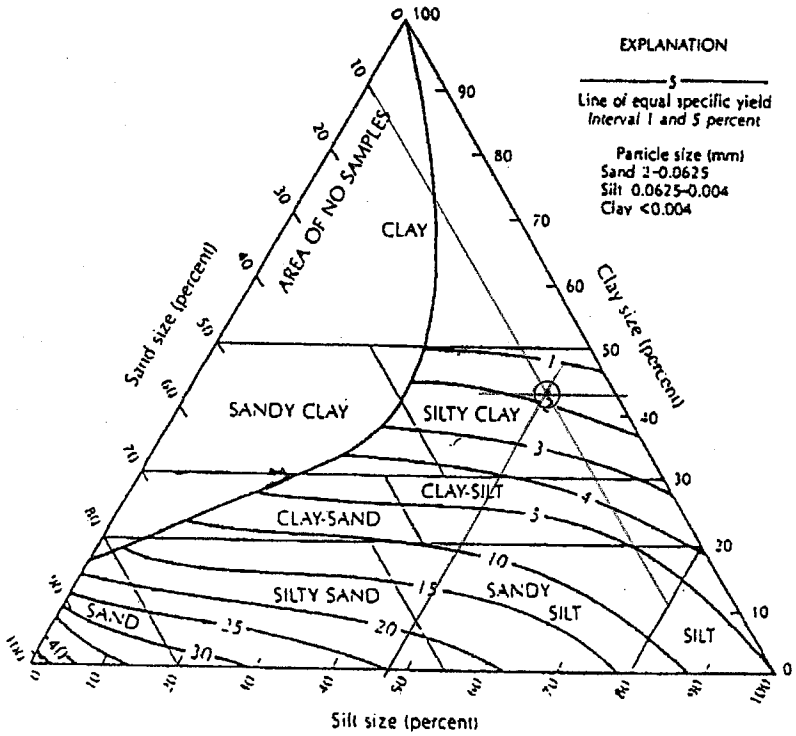


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

SB-1 (3'-5')

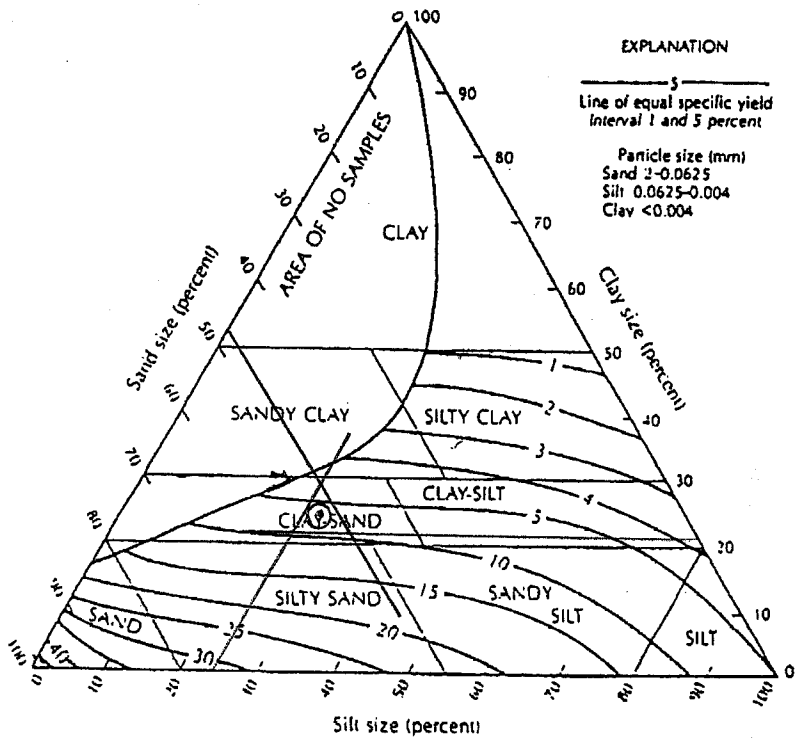


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

SB-1 (14'-15')

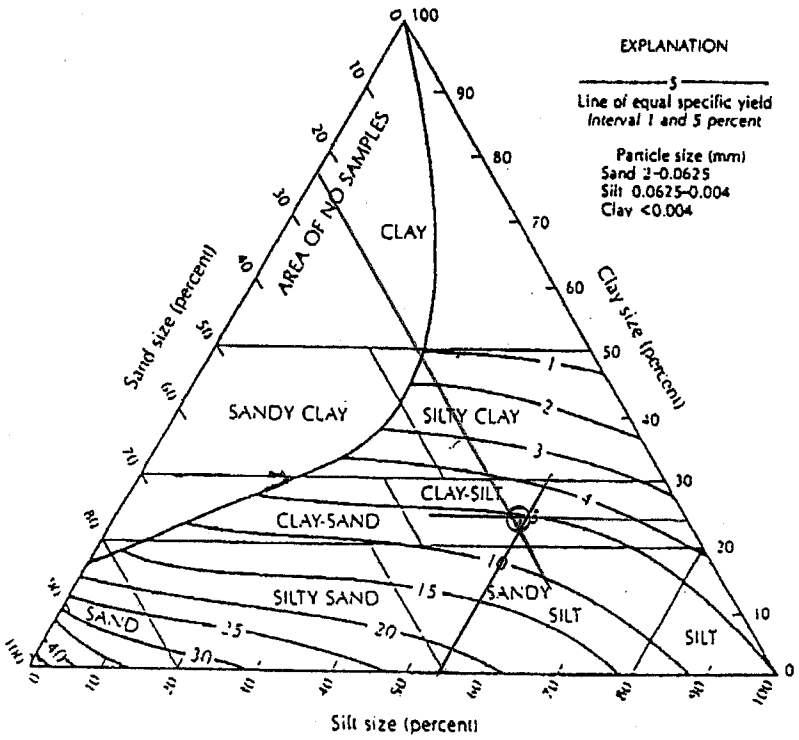


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

SB-2 (3'-4')

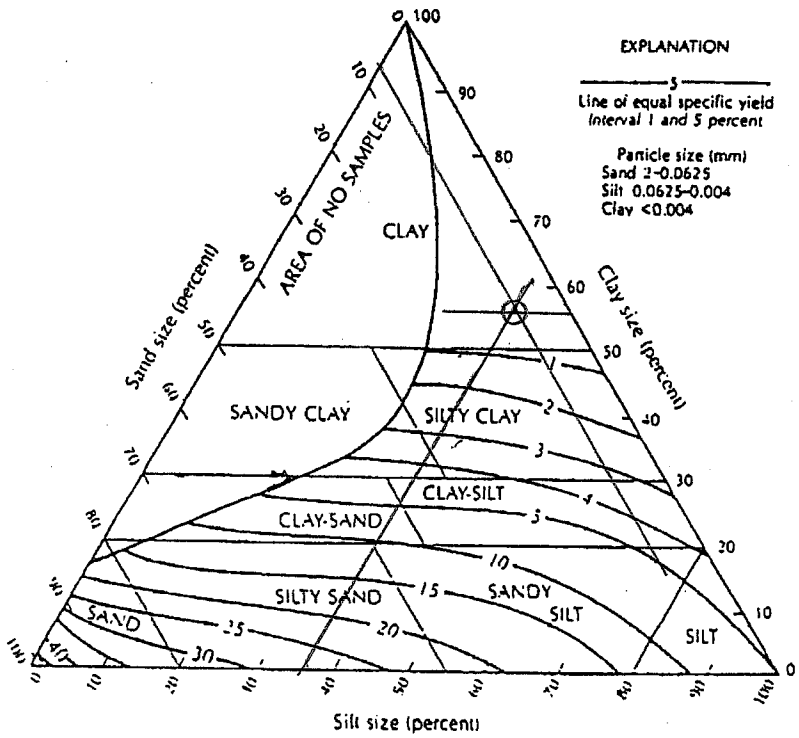


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

SB-2 (13'-14')

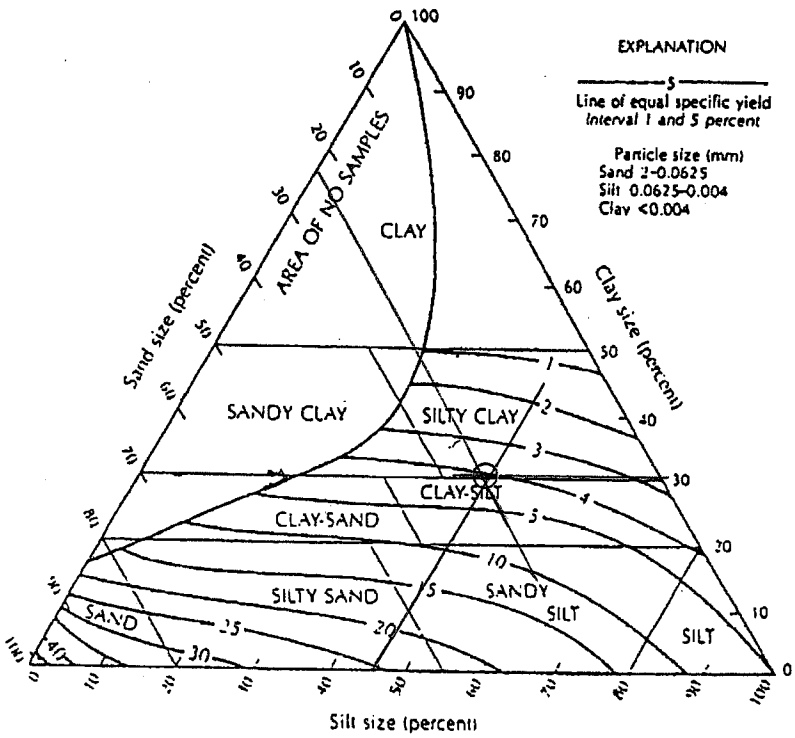


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

SB-3 (5'-6')

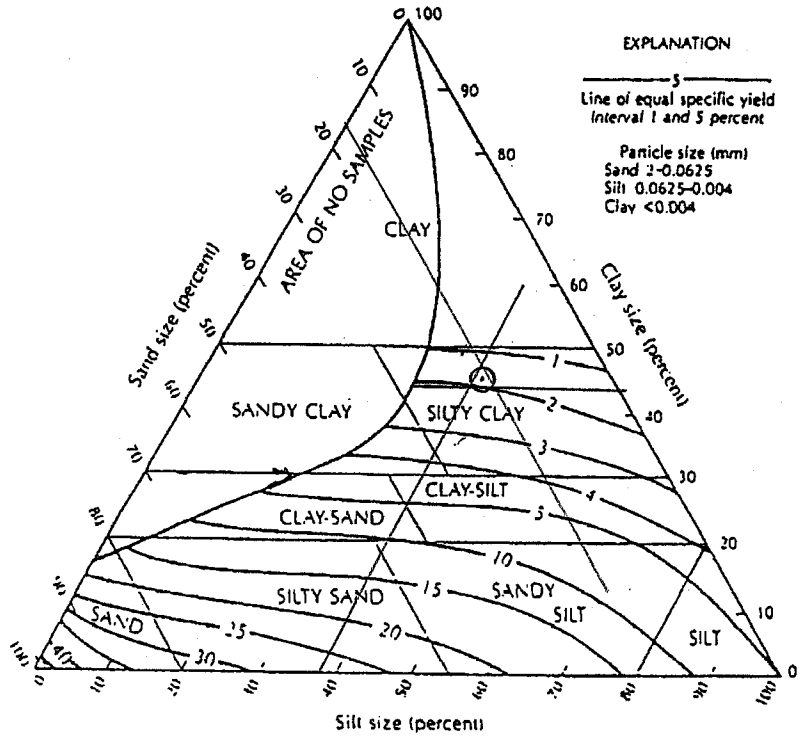


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.