Permit No.	Date	DIN
11-07	May 15 2015	24316

RECEIVED
May 14, 2015
Solid Waste Section
Asheville Regional Office

May 14, 2015

Allen Gaither
North Carolina Department of Environment and Natural Resources
Division of Waste Management – Solid Waste Section
2090 U.S. 70 Highway
Swannanoa, North Carolina 28778

RE: Permit to Construct
CDLF Phase 5 Expansion Area
Permit # 11-07
Buncombe County, North Carolina

Dear Mr. Gaither:

On behalf of Buncombe County, McGill Associates, PA is pleased to submit one (1) copy of the Permit to Construct package for the Phase 5 Expansion Area of the C&D Landfill which includes the following:

1. Standalone Phase 5 Expansion Area Drawings to act as a supplement to the previously approved Permit to Construct Drawings. These include an overall site plan of the C&D Phase 5 Area, Subgrade Plan, Final Cap Plan, Cross Sections, and Details.
2. Stormwater Report with supporting calculations for proposed ditches and evaluation of existing sediment basin 11 capacity for runoff from the Phase 5 Expansion Area.
3. Letter from Bunnell-Lammons Engineering, Inc. providing justification that the original borings and Design Hydrogeological Report are representative of the proposed lateral expansion.
4. Volumes 1 and 2 of the C&D Landfill Substantial Amendment and Phase 5 Permit to Construction Application originally prepared by CDM with revisions pertaining to the Phase 5 Expansion Area by McGill Associates, PA. A summary of the changes noted as footnotes within the document has been provided below to aid in your review.

Part 3 – Facility Plan

Section 2.2.2, Table 2-2

- Updated to include lateral expansion gross capacity and total gross capacity

Section 2.2.7, Table 2-3

- Updated to include lateral expansion information for the operating life calculation.

55 Broad Street
Asheville, North Carolina 28801
P.O. Box 2259
Asheville, North Carolina 28802
ph: 828.252.0575
f: 828.252.2518
www.mcgillengineers.com

Section 2.2.8, Table 2-4

- Updated to include lateral expansion final cover and effect on net soils.

Part 5 – Engineering Plan

Section 1.2

- Added paragraph referencing the Phase 5 Expansion Area drawings.

Section 2.3

- Added paragraph referencing calculations for additional runoff to existing Sediment Basin 11 and the ability to pass the 25 year – 24 hour storm.
- Added paragraph referencing proposed Ditch 11.3 that conveys runoff from the expansion area to Sediment Basin 11.

Part 7 – Operation Plan

Section 4.4

- Added paragraph referencing final grades for the original Phase 5 and the lateral expansion being shown on Sheet C-103.

Part 8 – Closure/Post Closure Plan

Section 2.3

- Updated this section for new gross airspace, cover material, and net airspace calculations to include the lateral expansion.

If you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

McGILL ASSOCIATES, P.A.

Scott Burwell, PE
Project Engineer

Cc: Joe Wiseman, PE, Petra Engineering, LLC
Mark Cathey, PE, McGill Associates, PA

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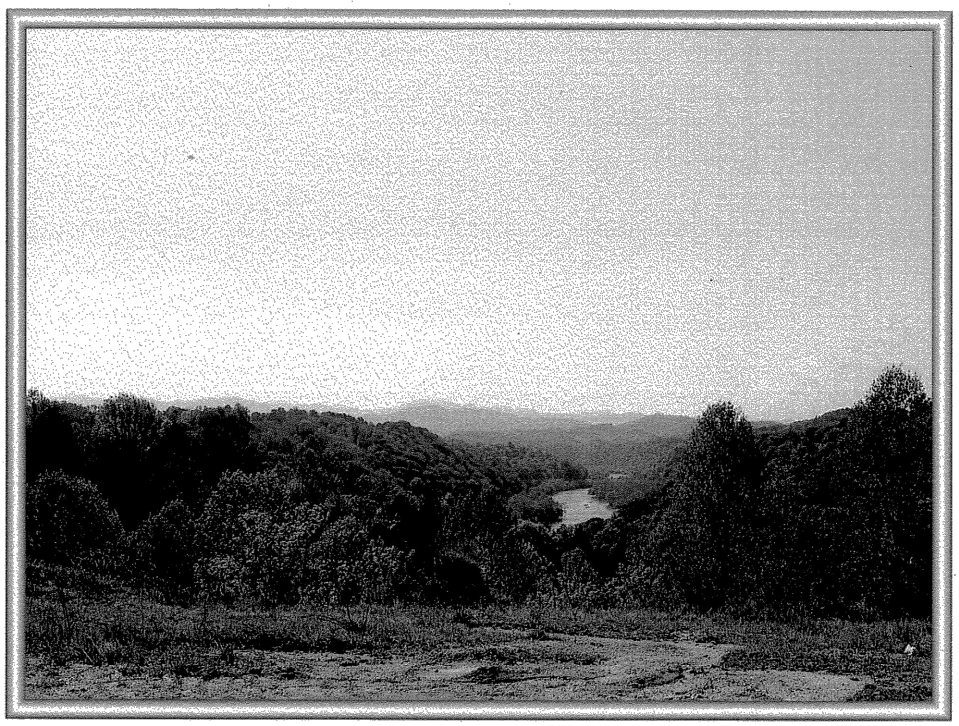
Buncombe County

Buncombe County Solid Waste Management Facility

C&D Landfill
Substantial Amendment and
Phase 5 Permit to Construction Application

Volume 1 of 2

April 2009
REVISED APRIL 2015 BY MCGILL ASSOCIATES P.A.



5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

April 30, 2009

Mr. Allen Gaither
North Carolina Department of Environmental and Natural Resources
Division of Waste Management
Solid Waste Section
2090 US Highway 70
Swannanoa, North Carolina 28778

Subject: Buncombe County Solid Waste Management Facility
Buncombe County, North Carolina
C&D Landfill Substantial Amendment and
Phase 5 Permit to Construct Application

Dear Mr. Gaither:

On behalf of Buncombe County, Camp Dresser & McKee (CDM) is pleased to submit two (2) copies of the Buncombe County C&D Landfill Substantial Amendment and Phase 5 Permit to Construct Application. Also attached is an electronic copy of the permit.

Please do not hesitate to contact me at (919) 787-5620 if you have any questions or if there is anything I can do to facilitate the review and approval of this permit application.

Very truly yours,

Kenton J. Yang, P.E.
Camp Dresser & McKee

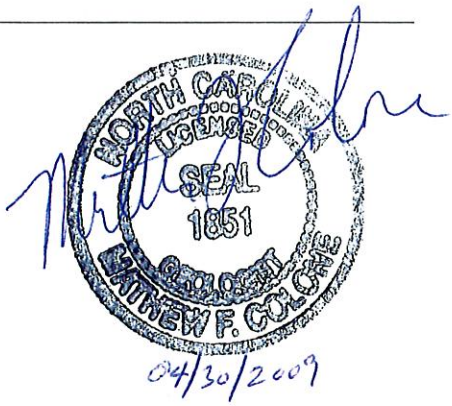
Enclosures
xc: Ed Mussler, NCDENR SWS
J. Creighton/J. Mears/K. Smith, BCGSD
J. Wiseman/C. Gabel/M. Colone, CDM

Buncombe County
North Carolina

Chairman:	David Gantt
Vice Chairman:	Bill Stanley
Commissioner:	K. Ray Bailey
Commissioner:	Holly Jones
Commissioner:	Carol Peterson
County Manager:	Wanda Greene
Assistant County Manager:	Jon Creighton
Landfill Manager:	Jerry Mears

Buncombe County Solid Waste Management Facility
C&D Landfill
Substantial Amendment and
Phase 5 Permit to Construct Application
Volume 1 of 2

April 2009



PHASE 5 EXPANSION PERMIT TO CONSTRUCT APPLICATION

BUNCOMBE COUNTY SOLID WASTE MANAGEMENT FACILITY

BUNCOMBE COUNTY, NORTH CAROLINA

MARK D. CATHEY, PE

McGill ASSOCIATES

Engineering • Planning • Finance
Asheville, North Carolina

Note: This seal only applies to the Phase 5 expansion revisions noted as footnotes throughout the document.

April 2015

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Part 1
Introduction

1.1 Purpose of Permit Application

Buncombe County (County) proposes to expand their existing construction and demolition (C&D) landfill to include areas to the northeast and west (see Facility Drawings). The proposed increase of the C&D landfill capacity results in expanding the landfill which is considered a substantial amendment (see Attachment 1 for Solid Waste Section guidance letter). In conjunction with the substantial amendment, requirements have been prepared to obtain a Permit to Construct for Phase 5. This permit application includes:

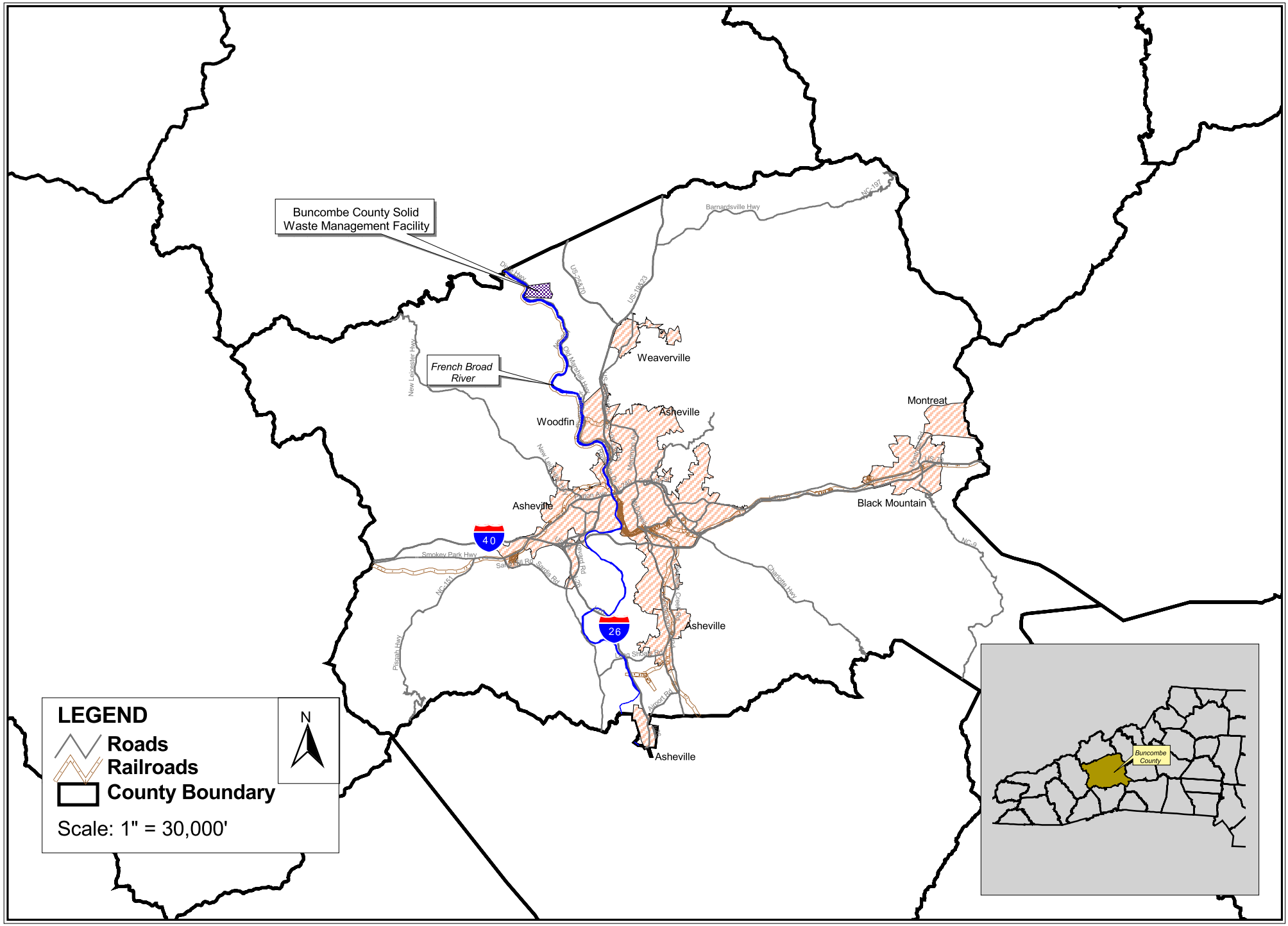
Permit Application	Prepared in accordance with
Substantial Amendment	.0535 (c)
Part 2 – Site Hydrogeologic Report	.0538 (a)
Part 3 – Facility Plan	.0537
Part 4 – Local Government Approval	.0536 (c)(11)
Permit to Construct	.0535 (a)(1)
Part 5 – Engineering Plan	.0539
Part 6 – Construction Quality Assurance Plan	.0541
Part 7 – Operation Plan	.0542
Part 8 – Closure/Post-Closure Plan	.0543

1.2 Facility Location

The Buncombe County Solid Waste Management Facility is located on NC 251 (Dixie Highway) in Alexander, North Carolina approximately 9 miles northwest of Asheville, North Carolina (see Figure 1-1). A construction entrance is located on NC 251. Primary access for landfilling activities is from SR 1745 (Panther Branch Road).

1.3 Solid Waste Management Rule Requirements

The Substantial Amendment/Permit to Construct Application criteria and requirements established in Rules .0536, .0537, .0538, .0539, 0541, .0542, and .0543 of the North Carolina Solid Waste Management Rules, as directly related to the C&D landfill, are presented in **Tables 1-1 through 1-8**, respectively. Following each criterion, a brief description of the location where the information is contained is provided.



CDM

Figure 1-1
Location Map

Table 1-1
Cross Reference Summary to Rule .0538 Requirements

Rule and Criteria	Location / Comment
15A NCAC 13B .0538 GEOLOGIC AND HYDROGEOLOGIC INVESTIGATIONS FOR C&DLF FACILITIES	
(a) Site Hydrogeologic Report. A permit applicant must conduct a hydrogeologic investigation and prepare a report. An investigation is required to assess the geologic and hydrogeologic characteristics of the proposed site to determine the suitability of the site for solid waste management activities, which areas of the site are most suitable for C&DLF units, and the general ground-water flow paths and rates for the uppermost aquifer. The report must provide an understanding of the relationship of the site ground-water flow regime to local and regional hydrogeologic features with special emphasis on the relationship of C&DLF units to ground-water receptors (especially drinking water wells) and to ground-water discharge features. Additionally, the scope of the investigation must include the general geologic information necessary to address compliance with the pertinent location restrictions described in Rule .0536 of this Section. The Site Hydrogeologic Report must provide, at a minimum, the following information:	
(1) A report on local and regional geology and hydrogeology based on research of available literature for the area. This information is to be used in planning the field investigation. For sites located in piedmont or mountain regions, this report must include an evaluation of structurally controlled features identified on a topographic map of the area.	• See Part 2, Page 1
(2) A report on field observations of the site that includes information on the following: (A) topographic setting, springs, streams, drainage features, existing or abandoned wells, rock outcrops, (including trends in strike and dip), and other features that may affect site suitability or the ability to effectively monitor the site; and (B) ground-water discharge features. For a proposed site where the owner or operator does not control the property from any landfill unit boundary to the controlling, downgradient, ground-water discharge feature(s), additional borings, geophysics or other hydrogeological investigations may be required to characterize the nature and extent of groundwater flow; and (C) the hydrogeological properties of the bedrock, if the uppermost ground-water flow is predominantly in the bedrock. Bedrock for the purpose of this rule is defined as material below auger refusal.	• See Part 2, Page 3

Rule and Criteria	Location / Comment
15A NCAC 13B .0538 GEOLOGIC AND HYDROGEOLOGIC INVESTIGATIONS FOR C&DLF FACILITIES	
(3) Borings for which the numbers, locations, and depths are sufficient to provide an adequate understanding of the subsurface conditions and ground-water flow regime of the uppermost aquifer at the site. The number and depths of borings required will depend on the hydrogeologic characteristics of the site. At a minimum, there must be an average of one boring for each 10 acres of the proposed landfill facility unless otherwise authorized by the Division. All borings intersecting the water table must be converted to piezometers or monitoring wells in accordance with 15A NCAC 02C .0108.	• See Part 2 - Site Hydrogeologic Investigation, Page 4
(4) A testing program for the borings which describes the frequency, distribution, and type of samples taken and the methods of analysis (ASTM Standards or test methods approved by the Division) used to obtain, at a minimum, the following information: (A) standard penetration - resistance (ASTM D 1586); (B) particle size analysis (ASTM D 422); (C) soil classification: Unified Soil Classification System (USCS) (ASTM D 2487); (D) formation descriptions; and (E) saturated hydraulic conductivity, porosity, effective porosity, and dispersive characteristics for each lithologic unit of the uppermost aquifer including the vadose zone.	• See Part 2 - Site Hydrogeologic Investigation, Page 25 and Appendix B
(5) In addition to borings, other techniques may be used to investigate the subsurface conditions at the site, including but not limited to: geophysical well logs, surface geophysical surveys, and tracer studies.	• See Part 2 - Site Hydrogeologic Investigation, Page 27
(6) Stratigraphic cross-sections identifying hydrogeologic and lithologic units, and stabilized water table elevations.	• See Part 2 - Site Hydrogeologic Investigation, Page 27
(7) Water table information, including: (A) tabulations of water table elevations measured at the time of boring, 24 hours, and stabilized readings for all borings (measured within a period of time short enough to avoid temporal variations in ground-water flow which could preclude accurate determination of ground-water flow direction and rate); (B) tabulations of stabilized water table elevations over time in order to develop an understanding of seasonal fluctuations in the water table; (C) an estimation of the long-term seasonal high water table based on stabilized water table readings, hydrographs of wells in the area, precipitation and other meteorological data, and streamflow measurements from the site frequent enough to demonstrate infiltration and runoff characteristics, and any other information available; and (D) a discussion of any natural or man-made activities that have the potential for causing water table fluctuations, including but not limited to, tidal variations, river stage changes, flood pool changes of reservoirs, high volume production wells, and injection wells.	• See Part 2 - Site Hydrogeologic Investigation, Page 35

Rule and Criteria	Location / Comment
15A NCAC 13B .0538 GEOLOGIC AND HYDROGEOLOGIC INVESTIGATIONS FOR C&DLF FACILITIES	
(8) The horizontal and vertical dimensions of ground-water flow including flow directions, rates, and gradients.	• See Part 2 - Site Hydrogeologic Investigation, Page 40
(9) Ground-water contour map(s) to show the occurrence and direction of ground-water flow in the uppermost aquifer and any other aquifers identified in the hydrogeologic investigation. The ground-water contours must be superimposed on a topographic map. The location of all borings and rock cores and the water table elevations or potentiometric data at each location used to generate the ground-water contours must be shown on the ground-water contour map(s).	• See Part 2 - Site Hydrogeologic Investigation, Page 50
(10) A topographic map of the site locating soil borings with accurate horizontal and vertical control, which are tied to a permanent onsite benchmark.	• See Part 2 - Site Hydrogeologic Investigation, Page 51
(11) Information for wells and water intakes within the site characterization study area, in accordance with Rule .0536(c) of this Section including: (A) boring logs, construction records, field logs and notes, for all onsite borings, piezometers and wells; (B) construction records, number and location served by wells, and production rates, for public water wells; and (C) available information for all surface water intakes, including use and production rate.	• See Part 2 - Site Hydrogeologic Investigation, Page 51 and Appendix A
(12) Identification of other geologic and hydrologic considerations including but not limited to: slopes, streams, springs, gullies, trenches, solution features, karst terranes, sinkholes, dikes, sills, faults, mines, ground-water discharge features, and ground-water recharge/discharge areas.	• See Part 2 - Site Hydrogeologic Investigation, Page 51
(13) A report summarizing the geological and hydrogeological evaluation of the site that includes the following: (A) a description of the relationship between the uppermost aquifer of the site to local and regional geologic and hydrogeologic features, (B) a discussion of the ground-water flow regime of the site focusing on the relationship of C&DLF unit(s) to ground-water receptors and to ground-water discharge features, (C) a discussion of the overall suitability of the proposed site for solid waste management activities and which areas of the site are most suitable for C&DLF units, and (D) a discussion of the ground-water flow regime of the uppermost aquifer at the site and the ability to effectively monitor the C&DLF units in order to ensure early detection of any release of constituents to the uppermost aquifer.	• See Part 2 - Site Hydrogeologic Investigation, Page 51
(b) Design Hydrogeologic Report	• See Part 5, Appendix C

Rule and Criteria	Location / Comment
15A NCAC 13B .0538 GEOLOGIC AND HYDROGEOLOGIC INVESTIGATIONS FOR C&DLF FACILITIES	
(1) A geological and hydrogeological report must be submitted in the application for the Permit to Construct. This report must contain the information required by Subparagraph (2) of this Paragraph. The number and depths of borings required must be based on the geologic and hydrogeologic characteristics of the landfill facility. At a minimum, there must be an average of one boring for each acre of the investigative area. The area of investigation must, at a minimum, be the area within the unit footprint and unit compliance boundary, unless otherwise authorized by the Division. The scope and purpose of the investigation is as follows: (A) The investigation must provide adequate information to demonstrate compliance with the vertical separation and foundation standards set forth in Items (2) and (5) of Rule .0540 of this Section. (B) The report must include an investigation of the hydrogeologic characteristics of the uppermost aquifer for the proposed phase of C&DLF development and any leachate management unit(s). The purpose of this investigation is to provide more detailed and localized data on the hydrogeologic regime for this area in order to design an effective water quality monitoring system.	• See Part 5, Appendix C

Rule and Criteria	Location / Comment
15A NCAC 13B .0538 GEOLOGIC AND HYDROGEOLOGIC INVESTIGATIONS FOR C&DLF FACILITIES	
(2) The Design Hydrogeologic Report must provide, at a minimum, the following information: (A) the information required in Subparagraphs (a)(4) through (a)(12) of this Rule; (B) the technical information necessary to determine the design of the monitoring system as required by Paragraph (b) of Rule .0544 of this Section; (C) the technical information necessary to determine the relevant point of compliance as required by Part (b)(1)(B) of Rule .0544 of this Section; (D) rock cores (for sites located in the piedmont or mountain regions) for which the numbers, locations, and depths are adequate to provide an understanding of the fractured bedrock conditions and ground-water flow characteristics of at least the upper 10 feet of the bedrock. Testing for the corings must provide, at a minimum, rock types, recovery values, rock quality designation (RQD) values, saturated hydraulic conductivity and secondary porosity values, and rock descriptions, including fracturing and jointing patterns, etc.; (E) a ground-water contour map based on the estimated long-term seasonal high water table that is superimposed on a topographic map and includes the location of all borings and rock cores and the water table elevations or potentiometric data at each location used to generate the ground-water contours; (F) a bedrock contour map (for sites located in piedmont or mountain regions) illustrating the contours of the upper surface of the bedrock that is superimposed on a topographic map and includes the location of all borings and rock cores and the top of rock elevations used to generate the upper surface of bedrock contours; (G) a three dimensional ground-water flow net or several hydrogeologic cross-sections that characterize the vertical ground-water flow regime for this area; (H) a report on the ground-water flow regime for the area including ground-water flow paths for both horizontal and vertical components of ground-water flow, horizontal and vertical gradients, flow rates, ground-water recharge areas and discharge areas; (I) a report on the soils in the four feet immediately underlying the waste with relationship to properties of the soil. Soil testing cited in Subparagraph (a)(4) of this Rule must be used as a basis for this discussion; and (J) a certification by a Licensed Geologist that all borings which intersect the water table at the site have been constructed and maintained as permanent monitoring wells in accordance with 15A NCAC 02C .0108, or that the borings will be properly abandoned in accordance with the procedures for permanent abandonment of wells as delineated in 15A NCAC 02C .0113. All piezometers within the footprint area must be overdrilled to the full depth of the boring, prior to cement or bentonite grout placement, and the level of the grout within the boring must not exceed in height the elevation of the proposed basegrade.	• See Part 5, Appendix C

Table 1-2
Cross Reference Summary to Rule .0537 Requirements

Rule and Criteria	Location / Comment
15A NCAC 13B .0537 FACILITY PLAN FOR C&DLFS	
(d) Facility Drawings. The facility plan must include the following drawings:	
(1) Site Development. The drawings which plot site development must be prepared on topographic maps representative of existing site conditions; the maps must locate or delineate the following: (A) Delineate the areal limits of all landfill units, and incorporate the buffer requirements set forth in Rule .0540(1); (B) Locate all solid waste management facilities and facility infrastructure, including landfill units; (C) Delineate the areal limits of grading, including borrow and stockpile areas; (D) Define phases of development, which do not exceed approximately five years of operating capacity; (E) Delineate proposed final contours for the C&DLF unit(s) and facility features for closure; and (F) Delineate physical features including floodplains, wetlands, unstable areas, and cultural resource areas as defined in Rule .0536.	(A) See Sheet SD-1. (B) See Sheet SD-1. (C) See Sheet SD-1. (D) See Sheet SD-2. (E) See Sheet SD-3. (F) See Sheet SD-1.
(2) Landfill Operation. The following information related to the long-term operation of the C&DLF unit must be included in facility drawings: (A) proposed transitional contours for each phase of development including operational grades for existing phase(s) and construction grading for the new phase; and (B) stormwater segregation features and details for inactive landfill subcells, if included in the design or required.	• See LO Sheets.
(3) Survey. A survey locating all property boundaries for the proposed landfill facility certified by an individual licensed to practice land surveying in the State of North Carolina.	• See SD Sheets.
(e) Facility Report. The facility plan must include the following information:	

Rule and Criteria	Location / Comment
15A NCAC 13B .0537 FACILITY PLAN FOR C&DLFS	
(1) Waste stream. A discussion of the characteristics of the wastes received at the facility and facility specific management plans must incorporate: (A) the types of waste specified for disposal; (B) average yearly disposal rates in tons and a representative daily rate that is consistent with the local government approval in accordance with Rule .0536 of this Section; (C) the area served by the facility; (D) procedures for segregated management at different on-site facilities; and (E) equipment requirements for operation of the C&DLF unit(s).	• See Section 2 of Part 3: Facility Plan.
(2) Landfill Capacity. An analysis of landfill capacity and soil resources must be performed. (A) The data and assumptions used in the analysis must be included with the facility drawings and disposal rates specified in the facility plan and representative of operational requirements and conditions. (B) The conclusions must provide estimates of gross capacity of the C&DLF unit; gross capacity for each phase of development of the C&DLF unit; the estimated operating life of all C&DLF units in years; and required quantities of soil for landfill construction, operation, and closure; and available soil resources from on-site. Gross capacity is defined as the volume of the landfill calculated from the elevation of the initial waste placement through the top of the final cover, including any periodic cover.	• See Section 2 of Part 3: Facility Plan.
(3) Special engineering features. (A) Leachate management systems, if proposed by the applicant. The performance of and design concepts for the leachate collection system within active areas of the C&DLF unit(s) and any storm water segregation included in the engineering design must be described. Normal operating conditions must be defined. A contingency plan must be prepared for storm surges or other considerations exceeding design parameters for the storage or treatment facilities. (B) Containment and environmental control systems. A general description of the systems designed for proper landfill operation, system components, and corresponding functions must be provided. (C) Base liner systems, if proposed by the applicant must be described. (D) Other device, components, and structures, if proposed by the applicant, must be described.	• Closure cap system, sedimentation and erosion control, and the landfill subgrade are described in Section 2 of Part 3: Facility Plan.

Table 1-3
Cross Reference Summary to Rule .0536 (c)(11) Requirements

Rule and Criteria		Location / Comment
15A NCAC 13B .0536 (c)(11) LOCAL GOVERNMENT APPROVALS FOR C&DLFS.		
(A)	Board approval of project. Approval may be in the form of either a resolution or a vote on a motion.	• See Section 2 of Part 4: Local Government Approval.
(B)	A permit applicant other than the unit of local government with jurisdiction over the proposed landfill site must obtain a franchise in accordance with N.C.G.S 130A-294(b1)(3) from each unit of local government in whose jurisdiction the site is located. A copy of the franchise must be submitted to the Division as part of the site study.	• Not required since (A) has been provided.
(C)	Prior to issuance of approval or a franchise, the jurisdictional local government(s) where the landfill is to be located shall hold at least one public meeting to inform the community of the proposed waste management activities as described in the proposed facility plan prepared in accordance with Subparagraph (2) of this Paragraph. The local government where the landfill is to be located shall provide a public notice of the meeting at least 30 days prior to the meeting. For purposes of this Part, public notice must include a legal advertisement placed in a newspaper or newspapers serving the county and provision of a news release to at least one newspaper serving the county. Public notice must include time, place, and purpose of the meetings required by this Part. The application for a franchise or other documentation as required by the appropriate local government(s), must be placed at a location that is accessible by the public. This location must be noted in the public notice. The permit applicant must notify the property owners of all property that shares a common border with the proposed facility by means of a U.S. Postal Service registered letter, return receipt requested. The notice must give the date, time and place of the public meeting, and must describe the facility plan for the landfill, including the areal location and final elevation of all waste disposal units, the type and amount of waste to be disposed at the landfill, any other waste management activities to be conducted at the facility, and the proposed location of the entrance to the facility. Mailings must be postmarked a minimum of 30 days prior to the public meeting which is being noticed. The applicant must provide documentation of the content and mailing of the notices in the site study.	• See Section 3 of Part 4: Local Government Approval.
(D)	Public notice of the meeting must be documented in the site study. A tape recording or a written transcript of the meeting, all written material submitted representing community concerns, and all other relevant written material distributed or used at the meeting must be submitted as part of the site study.	• See Section 3 of Part 4: Local Government Approval.
(E)	A letter from the unit of local government(s) having zoning jurisdiction over the site which states that the proposal meets all the requirements of the local zoning ordinance, or that the site is not zoned, must be submitted to the Division as part of the site study.	• See Section 4 of Part 4: Local Government Approval.

Table 1-4
Cross Reference Summary to Rule .0539 Requirements

Rule and Criteria	Location / Comment
15A NCAC 13B .0539 ENGINEERING PLAN FOR C&DLF FACILITIES	
(d) An engineering report must contain:	
(1) A summary of the facility design that includes: (A) a discussion of the analytical methods used to evaluate the design, (B) definition of the critical conditions evaluated and assumptions made, (C) a list of technical references used in the evaluation, and (D) completion of any applicable location restriction demonstrations in accordance with Rule .0536.	• See Section 3 of Part 5: Engineering Plan.
(2) A description of the materials and construction practices that conforms to the requirements set forth in Rule .0540.	• See Section 4 of Part 5: Engineering Plan.
(3) A copy of the Design Hydrogeologic Report prepared in accordance with Paragraph (b) of Rule .0538.	• See Appendix C of Part 5: Engineering Plan.
(e) Engineering drawings must illustrate:	
(1) existing conditions: site topography, features, existing disposal areas, roads, and buildings;	• See Sheet EP-1
(2) grading plans: proposed limits of excavation, subgrade elevations, intermediate grading for partial construction;	• See Sheet EP-3
(3) stormwater segregation system, if required: location and detail of features;	• Not required for design
(4) cap system: base and top elevations, landfill gas devices, infiltration barrier, surface water removal, protective and vegetative cover, and details;	• See EP Sheets
(5) temporary and permanent sedimentation and erosion control plans;	• See Sheets EP-2, EP-7, and EP-8
(6) vertical separation requirement estimates including: (A) Cross-sections, showing borings, which indicate existing ground surface elevations, base grades, seasonal high ground-water level, estimated long-term seasonal high ground-water level in accordance with Part (b)(2)(E) of Rule .0538, and bedrock level in accordance with Part (b)(2)(F) of Rule .0538; and (B) A map showing the existing ground surface elevation and base grades. The map must include labeled boring locations which indicate seasonal high ground-water level, estimated long term high ground-water level in accordance with Part (b)(2)(E) of Rule .0538, and bedrock level in accordance with Part (b)(2)(F) of Rule .0538.	• See Part 2: Site Hydrogeological Report and Appendix C of Part 5: Engineering Plan

Rule and Criteria	Location / Comment
15A NCAC 13B .0539 ENGINEERING PLAN FOR C&DLF FACILITIES	
(f) The engineering plan must also describe and illustrate additional engineering features and details including, if proposed by the applicant, the cap system, leachate collection system and base liner system. Cap systems, leachate collection systems and base liner systems must be designed in accordance with NC Solid Waste Management Rules 15A NCAC 13B .1620 and .1621.	• See Part 5: Engineering Plan.

Table 1-5
Cross Reference Summary to Rule .0541 Requirements

Rule and Criteria	Location / Comment
15A NCAC 13B .0541 CONSTRUCTION QUALITY ASSURANCE FOR C&DLF FACILITIES	
(b) For construction of each cell, the CQA plan must include at a minimum: (1) Responsibilities and authorities. The plan must establish responsibilities and authorities for the construction management organization. A pre-construction meeting must be conducted prior to beginning construction of the initial cell, or as required by the permit. The meeting must include a discussion of the construction management organization, respective duties during construction, and periodic reporting requirements for test results and construction activities; (2) Inspection activities. A description of all field observations, tests and equipment that will be used to ensure that the construction meets or exceeds all design criteria established in accordance with Rules .0539, .0540 and Rule .0543 Paragraph (d); (3) Sampling strategies. A description of all sampling protocols, sample size and frequency of sampling must be presented in the CQA plan; (4) Documentation. A description of reporting requirements for CQA activities; and (5) Progress and troubleshooting meetings. A plan for holding daily and monthly troubleshooting meetings. The proceedings of the meetings must be documented.	(1) See Sections 2 and 3 of Part 6: Construction Quality Assurance Plan. (2) See Section 4 of Part 6: Construction Quality Assurance Plan. (3) See Section 4 of Part 6: Construction Quality Assurance Plan. (4) See Section 5 of Part 6: Construction Quality Assurance Plan. (5) See Section 3 of Part 6: Construction Quality Assurance Plan.

Table 1-6
Cross Reference Summary to Rule .0542 Requirements

Rule and Criteria	Location / Comment
15A NCAC 13B .0542 OPERATION PLAN AND REQUIREMENTS FOR C&DLF FACILITIES	
(b) Operation Plan. The owner or operator of a C&DLF unit must prepare an operation plan for each phase of landfill development. The plan must include drawings and a report defining the information as identified in this Rule.	
(1) Operation drawings. Drawings must be prepared for each phase of landfill development. The drawings must be consistent with the engineering plan and prepared in a format which is useable for the landfill operator. The operation drawings must illustrate the following: (A) existing conditions including the known limits of existing disposal areas; (B) progression of operation including initial waste placement, daily operations, yearly contour transitions, and final contours; (C) stormwater controls for active and inactive subcells, if required; (D) special waste handling areas, such as asbestos disposal area, within the C&DLF unit; (E) buffer zones, noting restricted use; (F) stockpile and borrow operations; and (G) other solid waste activities, such as tire disposal or storage, yard waste storage, white goods storage, recycling pads, etc.	(A) See Sheet OP-1 (B) See Sheets OP-2 through OP-5 (C) See OP Sheets (D) See Sheets OP-2 through OP-5 (E) See Sheet OP-1 (F) See Sheet OP-1 (G) See Sheet OP-1
(2) Operation Plan Description. The owner and operator of any C&DLF unit must maintain and operate the unit in accordance with the operation plan as described in Paragraphs (c) through (l) of this Rule.	
(c) Waste Acceptance and Disposal Requirements.	• See Section 2 of Part 7: Operation Plan.
(d) Wastewater treatment sludge must not be accepted for disposal.	• See Section 2 of Part 7: Operation Plan.
(e) Waste Exclusions.	• See Section 2 of Part 7: Operation Plan.
(f) Cover material requirements.	• See Section 3 of Part 7: Operation Plan.
(g) Spreading and Compacting requirements.	• See Section 4 of Part 7: Operation Plan.
(h) Disease vector control.	• See Section 5 of Part 7: Operation Plan.
(i) Air Criteria and Fire Control.	• See Section 6 of Part 7: Operation Plan.
(j) Access and safety requirements.	• See Section 7 of Part 7: Operation Plan.
(k) Erosion and sedimentation control requirements.	• See Section 8 of Part 7: Operation Plan.

Rule and Criteria	Location / Comment
15A NCAC 13B .0542 OPERATION PLAN AND REQUIREMENTS FOR C&DLF FACILITIES	
(l) Drainage control and water protection requirements.	• See Section 9 of Part 7: Operation Plan.
(m) Survey for Compliance.	• See Section 10 of Part 7: Operation Plan.
(n) Operating Record and Recordkeeping requirements.	• See Section 11 of Part 7: Operation Plan.

Table 1-7
Cross Reference Summary to Rule .0543 Requirements

Rule and Criteria			Location / Comment
15A NCAC 13B .0543 CLOSURE AND POST-CLOSURE REQUIREMENTS FOR C&DLF FACILITIES			
(d)	Closure plan contents. The owner and operator must prepare a written closure plan that describes the steps necessary to close all C&DLF units at any point during their active life in accordance with the cap system requirements in Paragraph (c) of this Rule. The closure plan, at a minimum, must include the following information:		
	(1)	a description of the cap system and the methods and procedures to be used to install the cap that conforms to the requirements set forth in Paragraph (c) of this Rule;	• See Section 2 and Appendix A of Part 8: Closure/Post-Closure Plan.
	(2)	an estimate of the largest area of the C&DLF unit requiring the specified cap system at any time during the active life	• See Section 2 of Part 8: Closure/Post-Closure Plan.
	(3)	an estimate of the maximum inventory of wastes on-site over the active life of the landfill facility;	• See Section 2 of Part 8: Closure/Post-Closure Plan.
	(4)	a schedule for completing all activities necessary to satisfy the closure criteria; and	• See Section 2 of Part 8: Closure/Post-Closure Plan.
	(5)	the cost estimate for closure activities as required under Rule .0546.	• See Section 2 of Part 8: Closure/Post-Closure Plan.
(f)	Post-closure plan contents. The owner and operator of all C&DLF units must submit a written post-closure plan that includes, at a minimum, the following information:		
	(1)	a description of the monitoring and maintenance activities required for each C&DLF unit, and the frequency at which these activities must be performed;	• See Section 3 of Part 8: Closure/Post-Closure Plan.
	(2)	name, address, and telephone number of the person or office responsible for the facility during the post-closure period;	• See Section 3 of Part 8: Closure/Post-Closure Plan.
	(3)	a description of the planned uses of the property during the post-closure period; and	• See Section 3 of Part 8: Closure/Post-Closure Plan.
	(4)	the cost estimate for post-closure activities required under Rule .0546.	• See Section 3 of Part 8: Closure/Post-Closure Plan.

Table 1-8
Cross Reference Summary to Rule .0544 Requirements

Rule and Criteria	Location / Comment
15A NCAC 13B .0544 MONITORING PLANS AND REQUIREMENTS FOR C&DLF FACILITIES	
(a) A Monitoring Plan must be submitted that contains the following information and must apply to all C&DLF units. The Monitoring Plan must be prepared in accordance with this Rule.	
(b) Ground-water monitoring plan	• See Appendix A of Part 7: Operation Plan.
(c) Surface water monitoring plan.	• See Appendix A of Part 7: Operation Plan.
(d) Gas control plan.	• See Section 11 of Part 7: Operation Plan.
(e) A waste acceptability program.	• See Section 11 of Part 7: Operation Plan.

North Carolina Department of Environment and Natural Resources
Dexter R. Matthews, Director | Division of Waste Management | Michael F. Easley, Governor
William G. Ross Jr., Secretary
Document ID No. 4477

SOLID WASTE SECTION

May 12, 2008

Mr. Jerry Mears
Buncombe County – Solid Waste Manager
85 Panther Branch Road
Alexander, North Carolina 28701

Subject: Proposed C&D Phase Addition Application Clarification
Buncombe County Solid Waste Management Facility
Permit No. 11-07
Buncombe County

Dear Mr. Mears:

This letter is intended to further clarify several permitting requirements pertaining to the addition of a new Construction and Demolition (C&D) Debris Landfill phase at the existing Municipal Solid Waste (MSW) Landfill Facility.

I would first like to clarify the matter of the permit being an amendment or substantial amendment. Based on a review of the original facility plan with Mr. Kenton Yang, the proposed area for the new C&D landfill is outside of the original planned C&D area. This being the case, the proposed area has not been presented to public scrutiny and has not received local government approval. For this reason the facility change will be considered a substantial amendment. Therefore, you must submit a complete application containing a comprehensive facility plan per North Carolina Administrative Code Title 15A Subchapter 13B.0537 and local government approval per North Carolina Administrative Code Title 15A Subchapter 13B.053(c)(11).

In addition, I would like to clarify the submissions to satisfy North Carolina Administrative Code Title 15A Subchapter 13B.0547. Buncombe County plans to continue operating the existing C&D landfill past July 1, 2008. Therefore, you are required to submit a closure and post-closure plan and financial responsibility documentation prior to July 1, 2008. These documents must be prepared in accordance with North Carolina Administrative Code Title 15A Subchapter 13B.0543 and Subchapter 13B.0546, respectively. The application for the new phase, referenced above, must be submitted 120 days prior to the expiration date of the existing permit or 180 days prior to start of construction for the new phase.

Finally, I would like to clarify the permitting fee requirements. The closure and post-closure plan and the financial responsibility documentation require the submission of a permit modification fee. The application for the new C&D phase, since it is a substantial amendment, will require the submission of a new permit fee.

The new permit fee for this application is consistent with what the Division has charged other facilities given the same circumstances. In both cases, the permit fee amount will be based on the C&D rate structure in North Carolina General Statute Article 9 Chapter 130A-295.8. If you should have any questions regarding the permit fees please contact Ms. Ellen Lorscheider, Planning & Program Management Branch Head, at (919) 508-8499.

Should you have any other questions regarding this matter please contact me at (828) 296-4703.

Sincerely,

Allen Gaither
Environmental Engineer

Cc: Mr. Kenton Yang, P.E. Camp, Dresser & McKee 5400 Glenwood Avenue, Suite 300 Raleigh, North Carolina 27612
Kristy Smith, Buncombe County Solid Waste, 81 Panther Branch, Alexander, NC 28701
Ed Mussler – SWS/Raleigh
Brain Wootton – SWS/Raleigh
Deb Aja – SWS/ARO
Bill Wagner – SWS/ARO

Buncombe County, North Carolina

Buncombe County Solid Waste Management Facility

C&D Landfill Expansion
Part 2: Site Hydrogeologic Investigation

April 2009

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Part 2
Site Hydrogeologic Investigation

Rule .0538(a) of the North Carolina Solid Waste Management Rules require that a Geological and Hydrogeological Study be prepared for inclusion in a Site Plan Application for Construction and Demolition Debris (C&D) Landfills. This document is intended to fulfill all of the requirements set forth in this rule and to provide each form of documentation that is specified.

The Geological and Hydrogeological Study presented herein is designed to address the applicable Solid Waste Management Rules for the Site Plan Application for the proposed Buncombe County C&D Landfill Expansion. This report compiles information from all field activities to date, summarizes data from previously submitted documents and subsequent investigation activities to provide a comprehensive characterization of the geology and hydrogeology at the proposed C&D Landfill facility expansion site.

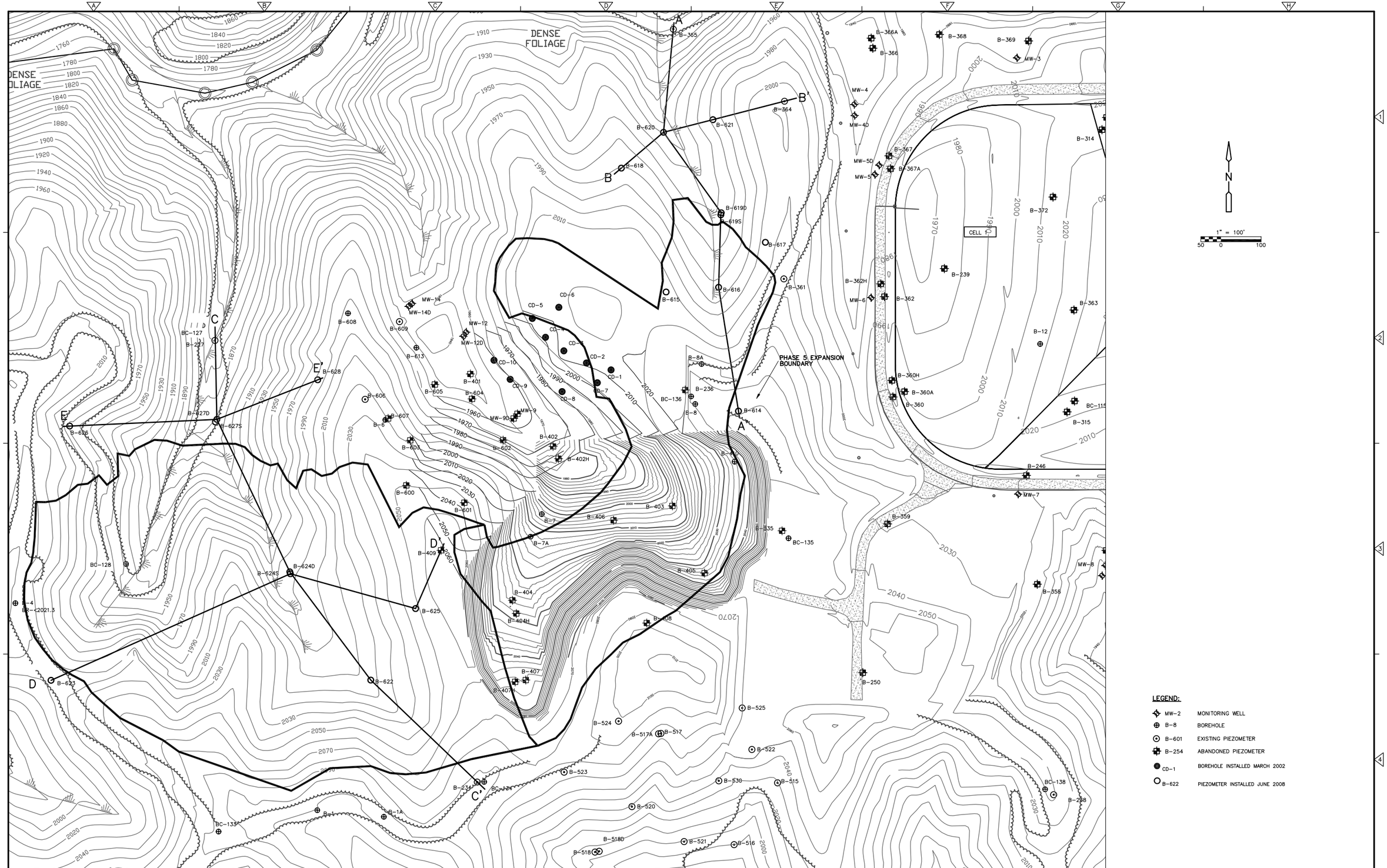
The current and proposed C&D Landfill expansion is located in the western portion of the approximately 557-acre parcel of land owned by Buncombe County in Alexander, North Carolina. The proposed landfill facility boundary footprint is 35 acres, of which approximately 15 acres is occupied by the existing C&D landfill. The C&D Landfill facility expansion site and investigation areas are shown on Sheet 2-1.

This report will discuss and provide information regarding local and regional geology and hydrogeology, field observations, borings, geotechnical testing, cross-sections, water table information, groundwater flow, and a report summary, as required in Rule .0538(a).

2.1 Local and Regional Geology and Hydrogeology

2.1.1 Regional Geology

The site is located within the Blue Ridge Physiographic Province. The surrounding terrain does not exhibit a strong preferential orientation, which is typical of the Blue Ridge Province. The Geologic Map of North Carolina (NCGS 1985) indicates that the area is underlain by northeasterly-trending banded metamorphic rocks of Precambrian age comprised of migmatitic gneiss. This unit consists of biotite-hornblende gneiss interlayered with biotite-granite gneiss and is described as being pinkish grey to light grey, massive to well foliated, and granite to quartz monzonite in composition. Throughout this report, the gneisses are referred in tandem as undifferentiated gneiss. Discontinuous layers and lenses of equigranular and massive to well foliated amphibolite are also present in the area. Other rocks of localized extent mapped in the region consist of a variety of metamorphosed intrusive and extrusive igneous rocks, metasedimentary rocks, calcium silicate rocks (calcium bearing silicate rocks formed by metamorphosis of impure limestone or dolomite) and relict granulite facies rock. Quartz veins and pegmatitic intrusives are also commonly found within the metamorphic rocks. No major faults or other major structural discontinuities have been mapped at the site or the surrounding area (CDM 1993).



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: D. FORBES
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

C&D LANDFILL SUBSTANTIAL AMENDMENT
SITE HYDROGEOLOGIC INVESTIGATION

SITE MAP

PROJECT NO. 6447-65973
FILE NAME: SHT_2-1.dwg

SHEET NO.
2-1

Soils overlying the bedrock units in the region consist of residual, colluvial, and alluvial materials, collectively known as regolith. The residual soils (saprolite) are derived from the in-place chemical weathering of the bedrock materials and typically exhibit the relic mineral fabric of the rock from which they are derived. They are generally fine grained, with texture related to the degree of weathering. The transition from saprolite to bedrock is generally gradational, with the degree of bedrock weathering decreasing with depth. Colluvial materials occur on side slopes and within the small drainages. This colluvium consists of materials derived from slopes and upland areas that have been redeposited by a variety of mass-wasting processes such as soil creep or slope wash. Alluvial soils occur along the larger drainage features and typically consist of sorted interbeds of silt, sand, and gravel.

2.1.2 Regional Hydrogeology

Groundwater within the Blue Ridge Province generally occurs in the pore spaces of the soil materials, near the bedrock/regolith interface and/or within bedrock fractures. The groundwater system is recharged by infiltrated precipitation falling on interstream (upland) areas. A portion of this water moves through the soil materials and is discharged to nearby springs and streams in adjacent valleys. Another portion migrates through the soil materials and into fractures within the bedrock to the saturated zone. This groundwater continues to move through these fractures, depending upon the degree of interconnection, to adjacent valleys where it is discharged.

Groundwater production wells in Buncombe County are reported to have an average yield of 10.3 gallons per minute or 0.069 gallons per minute per foot of well (NCWWAR 1970). Effective porosity has been reported by Heath (1980) to be approximately 0.1 percent for fractured bedrock materials in the area. Fractures in the region below a depth of 300 to 400 feet tend not to be water bearing (Heath 1980). However, groundwater production at greater depths has been reported in many areas (Daniel 1987). This implies that, while groundwater is most readily produced from the upper 300 feet, more localized zones of significant production may occur at greater depths in some locations.

2.2 Field Observations

This section discusses the field observations made during current and previous investigations at the Buncombe County C&D Landfill expansion including topographic setting, springs, streams, drainage features, and groundwater discharge features.

2.2.1 Topographic Setting

The entire landfill site (C&D and Subtitle D) encompasses an area of approximately 557 acres located in Buncombe County, about 9 miles northwest of the city of Asheville, North Carolina. The Site is bounded on the south by the French Broad River, which is the major surface water drainage feature in the area. Blevin Branch,

Panther Branch and Flat Creek, respectively, bound the north, west and east sides of the Site and are tributary to the French Broad River. The area is characterized by moderate to steep slopes separating narrow hills and ridges from small incised secondary drainages (locally known as hollows). Elevations range from 1,740 feet msl up to more than 2,150 feet msl at the tops of some hills.

There are active C&D and Subtitle D Landfills at the facility in addition to several borrow areas. The C&D landfill property is surrounded by forest to the west, north and south and developed residential areas to the east. The remaining areas are used for C&D and Subtitle D Landfill and related borrow activities.

2.2.2 Springs, Streams and Drainage Features

There are several springs on the property, however, no springs were observed within the proposed site expansion footprint. The Site is bounded on the south by the French Broad River, which is the major surface water drainage feature in the area. Blevin Branch, Panther Branch and Flat Creek, respectively, bound the north, west and east sides of the Site and are tributary to the French Broad River.

2.2.3 Groundwater Discharge Features

Typically, springs at the head of the drainage features represented saprolite discharge, and may also indicate bedrock discharge points. No groundwater discharge points (seeps or springs) were observed in the proposed expansion area. Groundwater in deeper bedrock is most likely discharging directly to Blevin Branch, Panther Branch and the French Broad River off the site.

The geologic cross sections included in previous Design Hydrogeologic Reports (CDM 1995a, 2004, 2005) suggested that discharge occurs on the western boundary of the current C&D Area into Panther Branch, and to a lesser extent north to Blevin Branch, and ultimately into the French Broad River. It is possible that Panther Branch may be a discharge point for only the shallow bedrock groundwater system, given the downward hydraulic gradients found at other areas throughout the Site. Deeper bedrock groundwater may discharge at a longer distance from the Site, most likely the French Broad River.

2.3 Borings

Rule .0538(a)(3) requires a sufficient number of borings to provide an adequate understanding of subsurface conditions and groundwater flow of the uppermost aquifer at the site. The proposed Buncombe County C&D Facility expansion site consists of approximately 35 acres to be utilized as landfill. This section discusses boring installation and piezometer construction followed by site specific subsurface conditions and findings.

The following section details the drilling methods used to install borings and piezometers and collect geologic and hydrogeologic data for the proposed C&D

Landfill expansion investigation and includes information collected during this and previous investigations.

2.3.1 Previous Investigations

Law Environmental, Inc. initially investigated the site in 1990 (Law 1991). The investigation consisted of seventeen exploratory soil test borings using hollow-stem augers at twelve locations. Split spoon soil samples were collected at regular intervals using standard penetration test methods (ASTM D-1586). Groundwater was not encountered in any of the borings during drilling. Two borings that were left open overnight also did not accumulate groundwater. No permanent piezometers or monitoring wells were constructed. The report cited an absence of perennial surface water features and a small drainage area entering the site as advantages for landfill development, but identified limited excavation depth, lack of low permeability soils, and soil workability problems as potential constraints.

Phase I Investigation

In November 1992, a Site Plan Application (CDM 1992) was submitted on behalf of Buncombe County to the North Carolina Division of Solid Waste Management - Solid Waste Section (SWS). A Geological and Hydrogeological Evaluation as per SWS Rule .1623(a) was included as Section 4 of that report. The evaluation presented results of a Phase I investigation encompassing the 557-acre proposed Buncombe County Landfill site (the Site). During this Phase I investigation, three 20-foot coring holes and 38 hollow-stem auger borings were drilled, and 19 piezometers were installed. Split spoon soil samples were collected at 5-foot intervals while the auger borings were drilled. Blow counts required to accomplish sample collection were also recorded. Collected soil samples were analyzed for geotechnical properties, including soil classification (25 samples), grain size distribution (25 samples), Atterberg Limits (10 samples), standard proctor compaction (seven samples), natural moisture content (seven samples), porosity (14 samples), and hydraulic conductivity (seven samples undisturbed, seven samples remolded). The rock cores were examined and descriptions recorded for fracture frequency and orientation, general mineralogy, rock quality designation, and other properties.

Water level measurements were taken in the piezometers at the time of completion, at 24 hours and at least seven days after installation. Piezometer measuring points were surveyed to state plane coordinates and mean sea level elevation. Falling head permeability tests (slug tests) were performed in five piezometers to obtain hydraulic conductivity data. Most of the piezometers installed were dry due to auger refusal encountered before reaching groundwater. A comprehensive literature search was also conducted during the Phase I evaluation. This search identified reference materials and mapping done by others to characterize the geology and hydrogeology of the site, as well as the surrounding region. The report concluded that the site appeared to be suitable for landfill development.

Phase II Investigation

In 1993, additional field activities were conducted to address SWS comments provided by letter dated April 29, 1993, concerning the Site Hydrogeologic Report. The results of these additional field activities were presented in the Response to Completeness Review (RCR) Site Plan Application (CDM 1993). As part of that document, GEI Consultants, Inc. (GEI) conducted a lineament/fracture trace analysis, a geophysical investigation, and a Phase II Geological/Hydrogeological Site Evaluation. The lineament/fracture trace analysis and geophysical investigation included lineament analyses on maps and aerial photographs, a fracture trace analysis of rock outcroppings within the Site, and a very low frequency (VLF) geophysical survey of the Site.

The Phase II Geological/Hydrogeological Site Evaluation was subsequently conducted and included the drilling of boreholes at 27 locations. Some of the boring locations were selected based on the results of the VLF survey. Multiple drilling techniques were often used at each location. Thirteen locations were investigated using hollow-stem augers with split spoon sampling as well as air rotary/hammer drilling, four locations by hollow-stem auger with split spoon sampling and rock coring, nine locations by air rotary/hammer drilling only, and one location by all three methods. One permanent piezometer was installed at each of the 27 locations. Water levels were measured in each piezometer at the time of installation, at 24 hours and at least seven days after installation. Eight of the piezometers were installed adjacent to borings drilled during the Phase I investigation that yielded no water. Piezometer measuring points were surveyed to state plane coordinates and mean sea level elevation. Water levels were also measured in the piezometers installed during the Phase I investigation. Six slug tests and/or recovery tests were performed in five piezometers to obtain additional hydraulic conductivity data.

The Site Hydrogeologic Report as required under Rule .1623(a), consisting of Section 4 of the Site Plan Application (CDM 1992) and the Response to Completeness Review, Site Plan Application (CDM 1993), has been previously submitted to the SWS. Data and information in these documents have been reproduced in this report only to the extent necessary to support the Geological and Hydrogeological Study required for the C&D Landfill expansion.

Phase III Investigation

In March 1995, a Permit To Construct Application (CDM, 1995a) was submitted to the SWS. The Design Hydrogeologic Report was included as Appendix G of the report. The Phase III investigation focused on the area within and around the Subtitle D landfill Cells 1-3. The Cell 1-3 Area extended beyond the cell boundaries and past adjacent topographic divides in order to sufficiently characterize the hydrogeologic regime beneath Cells 1-3.

Over 71 boreholes were drilled at 39 locations during the Phase III investigation. Air rotary hammer drilling was used for 44 borings, three boreholes were cored, and 24

boreholes were drilled using hollow-stem auger drilling techniques. Geotechnical samples were collected during hollow-stem auger drilling at nine locations within the Cell 1-3 Area, and blow counts were taken at all 24 auger locations.

Piezometers were installed in 39 boreholes at 29 locations, making a total of nine nested well pairs. Observation wells were installed in eight boreholes, and two pumping wells were constructed. Water level measurements were taken at each of the piezometers at time of boring, and at 24 hours at least seven days after boring. Piezometer measuring points were surveyed to state plane coordinates and mean sea level elevation. Slug testing was performed in 10 piezometers to obtain additional hydraulic conductivity data. Two pumping tests were performed in two hollows within the Cell 1-3 Area to further characterize the groundwater system.

Additional information on the site hydrogeology and the water quality monitoring plan was presented in two Response to Comments letters dated June, 1995 and August, 1995 (CDM, 1995b and 1995c).

Monitoring Well Installation - Cells 1-3

After construction of Cells 1-3, thirteen groundwater monitoring wells and two methane gas monitoring wells were installed around the perimeter of Cells 1-3, in accordance with the approved Water Quality Monitoring Plan for the Subtitle D landfill. A discussion of the field activities and the results of the initial baseline sampling event were presented in the Water Quality Monitoring System Installation and Initial Sampling Report (CDM 1996).

All the groundwater monitoring wells were installed using air rotary drilling methods since groundwater was located at or below the top of bedrock. The methane gas monitoring wells were installed using hollow-stem auger methods. Slug tests were conducted on all wells following development to obtain hydraulic conductivity data. One round of groundwater samples were collected from the thirteen monitoring wells and the three surface water locations and submitted for laboratory analysis of the Appendix I constituents list.

Phase IV Investigation

The Phase IV investigation focused on the area within and surrounding the existing Phase I and II C&D landfill. Since the current C&D landfill is located within the confines of a single drainage basin, the investigation focused on the area within the drainage feature. Sheet 1-1 delineates this area of focused investigation as well as the location of Cells 1-3 and previously installed piezometers.

Nineteen boreholes were drilled at ten locations during the Phase IV investigation. Air rotary hammer drilling was used for nine borings and ten boreholes were drilled using hollow-stem auger drilling techniques. Geotechnical samples were collected during hollow-stem auger drilling at seven locations and blow counts were taken at all 10 auger locations.

Piezometers were installed in twelve boreholes at nine locations, making a total of three nested well pairs. Water level measurements were taken at each of the piezometers at time of boring, and at 24 hours, and at least seven days after boring. Piezometer measuring points were surveyed to state plane coordinates and mean sea level elevation.

Monitoring Well Installation – Phase I C&D
Installation of two monitoring wells for the C&D landfill (MW-9 and MW-9d) was completed in October of 1997. The wells are located within the drainage feature, down-gradient of the existing C&D landfill. The wells were slug tested for estimation of hydraulic conductivity after development, surveyed to state plane coordinates and mean sea level elevation, and sampled. Borelogs, slug test and initial sampling results were forwarded to the SWS in a letter report dated July 2, 1998.

Additional Geologic Investigation
During permitting of the existing C&D landfill, the SWS expressed concerns regarding the complexity of the geology in the western portion of the landfill. To address these concerns, CDM contracted Gram, Inc. to perform a geologic mapping study of the area. A letter report by Gram, Inc. (January 11, 1999) was forwarded to the SWS and included in the Phase 3 Construction and Demolition Debris Landfill Permit Application (CDM, October 2000).

Phase V Investigation
The Phase V investigation focused on the Phase III expansion area of the C&D landfill adjacent to the south and east of the existing C&D landfill. Since the C&D landfill expansion was located within the confines of a single drainage basin, the C&D investigation focused on the area within the drainage divides. The Phase 3 Construction and Demolition Debris Landfill Permit Application was submitted to the SWS in October 2000.

Seven boreholes were drilled at five locations during the Phase V investigation. Air rotary hammer drilling was used for installation of all piezometers. Hollow-stem auger drilling was used for geologic description at each location prior to piezometer installation. Rock coring was performed at one location (B-519). Standard penetration tests (blow counts) were taken at all 5 auger locations.

Piezometers were installed in seven boreholes at five locations, making a total of two nested well pairs. Water level measurements were taken at each of the piezometers at time of boring, and at 24 hours, and at least seven days after boring. Piezometer measuring points were surveyed to state plane coordinates and mean sea level elevation.

Additional Phase V Investigation
The Additional Phase V investigation also focused on the Phase III expansion area of the C&D landfill. Based on comments by the SWS, additional information regarding bedrock and groundwater flow in the fractured bedrock was needed.

Twelve piezometers and one pumping well were installed at thirteen locations during the additional investigation. Air rotary hammer drilling was used for installation of all piezometers and the pumping well. Hollow-stem auger drilling was used for geologic description and locating the top of bedrock at each location, with the exception of the pumping well. Rock coring was performed at two locations. Standard penetration tests (blow counts) were taken at all 12 auger locations.

Water level measurements were taken at each of the piezometers at time of boring, and at 24 hours, and at least seven days after boring. Piezometer measuring points were surveyed to state plane coordinates and mean sea level elevation.

Following the completion of the air rotary and hollow stem auger work, the piezometers were allowed to equilibrate for a period of two weeks. The pumping well was fitted with a 4-inch submersible pump and a pump test was performed. During the pump test, groundwater measurements were collected from all of the piezometers within the Phase III C&D landfill area. The pump test was allowed to run for a period of 56 hours. After stopping the test, groundwater elevation measurements were collected from the piezometers to estimate recharge rates.

Following submission of the additional investigation data in January 2002, the SWS determined that the Phase III C&D Landfill expansion site was not suitable for landfill development. As an alternative, it was decided that C&D landfill expansion was practical west of the existing Phase I and II C&D landfill.

A field investigation was performed in March 2002 to determine the depth to bedrock and/or groundwater in order to obtain the data necessary to design the expansion. Ten hollow stem auger borings were advanced in the proposed landfill expansion site. Borings were advanced using 2¼ inch inside diameter hollow stem augers and standard split spoon sampling techniques down to auger refusal. The depth to auger refusal was assumed to the top of bedrock. Blow counts, sample descriptions, and auger refusal depths were noted for each boring. Following completion, each boring was left open for an extended period (in some cases, overnight) to provide for monitoring of groundwater levels. In all cases, groundwater was not encountered. The boreholes were backfilled with a bentonite/cement grout. The boring locations were surveyed by a North Carolina registered surveyor for northing and easting coordinates and ground elevation.

Phase VI Investigation

The Phase VI investigation focused on the Subtitle D Cell 6 area and the Phase IV expansion area of the C&D landfill adjacent to the existing Phase I and II C&D landfill. Results of the Cell 6 investigation were submitted to the SWS in the Design Hydrogeologic Report in December 2004.

Since the proposed C&D landfill expansion is located within the confines of a single drainage basin, the C&D investigation focused on the area within the drainage divides. Thirteen boreholes were drilled at 13 locations during the Phase VI

investigation. Seven borings were converted to temporary piezometers for groundwater elevation measurements while the remaining borings were used to collect lithologic and geotechnical data only. Air rotary hammer drilling was used for installation of all piezometers. Hollow-stem auger drilling was used for lithologic and geotechnical data collection at all borings. Rock coring was performed at one location (B-601). Standard penetration tests (blow counts) were taken at all locations.

Water level measurements were taken at each of the piezometers at time of boring, and at 24 hours, and at least seven days after boring. Piezometer measuring points were surveyed to state plane coordinates and mean sea level elevation.

Following SWS approval and permit issuance, two monitoring wells (MW-14/14d) were installed downgradient of the Phase IV landfill.

2.3.2 Current Investigation

The Phase VII investigation focused on the proposed expansion facility plan area adjacent to the existing Phases of the active C&D landfill. The proposed facility plan boundaries include two individual drainage basins on either side of the existing active C&D landfill. The investigation focused on the area within the two drainages.

Eighteen boreholes were drilled at 15 locations during the Phase VII investigation. All borings were converted to temporary piezometers for groundwater elevation measurements and lithologic and geotechnical data was collected at each location. Air rotary hammer drilling was used for installation of all piezometers. Hollow-stem auger drilling was used for lithologic and geotechnical data collection at all borings. Rock coring was performed at three locations (B-619d, B-623, and B-627d). Standard penetration tests (blow counts) were taken at all locations.

Water level measurements were taken at each of the piezometers at time of boring, and at 24 hours, and at least seven days after boring. Piezometer measuring points were surveyed to state plane coordinates and mean sea level elevation.

2.3.2.1 Borehole Drilling

Borehole drilling methods included air rotary, hollow-stem auger, and conventional rock coring. An onsite hydrogeologist or geotechnical engineer observed the drilling operations and logged the borings. Boring logs from this investigation are provided in Appendix A.

Air Rotary Drilling

Air rotary drilling, utilizing a Schram truck-mounted rig, was conducted at 18 locations within the proposed landfill expansion facility boundary. The air rotary boreholes were drilled solely for the purpose of piezometer installation in bedrock. Lithologic samples were collected continuously using a shovel to observe the cuttings blown from the bottom of the hole. Grain size of the cuttings was observed to be a

function of the properties of the rock being drilled. Potable water was occasionally added to suppress drilling dust. Logs of the borings are presented in Appendix A.

Fractures or soft spots were noted during drilling by observing the drill rods and by listening to the drill chatter. Fractures were often indicated by the sudden drop of the drill rod and a pause in the chatter from the percussion bit. Coarser drill cuttings and/or clay were often noted in samples associated with fracture zone observations.

The bedrock boreholes typically targeted the first water-bearing zones appropriate for piezometer installation. Air lift yield aquifer tests were periodically performed as described below to determine whether groundwater had been encountered, and to estimate the groundwater yield. Upon reaching the desired depth of the blow test, the drill string was retracted 20 feet from the bottom of the hole. After waiting five to ten minutes, the string was lowered to the bottom of the hole and the on-board air compressor was used to blow air through the drill string at the bottom of the hole, blowing water up and out of the top of the borehole. After allowing a sufficient period to remove accumulated water from the hole and dry out any added water, the amount of water being discharged at the surface was noted. Water production varied from none, to a fine mist, to a stream of water flowing from the boring. The observed rate of water production is generally related to the amount of water yielded from the formation to the hole. The observed rate of water production can be also affected by the depth of immersion of the drill string into the water column, the amount of time the boring has been allowed to sit prior to blowing, and the length of time the blowing occurs. In some cases pressure from the air discharge can inhibit movement of water from the formation into the borehole, depending upon the location of the discharge interval relative to the drill bit.

The air rotary drilled boreholes were developed by blowing water out of the hole using the drill string placed at the bottom of the hole until the boring was substantially free of cuttings.

Often when a substantial fracture was encountered during drilling, water would be observed at the surface during the drilling operation. This was interpreted to indicate the presence a water-bearing feature such as fracture(s) or weathered zone, and the borehole would be terminated soon after.

Hollow-Stem Auger Drilling

Hollow-stem auger drilling was conducted at all locations, including those at which air rotary drilling was performed, to obtain lithologic information. All hollow-stem auger borings were advanced to the top of the bedrock (auger refusal).

Hollow-stem auger drilling was done from an ATV-mounted CME 750 drill rig using 6-inch outer diameter augers. Lithologic information was obtained through split spoon sampling at 5-foot intervals as outlined in ASTM D-1586. Blow counts were noted during the driving of the split spoon sampler, and the sample was examined by the field geologist or geotechnical engineer and described for color, grain size, USCS

code, texture, and moisture content. The field descriptions were entered into the field logbook or dedicated field log sheets. Hollow-stem auger borehole logs are provided in Appendix A. The depth of the first encountered blow count of 50 within a 6-inch interval was used to define the top of partially weathered rock (PWR), and the depth of auger refusal was used to define the top of bedrock.

Rock Coring
The CME 750 rig used for HSA drilling was also used for rock coring. During this investigation, three locations in the proposed expansion facility area (B-619d, B-623, B-627d) were cored. Standard rock coring techniques were utilized as described below. An HQ size double tube core barrel was attached to the bottom of the drill string and lowered to the bottom of the borehole. The desired coring interval was drilled using a carbide-toothed bit and clear, potable water. When the desired interval had been penetrated, the entire core barrel and attached drill string were retrieved from the hole. The inner sample tube was extracted from the outer barrel and the core sample was then extruded and placed into a box labeled with the core ID and depth intervals.

The rock core was described in the field and the percent recovery, rock quality designation (RQD), and frequency of fractures were noted. Observed fracture infilling or coatings, gross mineralogy, and other notable characteristics were also recorded. The RQD was determined by dividing the total length of rock fragment longer than four inches over the total core length. Logs of the core borings are contained in Appendix A and discussed further in Section 2.4.4.

2.3.2.2 Piezometer Installations

As discussed in Section 2.3.2, 18 piezometers were installed during the current investigation in the proposed expansion area. The piezometer locations are shown on Sheet 2-1 along with those installed during the previous phases. A summary of piezometer and well completion data for the C&D area borings and selected borings from the Subtitle D area is provided in Table 2-1.

All piezometers installed during this investigation were screened in bedrock, with the exception of B-619, B-624, and B-627 which were installed across the bedrock/PWR/saprolite boundary. Completion diagrams are provided along with the borehole logs in Appendix A. Piezometers installed in bedrock targeted the first significant water-bearing zone for completion, as indicated by the air-lift testing during air rotary drilling (Section 2.3.2.1).

Table 2-1
Summary of Piezometer and Monitoring Well Completion Data
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Well	Completion Date	Drilling Method	Monitoring Interval Lithology	Top of PVC Elevation (feet msl)	Ground Surface Elevation (feet msl)	Borehole Depth (feet bgs)	Screen Interval (feet bgs)	Top of Sand (feet bgs)	Top of Seal (feet bgs)	Borehole Diam (inches)	Casing Diam (inches)
B-129	8/19/1992	Core	Bedrock	2015.06	2013.30	42.0	37.0-42.0	-	17.0	3.0	2.0
B-227	11/23/1993	Air	Bedrock	1853.80	1851.80	23.0	13.0-23.0	8.0	6.0	6.0	2.0
B-234	11/16/1993	Air	Bedrock	2094.66	2092.70	80.0	70.0-80.0	68.0	66.0	6.0	2.0
B-236	11/18/93	Air	Bedrock	2051.88	2049.98	61.0	46.0-61.0	44.0	42.0	6.0	2.0
B-238	11/16/1993	Air	Bedrock	2041.82	2041.40	144.0	129.0-144.0	127.0	125.0	6.0	2.0
B-250	11/16/93	Air	Bedrock	2076.23	2074.90	182.0	167-182	165.0	163.0	6.0	2.0
B-335	10/18/94	Air	Bedrock	2074.68	2071.60	101.0	91.0-101.0	85.0	83.0	6.0	2.0
B-361	10/18/94	Air	Bedrock	2018.19	2015.30	96.0	85.5-95.5	83.0	81.0	6.0	2.0
B-364	10/18/94	Air	Bedrock	2011.14	2008.40	100.0	90.0-100.0	86.5	84.0	6.0	2.0
B-365	10/26/94	Air	Bedrock	1872.89	1870.30	140.0	90.0-100.0	78.0	74.0	6.0	2.0
MW-4	10/10/1996	Air	Bedrock	1944.35	1942.48	25.0	9.0-24.0	7.0	5.0	8.0	2.0
MW-4d	10/11/1996	Air	Bedrock	1944.64	1942.79	55.0	45.0-55.0	43.0	40.0	6.0	2.0
MW-5	10/9/1996	Air	Bedrock	1977.12	1975.39	50.0	35.0-50.0	33.0	31.0	6.0	2.0
MW-5d	10/10/1996	Air	Bedrock	1976.92	1975.31	81.0	71.0-81.0	68.5	66.5	6.0	2.0
MW-6	10/8/1996	Air	Bedrock	1987.34	1985.39	50.0	35.0-50.0	27.0	24.5	6.0	2.0
MW-7	10/4/1996	Air	Bedrock	2022.83	2020.72	61.0	41.0-57.0	40.0	38.0	6.0	2.0
MW-9	10/9/1997	Air	Bedrock	1966.54	1963.70	25.8	10.8-25.8	8.0	6.0	6.0	2.0
MW-9d	10/9/1997	Air	Bedrock	1966.34	1963.60	39.5	34.5-39.5	31.5	29.0	6.0	2.0
MW-12	6/25/2002	Air	Saprolite/Bedrock	1947.39	1944.71	17.0	7.0-17.0	5.0	3.0	6.0	2.0
MW-12d	6/25/2002	Air	Bedrock	1947.10	1944.28	37.0	27.0-37.0	25.0	23.0	6.0	2.0
MW-14	4/5/2006	Air	PWR/Bedrock	1952.78	1949.8	49.0	39.0-49.0	35.5	33.0	6.0	2.0
MW-14d	4/5/2006	Air	Bedrock	1953.77	1950.5	88.0	78.0-88.0	74.5	71.5	6.0	2.0
B-401	3/13/1997	Air	Bedrock	1949.58	1947.90	16.0	11.0-16.0	9.5	7.5	6.0	2.0
B-402	3/13/1997	Air	Bedrock	1972.29	1970.04	17.5	12.5-17.5	10.5	8.5	6.0	2.0
B-402H	3/17/1997	HSA	Saprolite	1972.78	1970.42	10.5	5.0-10.0	3.0	1.5	8.0	2.0
B-403	3/13/1997	Air	Bedrock	2019.14	2016.48	30.0	25.0-30.0	23.0	21.0	6.0	2.0
B-404	3/12/1997	Air	Bedrock	2031.06	2028.50	20.0	15.0-20.0	13.0	11.0	6.0	2.0
B-404H	3/18/1997	HSA	Saprolite	2030.54	2028.50	13.5	5.0-11.0	3.0	1.5	8.0	2.0
B-405	3/12/1997	Air	Bedrock	2048.57	2045.49	37.0	27.0-37.0	24.0	22.0	6.0	2.0
B-406	3/13/1997	Air	Bedrock	2040.69	2037.00	76.0	66.0-76.0	64.0	62.0	6.0	2.0
B-407	3/13/1997	Air	Bedrock	2051.25	2048.53	39.0	29.0-39.0	26.0	24.0	6.0	2.0
B-407H	3/20/1997	HSA	Saprolite	2051.22	2048.03	15.0	10.0-15.0	8.0	6.0	8.0	2.0
B-408	3/11/1997	Air	Bedrock	2099.07	2096.43	94.0	84.0-94.0	77.0	75.0	6.0	2.0
B-409	3/11/1997	Air	Bedrock	2067.67	2065.36	60.0	50.0-60.0	47.5	45.5	6.0	2.0
B-515	4/29/1999	Air	Saprolite/Bedrock	2031.78	2028.40	31.5	21.5-31.5	19.5	17.5	6.0	2.0
B-516	5/3/1999	Air	Bedrock	1993.68	1990.74	25.6	15.6-25.6	13.6	11.6	6.0	2.0
B-517	5/4/1999	Air	Bedrock	2079.04	2076.16	70.0	60.0-70.0	58.0	56.0	6.0	2.0
B-517d	5/4/1999	Air	Bedrock	2078.80	2075.55	85.0	75.0-85.0	73.0	71.0	6.0	2.0
B-518	5/4/1999	Air	Saprolite/Bedrock	2005.54	2002.53	10.0	5.0-10.0	4.5	2.5	6.0	2.0
B-518d	10/10/2001	Air	Bedrock	2005.21	2002.49	25.0	15.0-25.0	14.0	12.0	6.0	2.0
B-519	5/3/1999	Air	Saprolite/Bedrock	1958.36	1955.54	10.5	5.5-10.5	4.5	2.5	6.0	2.0
B-519d	5/3/1999	Air	Bedrock	1959.11	1956.24	101.0	91.0-101.0	89.0	87.0	6.0	2.0
B-520	10/10/2001	Air	Bedrock	2044.17	2041.53	85.0	75.0-85.0	70.0	68.0	6.0	2.0
B-521	10/11/2001	Air	Bedrock	2005.18	2002.64	52.0	42.0-52.0	39.0	37.0	6.0	2.0
B-522	10/10/2001	Air	Bedrock	2058.81	2055.14	80.0	60.0-70.0	45.0	43.0	6.0	2.0
B-523	10/10/2001	Air	Bedrock	2080.42	2077.76	137.0	117.0-137.0	116.0	114.0	6.0	2.0
B-524	10/8/2001	Air	Bedrock	2101.58	2098.63	88.0	78.0-88.0	76.0	74.0	6.0	2.0
B-525	10/8/2001	Air	Bedrock	2061.44	2058.74	53.0	43.0-53.0	40.0	38.0	6.0	2.0
B-526	10/11/2001	Air	Bedrock	1972.51	1969.51	38.0	28.0-38.0	25.0	23.0	6.0	2.0
B-527	10/11/2001	Air	Bedrock	1976.56	1973.66	32.0	22.0-32.0	20.0	18.0	6.0	2.0
B-528	10/11/2001	Air	Bedrock	1950.28	1947.66	62.0	52.0-62.0	49.0	47.0	6.0	2.0
B-529	10/11/2001	Air	Bedrock	1962.31	1959.58	26.0	16.0-26.0	14.0	13.0	6.0	2.0
B-530	10/10/2001	Air	Bedrock	2045.01	2042.24	100.0	80.0-100.0	78.0	76.0	6.0	2.0

Table 2-1
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Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Well	Completion Date	Drilling Method	Monitoring Interval Lithology	Top of PVC Elevation (feet msl)	Ground Surface Elevation (feet msl)	Borehole Depth (feet bgs)	Screen Interval (feet bgs)	Top of Sand (feet bgs)	Top of Seal (feet bgs)	Borehole Diam (inches)	Casing Diam (inches)
Pumping Well	10/12/2001	Air	Bedrock	1955.22	1953.52	110.0	Open	--	--	6.0	6.0
B-600	9/27/2004	Air	Bedrock	2055.38	2052.74	65.0	55.0-65.0	47.0	44.0	6.0	2.0
B-601	9/27/2004	Air	Bedrock	2056.24	2053.61	117.0	107.0-117.0	102.0	97.0	6.0	2.0
B-602	10/5/2004	Air	Bedrock	1978.36	1975.52	46.0	36.0-46.0	33.0	30.0	6.0	2.0
B-603	10/5/2004	Air	Bedrock	2013.61	2010.97	80.0	70.0-80.0	67.0	64.0	6.0	2.0
B-605	10/6/2004	Air	Saprolite/Bedrock	1956.65	1953.98	26.0	16.0-26.0	13.0	10.0	6.0	2.0
B-606	10/6/2004	Air	Bedrock	2027.09	2024.28	75.0	65.0-75.0	62.0	59.0	6.0	2.0
B-609	10/6/2004	Air	Bedrock	1955.19	1952.18	80.0	70.0-80.0	68.0	65.0	6.0	2.0
B-614	6/10/2008	Air	Bedrock	2047.20	2043.80	42.0	32.0-42.0	30.0	28.0	6.0	2.0
B-615	6/12/2008	Air	Bedrock	2023.40	2021.60	51.0	41.0-51.0	40.0	38.0	6.0	2.0
B-616	6/11/2008	Air	Bedrock	1984.90	1981.50	31.0	21.0-31.0	20.5	18.5	6.0	2.0
B-617	6/12/2008	Air	Bedrock	2008.70	2005.40	61.0	51.0-61.0	49.0	47.0	6.0	2.0
B-618	6/12/2008	Air	Bedrock	1987.20	1985.50	50.0	40.0-50.0	38.5	36.5	6.0	2.0
B-619	6/10/2008	Air	Saprolite/PWR	1965.70	1963.50	14.0	4.0-14.0	3.5	2.0	6.0	2.0
B-619d	6/10/2008	Air	Bedrock	1966.70	1963.40	30.0	20.0-30.0	17.0	15.0	6.0	2.0
B-620	6/11/2008	Air	Bedrock	1940.90	1937.90	51.5	41.5-51.5	41.0	39.0	6.0	2.0
B-621	6/11/2008	Air	Bedrock	1975.80	1972.50	45.0	35.0-45.0	34.0	32.0	6.0	2.0
B-622	6/18/2008	Air	Bedrock	2006.40	2003.10	46.0	36.0-46.0	34.0	32.0	6.0	2.0
B-623	6/13/2008	Air	Bedrock	2027.40	2025.20	99.0	89.0-99.0	88.0	86.0	6.0	2.0
B-624	6/18/2008	Air	Saprolite/Bedrock	1980.50	1977.20	20.0	10.0-20.0	8.0	6.0	6.0	2.0
B-624d	6/18/2008	Air	Bedrock	1980.40	1977.10	40.0	30.0-40.0	28.0	26.0	6.0	2.0
B-625	6/13/2008	Air	Bedrock	2054.40	2051.90	62.0	52.0-62.0	51.5	49.5	6.0	2.0
B-626	6/17/2008	Air	Bedrock	1981.30	1979.70	57.0	47.0-57.0	45.0	43.0	6.0	2.0
B-627	6/17/2008	Air	PWR/Bedrock	1883.00	1880.10	18.0	8.0-18.0	11.0	9.0	6.0	2.0
B-627d	6/17/2008	Air	Bedrock	1882.80	1880.30	124.0	114.0-124.0	112.0	110.0	6.0	2.0
B-628	6/12/2008	Air	Bedrock	1990.30	1987.90	63.5	53.5-63.5	52.0	50.0	6.0	2.0

Notes:

Piezometers in bold located in proposed Facility expansion areas during current or previous investigations.

Piezometers in italics have been abandoned during previous construction/investigation activities.

--Pumping Well is located in former Phase III area and is completed with 6-inch PVC casing from 0 - 20 ft. bls, and open hole in bedrock from 20 - 110 ft. bls.

The piezometers were constructed of 2-inch diameter PVC casing, with 10-feet of 0.010-inch slotted screen. A filter pack consisting of #2 coarse sand was placed around the well screen to a minimum of 2 feet above the top of the screen. The piezometer annulus above the filter pack was then sealed with a minimum 2 feet of 3/8-inch bentonite pellets, which were hydrated with potable water (if above groundwater). The bentonite was given a period of at least several hours to set up prior to grouting. The remainder of the annulus was completed with portland cement/bentonite grout tremmied into place. The piezometers were finished with locking steel protective covers and a 3-foot by 3-foot concrete pad.

2.3.2.3 Water Level Measurements

Water level measurements were made using an electronic water level meter with accuracy to 1/100 of a foot. Water level measurements were taken relative to a permanent reference point marked at the top of each PVC well casing (TOC). Water levels were monitored both during and after the completion of the piezometer. Water level measurements were made, to the extent possible, immediately after piezometer completion, at least seven days after boring, and monthly thereafter. Water level measurements are discussed in Section 2.8.

2.3.2.4 Well Surveying

Ed Holmes and Associates, Inc. conducted the surveying. All of the newly installed piezometers and borings were surveyed to the TOC measuring point and to ground surface. Northing and easting coordinates were reported in the State Plane coordinate system, and elevations were surveyed to mean sea level (msl).

2.4 Site Geology

The Buncombe County landfill site area has been preliminarily mapped by the North Carolina Geological Survey (Wiener 1970). This mapping shows that the site is underlain to a large degree by granite gneiss and biotite gneiss. The North Carolina Geological Survey did not differentiate a part of the central portion of the proposed landfill site during this mapping effort. Exploratory drilling in this area has shown it to also be underlain by gneiss. Marble and calc-silicate units have been mapped in a small area near the French Broad River along the southern boundary of the site. Each of these materials was observed in outcrop during reconnaissance at the site (CDM 1993). A narrow band of calc-silicate rock was also mapped within the vicinity of the C&D Landfill although current and past field investigations did not confirmed this. If present, this unit likely consists of small compositional distinctions relative to adjacent materials. Exploratory activities in this portion of the site have not identified any significant differences in engineering and hydrologic properties that could be associated with this unit relative to the surrounding gneiss. A small east-west trending diorite dike was mapped along the bottom of Blevin Branch just north of the east half of the Cell 1-3 Area. This structure is truncated by a younger granite gneiss unit that comprises much of the bedrock underlying the proposed landfill site. This infers that this unit was not emplaced along a zone of recent structural weakness. The

reported dike location lies beyond the limits of any proposed landfill development, and diorite intrusions were not observed in any of the exploratory borings at the site.

Further mapping at the site was performed in November 1998 at the outcrop/road cut at the entrance to the facility and in the exposed bedrock within the Phase I and II C&D area. During this investigation, it was determined that the dominant lithology in the area is migmatic biotite hornblende gneiss. Layers of amphibolite were found with the gneiss as dikes or small pods within the gneiss. Although present in the area, no calc-silicate rocks, granitic rocks, meta-sedimentary rocks, or marble were observed in the road cut or exposures at the C&D site (GRAM, 1999).

The migmatic biotite gneiss and interlayered amphibolite sequence is common in the Blue Ridge of North Carolina. The parent rocks were likely igneous in origin and apparent lithology differences are simply chemical differences between the parent rocks. The amphibolite has a higher percentage of mafic minerals than the gneiss, which indicates that the parent rock of the amphibolite was more mafic than the parent rock of the gneiss (GRAM, 1999).

Structural Geology

Foliation attitude measurements were collected during the 1970 mapping effort and supplemented during the 1993 field reconnaissance and 1998 field mapping. They indicate that foliation generally strikes between N 0° and N 40° east and dips 60° to 90° southeasterly. This generally coincides with the dominant structural fabric inferred by the regional mapping. Variations from the normal foliation orientation were observed in small areas of outcrop throughout the site, and appear to be related to localized deformation associated with the metamorphism of the rock mass or disturbance of the observation area by mass wasting.

Photolineament trends at the site and adjacent areas compiled from aerial photographs (CDM 1993) identified three prominent lineament directions. One direction trends N 10° to 30° east and is believed to be associated with the dominant structural fabric of the region as well as foliation of the rock mass. Most of the photolineaments within the site also appeared to be associated with the first pattern. The other lineament trends are east west and North 52° west.

Measurements of fracture orientations were also recorded from observed outcroppings during reconnaissance of the site (CDM 1993) and during the additional geologic investigation (GRAM, 1999). Analysis of these measurements indicated two major trends to be present at the site. These are North 50° east and North 15° west. Secondary sets of fracturing range from North 35° west to North 85° west. A strong association between the orientation of fractures and foliation was not apparent in the outcrops.

Possible faulting was observed along the road cut at the entrance road. This faulting is representative of post-tectonic movement. The possible faults are likely of limited displacement extent, and were not observed within the C&D area (GRAM, 1999).

A very low frequency (VLF) electromagnetic geophysical survey was also conducted at the Site (CDM 1993) for the purpose of identifying anomalous conductive features, which could represent zones of preferential groundwater occurrence and/or movement. Specifically, many of the photolineaments described above were evaluated by the survey. The survey identified nine features of potential interest at depths of 30 to 50 meters (98 to 164 feet). Many of these features as well as the photolineaments were targeted by exploratory borings drilled during the subsequent investigations.

Drilling Observations
Three major lithologic distinctions have been made at the C&D Landfill expansion area based on observations from the subsurface investigations. These are saprolite, partially weathered rock (PWR), and bedrock. In addition, small localized areas of alluvium or colluvium were encountered near the drainage features. Descriptions of each material encountered at specific boring locations are provided in the boring logs contained in Appendix A. Each of these units is discussed in the following sections of the report. Table 2-2 lists all of the borings drilled at the C&D Landfill, and the depths at which the above geologic units were encountered.

2.4.1 Alluvium

Alluvium was present in small localized areas within or adjacent to the drainage features. Where present, the alluvium was found to be of limited thickness and overlaid PWR or bedrock. The alluvium ranged in grain size from clayey silt to poorly sorted sands.

2.4.2 Saprolite

Saprolite (saprolitic soils) is the uppermost unit present at the site and is present at most locations except small areas where bedrock outcrops at the ground surface or depth to bedrock is shallow, and within most surface drainage features. These soils are derived from the in-place chemical weathering of bedrock materials, and are characterized by the presence of relict mineral fabric from the original rock mass.

These soils are typically finer near the surface where weathering is more advanced, and become more dense and coarser in texture as weathering decreases with depth.

Near the surface, they are generally comprised of fine sandy silt, or sandy silt with clay, with silty clay or silty sand present at some locations. They grade to silty sand or very sandy silt with depth. Hard rock fragments are commonly present in this lower portion of the saprolite, which become larger and more frequent with depth. The contact with the underlying partially weathered rock (PWR) or bedrock is typically gradational. These soils are typically red/brown or light to dark brown in color and usually micaceous with some areas being very micaceous. Locally grey, dark grey or green/grey colors are present, and appear to correlate with an abundance of mafic minerals in the rock mass from which they were derived. Thin zones of light brown or orange/tan lean clay are also present locally. As noted in Section 2.3.2.1, for the

purposes of this investigation, the base of the saprolite unit has been defined as the depth at which soil penetration using a split spoon sampler is greater than 50 blows per 6 inches. This definition is used to permit consistent identification of the soil/PWR contact.

Across the entire C&D Landfill area, saprolite was observed to range in thickness from not present at borings B-606, -607, -620, -and -626 to greater than 51.5 feet at B-250, and averaged about 11 feet. The unit was generally thicker beneath hills and ridges than side slopes or drainages. Within the proposed C&D Landfill expansion facility area, the saprolite ranges from not present (B-620 and 626) to 19 feet in thickness (B-615, -618, and 623) and averages about 9 feet in thickness. The saprolitic soils were typically moist but none were observed to be saturated.

2.4.3 Partially Weathered Rock

At most locations, the saprolite transitionally grades in to the parent bedrock from which it is derived. This transition zone has been designated the PWR unit. It is characterized by deeply weathered bedrock material that can be penetrated by hollow-stem augers but requires more than 50 blows to advance a split spoon sampler 6 inches. The PWR consists of reddish brown, brown, white, or yellow/orange silty sand with some intervals of sandy silt. Hard, but weathered, rock fragments were also present at many locations. Local areas of tan to cream coloration are also present as well as grey/green materials derived from mafic rich rocks.

Within the proposed C&D Landfill expansion facility area, the PWR unit ranged from 1.5 feet (B-619 and 627) to 10 feet (B-618 and 623), and averaged about 5 feet in thickness. Overall, PWR thickness across the entire Buncombe County site ranges from absent where saprolite directly overlies bedrock to more than 44 feet, but within the existing and proposed expansion areas of the C&D landfill, the average PWR thickness is around 6 feet.

The PWR was observed to be dry or only slightly moist at most locations. Saturated conditions were observed in the PWR at only a few locations (B-619 and 627) within the proposed expansion area.

2.4.4 Bedrock

Bedrock beneath the entire site consists of foliated and banded hornblende biotite (undifferentiated) gneiss and granitic gneiss and, to a lesser extent, amphibolite and biotite or quartz biotite schist. The undifferentiated gneiss is light grey in color where unweathered, and generally comprises 60 to 95 percent of the rock mass. The more mafic foliation planes and bands consist of hornblende or other amphibole minerals and/or biotite, are dark grey/green to black in color, and are generally more strongly foliated, especially where biotite is prevalent. Locally, these minerals compose most of the rock mass, and are only interbanded with granitic minerals. Accessory minerals consist of pyroxenes, pyrite, and quartz. Quartz veins are also indicated by the presence of white quartz float on the ground surface at some locations and were

occasionally observed in some of the exploratory borings. The quartz was sometimes observed to contain vugs (cavities) and exhibit the familiar crystalline structure.

Weathering in the bedrock is highly variable and generally decreases with depth. However, at many locations, some zones are completely decomposed to soil-like materials similar to those described for the PWR unit, but occur within or beneath intervals of more competent material. Similarly, engineering and hydrologic properties (i.e., porosity) are probably much the same in these intervals as those within the PWR unit.

Observations from the rock cores collected during the current investigation from borings B-619d, B-623, and B-627d generally showed a moderate to highly fractured top 5 to 10 feet of bedrock that becomes increasingly competent with depth. Recovery values ranged from 40 to 100 percent and RQD values ranged from 10 to 85 percent in the expansion area.

Observations from core samples collected during this and previous investigations in both the C&D and Subtitle D landfill areas indicate that the bedrock is variably fractured. RQD values of the recovered cores ranged from 0 percent up to 100 percent, and averaged 47 percent. Recovery values ranged from 0 percent to 100 percent and averaged 68 percent. In general, recovery and RQD values increased with depth. A summary of the rock core observations from the entire site is presented in Table 2-3.

Based on observation of the cores, a conservative effective porosity of about 1 to 5 percent has been estimated for the competent bedrock material. This estimated effective porosity is higher than the 0.1 percent value estimated by Heath (1980) for bedrock aquifers in granite gneiss in the Blue Ridge Province. Fracture density in bedrock generally decreases with depth. Site estimates were made from shallow bedrock cores, and Heath's estimate was for bedrock aquifer systems as a whole, therefore the Site estimate for effective porosity is correspondingly higher than Heath's 0.1 percent value.

Although oxidation was frequently observed to parallel foliation planes, fractures were not generally observed to be closely oriented with the foliation, except in the upper portion of the core. This is consistent with fracture orientation measurements made in surface outcroppings as previously discussed (CDM 1993, GRAM 1999). The fractures were mostly open and oxidized. Some were filled with orange clay.

Table 2-2
Summary of Lithological Data
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Borehole	Surveyed Ground Surface Elevation (feet msl)	Depth to PWR (feet bgs)	PWR Elevation (feet msl)	Depth to Bedrock (feet bgs)	Bedrock Elevation (feet msl)
CD-1	2021.49	4.0	2017.5	13.0	2008.5
CD-2	2021.95	3.5	2018.5	16.0	2006.0
CD-3	2017.54	3.5	2014.0	8.5	2009.0
CD-4	2015.95	9.0	2007.0	20.0	1996.0
CD-5	2015.55	4.0	2011.6	18.5	1997.1
CD-6	2015.40	3.5	2011.9	12.0	2003.4
CD-7	2011.85	8.5	2003.4	13.0	1998.9
CD-8	1996.27	4.5	1991.8	19.0	1977.3
CD-9	1969.61	8.5	1961.1	17.0	1952.6
CD-10	1968.48	8.5	1960.0	12.0	1956.5
B-1	2090.0	19.0	2071.0	19.0	2071.0
B-1A	2070.0	16.0	2054.0	25.0	2045.0
B-4	2040.0	12.0	2028.0	18.7	2021.3
B-5	1895.0	3.0	1892.0	8.0	1887.0
B-5A	1900.0	6.0	1894.0	10.0	1890.0
B-6	2020.0	28.0	1992.0	33.6	1986.4
B-7	2000.0	3.0	1997.0	6.0	1994.0
B-7A	2010.0	3.0	2007.0	6.0	2004.0
B-8	ND	12.0	2037.0	25.0	2024.0
B-8A	ND	8.0	2033.0	21.0	2020.0
BC-127	1851.8	10.0	1841.8	12.0	1839.8
B-227	-	-	-	-	-
BC-128	1942.2	10.0	1932.2	16.5	1925.7
BC-129	2013.3	15.0	1998.3	22.0	1991.3
BC-133	2092.5	9.0	2083.5	22.5	2070.0
BC-134	2092.7	35.0	2057.7	38.0	2054.7
B-234	-	-	-	-	-
BC-135	ND	15.0	2057.0	17.5	2054.5
B-335	0.0	-	-	-	-
BC-136	ND	10.0	2040.0	20.5	2029.5
B-236	2050.0	-	-	-	-
BC-137	1922.0	3.0	1919.0	9.0	1913.0
B-138	2041.4	25.0	2016.4	69.0	1972.4
B-238		-	-	-	-
B-250	2074.9	51.5	2023.4	51.5	2023.4
B-358	1956.6	5.0	1951.6	10.0	1946.6
B-359	2045.5	36.0	2009.5	45.0	2000.5
B-360H	1974.4	11.0	1963.4	14.0	1960.4
B-360	1977.5	-	-	-	-
B-360A	1977.1	-	-	-	-
B-361	2015.3	13.0	2002.3	27.0	1988.3
B-362H	1956.7	11.0	1945.7	21.0	1935.7
B-362	1959.0	-	-	-	-
B-364	2008.4	3.0	2005.4	15.5	1992.9
B-365	1870.3	4.0	1866.3	5.0	1865.3
B-366	1929.9	-	-	-	-
B-366A	1930.8	3.0	1927.8	5.5	1925.3
B-367	1943.9	9.0	1934.9	11.5	1932.4
B-367A	1944.6				

Table 2-2
Summary of Lithological Data
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Borehole	Surveyed Ground Surface Elevation (feet msl)	Depth to PWR (feet bgs)	PWR Elevation (feet msl)	Depth to Bedrock (feet bgs)	Bedrock Elevation (feet msl)
B-401	1947.5	4.5	1943.0	5.5	1942.0
B-402	1970.4	3.5	1966.9	10.5	1959.9
B-403	2016.4	12.0	2004.4	22.5	1993.9
B-404	2028.3	8.0	2020.3	13.5	2014.8
B-405	2045.5	16.0	2029.5	22.5	2023.0
B-406	2037.0	18.5	2018.5	39.5	1997.5
B-407	2048.0	18.0	2030.0	30.0	2018.0
B-408	2096.4	38.0	2058.4	47.0	2049.4
B-409	2065.4	9.0	2056.4	15.5	2049.9
B-410	2048.9	19.0	2029.9	26.0	2022.9
MW-9/9d	1963.3	3.5	1959.8	9.5	1953.8
MW-12/12d	1947.4	5.0	1942.4	15.0	1932.4
MW-14/14d	1950.7	25.0	1925.7	33.0	1917.7
B-515	2028.4	14.0	2014.4	22.5	2005.9
B-516	1990.7	3.5	1987.2	8.0	1982.7
B-517	2076.2	33.5	2042.7	38.0	2038.2
B-517d	2075.6	33.5	2042.1	38.0	2037.6
B-518	2002.5	8.5	1994.0	10.0	1992.5
B-518d	2002.5	8.5	1994.0	10.0	1992.5
B-519	1955.5	8.5	1947.0	9.0	1946.5
B-519d	1956.2	8.5	1947.7	9.0	1947.2
B-520	2041.5	8.5	2033.0	15.0	2026.5
B-521	2002.6	3.5	1999.1	8.5	1994.1
B-522	2055.1	10.0	2045.1	17.0	2038.1
B-523	2077.8	13.5	2064.3	18.5	2059.3
B-524	2098.6	14.5	2084.1	61.0	2037.6
B-525	2058.7	9.5	2049.2	23.5	2035.2
B-526	1969.5	3.5	1966.0	4.0	1965.5
B-527	1973.7	19.0	1954.7	23.0	1950.7
B-528	1947.7	7.5	1940.2	8.0	1939.7
B-529	1959.6	3.5	1956.1	5.0	1954.6
B-530	2042.2	4.0	2038.2	6.5	2035.7
B-600	2052.7	13.5	2039.2	21.0	2031.7
B-601	2053.6	4.0	2049.6	20.0	2033.6
B-602	1975.5	9.0	1966.5	10.5	1965.0
B-603	2011.0	9.0	2002.0	19.0	1992.0
B-604	1955.2	4.5	1950.7	5.5	1949.7
B-605	1954.0	12.0	1942.0	13.0	1941.0
B-606	2024.3	0.0	2024.3	23.0	2001.3
B-607	2019.4	0.0	2019.4	6.0	2013.4
B-608	1991.7	4.0	1987.7	17.0	1974.7
B-609	1952.2	9.0	1943.2	11.5	1940.7
B-613	1951.7	3.5	1948.2	12.5	1939.2
B-614	2043.8	8.5	2035.3	11.5	2032.3
B-615	2021.6	19.0	2002.6	21.5	2000.1
B-616	1981.5	10.0	1971.5	12.0	1969.5
B-617	2005.4	5.5	1999.9	13.5	1991.9
B-618	1985.5	19.0	1966.5	29.0	1956.5
B-619	1963.5	13.0	1950.5	14.5	1949.0
B-619d	1963.4	13.0	1950.4	14.5	1948.9
B-620	1937.9	0.0	1937.9	3.5	1934.4

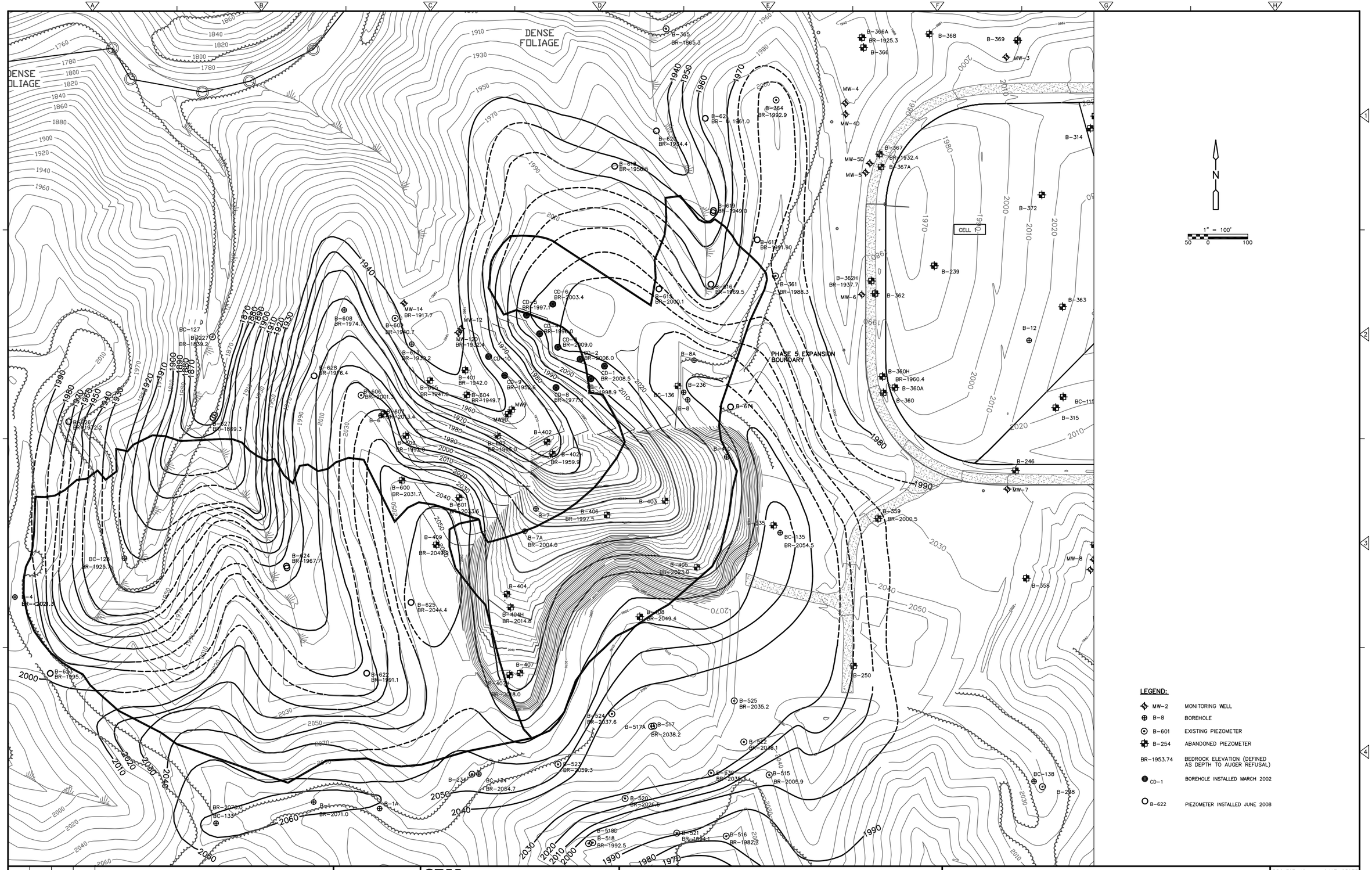
Table 2-2
Summary of Lithological Data
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Borehole	Surveyed Ground Surface Elevation (feet msl)	Depth to PWR (feet bgs)	PWR Elevation (feet msl)	Depth to Bedrock (feet bgs)	Bedrock Elevation (feet msl)
B-621	1972.5	5.0	1967.5	11.5	1961.0
B-622	2003.1	9.0	1994.1	12.0	1991.1
B-623	2025.2	19.5	2005.7	29.5	1995.7
B-624	1977.2	4.5	1972.7	9.5	1967.7
B-624d	1977.1	4.5	1972.6	9.5	1967.6
B-625	2051.9	4.5	2047.4	7.5	2044.4
B-626	1979.7	0.0	1979.7	7.5	1972.2
B-627	1880.1	9.5	1870.6	11.0	1869.1
B-627d	1880.3	9.5	1870.8	11.0	1869.3
B-628	1987.9	4.5	1983.4	11.5	1976.4

ND = Not Determined
Depth to bedrock defined by auger refusal.
PWR = Partially weathered rock, determined by a blow count of 50 for 6 inches.
Piezometers in bold installed in proposed C&D Facility expansion area.

Table 2-3
Summary of Rock Core Observations
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Boring	Core Run Depth (feet)	Recovery (%)	RQD (%)	Material Description
Cell 3 (Subtitle D Landfill)				
B-314C	33.5-37.5	85	42	Granite (Undifferentiated) Gneiss, soft, weathered
	37.5-47.0	99	94	Granite (Undifferentiated) Gneiss
Cell 4 (Subtitle D Landfill)				
BC-107A	56.4-61.4	15	0	Biotite Quartz Schist
	61.4-66.4	20	0	Biotite Quartz Schist
	66.4-71.4	25	0	66.4-67.5 - Biotite Quartz Schist, 67.5-71.4 - Amphibolite
	71.4-46.4	15	0	Biotite Quartz Schist
B-503B	48.5-53.5	58	40	Undifferentiated Gneiss, w/bioite, feldspar, and some quartz, migmatic, very fractured to 58.5'
	53.5-58.5	98	23.7	Undifferentiated Gneiss
	58.5-63.5	100	90	Undifferentiated Gneiss
	63.5-68.5	100	70	Undifferentiated Gneiss
Cell 5 (Subtitle D Landfill)				
B-514B	18-20	85	37	Undifferentiated Gneiss, w/bioite, horneblend, feldspar, and some quartz
	20-25	87	81	Undifferentiated Gneiss
	25-30	98	86	Undifferentiated Gneiss
	30-35	93	59	Undifferentiated Gneiss
	35-38	67	46	Undifferentiated Gneiss
Cell 6 (Subtitle D Landfill)				
B-702	30-40	94		Granitic Gneiss with biotite, feldspar, and quartz. Small quartz veins (~6") at 31.5' and 35.5'.
B-704	39-49	46		Granitic Gneiss with biotite, feldspar, and quartz. Soft, very fractured.
B-707	19-29	83		Granititc Gneiss with biotite, feldspar, and quartz. Increasing RQD with depth
C&D Landfill Phase 1 and 2				
MW-9/9d	9.5-19.5	57	39	Undifferentiated Gneiss, w/ biotite, quartz, and feldspar (granitic texture)
	19.5-24.5	35	7	Undifferentiated Gneiss, w/ biotite, and hornblende
	24.5-29.5	90	74	Undifferentiated Gneiss w/ biotite, horneblende, some plagioclase
C&D Landfill Expansion Phase 3				
B-519d	9.0-14.0	37	25	Undifferentiated Gneiss, w/ plagioclase (60%), quartz (20%), and biotite (20%), trace hornblende
	14-19	100	100	Undifferentiated Gneiss, w/ biotite (10-20%), and hornblende (<10%), pyrite @ 17.8'
	19-24	100	100	Undifferentiated Gneiss
	24-29	100	77	Undifferentiated Gneiss, migmatic, distinct foliation
B-521	8.5-18.5	67	55	Fractured, Undifferentiated Gneiss
B-530	6.5-16.5	28	27	Very Fractured, Undifferentiated Gneiss
	16.5-21.5	27	31	Very Fractured, Undifferentiated Gneiss
C&D Landfill Expansion Phase 4				
B-601	20-30	30	4	Very Fractured, Undifferentiated Gneiss w/ biotite, quartz, and feldspar (granitic texture)
C&D Landfill Expansion Phase 5				
B-619d	15.5-20.5	88	56	Moderately fractured, foliated, horizontal to moderate dipping, Undifferentiated Gneiss (granitic texture)
	20.5-25.5	95	85	Slightly fractured, foliated, horizontal to moderate dipping, Undifferentiated Gneiss (granitic texture)
B-623	31.5-36.5	40	10	Very fractured, foliated, horizontal to moderate dipping, Undifferentiated Gneiss (quartz/biotite)
	36.5-41.5	68	37	Very fractured, foliated, horizontal to moderate dipping, Undifferentiated Gneiss (quartz/biotite)
B-627d	11.5-16.5	100	60	Moderately fractured, Undifferentiated Gneiss (quartz/feldspar/hornblende/mica). Granitic texture.
	16.5-21.5	80	72	Slightly fractured, foliated, Undifferentiated Gneiss (quartz/feldspar/hornblende/mica). Granitic texture



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: D. FORBES
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

C&D LANDFILL SUBSTANTIAL AMENDMENT
SITE HYDROGEOLOGIC INVESTIGATION

BEDROCK CONTOUR MAP

PROJECT NO. 6447-65973
FILE NAME: SHT_2-2.dwg

SHEET NO.
2-2

Depth from the ground surface to the top of the bedrock unit within the proposed C&D Landfill expansion facility area ranged from 3.5 feet in B-620 up to 29.5 feet in B-623. The average bedrock depth was approximately 14 feet over the proposed Landfill expansion area. The depth to bedrock is generally relatively shallow in drainage features, and somewhat to significantly deeper beneath upland areas. Sheet 2-2 is a contour map of the bedrock surface developed from depth to bedrock measurements observed in the exploratory borings drilled throughout the proposed C&D landfill expansion site from this and previous investigations. It shows that the bedrock surface over most of the C&D Landfill area is a subdued reflection of surficial topography.

2.5 Testing Program

Rule .0538(a)(4)(A through E) requires a testing program for the borings which describes the frequency, distribution, and type of samples taken and the methods of analysis used to obtain the following information: Standard Penetration (SPT), particle size, soil classification (USCS), formation descriptions, and saturated hydraulic conductivity, porosity, effective porosity, and dispersive characteristics for each unit of the uppermost aquifer.

2.5.1 Standard Penetration Testing

Standard Penetration Testing (SPT), in accordance with ASTM Standard D1586, was conducted at all boring locations during this investigation. SPT's were conducted over 2-foot intervals, typically every 5-feet from ground surface to the termination of the boring. Blow counts were recorded for every 6-inches and recorded. In addition to SPT's, pocket penetrometer or Torvane readings were collected on select intervals in boring B-616. The split spoon sample was placed in a sealed glass jar and labeled by boring number, sample number, depth interval, and blow count. Blow counts and pocket penetrometer or Torvane readings (where applicable) are presented on the boring logs in Appendix A.

2.5.2 Particle Size Analysis and Unified Soil Classification

Twenty split-spoon and 5 Shelby Tube samples were submitted for laboratory analysis for grain size, USCS classification, natural moisture content, and Atterberg limits. USCS classifications ranged from CH in B-623 (1-3) to SM in all but 5 samples. Natural moisture content values ranged from 4.5% in B-617 (8.5-10) to 39.1% in B-623 (1-3).

A summary of the geotechnical laboratory results is provided on Table 2-4. Copies of the laboratory data for the samples collected from the current investigation are provided in Appendix B.

2.5.3 Formation Descriptions

Formation descriptions were made in the field during drilling by an on-site geologist or geotechnical engineer. Formation descriptions were made according to moisture

content, consistency, color, and grain size. Alterations to the field descriptions, where necessary, were made according to the geotechnical laboratory results. Boring logs are provided in Appendix A. Copies of the field notes are provided in Appendix C.

2.5.4 Geotechnical Laboratory Testing

The following section provides laboratory analysis data for hydraulic conductivity, porosity, and effective porosity.

Porosity and hydraulic conductivity values were obtained from 4 Shelby Tube and 3 remolded samples collected during this investigation. Porosity values in the Shelby Tube samples ranged from 28.3% in B-627 (1-3) to 50.7% in B-623 (1-3) and undisturbed hydraulic conductivity values ranged from 6.10×10^{-8} cm/sec in B-623 (1-3) to 5.50×10^{-6} cm/sec in B-618 (7-9). Permeability values in the remolded samples ranged from 2.50×10^{-7} cm/sec in B-618 to 3.20×10^{-6} cm/sec in B-619.

Porosity values were calculated from the initial void ratio by using the equation:

$$n = e/(1+e)$$

where:
n = porosity
e = void ratio

Values for effective porosity (n_e) for these samples were estimated based on the grain size analyses applied to the soil classification triangle which illustrates the relationship between grain size and specific yield values (Johnson, 1967). Estimated effective porosity values ranged from 8% in the shallow clay (B-619 4-5) to 27% in the weathered saprolite (B-614 3.5-5.5 and B-615 4-6). Table 2-4 presents a summary of the results of the geotechnical laboratory testing for this and previous investigations.

2.5.5 Dispersive Characteristics

Estimates were made for longitudinal and transverse dispersivity for uppermost aquifer at the site, which in this case is the saturated PWR and shallow fractured bedrock. Using an equation provided by the Solid Waste Section, longitudinal dispersivity (D_l) was estimated by the following calculation:

$$D_l = C \times L \times \frac{Kdh}{n_e dl}$$

where:

C = Constant (0.1)
L = Length to compliance boundary
K = hydraulic conductivity
dh/dl = hydraulic gradient
n_e = effective porosity

For this estimation, an average hydraulic conductivity value of $5.8x10^{-4}$ cm/sec (1.65 ft/day) was used. This value represents the average K of the piezometers installed during the current investigation, based on slug test analyses. An average hydraulic gradient of 0.2 ft/ft was used. This value represents measurements collected from piezometers installed in the expansion areas during the current investigation. An average effective porosity of 20% was used. This value represents the average estimated effective porosity from samples collected from the PWR and a conservative assumed effective porosity of 10% (Heath's estimates are 0.1%). A length of 250 feet was used. This value represents the distance from the edge of waste to the compliance boundary.

Using the estimations and calculation described above, an average longitudinal dispersivity of 80 ft was determined. Assuming that transverse dispersivity is 10% of longitudinal dispersivity, transverse dispersivity was estimated at 8 ft.

Longitudinal dispersivity was also estimated using an EPA calculator. Assuming a plume length of 250 feet, longitudinal dispersivity ranged from 0.41 ft to 1500 ft. And by using the formula from Xu and Eckstein (1995) on the EPA site, assuming a plume length of 250 feet, a longitudinal dispersivity of 12.5 ft was determined. Therefore, transverse dispersivity ranges from 0.041 ft to 150 ft.

These calculations are intended for unconsolidated materials. As discussed throughout this report, groundwater flow in bedrock is complex. Groundwater movement in bedrock is in the fractures and is limited by degree of fracturing, size of fractures, and interconnectedness of fractures.

2.6 Other Investigative Techniques

Rule .0538(a)(5) provides an option to discuss other techniques, other than borings, used to investigate the subsurface conditions at the site. The additional techniques include but are not limited to: geophysical well logs, surface geophysical surveys, and tracer studies. For this investigation, none of the above mentioned methods were used. However, during previous investigations, techniques including very low frequency (VLF) geophysical surveys (CDM 1993), geologic mapping (CDM, October 2000), and pump testing (CDM, January 2002).

2.7 Stratigraphic Cross Sections

Rule .0538(a)(6) requires stratigraphic cross-sections identifying hydrogeologic and lithologic units and stabilized water table elevations. Figures 2-1 through 2-5 provide hydrogeologic cross-sections with flow nets for sections A-A', B-B', C-C', D-D', and E-E'. Cross-section references for are provided on Sheet 2-1.

Table 2-4
Summary of Geotechnical Testing Results
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

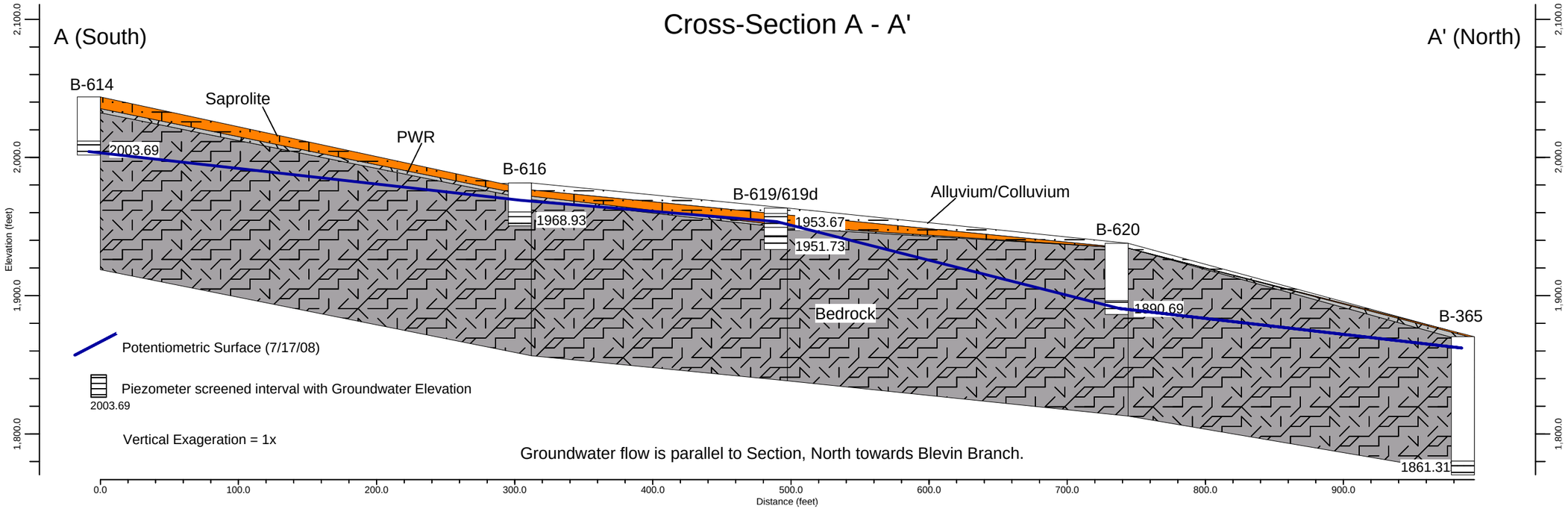
Boring No.	Depth (feet)	Lithology	Sample Type	USCS Classification	Natural Moisture Content	Volume Percent Water	Porosity (%)	Effective Porosity (%)	Undisturbed Hydraulic Conductivity (cm/sec)	Remolded Hydraulic Conductivity (cm/sec)	Moisture Density Relationship (pcf)	Atterberg Limits		
												Liquid Limit	Plastic Limit	Plasticity Index
BC-133	10.0-15.0	PWR	Bag	SM										
BC-133	21.5-22.5	PWR	Bag	SM										
BC-135	0-5.0	Saprolite	Bag	SM										
BC-138	14.0-19.0	Saprolite	Bag	SM										
BC-138	19.0-19.7	Saprolite	UD	SM	30.4		43.0		5.30E-07					
B-360	9.0-11.0	Regolith	UD	ML	26.4		41.2		2.90E-07					
B-362	1.0-3.0	Saprolite	UD	SM	26.6		45.3		7.40E-05					
B-362	9.4-11.4	Regolith	UD	SM			44.0							
P-403	4.0-6.0	Saprolite	UD	CL-ML		98	34.0		1.50E-06			28	21	7
P-403	0.0-11.0	Saprolite	Bag	SC								37	24	13
P-404	0.0-13.0	Saprolite	Bag	SC-SM								25	21	4
P-405	0.0-12.0	Saprolite	Bag	CL						2.10E-07		38	24	14
P-406	22.0-22.7	Saprolite	UD	SM		52	46.0					32	NP	-
P-406	0.0-20.0	Saprolite	Bag	SM						4.80E-06		32	29	3
P-407	10.0-11.0	Saprolite	UD	SC		88	44.0		9.50E-08			37	24	13
P-407	0.0-10.0	Saprolite	Bag	SC								34	18	16
P-408	0.0-11.0	Saprolite	Bag	SM								43	32	11
B-502A	18.5-20.0	Saprolite	UD	SM	19.5		51.8		2.00E-04			45	NP	-
B-509A	7.0-9.0	Saprolite	UD	ML	15.2		48.9		9.90E-06			47	45	2
B-513A	12.0-14.0	Saprolite	UD	CL	21.5		22.2		1.50E-07			35	23	12
B-514A	10.0-12.0	Saprolite	UD	ML	20.0		65.7		1.20E-07			35	30	5
B-519B	3.5-5.0	Saprolite	UD	SM-SC	13.4		64.6		1.50E-05			28	22	6
B-600	5.0-7.0	Saprolite	UD	SM	15.3		39.7		2.00E-07			NP	NP	-
B-605	8.5-10	Saprolite	Bag	SM	5.2							NP	NP	-
B-608	13.5-15.0	PWR	Bag	SM	6.5							NP	NP	-
B-614	3.5-5.5	Saprolite	Jar	SM	12.3			27				25	25	0
B-615	4.0-6.0	Saprolite	Jar	SM	10.5			27				37	30	7
B-615	13.5-15.5	Saprolite	UD	SM	8.5		37.0		1.60E-06			33	25	8
B-615	14.0-15.0	Saprolite	Jar	SC-SM	16.4			26				24	20	4
B-616	2.5-4.5	Saprolite	UD	SC	16.9							33	20	13
B-617	8.5-10.0	PWR	Jar	SM	4.5			24				34	30	4
B-618	7.0-9.0	Saprolite	UD	SM	11.1		40.0		5.50E-06			36	32	4
B-618	9.0-11.0	Saprolite	Jar	SM	11.7			23				32	31	1
B-618	24.0-26.0	PWR	Jar	SM	8.9			21				28	25	3
B-618			Bulk	ML			48.0			2.50E-07	91.0			
B-619	4.0-5.0	Saprolite	Jar	CL	16.2			8				34	19	15
B-619	5.0-6.0	Saprolite	Jar	SM	11.2			22				NP	NP	-
B-619	9.0-11.0	Saprolite	Jar	SM	13.7			21				27	24	3
B-619			Bulk	SM			34.2			3.20E-06	115.0			

Table 2-4
Summary of Geotechnical Testing Results
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Boring No.	Depth (feet)	Lithology	Sample Type	USCS Classification	Natural Moisture Content	Volume Percent Water	Porosity (%)	Effective Porosity (%)	Undisturbed Hydraulic Conductivity (cm/sec)	Remolded Hydraulic Conductivity (cm/sec)	Moisture Density Relationship (pcf)	Atterberg Limits		
												Liquid Limit	Plastic Limit	Plasticity Index
B-620	0.0-2.0	Alluvium	Jar	ML	15.1			16				21	20	1
B-621	0.0-2.0	Saprolite	UD	SM	11.5							32	24	8
B-621	9.0-11.0	PWR	Jar	SM	5.5			26				24	23	1
B-622	9.0-11.0	PWR	Jar	SM	10.9			22				NP	NP	-
B-622			Bulk	SM			33.2			1.20E-06	117.1			
B-623	1.0-3.0	Saprolite	UD	CH	38.7		50.7		6.10E-08			73	34	39
B-623	4.0-6.0	Saprolite	Jar	SM	29.8			24				48	33	15
B-623	14.0-16.0	Saprolite	Jar	SM	17.7			22				43	30	13
B-623	24.0-26.0	PWR	Jar	SM	6.0			20				NP	NP	-
B-624	0.0-2.0	Saprolite	Jar	SM	23.8			12				42	34	8
B-624	4.0-6.0	PWR	Jar	SM	6.4			21				NP	NP	-
B-625	4.0-5.0	PWR	Jar	SM	6.5			18						
B-626	0.0-1.0	Saprolite	Jar	ML	16.8			15				30	23	7
B-626	3.0-5.0	Saprolite	Jar	SM	8.2			20				27	24	3
B-627	1.0-3.5	Alluvium	UD	--	13.3		28.3		3.30E-06			-	-	-
Average					**14.9**		**43.1**	**20.8**	**2.08E-05**	**1.93E-06**				
Geometric Mean					**13.0**		**41.8**	**20.0**	**1.46E-06**	**9.93E-07**				

Table includes borings from C&D and applicable adjacent Subtitle D sites.
Piezometers in bold located within proposed C&D Facility expansion areas.
USCS - Unified Soil Classification System
UD - Undisturbed Sample (Shelby Tube)
PWR - Partially weathered rock
** - Remolded
- Not Calculated

Cross-Section A - A'



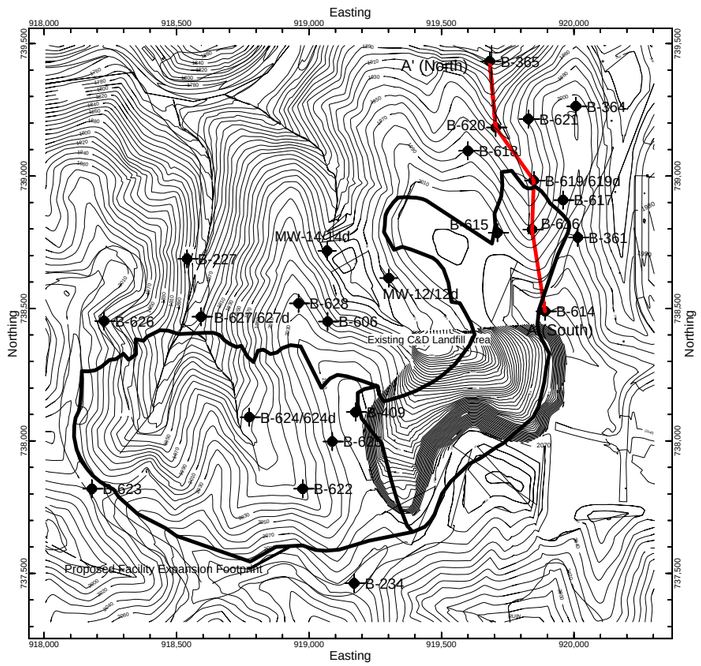
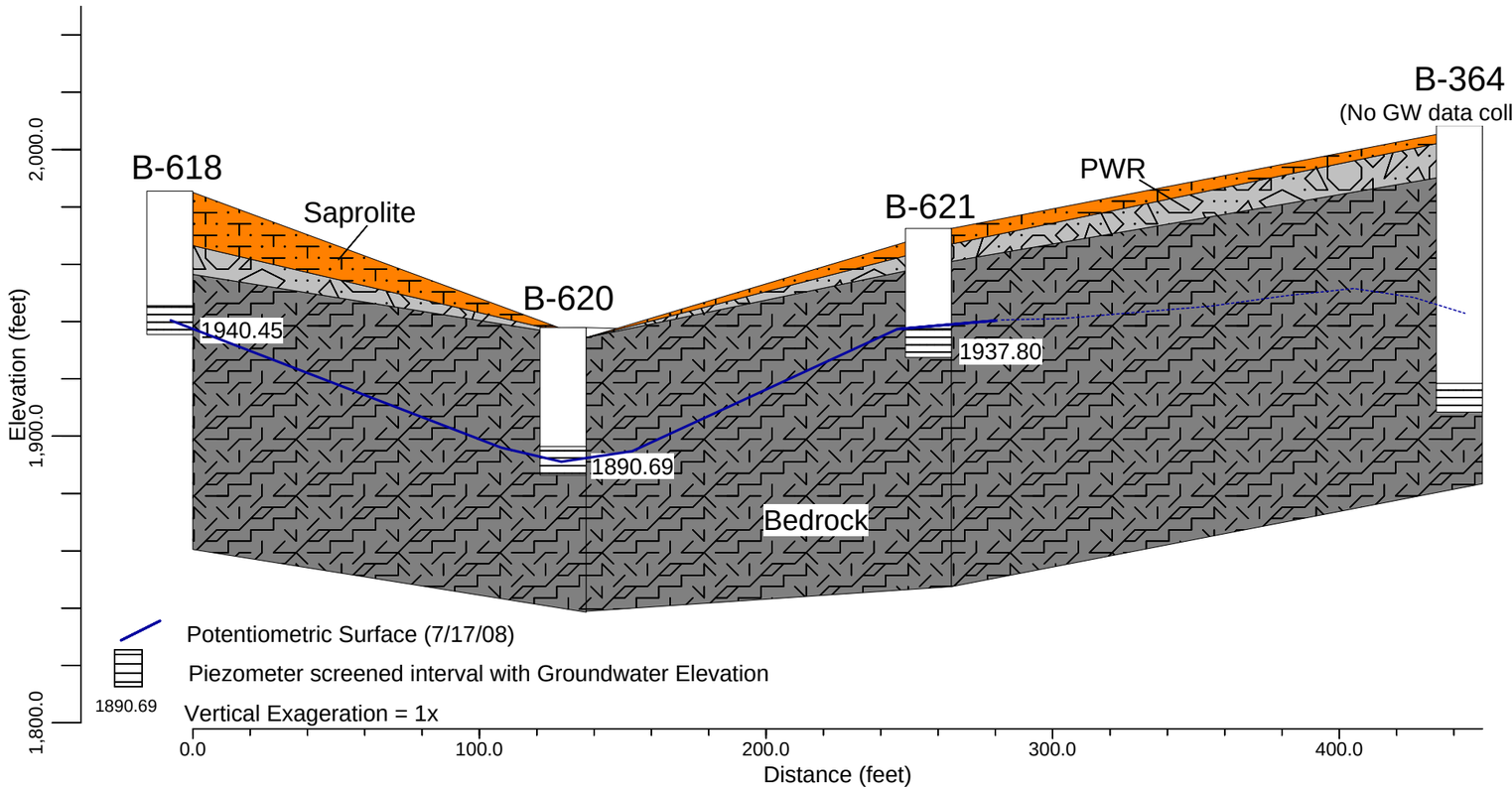


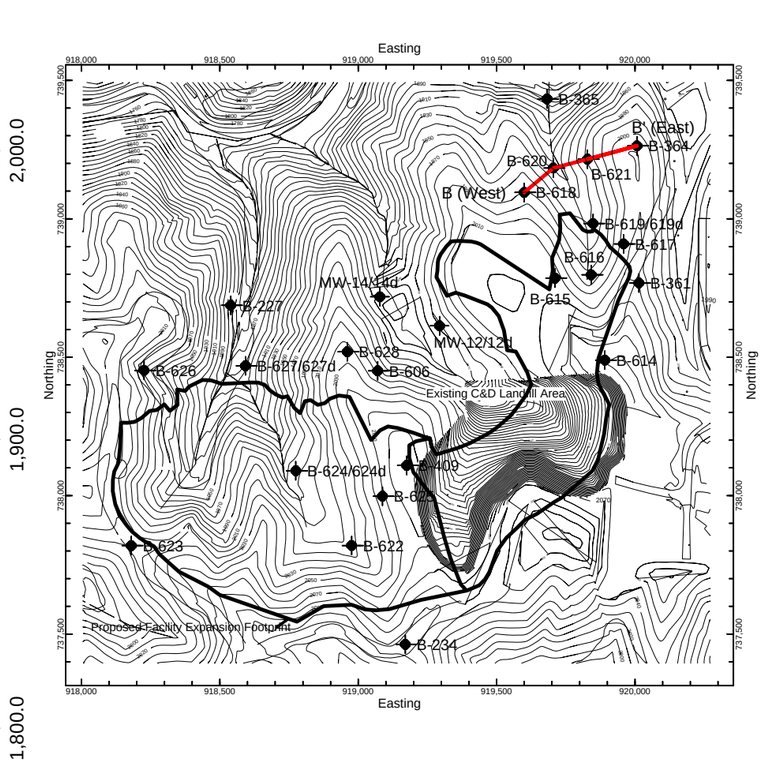
Figure 2-1
Cross-Section A - A'
Buncombe County C&D Landfill Facility Expansion
Site Hydrogeologic Investigation

Cross-Section B - B'

B (West)

B' (East)



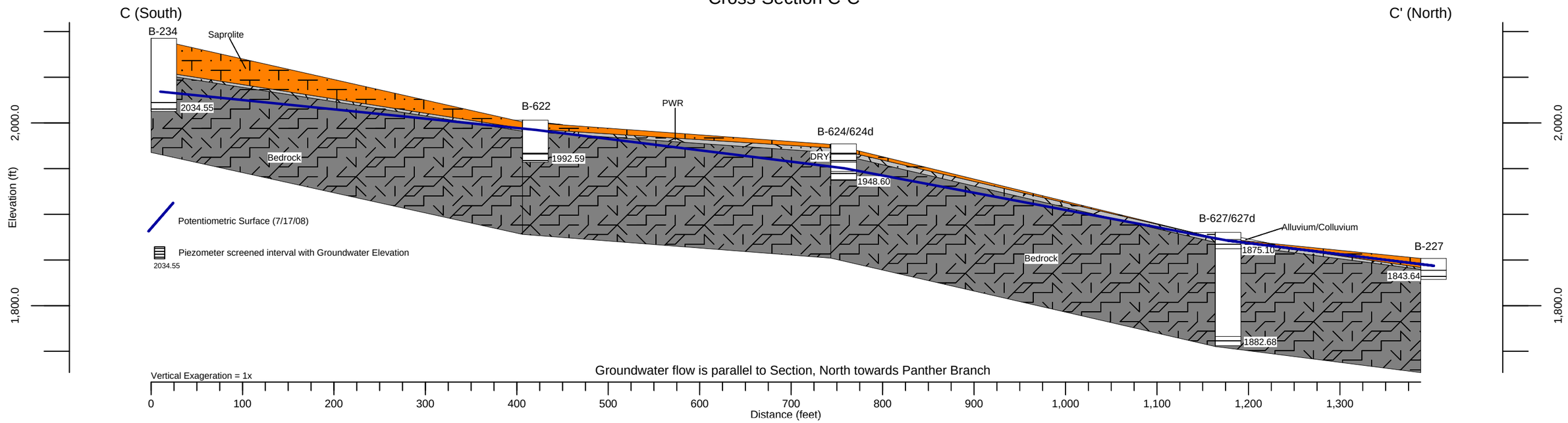


Dominant groundwater flow is perpendicular to Section, North towards Blevin Branch.

Potentiometric surface data from B-364 estimated from previous investigations.

Figure 2-2
Cross-Section B - B'
Buncombe County C&D Landfill Facility Expansion
Site Hydrogeologic Investigation

Cross-Section C-C'



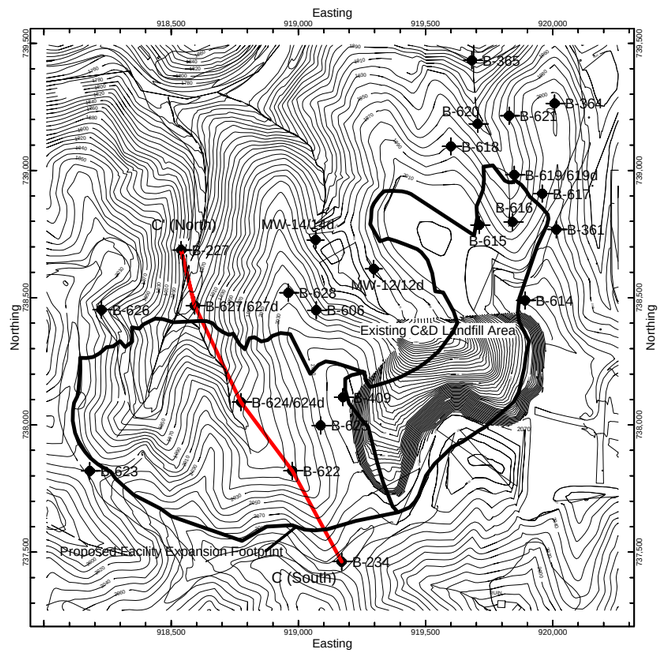
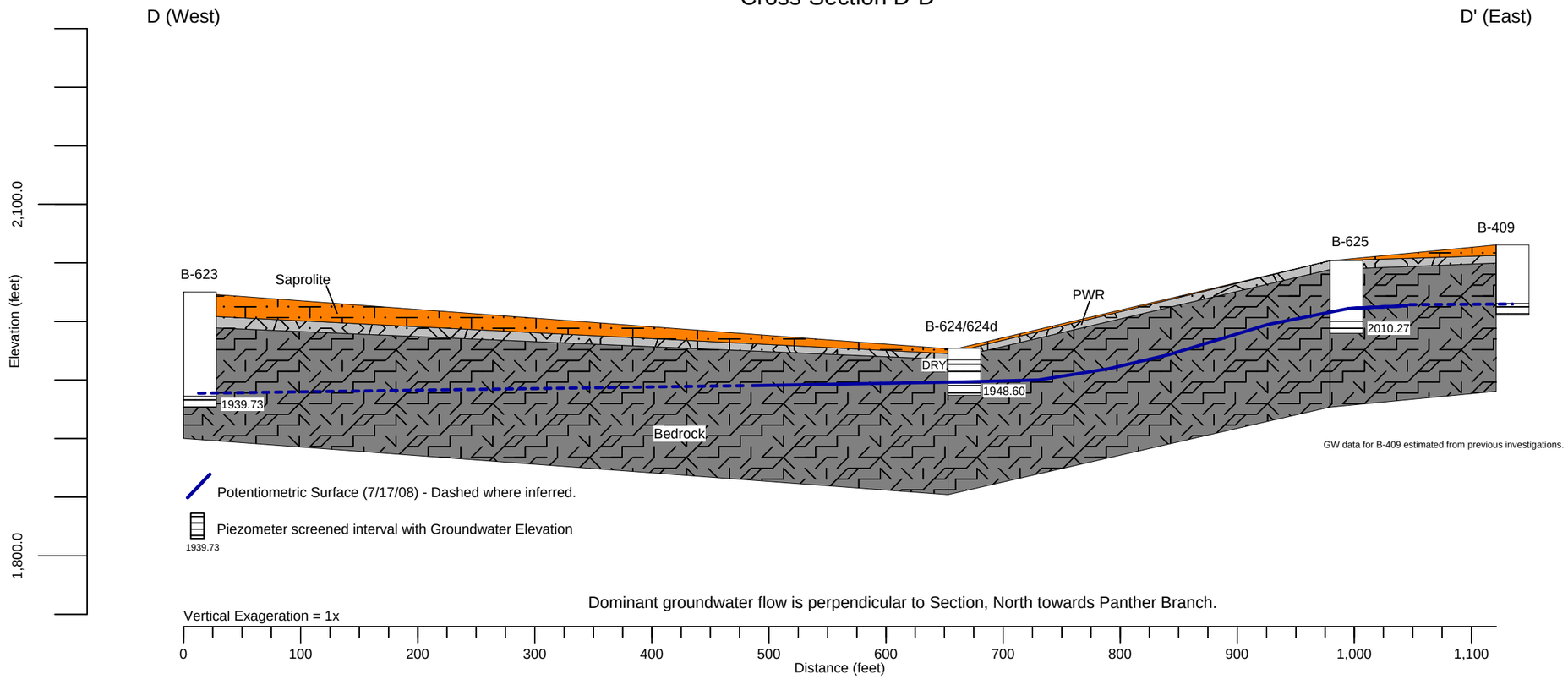


Figure 2-3
Cross-Section C - C'
Buncombe County C&D Landfill Facility Expansion
Site Hydrogeologic Investigation

Cross-Section D-D'



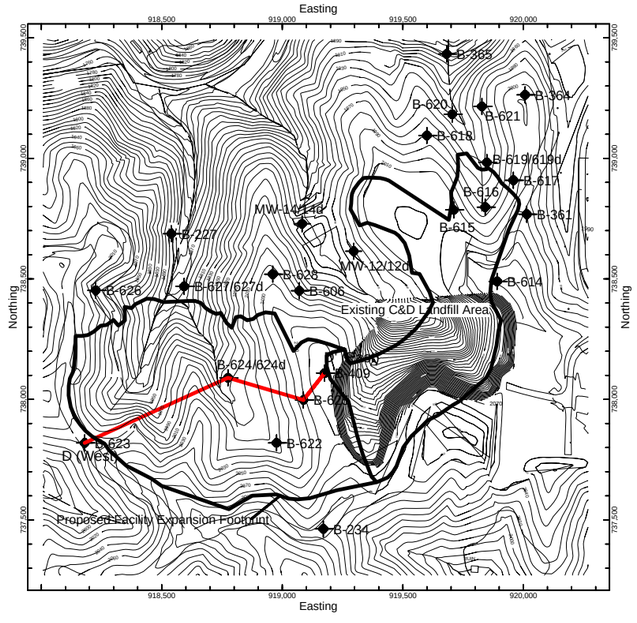
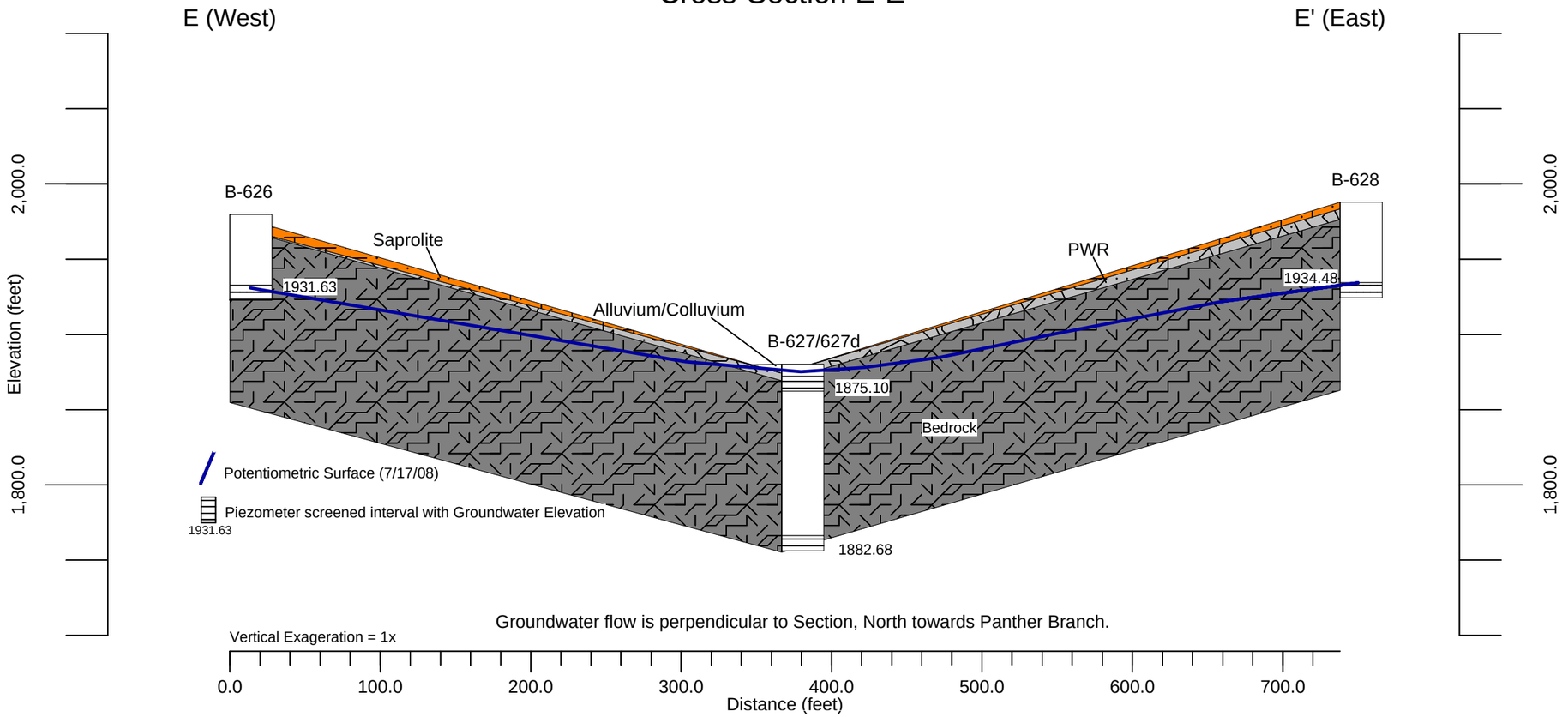


Figure 2-4
Cross-Section D - D'
Buncombe County C&D Landfill Facility Expansion
Site Hydrogeologic Investigation

Cross-Section E-E'



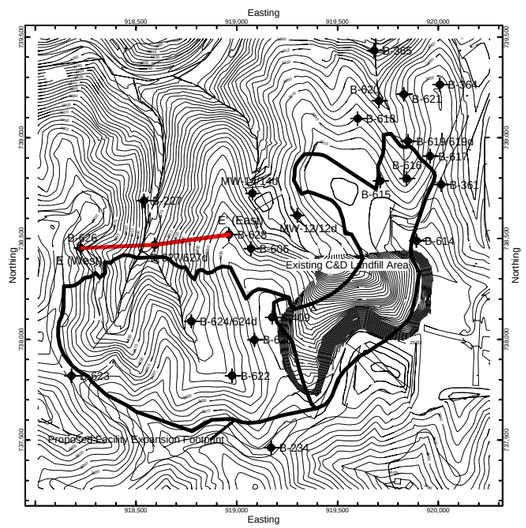


Figure 2-5
Cross-Section E - E'
Buncombe County C&D Landfill Facility Expansion
Site Hydrogeologic Investigation

2.8 Water Table Information

Rule .0538(a)(7)(A through D) requires tabulations of stabilized water table elevations, an estimate of seasonal high water table, and a discussion of any activities that have the potential for causing water table fluctuations.

2.8.1 Stabilized Water Table Elevations

Water level measurements collected from the piezometers installed during the current investigation are provided in Table 2-5. These include measurements at the time of boring, 24 hours after installation, June 18, 2008, July 17, 2008. The water level measurements taken during the June 18, 2008 event were used to construct the potentiometric contour map presented on Sheet 2-3. In addition to the current investigation piezometers, historic data from previous investigations are also included.

Table 2-5 also includes the highest recorded elevations for the piezometers and the monitoring wells installed during previous investigations. For the 200-series piezometers, this includes water level measurements dating back to November 1993. For the 300-series piezometers, water level measurements date back to February 1995 (CDM 1995a). For the 400-series piezometers, this includes water level measurements dating from March 1997 (CDM 1997). The 500-series piezometers date back to 1999 (CDM, October 2000). In most cases, piezometers from previous investigations have been abandoned.

Water levels in most piezometers are below the top of bedrock. Saturated conditions above the bedrock surface were encountered in piezometers B-619s and B-627s in the current investigation areas. Both are located in areas of low-lying topography near the drainage features, and are within the proposed C&D Landfill expansion area. The deeper piezometer at the B-627 location also has pieziometric elevations above the bedrock surface.

In general, the initial water table measurements were obtained 24-hours after installation. Stabilized water table readings for the current piezometers were collected again on June 18, 2008 and July 17, 2008. Since installation, water table elevations remained fairly constant; however, elevations in three piezometers have varied significantly. The water table elevation in B-615 decreased almost 3.5 feet between readings and elevations in piezometers B-625 and B-627d increased by approximately 5.5 and 9 feet respectively between readings. The reading collected from B-627d on July 17, 2008 was approximately 2.4 feet above ground surface. Water table elevations are presented in Table 2-5.

Table 2-5
Groundwater Elevations
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Well	Top of PVC Elevation (feet msl)	Ground Surface Elevation (feet msl)	Groundwater Elevation @TOB (feet msl)	Groundwater Elevation @ 24 hours (feet msl)	Groundwater Elevation 4/30/1997 (feet msl)	Groundwater Elevation 5/5/1999 (feet msl)	Groundwater Elevation 9/13/1999 (feet msl)	Groundwater Elevation 10/29/2001 (feet msl)	Groundwater Elevation 3/7/2002 (feet msl)	Groundwater Elevation 6/26/2002 (feet msl)	Groundwater Elevation 10/14/2004 (feet msl)	Groundwater Elevation 3/3/2005 (feet msl)	Groundwater Elevation 6/18/2008 (feet msl)	Groundwater Elevation 7/17/2008 (feet msl)	Groundwater Elevation 8/12/2008 (feet msl)	Estimated Seasonal High Elevation	Estimated Long-Term Seasonal High
B-227	1853.80	1851.8			1845.48	1845.01	1843.55		1843.75				1843.64	1843.64	1843.60	1849.48	1851.8
B-234	2094.66	2092.7			2044.55	2044.51	2042.41		2034.18				2034.71	2034.55	2034.43	2048.55	2051.55
B-335	2074.68	2071.6			2016.77	NM	NM		NM							2017.8**	2020.8
B-236	2051.88	2050.0			2008.84	NM	NM		NM							2009.4	2012.4
B-361	2018.19	2015.3			1961.70	1961.61	1961.33		NM				1959.74	1960.01	1958.88	1965.70	1968.7
B-364	2011.14	2008.4															
B-365	1872.89	1870.3												1861.31			
MW-4	1944.35	1942.5			1932.50	1930.92	1929.88		1928.86	1929.94		1935.49			1929.71	1935.49	1938.5
MW-4d	1944.64	1942.8			1931.69	1929.90	1927.67		1926.96	1928.68		1934.60			1928.93	1934.60	1937.6
MW-5	1977.12	1975.4			1939.89	1939.61	NM		1937.97	1938.44		1942.05			1939.75	1942.05	1945.1
MW-5d	1976.92	1975.3			1939.56	1938.37	NM		1936.41	1936.93		1940.48			1937.67	1940.48	1943.5
MW-6	1987.34	1985.4			1957.68	1957.43	1957.07		1954.18	1954.80		1960.13			1956.16	1960.13	1963.1
MW-7	2022.83	2020.7			1974.33	1974.47	1974.11		1970.20	1970.59		1974.45				1975.1	1978.1
MW-9	1966.54	1963.5				1950.97	1950.25		1951.65	1951.14		1953.28				1953.28	1956.3
MW-9d	1966.34	1963.3				1950.80	1950.08		1951.52	1951.03		1953.15				1953.15	1956.2
MW-12	1947.39	1944.7	1931.7							1933.54		1940.41	1934.34	1933.79	1933.20	1944.41	1944.7
MW-12d	1947.10	1944.3	1918.3							1930.98		1939.67	1932.66	1932.59	1931.31	1943.67	1944.3
MW-14	1952.78	1949.8	1909.8										1918.86	1919.36	1918.59	1923.36	1926.4
MW-14d	1953.77	1950.5	1869.5										1919.54	1919.86	1919.24	1923.86	1926.9
B-401	1949.58	1947.9	1936.0	1941.14	1940.22	NM	NM									1940.22**	1943.2**
B-402	1972.29	1970.0	ND	1964.96	1964.48	NM	NM									1964.48**	1967.5**
B-402H	1972.78	1970.4	ND	1967.66	1967.56	NM	NM									1967.56**	1970.4**
B-403	2019.14	2016.5	1988.5	1988.62	1988.75	NM	NM									1988.76**	1991.8**
B-404	2031.06	2028.5	2010.5	2022.33	2024.02	NM	NM									2024.02**	2027.0**
B-404H	2030.54	2028.5	ND	2025.19	2022.97	NM	NM									2022.97**	2026.0**
B-405	2048.57	2045.5	2011.5	2023.81	2024.21	NM	NM									2024.21	2027.2
B-406	2040.69	2037.0	ND	1971.36	1968.44	NM	NM									1968.44**	1971.4**
B-407	2051.25	2048.5	2020.5	2045.38	2045.45	NM	NM									2045.45	2048.5
B-407H	2051.22	2048.0	ND	2044.64	2045.79	NM	NM									2045.79	2048.8
B-408	2099.07	2096.4	2019.4	2027.70	2027.04	2020.80	NM									2027.04	2030
B-409	2067.67	2065.4	2010.4	2014.62	2015.53	2014.97	2014.36					2012.39				2015.53	2018.5
B-515	2031.78	2028.4	1997.4	2007.11		2007.12	2007.16	2005.61	2003.53			2007.28				2007.28	2010.2
B-516	1993.68	1990.7	1966.1	1965.73		1988.57	1986.46	1980.76	1979.08			1983.49				1988.57	1990.7
B-517	2079.04	2076.2	2009.2	2010.47		2010.47	2022.41	2019.96	2018.45			NM				2022.41	2025.4
B-517d	2078.80	2075.6	1991.6	2007.68		2007.68	2022.16	2019.33	2017.90			NM				2022.16	2025.2
B-518	2005.54	2002.5	1994.5	1999.49		1999.49	1999.11	1999.26	1998.10			1999.05				1999.49	2002.5
B-518d	2005.21	2002.5	1987.5	1988.53				1987.62	1985.71			1990.24				1990.24	1993.2
B-519	1958.36	1955.5	1946.4	1946.25		1951.17	1947.62	1947.65	1947.46			1951.90				1951.17	1954.2
B-519d	1959.11	1956.2	[1]	[1]		[1]	[1]	1956.97	1956.53			1956.61				[1*]	[1*]
B-520	2044.17	2041.5	1959.5	1980.91				1983.27	1982.02			1986.77				1986.77	1989.3
B-521	2005.18	2002.6	1952.6	1964.71				1965.18	1964.88			1973.21				1973.21	1976.2
B-522	2058.81	2055.1	DRY	1995.11				2012.98	2010.61			2014.88				2014.88	2017.9
B-523	2080.42	2077.8	DRY	1967.42				2022.28	2021.03			2022.26				2022.28	2025.3
B-524	2101.58	2098.6	2012.6	2024.30				2023.88	2022.69			NM				2024.3	2027.3
B-525	2061.44	2058.7	2005.7	2019.39				2020.15	2017.01			NM				2020.15	2023.2
B-526	1972.51	1969.5	1931.5	1959.06				1959.43	1958.51			1964.93				1964.93	1967.9
B-527	1976.56	1973.7	1943.7	1951.40				1951.29	1950.34			1958.17				1958.17	1961.2
B-528	1950.28	1947.7	1886.7	1906.93				1909.57	1908.90			1911.26				1911.26	1914.3
B-529	1962.31	1959.6	1933.6	1938.61				1938.79	1937.36			1938.01				1938.79	1941.8
B-530	2045.01	2042.2	DRY	1964.41				1980.46	1977.87			1983.19				1983.19	1986.2
Pumping Well	1955.22	1953.5	1855.5	[1]				[1]	[1]			[1]				[1]	[1]

Table 2-5
Groundwater Elevations
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Well	Top of PVC Elevation (feet msl)	Ground Surface Elevation (feet msl)	Groundwater Elevation @TOB (feet msl)	Groundwater Elevation @ 24 hours (feet msl)	Groundwater Elevation 4/30/1997 (feet msl)	Groundwater Elevation 5/5/1999 (feet msl)	Groundwater Elevation 9/13/1999 (feet msl)	Groundwater Elevation 10/29/2001 (feet msl)	Groundwater Elevation 3/7/2002 (feet msl)	Groundwater Elevation 6/26/2002 (feet msl)	Groundwater Elevation 10/14/2004 (feet msl)	Groundwater Elevation 3/3/2005 (feet msl)	Groundwater Elevation 6/18/2008 (feet msl)	Groundwater Elevation 7/17/2008 (feet msl)	Groundwater Elevation 8/12/2008 (feet msl)	Estimated Seasonal High Elevation	Estimated Long-Term Seasonal High
B-600	2055.38	2052.7	1992.7								2011.61	2010.90				2011.61	2014.6
B-601	2056.24	2053.6	1953.6								1962.15	1963.26				1963.26	1966.3
B-602	1978.36	1975.5	1933.5								1951.83	1955.74				1955.74	1958.7
B-603	2013.61	2011.0	1936.0								1953.21	1953.48				1953.48	1956.5
B-605	1956.60	1954.0	1931.0								1939.20	1942.76				1942.76	1945.8
B-606	2027.09	2024.3	1952.3								1953.48	1952.62	1951.51	1951.30	1951.14	1957.48	1960.5
B-609	1955.19	1952.2	1884.2								1921.83	1923.44	1919.76	1920.12	1919.45	1927.44	1930.4
B-614	2047.20	2043.8	2001.8	2004.73									2004.73	2003.69	2003.05	2008.73	2011.7
B-615	2023.40	2021.6	1988.1	1987.69									1987.69	1984.45	1981.60	1991.69	1994.7
B-616	1984.90	1981.5	1969.5	1969.49									1969.49	1968.93	1967.99	1973.49	1976.5
B-617	2008.70	2005.4	1960.4	1960.42									1960.42	1960.08	1959.54	1964.42	1967.4
B-618	1987.20	1985.5	1940.5	1940.73									1940.73	1940.45	1940.33	1944.73	1947.7
B-619	1965.70	1963.5	1953.5	1953.86									1953.86	1953.67	1952.88	1957.86	1960.9
B-619d	1966.70	1963.4	1951.4	1951.75									1951.75	1951.73	1951.32	1955.75	1958.8
B-620	1940.90	1937.9	1889.9	1891.20									1891.20	1890.69	1890.63	1895.20	1898.2
B-621	1975.80	1972.5	1937.5	1937.93									1937.93	1937.80	1937.66	1941.93	1944.9
B-622	2006.40	2003.1	1988.6	1990.90									1991.90	1992.59	1991.11	1996.59	1999.6
B-623	2027.40	2025.2	1940.6	1940.22									1940.22	1939.73	1939.45	1944.22	1947.2
B-624	1980.50	1977.2	DRY	DRY									DRY	DRY	DRY	1968.00	1970.0
B-624d	1980.40	1977.1	1943.9	1947.19									1947.19	1948.60	1945.32	1952.60	1955.6
B-625	2054.40	2051.9	2004.4	2004.75									2004.75	2010.27	2010.37	2014.37	2017.4
B-626	1981.30	1979.7	1933.0	1932.53									1932.53	1931.63	1931.65	1936.53	1939.5
B-627	1883.00	1880.1	1875.2	1875.17									1875.17	1875.10	1873.45	1879.17	1880.1
B-627d	1882.80	1880.3	1873.8	1873.72									1873.72	1882.68	1882.78	1880.30	1880.3
B-628	1990.30	1987.9	1933.9	1933.66									1933.66	1934.48	1932.70	1938.48	1941.5

Piezometers in bold are located within proposed C&D Facility expansion areas.

ND - Not Determined

NM - Not Measured (well abandoned)

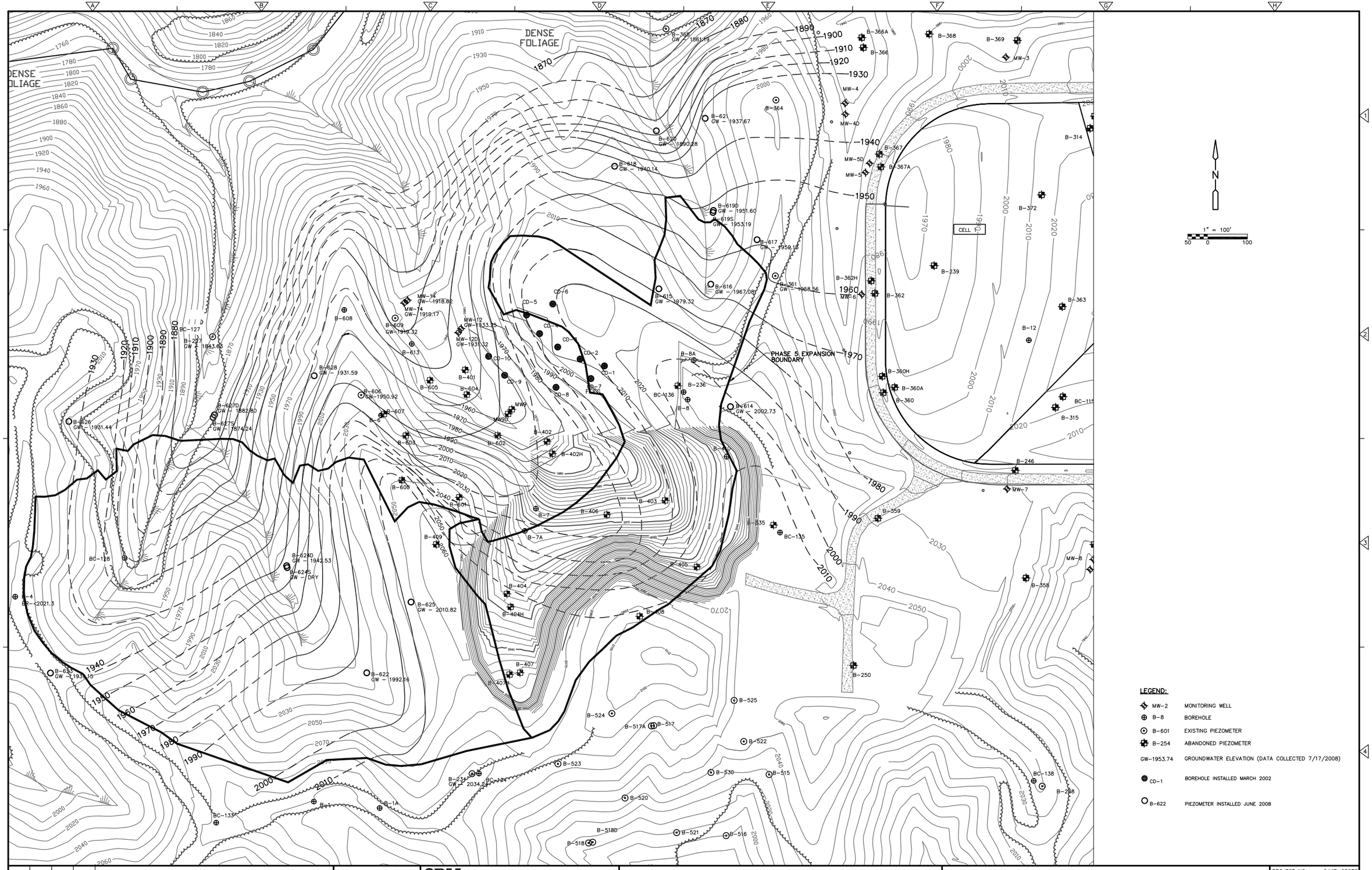
TOB - Time of boring

* - Groundwater elevation measured during previous investigations.

** - Groundwater elevation represents highest elevation after well stabilization.

[1] - Piezometer demonstrates artesian characteristics.

[1*] - Piezometer demonstrated artesian characteristics until the installation of the 6" pumping well, approximately 50 feet downgradient.



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: D. FORBES
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

C&D LANDFILL SUBSTANTIAL AMENDMENT
SITE HYDROGEOLOGIC INVESTIGATION

POTENTIOMETRIC CONTOUR MAP

PROJECT NO. 6447-65973
FILE NAME: SHT_2-3.dwg

SHEET NO.
2-3

2.8.2 Estimated Seasonal High Water Table

Table 2-5 summarizes water level measurements collected on a nominal basis from all of the piezometers completed during this and previous investigations. Because most of the piezometers have been abandoned, the water levels are presented for the discussion of temporal trends only.

In general, bedrock, and not the elevation of the water table, is the limiting factor in determining the landfill base grades. The water table occurs in PWR only in topographic low areas (drainage features). Fill will be placed in these low areas to ensure proper separation and maintain manageable slopes. Therefore, separation from the seasonal high water table is not an issue for most of the site.

An evaluation of seasonal fluctuations in the water table elevations in the piezometers installed during previous investigations indicated that the seasonal high water levels typically occurred in late March to early May (CDM, October 2000). Based on the groundwater elevations collected from the monitoring wells and existing piezometers, it appears that the data collected on June 18, 2008 represents seasonal high water table for the monitoring wells, unless otherwise noted. However, due to the current drought status in the region, it is likely that the elevations are still lower than normal.

There are several existing piezometers in and adjacent to the current investigation area that were installed during previous investigations. Three wells in particular (B-227, B-234, and B-361) have data going back more than ten years.

In order to estimate long-term seasonal high levels, CDM reviewed historic groundwater levels from several inactive and active wells in the USGS and NCDENR Division of Water Resources groundwater level monitoring networks in the vicinity of the landfill or similar terrain and depth. Well names, locations, depths and monitoring zones are provided in the table below (CDM, December 2004).

NCDENR – Division of Water Resources Inactive Groundwater Level Monitoring Network

Quad	Name	County	Total Depth	Monitoring Zone
M 84P1	Swannanoa	Buncombe	99	Bedrock
Q 85N1	Hendersonville	Henderson	48	Bedrock
P 84G2	Hendersonville	Henderson	44	Saprolite
M 90T1	Canton Watershed RS 1	Haywood	35	Saprolite

USGS Groundwater Climate Response Network

Designation	Name	County	Total Depth	Monitoring Zone
NC-40	Champion Well	Haywood	18.5	Saprolite/Bedrock
NC-144	Blantyre Well	Transylvania	58	Saprolite

Hydrographs and well statistics were compared for all of these wells; particularly maximum water levels compared to minimum water levels. The average difference between the maximum recorded highs and the maximum recorded lows for all of these wells were about 8 feet. In this case, the maximum value would be 4 feet above the mean.

In the case of the newly installed Buncombe County C&D piezometers, there is insufficient data to determine an average groundwater level; however, based on the groundwater elevations recorded since installation, the groundwater data collected at the site in June 2008 are most likely representative of average levels.

In order to construct an estimated seasonal high potentiometric contour map, a conservative value of 4 feet was added to the highest recorded elevation (in most cases the June 18, 2008 data). A review of monthly statistics from the Champion Well and the Blantyre Well indicate that an average value of 3 feet above the mean value is typical for the seasonal high.

The Estimated Seasonal High values for the existing monitoring wells and piezometers are included on Table 2-5. Copies of the hydrographs and well statistical data for the USGS and NCDENR wells are included in Appendix C. Table 2-6 and Figure 2-6 present monthly precipitation totals from January 1995 to July 2008 at the Asheville Airport. Figure 2-7 provides a graphic view of yearly precipitation totals from 1995 to 2007. A seasonal high groundwater contour map is provided on Sheet 2-4 and a long-term seasonal high groundwater contour map is provided on Sheet 2-5.

2.9 Horizontal and Vertical Dimension of Groundwater Flow

Rule .0538(a)(8) requires a discussion on the horizontal and vertical dimension of groundwater flow, including flow directions, rates, and gradients.

DENSE FOLIAGE

DENSE FOLIAGE

PHASE 5 EXPANSION BOUNDARY

CELL 1

N

1" = 100'
50 0 100

LEGEND:

MW-2	MONITORING WELL
B-8	BOREHOLE
B-601	EXISTING PIEZOMETER
B-254	ABANDONED PIEZOMETER
SHGW-1953.74	SEASONAL HIGH GROUNDWATER ELEVATION
CD-1	BOREHOLE INSTALLED MARCH 2002
B-622	PIEZOMETER INSTALLED JUNE 2008

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: D. FORBES
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

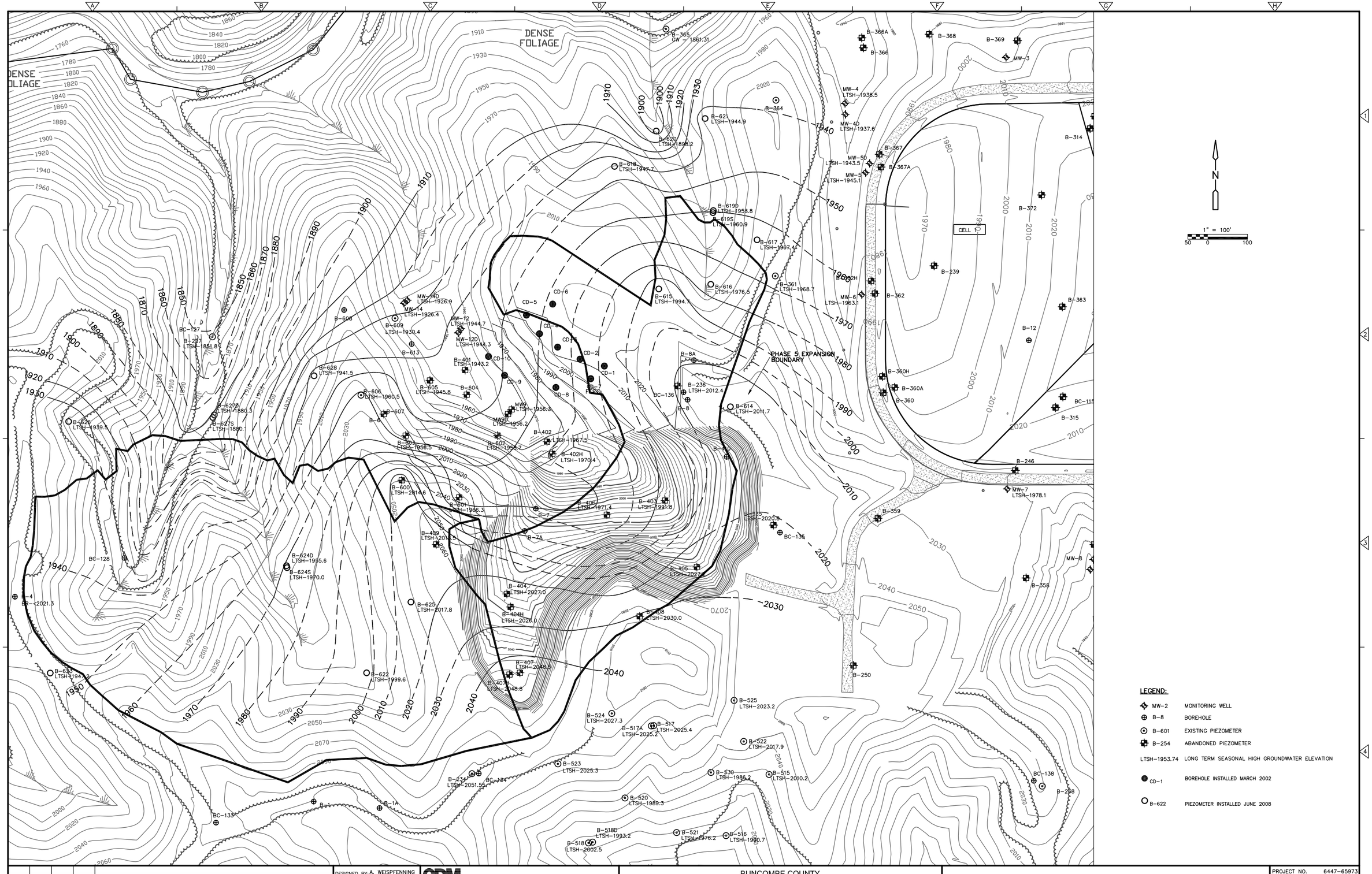
BUNCOMBE COUNTY
NORTH CAROLINA

C&D LANDFILL SUBSTANTIAL AMENDMENT
SITE HYDROGEOLOGIC INVESTIGATION

SEASONAL HIGH GROUNDWATER CONTOUR MAP

PROJECT NO. 6447-65973
FILE NAME: SHT_2-4.dwg

SHEET NO.
2-4



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. WEISPFENNING
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY: M. COLONE
CROSS CHK'D BY:
APPROVED BY:
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

C&D LANDFILL SUBSTANTIAL AMENDMENT
SITE HYDROGEOLOGIC INVESTIGATION

LONG TERM SEASONAL HIGH GROUNDWATER CONTOUR MAP

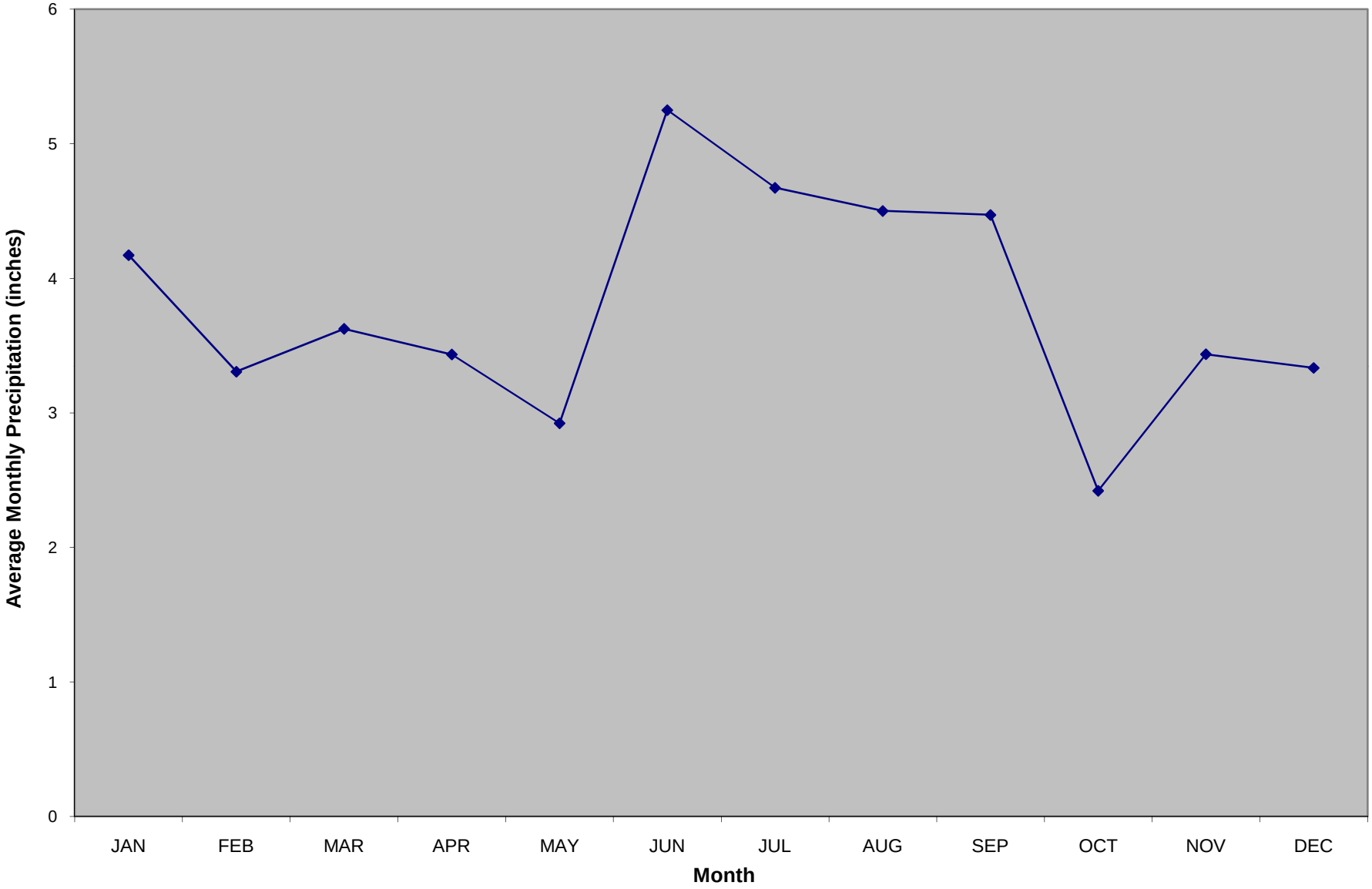
PROJECT NO. 6447-65973
FILE NAME: SHT_2-5.dwg
SHEET NO.
2-5

Table 2-6
Annual Precipitation Data - Asheville Airport
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual Total
1995	7.09	2.93	2.46	1.01	6.05	8.91	3.66	9.27	2	7.26	3.69	1.55	55.88
1996	7.29	2.78	3.43	2.01	2.59	3.57	4.88	6.73	5.26	0.7	4.48	3.98	47.70
1997	4.49	5.29	5.49	5.32	2.94	8.37	3	1.38	4.92	3.94	1.65	3.02	49.81
1998	10	6.4	3.77	8.73	2.28	3.68	2.02	2.3	1.66	1.8	2.8	3.12	48.56
1999	6.43	3.37	2.85	2.45	2.54	4.44	3.89	3.4	2.22	3.34	3.34	2.02	40.29
2000	3.19	2.37	3.87	5.17	1.31	2.81	2.88	4.46	3.33	0	4.29	2.44	36.12
2001	2.68	2.75	5.02	1.35	2.54	2.97	5.54	3.24	4.37	0.63	1.43	2.35	34.87
2002	3.66	1.33	4.38	1.77	3.43	6.19	2.05	2.12	6.09	3.17	4.28	6.41	44.88
2003	1.25	4.5	4.41	5.26	8.37	6.16	10.88	6.86	3.03	2.36	3.93	2.8	59.81
2004	0.83	4.2	2.02	2.95	3.23	7.39	4.68	3.79	13.71	1.11	5.02	3.44	52.37
2005	2	2.57	3.33	2.86	1.65	10.09	10.26	5.71	0.34	1.2	3.74	3.51	47.26
2006	3.58	2.55	0.91	4.58	1.69	5.16	2.81	7.12	7.8	2.93	4.52	4.64	48.29
2007	3.35	1.45	4.29	1.77	0.96	2.91	4.85	2.84	3.4	3.02	1.49	4.06	34.39
2008	2.56	3.79	4.51	2.84	1.33	0.85	4.02	3.79	--	--	--	--	--
Average	4.17	3.31	3.62	3.43	2.92	5.25	4.67	4.50	4.47	2.42	3.44	3.33	46.17

Source - Climatological Data - Annual Summary North Carolina

Figure 2-6
Average Monthly Precipitation
Asheville Airport
Asheville, North Carolina



CDM

Monthly average data from January 1995 to Present

Figure 2-7
Average Annual Precipitation
1995 to 2007
Asheville Airport
Asheville, North Carolina

CDM

2.9.1 Groundwater Flow

Over most locations, the saturated zone lies within the bedrock beneath the saprolite and PWR hydrogeologic units. At some locations, the saturated zone is within the saprolite and/or PWR. The saturation found in these areas likely represents water that has infiltrated in surrounding areas, and then has moved laterally, possibly on the bedrock surface, until it accumulated in the lower elevation area. Within the overburden materials, the zone of highest conductance usually lies immediately above the bedrock surface, due to the lesser amounts of clay minerals in this interval than at the ground surface.

Downward gradients were identified well nests B-619 and B-627. Water within the saturated zone of the PWR must therefore generally either move laterally or downward. If laterally moving water intersects the ground surface before it finds a path permitting further downward migration, it will be discharged as surface water. No springs or seeps were noted in the investigation area. Cross-sections from this and previous investigations indicate that groundwater in the lower portion of the drainage features moves laterally along the PWR/bedrock interface (CDM, October 2000, June 2005).

Since the PWR is only locally saturated, the bedrock groundwater system is the primary water-bearing unit of concern for the site. The bulk of groundwater flow within the Blue Ridge Province is in the upper several hundred feet, due to the decrease in fracturing and thus bedrock permeability with depth (Freeze and Cherry 1979). Bedrock fracture flow is complex, with flow dependent upon fracture size, orientation, the degree of infilling, and interconnectedness. Localized weathered zones will also affect bedrock fracture flow. Since bedrock fracture flow systems cannot be characterized by direct observation, indirect methods must be utilized.

Aquifer hydraulic conductivity and transmissivity values derived from slug and pumping tests during this and previous investigations have indicated that the saturated PWR and fractured bedrock aquifer system is homogeneous. Slug tests were performed on select piezometers within the current investigation areas. In addition, data from slug tests conducted during previous investigations in and around the current C&D and existing Subtitle D area were also reviewed. Given the lithologically similar conditions found at the proposed expansion areas and the active C&D Landfill and the Subtitle D area, this data would likely be representative of the hydraulic conductivity expected at the proposed C&D Landfill facility expansion.

Within the current investigation areas, slug tests were performed on piezometers B-615, -617, -619d, -625, and -627s. All of the tested piezometers are screened in bedrock, with the exception of B-627s which is screened across the PWR/bedrock contact. Using slug-out (recovery) data, hydraulic conductivity (K) values ranged from 0.23 ft/day in B-619d to 3.28 ft/day in B-627s. The average K for all piezometers in the proposed facility expansion areas was 1.65 ft/day. These values are similar to those seen in the existing C&D landfill and from pump testing in adjacent areas. A

summary of calculated K values is provided on Table 2-7. Calculations and graphs for the K values are provided in Appendix E.

It should be noted that the hydraulic conductivities from slug testing in bedrock represent vertically averaged values, as the actual hydraulic conductivity will vary throughout the well monitoring interval with variable fracturing of the bedrock (CDM 1995a, CDM 1996, CDM, October 2000, CDM, June 2005).

Within the current C&D area, hydraulic conductivity (K) values were 0.14 ft/day in MW-9 and 0.55 ft/day in MW-9d and 3.08 and 3.88 ft/day in MW-14 and MW-14d, respectively. Wells MW-9, -9d, and -14d are screened within bedrock and MW-14 is screened across the PWR/bedrock interface. Across the entire Buncombe County site, saprolite/PWR hydraulic conductivity (K) values ranged from 0.02 ft/day in B-119 to 1.28 ft/day in B-513. Hydraulic conductivities within the bedrock unit ranged from 0.02 ft/day in B-252 up to 47 ft/day in B-372.

Two long-term pumping tests were conducted in the two drainage features in Cells 1-3. Further discussion of the pump tests is contained in the Design Hydrogeologic Report (CDM, 1995a). Assuming a saturated thickness of 100 feet, the pumping test hydraulic conductivities ranged from 0.015 to 52 ft/day in the two drainage features in Cells 1-3. These ranges agree well with the slug test hydraulic conductivities. This wide range in hydraulic conductivity values is due primarily to the varied nature of the bedrock fractures. At locations where a major fracture was encountered, hydraulic conductivities were very high, and likewise, in areas in which only minor or no fractures were encountered, hydraulic conductivities were comparatively low. The fractures appear to be sufficiently interconnected beneath Cells 1-3, and similar conditions would be expected in the C&D Landfill area. Pumping test results yielded some similarities in drawdown response in groups of observation wells, indicating fracture interconnection.

A third long-term pumping test was performed in the proposed Phase III C&D expansion area, southeast of the existing C&D landfill. Similar results were seen in the analysis of the C&D landfill pump test and the two pump tests conducted in the Subtitle D Landfill Cells 1-3, in that similarities in drawdown were seen between some of the observation wells and the pumping well. Based on the results of the pumping test, hydraulic conductivity values within the bedrock aquifer ranged from 0.07 ft/day to 31.68 ft/day and averaged 6 ft/day. These ranges agreed well with the hydraulic conductivity values obtained from slug tests (0.02 ft/day to 47 ft/day) and the values obtained from the pump tests conducted in the Cells 1-3 area (0.015 ft/day to 52 ft/day). The results of the pump test completed during the investigation at the Phase III C&D Landfill expansion were discussed further in the Additional Hydrogeologic Investigation Report (CDM, January 2002).

2.9.1.1 Horizontal Groundwater Flow

Sheet 2-3 presents a potentiometric surface contour map for the entire C&D Landfill expansion area. This map was constructed from water level data collected during the June 18, 2008 event. The potentiometric surface is interpolated from data from piezometers screened in both bedrock and overburden. The contour map shows that the potentiometric surface, similar to the bedrock surface is a subdued reflection of surface topography. Topographic divides are generally also groundwater divides and groundwater flow converges into the main drainage features in the proposed C&D facility expansion areas. Groundwater flows radially away from topographically high areas. On the steep slopes, the hydraulic gradient steepens.

In the proposed C&D Landfill facility expansion areas, groundwater flows away from the topographic high points in the vicinity of piezometers B-614 and B-622 toward the secondary and primary drainage features. The ridges bracketing the drainage features in both portions of the proposed C&D Landfill facility expansion form hydraulic divides, such that groundwater flow within each area is confined to the central drainage feature at each portion. The gradient from the top of the ridge in the proposed northern expansion (B-614) down the drainage feature (B-620) as measured on June 18, 2008 was 0.16 ft/ft. The gradient from the top of the ridge in the proposed western expansion (B-622) down the drainage feature (B-627d) as measured on July 18, 2008 was also 0.16 ft/ft. Gradient values across the investigation areas averaged approximately 0.15 ft/ft.

Using the calculated hydraulic conductivity values from slug testing and horizontal hydraulic gradient information, groundwater velocity values can be calculated. The average linear velocity of groundwater flow was calculated using the following formula:

$$V_x = \frac{Kdh}{n_e dl}$$

Where,
V_x = average linear velocity
K = hydraulic conductivity
dh/dl = hydraulic gradient
n_e = effective porosity

The average linear flow velocity is provided in Table 2-8. Average groundwater flow velocity at the site was 1.54 ft/day and ranged from 0.19 ft/day in B-619d to 2.77 ft/day in B-625.

The hydraulic conductivity was obtained from the slug test data presented in Table 2-7. The hydraulic gradient values were estimated using the potentiometric contour map from June 18, 2008 data. The effective porosity values were estimated based on average values for PWR and the discussion of fractured bedrock in Section 2.1.3.

Table 2-7
Calculated Hydraulic Conductivity Values
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Well ID	Boring Depth (ft)	Aquifer Monitored Interval	K (in/sec)	K (ft/min)	K (ft/day)	K (cm/sec)
B-615 Slug In	51	Bedrock	3.36E-04	1.68E-03	2.42	8.54E-04
B-615 Slug Out	51	Bedrock	1.80E-04	9.01E-04	1.30	4.58E-04
B-617 Slug In	61	Bedrock	3.81E-05	1.90E-04	0.27	9.67E-05
B-617 Slug Out	61	Bedrock	9.70E-05	4.85E-04	0.70	2.46E-04
B-619d Slug In	30	Bedrock	3.84E-05	1.92E-04	0.28	9.74E-05
B-619d Slug Out	30	Bedrock	3.13E-05	1.56E-04	0.23	7.94E-05
B-625 Slug In	62	Bedrock	4.15E-04	2.07E-03	2.99	1.05E-03
B-625 Slug Out	62	Bedrock	2.77E-04	1.38E-03	1.99	7.02E-04
B-625re Slug In	62	Bedrock	1.94E-04	9.69E-04	1.39	4.92E-04
B-625re Slug Out	62	Bedrock	2.67E-04	1.33E-03	1.92	6.77E-04
B-627s Slug In	18	Saprolite/Bedrock	4.28E-04	2.14E-03	3.08	1.09E-03
B-627s Slug Out	18	Saprolite/Bedrock	4.55E-04	2.28E-03	3.28	1.16E-03
MW-9 Slug In*	26	Bedrock	2.00E-05	1.00E-04	0.14	5.08E-05
MW-9 Slug Out*	26	Bedrock	2.00E-05	1.00E-04	0.14	5.08E-05
MW-9d Slug In*	40	Bedrock	8.00E-05	4.00E-04	0.55	2.03E-04
MW-9d Slug Out*	40	Bedrock	7.00E-05	3.50E-04	0.50	1.78E-04
MW-14 Slug Out*	49	PWR/Bedrock	4.28E-04	2.14E-03	3.08	1.09E-03
MW-14d Slug Out*	88	Bedrock	4.55E-04	2.28E-03	3.28	1.16E-03
		Average Facility Expansion Area	2.30E-04	1.15E-03	1.65	5.83E-04
		Average Existing C&D Area Monitoring Wells	1.79E-04	8.94E-04	1.28	4.54E-04

** Monitoring wells at existing C&D landfill.*

Table 2-8
Summary of Calculated Groundwater Flow Velocities
Buncombe County Construction and Demolition Landfill Facility Expansion
Site Hydrogeologic Investigation

Piezometer Designation	Horizontal Gradient [1] (ft/ft)	Estimated Effective Porosity [2]	Hydraulic Conductivity [3] (ft/day)			**Average Linear Velocity (ft/day)**		
			Maximum	*Minimum*	*Average*	*Maximum*	*Minimum*	*Average*
B-615	0.15	0.15	2.42	1.3	1.86	2.42	1.30	1.86
B-617	0.10	0.15	0.7	0.27	0.49	0.47	0.18	0.32
B-619d	0.11	0.15	0.28	0.23	0.26	0.21	0.17	0.19
B-625	0.19	0.15	2.99	1.39	2.19	3.79	1.76	2.77
B-627s	0.16	0.2	3.28	3.08	3.18	2.62	2.46	2.54

[1] Horizontal Gradient calculated from July 2008 potentiometric contours and distances on Sheet 2-3.

[2]- A conservative average value of 15% was used based on bedrock estimates by Heath and average PWR values from Johnson Soil Triangle (Table 2-4).

[3]-Values from calculated Hydraulic Conductivity calculations provided on Table 2-7.

2.9.1.2 Vertical Groundwater Flow

Vertical gradient data is evaluated through the examination of water levels from nested piezometer sets B-619 and B-627 in the proposed facility expansion areas, and MW-12 and MW-14 at the existing C&D area. Vertical gradients are calculated as the difference in water level elevation between two nested piezometers, divided by the vertical distance from the saturated midpoint of the sand filter pack of the shallower well to the saturated midpoint of the sand filter pack in the deeper well.

The July 17, 2008 water level elevations indicated the presence of a downward gradient (indicated by a negative gradient value) at well nests B-619 and MW-12, and upward gradients at nests B-627 and MW-14. The downward gradients indicate that areas serve as recharge areas and groundwater is moving from the PWR to the bedrock. The upward gradients indicate that groundwater is discharging from the bedrock to the PWR, however, there were no seeps or springs visible near the well nests.

The vertical gradients from the July 17, 2008 water levels at the B-619, B-627, MW-12 and MW-14 nests are presented below:

Well Nest	Shallow Groundwater Elevation (MSL)	Deep Groundwater Elevation (MSL)	Groundwater Elevation Difference (ft)	Shallow Screen Saturated Midpoint (MSL)	Deep Screen Saturated Midpoint (MSL)	Screen Midpoint Separation (ft)	Calculated Vertical Gradient (ft/ft)
B-619	1953.67	1951.73	-1.94	1951.58	1939.90	11.6	-0.166
B-627	1875.10	1882.68	+7.58	1867.60	1762.30	105.3	+0.072
MW-12	1933.79	1932.59	-1.20	1930.7	1913.3	17.4	-0.068
MW-14	1919.36	1919.86	+0.50	1907.6	1869.3	38.3	+0.013

2.10 Groundwater Contour Map

Rule .0538(a)(9) requires a groundwater contour map to show the occurrence and direction of groundwater flow in the uppermost aquifer and any other aquifers identified in the hydrogeologic investigation. Sheet 2-3 presents a groundwater contour map based on groundwater elevation data collected from the existing piezometers and groundwater monitoring wells screened in the PWR and shallow fractured bedrock. The groundwater contour map was generated using the groundwater data collected on July 17, 2008. A discussion of the groundwater flow was presented in Section 2.9.

2.11 Topographic Map of the Site

Rule .0538(a)(10) requires a topographic map of the site with boring locations. Sheet 2-1 provides a topographic map with boring and monitoring well locations (existing and abandoned), current landfill cells, surface water drainage features, and cross-section references.

2.12 Logs, Notes and Records

Rule .0538(a)(11) requires boring logs, field notes, well construction records, and piezometer completion records. Appendix A contains bore logs and well construction reports for the existing and abandoned piezometers and groundwater monitoring wells. Appendix D contains copies of the field logs from the current Site Hydrogeologic Investigation. Piezometer construction details are also provided on Table 2-1.

2.13 Geologic and Hydrologic Considerations

Rule .0538(a)(12) requires identification of other geologic and hydrologic considerations. No features of consequence, other than those presented previously, were found during this investigation.

2.14 Report Summary

Rule .0538(a)(13)(A – D) requires a discussion summarizing the geologic and hydrogeologic evaluation of the site.

2.14.1 Hydrogeologic Conceptual Model

This section presents a discussion of the hydrogeologic regime at the proposed C&D Landfill facility expansion area based on the results of this and previous site investigation activities. The conceptual model is divided into three sections: precipitation and groundwater recharge, groundwater flow, and surface water interactions and groundwater discharge.

2.14.1.1 Precipitation and Groundwater Recharge

Factors affecting infiltration of precipitation include the rate of precipitation, slope, soil texture, and vegetative cover. Much of the C&D Landfill facility expansion area is comprised of steep slopes that inhibit infiltration. Areas of lower relief such as the flat hilltops and drainage bottoms are expected to be the locations of greatest recharge. Areas covered by forest litter are also expected to enhance infiltration. Forest litter currently covers almost the entire proposed C&D Landfill expansion areas. These factors will most likely influence the amount of infiltration to the greatest extent during periods of extended precipitation.

As previously discussed, the average monthly precipitation at the site does not vary greatly over the year. However, precipitation during the summer months typically occurs as sporadic high intensity events of short duration, which leads to runoff. In

addition, plant evapotranspiration in the summer leads to higher removal of soil moisture and decreases the potential for deep infiltration. Winter precipitation occurs as events of longer duration and lesser intensity, therefore infiltration and groundwater recharge should be greater in the winter months than in the summer. Approximately 5 to 10 inches per year of precipitation (13 to 26 percent of average annual precipitation) are expected to result in groundwater recharge, based on typical regional recharge values.

Precipitation that infiltrates into the ground will seep downward as wetting fronts following precipitation. These wetting fronts will follow the path of least resistance through zones of relatively higher conductivity in the saprolite and PWR. Upon reaching a less permeable surface such as the top of hard, unfractured bedrock, the water will spread laterally until it finds another relatively higher conductivity pathway downward such as a weathered zone or a fracture, or until it is discharged to the surface water system. These discharges are generally intermittent, and occur in the secondary drainage features following precipitation events. As saturation is not generally observed within the overburden materials, the fractured bedrock material is apparently capable of transmitting water at a rate exceeding infiltration except in local areas. Previous slug test and pumping tests results also indicated that the fractured bedrock materials were often more permeable than the saprolite and PWR units (CDM 1995a).

Over most locations, the saturated zone lies within the bedrock beneath the saprolite and PWR hydrogeologic units. At some locations, the saturated zone is within the saprolite and/or PWR. The saturation found in these areas likely represents water that has infiltrated in surrounding areas, and then has moved laterally, possibly on the bedrock surface, until it accumulated in the lower elevation area. Within the overburden materials, the zone of highest conductance usually lies immediately above the bedrock surface, due to the lesser amounts of clay minerals in this interval than at the ground surface.

2.14.1.2 Surface Water Interactions and Groundwater Discharge

No groundwater discharge points (seeps or springs) were observed in the proposed expansion areas. Groundwater in deeper bedrock is most likely discharging directly to Panther Branch and the French Broad River off the site.

The geologic cross sections included in the Design Hydrogeologic Report (CDM 1995a) suggested that discharge occurs on the western boundary of the current C&D Area into Panther Branch and ultimately into the French Broad River. It is possible that Panther Branch may be a discharge point for only the shallow bedrock groundwater system, given the downward hydraulic gradients found at other areas throughout the Site. Deeper bedrock groundwater may discharge at a longer distance from the Site, most likely the French Broad River.

2.14.2 Site Suitability

Based on the geologic and hydrogeologic data collected during this and previous investigations at the Buncombe County C&D Landfill site, the areas identified to the north and west of the existing C&D landfill appear to be suitable for further C&D landfill development. Across both investigation areas, the average depth to bedrock is approximately 14 feet. The average depth to groundwater varies, but was typically about 35 feet below land surface. Bedrock depth was typically deeper along the ridges and shallower on the side-slopes in the drainage bottoms where erosion and mass wasting has removed the overburden. Conversely, groundwater depth was typically deeper along the ridges and shallower on the side-slopes and drainage bottoms.

- Saturated conditions within the saprolite or PWR are only locally present in the low elevation areas discussed above. These areas can be easily monitored with one nested pair of wells completed further down the drainage feature.

- The proposed footprints of the proposed C&D Landfill facility expansion will be located within individual drainage basins. Groundwater within these basins generally flows from areas of higher topography to areas of lower topography converging toward the central secondary drainage feature and ultimately discharging at the primary discharge features. This flow can be easily monitored with wells completed in the drainage features near the base of the landfill.

- Based on the results of this and previous investigations, the shallow bedrock groundwater system underlying most of the Site apparently discharges into Panther or Blevin branch in the west and northern portions. In the proposed C&D expansion areas, discharge of the shallow bedrock aquifer system in the northern expansion appears to be to Blevin Branch and ultimately to the French Broad River and discharge of the shallow bedrock aquifer system in the western expansion appears to be to Panther Branch and ultimately the French Broad River.

- The proposed expansion areas bracket the existing C&D landfill. An approved Water Quality Monitoring Network is already in place at the site. A review of historic water quality data from the existing network showed no detected volatile organic compounds above applicable groundwater standards.

The following issues should be considered in the landfill design:

- The separation between the base of the proposed landfill and the water table surface is not a site concern, except in the northern portions of the proposed footprints, near the secondary drainage features. Within the rest of the landfill footprint, the groundwater occurs within shallow fractured bedrock.

- After construction of the landfill, groundwater recharge will decrease due to improved run-off control, thus, reduced precipitation available for infiltration, and the later placement of the landfill cap. This reduction in groundwater recharge will

cause a lowering in the water table surface, however, no change of direction of groundwater flow is anticipated. With the decrease in the water table surface, a decrease in the hydraulic gradient beneath the landfill will occur. This will decrease the groundwater velocity.

2.14.3 Water Quality Monitoring Plan Considerations

The overall C&D Landfill groundwater system is largely composed of a complex fractured bedrock aquifer system with a saturated overburden aquifer near the base of the drainage features. The aquifer behaves as a single unit between the bedrock/saprolite/PWR media.

Investigations at both sites focused on the secondary drainage features and associated ridges. The ridges act as groundwater divides and therefore, confine groundwater to single drainages. This single-valley confined drainage and the presence of upward gradients and saturated PWR offer favorable conditions for monitoring for early detection of a release with nested pairs of groundwater wells in addition to surface water sampling.

There were no springs or seeps identified within the proposed facility expansion boundary, however, past investigations have identified springs in the drainage features further down-gradient from the boundary of the western portion. These springs will serve as excellent monitoring points.

- Saturated PWR and shallow bedrock groundwater and can be effectively monitored between the proposed landfill expansion areas and the smaller primary drainage features (Blevin and Panther Branch) and the French Broad River with one pair of nested wells near the base of the landfill within the secondary drainage features. The PWR well will target the saturated zone just above the bedrock and the bedrock will target the shallowest significant water bearing zone observed during well installation activities.

- Down-gradient groundwater discharge in the forms of springs, seeps, and streams will be added to the Water Quality Monitoring Plan to further monitor the sites.

2.15 References

ASTM (American Society of Testing and Materials). Annual Book of Standards.

Bouwer, H. 1989. The Bouwer and Rice Method - An Update. Groundwater. pp. 304-309. May - June.

CDM (Camp Dresser & McKee). 1992. Site Plan Application - Buncombe County Solid Waste Management Facility. November.

_____ 1993. Response to Completeness Review - Site Plan Application - Buncombe County Solid Waste Management Facility. December.

_____ 1995a. Permit To Construct Application - Buncombe County Solid Waste Management Facility. March.

_____ 1995b. Response to Technical Review of Design Hydrogeologic Report/Water Quality Monitoring Plan - Buncombe County Solid Waste Management Facility. June.

_____ 1995c. Response to Technical Review of Design Hydrogeologic Report/Water Quality Monitoring Plan - Buncombe County Solid Waste Management Facility. August.

_____ 1996. Water Quality Monitoring System Installation and Initial Sampling Report - Buncombe County Solid Waste Management Facility. November.

_____ 1997. Construction and Demolition Debris Landfill Permit Application - Buncombe County Solid Waste Management Facility. May.

_____ 1997. Response to Technical Review of Design Hydrogeologic Report Construction and Demolition Debris Landfill - Buncombe County Solid Waste Management Facility. October.

_____ 2000. Design Hydrogeologic Report - Buncombe County Solid Waste Management Facility. February (Revised).

_____ 2000. Phase 3 Construction and Demolition Debris Landfill Permit Application - Buncombe County Solid Waste Management Facility. October.

_____ 2002. Additional Hydrogeologic Investigation - Phase 3 Construction and Demolition Debris Landfill Permit Application - Buncombe County Solid Waste Management Facility. January.

_____ 2004. Permit Amendment Application - Phase 3 Design Hydrogeologic Report – Cell 6 - Buncombe County Solid Waste Management Facility. December.

_____ 2005. Construction and Demolition Debris Landfill Phase 4 Permit Application - Buncombe County Solid Waste Management Facility. June.

Daniel, III, C.C. 1987. Statistical Analysis Relating Well Yield to Construction Practices and Siting of Wells in the Piedmont and Blue Ridge Provinces of North Carolina. USGS Water Resources Report 86-4132.

Driscoll, F.G. 1986. Groundwater and Wells. 2nd Edition. pp. 252-260.

GRAM, Inc. 1999. Buncombe County Landfill Geologic Mapping Letter Report. January 11.

Heath, Ralph C. 1980. Basic Elements of Ground-Water Hydrology With References to Conditions in North Carolina. U.S. Geological Survey Water Resources Investigations. Open-File Report 80-44.

Johnson, A.I. 1967. Specific Yields for Geologic Materials. USGS Water Supply Paper 1662-D.

Law Environmental, Inc. (Law). 1991. Report of Preliminary Exploration - Proposed Municipal Landfill Site - Highway 251 and Panther Branch, Buncombe County, North Carolina. January 10.

NCDWAR (North Carolina Department of Water and Air Resources). 1970. Geology and Groundwater Resources of the Asheville Area, North Carolina. Division of Groundwater. Groundwater Bulletin No. 16. April.

NCGS (North Carolina Geological Survey). 1985. Geologic Map of North Carolina.

Wiener, L.S. 1970. Preliminary Geologic Map of the Leicester Quadrangle (Unpublished). North Carolina Geological Survey.

Appendix A

Bore Logs and Well Construction Diagrams

FIELD GEOLOGIC LOG

PROJECT: *BUNCOMBE COUNTY PROPOSED LANDFILL*		DATE: *8/19/92*	SHEET: *1* OF *1*
		DRILLING CONTRACTOR: *Southeastern Geotech, Inc.*	
WELL No.: *BC-127*	SAMPLING METHOD: *Split Spoon*	DRILLER:	
LOGGED BY: *M. Sanford*	OFFICE: *CDM/Ral*	DRILLING METHOD: *6 3/4" O.D. HSA*	

SAMP. No.	DEPTH, feet	LITHOLOGY	BLOW COUNT	SAMPLE DESCRIPTION	DRILLING COMMENTS
	0			*0-3" TOPSOIL*	
	1			*3"-10' - dark brown with black streaks, fine- grained, sandy, clayey SILT, micaceous*	
	2				
	3				
	4		*17*		
	5		*50/6"*		
	6				
	7				
	8				
	9		*21*		
	10		*31*		
	1		*50/4*	*10'- 12' - dark green with black streaks, silty, fine to medium-grained sandy SILT, partially weathered rock*	*No groundwater encountered at time of boring*
	2				
	3				*Auger Refusal Boring terminated at 12'*
	4				
	15				
	6				
	7				
	8				
	9				
	20				

GROUNDWATER OBSERVATION WELL REPORT

PROJECT	Buncombe County Proposed Landfill		
LOCATION	Asheville, North Carolina		
CLIENT	Camp Dresser & McKee		
CONTRACTOR	Caldwell Drilling	DRILLER	C. Sawyers
OBSERVED BY	S. Webb	DATE	11-23-93
CHECKED BY	M. Landis	DATE	12-16-93

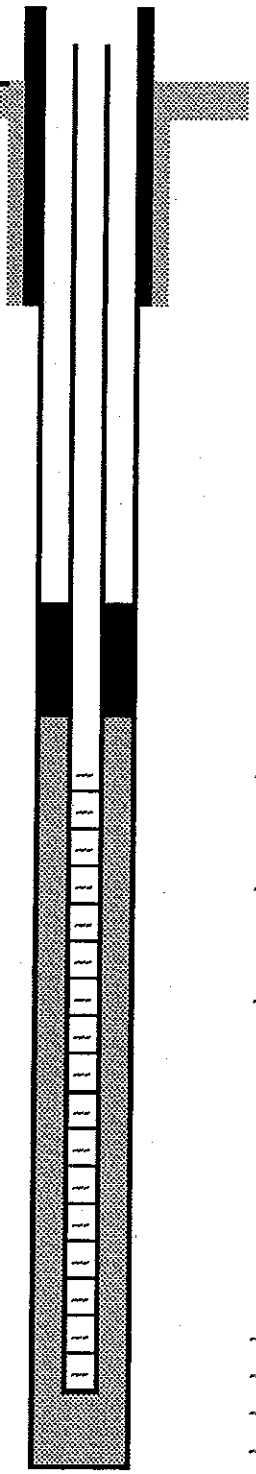
B-227

PROJECT NO.	93355
BORING NO.	B-227
ELEVATION	1851.82
LOCATION	See Site Map

GROUND ELEVATION - 1851.82

GENERAL SOIL CONDITIONS

(not to scale)



LENGTH OF CASING ABOVE GROUND SURFACE	2.30 ft.
LENGTH OF RISER PIPE ABOVE GROUND SURFACE	1.98 ft.
THICKNESS OF SURFACE SEAL	3.02 ft.
TYPE OF SURFACE SEAL (indicate any additional seals)	2'x2'conc. pad
TYPE OF SURFACE CASING	Galv. Steel
ID OF SURFACE CASING	5" square
DEPTH BOTTOM OF PVC CASING	NA
ID and OD OF RISER PIPE	2.067/2.375 in.
TYPE OF RISER PIPE	2" PVC-sch.40
TYPE OF BACKFILL AROUND RISER PIPE	Air Cuttings
DEPTH TOP OF SEAL	6.0 ft
TYPE OF SEAL	Bentonite Pellets
DEPTH BOTTOM OF SEAL	8.0 ft
DEPTH TOP OF PERVIOUS SECTION	13.0 ft
TYPE OF PERVIOUS SECTION	2" PVC-sch.40
DESCRIBE OPENINGS	0.010" slot
ID and OD OF PERVIOUS SECTION	2.067/2.375 in.
TYPE OF BACKFILL AROUND PERVIOUS SECTION	Filter Sand
DEPTH BOTTOM OF PERVIOUS SECTION	23.0 ft
DEPTH BOTTOM OF SAND COLUMN	23.0 ft
DIAMETER OF BOREHOLE	6.0 in.
DEPTH BOTTOM OF BOREHOLE	23.0 ft

Notes: Survey Datum- National Geodetic Vertical Datum (NGVD)

GEI Consultants, Inc.

Boring Location See site map
Ground Elevation (NGVD) 2092.66
Groundwater Depth 48.19 Date 11/30/93

Date Start/Finish 11/16/93 - 11/16/93
Drilled by C. Sawyers / Caldwell Drilling
Logged by Chris Covel Total Depth (ft.) 80.0

B-234AIR

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks	Graphic Log	Well Installation	Soil and Rock Descriptions
2090.0	0								0' - 40' : Partially weathered rock.
	5								
2085.0									
	10								
2080.0									
	15								
2075.0									
	20								
2070.0									
	25								
2065.0									
	30								

Blows per 6" - 140 lb. Hammer falling 30" to drive a 2.0" O.D. Split Spoon Sampler.
Pen. - Penetration length of sampler or core barrel.
Rec. - Recovery length of sample.
RQD - (Length of sound cores > 4")/(Length cored), %
S - Split spoon sample U - Shelby tube sample
C - Diamond rock core UF - Fixed piston sample
▽ - Long-term groundwater level UO - Osterberg sample

Notes:
1) Advanced borehole using TAMROCK D25K Air percussion rig with 6" diameter hammer.

Buncombe County Landfill

Project No. 93355

GEI Consultants, Inc.

Boring Location See site map
Ground Elevation (NGVD) 2092.66
Groundwater Depth 48.19 Date 11/30/93

Date Start/Finish 11/16/93 - 11/16/93
Drilled by C. Sawyers / Caldwell Drilling
Logged by Chris Covel Total Depth (ft.) 80.0

B-234AIR

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks	Graphic Log	Well Installation	Soil and Rock Descriptions
2060.0	30								
	35								
2055.0	40					Bedrock at 40'			40 - 60' : Granite Gneiss, slightly weathered, ~50% Hornblende and Biotite, ~50% Quartz and Feldspar.
2050.0	45								
2045.0	50								
2040.0	55								
2035.0	60								

Blows per 6" - 140 lb. Hammer falling 30" to drive a 2.0" O.D. Split Spoon Sampler.
Pen. - Penetration length of sampler or core barrel.
Rec. - Recovery length of sample.
ROD - (Length of sound cores > 4")/(Length cored), %
S - Split spoon sample U - Shelby tube sample
C - Diamond rock core UF - Fixed piston sample
⧗ - Long-term groundwater level UO - Osterberg sample

Notes:
1) Advanced borehole using TAMROCK 025K Air percussion rig with 6" diameter hammer.

Buncombe County Landfill

Project No. 93355

GEI Consultants, Inc.

Boring Location See site map | Date Start/Finish 11/16/93 - 11/16/93 | B-234AIR
Ground Elevation (NGVD) 2092.66 | Drilled by C. Sawyers / Caldwell Drilling
Groundwater Depth 48.19 Date 11/30/93 | Logged by Chris Covel | Total Depth (Ft.) 80.0 | Page 3 of 3

El. Ft.	Depth Ft.	Sample Type & No.	Blows per 6" in.	Pen. in.	Rec. in.	Remarks	Graphic Log	Well Installation	Soil and Rock Descriptions
2030.0	60								60' - 80' : Felsic rich Granite Gneiss, 60% Feldspar, 20% Hornblende, 15% Quartz, 5% Biotite, slightly oxidized along foliation.
	65								
2025.0									
	70								
2020.0									
	75								
2015.0									
	80								Bottom of borehole = 80.0'
2010.0									
	85								
2005.0									
	90								

Blows per 6" - 140 lb. Hammer falling 30" to drive a 2.0" O.D. Split Spoon Sampler.
Pen. - Penetration length of sampler or core barrel.
Rec. - Recovery length of sample.
RQD - (Length of sound cores > 4")/(Length cored), %
S - Split spoon sample U - Shelby tube sample
C - Diamond rock core UF - Fixed piston sample
⧗ - Long-term groundwater level UO - Osterberg sample

Notes:
1) Advanced borehole using TAMROCK D25K Air percussion rig with 6" diameter hammer.

Buncombe County Landfill

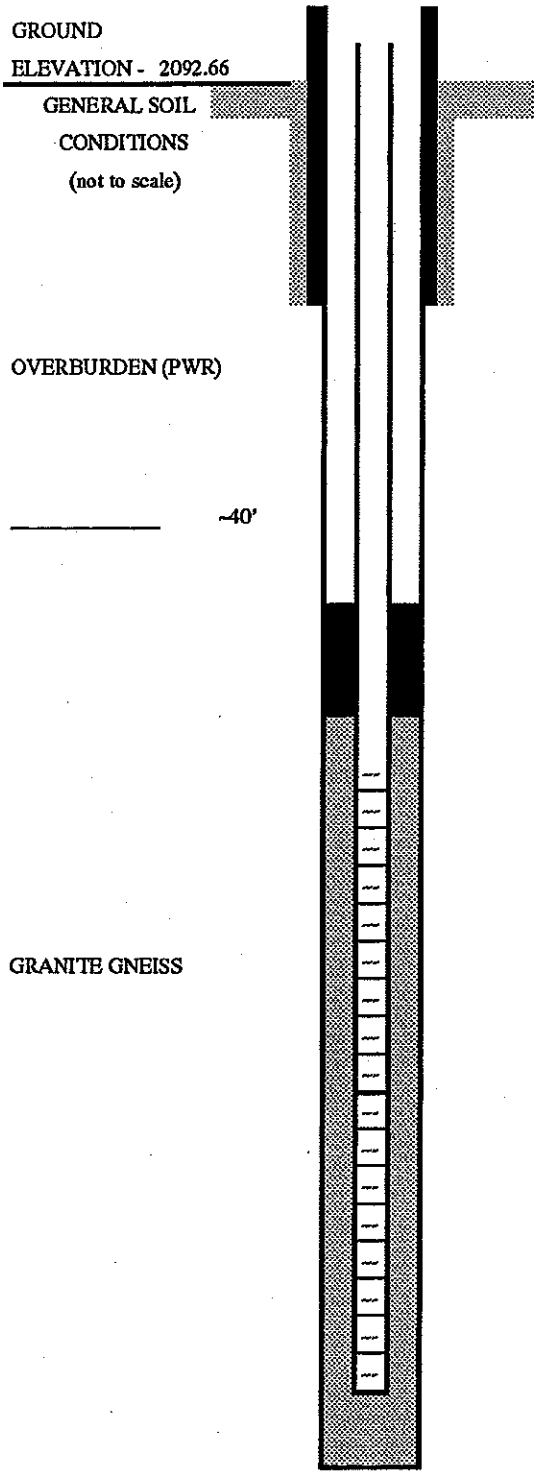
Project No. 93355

GEI Consultants, Inc.

GROUNDWATER OBSERVATION WELL REPORT

B-234

PROJECT	Buncombe County Proposed Landfill			PROJECT NO.	93355
LOCATION	Asheville, North Carolina			BORING NO.	B-234
CLIENT	Camp Dresser & McKee			ELEVATION	2092.66
CONTRACTOR	Caldwell Drilling	DRILLER	C. Sawyers	LOCATION	See Site Map
OBSERVED BY	C. Covel	DATE	11-16-93		
CHECKED BY	M. Landis	DATE	12-17-93		



LENGTH OF CASING ABOVE GROUND SURFACE	2.10 ft.
LENGTH OF RISER PIPE ABOVE GROUND SURFACE	2.00 ft
THICKNESS OF SURFACE SEAL	2.90 ft.
TYPE OF SURFACE SEAL (indicate any additional seals)	2'x2'conc. pad
TYPE OF SURFACE CASING	Galv. Steel
ID OF SURFACE CASING	5" square
DEPTH BOTTOM OF PVC CASING	NA
ID and OD OF RISER PIPE	2.067/2.375 in.
TYPE OF RISER PIPE	2" PVC-sch.40
TYPE OF BACKFILL AROUND RISER PIPE	Air Cuttings
DEPTH TOP OF SEAL	66.0 ft
TYPE OF SEAL	Bentonite Pellets
DEPTH BOTTOM OF SEAL	68.0 ft
DEPTH TOP OF PERVIOUS SECTION	70.0 ft
TYPE OF PERVIOUS SECTION	2" PVC-sch.40
DESCRIBE OPENINGS	0.010" slot
ID and OD OF PERVIOUS SECTION	2.067/2.375 in.
TYPE OF BACKFILL AROUND PERVIOUS SECTION	Filter Sand
DEPTH BOTTOM OF PERVIOUS SECTION	80.0 ft
DEPTH BOTTOM OF SAND COLUMN	80.0 ft
DIAMETER OF BOREHOLE	6.0 in.
DEPTH BOTTOM OF BOREHOLE	80.0 ft

Notes: Survey Datum- National Geodetic Vertical Datum (NGVD)

GEI Consultants, Inc.

CAMP DRESSER & McKEE INC.

Client Buncombe County Site Proposed Landfill Job No. 6447-010 Soil Bore/ Well No. **B-361H**

Drill Contractor Metro Drill Inc. Drilling Method Hollow Stem Auger Date Drilled 10/19/94

Piez/Casing Size & Type NA Screened Length/Interval NA Total Depth 27.0'

Field Geologist/Technician FW/DH Stickup NA Casing Elevation NA Static Water Level Dry

DEPTH (feet)	Lithology	DESCRIPTION Grain size - Lithology: Color, cements, bedding, odor, miscellaneous, (plasticity, hardness, textural maturity,etc.)	USCS	Blow Count 6",6",6"	Samples	Water Level	WELL CONSTRUCTION
		Silty sand to sandy silt, yellow to med orange-brown, fine-med, w/ relict gneiss texture, moist.	SM	7,8,10			
10		SAA, mixes to light orange-red-brown.	SM	8,17,25			
		PWR at 13'.					
		Silty sand, light red-brown to tan, fine-very fine, w/ 5% rock fragments to 3mm.	SM	50/5.5"			
20		SAA.	SM	50/2"			
		SAA.	SM	50/3"			
30		*Borehole refusal at 27.0' bgs.*					
40							
50							
60							
70							

Drill Rig Type Acker AD-2 Borehole Diameter 6"

CAMP DRESSER & McKEE INC.

Client Buncombe County Site Proposed Landfill Job No. 6447-010 Soil Bore/ Well No. **B-361**

Drill Contractor Caldwell Drilling Drilling Method Air Rotary Date Drilled 10/12/94

Piez/Casing Size & Type 2" PVC Screened Length/Interval 85.5-95.5' Total Depth 100'

Field Geologist/Technician FW Stickup 2.9' Casing Elevation 2018.19 Static Water Level 58'

DEPTH (feet)	Lithology	DESCRIPTION Lithological Description from Cuttings	USCS	Drilling Comments	Samples	Water Level	WELL CONSTRUCTION
		Silty sand-sandy silt, medium red-brown, fine, w/ rock fragments to 3mm, moist.	SM				
20		SAA, silty sand.	SM				
		Silty sand, light red-brown, fine-very fine, slightly moist.		*27.0' HSA refusal.*			
40		Silty sand, medium red-brown, w/ 5% rock fragments to 5mm.					
		SAA, slightly moist.					
60		SAA.		55-68' soft rock			
		SAA.					
				68-96' hard rock			
80		SAA, w/ 1% rock fragments.					
		Silty sand, medium grey-brown, fine-medium w/ 1% rock fragments to 5mm.					
		Silty sand, medium red-brown, fine w/ 5% rock fragments to 5mm.		95' 5 min blow test, >5 gpm			
100		*Drilled to 100'.*					
120							
140							

Drill Rig Type Tamrock T25K2W Borehole Diameter 6"

CAMP DRESSER & McKEE INC.

Client Buncombe County Site Proposed Landfill Job No. 6447-010 Soil Bore/ Well No. **B-364H**

Drill Contractor Metro Drill Inc. Drilling Method Hollow Stem Auger Date Drilled 10/22/94

Piez/Casing Size & Type NA Screened Length/Interval NA Total Depth 15.5'

Field Geologist/Technician TG/FW Stickup NA Casing Elevation NA Static Water Level Dry

DEPTH (feet)	Lithology	DESCRIPTION Grain size - Lithology: Color, cements, bedding, odor, miscellaneous, (plasticity, hardness, textural maturity,etc.)	USCS	Blow Count 6",6",6"	Samples	Water Level	WELL CONSTRUCTION
0		0-3' Sandy silt w/ some clay, tan.	ML	50/5"			
		3' Silty fine sand trace clay, white to tan, w/1-2 % rock fragments that crumble to fine-med sand w/ moderate pressure, relicit foliation. *PWR at 3'.*	SM	50/5"			
		8' SAA, slightly larger rock fragments.					
10		13' SAA, w/ 5% rock fragments, 10-20 mm, rock crumbles under moderate pressure, consists of quartz w/ some biotite (granitic gneiss).	SM	50/1"			
		Borehole refusal at 15.5' bgs.					
20							
30							
40							
50							
60							
70							

Drill Rig Type Acker AD-2 Borehole Diameter 6"

CAMP DRESSER & McKEE INC.

Soil Boring Log -Page 1 of 1

Client Buncombe County Site Proposed Landfill Job No. 6447-010 Soil Bore/ Well No. **B-364**

Drill Contractor Caldwell Drilling Drilling Method Air Rotary Date Drilled 10/18/94

Piez/Casing Size & Type 2" PVC Screened Length/Interval 90'-100' Total Depth 100'

Field Geologist/Technician FW/DH Stickup 2.7' Casing Elevation 2011.14 Static Water Level 88'

DEPTH (feet)	Lithology	DESCRIPTION Lithological Description from Cuttings	USCS	Drilling Comments	Samples	Water Level	WELL CONSTRUCTION
		Silty sand, light tan-cream, fine-very fine, w/ 1% rock fragments to 3mm, slightly moist.	SM				
20		SAA, light pale-brown.		*15.5' HSA refusal.*			
		Silty sand, medium red-brown, fine-very fine, w/ 3% rock fragments to 5mm, slightly moist.		30' hard			
40		Silty sand, dark grey, fine-very fine.		40' dry			
		SAA, light grey.		55' some water hard			
60		Silty sand, medium grey, fine, w/ 30 % rock fragments to 10mm.					
		Silty sand, medium-dark grey, w/ 1% rock fragments to 3mm.					
80		SAA, fine, w/ silty seams.					
		Silty sand w/ some clay, fine, w/ 20% rock fragments to 10mm.					
100		Silty sand, light grey, fine-very fine, w/ 1% rock fragments to 3mm.		100' 8 min blow test, good water			
		Drilled to 100'.					
120							
140							

Drill Rig Type Tamrock T25K2W Borehole Diameter 6"

CAMP DRESSER & McKEE INC.

Client Buncombe County Site Proposed Landfill Job No. 6447-010 Soil Bore/ Well No. **B-365H**

Drill Contractor Metro Drill Inc. Drilling Method Hollow Stem Auger Date Drilled 10/19/94

Piez/Casing Size & Type NA Screened Length/Interval NA Total Depth 5.0'

Field Geologist/Technician TG/FW Stickup NA Casing Elevation NA Static Water Level Dry

DEPTH (feet)	Lithology	DESCRIPTION Grain size - Lithology: Color, cements, bedding, odor, miscellaneous, (plasticity, hardness, textural maturity,etc.)	USCS	Blow Count 6",6",6"	Samples	Water Level	WELL CONSTRUCTION
		0-2' Sandy silt w/ some clay, tan. 2-5' Fine sandy silt w/ 10-40mm rock fragments interbedded w/ PWR lenses.	ML ML	16,13, 50/5.5"			
		PWR at 4'.					
10		*Borehole refusal at 5.0' bgs.*					
20							
30							
40							
50							
60							
70							

Drill Rig Type Acker AD-2 Borehole Diameter 6"

CAMP DRESSER & McKEE INC.

Soil Boring Log -Page 1 of 1

Client Buncombe County Site Proposed Landfill Job No. 6447-010 Soil Bore/ Well No. **B-365**

Drill Contractor Caldwell Drilling Drilling Method Air Rotary Date Drilled 10/18/94

Piez/Casing Size & Type 2" PVC Screened Length/Interval 90-100' Total Depth 140'

Field Geologist/Technician FW/DH Stickup 2.6' Casing Elevation 1872.89 Static Water Level 7'

DEPTH (feet)	Lithology	DESCRIPTION Lithological Description from Cuttings	USCS	Drilling Comments	Samples	Water Level	WELL CONSTRUCTION
		Slity sand, medium grey, fine, w/ 3% rock fragments to 3mm.		*5' HSA refusal.* Hard at surface			
20		SAA, w/ 5% rock fragments to 5mm.					
		SAA, w/ 20% rock fragments to 5mm.		Dry			
40		SAA, w/ 1% rock fragments to 10mm.		Dry			
		SAA, w/ 5% rock fragments.					
60		SAA.					
		SAA, light grey.		70' Blow test, dry			
80		SAA, medium grey, w/ 10% rock fragments to 5mm.					
		SAA, w/ 3% rock fragments.					
100		SAA.					
		Sandy silt, light grey, w/ 1% rock fragments to 3mm.					
120		Silty sand, light grey, w/ 1% rock fragments to 3mm.					
		SAA.		130' hard, dry			
140		SAA. *Drilled to 140'.*		140' 30 min blow test, dry			

Drill Rig Type Tamrock T25K2W Borehole Diameter 6"

CDM

LOG OF BORING

BORING **B-606**

Project Buncombe Phase IV C&D Exp. Location Alexander, North Carolina

Page 1 of 1

Date Drilled 11-Oct-04 Drilling Co.: MDI, Inc./Reuben Caldwell Drilling, Inc.

Total Depth 75 ft. bls Method Used: 4.25" ID Hollow Stem Auger/6" Air Rotary

Job #: 6447-

Inspector Brian Goodman

Water elev: 75 ft (0 hr)

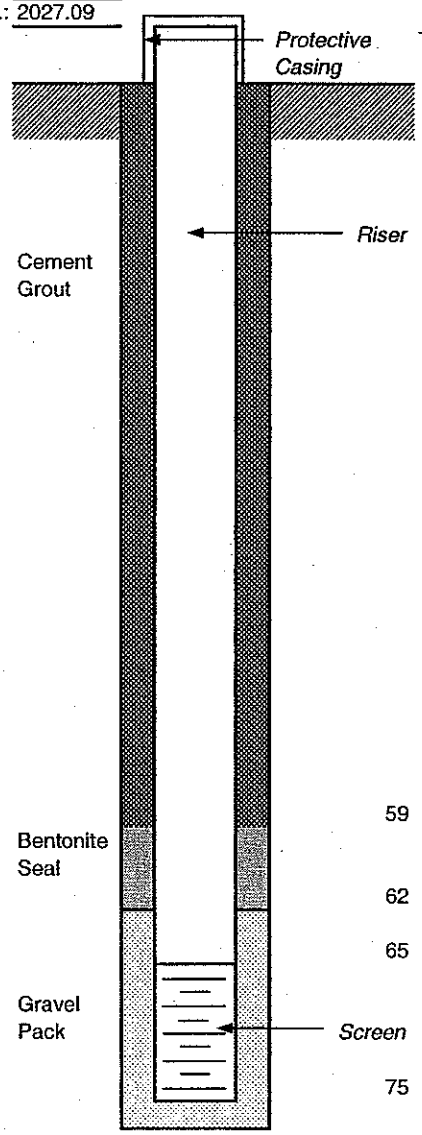
Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Recover (inches)	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
5	1	50/3	3.5-5	0	NA	-No recovery		
10	2	41-50/5	8.5-10	11	NA	Dry, tan/white, silty SAND (PWR) -Hard augerring		
15	3	50/4	13.5-15	0	NA	-No recovery		
20	4	50/5	18.5-20	5	NA	Dry, tan/white, silty SAND (PWR)		
25						**Auger Refusal at 23' bls** Boring completed with Air Rotary Boring terminated at water bearing fracture at 75' bls.		
30								
35								
40								
45								
50								
55								
60								
65								

CDM

WELL CONSTRUCTION SUMMARY

Project: Buncombe County Phase IV C&D Landfill Exp. Location: BCSWM Facility, Alexander, North Carolina

Well No.: **B-606**
TOC elev.: 2027.09



Type: *Type I Piezometer*

DRILLING SUMMARY

Drilling Company:	Reuben Caldwell	Drillers:	Billie Nash
Drill Rig/Model:	Schramm		
Borehole Diameters:	6 in	Drilling Fluid:	Air
Bits:	6-inch Air Hammer		
Total Depth:	75 ft.	Depth To Water:	73.61 ft. btoc (static)
Geologist:	Brian Goodman		

WELL DESIGN

Casing Material:	Schedule 40 PVC	Diameter:	2-in.
Screen Size:	10 ft.	Diameter:	2-in.
Slot Size:	0.010-in.	Setting:	65 to 75 ft. bls
Filter Material:	#2 Filter Sand	Setting:	62 to 75 ft. bls
Seal Material:	3/8 in. bentonite pellet	Setting:	59 to 62 ft. bls
Grout:	type I portland cement	Setting:	0 to 59 ft. bls
Surface Casing Material:	Above Grade Steel		

TIME LOG

	Started	Completed
Drilling:	10/6/2004	10/6/2004
Installation:	10/6/2004	10/6/2004
Development:	10/8/2004	10/8/2004

CDM

LOG OF BORING

BORING **B-609**

Project Buncombe Phase IV C&D Exp. Location Alexander, North Carolina

Date Drilled 12-Oct-04 Drilling Co.: MDI, Inc./Reuben Caldwell Drilling, Inc.

Total Depth 80 ft. bls Method Used: 4.25" ID Hollow Stem Auger/6" Air Rotary Job #: 6447-

Inspector Brian Goodman Water elev: 68 ft (0 hr)

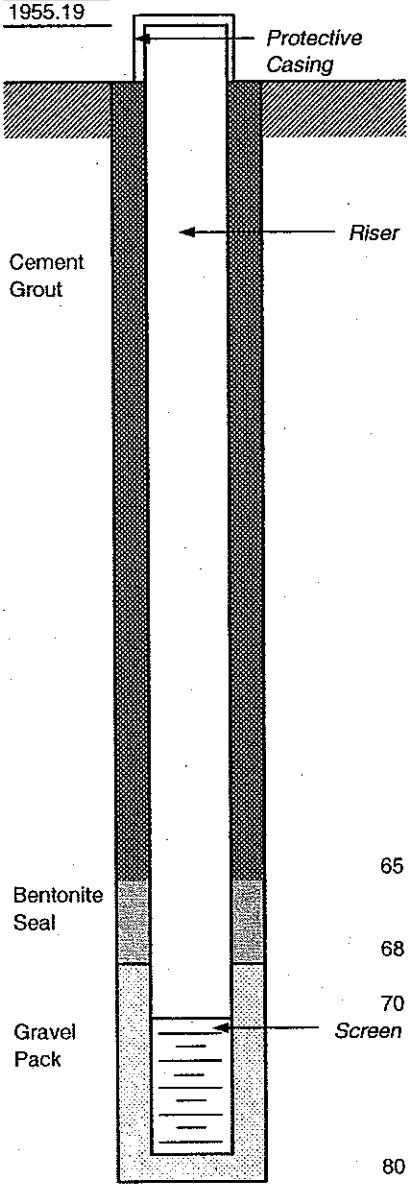
Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Recover (inches)	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
5	1	8/5/4	3.5-5	18	NA	-Moist, tan, silty fine sand saprolite (SPT= 0.5 kg/cm^2)		
10	2	27-50/4	8.5-10	10	NA	-Slightly moist, green/brown, micaceous silty sand saprolite - transition to PWR		
15						**Auger Refusal at 11.5' bls** Boring completed with Air Rotary Boring terminated at water bearing fracture at 80' bls.		
20								
25								
30								
35								
40								
45								
50								
55								
60								
65								

CDM

WELL CONSTRUCTION SUMMARY

Project: Buncombe County Phase IV C&D Landfill Exp. Location: BCSWM Facility, Alexander, North Carolina

Well No.: **B-609**
TOC elev.: 1955.19



Type: *Type I Piezometer*

DRILLING SUMMARY

Drilling Company:	Reuben Caldwell	Drillers:	Billie Nash
Drill Rig/Model:	Schramm		
Borehole Diameters:	6 in	Drilling Fluid:	Air
Bits:	6-inch Air Hammer		
Total Depth:	80 ft.	Depth To Water:	33.36 ft. btoc (static)
Geologist:	Brian Goodman		

WELL DESIGN

Casing Material:	Schedule 40 PVC	Diameter:	2-in.
Screen Size:	10 ft.	Diameter:	2-in.
Slot Size:	0.010-in.	Setting:	70 to 80 ft. bls
Filter Material:	#2 Filter Sand	Setting:	68 to 80 ft. bls
Seal Material:	3/8 in. bentonite pellet	Setting:	65 to 68 ft. bls
Grout:	type I portland cement	Setting:	0 to 65 ft. bls
Surface Casing Material:	Above Grade Steel		

AIR DRILLING TIME LOG

	Started	Completed
Drilling:	10/6/2004	10/6/2004
Installation:	10/6/2004	10/6/2004
Development:	10/8/2004	10/8/2004

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

614

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 2043.8
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 42
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 42
Drilling Date: Start: 6/2/2008 **End:** 6/10/2008
Development Method: None
Borehole Coordinates:
Field Screening Instrument: None
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								2043.8	Protective Casing *Ground Surface*
SS	S-1		WOH WOH 2 3	24/16	ML	Dry, very soft, brown, SILT, little sand.		0	Type II Portland Cement
SS	S-2		5 5 7 10	24/24		Dry, stiff, brown, SILT, little sand.		2038.8 5	
						Dry, stiff, light gray and orange mottled, SILT, some sand, little clay. **-RESIDUAL SOIL-**			
SS	S-3		50/6"	6/6	PWR	Dry, very dense, light gray, fine to medium SAND, little silt. **-PARTIALLY WEATHERED ROCK-**		2033.8 10	
						Auger refusal at 11.5 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		2028.8 15	
								2023.8	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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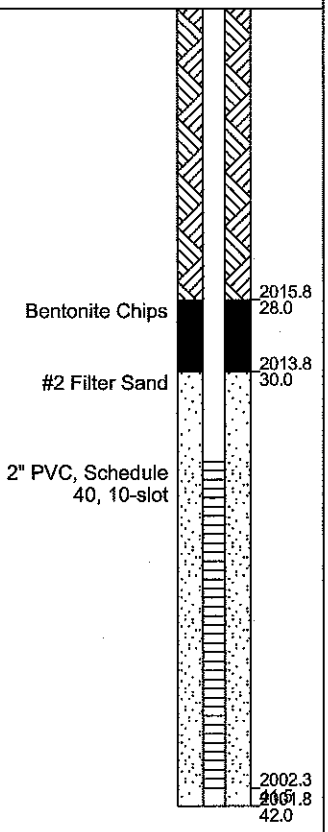
BORING LOG& MONITORING WELL DETAIL

614

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								2023.8	
								20	
								2018.8	
								25	
								2013.8	
								30	
								2008.8	
								35	
								2003.8	
								40	
								1998.8	
								45	
								1993.8	
								50	
								1988.8	
								55	
								1983.8	



MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

615

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 2021.6
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 51.25
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 33.5
Drilling Date: Start: 6/4/2008 **End:** 6/12/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								2021.6	Protective Casing *Ground Surface*
SS	S-1		5 8 8 9	24/10	SW	Dry, medium dense, brown, fine to coarse SAND, some silt, trace gravel. Relict rock fabric visible. **-RESIDUAL SOIL-**		0	Type II Portland Cement
SS	S-2		5 7 9 9	24/24	SM	Dry, medium dense, light gray/brown/black mottled, fine to medium SAND, some silt.		2016.6 5	
SS	S-3		14 20 21 31	24/18	SW	Dry, dense, light to dark gray/reddish brown mottled, fine to coarse SAND, some silt.		2011.6 10	
ST SS	T-1 S-4		5 3 5 8	24/12 24/24	SM	Dry, loose, yellowish brown, fine to medium SAND, some silt.		2006.6 15	
					SW	Dry, loose, light to dark gray/reddish brown mottled, fine to coarse SAND, some silt.			
SS	S-5		50/4"	4/4	PWR	Dry, very dense, gray, GRAVEL, some		2001.6	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Shelby Tube from 13.5 to 15.5 feet below ground surface.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

615

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
					PWR	sand, little silt. **-PARTIALLY WEATHERED ROCK-** Auger refusal at 21.5 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		2001.6 20 1996.6 25 1991.6 30 1986.6 35 1981.6 40 1976.6 45 1971.6 50 1966.6 55 1961.6	Bentonite Chips #2 Filter Sand 2" PVC, Schedule 40, 10-slot 1983.6 38.0 1981.6 40.0 1970.9 51.3

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

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BORING LOG& MONITORING WELL DETAIL

616

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 1981.5
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 31
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 12
Drilling Date: Start: 6/2/2008 **End:** 6/11/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1981.5	Protective Casing *Ground Surface*
SS	S-1		1 1 1 2	24/18	ML-SM	Moist, very soft to soft, brown, SILT and fine SAND, trace clay. A few roots.		0	Type II Portland Cement
ST	T-1			24/24					
SS	S-2		1 9 18 32	24/24		Moist, very stiff, brown, SILT and fine SAND, trace clay.		1976.5 5	
					SM	Dry, medium dense, gray and orange, fine SAND, some silt.			
SS	S-3		16 20 50/4"	16/15				1971.5 10	
					PWR	Dry, very dense, light to dark gray mottled, fine to coarse SAND, little silt. **-PARTIALLY WEATHERED ROCK-**			
						Auger refusal at 12.0 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		1966.5 15	Bentonite Chips 1963.0 18.5
								1961.5	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Shelby Tube from 2.5 to 4.5 feet below ground surface.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

616

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1961.5	
								20	#2 Filter Sand 2" PVC, Schedule 40, 10-slot 1961.0 20.5
								1956.5 25	
								1951.5 30	1951.0 30.5 31.0
								1946.5 35	
								1941.5 40	
								1936.5 45	
								1931.5 50	
								1926.5 55	
								1921.5	

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

617

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 2005.4
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 61
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 45
Drilling Date: Start: 6/2/2008 **End:** 6/12/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
								2005.4 *Ground Surface*	Protective Casing
SS	S-1		1 5 15 25	24/17	SW	Dry, medium dense, gray/black/yellow mottled, fine to coarse SAND, little silt, trace gravel.		0	Type II Portland Cement
SS	S-2		17 35 50/6"	18/18		Dry, very dense, gray/black/yellow mottled, fine to coarse SAND, little gravel, trace silt.		2000.4 5	
SS	S-3		17 49 50/3"	15/15	PWR	Dry, very dense, gray/orange mottled, fine to coarse SAND, little gravel, trace silt. **-PARTIALLY WEATHERED ROCK-**		1995.4 10	
SS	S-4		50/3"	3/3		Dry, very dense, dark gray and black, GRAVEL, some sand. Auger refusal at 13.5 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		1990.4 15	
								1985.4	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

617

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1985.4	
								20	
								1980.4	
								25	
								1975.4	
								30	
								1970.4	
								35	
								1965.4	
								40	
								1960.4	
								45	
								1955.4	Bentonite Chips 1958.4 / 47.0; #2 Filter Sand 1956.4 / 49.0; 2" PVC, Schedule 40, 10-slot
								50	
								1950.4	
								55	
								1945.4	

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

617

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1945.4 60	1944.9 60.5 1944.4 61.0
								1940.4 65	
								1935.4 70	
								1930.4 75	
								1925.4 80	
								1920.4 85	
								1915.4 90	
								1910.4 95	
								1905.4	

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

618

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 1985.5
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 50
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 45
Drilling Date: Start: 6/4/2008 **End:** 6/12/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
									Protective Casing
								1985.5	*Ground Surface*
SS	S-1		3 4 5 6	24/14	ML	Moist, stiff, orangish brown, SILT, some sand, few roots. Relict fabric visible.		0	Type II Portland Cement
					SM	**-RESIDUAL SOIL-** Dry, loose, light brown, fine to medium SAND, some silt.			
SS	S-2		5 6 8 9	24/16		Dry, medium dense, white/light gray/orange mottled, fine to medium SAND, some silt.		1980.5 5	
ST	T-1			24/24					
SS	S-3		4 5 6 10	24/16		Dry, medium dense, white/light gray/orange mottled, fine to medium SAND, some silt.		1975.5 10	
SS	S-4		6 13 21 26	24/15		Dry, dense, gray, fine to coarse SAND, little silt.		1970.5 15	
SS	S-5		50/3"	3/3	PWR	Dry, very dense, gray and brown, fine to		1965.5	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Shelby Tube from 7 to 9 feet below ground surface.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

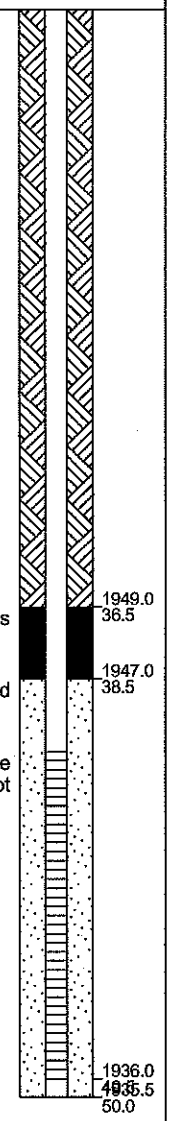
BORING LOG& MONITORING WELL DETAIL

618

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
					PWR	coarse SAND, little silt, trace gravel. **-PARTIALLY WEATHERED ROCK-**		1965.5 20	
SS	S-6		12 13 50/5"	17/17		Dry, very dense, gray and brown, fine to coarse SAND, little silt, trace gravel.		1960.5 25	
						Auger refusal at 29 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		1955.5 30	
								1950.5 35	
								1945.5 40	
								1940.5 45	
								1935.5 50	
								1930.5 55	
								1925.5	



M:\W C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

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BORING LOG& MONITORING WELL DETAIL

619S

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: Reuben Caldwell Drilling
Drilling Method/Rig: Air Rotary 6" OD/Schramm T450
Drillers: Billy Nash
Drilling Date: Start: 6/10/2008 **End:** 6/10/2008
Borehole Coordinates:
N E
Development Date: Start End

Surface Elevation (ft.): 1963.5
Total Depth (ft.): 14
Depth to Initial Water Level (ft. BGS): 10
Development Method:
Field Screening Instrument:
Logged By: D. Caldwell
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1963.5	Protective Casing; Ground Surface
					AUGER	See 619D for soil and bedrock profile information.		0	Type II Portland Cement
								1958.5 5	Bentonite Chips 1961.5 2.0; 1959.5 4.0
								1953.5 10	#2 Filter Sand 2" PVC, Schedule 40, 10-slot; 1950.0 13.5; 1949.5 14.0
								1948.5 15	
								1943.5	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Shallow well of nested pair.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

619D

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 1963.4
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 30
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 12
Drilling Date: Start: 6/3/2008 **End:** 6/10/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
								1963.4	Protective Casing *Ground Surface*
					AUGER	No sample at surface. Material was moved into place by bulldozer while clearing area.		0	Type II Portland Cement
SS	S-1		3 6 8 9	24/24	ML	Moist, stiff, brown, SILT, some sand, trace gravel. **-RESIDUAL SOIL-**		1958.4 5	
SS	S-2		14 9 10 14	24/24		Dry, medium dense, brown/gray/orange mottled, fine to coarse SAND, little gravel and silt. Relict rock fabric visible.		1953.4 10	
~~SS~~	~~S-3~~		~~50/1"~~	~~1/0~~	PWR	No sample recovery. **-PARTIALLY WEATHERED ROCK-** Auger refusal at 14.5 feet below ground surface.		1948.4 15	Bentonite Chips 1948.4 15.0
NQ	C-1		1:10 1:00 1:00 1:10 2:00	60/53	GNEISS	**RUN 1: 15.5 to 20.5 feet below ground surface** REC = 88%, RQD = 56% Hard, fresh to completely weathered, gray/pink/black, aphanitic to coarse, UNDIFFERENTIATED GNEISS; heavily foliated, horizontal to moderately		1943.4	#2 Filter Sand 1946.4 17.0

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Deep well of nested pair.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

619D

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1943.4	
			1:00			GNEISS dipping, extremely close; joint set horizontal, very close to moderate, rough, stepped, open.		20	2" PVC, Schedule 40, 10-slot
			1:00			**RUN 2: 20.5 to 25.5 feet below ground surface**			
NQ	C-2		1:10	60/57		REC = 95%, RQD = 85%			
			1:05			Hard, fresh to completely weathered, gray/black, aphanitic to coarse, UNDIFFERENTIATED GNEISS; heavily foliated, horizontal to moderately dipping, extremely close; joint set horizontal, very close to moderate, rough, stepped, open.		1938.4 25	
			1:30			Continued into bedrock with Air Rotary to first water bearing fracture.		1933.4 30	1933.9 1933.4 30.0
								1928.4 35	
								1923.4 40	
								1918.4 45	
								1913.4 50	
								1908.4 55	
								1903.4	

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

620

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 1937.9
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 51.5
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 48
Drilling Date: Start: 6/3/2008 **End:** 6/11/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1937.9	Protective Casing *Ground Surface*
SS	S-1		1 2 2 3	24/12	SM	Moist, very loose to loose, brown, fine to coarse SAND, some silt.		0	Type II Portland Cement
						Auger refusal at 3.5 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		1932.9 5	
								1927.9 10	
								1922.9 15	
								1917.9	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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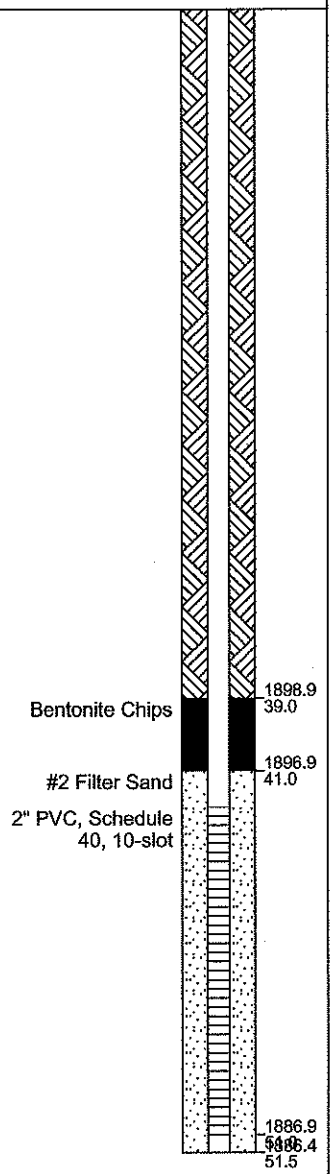
BORING LOG& MONITORING WELL DETAIL

620

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1917.9	
								20	
								1912.9	
								25	
								1907.9	
								30	
								1902.9	
								35	
								1897.9	
								40	
								1892.9	
								45	
								1887.9	
								50	
								1882.9	
								55	
								1877.9	



MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

621

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 1972.5
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 45
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 35
Drilling Date: Start: 6/3/2008 **End:** 6/11/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
								1972.5	Protective Casing; *Ground Surface*
SS	S-1		4 5 6 6	24/16	SM	Dry, medium dense, brown/orange/black mottled, fine to coarse SAND, some silt. Relict rock fabric visible **-RESIDUAL SOIL-**		0	Type II Portland Cement
SS	S-2		9 16 50/4"	16/16	PWR	Dry, very dense, brown/orange/black mottled, fien to medium SAND, some silt. **-PARTIALLY WEATHERED ROCK-**		1967.5 5	
SS	S-3		50/6"	6/6		Dry, very dense, gray/red/black mottled, fine to medium SAND, little silt.		1962.5 10	
						Auger refusal at 11.5 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		1957.5 15	
								1952.5	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

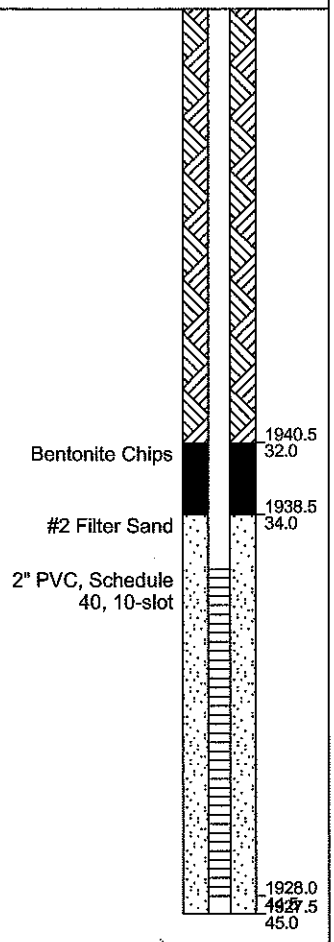
BORING LOG& MONITORING WELL DETAIL

621

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1952.5	
								20	
								1947.5	
								25	
								1942.5	
								30	
								1937.5	
								35	
								1932.5	
								40	
								1927.5	
								45	
								1922.5	
								50	
								1917.5	
								55	
								1912.5	



MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

622

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 2003.1
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 46
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 14.5
Drilling Date: Start: 6/4/2008 **End:** 6/18/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell & D. Forbes
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								2003.1	Protective Casing *Ground Surface*
~~SS~~	~~S-1~~		2 3	~~24/17~~	SM	Dry, loose, brown, fine to coarse SAND, some silt, trace gravel, few roots.		0	Type II Portland Cement
~~ST~~	~~T-1~~		3 3	~~24/24~~					
SS	S-2		4 10 8 7	24/20		Moist, medium dense, brown/yellow mottled, fine to coarse SAND, some silt, little gravel. **-RESIDUAL SOIL-**		1998.1 5	
~~SS~~	~~S-3~~		~~50/5"~~	~~5/5~~	PWR	Dry, very dense, gray/black/orange mottled, fine to coarse SAND, little silt, trace gravel. **-PARTIALLY WEATHERED ROCK-**		1993.1 10	
						Auger refusal at 12 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		1988.1 15	
								1983.1	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Shelby Tube from 1 to 3 feet below ground surface.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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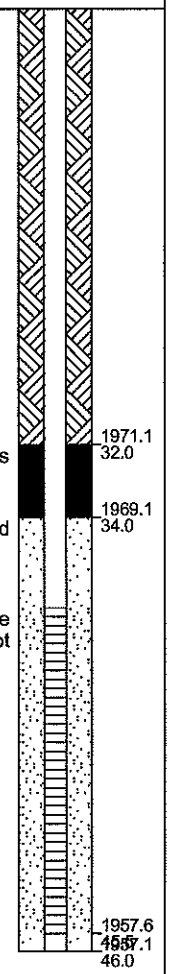
BORING LOG& MONITORING WELL DETAIL

622

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1983.1 20	
								1978.1 25	
								1973.1 30	
						6" Fracture at 31 feet			
						6" Fracture at 34 feet		1968.1 35	
						Fracture present from 39 to 41 feet		1963.1 40	
								1958.1 45	
								1953.1 50	
								1948.1 55	
								1943.1	



MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

623

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 2025.2
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 99
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 84.6
Drilling Date: Start: 6/5/2008 **End:** 6/13/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								2025.2	Protective Casing *Ground Surface*
~~SS~~ ~~ST~~	~~S-1~~ ~~T-1~~		1 3 5 4	~~24/16~~ ~~24/18~~	SM	Moist, loose, brown, fine to medium SAND, some silt.		0	Type II Portland Cement
SS	S-2		4 4 5 6	24/24		Moist, loose, reddish brown, fine SAND, some silt, micaceous. Relict rock fabric visible. **-RESIDUAL SOIL-**		2020.2 5	
SS	S-3		6 7 7 12	24/24		Moist, medium dense, yellow/black/gray mottled, fine SAND, some silt.		2015.2 10	
SS	S-4		8 19 21 34	24/20		Moist, dense, gray/reddish brown/black mottled, fine to medium SAND, some silt.		2010.2 15	
			16 26			Dry, very dense, white/gray/yellow		2005.2	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Shelby Tube from 1 to 3 feet below ground surface.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG & MONITORING WELL DETAIL

623

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								2005.2	
SS	S-5		35 50/5"	23/22	PWR	mottled, fine to medium SAND, some silt. **-PARTIALLY WEATHERED ROCK-**		20	
SS	S-6		50/4"	5/5		Dry, very dense, white/gray/yellow mottled, fine to medium SAND, some silt.		2000.2 25	
SS	S-7		50/4"	4/2		Dry, very dense, black and white, fine to coarse SAND, some gravel, trace silt.		1995.2 30	
NQ	C-1		0:35 0:45 0:55 0:50 1:15	60/24	GNEISS	Auger refusal at 29.5 feet below ground surface. **RUN 1: 31.5 to 36.5 feet below ground surface** REC = 40%, RQD = 10% Moderately hard, slightly to completely weathered, white/black/gray, fine to medium grained UNDIFFERENTIATED GNEISS; foliated, horizontal to moderately dipping, very close to close; joint set horizontal, very close to close, rough, undulating, discolored to disintegrated, open.		1990.2 35	
NQ	C-2		1:00 1:15 1:15 1:00 0:55	60/41		**RUN 2: 36.5 to 41.5 feet below ground surface** REC = 68%, RQD = 37% Moderately hard, slightly to completely weathered, white/black/gray, fine to medium grained UNDIFFERENTIATED GNEISS; foliated, horizontal to moderately dipping, very close to close; joint set horizontal, very close to close, rough, undulating, discolored to disintegrated, open. Continued into bedrock with Air Rotary to first water bearing fracture.		1985.2 40	
								1980.2 45	
								1975.2 50	
								1970.2 55	
								1965.2	

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

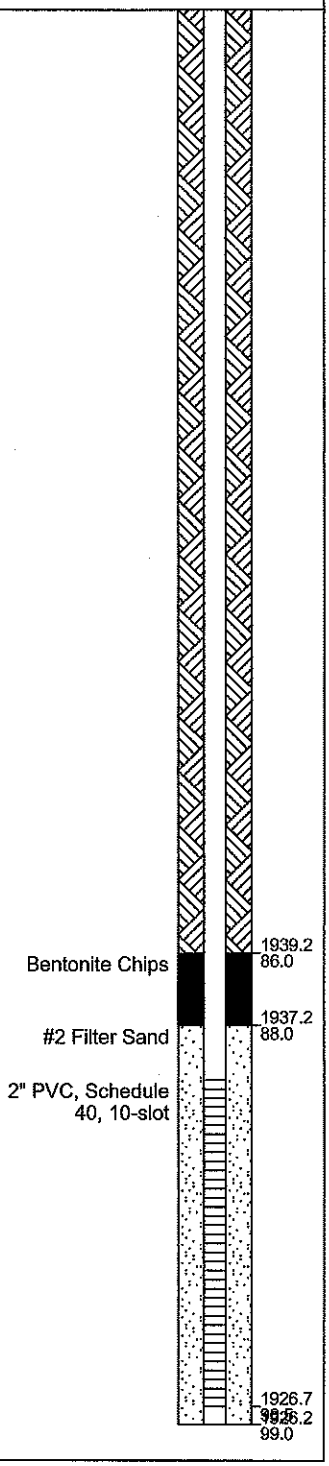
BORING LOG& MONITORING WELL DETAIL

623

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1965.2	
								60	
								1960.2	
								65	
								1955.2	
								70	
								1950.2	
								75	
								1945.2	
								80	
								1940.2	
								85	
								1935.2	
								90	
								1930.2	
								95	
								1925.2	



MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

624S

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: Reuben Caldwell Drilling
Drilling Method/Rig: Air Rotary 6" OD/Schramm T450
Drillers: Billy Nash
Drilling Date: Start: 6/18/2008 **End:** 6/18/2008
Borehole Coordinates:
N E
Development Date: Start End

Surface Elevation (ft.): 1977.2
Total Depth (ft.): 20
Depth to Initial Water Level (ft. BGS):
Development Method:
Field Screening Instrument:
Logged By: D. Caldwell & D. Forbes
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1977.2 0	Protective Casing; Ground Surface
						See 624D for soil profile information.		1972.2 5	Type II Portland Cement
								1967.2 10	Bentonite Chips 1971.2 6.0; #2 Filter Sand 1969.2 8.0; 2" PVC, Schedule 40, 10-slot
								1962.2 15	
								1957.2	1957.7 1957.2

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Shallow well of nested pair.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

624S

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1957.2 20	20.0
								1952.2 25	
								1947.2 30	
								1942.2 35	
								1937.2 40	
								1932.2 45	
								1927.2 50	
								1922.2 55	
								1917.2	

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

624D

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 1977.1
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 40
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 33.2
Drilling Date: Start: 6/5/2008 **End:** 6/18/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell & D. Forbes
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
								1977.1	Protective Casing; *Ground Surface*
SS	S-1		1 1 5 3	24/18	SM	Moist, loose, reddish brown, fine to coarse SAND, some silt, trace gravel.		0	Type II Portland Cement
SS	S-2		16 50/4"	16/12	PWR	Dry, very dense, orange/brown mottled, fine to coarse SAND, some gravel, little silt. Relict rock fabric visible. **-PARTIALLY WEATHERED ROCK-**		1972.1 5	
~~SS~~	~~S-3~~		~~50/1"~~	~~1/1~~		A few rock fragments recovered.		1967.1 10	
						Auger refusal at 9.5 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		1962.1 15	
								1957.1	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Deep well of nested pair.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

624D

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1957.1	
								20	
						Soft zone/fracture from 23 to 25 feet		1952.1 25	
						Soft zone/fracture from 27 to 28 feet		1947.1 30	Bentonite Chips 1951.1 26.0 #2 Filter Sand 1949.1 28.0 2" PVC, Schedule 40, 10-slot
						Large fracture from 33 to 37 feet producing good water		1942.1 35	
								1937.1 40	1937.6 1937.1 40.0
								1932.1 45	
								1927.1 50	
								1922.1 55	
								1917.1	

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

625

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 2051.9
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 62
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 47.5
Drilling Date: Start: 6/9/2008 **End:** 6/13/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
								2051.9	Protective Casing *Ground Surface*
					AUGER	No sample at surface. Material was moved into place by bulldozer while clearing area.		0	Type II Portland Cement
SS	S-1		10 50/4"	16/14	SM PWR	Dry, very dense, brown, fine to coarse SAND, little gravel and silt. **-RESIDUAL SOIL-**		2046.9 5	
						Dry, very dense, brownish gray, fine to coarse SAND, littel gravel and silt. **-PARTIALLY WEATHERED ROCK-** Auger refusal at 7.5 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		2041.9 10	
								2036.9 15	
								2031.9	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

625

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								2031.9	
								20	
								2026.9	
								25	
								2021.9	
								30	
								2016.9	
								35	
								2011.9	
								40	
								2006.9	
								45	
								2001.9	Bentonite Chips 2002.4 / 49.5
								50	#2 Filter Sand 2" PVC, Schedule 40, 10-slot 2000.4 / 51.5
								1996.9	
								55	
								1991.9	

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

625

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1991.9 60	1990.9 1990.4 61.5
								1986.9 65	
								1981.9 70	
								1976.9 75	
								1971.9 80	
								1966.9 85	
								1961.9 90	
								1956.9 95	
								1951.9	

CAMP DRESSER & McKEE

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BORING LOG& MONITORING WELL DETAIL

626

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 1979.7
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 57
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 46.7
Drilling Date: Start: 6/9/2008 **End:** 6/17/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell & D. Forbes
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1979.7	Protective Casing *Ground Surface*
SS	S-1		2 3 2 3	24/16	SM	Moist, loose, brown, fine to medium SAND, some silt, trace gravel.		0	Type II Portland Cement
						Dry, loose, orangish brown, fine to coarse SAND, some silt. Relict rock fabric visible.			
SS	S-2		9 9 11 15	24/18		**-RESIDUAL SOIL-** Dry, medium dense, orangish brown, fine to coarse SAND, some silt.		1974.7 5	
						Auger refusal at 7.5 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		1969.7 10	
								1964.7 15	
								1959.7	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

626

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1959.7	
								20	
								1954.7 25	
								1949.7 30	
								1944.7 35	
								1939.7 40	
						Fracture from 46 to 51 feet, sediment filled, producing water		1934.7 45	Bentonite Chips 1936.7 43.0; #2 Filter Sand 1934.7 45.0; 2" PVC, Schedule 40, 10-slot; 1923.2 1922.7 57.0
								1929.7 50	
								1924.7 55	
								1919.7	

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

627S

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: Reuben Caldwell Drilling
Drilling Method/Rig: Air Rotary 6" OD/Schramm T450
Drillers: Billy Nash
Drilling Date: Start: 6/6/2008 **End:** 6/17/2008
Borehole Coordinates:
N E
Development Date: Start End

Surface Elevation (ft.): 1880.1
Total Depth (ft.): 18
Depth to Initial Water Level (ft. BGS): 4.9
Development Method:
Field Screening Instrument:
Logged By: D. Caldwell & D. Forbes
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
								1880.1	Protective Casing; Ground Surface
					AUGER	See 627D for soil and bedrock profile information.		0	Type II Portland Cement
								1875.1 / 5	
								1870.1 / 10	Bentonite Chips 1871.1 / 9.0
								1869.1 / 11.0	#2 Filter Sand
								1865.1 / 15	2" PVC, Schedule 40, 10-slot
								1862.6	
								1862.1 / 18.0	
								1860.1	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

Shallow well of nested pair.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

627D

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 1880.3
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 124
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 6.5
Drilling Date: Start: 6/17/2008 **End:** 6/17/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell & D. Forbes
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1880.3	Protective Casing *Ground Surface*
~~SS~~	~~S-1~~		4 6 4 4	~~24/6~~	SM	Moist, loose to medium dense, brown, fine to coarse SAND, some silt, little gravel.		0	Type II Portland Cement
ST				30/30					
SS	S-2		5 8 6 5	24/18		Moist, medium dense, brown, fine to coarse SAND, some silt, little gravel.		1875.3 5	
SS	S-3		12 50/4"	10/10	PWR	Moist, very dense, black/brown mottled, fine to medium SAND, some silt.		1870.3 10	
						Auger refusal 11 feet below ground surface.			
NQ	C-1		1:45 1:55 2:25 2:15 2:55	60/60	GNEISS	Hard, fresh to completely weathered, light to dark gray, fine to medium grained, UNDIFFERENTIATED GNEISS; heavily foliated, high angle, extremely close; joint set horizontal to low angle, extremely close to close, rough, stepped, fresh to disintegrated, open.		1865.3 15	
NQ	C-2		1:15 1:15 1:10 1:20	60/48		Hard, fresh to completely weathered, light to dark gray, fine to medium grained, UNDIFFERENTIATED GNEISS; heavily foliated, high angle, extremely close; joint set low to high		1860.3	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Deep well of nested pair.

Shelby Tube from 1 to 3.5 feet below ground surface.

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

627D

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
			1:20			GNEISS angle, extremely close to close, rough, stepped, fresh to disintegrated, open. Continued into bedrock with Air Rotary to first water bearing fracture.		1860.3 20 1855.3 25 1850.3 30 1845.3 35 1840.3 40 1835.3 45 1830.3 50 1825.3 55 1820.3	

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

627D

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1820.3 60 1815.3 65 1810.3 70 1805.3 75 1800.3 80 1795.3 85 1790.3 90 1785.3 95 1780.3	

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

627D

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1780.3	
								100	
								1775.3 105	
								1770.3 110	Bentonite Chips 1770.3 110.0
									#2 Filter Sand 1768.3 112.0
								1765.3 115	2" PVC, Schedule 40, 10-slot
						Small fracture at 118 feet			
								1760.3 120	
									1756.8 1756.3 124.0
								1755.3 125	
								1750.3 130	
								1745.3 135	
								1740.3	

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

BORING LOG& MONITORING WELL DETAIL

628

Client: Buncombe County
Project Name: C&D Landfill Expansion
Project Location: Buncombe County Landfill, Asheville, NC
Project Number: 6447-65973

Drilling Contractor: A&E Drilling
Surface Elevation (ft.): 1987.9
Drilling Method/Rig: HSA 8.5" OD/CME 750x/Schram T450
Total Depth (ft.): 63.5
Drillers: Lee Brown/Billy Nash
Depth to Initial Water Level (ft. BGS): 54
Drilling Date: Start: 6/10/2008 **End:** 6/12/2008
Development Method:
Borehole Coordinates:
Field Screening Instrument:
N E
Logged By: D. Caldwell
Development Date: Start End
Top of Riser Elevation (ft.):

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
								1987.9	Protective Casing *Ground Surface*
SS	S-1		2 4 4 6	24/10	SM	Dry, loose, brown, fine to medium SAND, some gravel and silt.		0	Type II Portland Cement
SS	S-2		15 50/5"	17/10	PWR	Dry, very dense, brown and gray, fine to coarse SAND, some gravel and silt. Relict rock fabric visible. **-PARTIALLY WEATHERED ROCK-**		1982.9 5	
~~SS~~	~~S-3~~		~~50/3"~~	~~3/2~~				1977.9 10	
						Auger refusal at 11.5 feet below ground surface. Continued into bedrock with Air Rotary to first water bearing fracture.		1972.9 15	
								1967.9	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

CDM

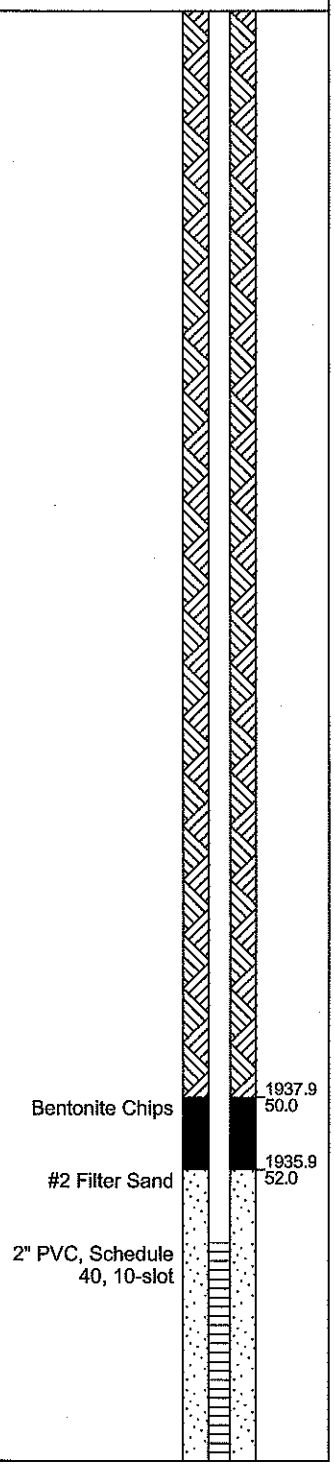
BORING LOG& MONITORING WELL DETAIL

628

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1967.9	
								20	
								1962.9	
								25	
								1957.9	
								30	
								1952.9	
								35	
								1947.9	
								40	
								1942.9	
								45	
								1937.9	
								50	
								1932.9	
								55	
								1927.9	



MW C&D EXPANSION.GPJ CDM_CORP.GDT 7/8/08

CAMP DRESSER & McKEE

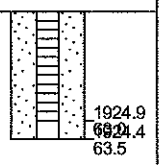
CDM

BORING LOG& MONITORING WELL DETAIL

628

Client: Buncombe County **Project Name:** C&D Landfill Expansion

Project Location: Buncombe County Landfill, Asheville, NC **Project Number:** 6447-65973

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								1927.9 60	
								1924.9 63.5	
								1922.9 65	
								1917.9 70	
								1912.9 75	
								1907.9 80	
								1902.9 85	
								1897.9 90	
								1892.9 95	
								1887.9	

Appendix B

Geotechnical Laboratory Data

Geotechnics

.....GEOTECHNICAL, GEOENVIRONMENTAL, AND GEOSYNTHETIC LABORATORIES

July 21, 2008

Project No. 2008-598-01

Mr. Mat Colone
CDM
5400 Glenwood Ave., Suite 300
Raleigh, NC 27612

Transmittal
Laboratory Test Results
Buncombe County C & D Landfill Expansion

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was faxed to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens which were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectively submitted,
Geotechnics, Inc.

Michael P. Smith
Regional Manager

We understand that you have a choice in your laboratory services and we thank you for choosing Geotechnics.

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Geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	CDM
Client Reference	BUNCOMBE CO. C&D LF EXP.
Project No.	2008-598-01

PG.1

Lab ID	.001	.002	.003	.004	.005
Boring No.	B-614	B-615	B-615	B-617	B-618
Depth (ft)	3.5-5.5	4-6	14-15	8.5-10	9-11
Sample No.	S-2	S-2	S-4T	S-3	S-3
Tare Number	250	213	203	P-12	200
Wt. of Tare & WS (gm)	222.43	224.44	237.7	257.19	229.34
Wt. of Tare & DS (gm)	216.62	219.6	228.33	254.55	223.33
Wt. of Tare (gm)	169.42	173.44	171.12	196.45	171.85
Wt. of Water (gm)	5.81	4.84	9.37	2.64	6.01
Wt. of DS (gm)	47.2	46.16	57.21	58.1	51.48
Water Content (%)	**12.3**	**10.5**	**16.4**	**4.5**	**11.7**

Lab ID	.006	.007	.008	.009	.010
Boring No.	B-618	B-619	B-619	B-619	B-620
Depth (ft)	24-26	4-5	5-6	9-11	0-2
Sample No.	S-6	S-1T	S-1B	S-2	S-1
Tare Number	212	215	202	214	208
Wt. of Tare & WS (gm)	204.52	224.13	283.68	236.93	216.14
Wt. of Tare & DS (gm)	201.83	216.91	275.01	229.01	210.06
Wt. of Tare (gm)	171.6	172.33	197.38	171.34	169.85
Wt. of Water (gm)	2.69	7.22	8.67	7.92	6.08
Wt. of DS (gm)	30.23	44.58	77.63	57.67	40.21
Water Content (%)	**8.9**	**16.2**	**11.2**	**13.7**	**15.1**

Notes : *NA*

Tested By *SD* *Date* *7/17/2008* *Checked By* *Date* 7-21-08

DCN: CT-S1 DATE 6-30-98 REVISION: 2

\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01 PG1 WATCONT.XLS]Sheet1

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Geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	CDM
Client Reference	BUNCOMBE CO. C&D LF EXP.
Project No.	2008-598-01

PG.2

Lab ID	.011	.012	.013	.014	.015
Boring No.	B-621	B-622	B-623	B-623	B-623
Depth (ft)	9-11	9-11	4-6	14-16	24-26
Sample No.	S-3	S-3	S-2	S-4	S-6
Tare Number	201	216	318	319	P-12
Wt. of Tare & WS (gm)	227.39	198.05	273.68	249.17	259.84
Wt. of Tare & DS (gm)	224.44	195.38	258.53	243.13	256.24
Wt. of Tare (gm)	170.76	170.79	207.63	208.98	196.42
Wt. of Water (gm)	2.95	2.67	15.15	6.04	3.6
Wt. of DS (gm)	53.68	24.59	50.9	34.15	59.82
Water Content (%)	**5.5**	**10.9**	**29.8**	**17.7**	**6.0**

Lab ID	.016	.017	.018	.019	.020
Boring No.	B-624	B-624	B-625	B-626	B-626
Depth (ft)	0-2	4-6	4-5	0-1	3-5
Sample No.	S-1	S-2	S-1T	S-1T	S-2
Tare Number	820	316	209	211	318
Wt. of Tare & WS (gm)	285.28	297.96	234.77	275.39	296.44
Wt. of Tare & DS (gm)	270.46	292.58	230.92	260.39	289.68
Wt. of Tare (gm)	208.06	208.13	171.71	171.18	207.59
Wt. of Water (gm)	14.82	5.38	3.85	15	6.76
Wt. of DS (gm)	62.4	84.45	59.21	89.21	82.09
Water Content (%)	**23.8**	**6.4**	**6.5**	**16.8**	**8.2**

Notes : *NA*

Tested By *SD* *Date* *7/17/2008* *Checked By* CEM *Date* 7-21-08

DCN: CT-S1 DATE 6-30-98 REVISION: 2

\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01 PG2 WATCONT.XLS]Sheet1

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Geotechnics
INTEGRITY IN TESTING

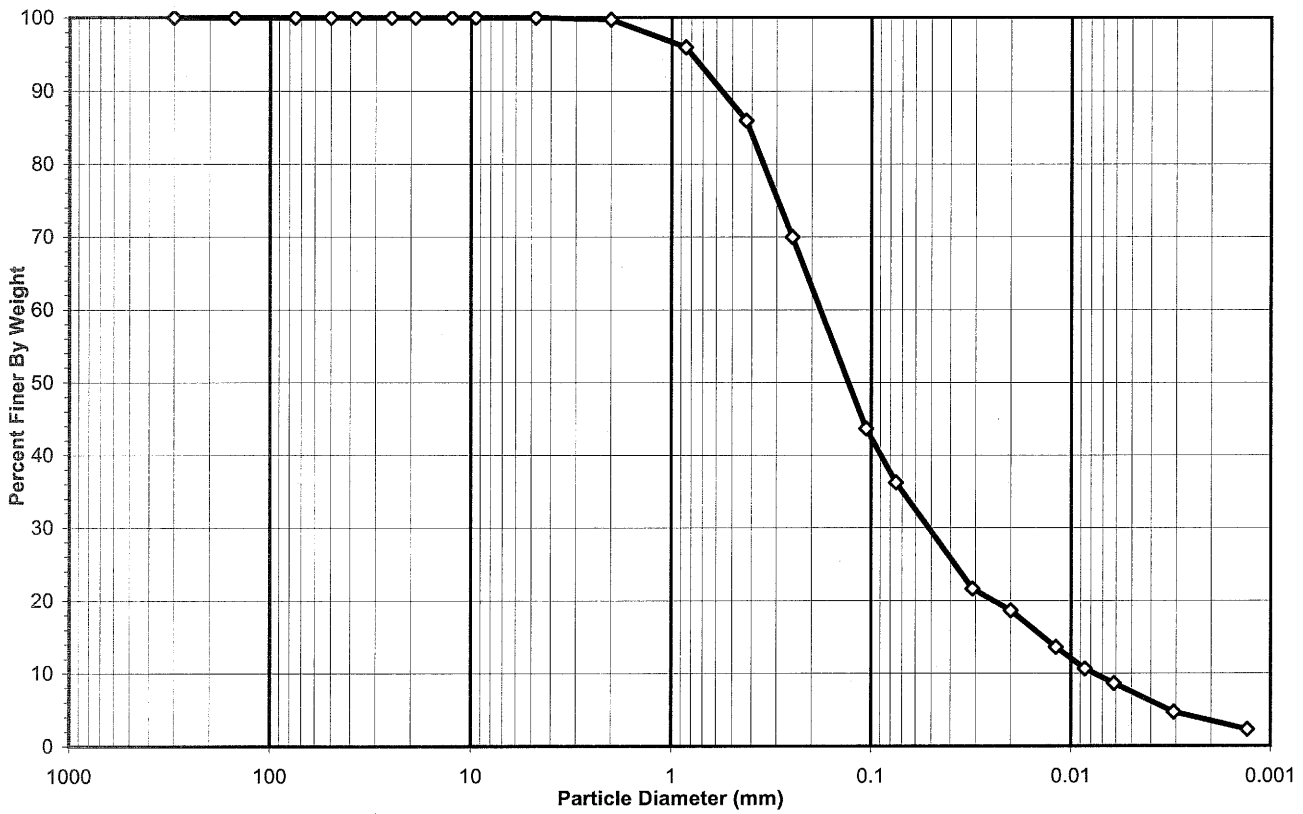
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-614
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3.5-5.5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-01	Soil Color	**LIGHT TAN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	63.78
Finer Than #200	*Silt & Clay*	36.22

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-01 #10 Split Hydro rev 8.xls]Sheet1*

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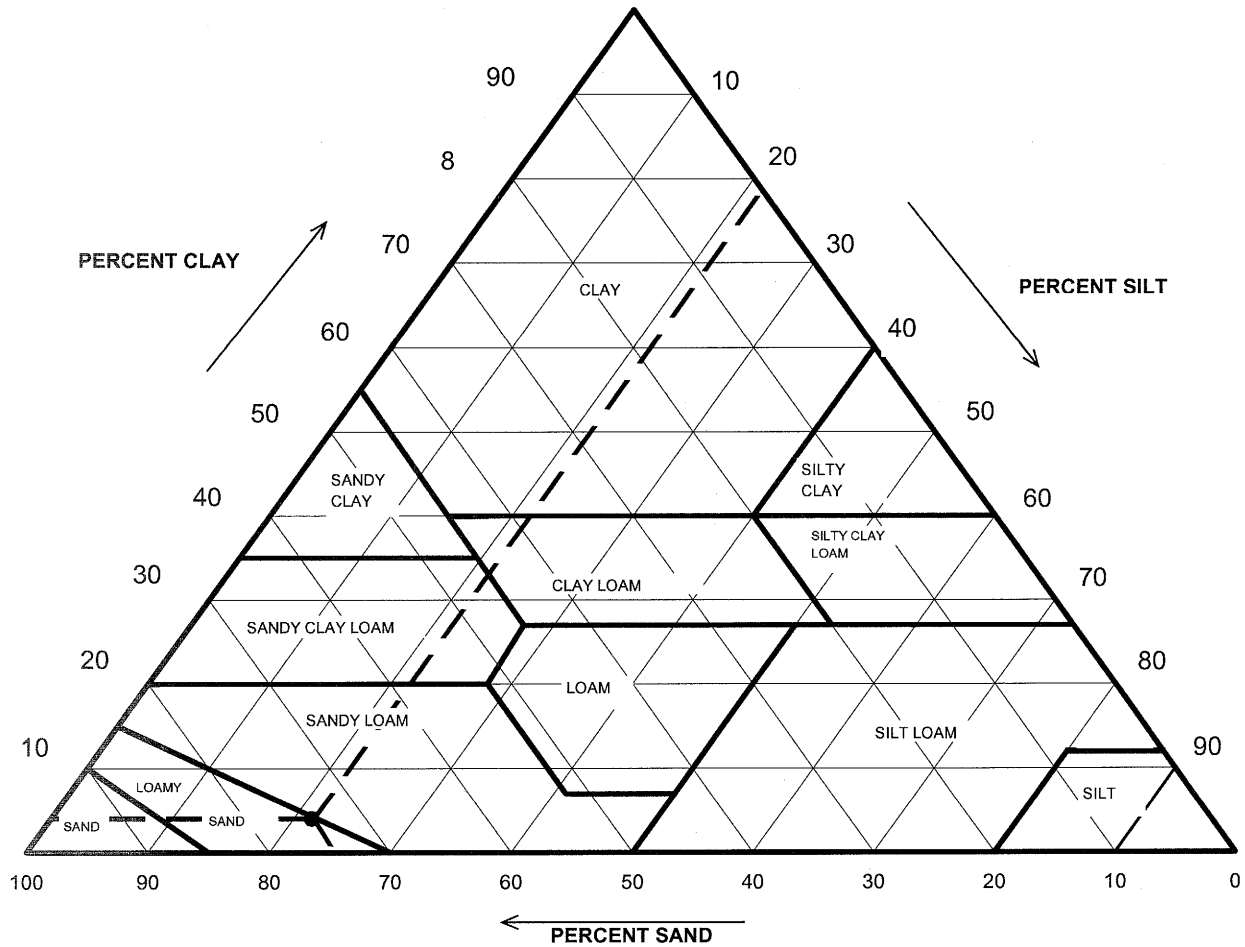
Geotechnics
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-614
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3.5-5.5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-01	Soil Color	LIGHT TAN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.25	**0.00**
2	99.75	*Sand*	74.27	**74.46**
0.05	25.47	*Silt*	21.46	**21.52**
0.002	4.01	*Clay*	4.01	**4.02**

USDA Classification: ***LOAMY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-01 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-614
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3.5-5.5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-01	Soil Color	**LIGHT TAN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	250	Tare No.	L-1
Wgt.Tare + Wet Soil (gm)	222.43	Wgt.Tare + Wet Soil (gm)	50.80
Wgt.Tare + Dry Soil (gm)	216.62	Wgt.Tare + Dry Soil (gm)	50.29
Weight of Tare (gm)	169.42	Weight of Tare (gm)	15.80
Weight of Water (gm)	5.81	Weight of Water (gm)	0.51
Weight of Dry Soil (gm)	47.20	Weight of Dry Soil (gm)	34.49
Moisture Content (%)	**12.3**	**Moisture Content (%)**	**1.5**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	53.01	Weight of the Dry Sample (gm)	145.74
Dry Weight +#10 Material(gm)	47.2	Weight of minus #200 material (gm)	35.78
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	109.96
Dry Weight Hydro. Material (gm)	98.54		
Total Dry Weight Sample (gm)	145.74	**J-FACTOR (%FINER THAN #10)**	**0.9975**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.12	0.25	0.25	99.75	**99.75**
#20	0.85	3.72	3.78	3.78	96.22	**95.98**
#40	0.425	9.93	10.08	13.85	86.15	**85.93**
#60	0.250	15.79	16.02	29.88	70.12	**69.95**
#140	0.106	25.96	26.34	56.22	43.78	**43.67**
#200	0.075	7.36	7.47	63.69	36.31	**36.22**
Pan	-	35.78	36.31	100.00	-	**-**

Notes :

Tested By SD Date 7/14/2008 Checked By GEM Date 7-16-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-01 #10 Split Hydro rev 8.xls]Sheet1*

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Geotechnics
INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-614
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3.5-5.5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-01	Soil Color	**LIGHT TAN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	25.0	25.0	25.5	3.35	21.6	21.7	0.01253	0.0309	**21.6**
5		22.0	25.5	3.35	18.6	18.7	0.01253	0.0200	**18.6**
15		17.0	25.5	3.35	13.6	13.7	0.01253	0.0119	**13.6**
30		14.0	25.5	3.35	10.6	10.7	0.01253	0.0086	**10.6**
60		12.0	25.5	3.35	8.6	8.7	0.01253	0.0061	**8.6**
250		8.0	25.5	3.35	4.6	4.6	0.01253	0.0031	**4.6**
1440		6.0	24.2	3.73	2.3	2.3	0.01272	0.0013	**2.3**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	98.54	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	99.75
Weight of Dry Material (gm)	98.54		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/11/2008 Checked By GAM Date 7-16-08

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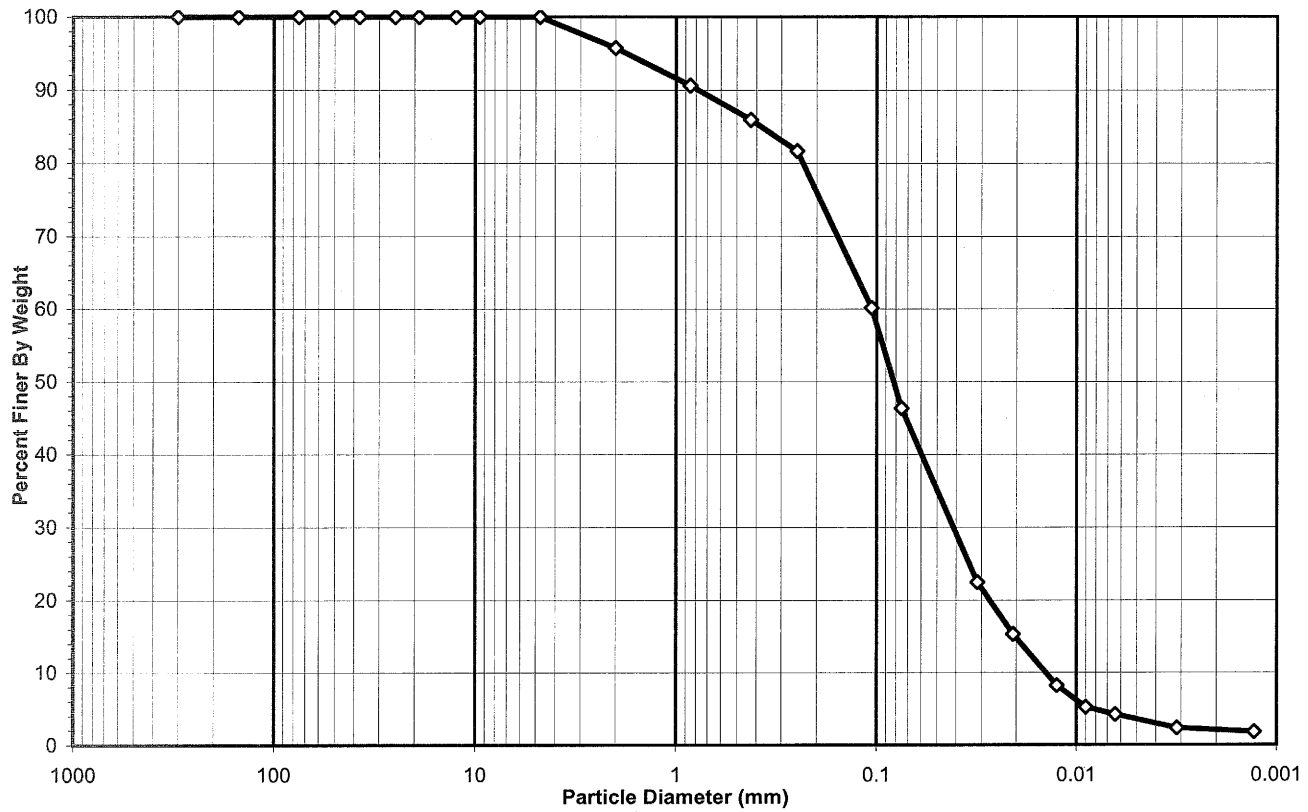
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-02	Soil Color	**LIGHT BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	53.66
Finer Than #200	*Silt & Clay*	46.34

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-02 #10 Split Hydro rev 8.xls]Sheet1*

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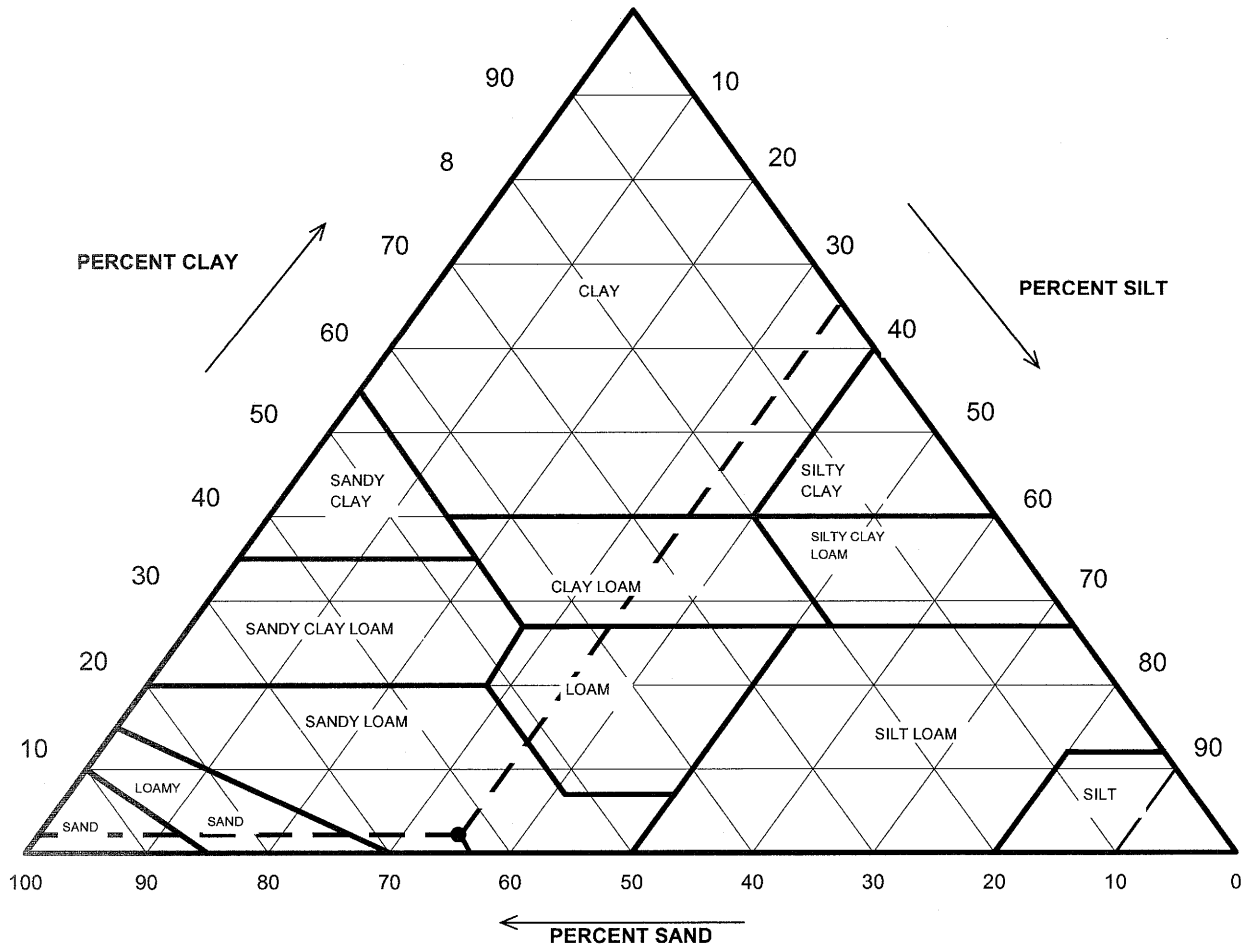
Geotechnics
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-02	Soil Color	LIGHT BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	4.25	**0.00**
2	95.75	*Sand*	60.54	**63.23**
0.05	35.21	*Silt*	33.16	**34.63**
0.002	2.05	*Clay*	2.05	**2.14**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-02 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-02	Soil Color	**LIGHT BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	213	Tare No.	R-1
Wgt.Tare + Wet Soil (gm)	224.44	Wgt.Tare + Wet Soil (gm)	55.23
Wgt.Tare + Dry Soil (gm)	219.60	Wgt.Tare + Dry Soil (gm)	52.51
Weight of Tare (gm)	173.44	Weight of Tare (gm)	15.65
Weight of Water (gm)	4.84	Weight of Water (gm)	2.72
Weight of Dry Soil (gm)	46.16	Weight of Dry Soil (gm)	36.86
Moisture Content (%)	**10.5**	**Moisture Content (%)**	**7.4**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	51.00	Weight of the Dry Sample (gm)	139.29
Dry Weight +#10 Material(gm)	46.2	Weight of minus #200 material (gm)	45.07
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	94.22
Dry Weight Hydro. Material (gm)	93.13		
Total Dry Weight Sample (gm)	139.29	**J-FACTOR (%FINER THAN #10)**	**0.9575**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	1.96	4.25	4.25	95.75	**95.75**
#20	0.85	4.99	5.36	5.36	94.64	**90.62**
#40	0.425	4.56	4.90	10.25	89.75	**85.93**
#60	0.250	4.14	4.45	14.70	85.30	**81.68**
#140	0.106	20.97	22.52	37.22	62.78	**60.12**
#200	0.075	13.40	14.39	51.61	48.39	**46.34**
Pan	-	45.07	48.39	100.00	-	-

Notes :

Tested By SD Date 7/16/2008 Checked By GBM Date 7-16-08

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Geotechnics
INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-02	Soil Color	**LIGHT BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	26.0	26.0	23.7	3.88	22.1	23.4	0.01279	0.0314	**22.4**
5		19.0	23.7	3.88	15.1	16.0	0.01279	0.0208	**15.3**
15		12.0	23.7	3.88	8.1	8.6	0.01279	0.0125	**8.2**
30		9.0	23.8	3.85	5.2	5.5	0.01278	0.0090	**5.2**
60		8.0	23.8	3.85	4.2	4.4	0.01278	0.0064	**4.2**
250		6.0	24.3	3.70	2.3	2.4	0.01270	0.0031	**2.3**
1440		5.0	25.9	3.24	1.8	1.9	0.01247	0.0013	**1.8**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	93.13	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	95.75
Weight of Dry Material (gm)	93.13		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/15/2008 Checked By GBM Date 7-16-08

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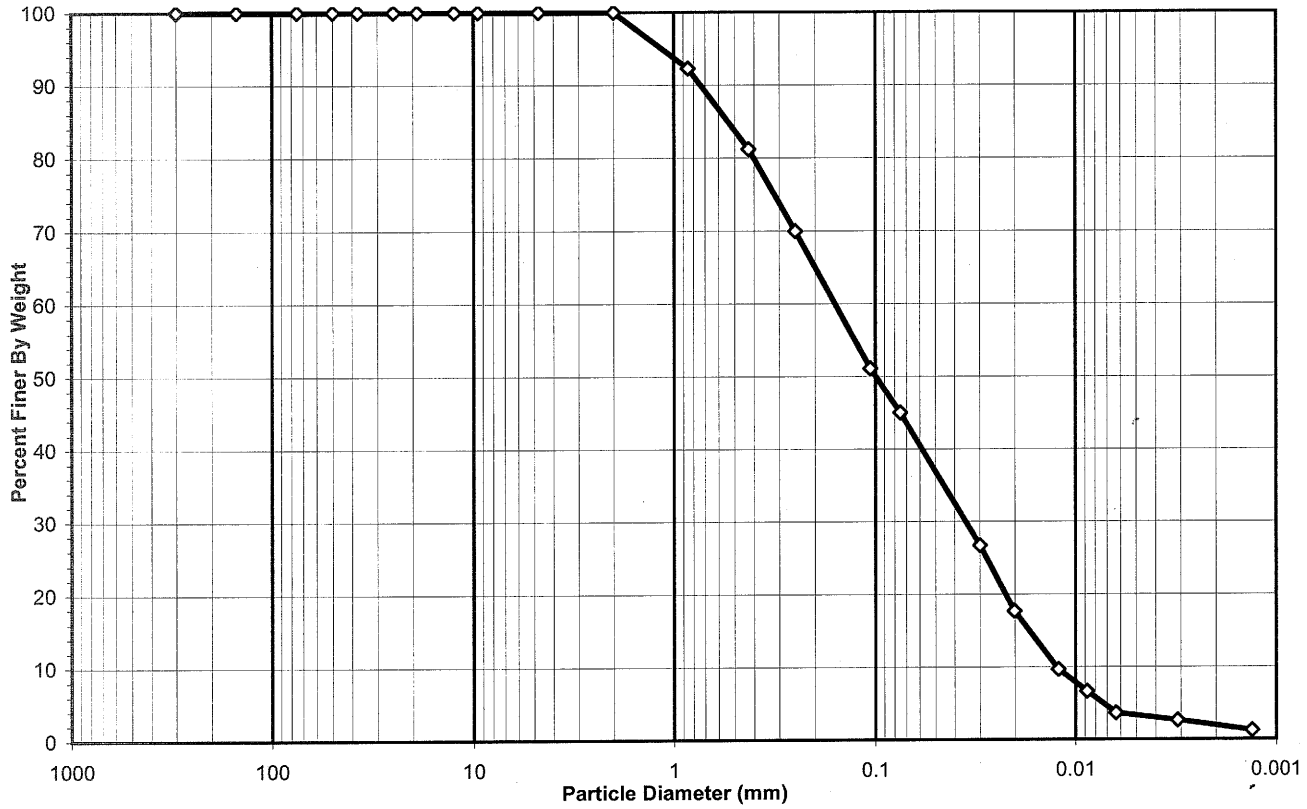
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-15
Project No.	2008-598-01	Sample No.	S-4T
Lab ID	2008-598-01-03	Soil Color	**LIGHT BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	55.00
Finer Than #200	*Silt & Clay*	45.00

USCS Symbol ***SC-SM, TESTED***

USCS Classification ***SILTY, CLAYEY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-03 #10 Split Hydro rev 8.xls]Sheet1*

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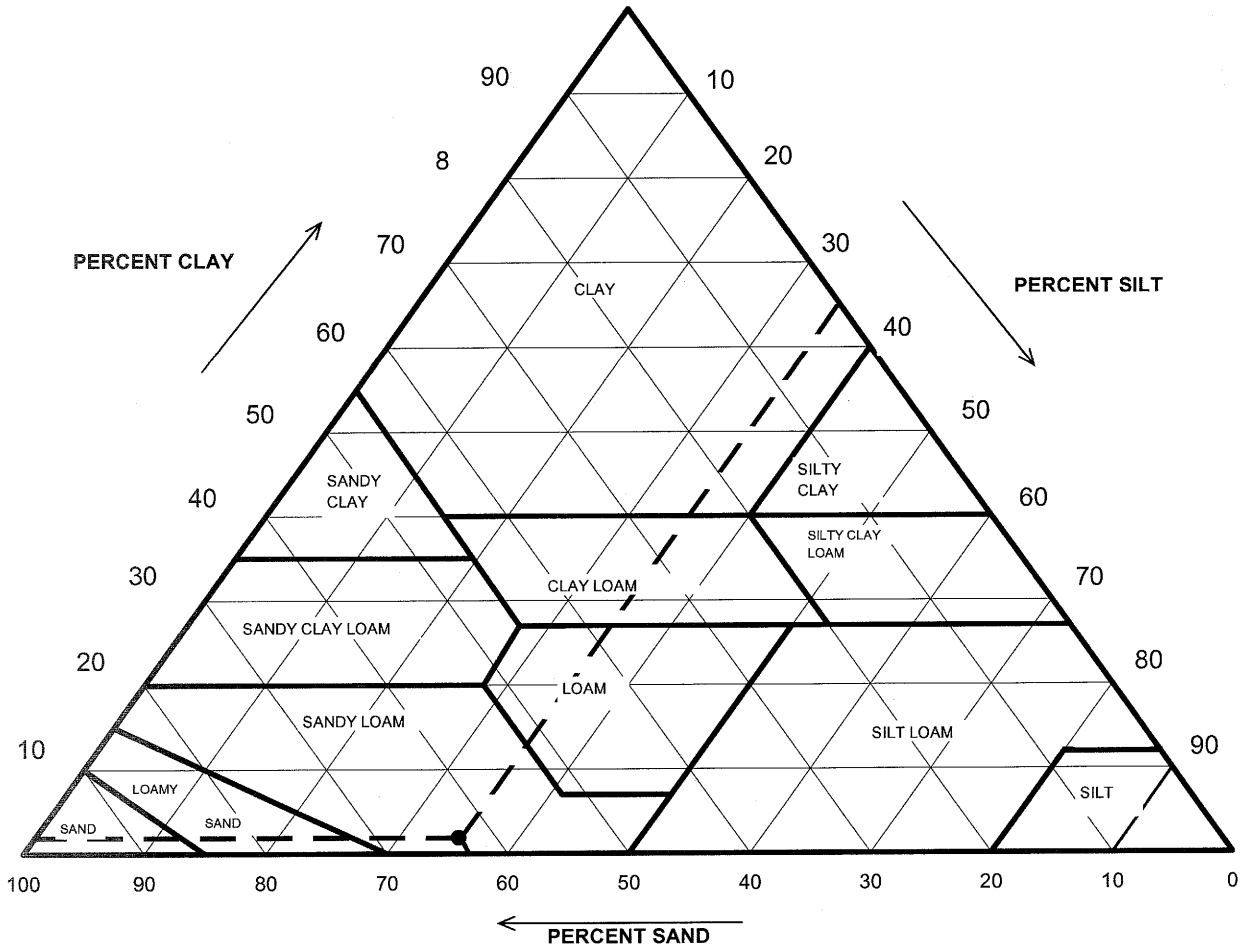
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-15
Project No.	2008-598-01	Sample No.	S-4T
Lab ID	2008-598-01-03	Soil Color	LIGHT BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.00	**0.00**
2	100.00	*Sand*	63.09	**63.09**
0.05	36.91	*Silt*	35.00	**35.00**
0.002	1.91	*Clay*	1.91	**1.91**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-03 #10 Split Hydro rev 8.xls]Sheet1

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-15
Project No.	2008-598-01	Sample No.	S-4T
Lab ID	2008-598-01-03	Soil Color	**LIGHT BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	203	Tare No.	B-1
Wgt.Tare + Wet Soil (gm)	237.70	Wgt.Tare + Wet Soil (gm)	61.91
Wgt.Tare + Dry Soil (gm)	228.33	Wgt.Tare + Dry Soil (gm)	61.35
Weight of Tare (gm)	171.12	Weight of Tare (gm)	22.06
Weight of Water (gm)	9.37	Weight of Water (gm)	0.56
Weight of Dry Soil (gm)	57.21	Weight of Dry Soil (gm)	39.29
Moisture Content (%)	**16.4**	**Moisture Content (%)**	**1.4**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	66.58	Weight of the Dry Sample (gm)	155.80
Dry Weight +#10 Material(gm)	57.2	Weight of minus #200 material (gm)	44.36
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	111.44
Dry Weight Hydro. Material (gm)	98.59		
Total Dry Weight Sample (gm)	155.80	**J-FACTOR (%FINER THAN #10)**	**1.0000**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.00	0.00	0.00	100.00	**100.00**
#20	0.85	7.61	7.72	7.72	92.28	**92.28**
#40	0.425	10.92	11.08	18.79	81.21	**81.21**
#60	0.250	11.08	11.24	30.03	69.97	**69.97**
#140	0.106	18.64	18.91	48.94	51.06	**51.06**
#200	0.075	5.98	6.07	55.00	45.00	**45.00**
Pan	-	44.36	45.00	100.00	-	**-**

Notes :

Tested By SD Date 7/14/2008 Checked By GEM Date 7-15-08

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-15
Project No.	2008-598-01	Sample No.	S-4T
Lab ID	2008-598-01-03	Soil Color	**LIGHT BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	30.0	30.0	25.5	3.35	26.6	26.6	0.01253	0.0299	**26.6**
5		21.0	25.5	3.35	17.6	17.6	0.01253	0.0201	**17.6**
15		13.0	25.5	3.35	9.6	9.6	0.01253	0.0122	**9.6**
30		10.0	25.5	3.35	6.6	6.6	0.01253	0.0088	**6.6**
60		7.0	25.5	3.35	3.6	3.6	0.01253	0.0063	**3.6**
250		6.0	25.5	3.35	2.6	2.6	0.01253	0.0031	**2.6**
1440		5.0	24.0	3.79	1.2	1.2	0.01275	0.0013	**1.2**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	98.59	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	100.00
Weight of Dry Material (gm)	98.59		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/11/2008 Checked By Gam Date 7-15-08

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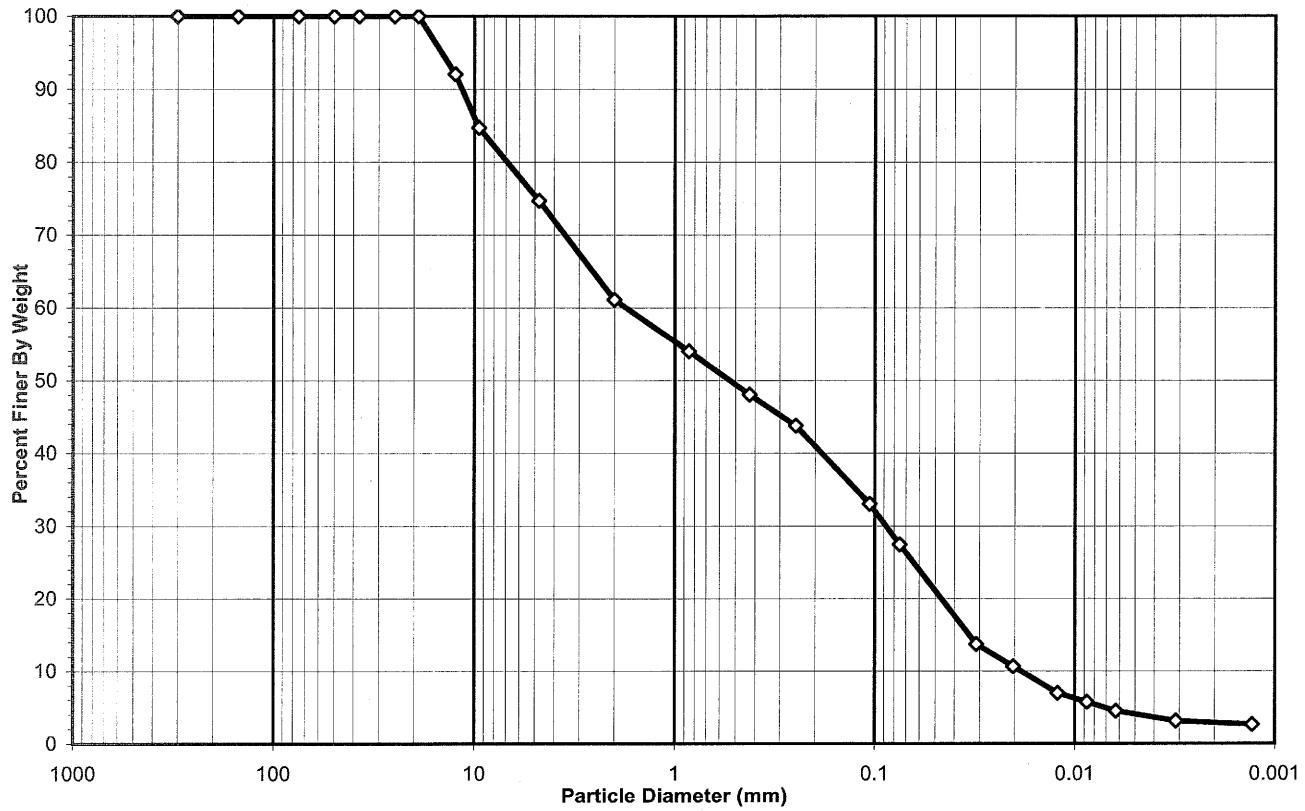
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-617
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	8.5-10
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-04	Soil Color	**BROWN TAN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	25.28
#4 To #200	*Sand*	47.29
Finer Than #200	*Silt & Clay*	27.43

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND WITH GRAVEL***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-04 #10 Split Hydro rev 8.xls]Sheet1*

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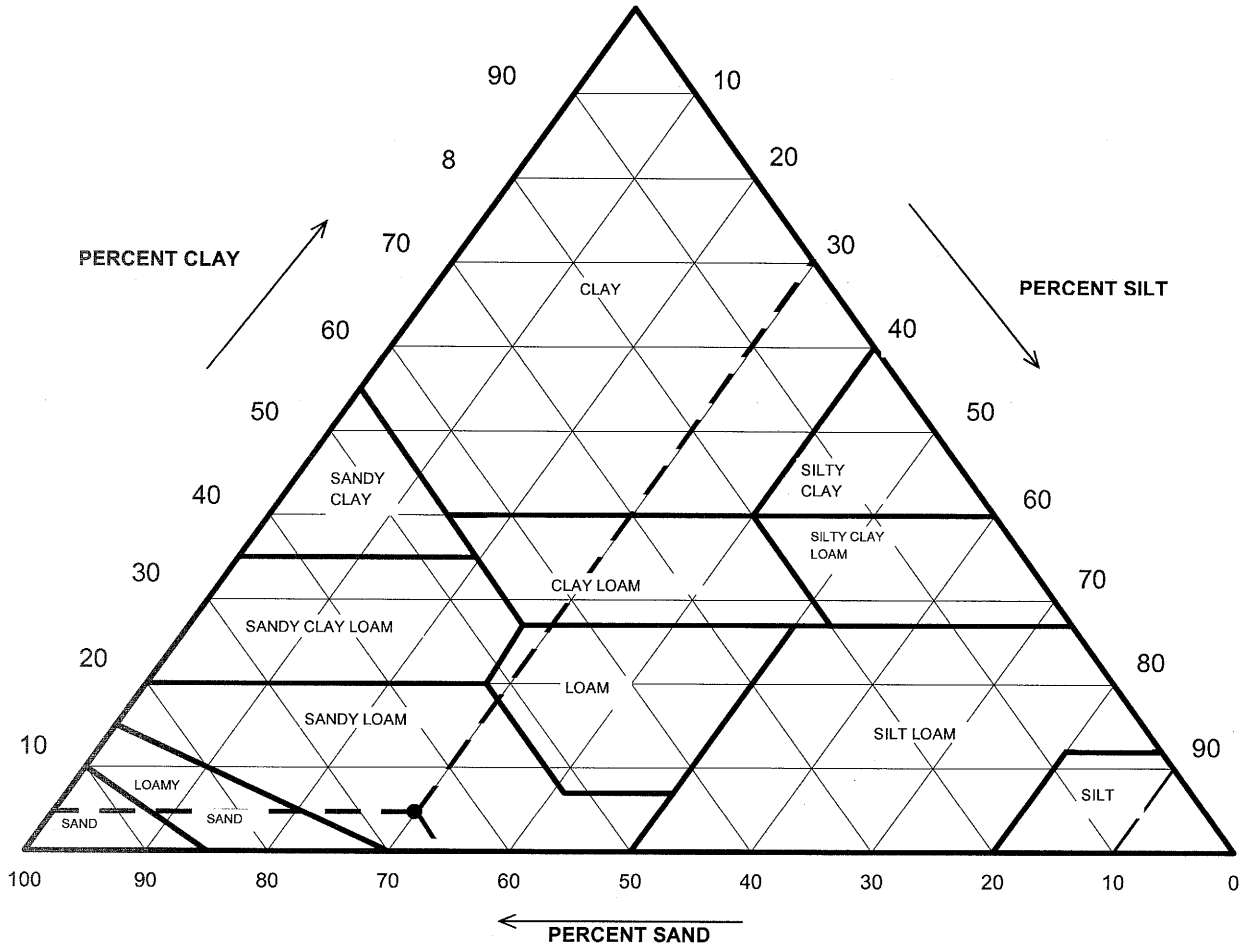
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-617
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	8.5-10
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-04	Soil Color	BROWN TAN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	38.90	**0.00**
2	61.10	*Sand*	40.01	**65.48**
0.05	21.10	*Silt*	18.23	**29.83**
0.002	2.87	*Clay*	2.87	**4.69**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-04 #10 Split Hydro rev 8.xls]Sheet1

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-617
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	8.5-10
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-04	Soil Color	**BROWN TAN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	P-12	Tare No.	S-1
Wgt.Tare + Wet Soil (gm)	257.19	Wgt.Tare + Wet Soil (gm)	55.34
Wgt.Tare + Dry Soil (gm)	254.55	Wgt.Tare + Dry Soil (gm)	54.64
Weight of Tare (gm)	196.45	Weight of Tare (gm)	15.55
Weight of Water (gm)	2.64	Weight of Water (gm)	0.70
Weight of Dry Soil (gm)	58.10	Weight of Dry Soil (gm)	39.09
Moisture Content (%)	**4.5**	**Moisture Content (%)**	**1.8**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	60.74	Weight of the Dry Sample (gm)	156.34
Dry Weight +#10 Material(gm)	58.1	Weight of minus #200 material (gm)	44.10
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	112.24
Dry Weight Hydro. Material (gm)	98.24		
Total Dry Weight Sample (gm)	156.34	**J-FACTOR (%FINER THAN #10)**	**0.6110**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	4.62	7.95	7.95	92.05	**92.05**
3/8"	9.50	4.25	7.31	15.27	84.73	**84.73**
#4	4.75	5.82	10.02	25.28	74.72	**74.72**
#10	2.00	7.91	13.61	38.90	61.10	**61.10**
#20	0.85	11.48	11.69	11.69	88.31	**53.96**
#40	0.425	9.49	9.66	21.35	78.65	**48.06**
#60	0.250	6.85	6.97	28.32	71.68	**43.80**
#140	0.106	17.31	17.62	45.94	54.06	**33.03**
#200	0.075	9.01	9.17	55.11	44.89	**27.43**
Pan	-	44.10	44.89	100.00	-	-

Notes :

Tested By SD Date 7/15/2008 Checked By GBM Date 7-17-08

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-617
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	8.5-10
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-04	Soil Color	**BROWN TAN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	26.0	26.0	24.4	3.67	22.3	22.4	0.01269	0.0311	**13.7**
5		21.0	24.4	3.67	17.3	17.4	0.01269	0.0203	**10.6**
15		15.0	24.4	3.67	11.3	11.4	0.01269	0.0122	**6.9**
30		13.0	24.4	3.67	9.3	9.4	0.01269	0.0087	**5.7**
60		11.0	24.4	3.67	7.3	7.4	0.01269	0.0062	**4.5**
250		9.0	23.6	3.91	5.1	5.1	0.01281	0.0031	**3.1**
1440		8.0	24.2	3.73	4.3	4.3	0.01272	0.0013	**2.6**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	98.24	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	61.10
Weight of Dry Material (gm)	98.24		
		Specific Gravity	2.72 Assumed

Note:

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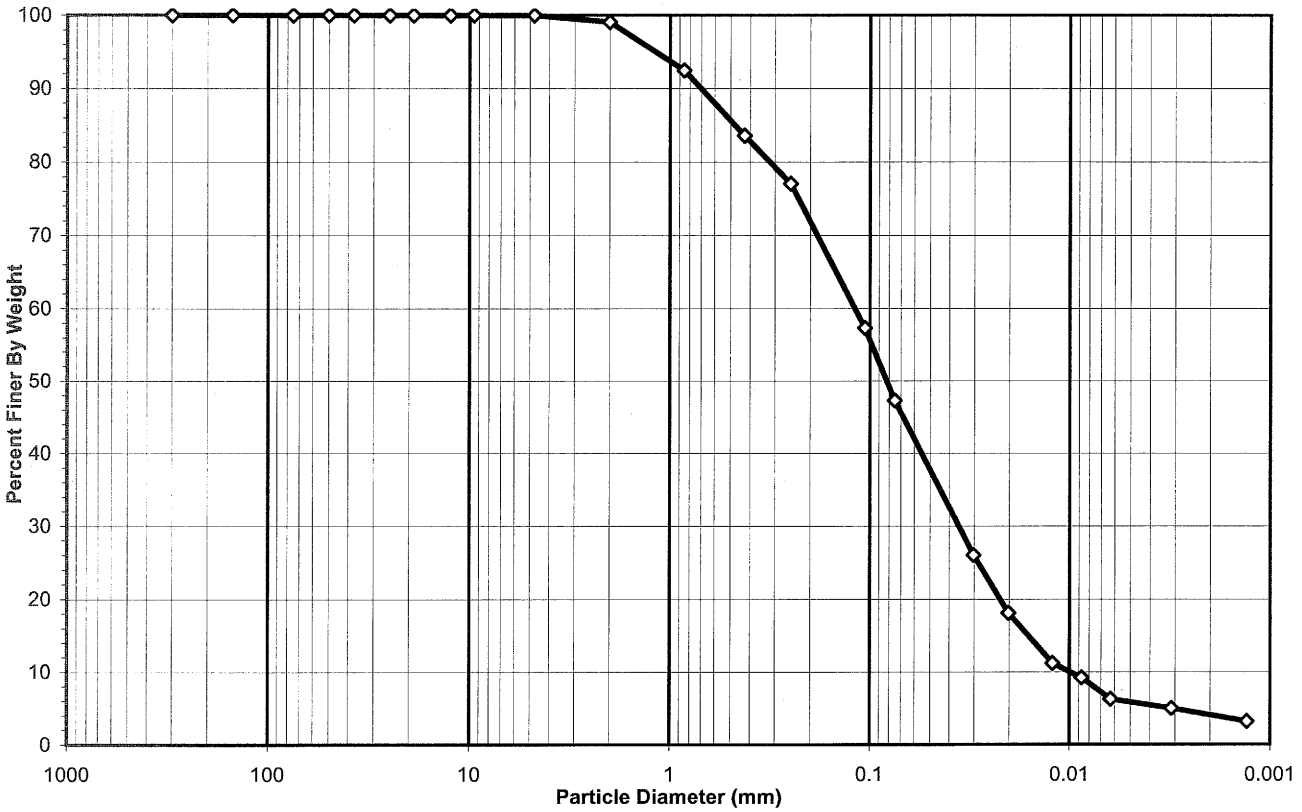
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-05	Soil Color	**LIGHT BROWN**

	SIEVE ANALYSIS				*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**		**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**		**silt**	**clay**

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	52.74
Finer Than #200	*Silt & Clay*	47.26

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-05 #10 Split Hydro rev 8.xls]Sheet1*

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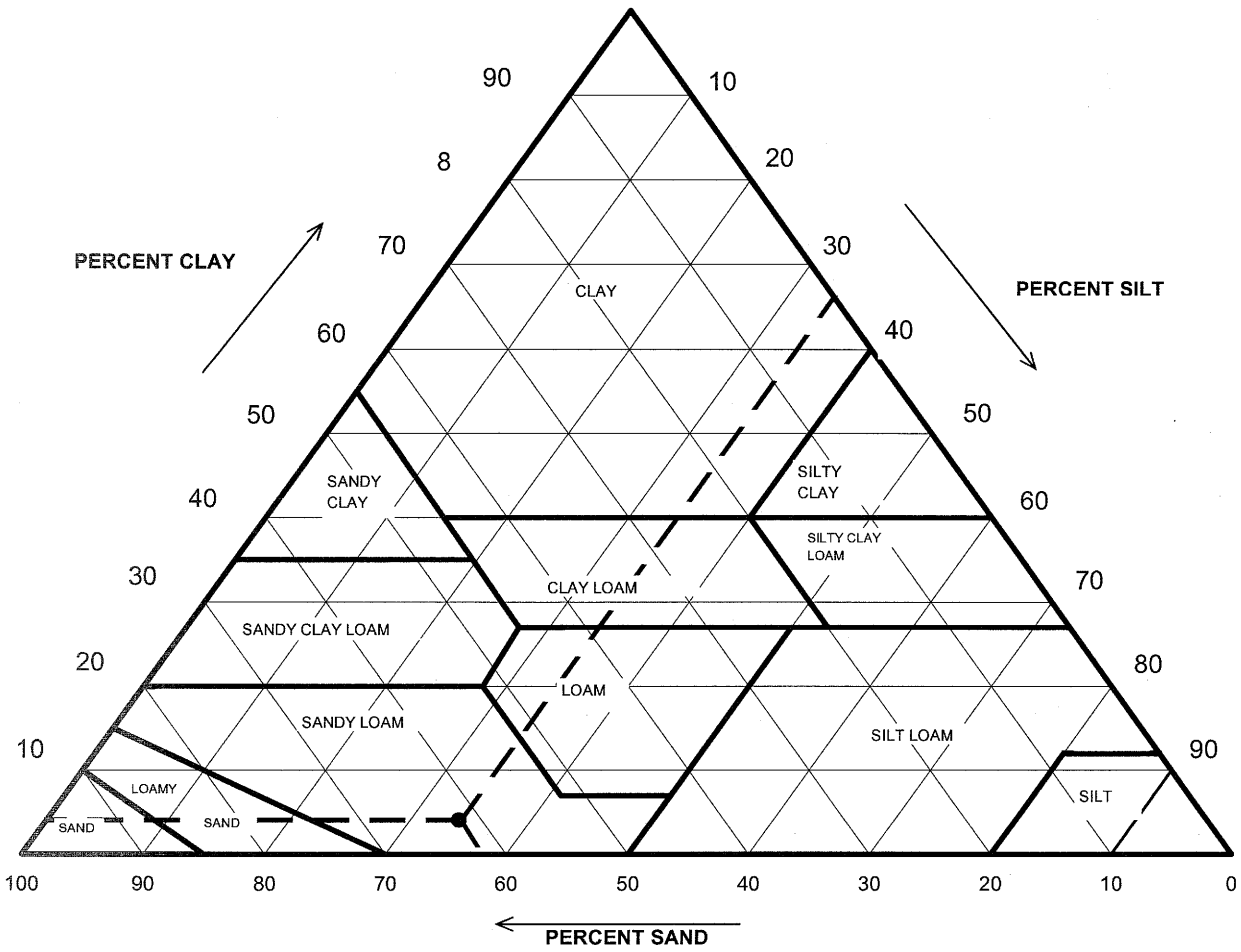
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-05	Soil Color	LIGHT BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.93	**0.00**
2	99.07	*Sand*	61.29	**61.87**
0.05	37.78	*Silt*	33.70	**34.02**
0.002	4.07	*Clay*	4.07	**4.11**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-05 #10 Split Hydro rev 8.xls]Sheet1

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-05	Soil Color	**LIGHT BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	200	Tare No.	E-2
Wgt.Tare + Wet Soil (gm)	229.34	Wgt.Tare + Wet Soil (gm)	61.85
Wgt.Tare + Dry Soil (gm)	223.33	Wgt.Tare + Dry Soil (gm)	61.45
Weight of Tare (gm)	171.85	Weight of Tare (gm)	21.90
Weight of Water (gm)	6.01	Weight of Water (gm)	0.40
Weight of Dry Soil (gm)	51.48	Weight of Dry Soil (gm)	39.55
Moisture Content (%)	**11.7**	**Moisture Content (%)**	**1.0**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	57.49	Weight of the Dry Sample (gm)	150.48
Dry Weight +#10 Material(gm)	51.5	Weight of minus #200 material (gm)	47.23
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	103.25
Dry Weight Hydro. Material (gm)	99.00		
Total Dry Weight Sample (gm)	150.48	**J-FACTOR (%FINER THAN #10)**	**0.9907**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.48	0.93	0.93	99.07	**99.07**
#20	0.85	6.62	6.69	6.69	93.31	**92.44**
#40	0.425	8.88	8.97	15.66	84.34	**83.56**
#60	0.250	6.51	6.58	22.23	77.77	**77.04**
#140	0.106	19.73	19.93	42.16	57.84	**57.30**
#200	0.075	10.03	10.13	52.29	47.71	**47.26**
Pan	-	47.23	47.71	100.00	-	-

Notes :

Tested By SD Date 7/15/2008 Checked By GEM Date 7-15-08

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-05	Soil Color	**LIGHT BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	30.0	30.0	24.5	3.65	26.4	26.2	0.01267	0.0302	**26.0**
5		22.0	24.5	3.65	18.4	18.3	0.01267	0.0202	**18.1**
15		15.0	24.5	3.65	11.4	11.3	0.01267	0.0122	**11.2**
30		13.0	24.5	3.65	9.4	9.3	0.01267	0.0087	**9.2**
60		10.0	24.5	3.65	6.4	6.3	0.01267	0.0063	**6.3**
250		9.0	23.5	3.94	5.1	5.0	0.01282	0.0031	**5.0**
1440		7.0	24.1	3.76	3.2	3.2	0.01273	0.0013	**3.2**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	99.00	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	99.07
Weight of Dry Material (gm)	99.00		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/14/2008 Checked By GEM Date 7-15-08

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Geotechnics
INTEGRITY IN TESTING

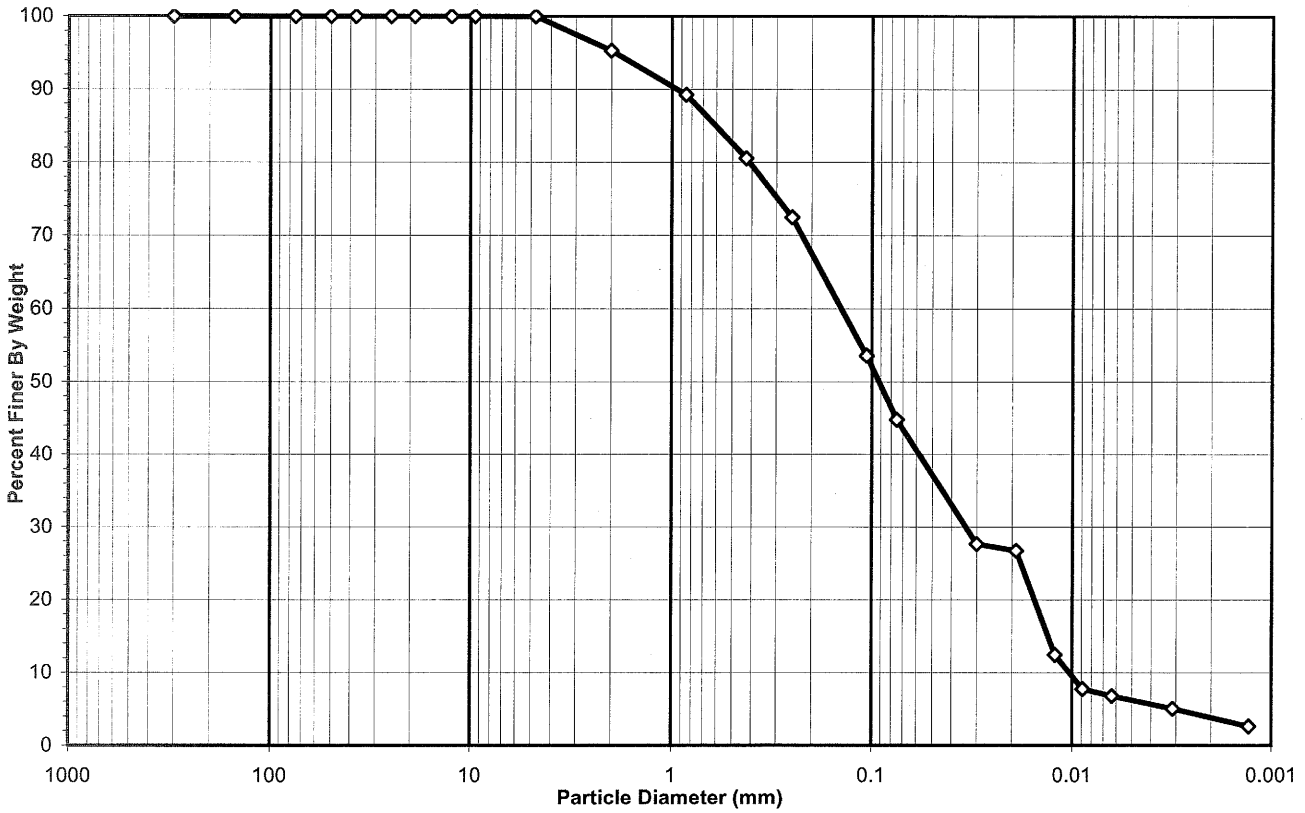
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-06	Soil Color	**GRAY WHITE BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	55.23
Finer Than #200	*Silt & Clay*	44.77

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-06 #10 Split Hydro rev 8.xls]Sheet1*

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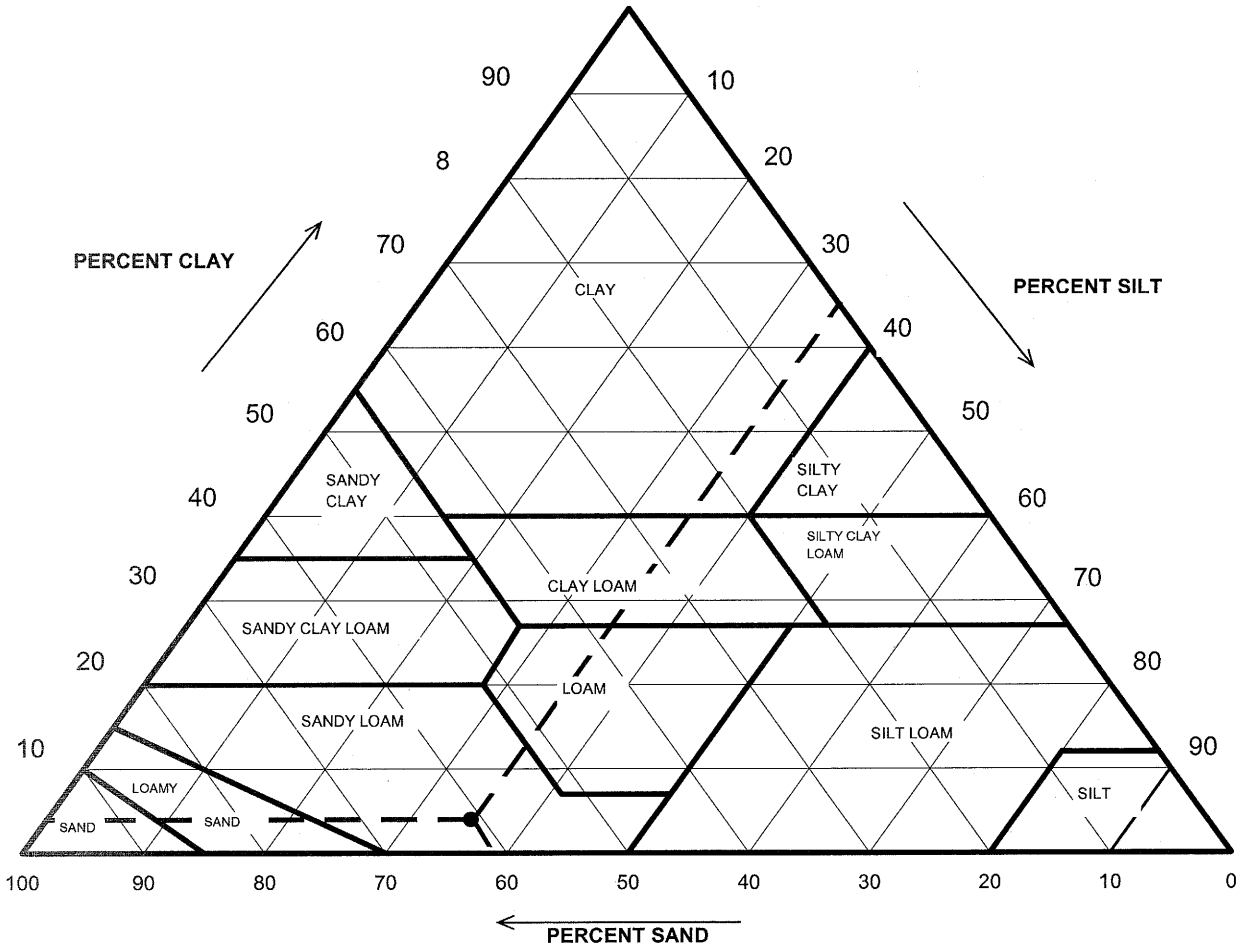
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-06	Soil Color	GRAY WHITE BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	4.70	**0.00**
2	95.30	*Sand*	58.12	**60.98**
0.05	37.18	*Silt*	33.38	**35.03**
0.002	3.80	*Clay*	3.80	**3.99**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-06 #10 Split Hydro rev 8.xls]Sheet1

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-06	Soil Color	**GRAY WHITE BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	212	Tare No.	C-2
Wgt.Tare + Wet Soil (gm)	204.52	Wgt.Tare + Wet Soil (gm)	45.46
Wgt.Tare + Dry Soil (gm)	201.83	Wgt.Tare + Dry Soil (gm)	45.28
Weight of Tare (gm)	171.60	Weight of Tare (gm)	15.63
Weight of Water (gm)	2.69	Weight of Water (gm)	0.18
Weight of Dry Soil (gm)	30.23	Weight of Dry Soil (gm)	29.65
Moisture Content (%)	**8.9**	**Moisture Content (%)**	**0.6**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	32.92	Weight of the Dry Sample (gm)	129.67
Dry Weight +#10 Material(gm)	30.2	Weight of minus #200 material (gm)	46.72
Wet Weight Hydro. Material.(gm)	100.04	Weight of plus #200 material (gm)	82.95
Dry Weight Hydro. Material (gm)	99.44		
Total Dry Weight Sample (gm)	129.67	**J-FACTOR (%FINER THAN #10)**	**0.9530**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	1.42	4.70	4.70	95.30	**95.30**
#20	0.85	6.33	6.37	6.37	93.63	**89.24**
#40	0.425	9.05	9.10	15.47	84.53	**80.56**
#60	0.250	8.47	8.52	23.99	76.01	**72.44**
#140	0.106	19.73	19.84	43.83	56.17	**53.53**
#200	0.075	9.14	9.19	53.02	46.98	**44.77**
Pan	-	46.72	46.98	100.00	-	**-**

Notes :

Tested By SD Date 7/16/2008 Checked By GEM Date 7-21-08

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-06	Soil Color	**GRAY WHITE BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	33.0	33.0	23.7	3.88	29.1	29.0	0.01287	0.0300	**27.6**
5		32.0	23.7	3.88	28.1	28.0	0.01287	0.0191	**26.7**
15		17.0	23.7	3.88	13.1	13.1	0.01287	0.0122	**12.4**
30		12.0	23.8	3.85	8.2	8.1	0.01285	0.0089	**7.7**
60		11.0	23.8	3.85	7.2	7.1	0.01285	0.0063	**6.8**
250		9.0	24.3	3.70	5.3	5.3	0.01278	0.0031	**5.0**
1440		6.0	25.8	3.27	2.7	2.7	0.01256	0.0013	**2.6**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	99.44	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	95.30
Weight of Dry Material (gm)	99.44		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/14/2008 Checked By GEM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-06 #10 Split Hydro rev 8.xls]Sheet1*

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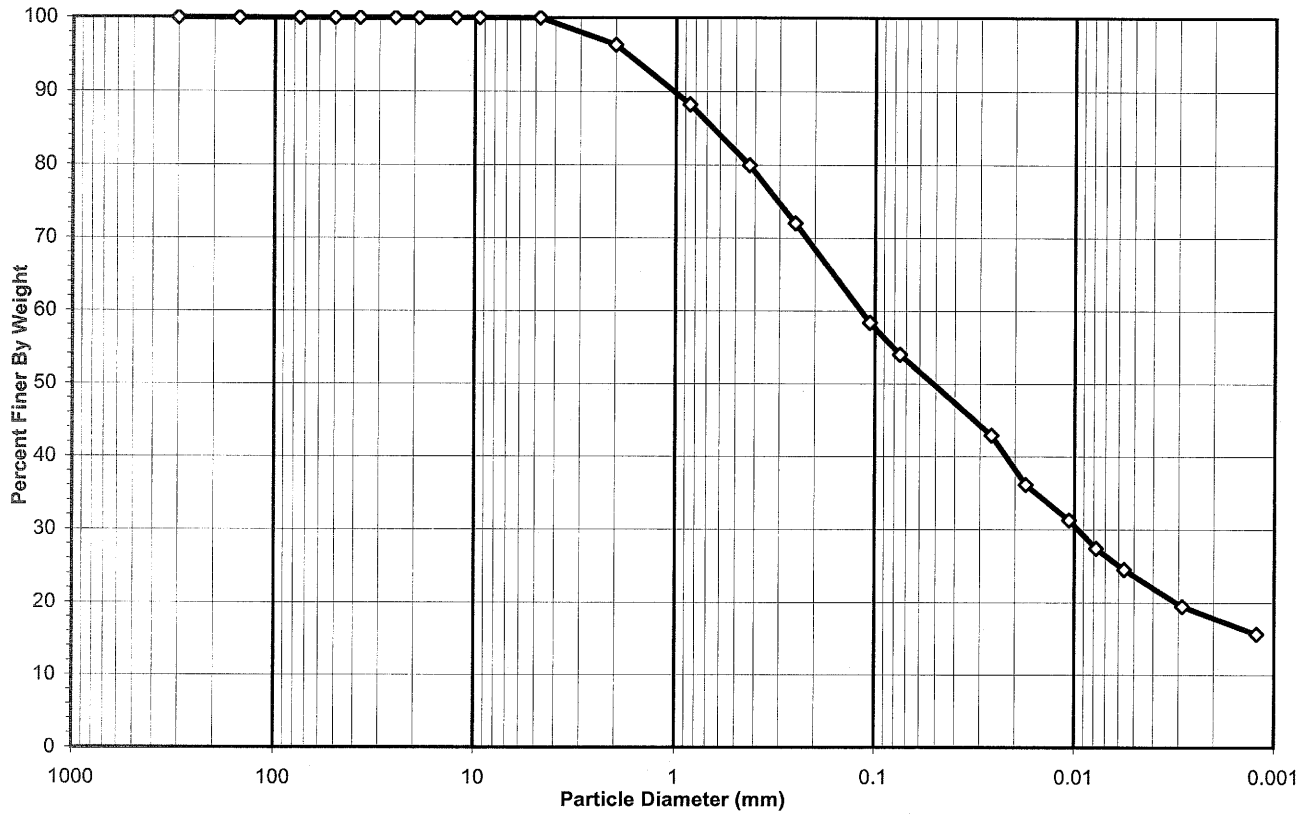
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-5
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-07	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	46.02
Finer Than #200	*Silt & Clay*	53.98

USCS Symbol ***CL, TESTED***

USCS Classification ***SANDY LEAN CLAY***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-07 #10 Split Hydro rev 8.xls]Sheet1*

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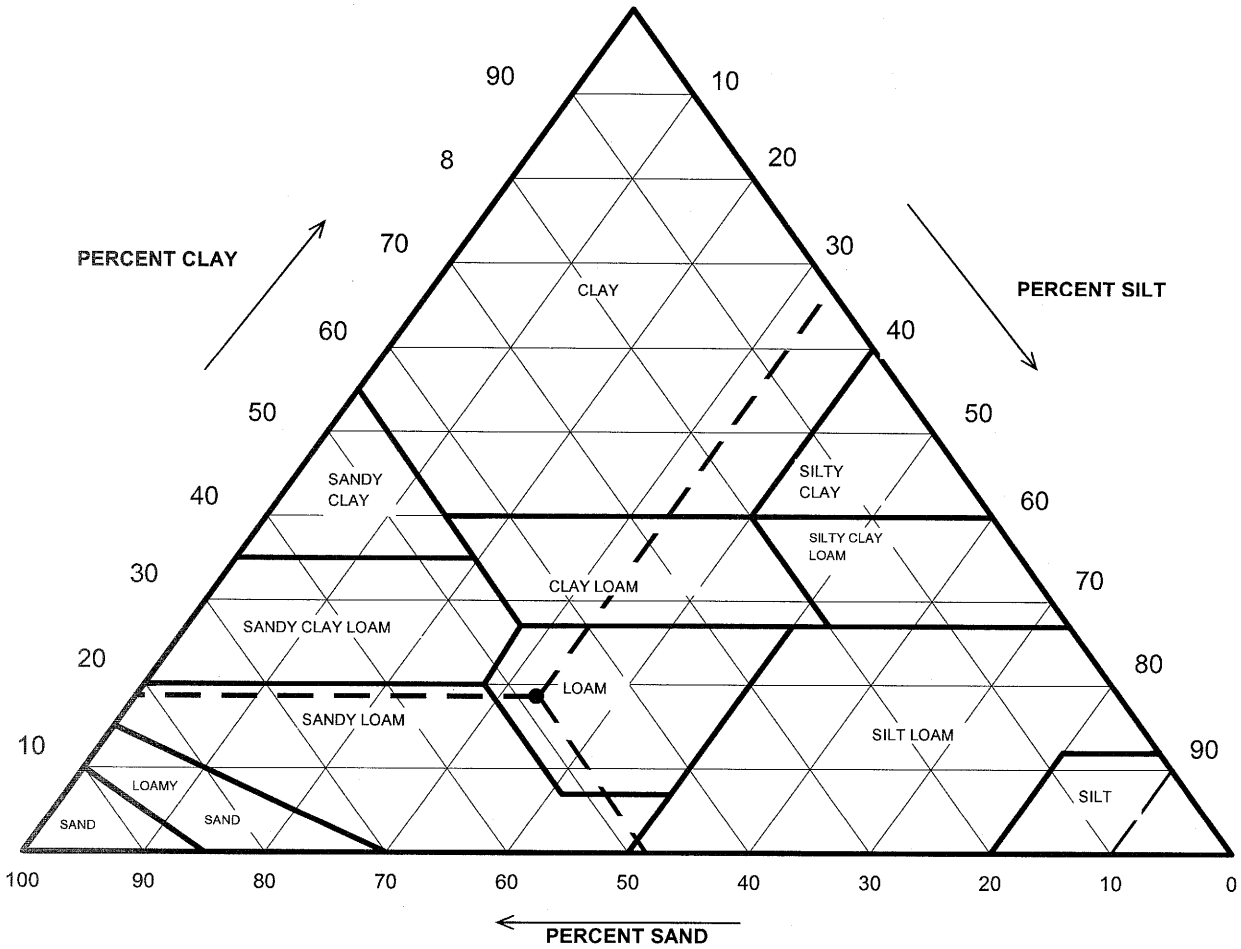
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-5
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-07	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	3.70	**0.00**
2	96.30	*Sand*	46.60	**48.39**
0.05	49.70	*Silt*	31.86	**33.08**
0.002	17.85	*Clay*	17.85	**18.53**

USDA Classification: ***LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-07 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-5
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-07	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	215	Tare No.	P-1
Wgt.Tare + Wet Soil (gm)	224.13	Wgt.Tare + Wet Soil (gm)	38.84
Wgt.Tare + Dry Soil (gm)	216.91	Wgt.Tare + Dry Soil (gm)	38.45
Weight of Tare (gm)	172.33	Weight of Tare (gm)	15.71
Weight of Water (gm)	7.22	Weight of Water (gm)	0.39
Weight of Dry Soil (gm)	44.58	Weight of Dry Soil (gm)	22.74
Moisture Content (%)	**16.2**	**Moisture Content (%)**	**1.7**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	51.80	Weight of the Dry Sample (gm)	142.92
Dry Weight +#10 Material(gm)	44.6	Weight of minus #200 material (gm)	55.12
Wet Weight Hydro. Material.(gm)	100.03	Weight of plus #200 material (gm)	87.80
Dry Weight Hydro. Material (gm)	98.34		
Total Dry Weight Sample (gm)	142.92	**J-FACTOR (%FINER THAN #10)**	**0.9630**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	1.65	3.70	3.70	96.30	**96.30**
#20	0.85	8.23	8.37	8.37	91.63	**88.24**
#40	0.425	8.43	8.57	16.94	83.06	**79.99**
#60	0.250	8.11	8.25	25.19	74.81	**72.04**
#140	0.106	13.95	14.18	39.37	60.63	**58.38**
#200	0.075	4.50	4.58	43.95	56.05	**53.98**
Pan	-	55.12	56.05	100.00	-	**-**

Notes :

Tested By SD Date 7/15/2008 Checked By Gem Date 7-21-08

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-5
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-07	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	48.0	48.0	24.2	3.73	44.3	44.6	0.01279	0.0263	**42.9**
5		41.0	24.2	3.73	37.3	37.5	0.01279	0.0177	**36.1**
15		36.0	24.2	3.73	32.3	32.5	0.01279	0.0106	**31.3**
30		32.0	24.2	3.73	28.3	28.5	0.01279	0.0078	**27.4**
60		29.0	24.2	3.73	25.3	25.4	0.01279	0.0056	**24.5**
250		24.0	23.5	3.94	20.1	20.2	0.01290	0.0029	**19.4**
1440		20.0	23.8	3.85	16.2	16.3	0.01285	0.0012	**15.7**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	98.34	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	96.30
Weight of Dry Material (gm)	98.34		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/15/2008 Checked By GBM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-07 #10 Split Hydro rev 8.xls]Sheet1*

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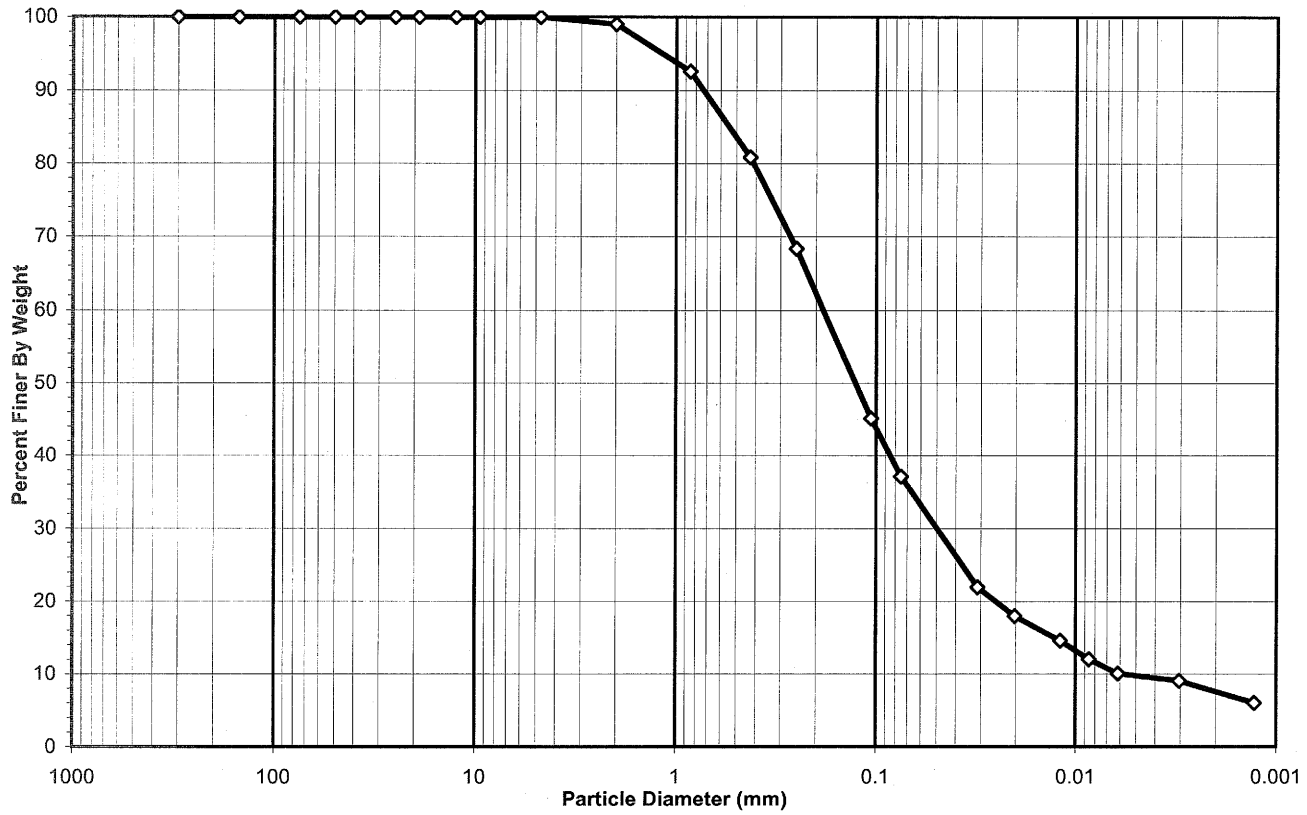
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	5-6
Project No.	2008-598-01	Sample No.	S-1B
Lab ID	2008-598-01-08	Soil Color	**BROWN WHITE**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	62.89
Finer Than #200	*Silt & Clay*	37.11

USCS Symbol ***SM, TESTED (NON PLASTIC FINES)***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-08 #10 Split Hydro rev 8.xls]Sheet1*

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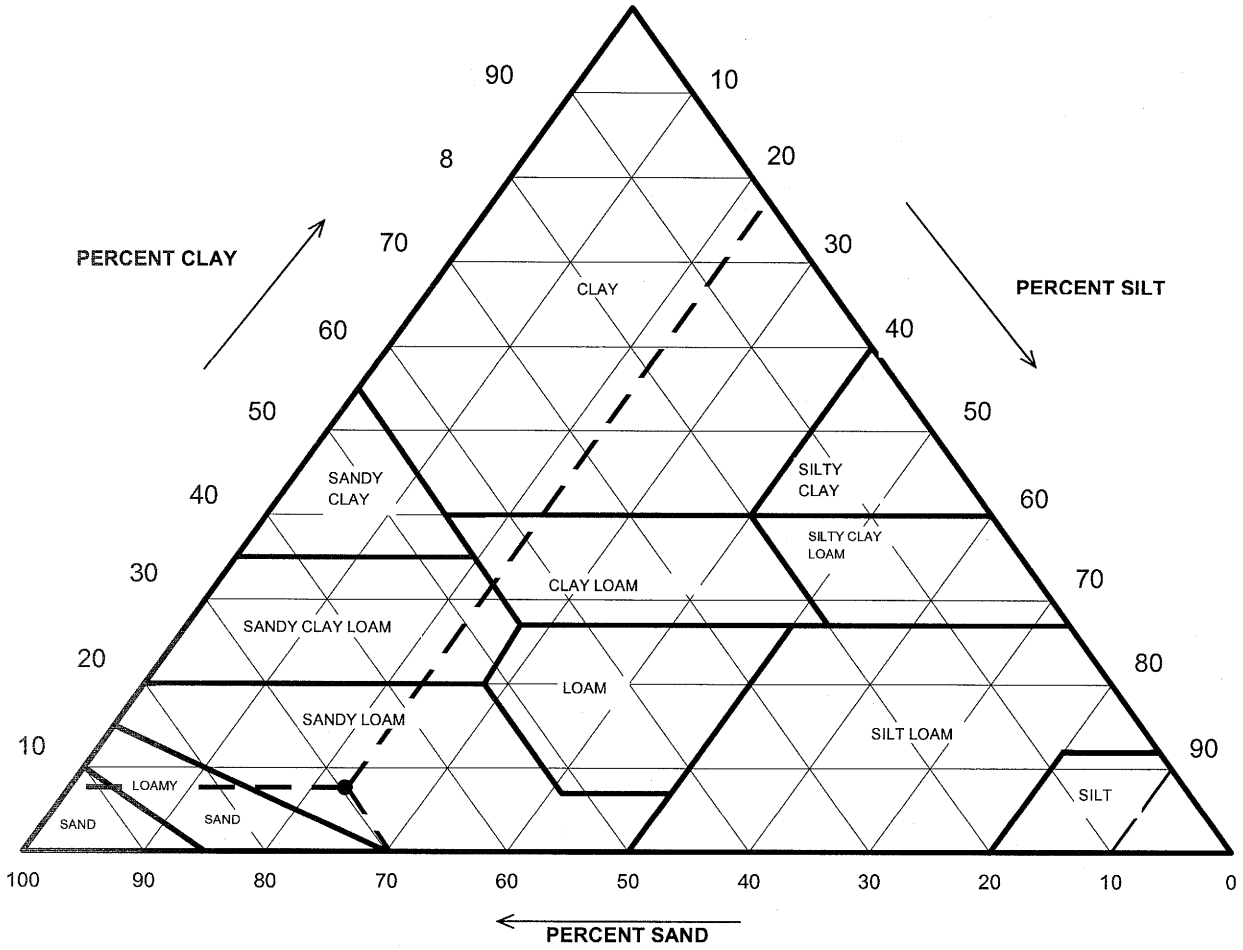
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	5-6
Project No.	2008-598-01	Sample No.	S-1B
Lab ID	2008-598-01-08	Soil Color	BROWN WHITE



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.95	**0.00**
2	99.05	*Sand*	68.94	**69.61**
0.05	30.10	*Silt*	22.53	**22.74**
0.002	7.57	*Clay*	7.57	**7.65**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-08 #10 Split Hydro rev 8.xls]Sheet1

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	5-6
Project No.	2008-598-01	Sample No.	S-1B
Lab ID	2008-598-01-08	Soil Color	**BROWN WHITE**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	202	Tare No.	B-1
Wgt.Tare + Wet Soil (gm)	283.68	Wgt.Tare + Wet Soil (gm)	56.57
Wgt.Tare + Dry Soil (gm)	275.01	Wgt.Tare + Dry Soil (gm)	56.40
Weight of Tare (gm)	197.38	Weight of Tare (gm)	22.07
Weight of Water (gm)	8.67	Weight of Water (gm)	0.17
Weight of Dry Soil (gm)	77.63	Weight of Dry Soil (gm)	34.33
Moisture Content (%)	**11.2**	**Moisture Content (%)**	**0.5**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	86.30	Weight of the Dry Sample (gm)	177.15
Dry Weight +#10 Material(gm)	77.6	Weight of minus #200 material (gm)	37.29
Wet Weight Hydro. Material.(gm)	100.01	Weight of plus #200 material (gm)	139.86
Dry Weight Hydro. Material (gm)	99.52		
Total Dry Weight Sample (gm)	177.15	**J-FACTOR (%FINER THAN #10)**	**0.9905**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.74	0.95	0.95	99.05	**99.05**
#20	0.85	6.49	6.52	6.52	93.48	**92.59**
#40	0.425	11.77	11.83	18.35	81.65	**80.87**
#60	0.250	12.61	12.67	31.02	68.98	**68.32**
#140	0.106	23.35	23.46	54.48	45.52	**45.08**
#200	0.075	8.01	8.05	62.53	37.47	**37.11**
Pan	-	37.29	37.47	100.00	-	**-**

Notes :

Tested By SD Date 7/15/2008 Checked By GEM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-08 #10 Split Hydro rev 8.xls]Sheet1*

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Geotechnics
INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	5-6
Project No.	2008-598-01	Sample No.	S-1B
Lab ID	2008-598-01-08	Soil Color	**BROWN WHITE**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	26.0	26.0	24.4	3.67	22.3	22.1	0.01269	0.0311	**21.9**
5		22.0	24.4	3.67	18.3	18.2	0.01269	0.0202	**18.0**
15		18.5	24.5	3.65	14.9	14.7	0.01267	0.0119	**14.6**
30		16.0	24.2	3.73	12.3	12.2	0.01272	0.0086	**12.0**
60		14.0	24.2	3.73	10.3	10.2	0.01272	0.0061	**10.1**
250		13.0	24.0	3.79	9.2	9.1	0.01275	0.0030	**9.0**
1440		10.0	23.8	3.85	6.2	6.1	0.01278	0.0013	**6.0**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	99.52	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	99.05
Weight of Dry Material (gm)	99.52		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/14/2008 Checked By GBM Date 7-21-08

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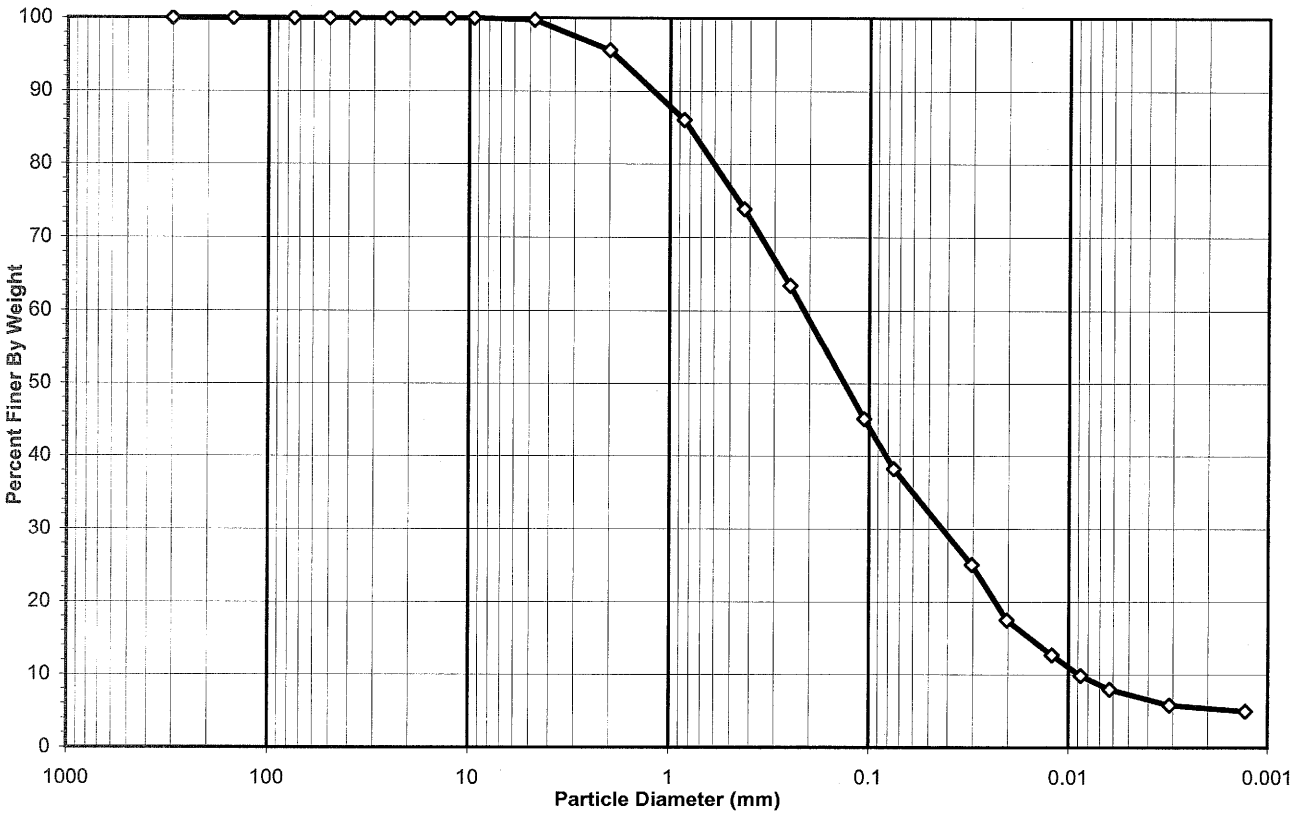
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-09	Soil Color	**BROWN TAN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.26
#4 To #200	*Sand*	61.51
Finer Than #200	*Silt & Clay*	38.23

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-09 #10 Split Hydro rev 8.xls]Sheet1*

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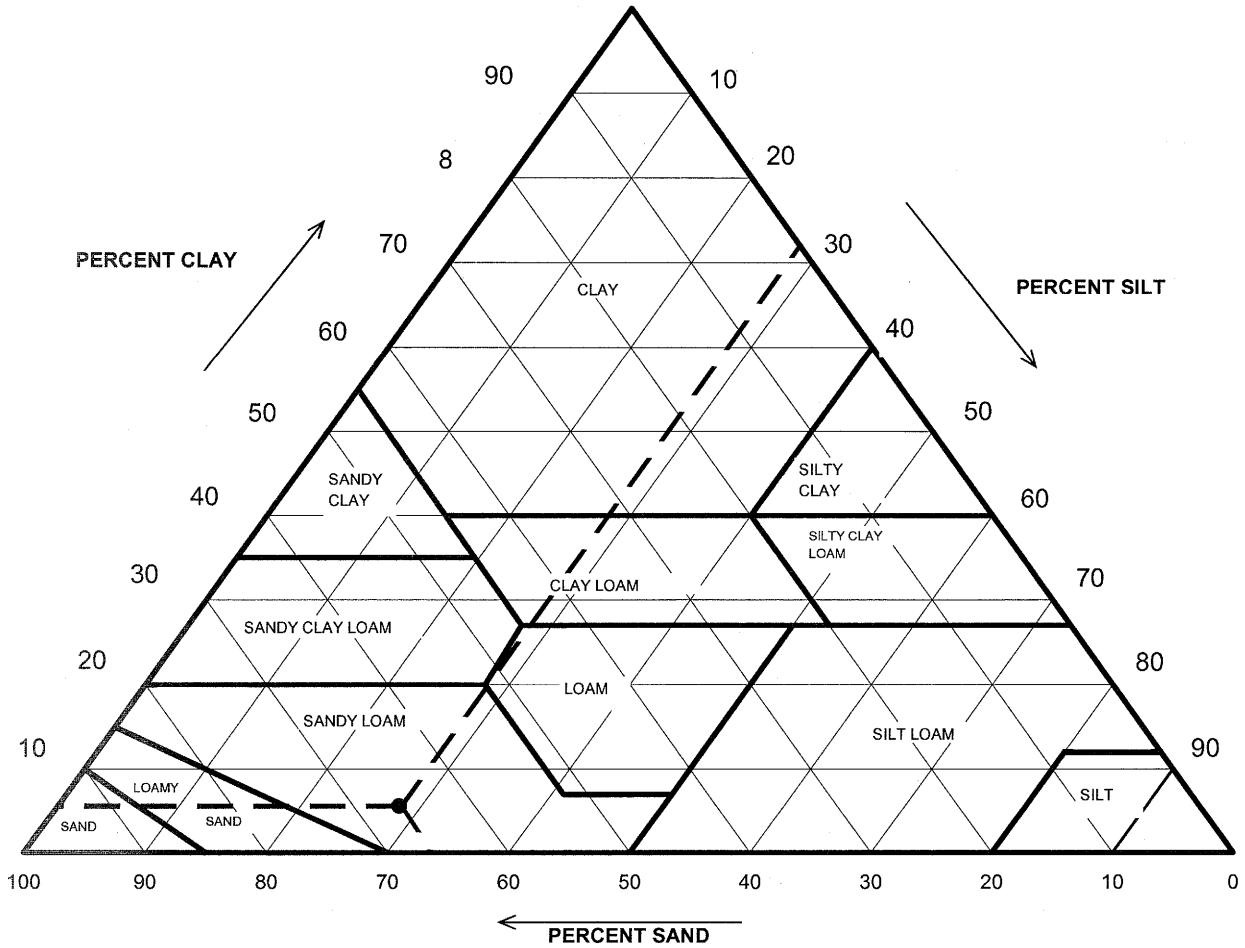
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-09	Soil Color	BROWN TAN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	4.39	**0.00**
2	95.61	*Sand*	63.29	**66.20**
0.05	32.32	*Silt*	26.94	**28.17**
0.002	5.38	*Clay*	5.38	**5.63**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-09 #10 Split Hydro rev 8.xls]Sheet1

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-09	Soil Color	**BROWN TAN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	214	Tare No.	R-1
Wgt.Tare + Wet Soil (gm)	236.93	Wgt.Tare + Wet Soil (gm)	45.59
Wgt.Tare + Dry Soil (gm)	229.01	Wgt.Tare + Dry Soil (gm)	45.42
Weight of Tare (gm)	171.34	Weight of Tare (gm)	15.65
Weight of Water (gm)	7.92	Weight of Water (gm)	0.17
Weight of Dry Soil (gm)	57.67	Weight of Dry Soil (gm)	29.77
Moisture Content (%)	**13.7**	**Moisture Content (%)**	**0.6**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	65.59	Weight of the Dry Sample (gm)	157.15
Dry Weight +#10 Material(gm)	57.7	Weight of minus #200 material (gm)	39.77
Wet Weight Hydro. Material.(gm)	100.05	Weight of plus #200 material (gm)	117.38
Dry Weight Hydro. Material (gm)	99.48		
Total Dry Weight Sample (gm)	157.15	**J-FACTOR (%FINER THAN #10)**	**0.9561**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.15	0.26	0.26	99.74	**99.74**
#10	2.00	2.38	4.13	4.39	95.61	**95.61**
#20	0.85	9.97	10.02	10.02	89.98	**86.03**
#40	0.425	12.64	12.71	22.73	77.27	**73.88**
#60	0.250	10.89	10.95	33.67	66.33	**63.42**
#140	0.106	19.04	19.14	52.81	47.19	**45.12**
#200	0.075	7.17	7.21	60.02	39.98	**38.23**
Pan	-	39.77	39.98	100.00	-	**-**

Notes :

Tested By SD Date 7/15/2008 Checked By GBM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-09 #10 Split Hydro rev 8.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-09	Soil Color	**BROWN TAN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	30.0	30.0	24.5	3.65	26.4	26.2	0.01275	0.0304	**25.1**
5		22.0	24.5	3.65	18.4	18.3	0.01275	0.0203	**17.5**
15		17.0	24.5	3.65	13.4	13.3	0.01275	0.0121	**12.7**
30		14.0	24.5	3.65	10.4	10.3	0.01275	0.0087	**9.9**
60		12.0	24.5	3.65	8.4	8.3	0.01275	0.0062	**7.9**
250		10.0	23.6	3.91	6.1	6.1	0.01288	0.0031	**5.8**
1440		9.0	24.1	3.76	5.2	5.2	0.01281	0.0013	**5.0**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	99.48	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	95.61
Weight of Dry Material (gm)	99.48		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/14/2008 Checked By GBM Date 7-21-08

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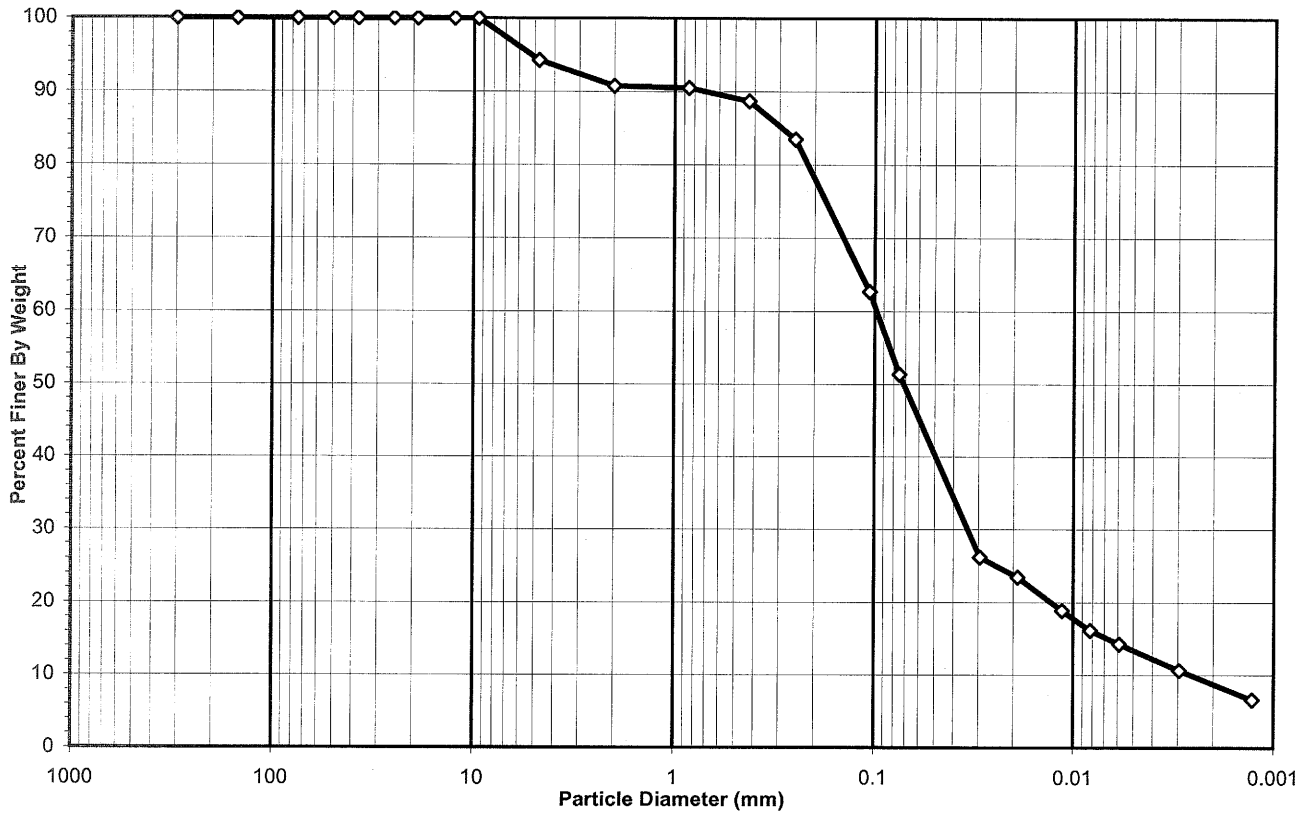
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-620
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-10	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	5.74
#4 To #200	*Sand*	42.98
Finer Than #200	*Silt & Clay*	51.28

USCS Symbol ***ML, TESTED***

USCS Classification ***SANDY SILT***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-10 #10 Split Hydro rev 8.xls]Sheet1*

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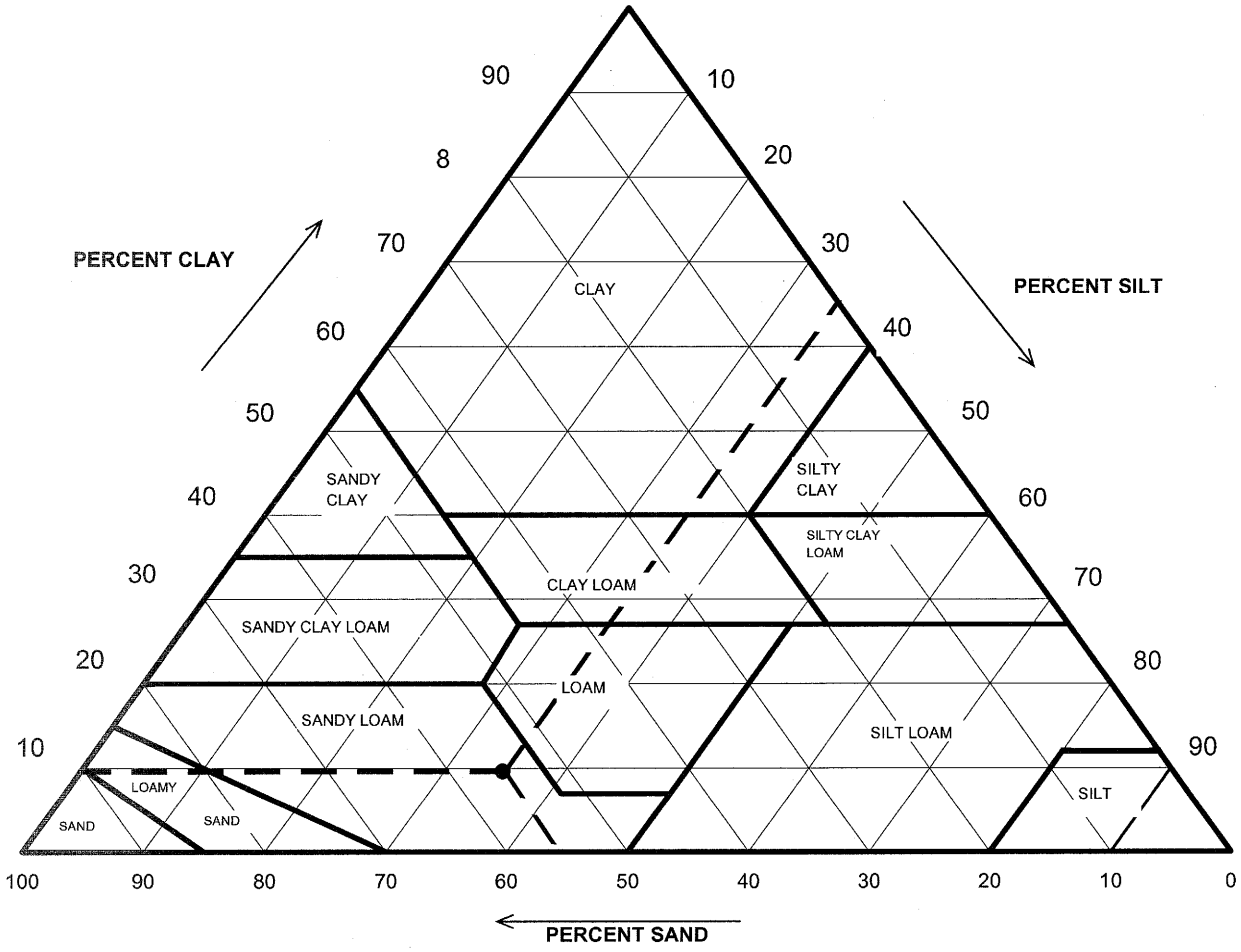
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-620
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-10	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	9.25	**0.00**
2	90.75	*Sand*	50.38	**55.51**
0.05	40.37	*Silt*	31.63	**34.85**
0.002	8.74	*Clay*	8.74	**9.64**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-10 #10 Split Hydro rev 8.xls]Sheet1

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-620
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-10	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	208	Tare No.	C-2
Wgt.Tare + Wet Soil (gm)	216.14	Wgt.Tare + Wet Soil (gm)	41.65
Wgt.Tare + Dry Soil (gm)	210.06	Wgt.Tare + Dry Soil (gm)	41.15
Weight of Tare (gm)	169.85	Weight of Tare (gm)	15.64
Weight of Water (gm)	6.08	Weight of Water (gm)	0.50
Weight of Dry Soil (gm)	40.21	Weight of Dry Soil (gm)	25.51
Moisture Content (%)	**15.1**	**Moisture Content (%)**	**2.0**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	46.29	Weight of the Dry Sample (gm)	138.29
Dry Weight +#10 Material(gm)	40.2	Weight of minus #200 material (gm)	55.42
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	82.87
Dry Weight Hydro. Material (gm)	98.08		
Total Dry Weight Sample (gm)	138.29	**J-FACTOR (%FINER THAN #10)**	**0.9075**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	2.31	5.74	5.74	94.26	**94.26**
#10	2.00	1.41	3.51	9.25	90.75	**90.75**
#20	0.85	0.30	0.31	0.31	99.69	**90.47**
#40	0.425	1.96	2.00	2.30	97.70	**88.66**
#60	0.250	5.61	5.72	8.02	91.98	**83.47**
#140	0.106	22.48	22.92	30.94	69.06	**62.67**
#200	0.075	12.31	12.55	43.50	56.50	**51.28**
Pan	-	55.42	56.50	100.00	-	**-**

Notes :

Tested By SD Date 7/14/2008 Checked By GEM Date 7-16-08

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-620
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-10	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	32.0	32.0	25.5	3.35	28.6	28.8	0.01253	0.0295	**26.1**
5		29.0	25.5	3.35	25.6	25.8	0.01253	0.0190	**23.4**
15		24.0	25.5	3.35	20.6	20.8	0.01253	0.0114	**18.8**
30		21.0	25.5	3.35	17.6	17.7	0.01253	0.0082	**16.1**
60		19.0	25.5	3.35	15.6	15.7	0.01253	0.0059	**14.3**
250		15.0	25.5	3.35	11.6	11.7	0.01253	0.0029	**10.6**
1440		11.0	24.0	3.79	7.2	7.2	0.01275	0.0013	**6.6**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	98.08	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	90.75
Weight of Dry Material (gm)	98.08		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/11/2008 Checked By GEM Date 7-16-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-10 #10 Split Hydro rev 8.xls]Sheet1*

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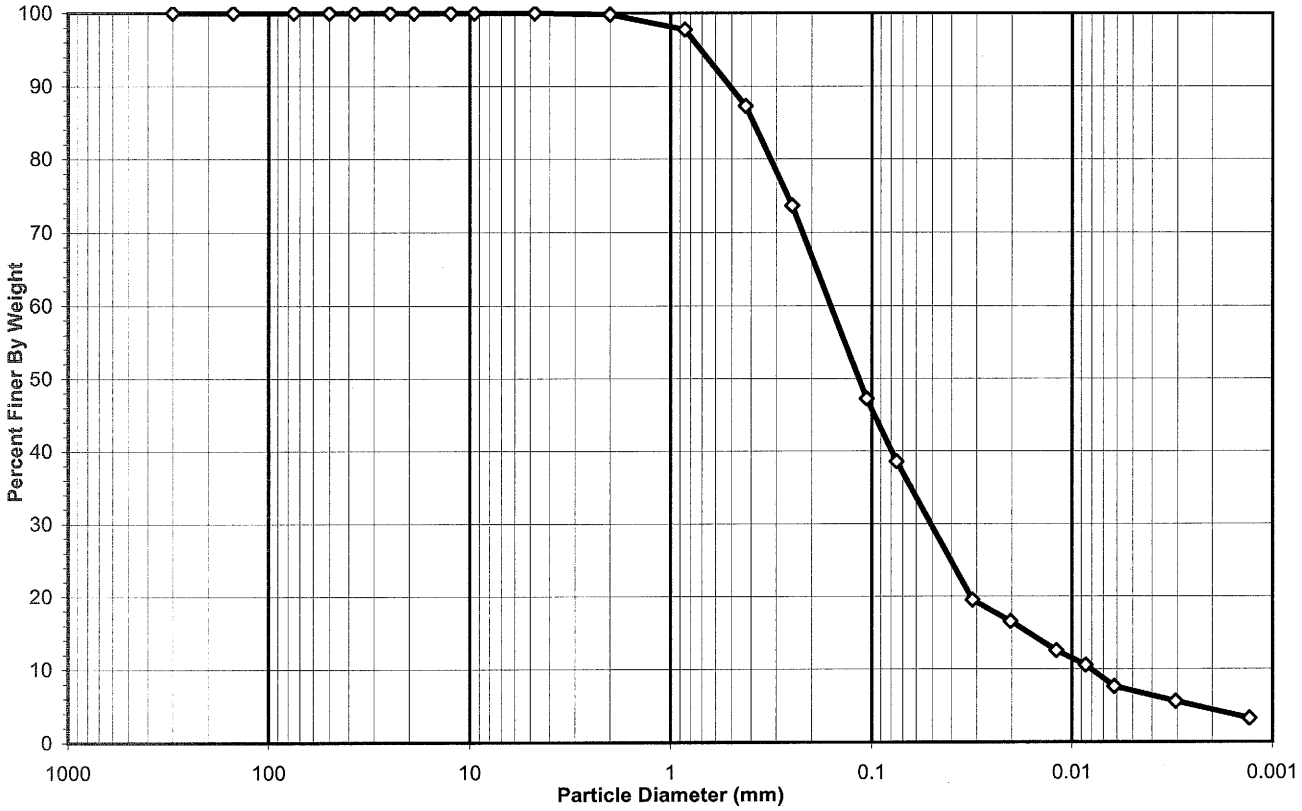
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-621
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-11	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	61.46
Finer Than #200	*Silt & Clay*	38.54

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-11 #10 Split Hydro rev 8.xls]Sheet1*

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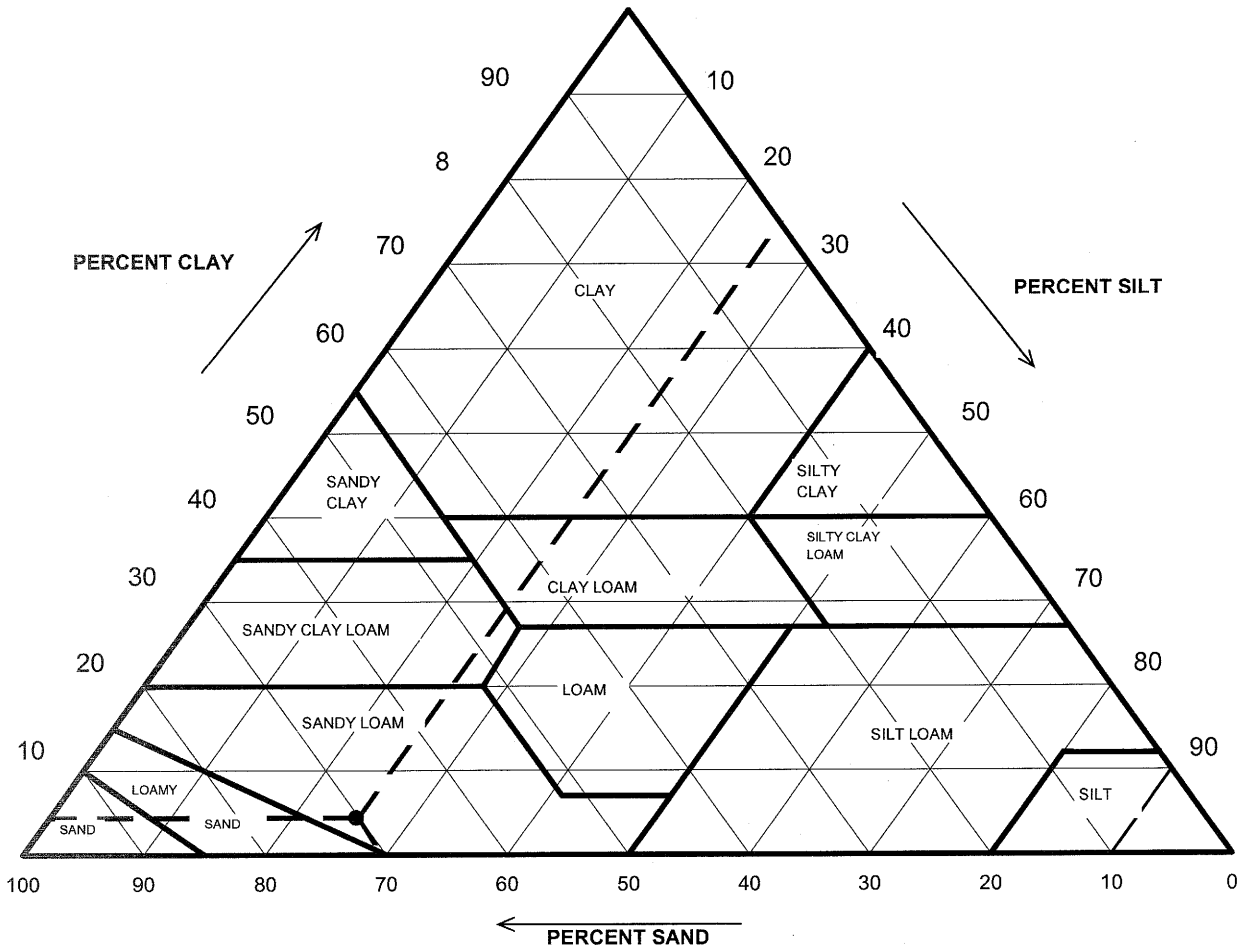
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-621
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-11	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.17	**0.00**
2	99.83	*Sand*	70.16	**70.28**
0.05	29.67	*Silt*	25.25	**25.29**
0.002	4.42	*Clay*	4.42	**4.43**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-11 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-621
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-11	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	201	Tare No.	K-1
Wgt.Tare + Wet Soil (gm)	227.39	Wgt.Tare + Wet Soil (gm)	35.44
Wgt.Tare + Dry Soil (gm)	224.44	Wgt.Tare + Dry Soil (gm)	35.31
Weight of Tare (gm)	170.76	Weight of Tare (gm)	15.74
Weight of Water (gm)	2.95	Weight of Water (gm)	0.13
Weight of Dry Soil (gm)	53.68	Weight of Dry Soil (gm)	19.57
Moisture Content (%)	**5.5**	**Moisture Content (%)**	**0.7**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	56.63	Weight of the Dry Sample (gm)	153.02
Dry Weight +#10 Material(gm)	53.7	Weight of minus #200 material (gm)	38.35
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	114.67
Dry Weight Hydro. Material (gm)	99.34		
Total Dry Weight Sample (gm)	153.02	**J-FACTOR (%FINER THAN #10)**	**0.9983**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.09	0.17	0.17	99.83	**99.83**
#20	0.85	2.05	2.06	2.06	97.94	**97.77**
#40	0.425	10.45	10.52	12.58	87.42	**87.27**
#60	0.250	13.57	13.66	26.24	73.76	**73.63**
#140	0.106	26.31	26.48	52.73	47.27	**47.19**
#200	0.075	8.61	8.67	61.40	38.60	**38.54**
Pan	-	38.35	38.60	100.00	-	**-**

Notes :

Tested By SD Date 7/14/2008 Checked By GEM Date 7-15-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-11 #10 Split Hydro rev 8.xls]Sheet1*

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Geotechnics
INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-621
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-11	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	23.0	23.0	25.5	3.35	19.6	19.5	0.01253	0.0314	**19.5**
5		20.0	25.5	3.35	16.6	16.5	0.01253	0.0202	**16.5**
15		16.0	25.5	3.35	12.6	12.6	0.01253	0.0120	**12.5**
30		14.0	25.5	3.35	10.6	10.6	0.01253	0.0086	**10.5**
60		11.0	25.5	3.35	7.6	7.6	0.01253	0.0062	**7.6**
250		9.0	25.5	3.35	5.6	5.6	0.01253	0.0031	**5.6**
1440		7.0	24.2	3.73	3.3	3.2	0.01272	0.0013	**3.2**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	99.34	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	99.83
Weight of Dry Material (gm)	99.34		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/11/2008 Checked By GBM Date 7-15-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-11 #10 Split Hydro rev 8.xls]Sheet1*

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INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-12	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200

Sieve Sizes (mm)	USCS Summary	Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	53.73
Finer Than #200	*Silt & Clay*	46.27

USCS Symbol ***SM, TESTED (NON PLASTIC FINES)***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-12 #10 Split Hydro rev 8.xls]Sheet1*

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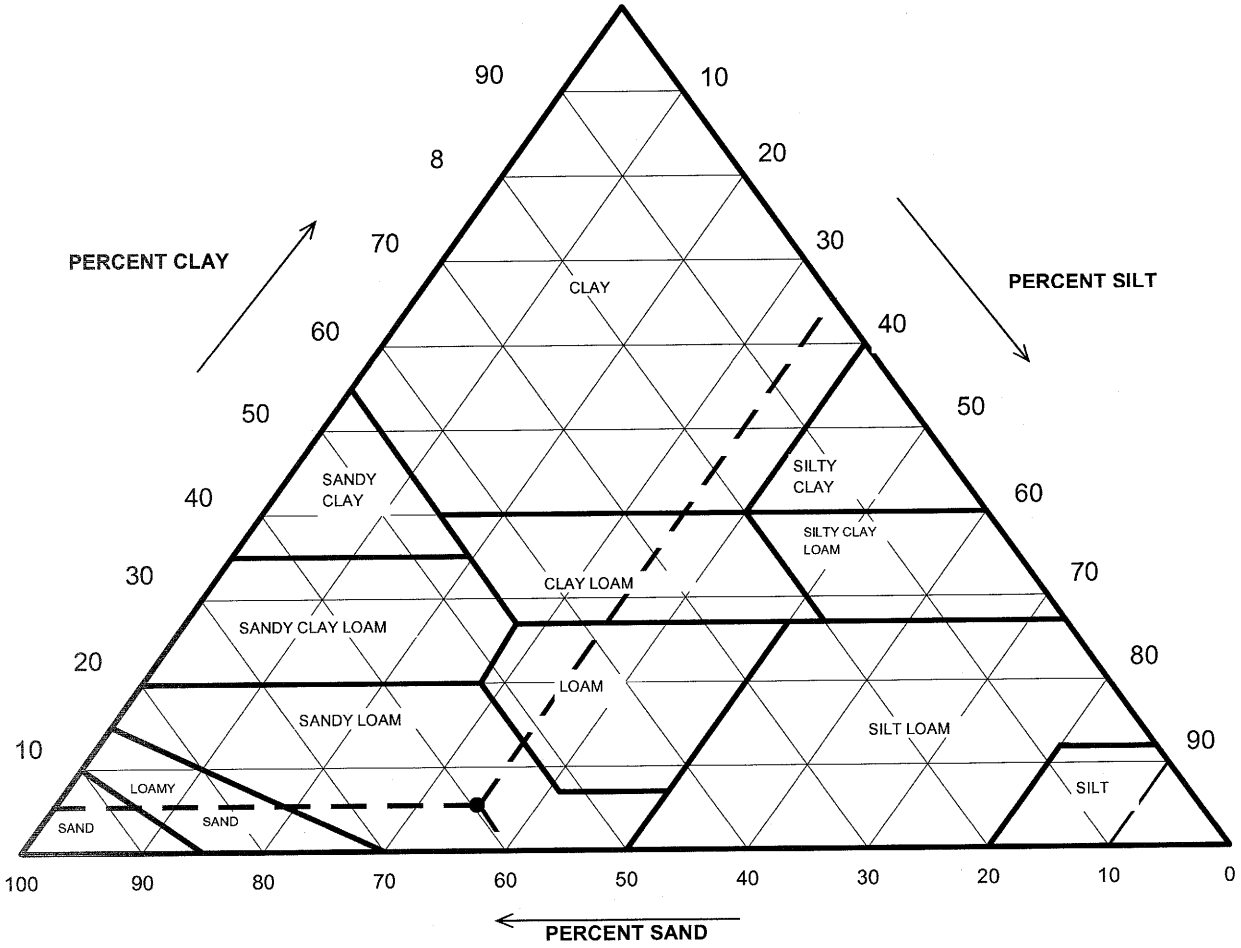
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-12	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	3.01	**0.00**
2	96.99	*Sand*	57.79	**59.58**
0.05	39.20	*Silt*	33.86	**34.91**
0.002	5.34	*Clay*	5.34	**5.51**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-12 #10 Split Hydro rev 8.xls]Sheet1

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-12	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	216	Tare No.	K-1
Wgt.Tare + Wet Soil (gm)	198.05	Wgt.Tare + Wet Soil (gm)	45.08
Wgt.Tare + Dry Soil (gm)	195.38	Wgt.Tare + Dry Soil (gm)	44.80
Weight of Tare (gm)	170.79	Weight of Tare (gm)	15.77
Weight of Water (gm)	2.67	Weight of Water (gm)	0.28
Weight of Dry Soil (gm)	24.59	Weight of Dry Soil (gm)	29.03
Moisture Content (%)	**10.9**	**Moisture Content (%)**	**1.0**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	27.26	Weight of the Dry Sample (gm)	123.67
Dry Weight +#10 Material(gm)	24.6	Weight of minus #200 material (gm)	47.26
Wet Weight Hydro. Material.(gm)	100.04	Weight of plus #200 material (gm)	76.41
Dry Weight Hydro. Material (gm)	99.08		
Total Dry Weight Sample (gm)	123.67	**J-FACTOR (%FINER THAN #10)**	**0.9699**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.74	3.01	3.01	96.99	**96.99**
#20	0.85	14.54	14.67	14.67	85.33	**82.76**
#40	0.425	10.44	10.54	25.21	74.79	**72.54**
#60	0.250	7.55	7.62	32.83	67.17	**65.15**
#140	0.106	13.36	13.48	46.31	53.69	**52.07**
#200	0.075	5.93	5.98	52.30	47.70	**46.27**
Pan	-	47.26	47.70	100.00	-	-

Notes :

Tested By SD Date 7/16/2008 Checked By GEM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-12 #10 Split Hydro rev 8.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-12	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	35.0	35.0	23.5	3.94	31.1	31.0	0.01290	0.0296	**30.1**
5		23.0	23.5	3.94	19.1	19.0	0.01290	0.0204	**18.5**
15		17.0	23.8	3.85	13.2	13.1	0.01285	0.0122	**12.7**
30		15.0	23.8	3.85	11.2	11.1	0.01285	0.0087	**10.8**
60		13.0	23.8	3.85	9.2	9.1	0.01285	0.0062	**8.9**
250		10.0	24.3	3.70	6.3	6.3	0.01278	0.0031	**6.1**
1440		8.0	25.8	3.27	4.7	4.7	0.01256	0.0013	**4.6**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	99.08	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	96.99
Weight of Dry Material (gm)	99.08		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/15/2008 Checked By GBM Date 7-21-08

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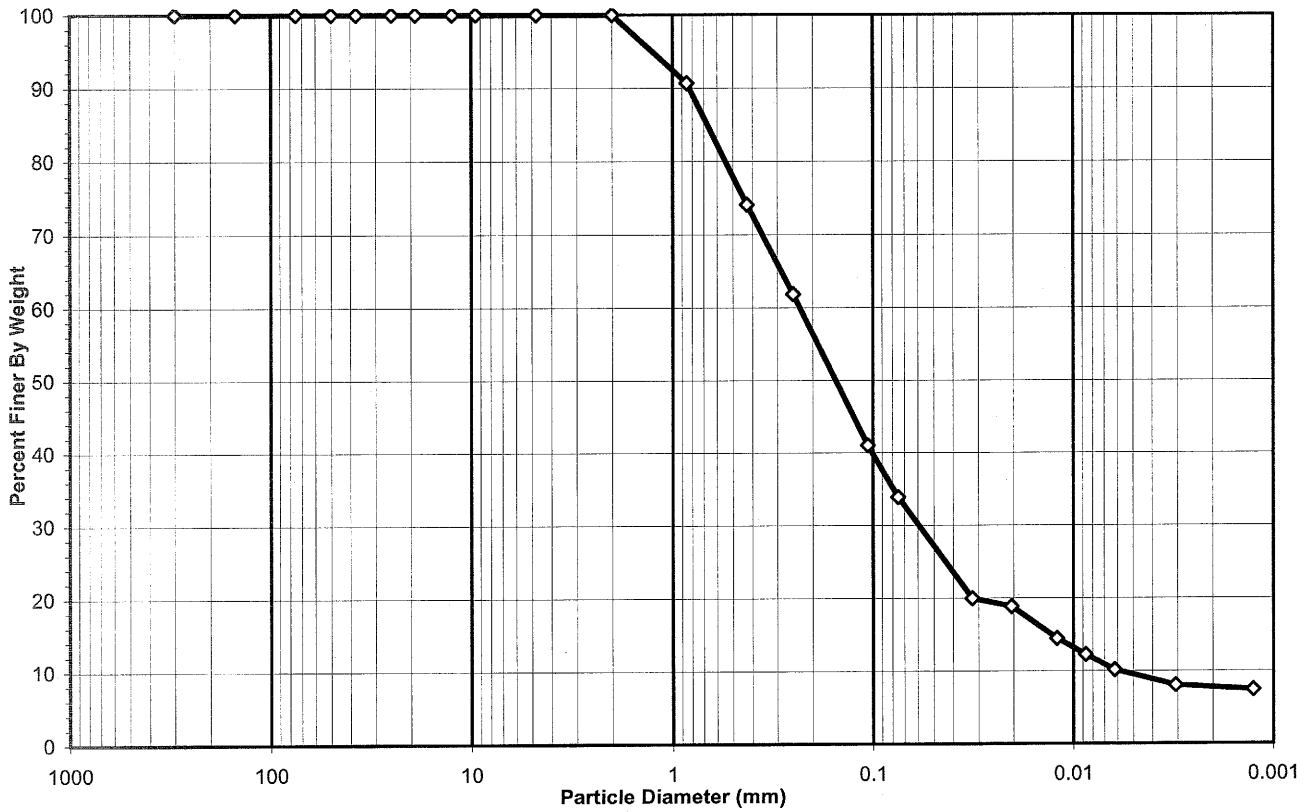
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-13	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	66.13
Finer Than #200	*Silt & Clay*	33.87

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-13 #10 Split Hydro rev 8.xls]Sheet1*

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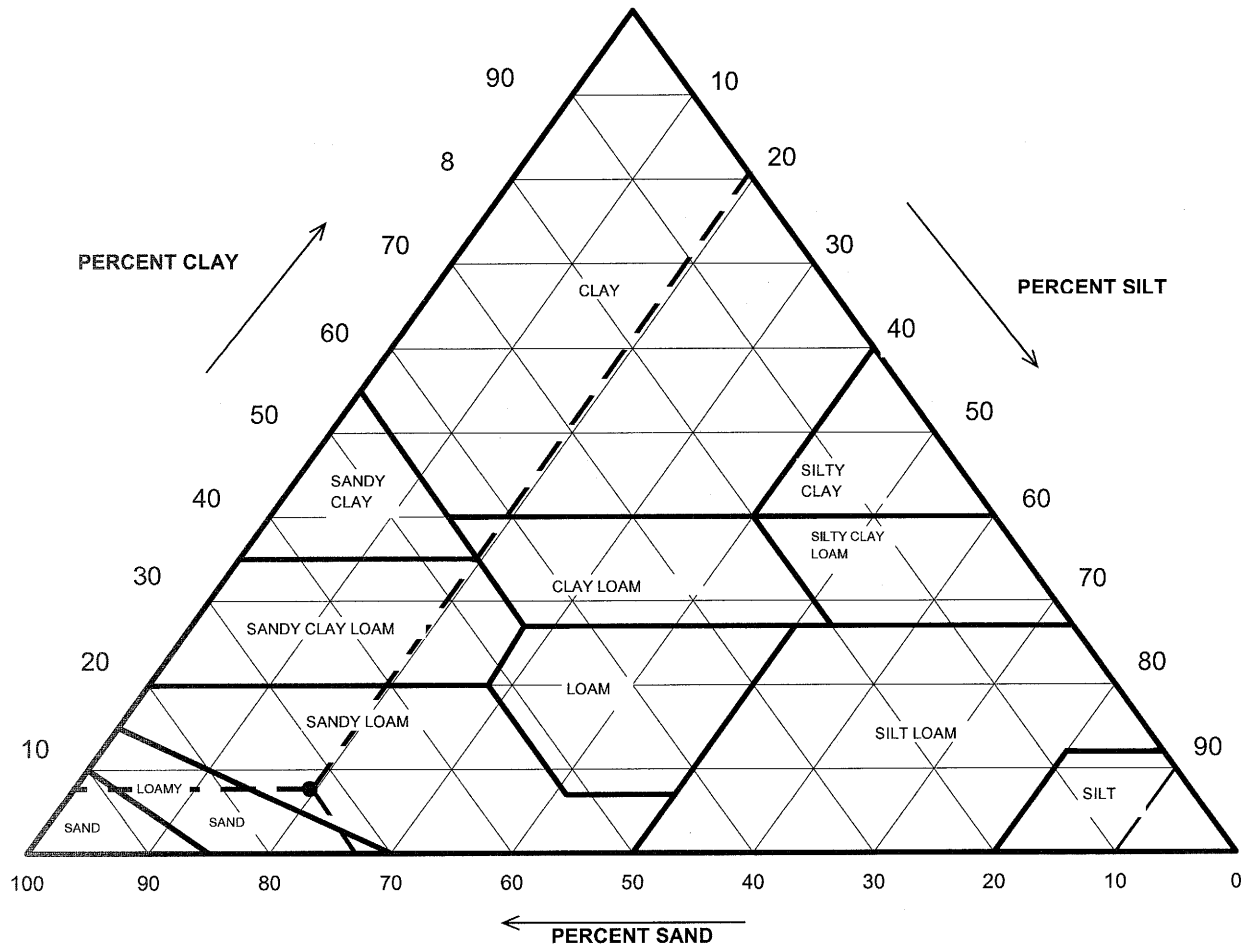
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-13	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.00	**0.00**
2	100.00	*Sand*	72.80	**72.80**
0.05	27.20	*Silt*	19.48	**19.48**
0.002	7.73	*Clay*	7.73	**7.73**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-13 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-13	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	318	Tare No.	M-1
Wgt.Tare + Wet Soil (gm)	273.68	Wgt.Tare + Wet Soil (gm)	49.21
Wgt.Tare + Dry Soil (gm)	258.53	Wgt.Tare + Dry Soil (gm)	45.77
Weight of Tare (gm)	207.63	Weight of Tare (gm)	15.89
Weight of Water (gm)	15.15	Weight of Water (gm)	3.44
Weight of Dry Soil (gm)	50.90	Weight of Dry Soil (gm)	29.88
Moisture Content (%)	**29.8**	**Moisture Content (%)**	**11.5**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	66.05	Weight of the Dry Sample (gm)	140.58
Dry Weight +#10 Material(gm)	50.9	Weight of minus #200 material (gm)	30.38
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	110.20
Dry Weight Hydro. Material (gm)	89.68		
Total Dry Weight Sample (gm)	140.58	**J-FACTOR (%FINER THAN #10)**	**1.0000**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.00	0.00	0.00	100.00	**100.00**
#20	0.85	8.40	9.37	9.37	90.63	**90.63**
#40	0.425	14.84	16.55	25.92	74.08	**74.08**
#60	0.250	10.99	12.26	38.17	61.83	**61.83**
#140	0.106	18.66	20.81	58.98	41.02	**41.02**
#200	0.075	6.41	7.15	66.13	33.87	**33.87**
Pan	-	30.38	33.87	100.00	-	-

Notes :

Tested By SD Date 7/16/2008 Checked By GEM Date 7-16-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-13 #10 Split Hydro rev 8.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-13	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	22.0	22.0	23.8	3.85	18.2	20.0	0.01278	0.0322	**20.0**
5		21.0	23.8	3.85	17.2	18.9	0.01278	0.0205	**18.9**
15		17.0	23.8	3.85	13.2	14.5	0.01278	0.0121	**14.5**
30		15.0	23.8	3.85	11.2	12.3	0.01278	0.0087	**12.3**
60		13.0	24.0	3.79	9.2	10.1	0.01275	0.0062	**10.1**
250		11.0	24.3	3.70	7.3	8.0	0.01270	0.0031	**8.0**
1440		10.0	25.8	3.27	6.7	7.4	0.01249	0.0013	**7.4**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	89.68	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	100.00
Weight of Dry Material (gm)	89.68		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/15/2008 Checked By GEM Date 7-16-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-13 #10 Split Hydro rev 8.xls]Sheet1*

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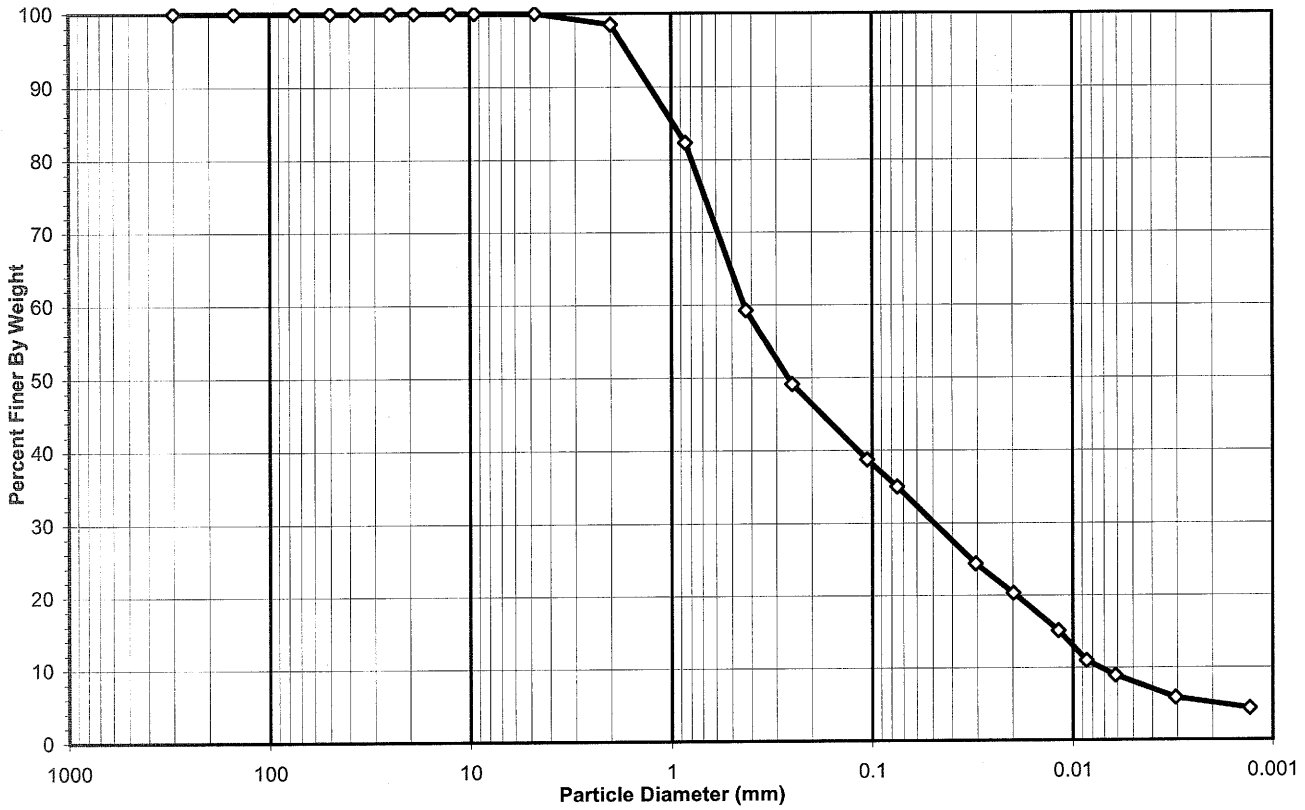
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-16
Project No.	2008-598-01	Sample No.	S-4
Lab ID	2008-598-01-14	Soil Color	**LIGHT BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	65.00
Finer Than #200	*Silt & Clay*	35.00

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-14 #10 Split Hydro rev 8.xls]Sheet1*

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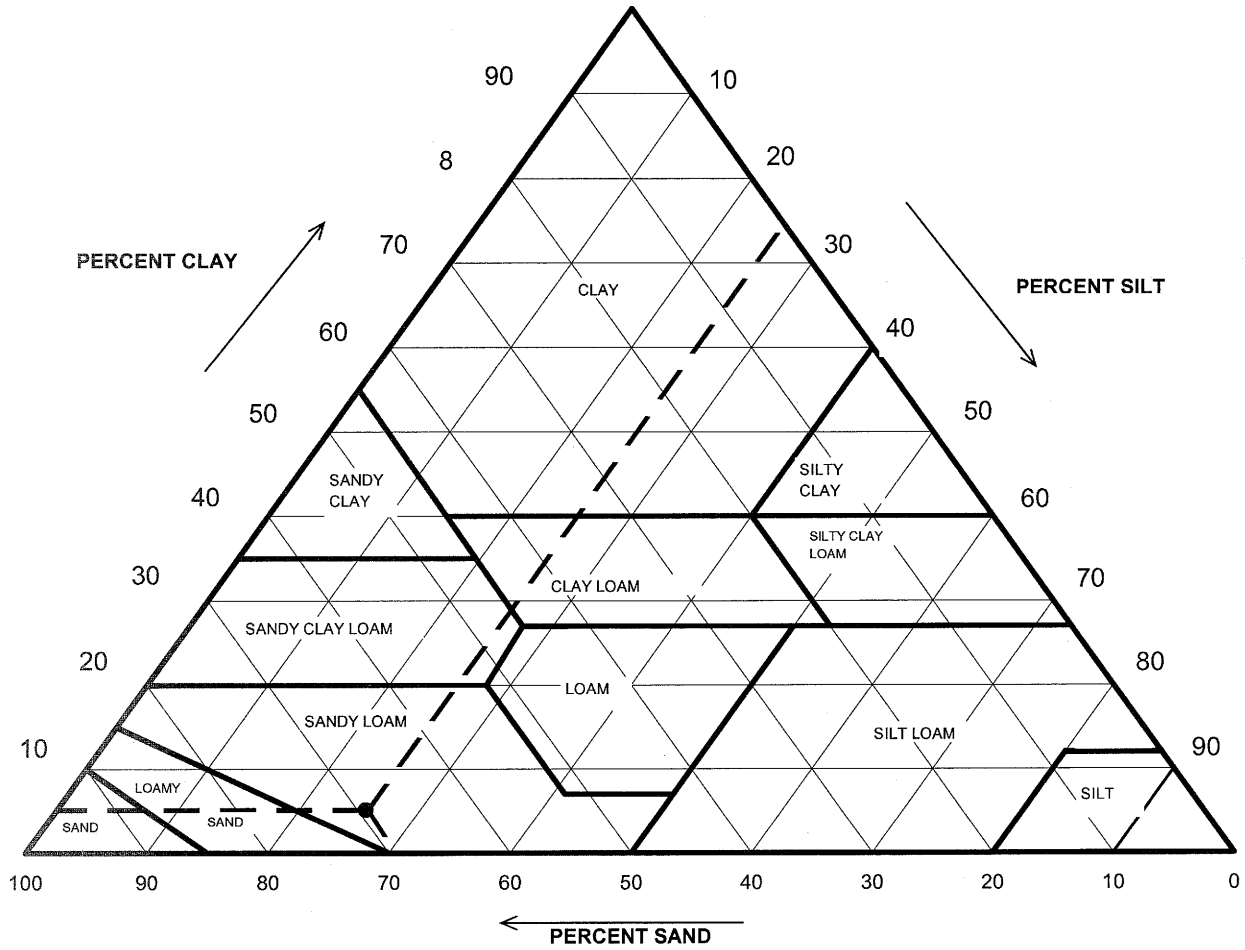
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-16
Project No.	2008-598-01	Sample No.	S-4
Lab ID	2008-598-01-14	Soil Color	LIGHT BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	1.49	**0.00**
2	98.51	*Sand*	68.29	**69.32**
0.05	30.22	*Silt*	25.13	**25.51**
0.002	5.09	*Clay*	5.09	**5.17**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-14 #10 Split Hydro rev 8.xls]Sheet1

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-16
Project No.	2008-598-01	Sample No.	S-4
Lab ID	2008-598-01-14	Soil Color	**LIGHT BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	319	Tare No.	P-1
Wgt.Tare + Wet Soil (gm)	249.17	Wgt.Tare + Wet Soil (gm)	47.48
Wgt.Tare + Dry Soil (gm)	243.13	Wgt.Tare + Dry Soil (gm)	45.62
Weight of Tare (gm)	208.98	Weight of Tare (gm)	15.72
Weight of Water (gm)	6.04	Weight of Water (gm)	1.86
Weight of Dry Soil (gm)	34.15	Weight of Dry Soil (gm)	29.90
Moisture Content (%)	**17.7**	**Moisture Content (%)**	**6.2**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	40.19	Weight of the Dry Sample (gm)	128.29
Dry Weight +#10 Material(gm)	34.2	Weight of minus #200 material (gm)	33.45
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	94.84
Dry Weight Hydro. Material (gm)	94.14		
Total Dry Weight Sample (gm)	128.29	**J-FACTOR (%FINER THAN #10)**	**0.9851**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.51	1.49	1.49	98.51	**98.51**
#20	0.85	15.44	16.40	16.40	83.60	**82.35**
#40	0.425	22.07	23.44	39.84	60.16	**59.26**
#60	0.250	9.72	10.32	50.17	49.83	**49.09**
#140	0.106	9.88	10.49	60.66	39.34	**38.75**
#200	0.075	3.58	3.80	64.47	35.53	**35.00**
Pan	-	33.45	35.53	100.00	-	-

Notes :

Tested By SD Date 7/14/2008 Checked By GBM Date 7-15-08

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-16
Project No.	2008-598-01	Sample No.	S-4
Lab ID	2008-598-01-14	Soil Color	**LIGHT BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	27.0	27.0	25.5	3.35	23.6	24.8	0.01253	0.0305	**24.4**
5		23.0	25.5	3.35	19.6	20.6	0.01253	0.0198	**20.3**
15		18.0	25.5	3.35	14.6	15.3	0.01253	0.0118	**15.1**
30		14.0	25.5	3.35	10.6	11.1	0.01253	0.0086	**11.0**
60		12.0	25.5	3.35	8.6	9.1	0.01253	0.0061	**8.9**
250		9.0	25.5	3.35	5.6	5.9	0.01253	0.0031	**5.8**
1440		8.0	24.0	3.79	4.2	4.4	0.01275	0.0013	**4.3**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	94.14	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	98.51
Weight of Dry Material (gm)	94.14		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/11/2008 Checked By GEM Date 7-15-08

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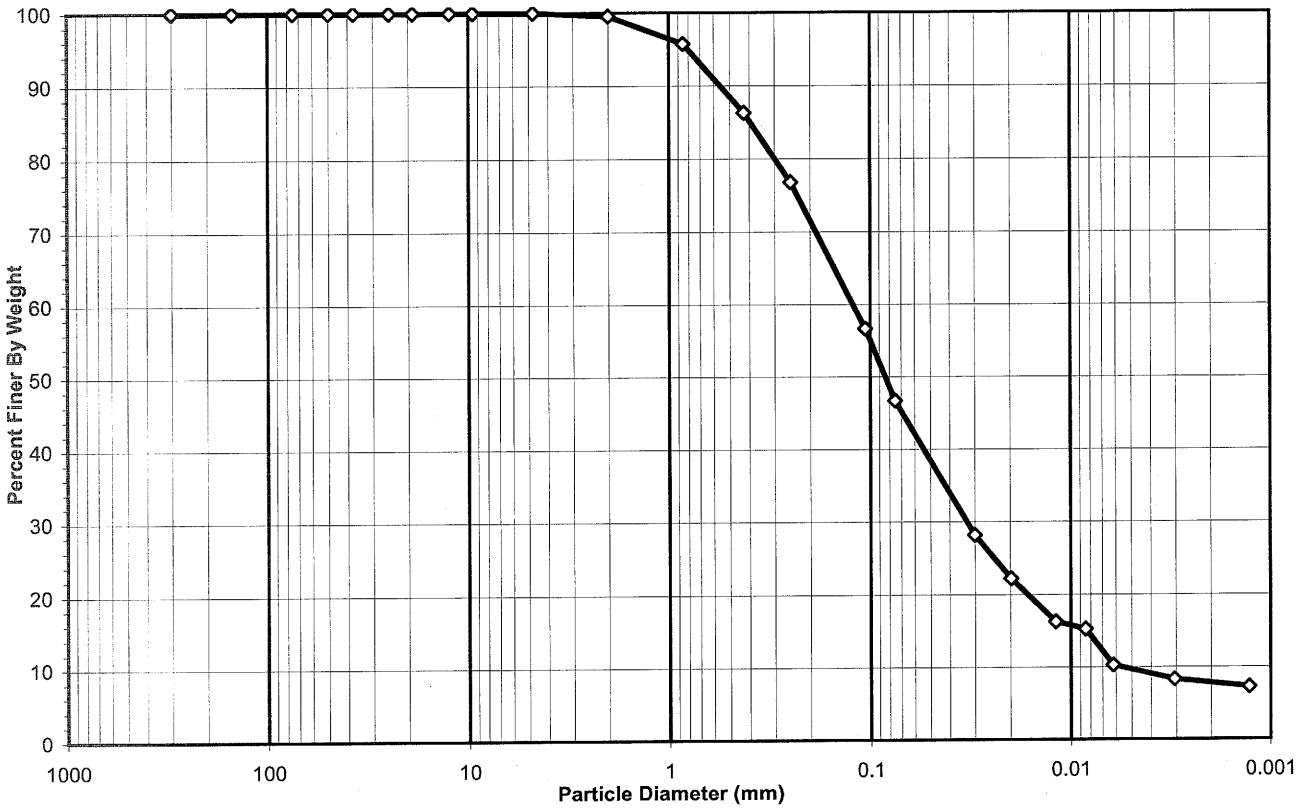
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-15	Soil Color	**LIGHT BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	53.31
Finer Than #200	*Silt & Clay*	46.69

USCS Symbol ***SM, TESTED (NON PLASTIC FINES)***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-15 #10 Split Hydro rev 8.xls]Sheet1*

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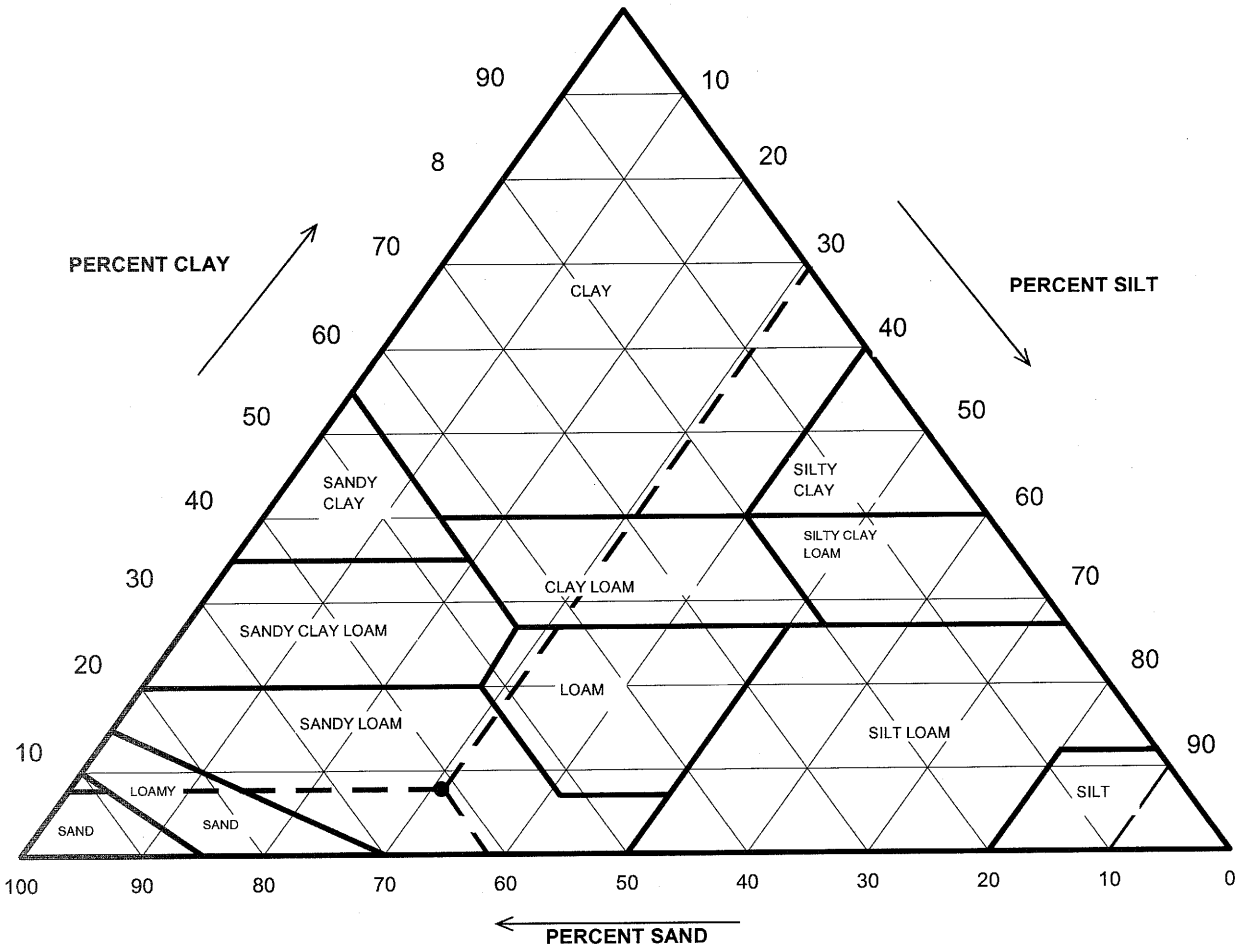
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-15	Soil Color	LIGHT BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.42	**0.00**
2	99.58	*Sand*	61.09	**61.35**
0.05	38.49	*Silt*	30.70	**30.83**
0.002	7.79	*Clay*	7.79	**7.83**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-15 #10 Split Hydro rev 8.xls]Sheet1

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-15	Soil Color	**LIGHT BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	P-12	Tare No.	F-1
Wgt.Tare + Wet Soil (gm)	259.84	Wgt.Tare + Wet Soil (gm)	58.77
Wgt.Tare + Dry Soil (gm)	256.24	Wgt.Tare + Dry Soil (gm)	58.45
Weight of Tare (gm)	196.42	Weight of Tare (gm)	21.97
Weight of Water (gm)	3.60	Weight of Water (gm)	0.32
Weight of Dry Soil (gm)	59.82	Weight of Dry Soil (gm)	36.48
Moisture Content (%)	**6.0**	**Moisture Content (%)**	**0.9**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	63.42	Weight of the Dry Sample (gm)	158.99
Dry Weight +#10 Material(gm)	59.8	Weight of minus #200 material (gm)	46.50
Wet Weight Hydro. Material.(gm)	100.04	Weight of plus #200 material (gm)	112.49
Dry Weight Hydro. Material (gm)	99.17		
Total Dry Weight Sample (gm)	158.99	**J-FACTOR (%FINER THAN #10)**	**0.9958**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.25	0.42	0.42	99.58	**99.58**
#20	0.85	3.84	3.87	3.87	96.13	**95.73**
#40	0.425	9.39	9.47	13.34	86.66	**86.30**
#60	0.250	9.45	9.53	22.87	77.13	**76.81**
#140	0.106	20.08	20.25	43.12	56.88	**56.64**
#200	0.075	9.91	9.99	53.11	46.89	**46.69**
Pan	-	46.50	46.89	100.00	-	**-**

Notes :

Tested By SD Date 7/18/2008 Checked By GBM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-15 #10 Split Hydro rev 8.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-15	Soil Color	**LIGHT BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	32.0	32.0	24.4	3.67	28.3	28.3	0.01276	0.0300	**28.2**
5		26.0	24.4	3.67	22.3	22.3	0.01276	0.0198	**22.2**
15		20.0	24.4	3.67	16.3	16.3	0.01276	0.0119	**16.2**
30		19.0	24.4	3.67	15.3	15.3	0.01276	0.0085	**15.2**
60		14.0	24.4	3.67	10.3	10.3	0.01276	0.0062	**10.3**
250		12.0	24.5	3.65	8.4	8.3	0.01275	0.0031	**8.3**
1440		11.0	24.3	3.70	7.3	7.3	0.01278	0.0013	**7.3**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	99.17	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	99.58
Weight of Dry Material (gm)	99.17		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/16/2008 Checked By GEM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-15 #10 Split Hydro rev 8.xls]Sheet1*

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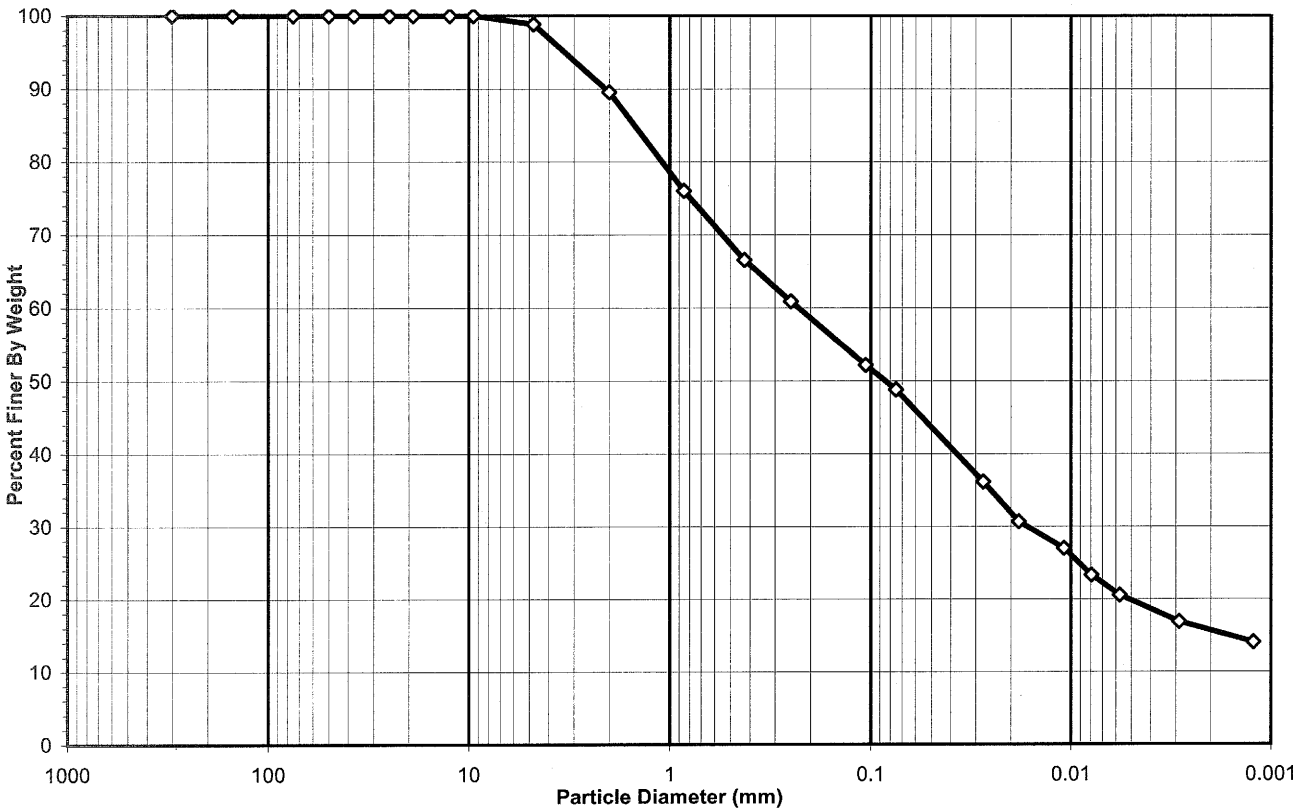
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-16	Soil Color	**REDDISH BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	1.14
#4 To #200	*Sand*	50.09
Finer Than #200	*Silt & Clay*	48.78

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-16 #10 Split Hydro rev 8.xls]Sheet1*

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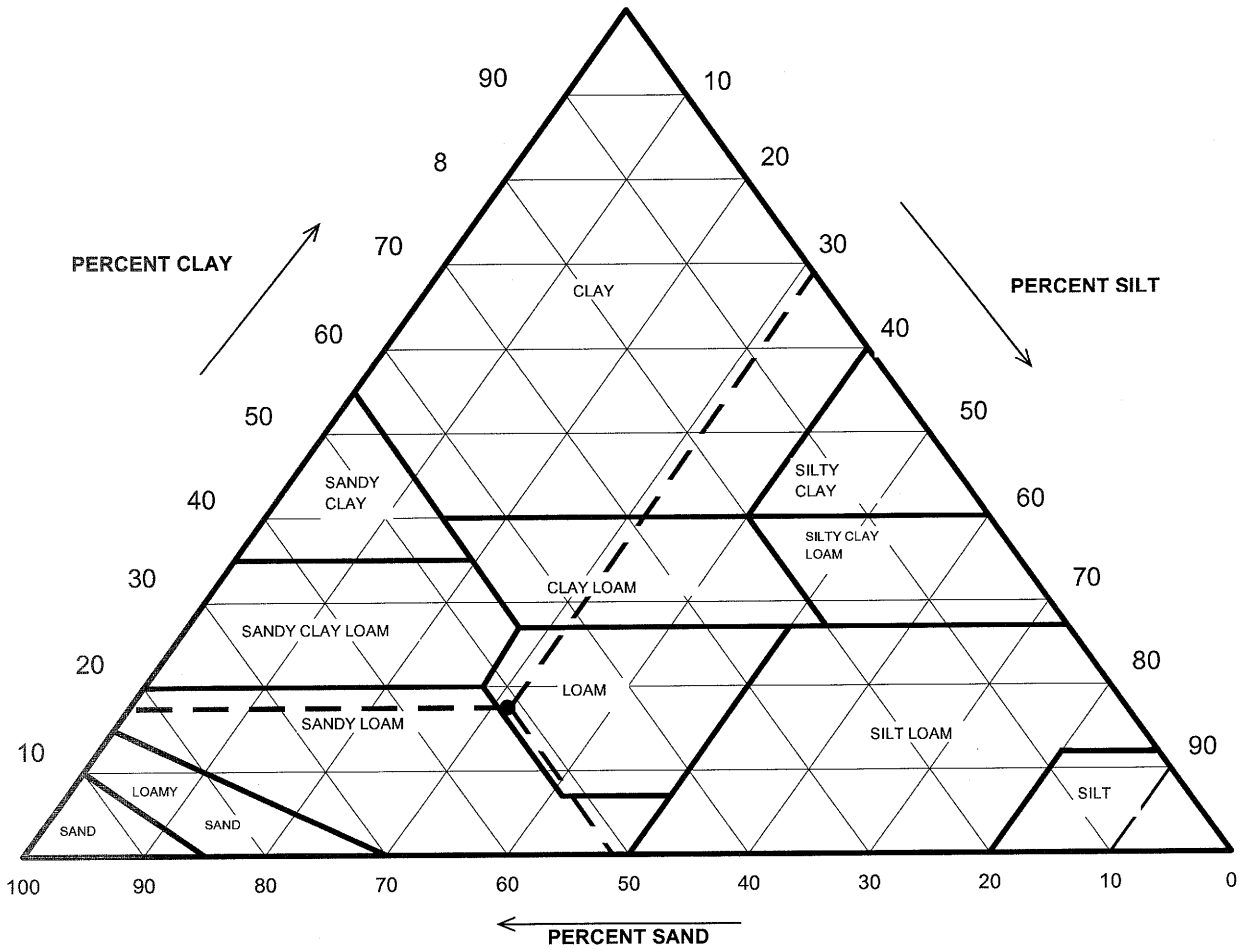
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-16	Soil Color	REDDISH BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	10.46	**0.00**
2	89.54	*Sand*	45.85	**51.21**
0.05	43.69	*Silt*	28.02	**31.29**
0.002	15.67	*Clay*	15.67	**17.50**

USDA Classification: ***LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-16 #10 Split Hydro rev 8.xls]Sheet1

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-16	Soil Color	**REDDISH BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	820	Tare No.	F-2
Wgt.Tare + Wet Soil (gm)	285.28	Wgt.Tare + Wet Soil (gm)	39.98
Wgt.Tare + Dry Soil (gm)	270.46	Wgt.Tare + Dry Soil (gm)	39.34
Weight of Tare (gm)	208.06	Weight of Tare (gm)	22.15
Weight of Water (gm)	14.82	Weight of Water (gm)	0.64
Weight of Dry Soil (gm)	62.40	Weight of Dry Soil (gm)	17.19
Moisture Content (%)	**23.8**	**Moisture Content (%)**	**3.7**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	77.22	Weight of the Dry Sample (gm)	158.81
Dry Weight +#10 Material(gm)	62.4	Weight of minus #200 material (gm)	52.52
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	106.29
Dry Weight Hydro. Material (gm)	96.41		
Total Dry Weight Sample (gm)	158.81	**J-FACTOR (%FINER THAN #10)**	**0.8954**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.71	1.14	1.14	98.86	**98.86**
#10	2.00	5.82	9.33	10.46	89.54	**89.54**
#20	0.85	14.57	15.11	15.11	84.89	**76.00**
#40	0.425	10.19	10.57	25.68	74.32	**66.54**
#60	0.250	6.10	6.33	32.01	67.99	**60.88**
#140	0.106	9.40	9.75	41.76	58.24	**52.15**
#200	0.075	3.63	3.77	45.52	54.48	**48.78**
Pan	-	52.52	54.48	100.00	-	-

Notes :

Tested By SD Date 7/18/2008 Checked By GEM Date 7-21-08

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-16	Soil Color	**REDDISH BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	43.0	43.0	24.4	3.67	39.3	40.4	0.01276	0.0274	**36.2**
5		37.0	24.4	3.67	33.3	34.2	0.01276	0.0183	**30.6**
15		33.0	24.4	3.67	29.3	30.1	0.01276	0.0109	**27.0**
30		29.0	24.4	3.67	25.3	26.0	0.01276	0.0079	**23.3**
60		26.0	24.4	3.67	22.3	22.9	0.01276	0.0057	**20.5**
250		22.0	24.4	3.67	18.3	18.8	0.01276	0.0029	**16.8**
1440		19.0	24.3	3.70	15.3	15.7	0.01278	0.0012	**14.1**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	96.41	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	89.54
Weight of Dry Material (gm)	96.41		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/16/2008 Checked By GEM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-16 #10 Split Hydro rev 8.xls]Sheet1*

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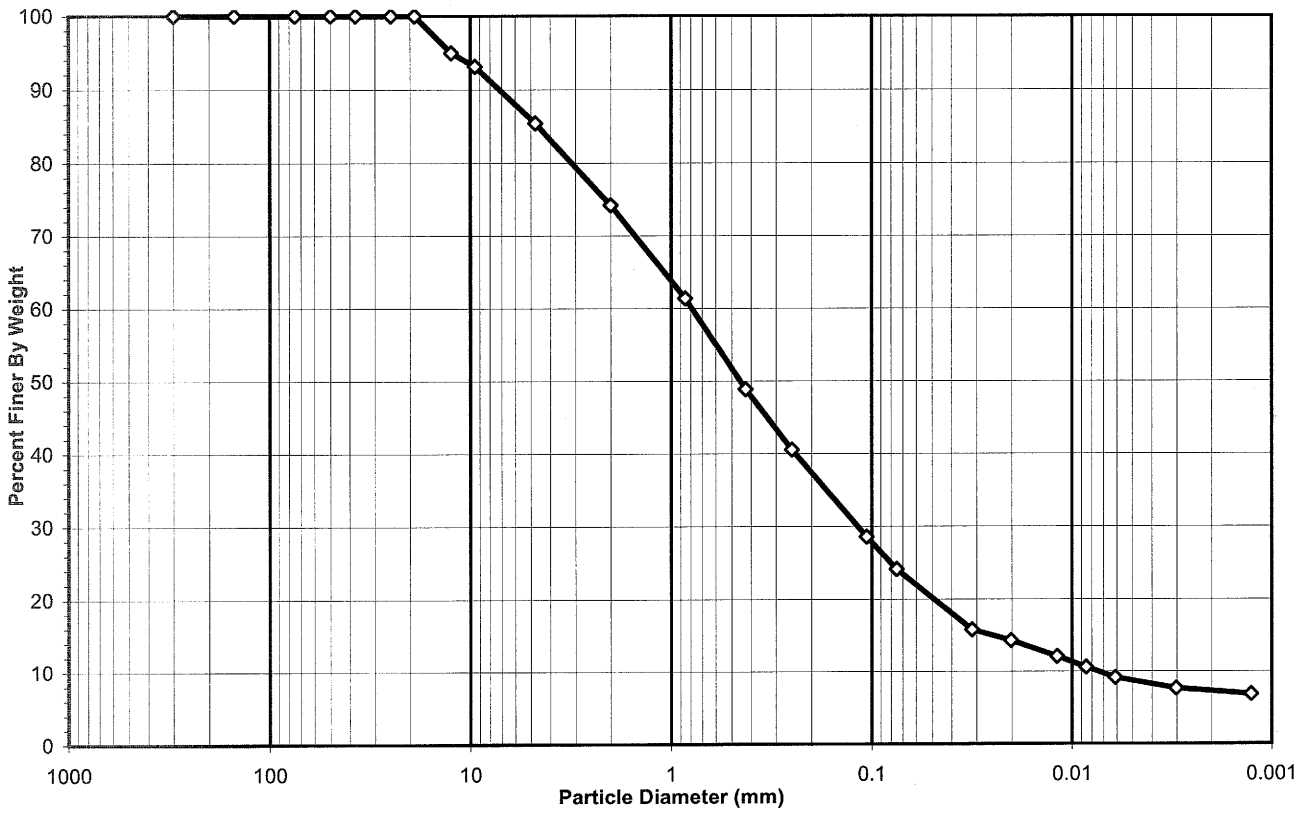
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-17	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	14.58
#4 To #200	*Sand*	61.32
Finer Than #200	*Silt & Clay*	24.11

USCS Symbol ***SM, TESTED (NON PLASTIC FINES)***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-17 #10 Split Hydro rev 8.xls]Sheet1*

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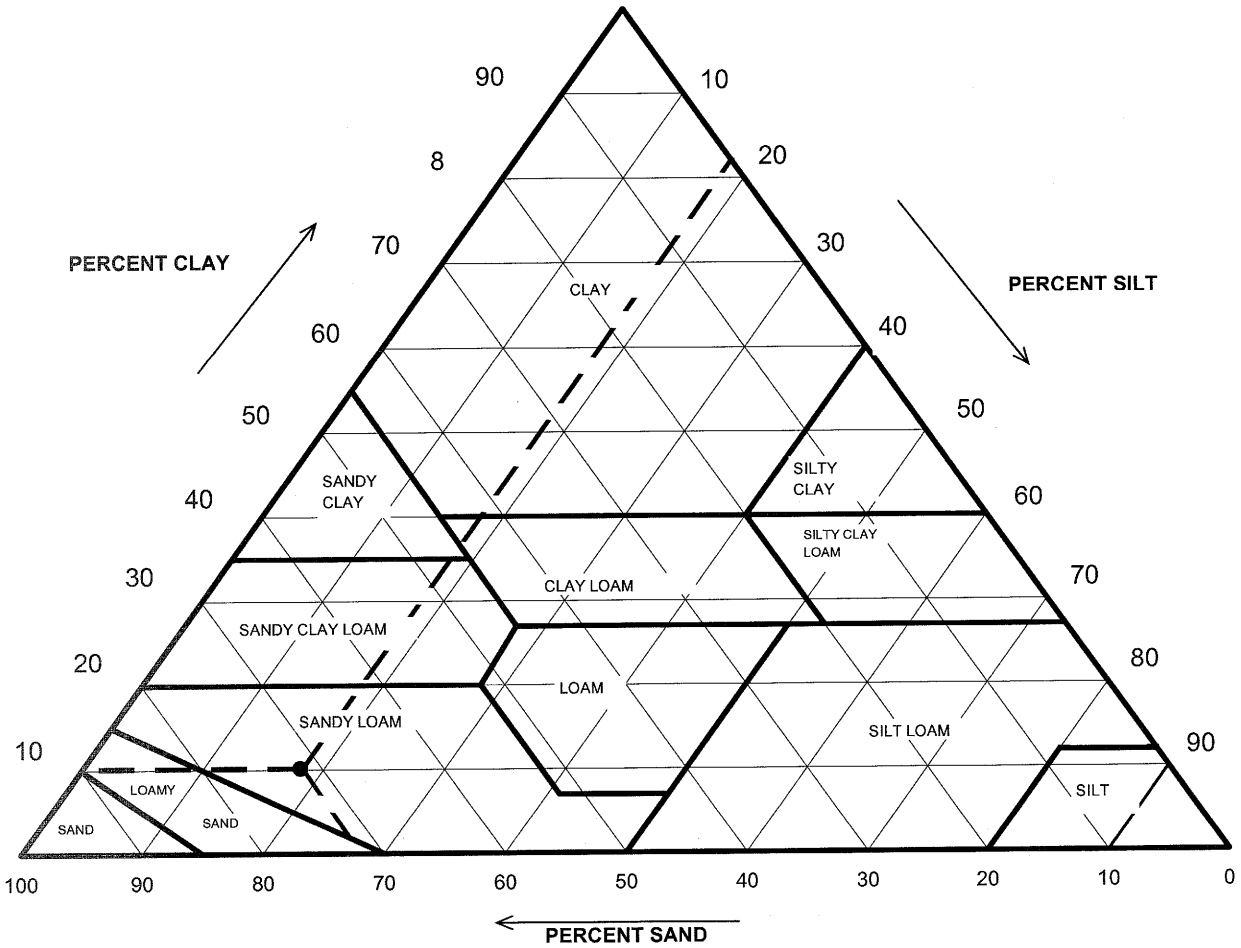
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-17	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	25.79	**0.00**
2	74.21	*Sand*	53.28	**71.80**
0.05	20.93	*Silt*	13.40	**18.05**
0.002	7.53	*Clay*	7.53	**10.15**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-17 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-17	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	316	Tare No.	R-1
Wgt.Tare + Wet Soil (gm)	297.96	Wgt.Tare + Wet Soil (gm)	49.88
Wgt.Tare + Dry Soil (gm)	292.58	Wgt.Tare + Dry Soil (gm)	49.66
Weight of Tare (gm)	208.13	Weight of Tare (gm)	15.66
Weight of Water (gm)	5.38	Weight of Water (gm)	0.22
Weight of Dry Soil (gm)	84.45	Weight of Dry Soil (gm)	34.00
Moisture Content (%)	**6.4**	**Moisture Content (%)**	**0.6**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	89.83	Weight of the Dry Sample (gm)	183.81
Dry Weight +#10 Material(gm)	84.5	Weight of minus #200 material (gm)	32.28
Wet Weight Hydro. Material.(gm)	100.00	Weight of plus #200 material (gm)	151.53
Dry Weight Hydro. Material (gm)	99.36		
Total Dry Weight Sample (gm)	183.81	**J-FACTOR (%FINER THAN #10)**	**0.7421**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	4.27	5.06	5.06	94.94	**94.94**
3/8"	9.50	1.54	1.82	6.88	93.12	**93.12**
#4	4.75	6.50	7.70	14.58	85.42	**85.42**
#10	2.00	9.47	11.21	25.79	74.21	**74.21**
#20	0.85	17.20	17.31	17.31	82.69	**61.36**
#40	0.425	16.77	16.88	34.19	65.81	**48.84**
#60	0.250	11.14	11.21	45.40	54.60	**40.52**
#140	0.106	16.03	16.13	61.54	38.46	**28.54**
#200	0.075	5.94	5.98	67.51	32.49	**24.11**
Pan	-	32.28	32.49	100.00	-	-

Notes :

Tested By SD Date 7/18/2008 Checked By GDM Date 7-21-08

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Geotechnics
INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-17	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	25.0	25.0	24.4	3.67	21.3	21.2	0.01276	0.0315	**15.8**
5		23.0	24.4	3.67	19.3	19.3	0.01276	0.0202	**14.3**
15		20.0	24.4	3.67	16.3	16.3	0.01276	0.0119	**12.1**
30		18.0	24.4	3.67	14.3	14.3	0.01276	0.0085	**10.6**
60		16.0	24.4	3.67	12.3	12.3	0.01276	0.0061	**9.1**
250		14.0	24.5	3.65	10.4	10.3	0.01275	0.0030	**7.7**
1440		13.0	24.2	3.73	9.3	9.2	0.01279	0.0013	**6.9**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	99.36	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	74.21
Weight of Dry Material (gm)	99.36		
		Specific Gravity	2.7 Assumed

Note: *(JAR SAMPLE CONTAINED SOME +3/4 INCH MATERIAL- NOT ENOUGH SAMPLE)*

Tested By JBD Date 7/16/2008 Checked By GEM Date 7-21-08

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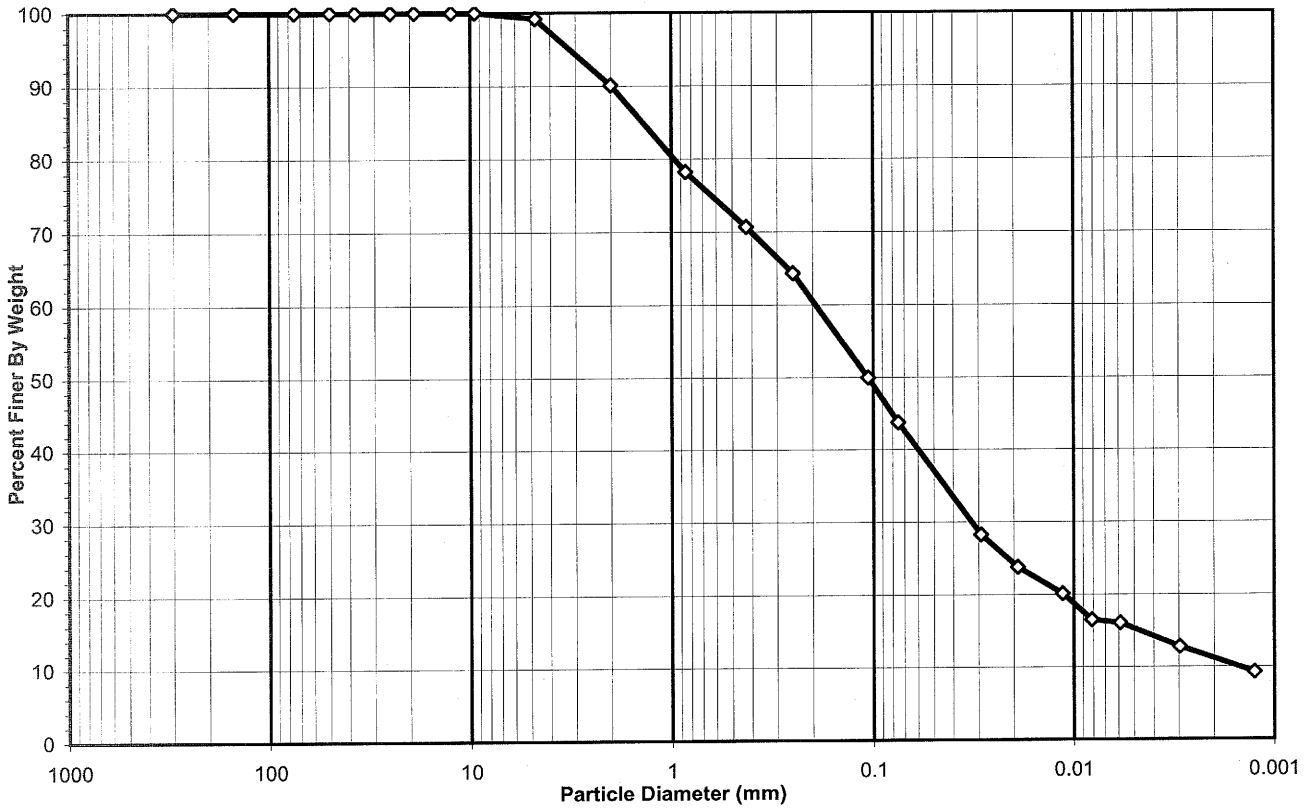
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-625
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-5
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-18	Soil Color	**TAN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.81
#4 To #200	*Sand*	55.45
Finer Than #200	*Silt & Clay*	43.74

USCS Symbol ***sm, ASSUMED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-18 #10 Split Hydro rev 8.xls]Sheet1*

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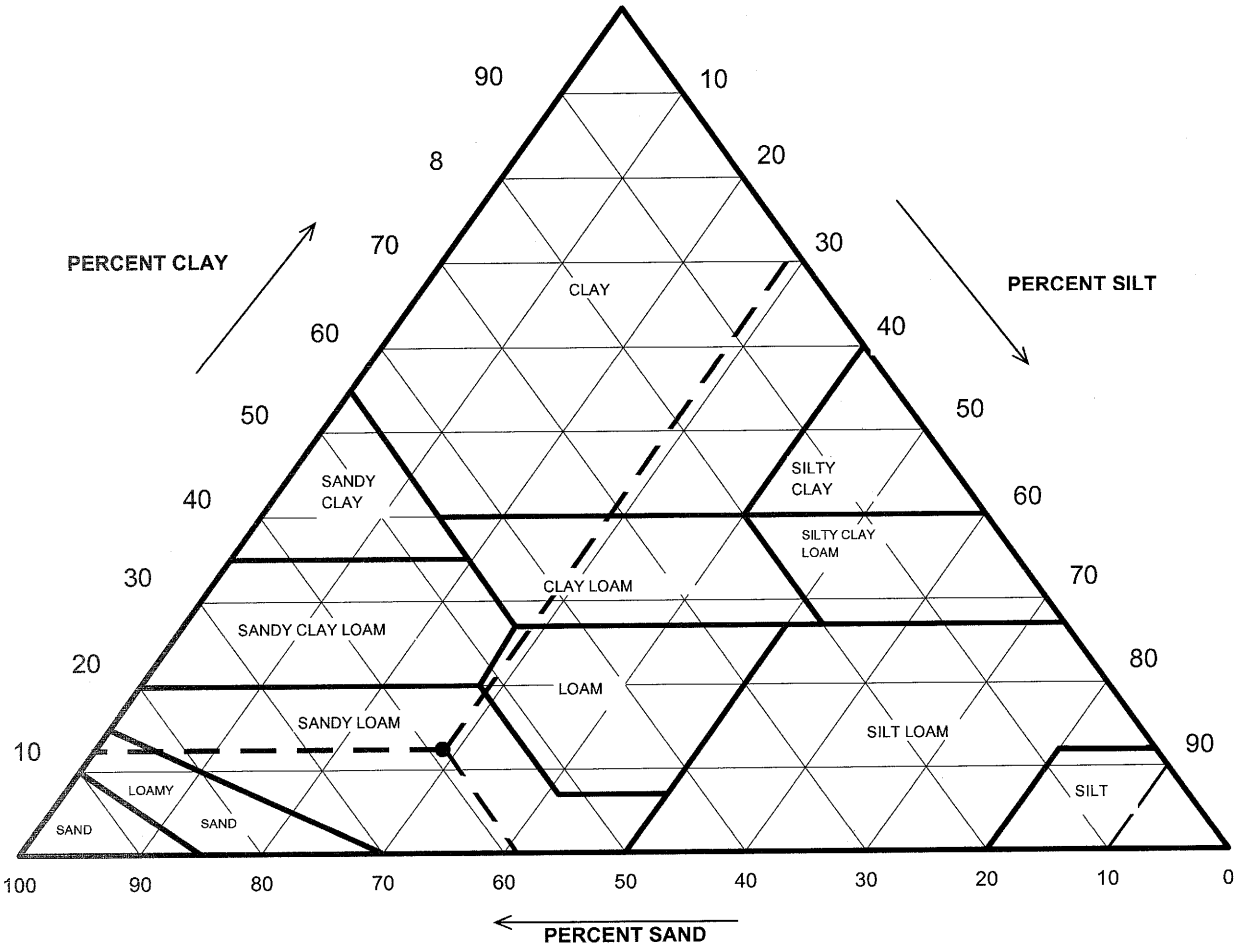
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-625
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-5
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-18	Soil Color	TAN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	9.93	**0.00**
2	90.07	*Sand*	52.97	**58.82**
0.05	37.09	*Silt*	25.91	**28.76**
0.002	11.19	*Clay*	11.19	**12.42**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-18 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-625
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-5
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-18	Soil Color	**TAN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	209	Tare No.	E-2
Wgt.Tare + Wet Soil (gm)	234.77	Wgt.Tare + Wet Soil (gm)	54.50
Wgt.Tare + Dry Soil (gm)	230.92	Wgt.Tare + Dry Soil (gm)	54.00
Weight of Tare (gm)	171.71	Weight of Tare (gm)	21.97
Weight of Water (gm)	3.85	Weight of Water (gm)	0.50
Weight of Dry Soil (gm)	59.21	Weight of Dry Soil (gm)	32.03
Moisture Content (%)	**6.5**	**Moisture Content (%)**	**1.6**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	63.06	Weight of the Dry Sample (gm)	157.65
Dry Weight +#10 Material(gm)	59.2	Weight of minus #200 material (gm)	47.80
Wet Weight Hydro. Material.(gm)	99.98	Weight of plus #200 material (gm)	109.85
Dry Weight Hydro. Material (gm)	98.44		
Total Dry Weight Sample (gm)	157.65	**J-FACTOR (%FINER THAN #10)**	**0.9007**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.48	0.81	0.81	99.19	**99.19**
#10	2.00	5.40	9.12	9.93	90.07	**90.07**
#20	0.85	12.97	13.18	13.18	86.82	**78.20**
#40	0.425	8.25	8.38	21.56	78.44	**70.65**
#60	0.250	6.97	7.08	28.64	71.36	**64.28**
#140	0.106	15.70	15.95	44.58	55.42	**49.91**
#200	0.075	6.75	6.86	51.44	48.56	**43.74**
Pan	-	47.80	48.56	100.00	-	-

Notes :

Tested By SD Date 7/15/2008 Checked By GEM Date 7-15-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-18 #10 Split Hydro rev 8.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-625
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-5
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-18	Soil Color	**TAN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	35.0	35.0	24.4	3.67	31.3	31.4	0.01269	0.0292	**28.3**
5		30.0	24.5	3.65	26.4	26.4	0.01267	0.0191	**23.8**
15		26.0	24.3	3.70	22.3	22.3	0.01270	0.0114	**20.1**
31		22.0	24.3	3.70	18.3	18.3	0.01270	0.0081	**16.5**
60		21.5	24.3	3.70	17.8	17.8	0.01270	0.0059	**16.1**
250		18.0	23.9	3.82	14.2	14.2	0.01276	0.0029	**12.8**
1440		14.0	24.2	3.73	10.3	10.3	0.01272	0.0013	**9.3**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	98.44	a - Factor	0.986
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	90.07
Weight of Dry Material (gm)	98.44		
		Specific Gravity	2.72 Assumed

Note:

Tested By JBD Date 7/14/2008 Checked By GBM Date 7-15-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-18 #10 Split Hydro rev 8.xls]Sheet1*

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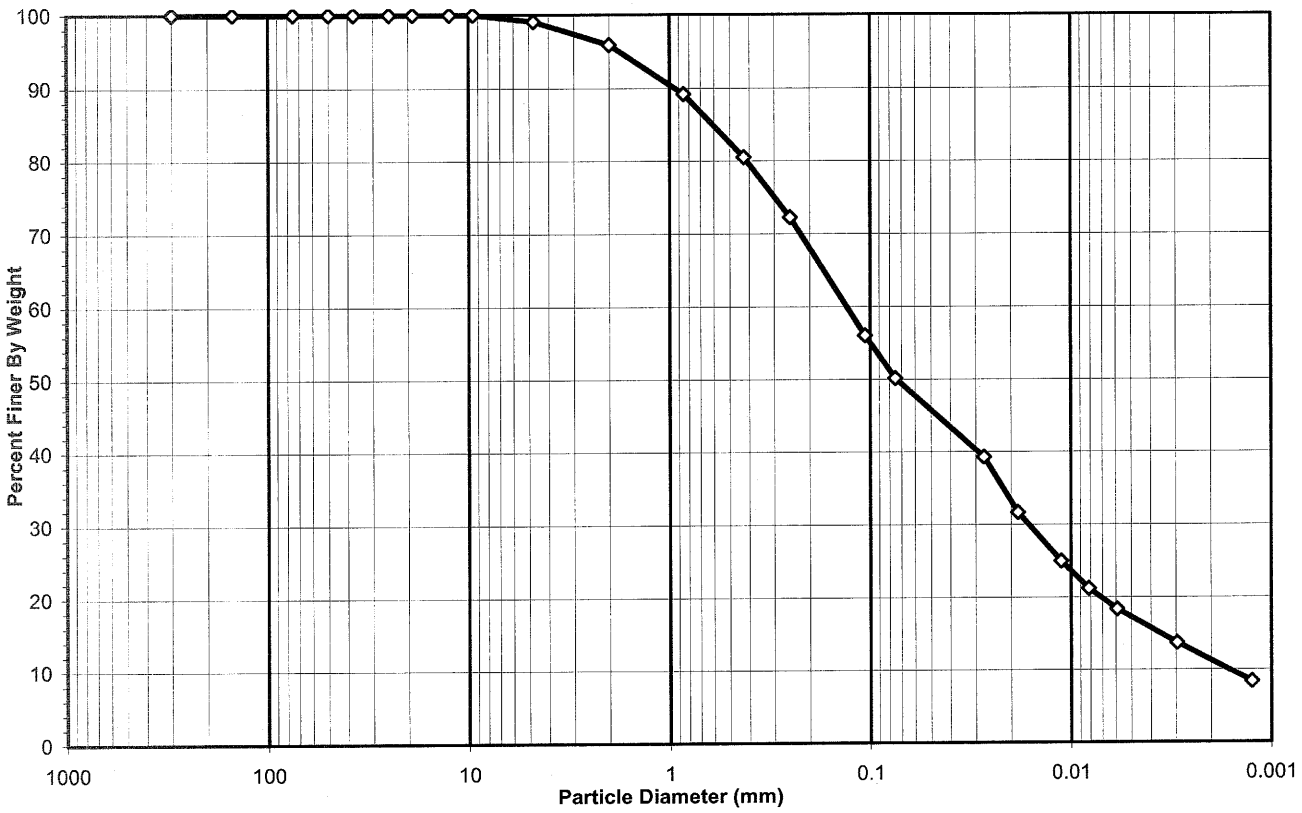
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-1
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-19	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.93
#4 To #200	*Sand*	48.94
Finer Than #200	*Silt & Clay*	50.13

USCS Symbol ***ML, TESTED***

USCS Classification ***SANDY SILT***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-19 #10 Split Hydro rev 8.xls]Sheet1*

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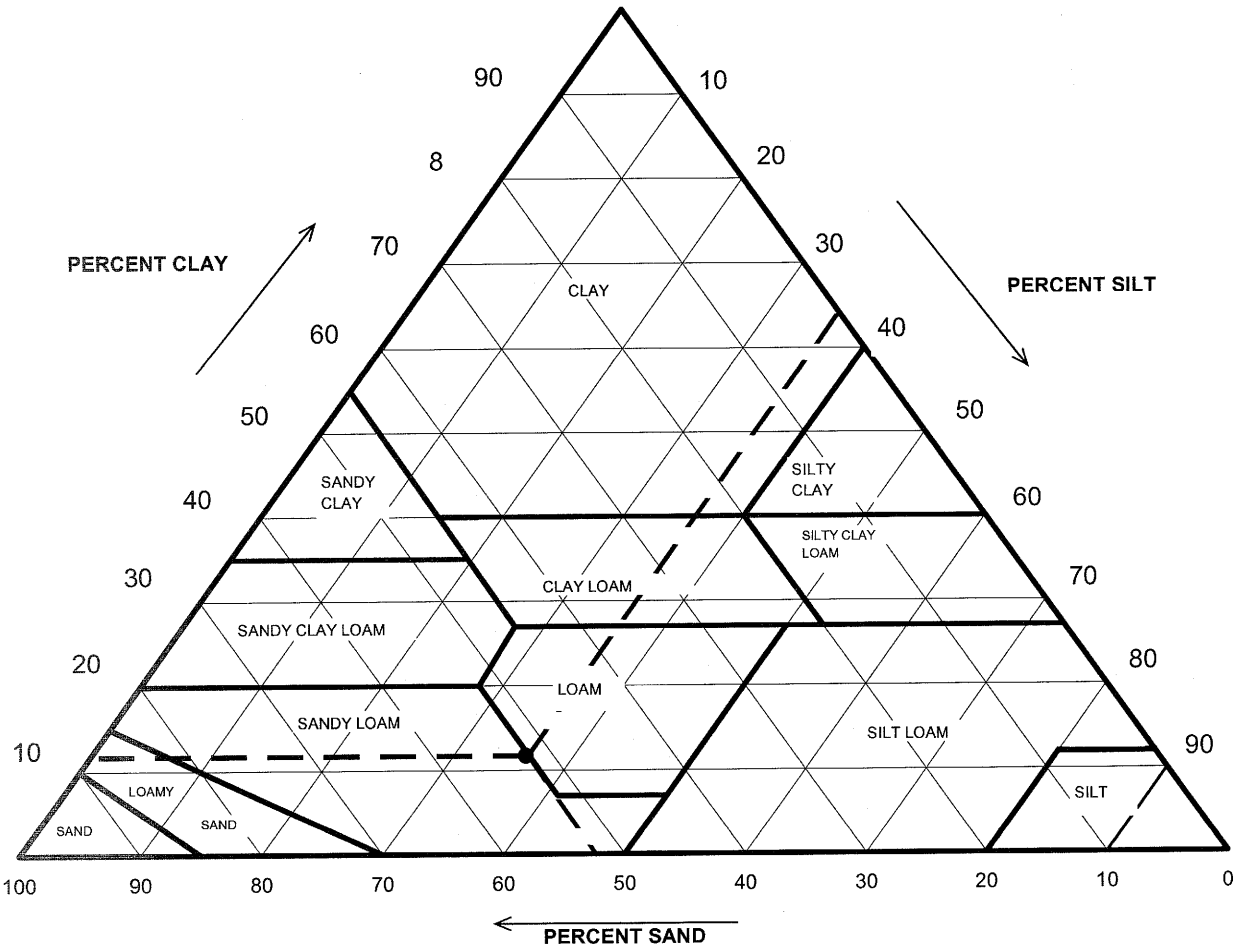
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-1
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-19	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	4.07	**0.00**
2	95.93	*Sand*	50.14	**52.27**
0.05	45.79	*Silt*	34.53	**35.99**
0.002	11.26	*Clay*	11.26	**11.74**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-19 #10 Split Hydro rev 8.xls]Sheet1

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-1
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-19	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	211	Tare No.	C-1
Wgt.Tare + Wet Soil (gm)	275.39	Wgt.Tare + Wet Soil (gm)	36.24
Wgt.Tare + Dry Soil (gm)	260.39	Wgt.Tare + Dry Soil (gm)	36.08
Weight of Tare (gm)	171.18	Weight of Tare (gm)	15.80
Weight of Water (gm)	15.00	Weight of Water (gm)	0.16
Weight of Dry Soil (gm)	89.21	Weight of Dry Soil (gm)	20.28
Moisture Content (%)	**16.8**	**Moisture Content (%)**	**0.8**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	104.21	Weight of the Dry Sample (gm)	188.49
Dry Weight +#10 Material(gm)	89.2	Weight of minus #200 material (gm)	51.88
Wet Weight Hydro. Material.(gm)	100.06	Weight of plus #200 material (gm)	136.61
Dry Weight Hydro. Material (gm)	99.28		
Total Dry Weight Sample (gm)	188.49	**J-FACTOR (%FINER THAN #10)**	**0.9593**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.83	0.93	0.93	99.07	**99.07**
#10	2.00	2.80	3.14	4.07	95.93	**95.93**
#20	0.85	6.98	7.03	7.03	92.97	**89.19**
#40	0.425	8.98	9.05	16.08	83.92	**80.51**
#60	0.250	8.55	8.61	24.69	75.31	**72.25**
#140	0.106	16.76	16.88	41.57	58.43	**56.05**
#200	0.075	6.13	6.17	47.75	52.25	**50.13**
Pan	-	51.88	52.25	100.00	-	**-**

Notes :

Tested By SD Date 7/16/2008 Checked By GEM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-19 #10 Split Hydro rev 8.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-1
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-19	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	45.0	45.0	23.5	3.94	41.1	40.9	0.01290	0.0272	**39.3**
5		37.0	23.5	3.94	33.1	33.0	0.01290	0.0184	**31.6**
15		30.0	23.5	3.94	26.1	26.0	0.01290	0.0112	**24.9**
30		26.0	23.7	3.88	22.1	22.1	0.01287	0.0081	**21.2**
60		23.0	23.8	3.85	19.2	19.1	0.01285	0.0059	**18.3**
250		18.0	24.3	3.70	14.3	14.3	0.01278	0.0030	**13.7**
1440		12.0	25.8	3.27	8.7	8.7	0.01256	0.0013	**8.4**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	99.28	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	95.93
Weight of Dry Material (gm)	99.28		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/15/2008 Checked By GBM Date 7-21-08

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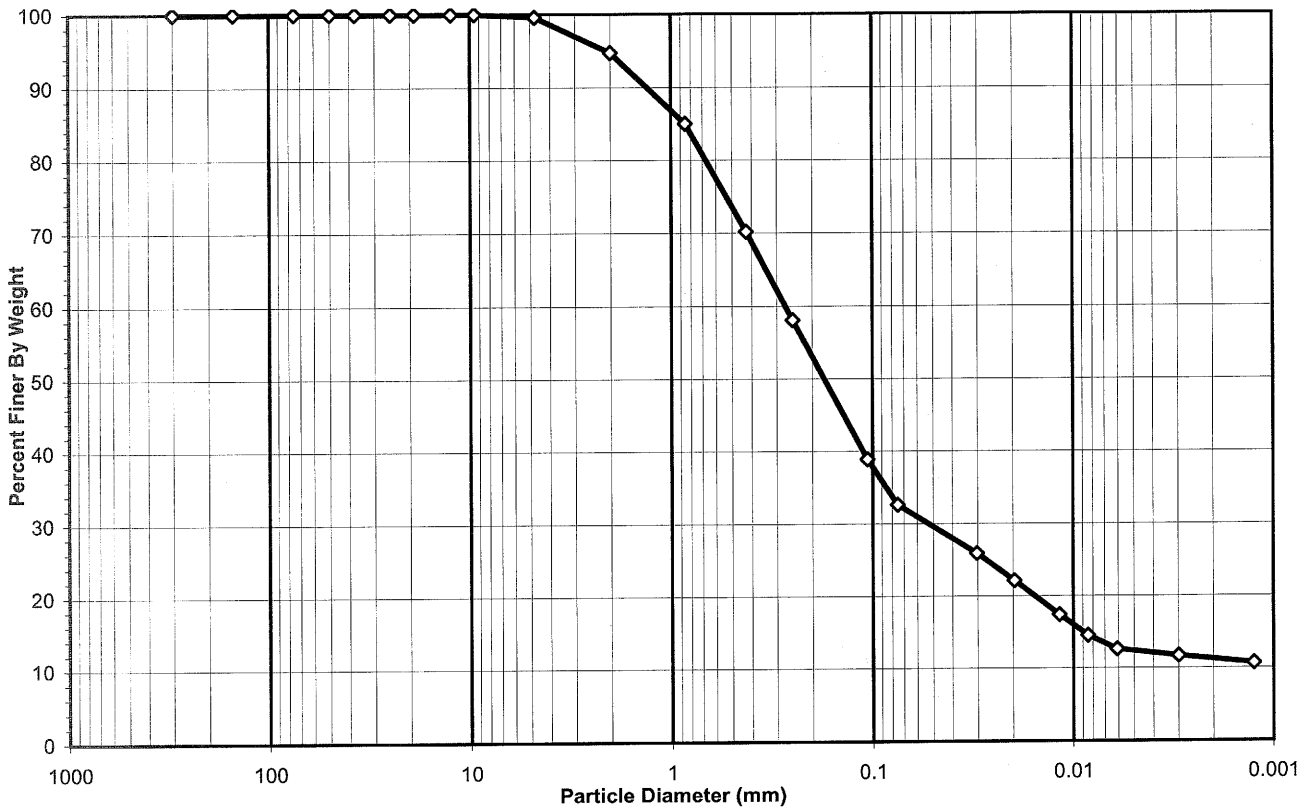
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3-5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-20	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.41
#4 To #200	*Sand*	66.99
Finer Than #200	*Silt & Clay*	32.60

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-20 #10 Split Hydro rev 8.xls]Sheet1*

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Geotechnics
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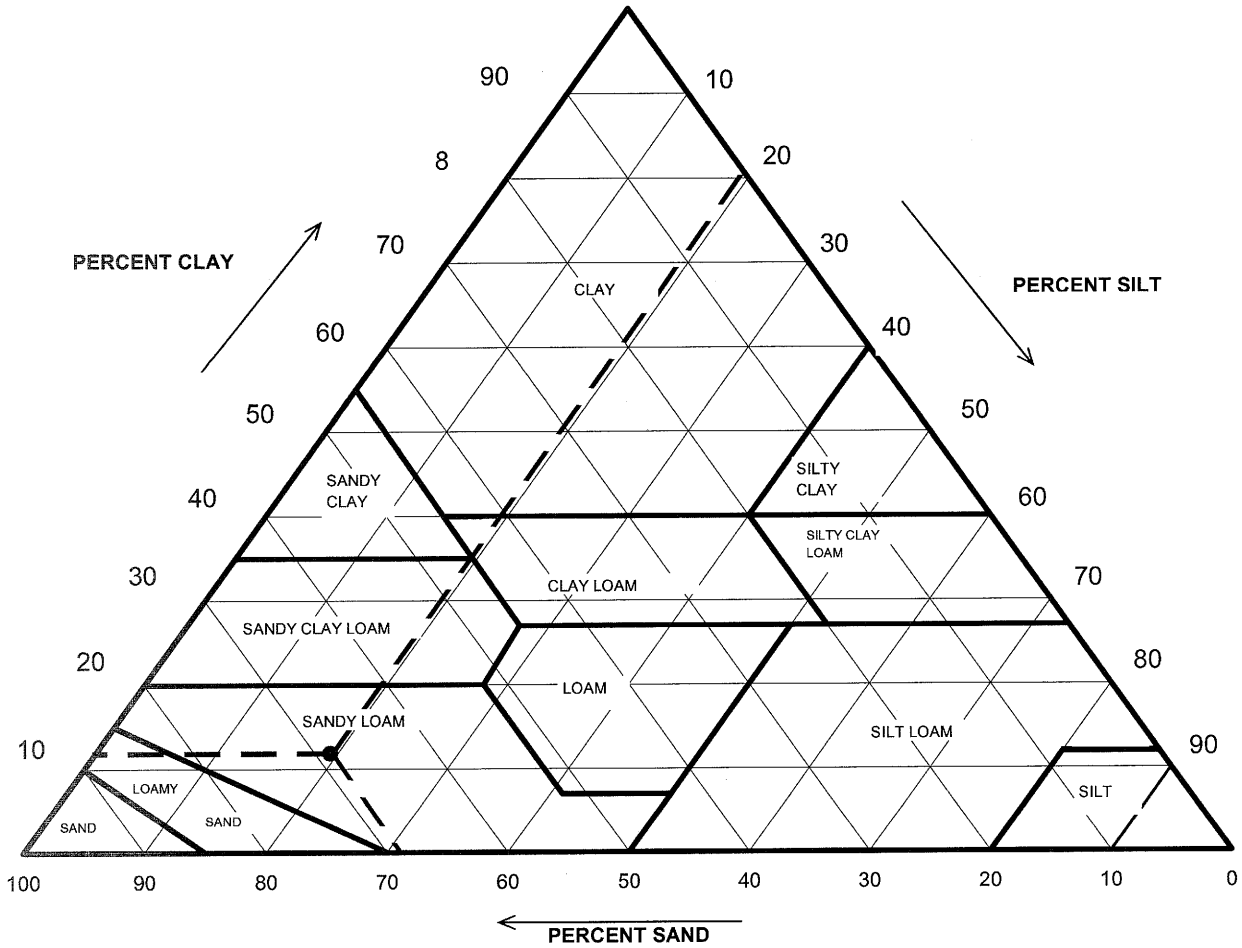
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3-5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-20	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	5.27	**0.00**
2	94.73	*Sand*	65.13	**68.76**
0.05	29.59	*Silt*	18.36	**19.39**
0.002	11.23	*Clay*	11.23	**11.85**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-20 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3-5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-20	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	318	Tare No.	M-1
Wgt.Tare + Wet Soil (gm)	296.44	Wgt.Tare + Wet Soil (gm)	42.54
Wgt.Tare + Dry Soil (gm)	289.68	Wgt.Tare + Dry Soil (gm)	42.30
Weight of Tare (gm)	207.59	Weight of Tare (gm)	15.89
Weight of Water (gm)	6.76	Weight of Water (gm)	0.24
Weight of Dry Soil (gm)	82.09	Weight of Dry Soil (gm)	26.41
Moisture Content (%)	**8.2**	**Moisture Content (%)**	**0.9**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	88.85	Weight of the Dry Sample (gm)	181.20
Dry Weight +#10 Material(gm)	82.1	Weight of minus #200 material (gm)	34.11
Wet Weight Hydro. Material.(gm)	100.01	Weight of plus #200 material (gm)	147.09
Dry Weight Hydro. Material (gm)	99.11		
Total Dry Weight Sample (gm)	181.20	**J-FACTOR (%FINER THAN #10)**	**0.9473**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.34	0.41	0.41	99.59	**99.59**
#10	2.00	3.99	4.86	5.27	94.73	**94.73**
#20	0.85	10.16	10.25	10.25	89.75	**85.01**
#40	0.425	15.52	15.66	25.91	74.09	**70.18**
#60	0.250	12.70	12.81	38.72	61.28	**58.04**
#140	0.106	20.06	20.24	58.97	41.03	**38.87**
#200	0.075	6.56	6.62	65.58	34.42	**32.60**
Pan	-	34.11	34.42	100.00	-	-

Notes :

Tested By SD Date 7/18/2008 Checked By GEM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-20 #10 Split Hydro rev 8.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3-5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-20	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	31.0	31.0	24.4	3.67	27.3	27.3	0.01276	0.0302	**25.9**
5		27.0	24.4	3.67	23.3	23.3	0.01276	0.0197	**22.1**
15		22.0	24.4	3.67	18.3	18.3	0.01276	0.0117	**17.3**
30		19.0	24.4	3.67	15.3	15.3	0.01276	0.0085	**14.5**
60		17.0	24.4	3.67	13.3	13.3	0.01276	0.0061	**12.6**
250		16.0	24.5	3.65	12.4	12.3	0.01275	0.0030	**11.7**
1440		15.0	24.3	3.70	11.3	11.3	0.01278	0.0013	**10.7**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	99.11	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	94.73
Weight of Dry Material (gm)	99.11		
		Specific Gravity	2.7 Assumed

Note:

Tested By KMR Date 4/25/2007 Checked By GLM Date 7-21-08

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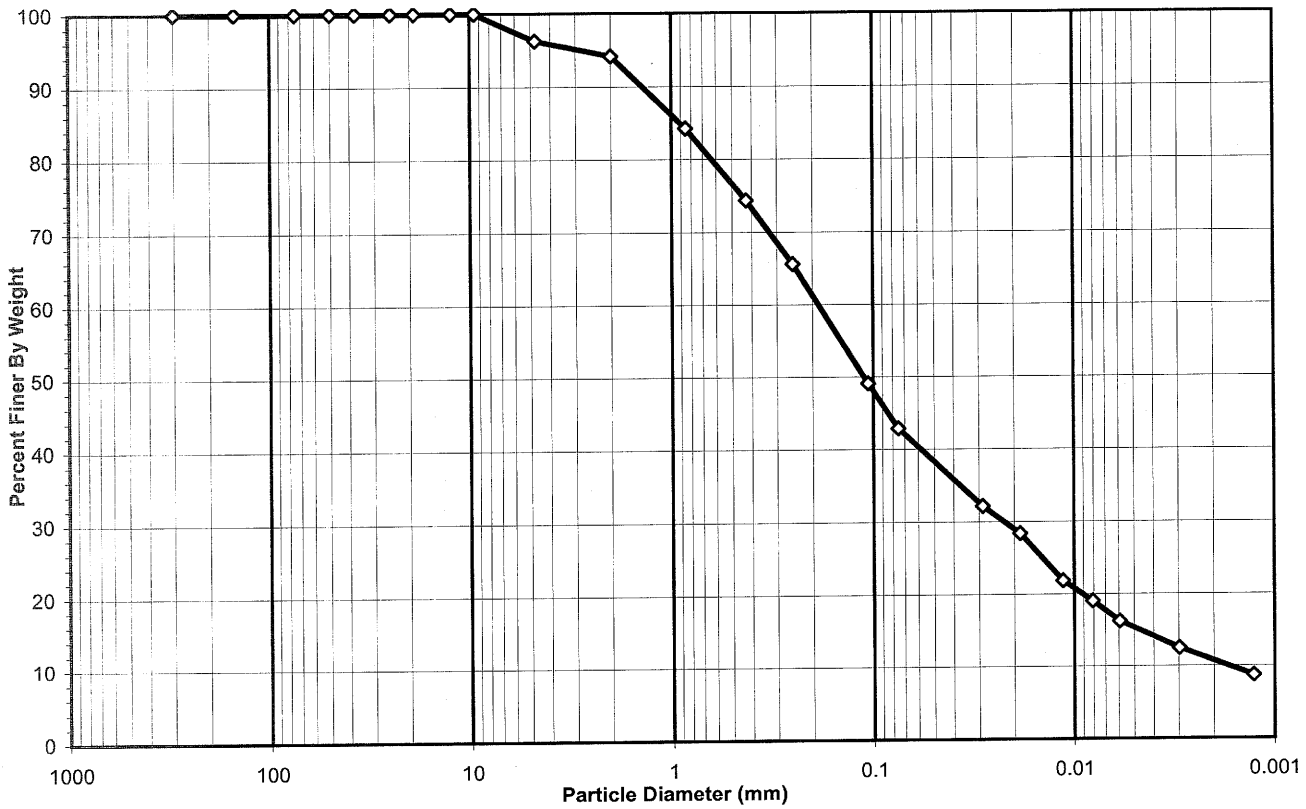
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	3.73
#4 To #200	*Sand*	53.41
Finer Than #200	*Silt & Clay*	42.86

USCS Symbol ***sm, ASSUMED***

USCS Classification ***SILTY SAND***

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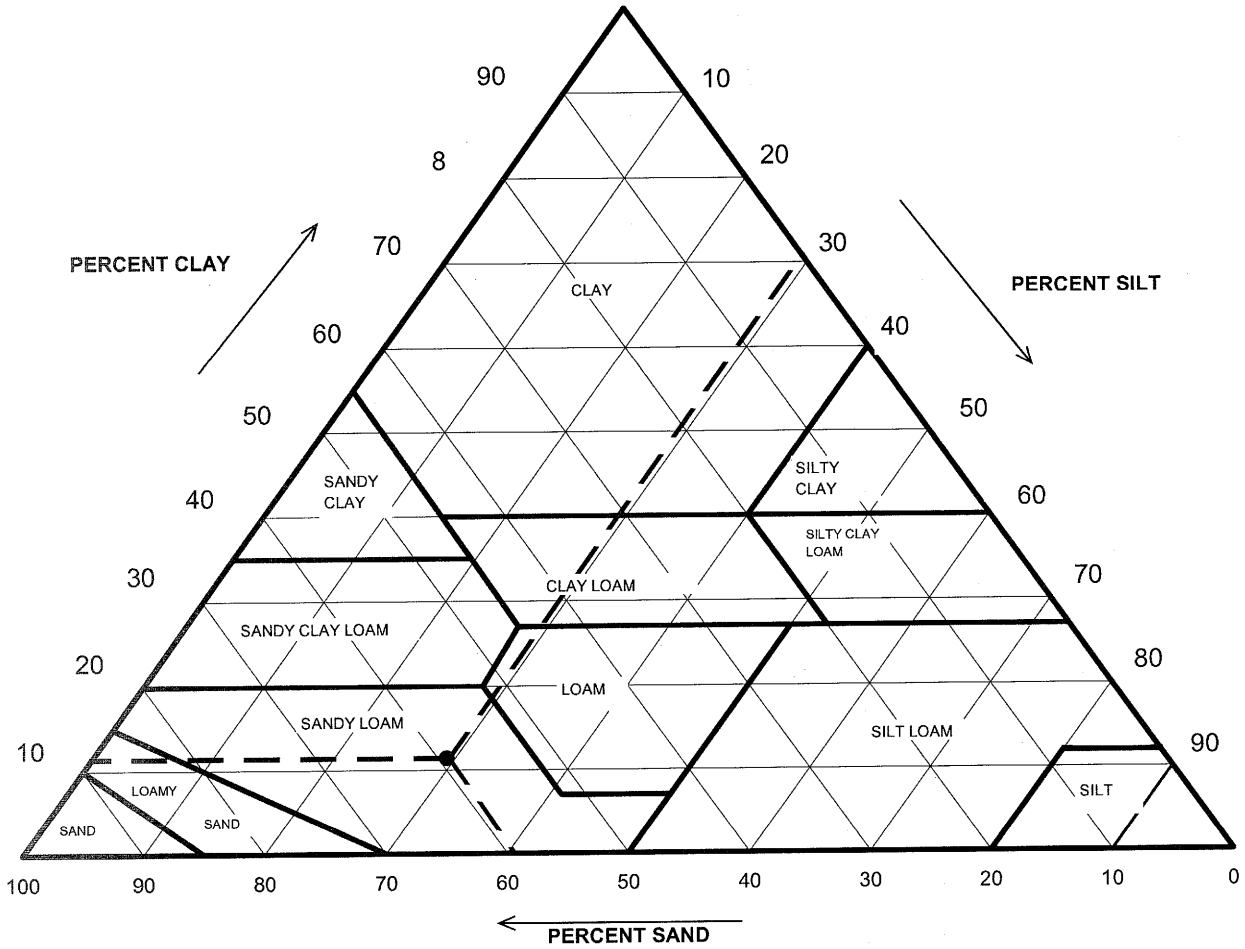
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	5.85	**0.00**
2	94.15	*Sand*	55.81	**59.28**
0.05	38.34	*Silt*	27.60	**29.32**
0.002	10.74	*Clay*	10.74	**11.40**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 #10 Split Hydro rev 8.xls]Sheet1

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	316	Tare No.	P-1
Wgt.Tare + Wet Soil (gm)	559.18	Wgt.Tare + Wet Soil (gm)	58.98
Wgt.Tare + Dry Soil (gm)	533.03	Wgt.Tare + Dry Soil (gm)	58.78
Weight of Tare (gm)	208.14	Weight of Tare (gm)	22.07
Weight of Water (gm)	26.15	Weight of Water (gm)	0.20
Weight of Dry Soil (gm)	324.89	Weight of Dry Soil (gm)	36.71
Moisture Content (%)	**8.0**	**Moisture Content (%)**	**0.5**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	351.04	Weight of the Dry Sample (gm)	424.36
Dry Weight +#10 Material(gm)	324.9	Weight of minus #200 material (gm)	45.28
Wet Weight Hydro. Material.(gm)	100.01	Weight of plus #200 material (gm)	379.08
Dry Weight Hydro. Material (gm)	99.47		
Total Dry Weight Sample (gm)	424.36	**J-FACTOR (%FINER THAN #10)**	**0.9415**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	12.12	3.73	3.73	96.27	**96.27**
#10	2.00	6.89	2.12	5.85	94.15	**94.15**
#20	0.85	10.49	10.55	10.55	89.45	**84.22**
#40	0.425	10.44	10.50	21.04	78.96	**74.34**
#60	0.250	9.20	9.25	30.29	69.71	**65.63**
#140	0.106	17.49	17.58	47.87	52.13	**49.08**
#200	0.075	6.57	6.61	54.48	45.52	**42.86**
Pan	-	45.28	45.52	100.00	-	-

Notes :

Tested By SD Date 7/18/2008 Checked By GBM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 #10 Split Hydro rev 8.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	38.0	38.0	24.3	3.70	34.3	34.1	0.01278	0.0287	**32.1**
5		34.0	24.3	3.70	30.3	30.2	0.01278	0.0187	**28.4**
15		27.0	24.3	3.70	23.3	23.2	0.01278	0.0114	**21.8**
31		24.0	24.3	3.70	20.3	20.2	0.01278	0.0081	**19.0**
60		21.0	24.3	3.70	17.3	17.2	0.01278	0.0059	**16.2**
250		17.0	24.4	3.67	13.3	13.3	0.01276	0.0030	**12.5**
1440		13.0	24.3	3.70	9.3	9.3	0.01278	0.0013	**8.7**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	99.47	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	94.15
Weight of Dry Material (gm)	99.47		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/16/2008 Checked By GEM Date 7-21-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 #10 Split Hydro rev 8.xls]Sheet1

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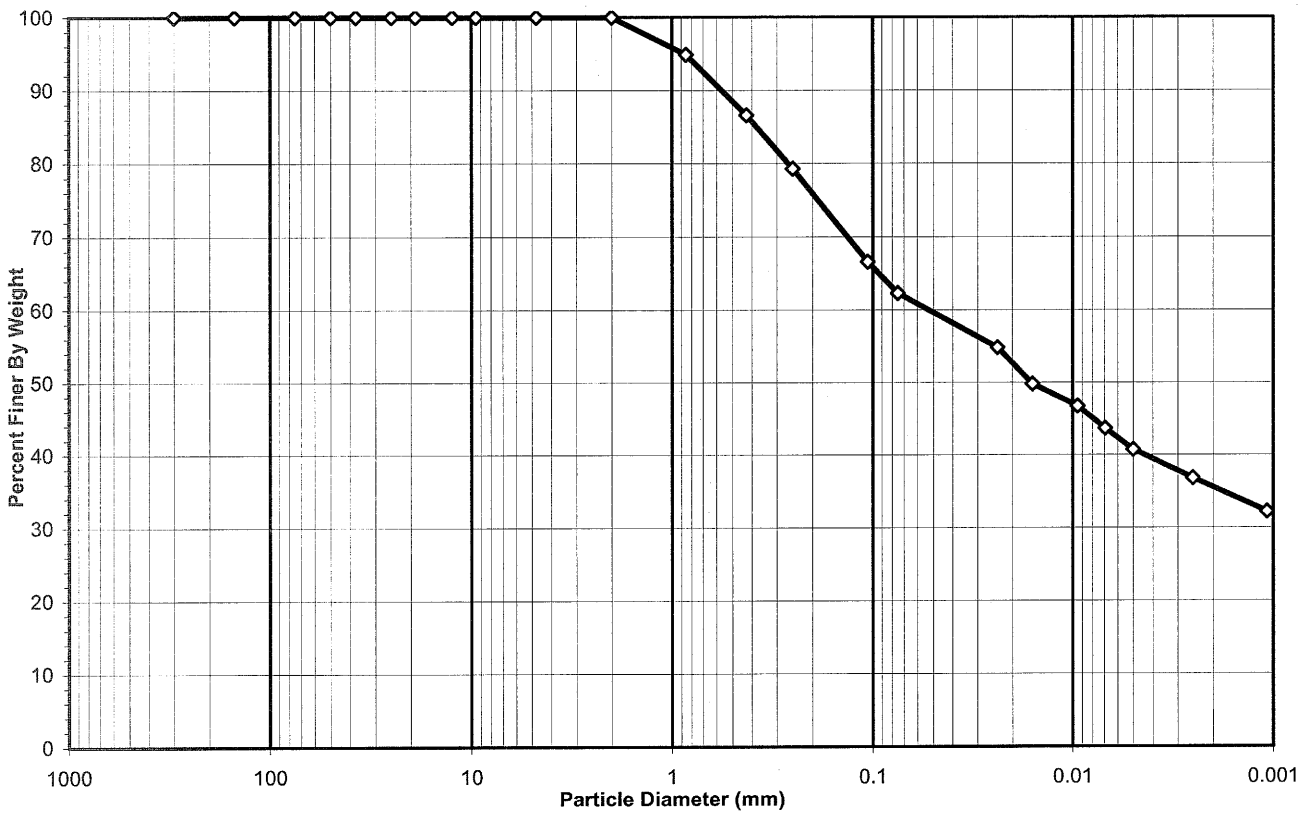
SIEVE AND HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Soil Color	**RED BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	37.71
Finer Than #200	*Silt & Clay*	62.29

USCS Symbol ***ml, ASSUMED***

USCS Classification ***SANDY SILT***

DCN: CT-S3P DATE:02/15/05 REVISION:8

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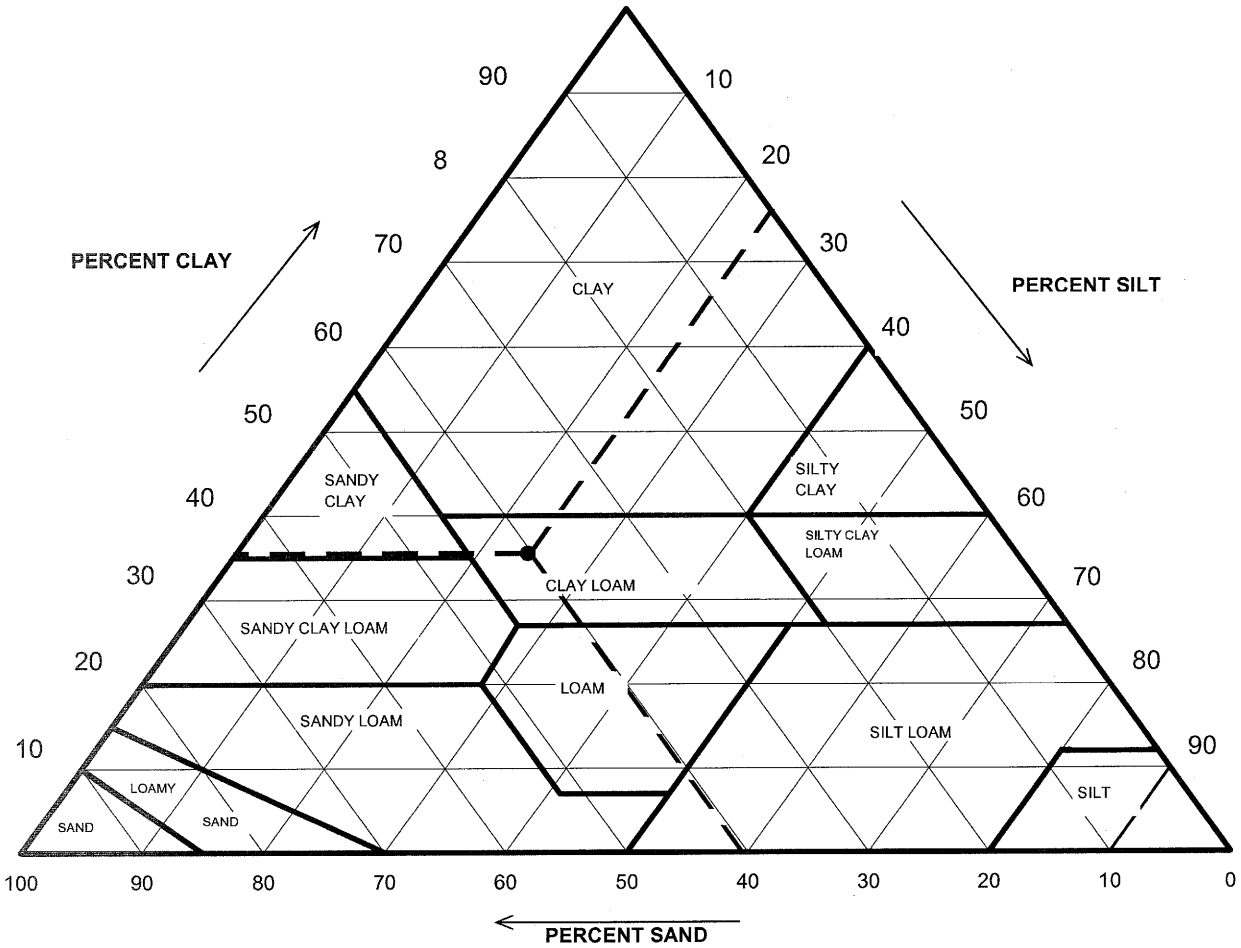
USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Soil Color	RED BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.00	**0.00**
2	100.00	*Sand*	40.35	**40.35**
0.05	59.65	*Silt*	24.11	**24.11**
0.002	35.55	*Clay*	35.55	**35.55**

USDA Classification: ***CLAY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8

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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Soil Color	**RED BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	307	Tare No.	M-1
Wgt.Tare + Wet Soil (gm)	677.90	Wgt.Tare + Wet Soil (gm)	36.74
Wgt.Tare + Dry Soil (gm)	557.82	Wgt.Tare + Dry Soil (gm)	36.24
Weight of Tare (gm)	111.10	Weight of Tare (gm)	15.96
Weight of Water (gm)	120.08	Weight of Water (gm)	0.50
Weight of Dry Soil (gm)	446.72	Weight of Dry Soil (gm)	20.28
Moisture Content (%)	**26.9**	**Moisture Content (%)**	**2.5**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	566.80	Weight of the Dry Sample (gm)	544.35
Dry Weight +#10 Material(gm)	446.7	Weight of minus #200 material (gm)	60.81
Wet Weight Hydro. Material.(gm)	100.04	Weight of plus #200 material (gm)	483.54
Dry Weight Hydro. Material (gm)	97.63		
Total Dry Weight Sample (gm)	544.35	**J-FACTOR (%FINER THAN #10)**	**1.0000**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.00	0.00	0.00	100.00	**100.00**
#20	0.85	5.00	5.12	5.12	94.88	**94.88**
#40	0.425	8.12	8.32	13.44	86.56	**86.56**
#60	0.250	7.10	7.27	20.71	79.29	**79.29**
#140	0.106	12.40	12.70	33.41	66.59	**66.59**
#200	0.075	4.20	4.30	37.71	62.29	**62.29**
Pan	-	60.81	62.29	100.00	-	**-**

Notes :

Tested By SD Date 7/16/2008 Checked By GEM Date 7-16-08

DCN: CT-S3P DATE:02/15/05 REVISION:8

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Soil Color	**RED BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	58.0	58.0	23.5	3.94	54.1	54.8	0.01290	0.0238	**54.8**
5		53.0	23.5	3.94	49.1	49.7	0.01290	0.0159	**49.7**
15		50.0	23.5	3.94	46.1	46.7	0.01290	0.0095	**46.7**
30		47.0	23.5	3.94	43.1	43.7	0.01290	0.0069	**43.7**
60		44.0	23.8	3.85	40.2	40.7	0.01285	0.0050	**40.7**
250		40.0	24.3	3.70	36.3	36.8	0.01278	0.0025	**36.8**
1440		35.0	25.8	3.27	31.7	32.2	0.01256	0.0011	**32.2**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	97.63	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	100.00
Weight of Dry Material (gm)	97.63		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/15/2008 Checked By GBM Date 7-16-08

DCN: CT-S3P DATE:02/15/05 REVISION:8

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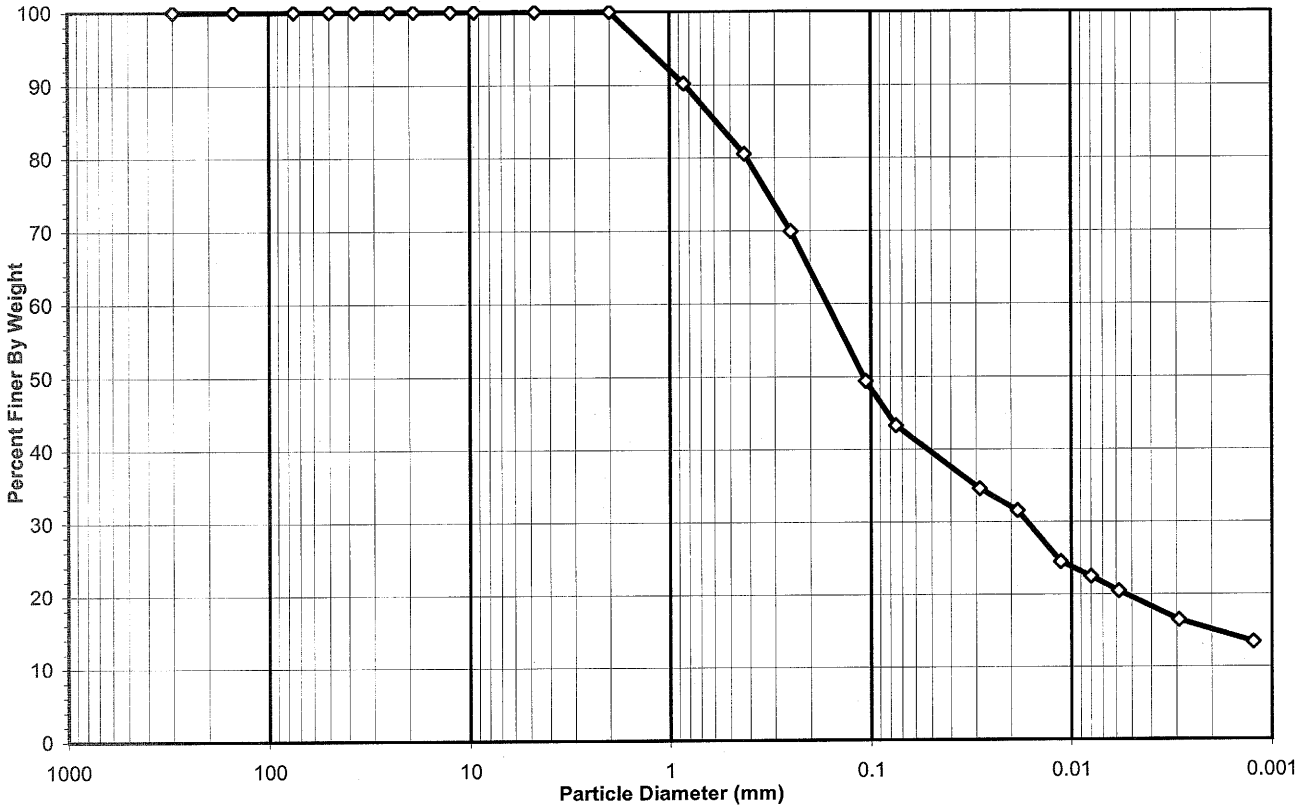
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Soil Color	**DARK BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	56.74
Finer Than #200	*Silt & Clay*	43.26

USCS Symbol ***sm, ASSUMED***

USCS Classification ***SILTY SAND***

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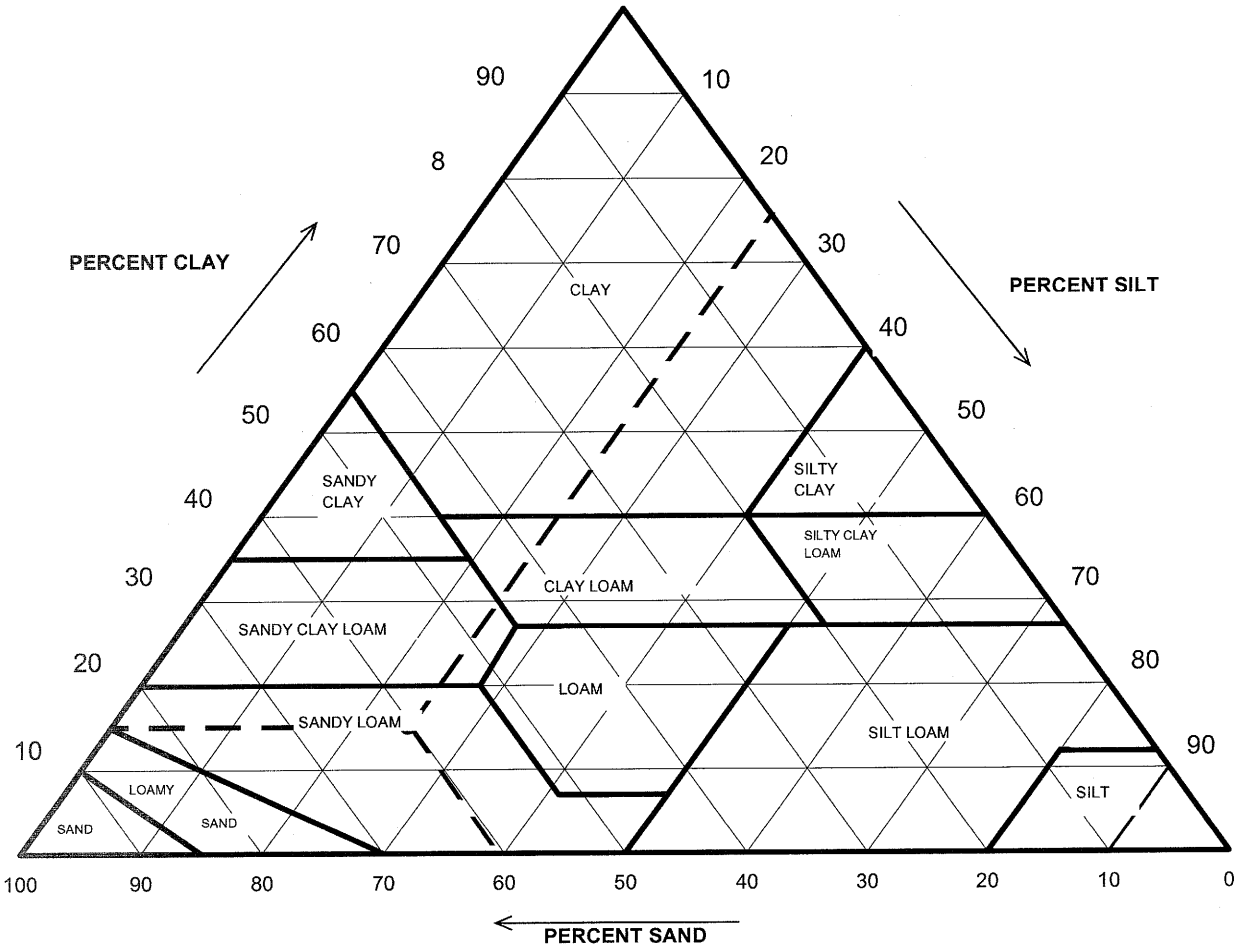
Geotechnics
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Soil Color	DARK BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.00	**0.00**
2	100.00	*Sand*	60.41	**60.41**
0.05	39.59	*Silt*	24.48	**24.48**
0.002	15.10	*Clay*	15.10	**15.10**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
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WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Soil Color	**DARK BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	318	Tare No.	C-2
Wgt.Tare + Wet Soil (gm)	600.50	Wgt.Tare + Wet Soil (gm)	50.35
Wgt.Tare + Dry Soil (gm)	530.79	Wgt.Tare + Dry Soil (gm)	49.75
Weight of Tare (gm)	86.60	Weight of Tare (gm)	15.63
Weight of Water (gm)	69.71	Weight of Water (gm)	0.60
Weight of Dry Soil (gm)	444.19	Weight of Dry Soil (gm)	34.12
Moisture Content (%)	**15.7**	**Moisture Content (%)**	**1.8**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	513.90	Weight of the Dry Sample (gm)	542.48
Dry Weight +#10 Material(gm)	444.2	Weight of minus #200 material (gm)	42.52
Wet Weight Hydro. Material.(gm)	100.02	Weight of plus #200 material (gm)	499.96
Dry Weight Hydro. Material (gm)	98.29		
Total Dry Weight Sample (gm)	542.48	**J-FACTOR (%FINER THAN #10)**	**1.0000**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.00	0.00	0.00	100.00	**100.00**
#20	0.85	9.64	9.81	9.81	90.19	**90.19**
#40	0.425	9.47	9.63	19.44	80.56	**80.56**
#60	0.250	10.45	10.63	30.07	69.93	**69.93**
#140	0.106	20.20	20.55	50.62	49.38	**49.38**
#200	0.075	6.01	6.11	56.74	43.26	**43.26**
Pan	-	42.52	43.26	100.00	-	-

Notes :

Tested By SD Date 7/18/2008 Checked By GBM Date 7-21-08

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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Soil Color	**DARK BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	38.0	38.0	24.3	3.70	34.3	34.5	0.01278	0.0287	**34.5**
5		35.0	24.3	3.70	31.3	31.5	0.01278	0.0186	**31.5**
15		28.0	24.3	3.70	24.3	24.5	0.01278	0.0113	**24.5**
31		26.0	24.3	3.70	22.3	22.5	0.01278	0.0080	**22.5**
60		24.0	24.3	3.70	20.3	20.4	0.01278	0.0058	**20.4**
250		20.0	24.4	3.67	16.3	16.4	0.01276	0.0029	**16.4**
1440		17.0	24.3	3.70	13.3	13.4	0.01278	0.0012	**13.4**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	98.29	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	100.00
Weight of Dry Material (gm)	98.29		
		Specific Gravity	2.7 Assumed

Note:

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ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-614
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3.5-5.5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-01	Soil Description	**LIGHT TAN SILT**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

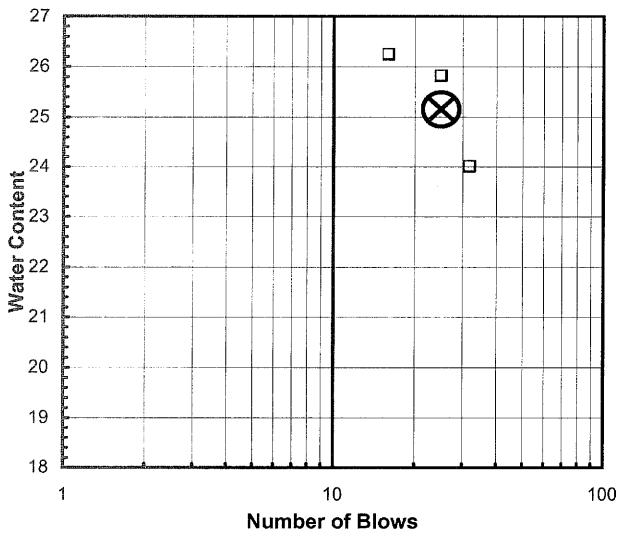
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	L-1	K-1	P-1	**U**
Wt. of Tare & WS (gm)	28.32	31.31	25.02	**L**
Wt. of Tare & DS (gm)	25.72	28.12	23.22	**T**
Wt. of Tare (gm)	15.81	15.76	15.72	**I**
Wt. of Water (gm)	2.6	3.2	1.8	**P**
Wt. of DS (gm)	9.9	12.4	7.5	**O**
				I
Moisture Content (%)	**26.2**	**25.8**	**24.0**	**N**
Number of Blows	**16**	**25**	**32**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	B-1	E-2	
Wt. of Tare & WS (gm)	32.92	32.40	
Wt. of Tare & DS (gm)	30.75	30.33	
Wt. of Tare (gm)	22.07	21.91	
Wt. of Water (gm)	2.2	2.1	
Wt. of DS (gm)	8.7	8.4	
Moisture Content (%)	**25.0**	**24.6**	**0.4**

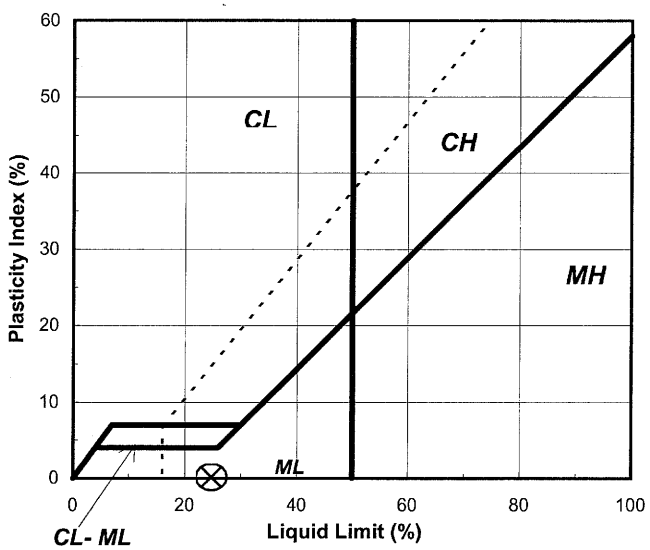
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**25**
Plastic Limit (%)	**25**
Plasticity Index (%)	**0**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-02	Soil Description	**LIGHT BROWN SILT**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

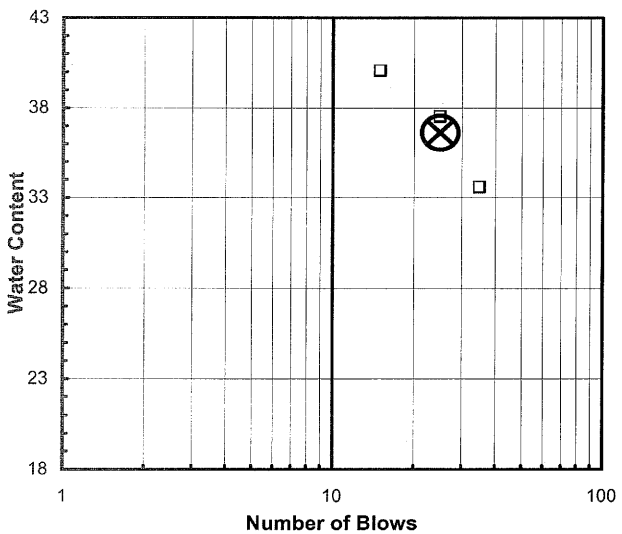
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	Q	K	U	**U**
Wt. of Tare & WS (gm)	25.11	25.22	27.86	**L**
Wt. of Tare & DS (gm)	22.27	22.50	24.68	**T**
Wt. of Tare (gm)	15.18	15.25	15.21	**I**
Wt. of Water (gm)	2.8	2.7	3.2	**P**
Wt. of DS (gm)	7.1	7.3	9.5	**O**
				I
Moisture Content (%)	**40.1**	**37.5**	**33.6**	**N**
Number of Blows	**15**	**25**	**35**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	A-P	A-B	
Wt. of Tare & WS (gm)	22.92	22.90	
Wt. of Tare & DS (gm)	21.25	21.19	
Wt. of Tare (gm)	15.60	15.57	
Wt. of Water (gm)	1.7	1.7	
Wt. of DS (gm)	5.7	5.6	
Moisture Content (%)	**29.6**	**30.4**	**-0.9**

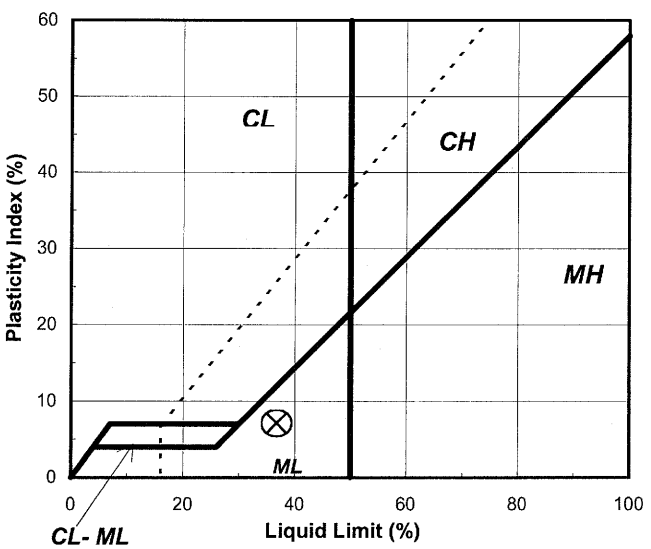
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**37**
Plastic Limit (%)	**30**
Plasticity Index (%)	**7**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-15
Project No.	2008-598-01	Sample No.	S-4T
Lab ID	2008-598-01-03	Soil Description	**LIGHT BROWN SILTY CLAY**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

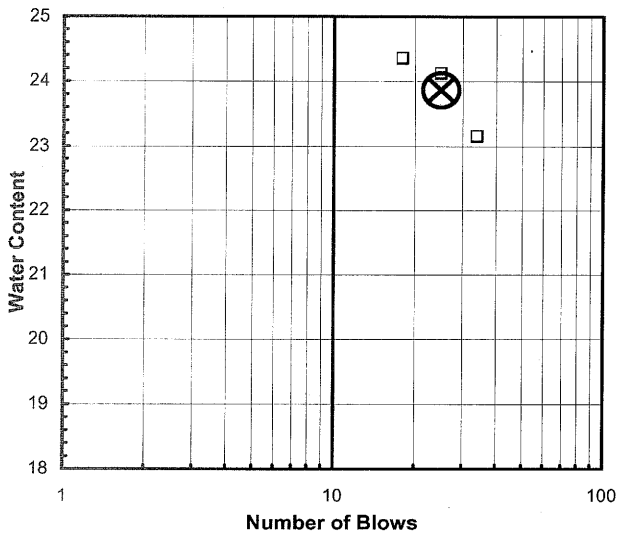
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	P	W	M	**U**
Wt. of Tare & WS (gm)	26.27	22.80	24.64	**L**
Wt. of Tare & DS (gm)	24.10	21.36	22.79	**T**
Wt. of Tare (gm)	15.19	15.14	15.12	**I**
Wt. of Water (gm)	2.2	1.4	1.9	**P**
Wt. of DS (gm)	8.9	6.2	7.7	**O**
				I
Moisture Content (%)	**24.4**	**23.2**	**24.1**	**N**
Number of Blows	**18**	**34**	**25**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	O	J	
Wt. of Tare & WS (gm)	22.78	22.04	
Wt. of Tare & DS (gm)	21.52	20.90	
Wt. of Tare (gm)	15.24	15.14	
Wt. of Water (gm)	1.3	1.1	
Wt. of DS (gm)	6.3	5.8	
Moisture Content (%)	**20.1**	**19.8**	**0.3**

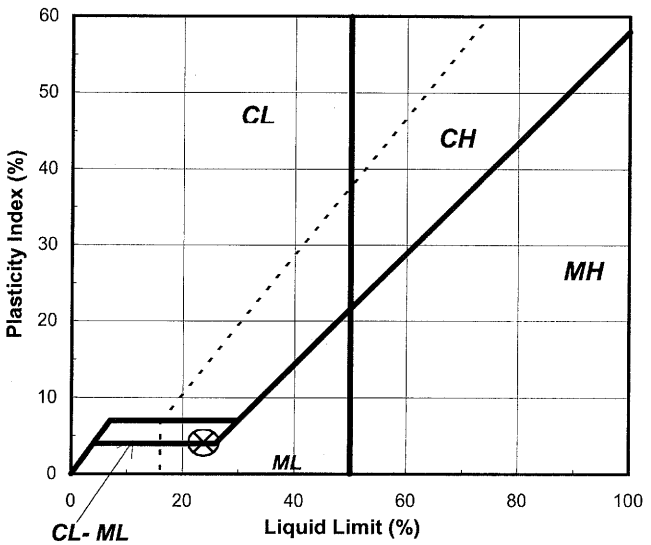
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**24**
Plastic Limit (%)	**20**
Plasticity Index (%)	**4**
USCS Symbol	**CL-ML**

Flow Curve



Plasticity Chart



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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-617
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	8.5-10
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-04	Soil Description	**BROWN TAN SILT**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

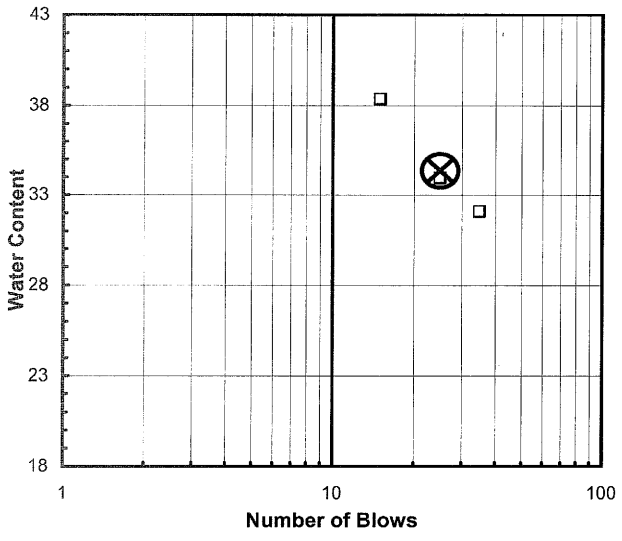
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	Q	K	A-B	**U**
Wt. of Tare & WS (gm)	30.36	26.37	27.49	**L**
Wt. of Tare & DS (gm)	26.15	23.55	24.60	**T**
Wt. of Tare (gm)	15.17	15.24	15.59	**I**
Wt. of Water (gm)	4.2	2.8	2.9	**P**
Wt. of DS (gm)	11.0	8.3	9.0	**O**
				I
Moisture Content (%)	**38.3**	**33.9**	**32.1**	**N**
Number of Blows	**15**	**25**	**35**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	U	A-P	
Wt. of Tare & WS (gm)	22.41	23.74	
Wt. of Tare & DS (gm)	20.71	21.90	
Wt. of Tare (gm)	15.18	15.60	
Wt. of Water (gm)	1.7	1.8	
Wt. of DS (gm)	5.5	6.3	
Moisture Content (%)	**30.7**	**29.2**	**1.5**

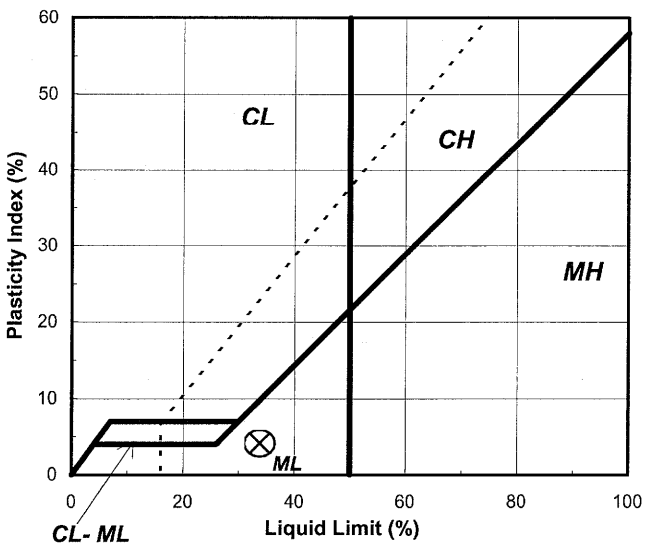
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**34**
Plastic Limit (%)	**30**
Plasticity Index (%)	**4**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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Geotechnics
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ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-05	Soil Description	**LIGHT BROWN SILT**

***Note: The* USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.**

(Minus No. 40 sieve material, Airdried)

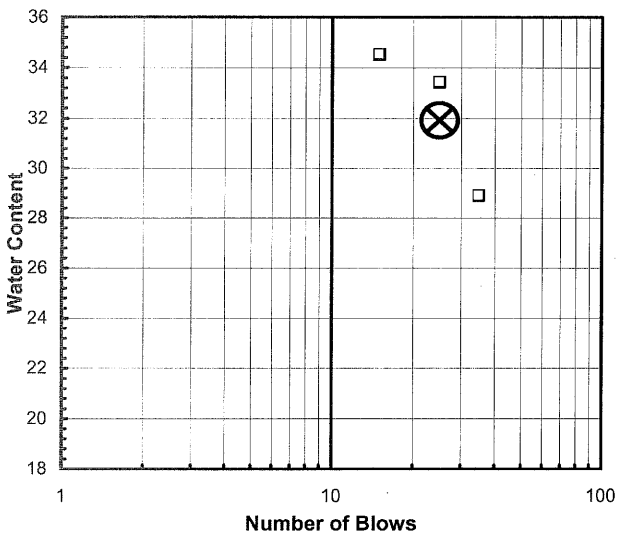
Liquid Limit Test	**1**	**2**	**3**	**MULTIPOINT**
Tare Number	F	E	H	
Wt. of Tare & WS (gm)	29.53	31.11	28.06	
Wt. of Tare & DS (gm)	25.83	27.15	25.17	
Wt. of Tare (gm)	15.11	15.30	15.17	
Wt. of Water (gm)	3.7	4.0	2.9	
Wt. of DS (gm)	10.7	11.9	10.0	
Moisture Content (%)	**34.5**	**33.4**	**28.9**	
Number of Blows	**15**	**25**	**35**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	A-D	A-O	
Wt. of Tare & WS (gm)	21.79	22.16	
Wt. of Tare & DS (gm)	20.29	20.59	
Wt. of Tare (gm)	15.42	15.48	
Wt. of Water (gm)	1.5	1.6	
Wt. of DS (gm)	4.9	5.1	
Moisture Content (%)	**30.8**	**30.7**	**0.1**

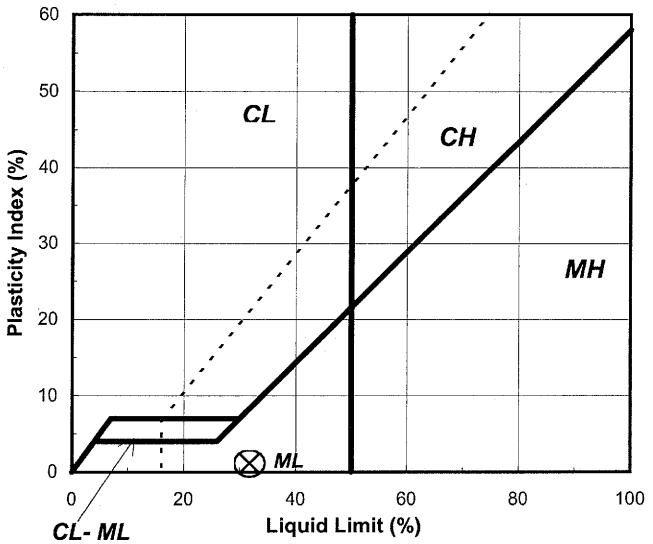
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**32**
Plastic Limit (%)	**31**
Plasticity Index (%)	**1**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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Geotechnics
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ATTERBERG LIMITS

ASTM D 4318-05 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-06	Soil Description	**GRAY WHITE BROWN SILT**

***Note: The* USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.**

(Minus No. 40 sieve material, Airdried)

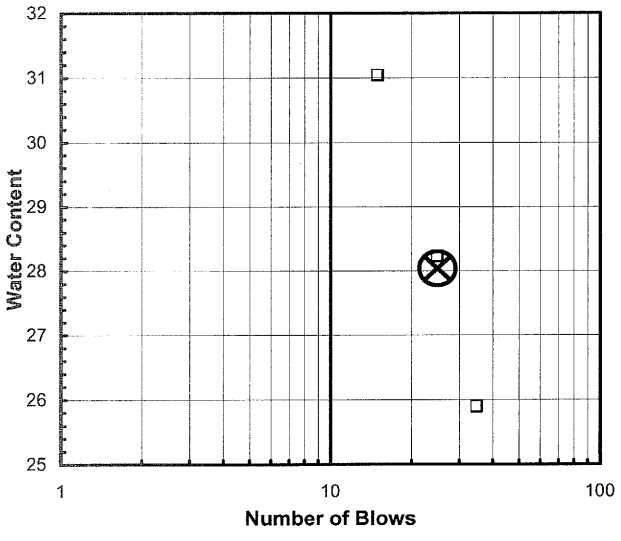
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	A-C	A-L	K-Q	**U**
Wt. of Tare & WS (gm)	27.97	26.57	28.91	**L**
Wt. of Tare & DS (gm)	25.04	24.14	26.15	**T**
Wt. of Tare (gm)	15.60	15.53	15.49	**I**
Wt. of Water (gm)	2.9	2.4	2.8	**P**
Wt. of DS (gm)	9.4	8.6	10.7	**O**
				I
Moisture Content (%)	**31.0**	**28.2**	**25.9**	**N**
Number of Blows	**15**	**25**	**35**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	D	I	
Wt. of Tare & WS (gm)	23.22	23.89	
Wt. of Tare & DS (gm)	21.62	22.14	
Wt. of Tare (gm)	15.16	15.23	
Wt. of Water (gm)	1.6	1.8	
Wt. of DS (gm)	6.5	6.9	
Moisture Content (%)	**24.8**	**25.3**	**-0.6**

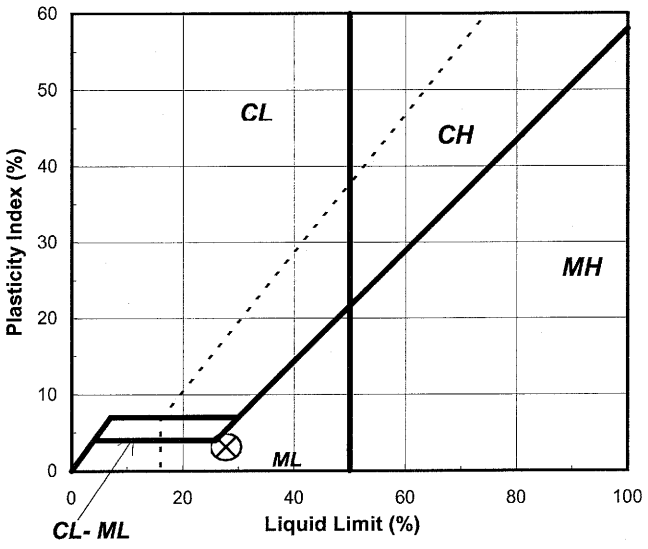
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**28**
Plastic Limit (%)	**25**
Plasticity Index (%)	**3**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-05 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-5
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-07	Soil Description	**BROWN LEAN CLAY**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

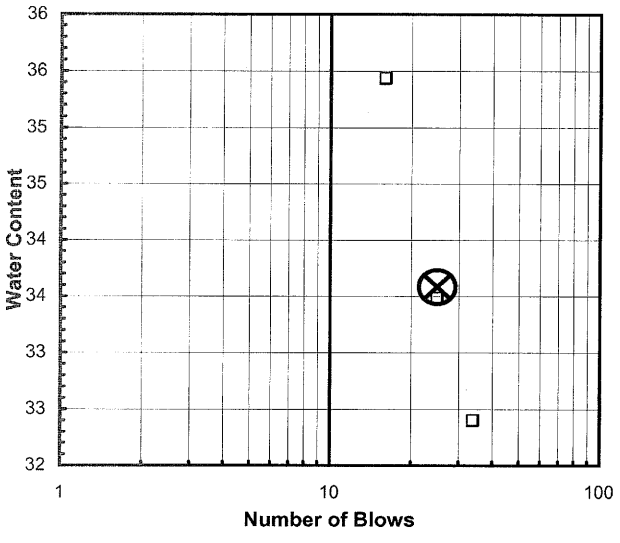
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	A-D	F	E	**U**
Wt. of Tare & WS (gm)	27.05	27.23	26.18	**L**
Wt. of Tare & DS (gm)	24.01	24.19	23.52	**T**
Wt. of Tare (gm)	15.43	15.11	15.31	**I**
Wt. of Water (gm)	3.0	3.0	2.7	**P**
Wt. of DS (gm)	8.6	9.1	8.2	**O**
				I
Moisture Content (%)	**35.4**	**33.5**	**32.4**	**N**
Number of Blows	**16**	**25**	**34**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	A-O	H	
Wt. of Tare & WS (gm)	22.88	21.31	
Wt. of Tare & DS (gm)	21.65	20.35	
Wt. of Tare (gm)	15.47	15.15	
Wt. of Water (gm)	1.2	1.0	
Wt. of DS (gm)	6.2	5.2	
Moisture Content (%)	**19.9**	**18.5**	**1.4**

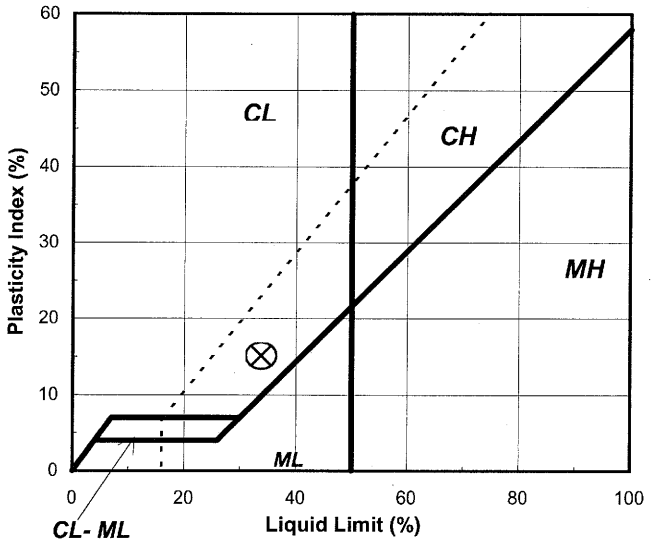
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**34**
Plastic Limit (%)	**19**
Plasticity Index (%)	**15**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMIT

ASTM D 4318-00 (SOP - S4)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	5-6
Project No.	2008-598-01	Sample No.	S-1B
Lab ID	2008-598-01-08	Visual Description	**BROWN WHITE**
			(MInus No. 40 sieve material, Wet Method)

NON - PLASTIC MATERIAL

Tested By SD *Date* 7/17/2008 *Checked By* GTM *Date* 7-21-08

DCN: CT-S4C DATE: 7-11-97 REVISION : 2

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-05 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-09	Soil Description	**BROWN TAN SILT**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

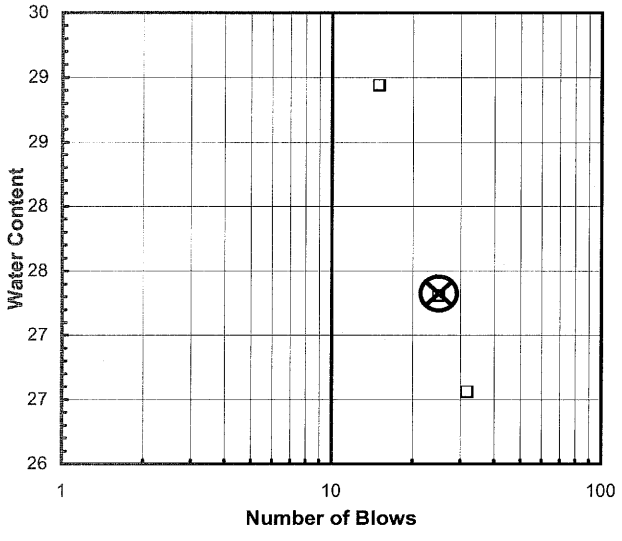
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	A-Q	R-1	B-B	**U**
Wt. of Tare & WS (gm)	27.14	29.01	28.91	**L**
Wt. of Tare & DS (gm)	24.53	26.14	26.10	**T**
Wt. of Tare (gm)	15.51	15.63	15.52	**I**
Wt. of Water (gm)	2.6	2.9	2.8	**P**
Wt. of DS (gm)	9.0	10.5	10.6	**O**
				I
Moisture Content (%)	**28.9**	**27.3**	**26.6**	**N**
Number of Blows	**15**	**25**	**32**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	S	A-P	
Wt. of Tare & WS (gm)	21.86	25.22	
Wt. of Tare & DS (gm)	20.63	23.30	
Wt. of Tare (gm)	15.24	15.61	
Wt. of Water (gm)	1.2	1.9	
Wt. of DS (gm)	5.4	7.7	
Moisture Content (%)	**22.8**	**25.0**	**-2.1**

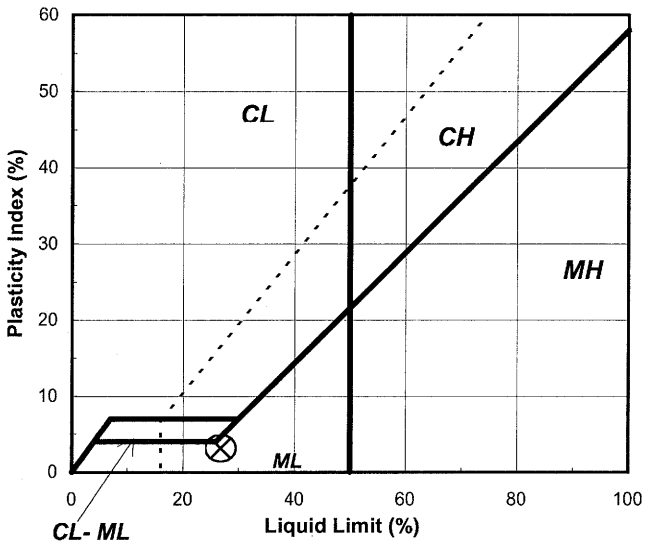
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**27**
Plastic Limit (%)	**24**
Plasticity Index (%)	**3**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-620
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-10	Soil Description	**BROWN SILT**

***Note: The* USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.** (Minus No. 40 sieve material, Airdried)

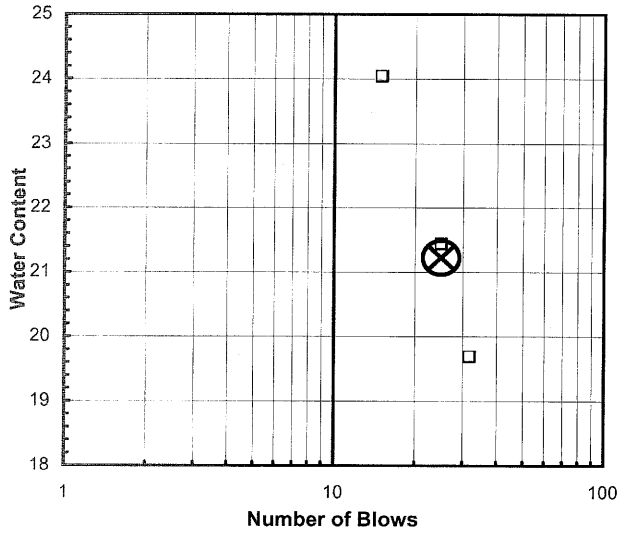
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	A-1	Y	A-N	**U**
Wt. of Tare & WS (gm)	28.34	26.26	24.57	**L**
Wt. of Tare & DS (gm)	25.85	24.38	23.07	**T**
Wt. of Tare (gm)	15.49	15.61	15.45	**I**
Wt. of Water (gm)	2.5	1.9	1.5	**P**
Wt. of DS (gm)	10.4	8.8	7.6	**O**
				I
Moisture Content (%)	**24.0**	**21.4**	**19.7**	**N**
Number of Blows	**15**	**25**	**32**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	A-K	A-M	
Wt. of Tare & WS (gm)	25.62	24.68	
Wt. of Tare & DS (gm)	23.99	23.15	
Wt. of Tare (gm)	15.56	15.38	
Wt. of Water (gm)	1.6	1.5	
Wt. of DS (gm)	8.4	7.8	
Moisture Content (%)	**19.3**	**19.7**	**-0.4**

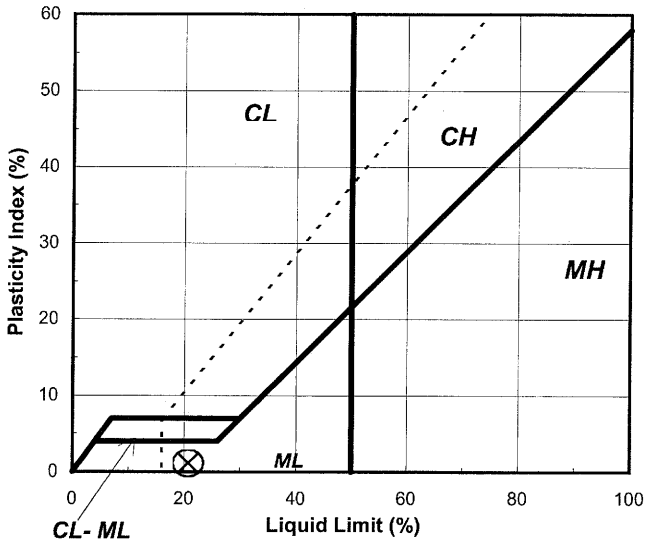
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**21**
Plastic Limit (%)	**20**
Plasticity Index (%)	**1**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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Geotechnics
INTEGRITY IN TESTING

ONE POINT ATTERBERG LIMIT

ASTM D 4318-96 (SOP - S4)

Client	CDM	Boring No.	B-621
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-11	Soil Description	**BROWN SILT**
			(MInus No. 40 sieve material, Airdried)

Liquid Limit Test	**1**	**2**
Tare Number	E	E
Wt. of Tare & WS (gm)	35.5	35.5
Wt. of Tare & DS (gm)	31.54	31.54
Wt. of Tare (gm)	15.29	15.29
Wt. of Water (gm)	3.96	3.96
Wt. of DS (gm)	16.25	16.25
Moisture Content (%)	**24.4**	**24.4**
Number of Blows	**25**	**25**

Blows	**K-factor**
20	0.974
21	0.979
22	0.985
23	0.990
24	0.995
25	1.000
26	1.005
27	1.009
28	1.014
29	1.018
30	1.022

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	F	A-D	
Wt. of Tare & WS (gm)	25.41	24.84	
Wt. of Tare & DS (gm)	23.54	23.1	
Wt. of Tare (gm)	15.28	15.4	
Wt. of Water (gm)	1.87	1.74	
Wt. of DS (gm)	8.26	7.7	
Moisture Content (%)	**22.6**	**22.6**	**0.0**

Note: The acceptable range of the two Moisture contents is ± 2.6

Liquid Limit Test Results

Test 1

LL = 24.4

LL^{CORR} = 24

Test 2

LL = 24.4

LL^{CORR} = 24

Summary

Liquid Limit (%)	**24**	**Plasticity Index (%)**	**1**
Plastic Limit (%)	**23**	**USCS Symbol**	**ML**

Tested By SD *Date* 7/14/2008 *Checked By* GEM *Date* 7-15-08

DCN: CT-S4A DAT 10/08/01 REVISION: 4

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ATTERBERG LIMIT

ASTM D 4318-00 (SOP - S4)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	9-11
Project No.	2008-598-01	Sample No.	S-3
Lab ID	2008-598-01-12	Visual Description	**BROWN**
			(MInus No. 40 sieve material, Wet Method)

NON - PLASTIC MATERIAL

Tested By JBD *Date* 7/17/2008 *Checked By* Gem *Date* 7-21-08

DCN: CT-S4C DATE: 7-11-97 REVISION : 2

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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-13	Soil Description	**BROWN SILT**

***Note: The* USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.**

(Minus No. 40 sieve material, Airdried)

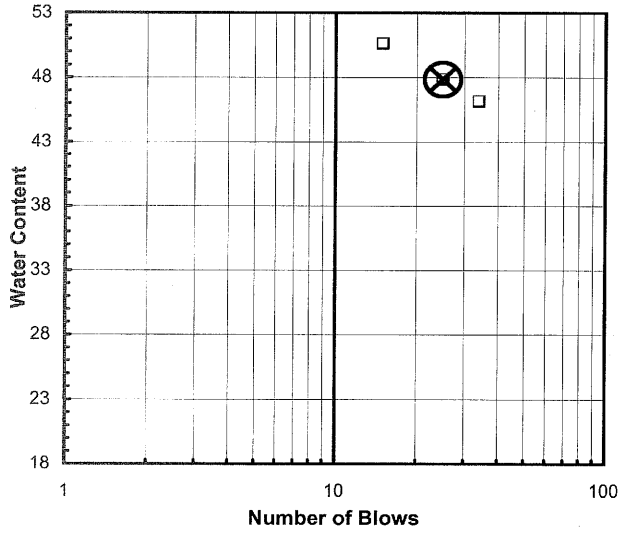
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	A-B	U	A-P	**U**
Wt. of Tare & WS (gm)	25.75	27.19	28.84	**L**
Wt. of Tare & DS (gm)	22.34	23.31	24.66	**T**
Wt. of Tare (gm)	15.60	15.20	15.60	**I**
Wt. of Water (gm)	3.4	3.9	4.2	**P**
Wt. of DS (gm)	6.7	8.1	9.1	**O**
				I
Moisture Content (%)	**50.6**	**47.8**	**46.1**	**N**
Number of Blows	**15**	**25**	**34**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	Q	K	
Wt. of Tare & WS (gm)	23.18	23.12	
Wt. of Tare & DS (gm)	21.15	21.17	
Wt. of Tare (gm)	15.16	15.24	
Wt. of Water (gm)	2.0	2.0	
Wt. of DS (gm)	6.0	5.9	
Moisture Content (%)	**33.9**	**32.9**	**1.0**

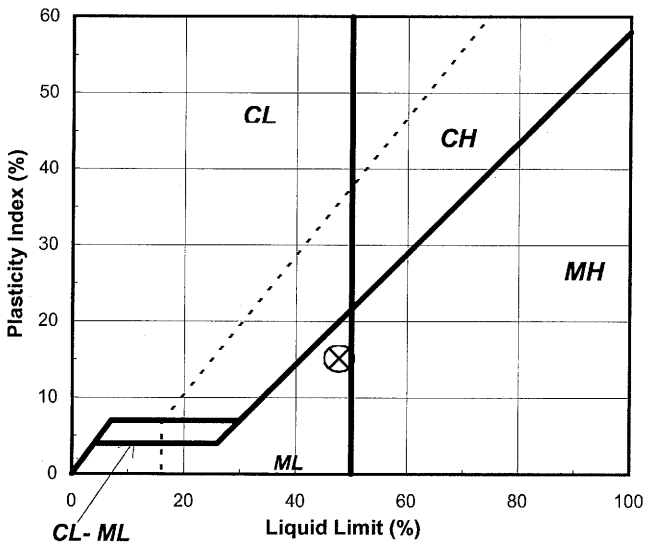
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**48**
Plastic Limit (%)	**33**
Plasticity Index (%)	**15**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	14-16
Project No.	2008-598-01	Sample No.	S-4
Lab ID	2008-598-01-14	Soil Description	**LIGHT BROWN SILT**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

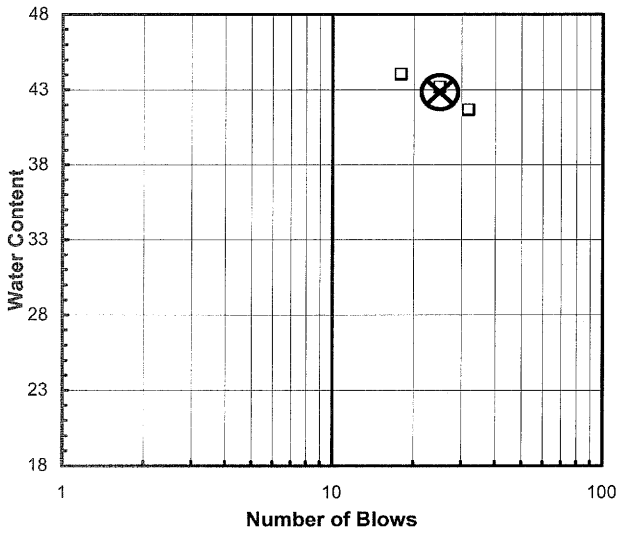
Liquid Limit Test	**1**	**2**	**3**	**MULTIPOINT**
Tare Number	L-1	L	R	
Wt. of Tare & WS (gm)	27.47	27.27	26.50	
Wt. of Tare & DS (gm)	23.90	23.64	23.16	
Wt. of Tare (gm)	15.79	15.23	15.14	
Wt. of Water (gm)	3.6	3.6	3.3	
Wt. of DS (gm)	8.1	8.4	8.0	
Moisture Content (%)	**44.0**	**43.2**	**41.6**	
Number of Blows	**18**	**25**	**32**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	N	B	
Wt. of Tare & WS (gm)	22.58	22.85	
Wt. of Tare & DS (gm)	20.93	21.10	
Wt. of Tare (gm)	15.31	15.22	
Wt. of Water (gm)	1.7	1.8	
Wt. of DS (gm)	5.6	5.9	
Moisture Content (%)	**29.4**	**29.8**	**-0.4**

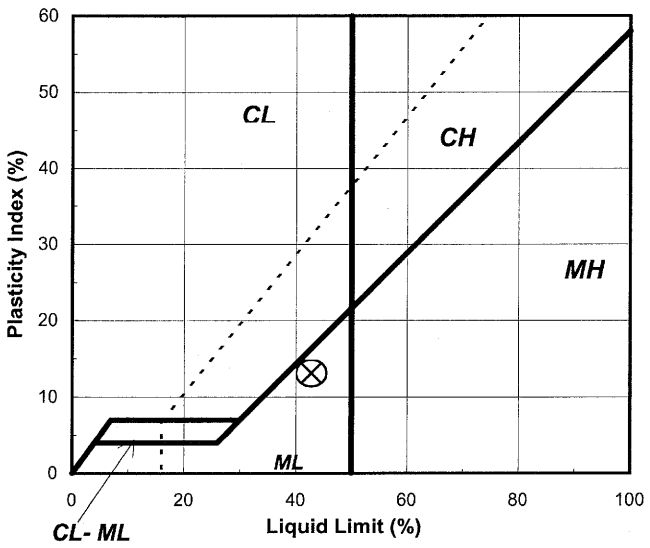
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**43**
Plastic Limit (%)	**30**
Plasticity Index (%)	**13**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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ATTERBERG LIMIT

ASTM D 4318-00 (SOP - S4)

Client	CDM	Boring No.	B-623
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	24-26
Project No.	2008-598-01	Sample No.	S-6
Lab ID	2008-598-01-15	Visual Description	**LIGHT BROWN TAN**
			(MInus No. 40 sieve material, Wet Method)

NON - PLASTIC MATERIAL

Tested By JBD *Date* 7/17/2008 *Checked By* GAM *Date* 7-21-08

DCN: CT-S4C DATE: 7-11-97 REVISION : 2

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ATTERBERG LIMITS

ASTM D 4318-05 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-2
Project No.	2008-598-01	Sample No.	S-1
Lab ID	2008-598-01-16	Soil Description	**REDDISH BROWN SILT**

***Note: The* USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.**

(Minus No. 40 sieve material, Airdried)

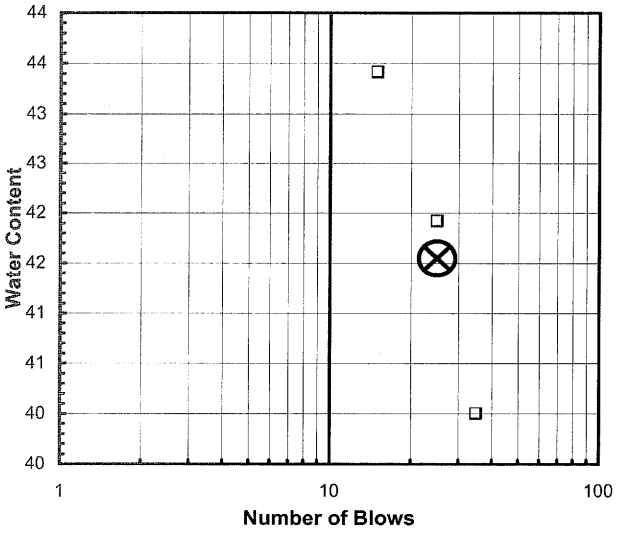
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	C	K	Q	**U**
Wt. of Tare & WS (gm)	28.19	25.59	27.00	**L**
Wt. of Tare & DS (gm)	24.27	22.53	23.62	**T**
Wt. of Tare (gm)	15.24	15.23	15.17	**I**
Wt. of Water (gm)	3.9	3.1	3.4	**P**
Wt. of DS (gm)	9.0	7.3	8.5	**O**
				I
Moisture Content (%)	**43.4**	**41.9**	**40.0**	**N**
Number of Blows	**15**	**25**	**35**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	U	Y	
Wt. of Tare & WS (gm)	23.83	22.32	
Wt. of Tare & DS (gm)	21.64	20.62	
Wt. of Tare (gm)	15.21	15.61	
Wt. of Water (gm)	2.2	1.7	
Wt. of DS (gm)	6.4	5.0	
Moisture Content (%)	**34.1**	**33.9**	**0.1**

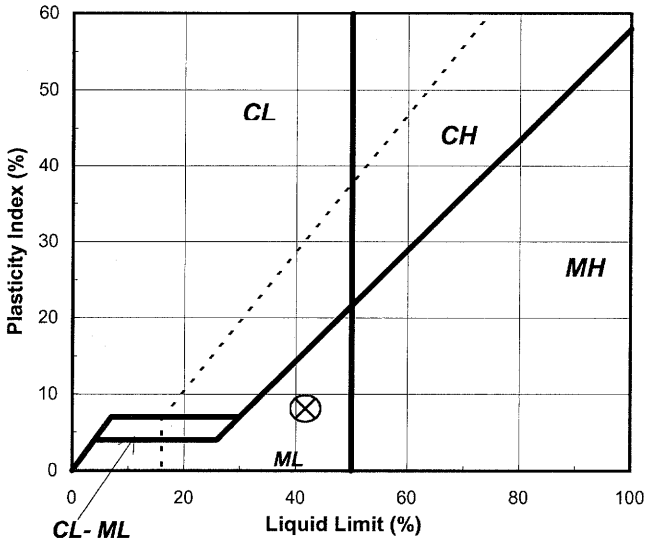
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**42**
Plastic Limit (%)	**34**
Plasticity Index (%)	**8**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMIT

ASTM D 4318-00 (SOP - S4)

Client	CDM	Boring No.	B-624
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	4-6
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-17	Visual Description	**BROWN**
			(MInus No. 40 sieve material, Wet Method)

NON - PLASTIC MATERIAL

Tested By JBD *Date* 7/17/2008 *Checked By* GBM *Date* 7-24-08

DCN: CT-S4C DATE: 7-11-97 REVISION : 2

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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-05 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-1
Project No.	2008-598-01	Sample No.	S-1T
Lab ID	2008-598-01-19	Soil Description	**BROWN SILT**

***Note: The* USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.**

(Minus No. 40 sieve material, Airdried)

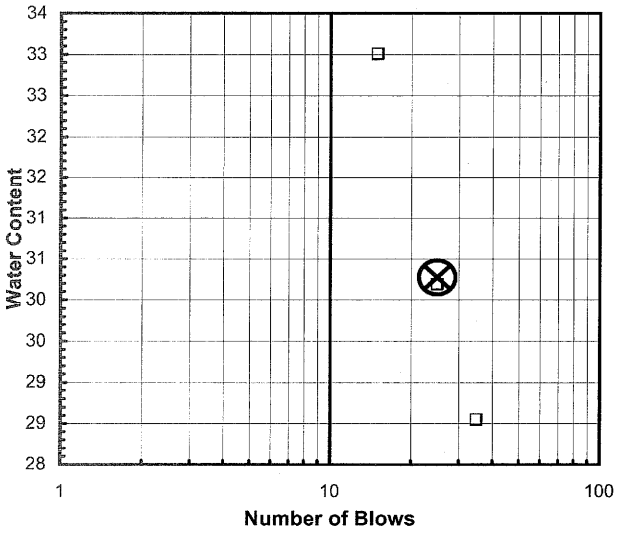
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	M	O	P	**U**
Wt. of Tare & WS (gm)	29.92	28.62	29.07	**L**
Wt. of Tare & DS (gm)	26.25	25.52	25.99	**T**
Wt. of Tare (gm)	15.13	15.25	15.20	**I**
Wt. of Water (gm)	3.7	3.1	3.1	**P**
Wt. of DS (gm)	11.1	10.3	10.8	**O**
				I
Moisture Content (%)	**33.0**	**30.2**	**28.5**	**N**
Number of Blows	**15**	**25**	**35**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	J	W	
Wt. of Tare & WS (gm)	23.11	23.31	
Wt. of Tare & DS (gm)	21.63	21.78	
Wt. of Tare (gm)	15.15	15.15	
Wt. of Water (gm)	1.5	1.5	
Wt. of DS (gm)	6.5	6.6	
Moisture Content (%)	**22.8**	**23.1**	**-0.2**

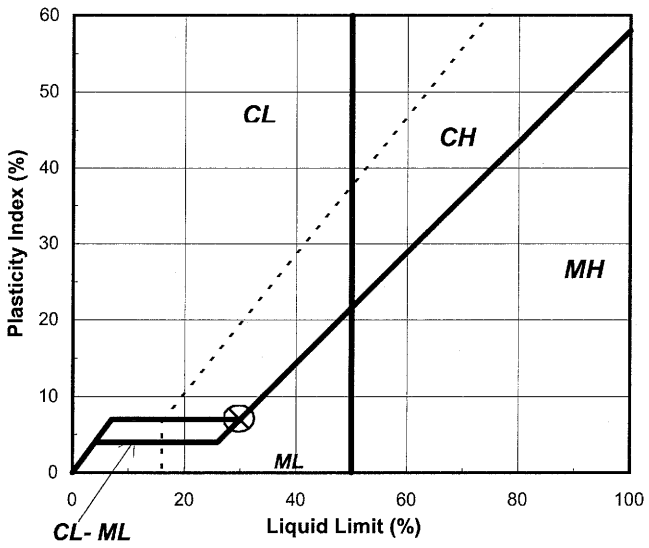
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**30**
Plastic Limit (%)	**23**
Plasticity Index (%)	**7**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



Tested By SGH *Date* 3/13/2008 *Checked By* GBM *Date* 7-21-08

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ATTERBERG LIMITS

ASTM D 4318-05 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	B-626
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	3-5
Project No.	2008-598-01	Sample No.	S-2
Lab ID	2008-598-01-20	Soil Description	**BROWN SILT**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried)
sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

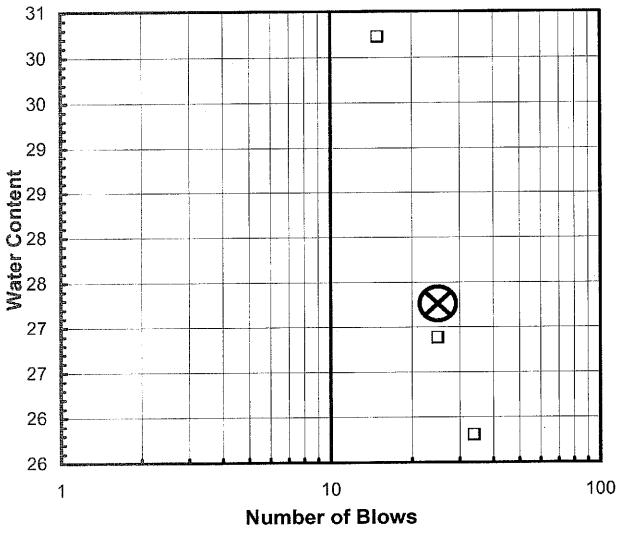
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	L	B	N	**U**
Wt. of Tare & WS (gm)	28.20	28.19	25.54	**L**
Wt. of Tare & DS (gm)	25.19	25.44	23.44	**T**
Wt. of Tare (gm)	15.23	15.21	15.30	**I**
Wt. of Water (gm)	3.0	2.8	2.1	**P**
Wt. of DS (gm)	10.0	10.2	8.1	**O**
				I
Moisture Content (%)	**30.2**	**26.9**	**25.8**	**N**
Number of Blows	**15**	**25**	**34**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	T	R	
Wt. of Tare & WS (gm)	22.19	24.22	
Wt. of Tare & DS (gm)	20.89	22.46	
Wt. of Tare (gm)	15.24	15.13	
Wt. of Water (gm)	1.3	1.8	
Wt. of DS (gm)	5.7	7.3	
Moisture Content (%)	**23.0**	**24.0**	**-1.0**

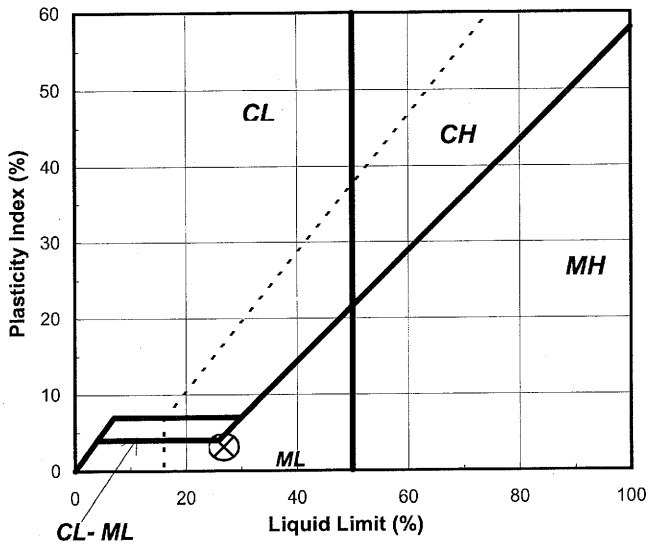
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**27**
Plastic Limit (%)	**24**
Plasticity Index (%)	**3**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



Tested By SD *Date* 7/17/2008 *Checked By* GBM *Date* 7-21-08

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Geotechnics
INTEGRITY IN TESTING

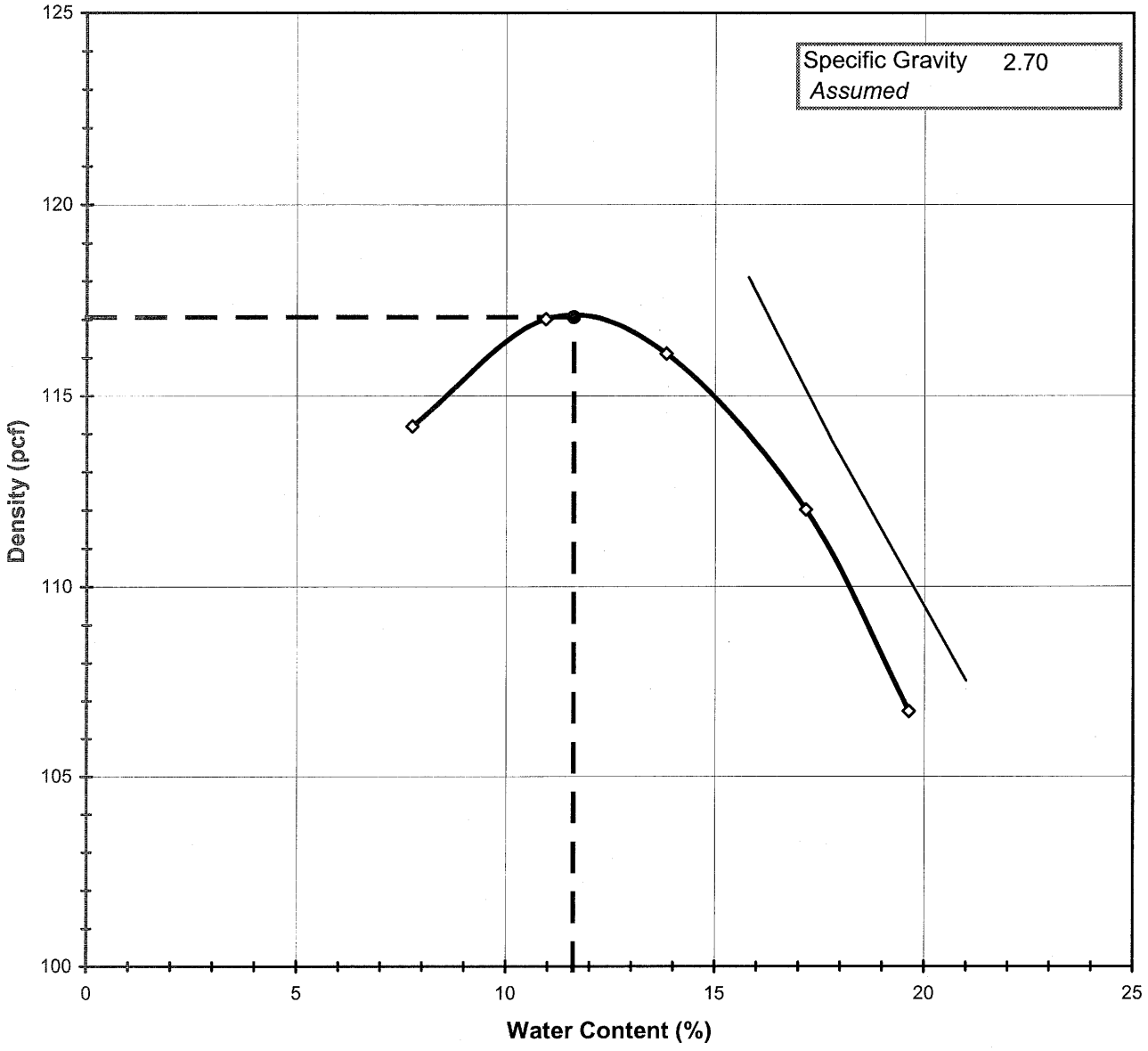
MOISTURE DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Test Method	**STANDARD**

Visual Description BROWN SILTY SAND

Optimum Water Content **11.6**
Maximum Dry Density **117.1**



Tested By SD *Date* 7/11/2008 *Checked By* GEM *Date* 7-15-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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Geotechnics
INTEGRITY IN TESTING

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21		

Visual Description: BROWN SILTY SAND

Total Weight of the Sample (gm)	26196
As Received Water Content(%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	172
Mold diameter		4"
Weight of the Mold		4326
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	6174	6276	6311	6297	6244
Wt.of Mold (gm)	4326	4326	4326	4326	4326
Wt. of WS	1848	1950	1985	1971	1918
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	308	304	318	307	301
Wt. of Tare & WS (gm)	747.20	671.30	637.20	613.10	610.50
Wt. of Tare & DS (gm)	701.46	615.99	570.35	539.50	524.17
Wt. of Tare (gm)	111.40	110.80	86.90	110.90	84.40
Wt. of Water (gm)	45.74	55.31	66.85	73.60	86.33
Wt. of DS (gm)	590.06	505.19	483.45	428.60	439.77
Wet Density (gm/cc)	1.97	2.08	2.12	2.10	2.05
Wet Density (pcf)	123.1	129.8	132.2	131.2	127.7
Moisture Content (%)	**7.8**	**10.9**	**13.8**	**17.2**	**19.6**
Dry Density (pcf)	**114.2**	**117.0**	**116.1**	**112.0**	**106.7**

Zero Air Voids

Moisture Content (%)	15.8	17.8	21.0
Dry Unit Weight (pcf)	118.1	113.8	107.5

Tested By SD *Date* 7/11/2008 *Checked By* GEM *Date* 7.15.08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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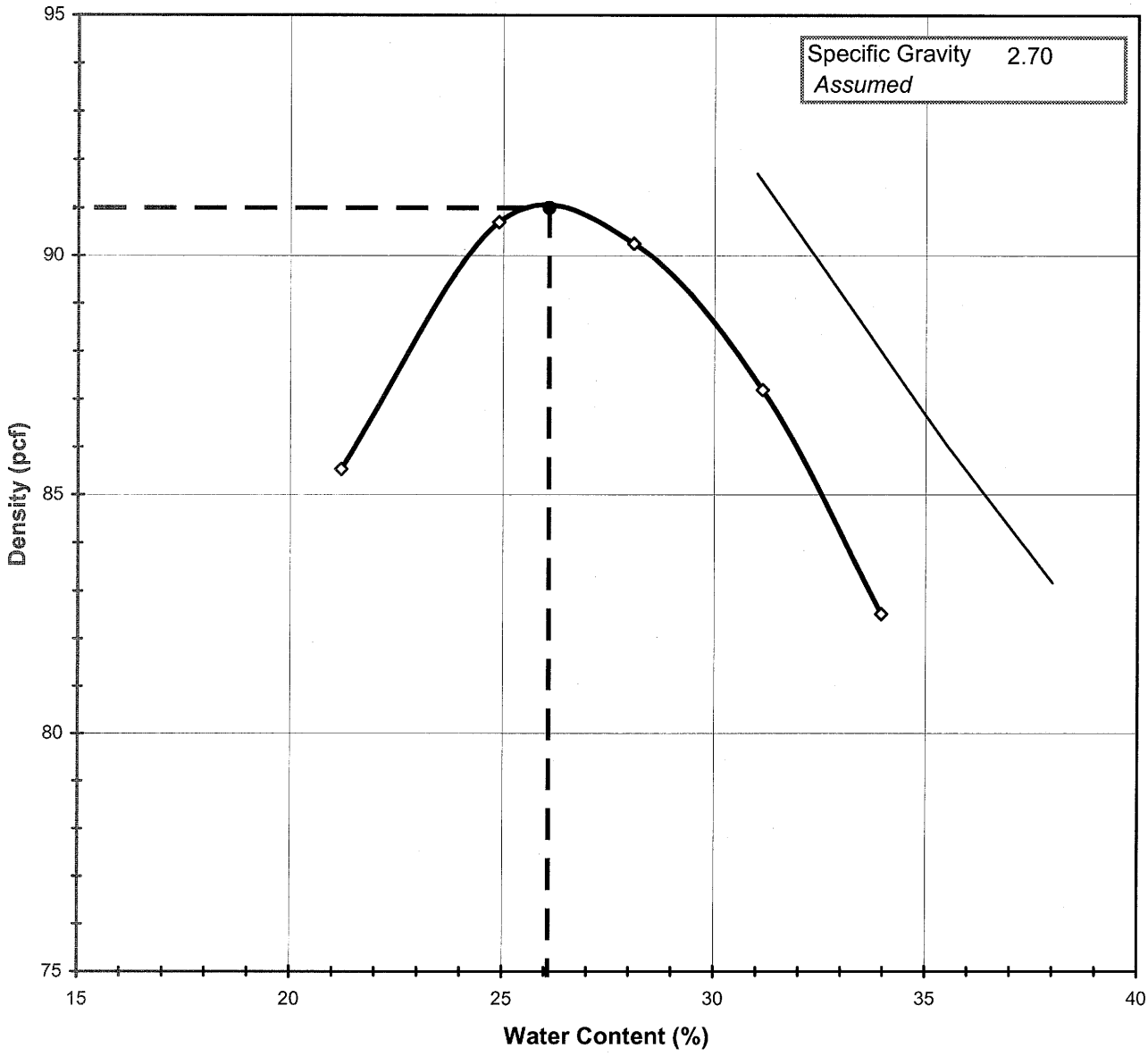
MOISTURE DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Test Method	**STANDARD**

Visual Description RED BROWN SANDY SILT

Optimum Water Content	**26.1**
Maximum Dry Density	**91.0**



Tested By DW *Date* 7/11/2008 *Checked By* GM *Date* 7-17-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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Geotechnics
INTEGRITY IN TESTING

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22		

Visual Description: RED BROWN SANDY SILT

Total Weight of the Sample (gm)	21164
As Received Water Content(%)	27
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	1
Percent Retained on 3/8"	NA
Percent Retained on #4	2
Oversize Material	Not included
Procedure Used	A

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	172
Mold diameter		4"
Weight of the Mold		4326
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	5883	6027	6062	6043	5986
Wt.of Mold (gm)	4326	4326	4326	4326	4326
Wt. of WS	1557	1702	1737	1718	1660
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	250	200	216	399	K-7
Wt. of Tare & WS (gm)	697.80	689.70	519.20	451.70	437.20
Wt. of Tare & DS (gm)	605.35	586.40	442.67	364.96	354.37
Wt. of Tare (gm)	169.20	171.50	170.30	86.40	110.40
Wt. of Water (gm)	92.45	103.30	76.53	86.74	82.83
Wt. of DS (gm)	436.15	414.90	272.37	278.56	243.97
Wet Density (gm/cc)	1.66	1.82	1.85	1.83	1.77
Wet Density (pcf)	103.7	113.3	115.6	114.3	110.5
Moisture Content (%)	**21.2**	**24.9**	**28.1**	**31.1**	**34.0**
Dry Density (pcf)	**85.5**	**90.7**	**90.2**	**87.2**	**82.5**

Zero Air Voids

Moisture Content (%)	31.0	35.5	38.0
Dry Unit Weight (pcf)	91.7	86.0	83.2

Tested By DW *Date* 7/11/2008 *Checked By* GEM *Date* 7-17-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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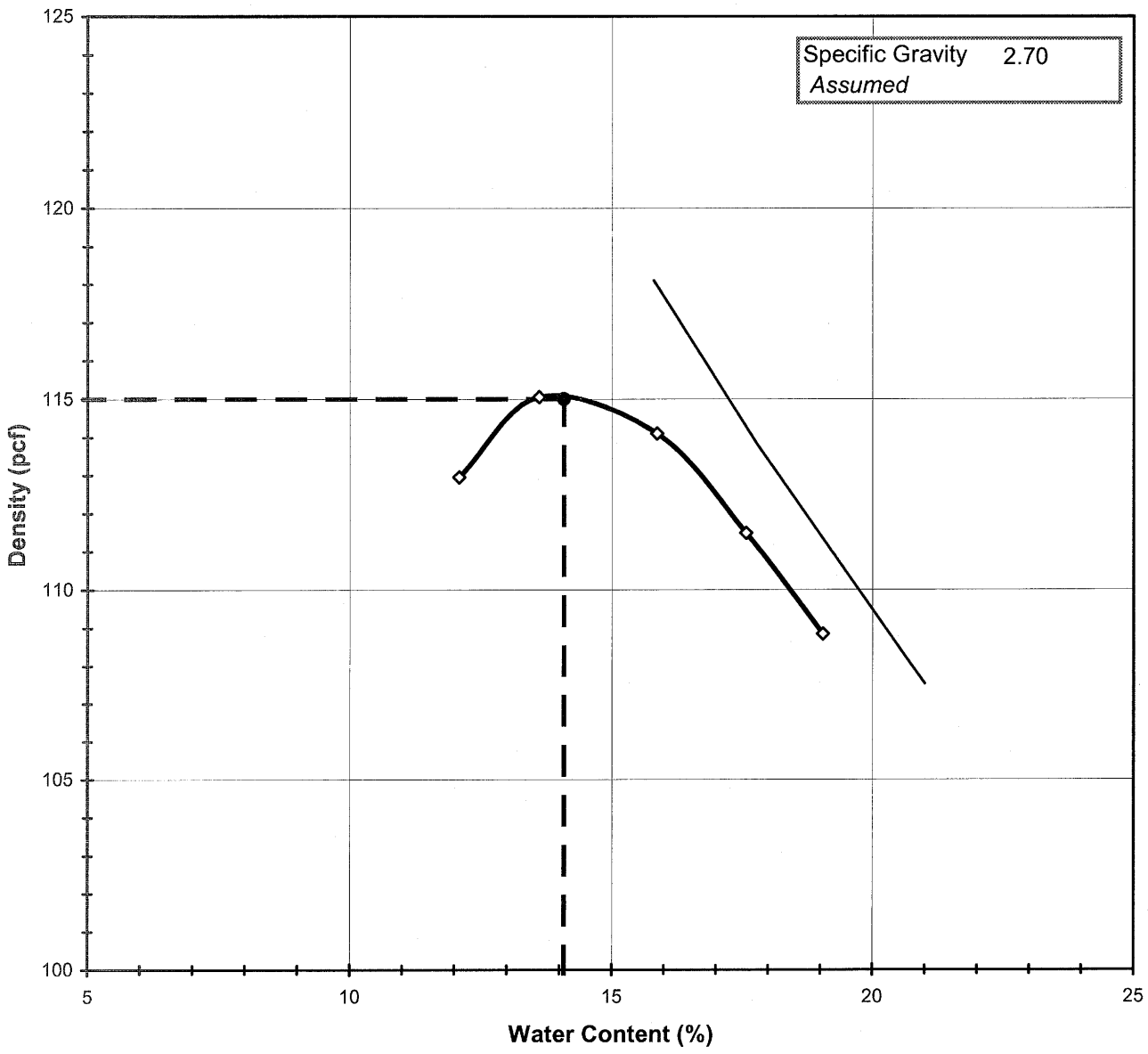
MOISTURE DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Test Method	**STANDARD**

Visual Description DARK BROWN SILTY SAND

Optimum Water Content **14.1**
Maximum Dry Density **115.0**



Tested By DW *Date* 7/11/2008 *Checked By* GDM *Date* 7-15-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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Geotechnics
INTEGRITY IN TESTING

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23		

Visual Description: DARK BROWN SILTY SAND

Total Weight of the Sample (gm)	22625
As Received Water Content(%)	16
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	1
Percent Retained on 3/8"	NA
Percent Retained on #4	6
Oversize Material	Not included
Procedure Used	B

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	172
Mold diameter		4"
Weight of the Mold		4326
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	6227	6289	6311	6295	6272
Wt.of Mold (gm)	4326	4326	4326	4326	4326
Wt. of WS	1902	1963	1986	1969	1946
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	314	315	309	305	310
Wt. of Tare & WS (gm)	520.10	561.00	516.00	659.50	681.90
Wt. of Tare & DS (gm)	473.14	507.01	460.36	573.53	590.42
Wt. of Tare (gm)	84.70	110.40	109.70	84.40	110.30
Wt. of Water (gm)	46.96	53.99	55.64	85.97	91.48
Wt. of DS (gm)	388.44	396.61	350.66	489.13	480.12
Wet Density (gm/cc)	2.03	2.09	2.12	2.10	2.08
Wet Density (pcf)	126.6	130.7	132.2	131.1	129.6
Moisture Content (%)	**12.1**	**13.6**	**15.9**	**17.6**	**19.1**
Dry Density (pcf)	**112.9**	**115.1**	**114.1**	**111.5**	**108.8**

Zero Air Voids

Moisture Content (%)	15.8	17.8	21.0
Dry Unit Weight (pcf)	118.1	113.8	107.5

Tested By DW *Date* 7/11/2008 *Checked By* GBM *Date* 7-15-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics
INTEGRITY IN TESTING

PERMOMETER METHOD

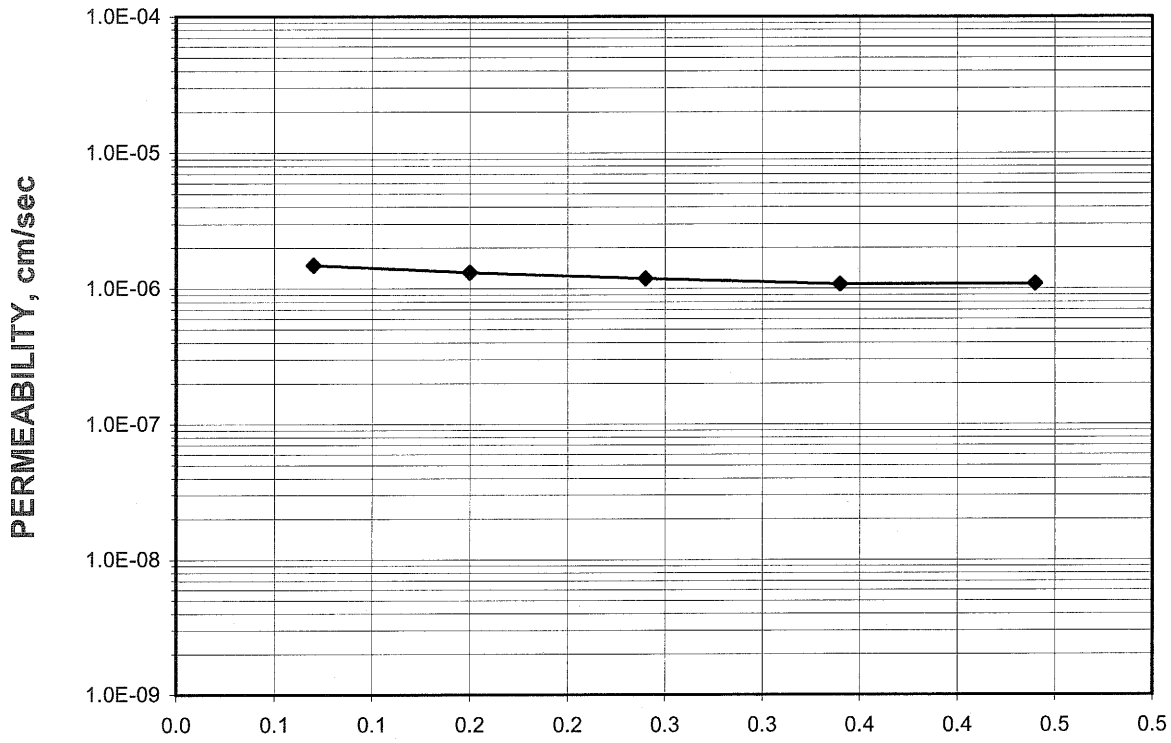
ASTM D 5084-97
(SOP-S22C)

Client	CDM	Boring No.	B-622
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-21		

Visual Description: BROWN SILTY SAND

AVERAGE PERMEABILITY = 1.2E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.2E-08 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS Date: 7/16/2008 Checked By: GBM Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-622
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-21		
		Specific Gravity	2.70 Assumed
		Sample Condition	Remolded

Visual Description: BROWN SILTY SAND

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	311	314
Wt. of Tare & WS (gm.)	298.29	652.97
Wt. of Tare & DS (gm.)	272.29	580.05
Wt. of Tare (gm.)	84.19	84.82
Wt. of Water (gm.)	26.00	72.92
Wt. of DS (gm.)	188.10	495.23
Moisture Content (%)	**13.8**	**14.7**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	874.24	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	874.24	881.17
Length 1 (in.)	4.012	3.917
Length 2 (in.)	4.012	3.871
Length 3 (in.)	4.012	3.934
Top Diameter (in.)	2.872	2.821
Middle Diameter (in.)	2.872	2.855
Bottom Diameter (in.)	2.872	2.844
Average Length (in.)	4.01	3.91
Average Area (in.^{2})	6.48	6.33
Sample Volume (cm^3)	425.91	405.61
Unit Wet Wt. (gm./ cm^3)	2.053	2.172
Unit Wet Wt. (pcf)	128.1	135.6
Unit Dry Wt. (pcf)	112.6	118.2
Unit Dry Wt. (gm./ cm^3)	1.803	1.894
Void Ratio, e	0.497	0.426
Porosity, n	0.332	0.299
Pore Volume (cm^3)	141.4	121.1

Tested By: TMS Date: 7/16/2008 Checked By: GEM Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-622
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-21		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	45.0	Sample Length (cm), L	9.92
Back Pressure(psi)	40.0	Sample Area (cm^2), A	40.87
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1.75

AVERAGE PERMEABILITY = 1.2E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.2E-08 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	FLOW CONDITION (0 flow)	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)	(cm/sec)
7/16/08	8	37.48	0	10.5	11.5	0	23.1	NA
7/16/08	8	37.55	0	10.4	11.4	0	23.1	1.5E-06
7/16/08	8	37.63	0	10.3	11.3	0	23.1	1.3E-06
7/16/08	8	37.72	0	10.2	11.1	0	23.1	1.2E-06
7/16/08	8	37.82	0	10.1	11.0	0	23.1	1.1E-06
7/16/08	8	37.92	0	10.0	10.9	1	23.1	1.1E-06

Tested By: TMS Date: 7/16/2008 Checked By: Gem Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics
INTEGRITY IN TESTING

PERMOMETER METHOD

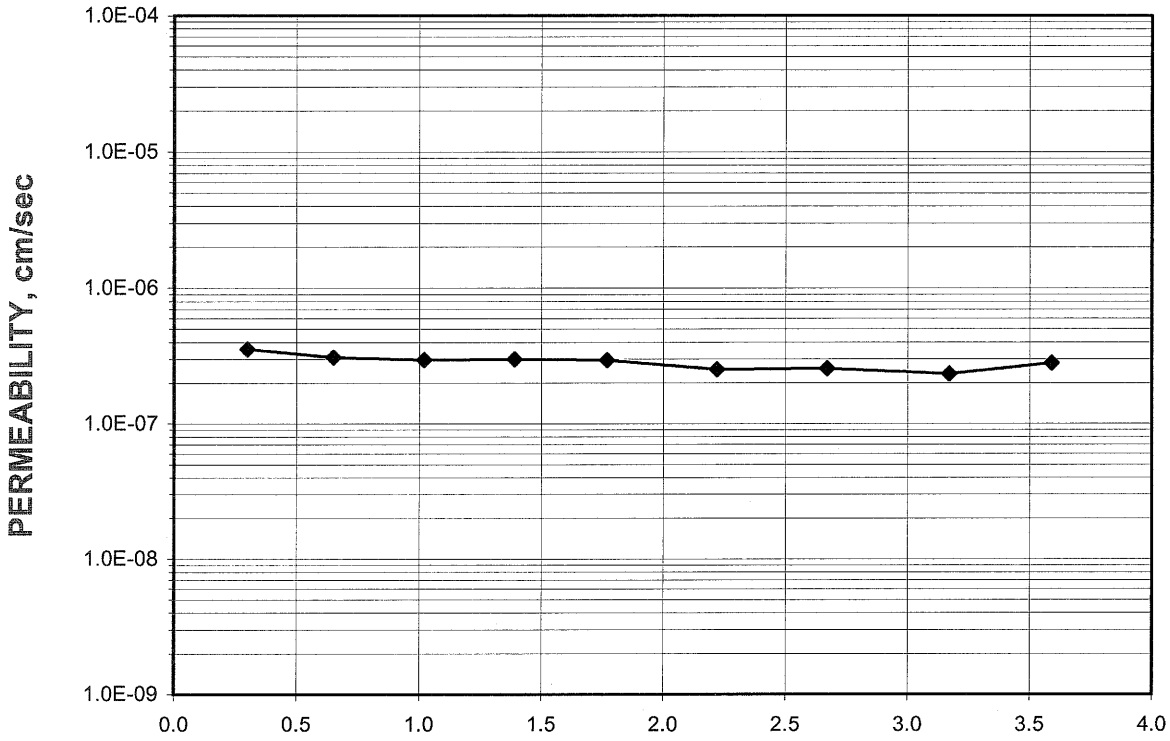
ASTM D 5084-97
(SOP-S22C)

Client	CDM	Boring No.	B-618
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-22		

Visual Description: RED/BROWN SANDY SILT

AVERAGE PERMEABILITY = 2.5E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.5E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS Date: 7/16/2008 Checked By: GEM Date: 7-17-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-22 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-618
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-22		
		Specific Gravity	2.70 Assumed
		Sample Condition	Remolded

Visual Description: RED/BROWN SANDY SILT

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	317	305
Wt. of Tare & WS (gm.)	377.20	429.84
Wt. of Tare & DS (gm.)	312.16	343.07
Wt. of Tare (gm.)	84.14	84.47
Wt. of Water (gm.)	65.04	86.77
Wt. of DS (gm.)	228.02	258.60
Moisture Content (%)	**28.5**	**33.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	768.96	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	768.96	799.05
Length 1 (in.)	4.012	4.059
Length 2 (in.)	4.012	4.065
Length 3 (in.)	4.012	4.057
Top Diameter (in.)	2.872	2.861
Middle Diameter (in.)	2.872	2.861
Bottom Diameter (in.)	2.872	2.859
Average Length (in.)	4.01	4.06
Average Area (in.^{2})	6.48	6.43
Sample Volume (cm^3)	425.91	427.55
Unit Wet Wt. (gm./ cm^3)	1.805	1.869
Unit Wet Wt. (pcf)	112.7	116.7
Unit Dry Wt. (pcf)	87.7	87.4
Unit Dry Wt. (gm./ cm^3)	1.405	1.399
Void Ratio, e	0.922	0.929
Porosity, n	0.480	0.482
Pore Volume (cm^3)	204.3	206.0

Tested By: TMS Date: 7/16/2008 Checked By: GBM Date: 7-17-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-22 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-618
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-22		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	55.0	Sample Length (cm), L	10.31
Back Pressure(psi)	50.0	Sample Area (cm^2), A	41.46
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	95	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1.75

AVERAGE PERMEABILITY = 2.5E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.5E-09 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	FLOW CONDITION (0 flow)	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)	(cm/sec)
7/16/08	8	54.3	0	10.5	11.1	0	23.1	NA
7/16/08	8	54.6	0	10.4	11.0	0	23.1	3.6E-07
7/16/08	8	54.9	1	10.3	10.8	0	23.1	3.1E-07
7/16/08	8	55.3	1	10.2	10.7	0	23.1	2.9E-07
7/16/08	8	55.7	1	10.1	10.6	0	23.1	3.0E-07
7/16/08	8	56.1	2	10.0	10.4	0	23.1	2.9E-07
7/16/08	8	56.5	2	9.9	10.3	0	23.1	2.5E-07
7/16/08	8	57	3	9.8	10.2	0	23.1	2.5E-07
7/16/08	8	57.5	3	9.7	10.1	0	23.1	2.3E-07
7/16/08	8	57.9	4	9.6	9.9	1	23.1	2.8E-07

Tested By: TMS Date: 7/16/2008 Checked By: GEM Date: 7-17-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-22 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics
INTEGRITY IN TESTING

PERMOMETER METHOD

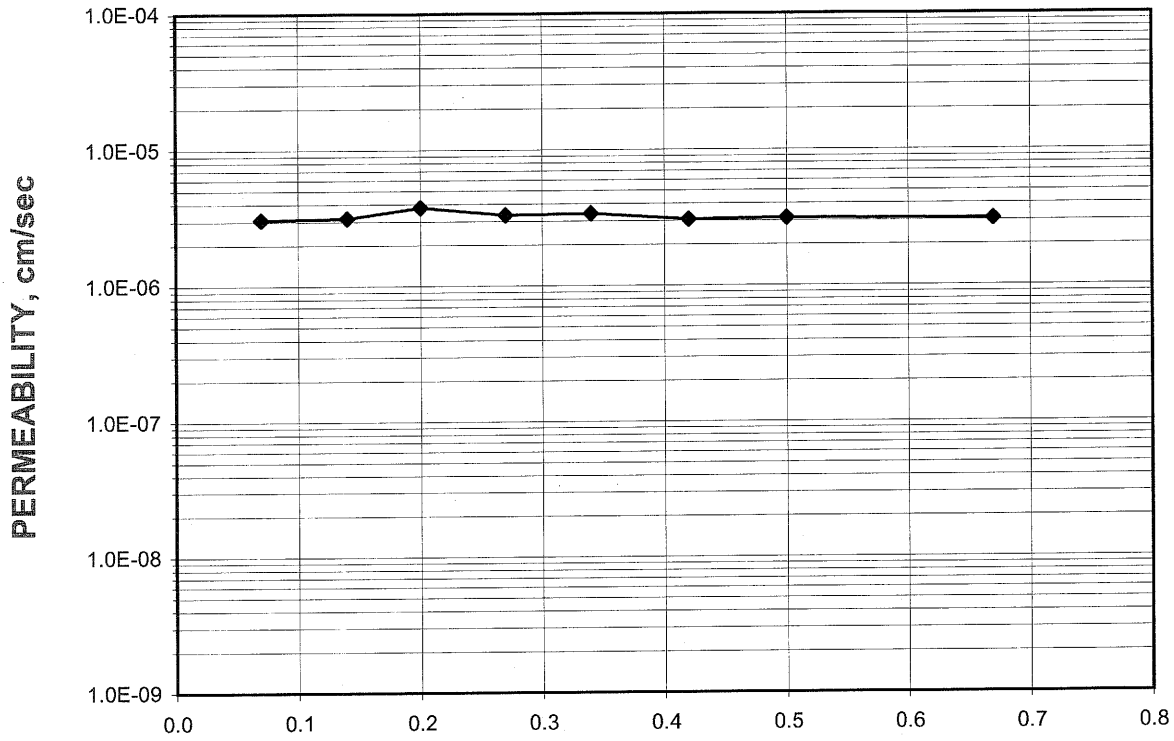
ASTM D 5084-97
(SOP-S22C)

Client	CDM	Boring No.	B-619
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-23		

Visual Description: DARK BROWN SILTY SAND

AVERAGE PERMEABILITY = 3.2E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.2E-08 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS Date: 7/16/2008 Checked By: GEM Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-619
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-23		
		Specific Gravity	2.70 Assumed
		Sample Condition	Remolded

Visual Description: DARK BROWN SILTY SAND

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	K-7	310
Wt. of Tare & WS (gm.)	302.02	600.65
Wt. of Tare & DS (gm.)	276.01	526.61
Wt. of Tare (gm.)	110.36	109.98
Wt. of Water (gm.)	26.01	74.04
Wt. of DS (gm.)	165.65	416.63
Moisture Content (%)	**15.7**	**17.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	875.25	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	875.25	890.90
Length 1 (in.)	4.012	3.991
Length 2 (in.)	4.012	4.040
Length 3 (in.)	4.012	4.042
Top Diameter (in.)	2.872	2.837
Middle Diameter (in.)	2.872	2.834
Bottom Diameter (in.)	2.872	2.842
Average Length (in.)	4.01	4.02
Average Area (in.^{2})	6.48	6.32
Sample Volume (cm^3)	425.91	417.07
Unit Wet Wt. (gm./ cm^3)	2.055	2.136
Unit Wet Wt. (pcf)	128.3	133.3
Unit Dry Wt. (pcf)	110.9	113.2
Unit Dry Wt. (gm./ cm^3)	1.776	1.814
Void Ratio, e	0.520	0.489
Porosity, n	0.342	0.328
Pore Volume (cm^3)	145.7	136.9

Tested By: TMS Date: 7/16/2008 Checked By: [illegible] Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-619
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	NA
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-23		

Test Pressures	
Cell Pressure(psi)	55.0
Back Pressure(psi)	50.0
Eff. Cons. Pressure(psi)	5.0
Response (%)	95

Final Sample Dimensions	
Sample Length (cm), L	10.22
Sample Area (cm^2), A	40.80
Pipette Area (cm^2), a_p	0.03142
Annulus Area (cm^2), a_a	0.76712
Equilibrium Level (cm), R_{eq}	1.75

AVERAGE PERMEABILITY = 3.2E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.2E-08 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	FLOW CONDITION (0 flow)	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)	(cm/sec)
7/16/08	8	4.58	0	10.5	11.2	0	23.1	NA
7/16/08	8	4.65	0	10.3	10.9	0	23.1	3.1E-06
7/16/08	8	4.72	0	10.1	10.7	0	23.1	3.2E-06
7/16/08	8	4.78	0	9.9	10.4	0	23.1	3.8E-06
7/16/08	8	4.85	0	9.7	10.2	0	23.1	3.3E-06
7/16/08	8	4.92	0	9.5	9.9	0	23.1	3.4E-06
7/16/08	8	5	0	9.3	9.6	0	23.1	3.0E-06
7/16/08	8	5.08	1	9.1	9.4	0	23.1	3.1E-06
7/16/08	8	5.25	1	8.7	8.9	1	23.1	3.1E-06

Tested By: TMS Date: 7/16/2008 Checked By: GDM Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 PERMOM.xls]Sheet1

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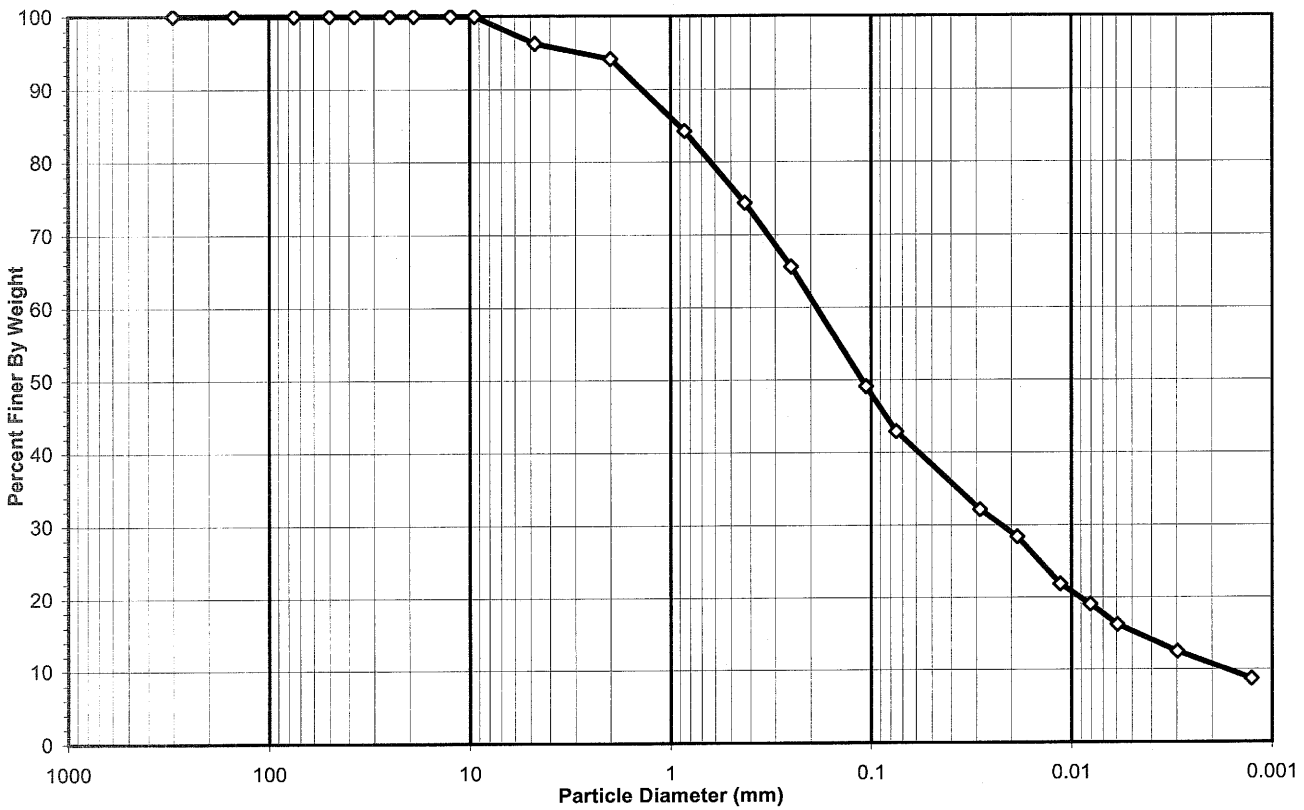
Geotechnics
INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-5
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Soil Color	**BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



Sieve Sizes (mm)	USCS Summary	Percentage
Greater Than #4	*Gravel*	3.73
#4 To #200	*Sand*	53.41
Finer Than #200	*Silt & Clay*	42.86

USCS Symbol ***sm, ASSUMED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 #10 Split Hydro rev 8.xls]Sheet1*

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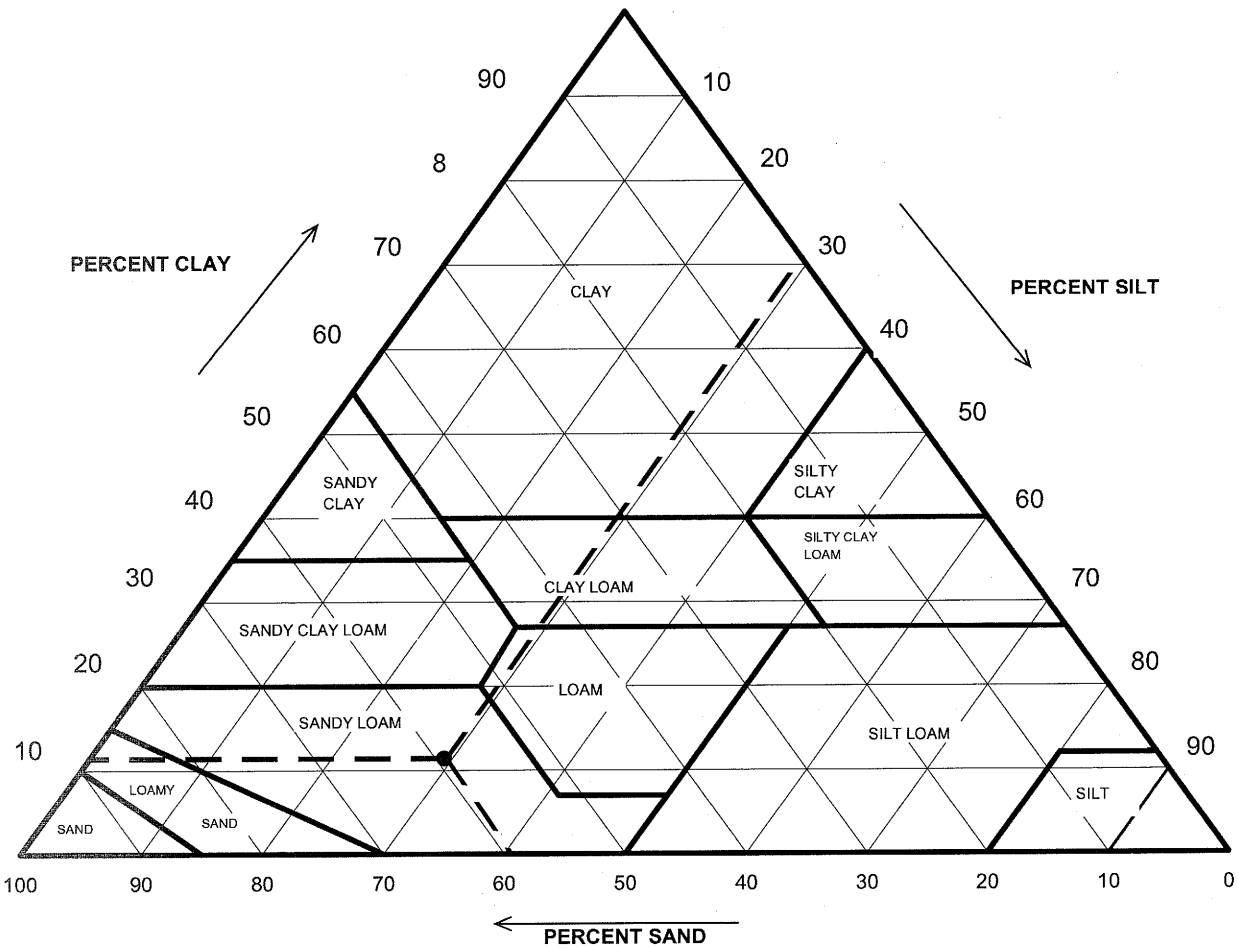
Geotechnics
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-5
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	5.85	**0.00**
2	94.15	*Sand*	55.81	**59.28**
0.05	38.34	*Silt*	27.60	**29.32**
0.002	10.74	*Clay*	10.74	**11.40**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-5
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Soil Color	**BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	316	Tare No.	P-1
Wgt.Tare + Wet Soil (gm)	559.18	Wgt.Tare + Wet Soil (gm)	58.98
Wgt.Tare + Dry Soil (gm)	533.03	Wgt.Tare + Dry Soil (gm)	58.78
Weight of Tare (gm)	208.14	Weight of Tare (gm)	22.07
Weight of Water (gm)	26.15	Weight of Water (gm)	0.20
Weight of Dry Soil (gm)	324.89	Weight of Dry Soil (gm)	36.71
Moisture Content (%)	**8.0**	**Moisture Content (%)**	**0.5**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	351.04	Weight of the Dry Sample (gm)	424.36
Dry Weight +#10 Material(gm)	324.9	Weight of minus #200 material (gm)	45.28
Wet Weight Hydro. Material.(gm)	100.01	Weight of plus #200 material (gm)	379.08
Dry Weight Hydro. Material (gm)	99.47		
Total Dry Weight Sample (gm)	424.36	**J-FACTOR (%FINER THAN #10)**	**0.9415**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	12.12	3.73	3.73	96.27	**96.27**
#10	2.00	6.89	2.12	5.85	94.15	**94.15**
#20	0.85	10.49	10.55	10.55	89.45	**84.22**
#40	0.425	10.44	10.50	21.04	78.96	**74.34**
#60	0.250	9.20	9.25	30.29	69.71	**65.63**
#140	0.106	17.49	17.58	47.87	52.13	**49.08**
#200	0.075	6.57	6.61	54.48	45.52	**42.86**
Pan	-	45.28	45.52	100.00	-	-

Notes :

Tested By SD Date 7/18/2008 Checked By Gem Date 7-28-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 #10 Split Hydro rev 8.xls]Sheet1*

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Geotechnics
INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-5
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Soil Color	**BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	38.0	38.0	24.3	3.70	34.3	34.1	0.01278	0.0287	**32.1**
5		34.0	24.3	3.70	30.3	30.2	0.01278	0.0187	**28.4**
15		27.0	24.3	3.70	23.3	23.2	0.01278	0.0114	**21.8**
31		24.0	24.3	3.70	20.3	20.2	0.01278	0.0081	**19.0**
60		21.0	24.3	3.70	17.3	17.2	0.01278	0.0059	**16.2**
250		17.0	24.4	3.67	13.3	13.3	0.01276	0.0030	**12.5**
1440		13.0	24.3	3.70	9.3	9.3	0.01278	0.0013	**8.7**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	99.47	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	94.15
Weight of Dry Material (gm)	99.47		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/16/2008 Checked By GEM Date 7-28-08

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Geotechnics
INTEGRITY IN TESTING

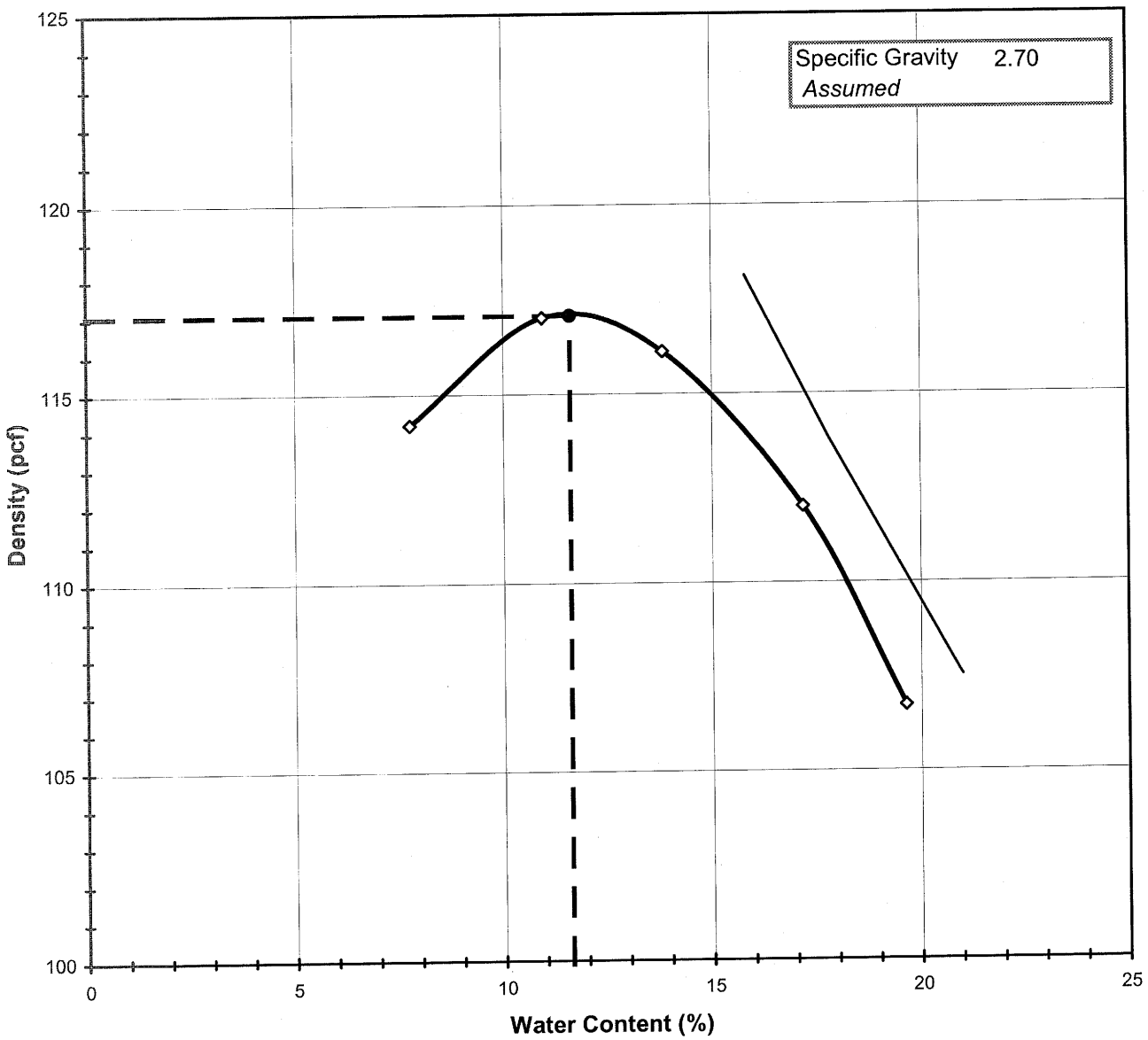
MOISTURE DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-5
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21	Test Method	**STANDARD**

Visual Description: BROWN SILTY SAND

Optimum Water Content **11.6**
Maximum Dry Density **117.1**



Tested By SD *Date* 7/11/2008 *Checked By* GEM *Date* 7-28-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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Geotechnics
INTEGRITY IN TESTING

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-622
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-5
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-21		

Visual Description: BROWN SILTY SAND

Total Weight of the Sample (gm)	26196
As Received Water Content(%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	172
Mold diameter		4"
Weight of the Mold		4326
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	6174	6276	6311	6297	6244
Wt.of Mold (gm)	4326	4326	4326	4326	4326
Wt. of WS	1848	1950	1985	1971	1918
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	308	304	318	307	301
Wt. of Tare & WS (gm)	747.20	671.30	637.20	613.10	610.50
Wt. of Tare & DS (gm)	701.46	615.99	570.35	539.50	524.17
Wt. of Tare (gm)	111.40	110.80	86.90	110.90	84.40
Wt. of Water (gm)	45.74	55.31	66.85	73.60	86.33
Wt. of DS (gm)	590.06	505.19	483.45	428.60	439.77
Wet Density (gm/cc)	1.97	2.08	2.12	2.10	2.05
Wet Density (pcf)	123.1	129.8	132.2	131.2	127.7
Moisture Content (%)	**7.8**	**10.9**	**13.8**	**17.2**	**19.6**
Dry Density (pcf)	**114.2**	**117.0**	**116.1**	**112.0**	**106.7**

Zero Air Voids

Moisture Content (%)	15.8	17.8	21.0
Dry Unit Weight (pcf)	118.1	113.8	107.5

Tested By SD *Date* 7/11/2008 *Checked By* GBM *Date* 7-28-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics
INTEGRITY IN TESTING

PERMOMETER METHOD

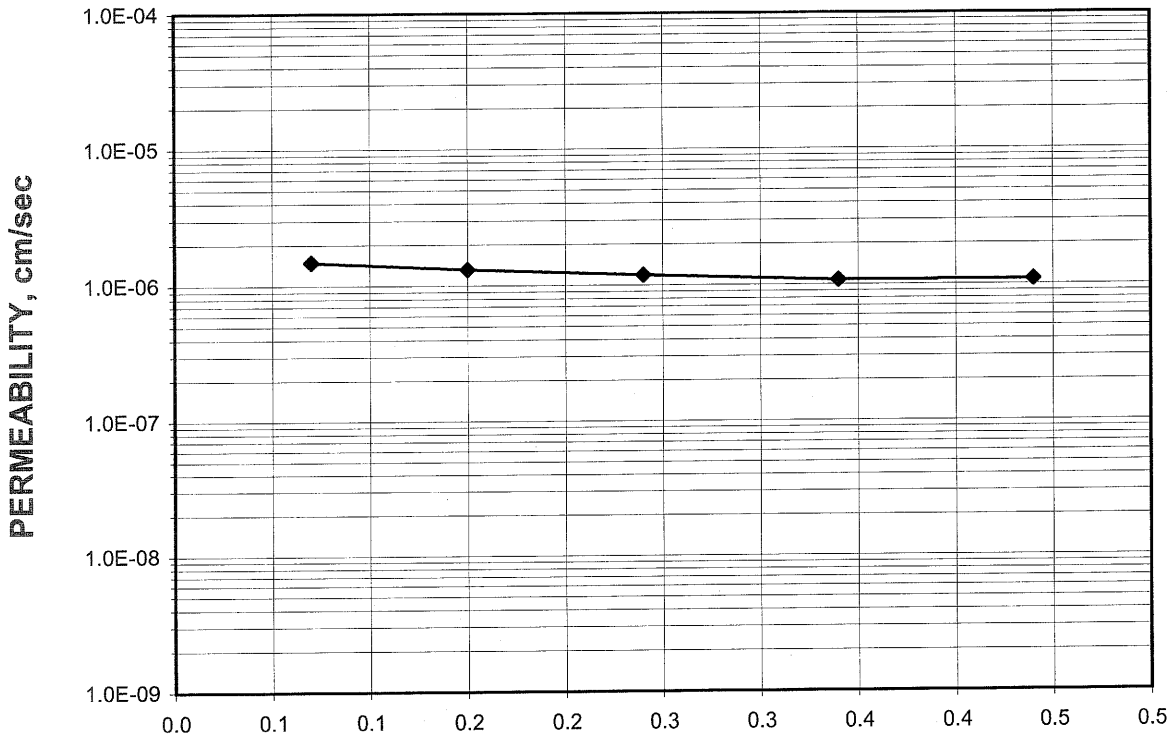
ASTM D 5084-97
(SOP-S22C)

Client	CDM	Boring No.	B-622
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	0-5
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-21		

Visual Description: BROWN SILTY SAND

AVERAGE PERMEABILITY = 1.2E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.2E-08 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS Date: 7/16/2008 Checked By: GEM Date: 7-28-08

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-622
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	0-5
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-21		
		Specific Gravity	2.70 Assumed
		Sample Condition	Remolded

Visual Description: BROWN SILTY SAND

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	311	314
Wt. of Tare & WS (gm.)	298.29	652.97
Wt. of Tare & DS (gm.)	272.29	580.05
Wt. of Tare (gm.)	84.19	84.82
Wt. of Water (gm.)	26.00	72.92
Wt. of DS (gm.)	188.10	495.23
Moisture Content (%)	**13.8**	**14.7**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	874.24	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	874.24	881.17
Length 1 (in.)	4.012	3.917
Length 2 (in.)	4.012	3.871
Length 3 (in.)	4.012	3.934
Top Diameter (in.)	2.872	2.821
Middle Diameter (in.)	2.872	2.855
Bottom Diameter (in.)	2.872	2.844
Average Length (in.)	4.01	3.91
Average Area (in.^{2})	6.48	6.33
Sample Volume (cm^3)	425.91	405.61
Unit Wet Wt. (gm./ cm^3)	2.053	2.172
Unit Wet Wt. (pcf)	128.1	135.6
Unit Dry Wt. (pcf)	112.6	118.2
Unit Dry Wt. (gm./ cm^3)	1.803	1.894
Void Ratio, e	0.497	0.426
Porosity, n	0.332	0.299
Pore Volume (cm^3)	141.4	121.1

Tested By: TMS Date: 7/16/2008 Checked By: GDM Date: 7-28-08

DCN: CT-22A DATE:12-21-98 REVISION: 4\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-622
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	0-5
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-21		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	45.0	Sample Length (cm), L	9.92
Back Pressure(psi)	40.0	Sample Area (cm^2), A	40.87
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1.75

AVERAGE PERMEABILITY = 1.2E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.2E-08 m/sec @ 20°C

DATE	TIME		ELAPSED TIME	PIPETTE READI NG	INCREMENT GRADIENT	FLOW CONDITION	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
			t	R_p	i	(0 flow)		
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)	(cm/sec)
7/16/08	8	37.48	0	10.5	11.5	0	23.1	NA
7/16/08	8	37.55	0	10.4	11.4	0	23.1	1.5E-06
7/16/08	8	37.63	0	10.3	11.3	0	23.1	1.3E-06
7/16/08	8	37.72	0	10.2	11.1	0	23.1	1.2E-06
7/16/08	8	37.82	0	10.1	11.0	0	23.1	1.1E-06
7/16/08	8	37.92	0	10.0	10.9	1	23.1	1.1E-06

Tested By: TMS Date: 7/16/2008 Checked By: GDM Date: 7-28-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-21 PERMOM.xls]Sheet1

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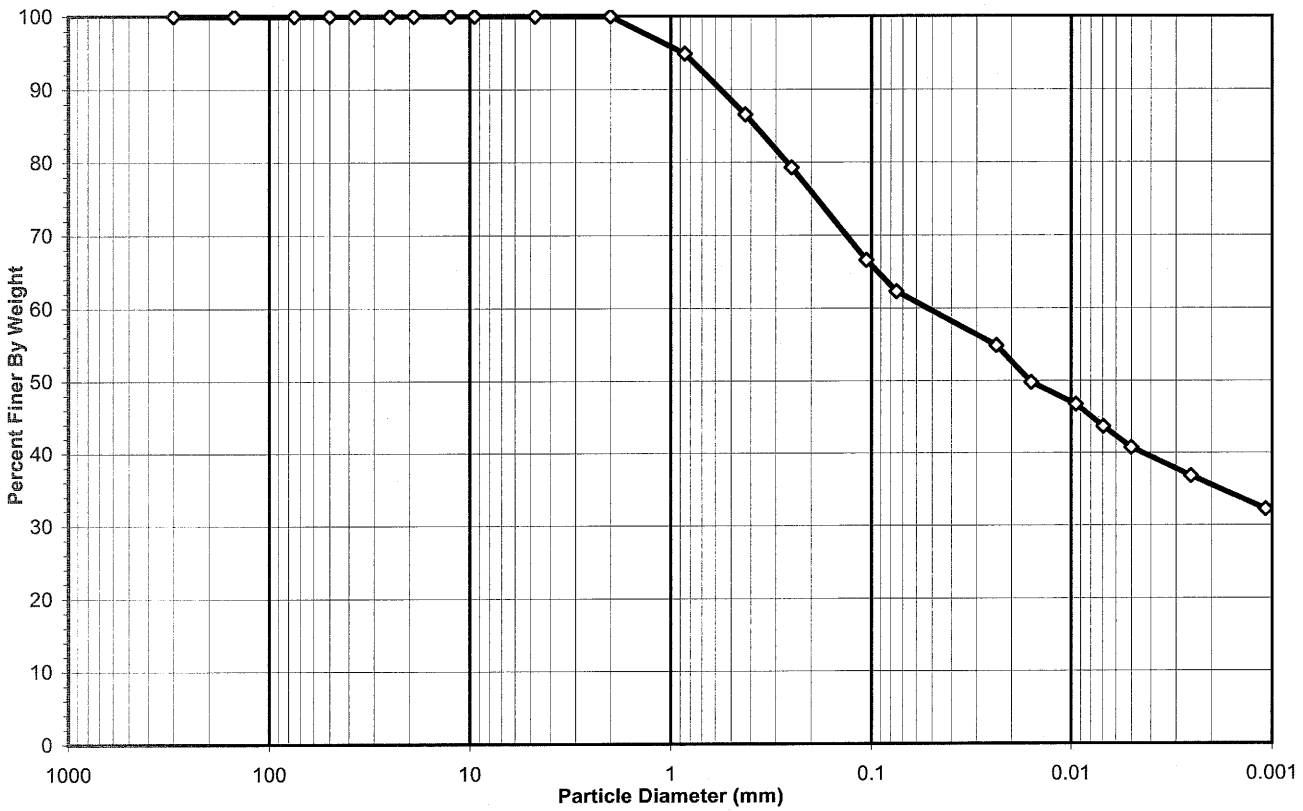
Geotechnics
INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Soil Color	**RED BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	37.71
Finer Than #200	*Silt & Clay*	62.29

USCS Symbol ***ml, ASSUMED***

USCS Classification ***SANDY SILT***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-22 #10 Split Hydro rev 8.xls]Sheet1*

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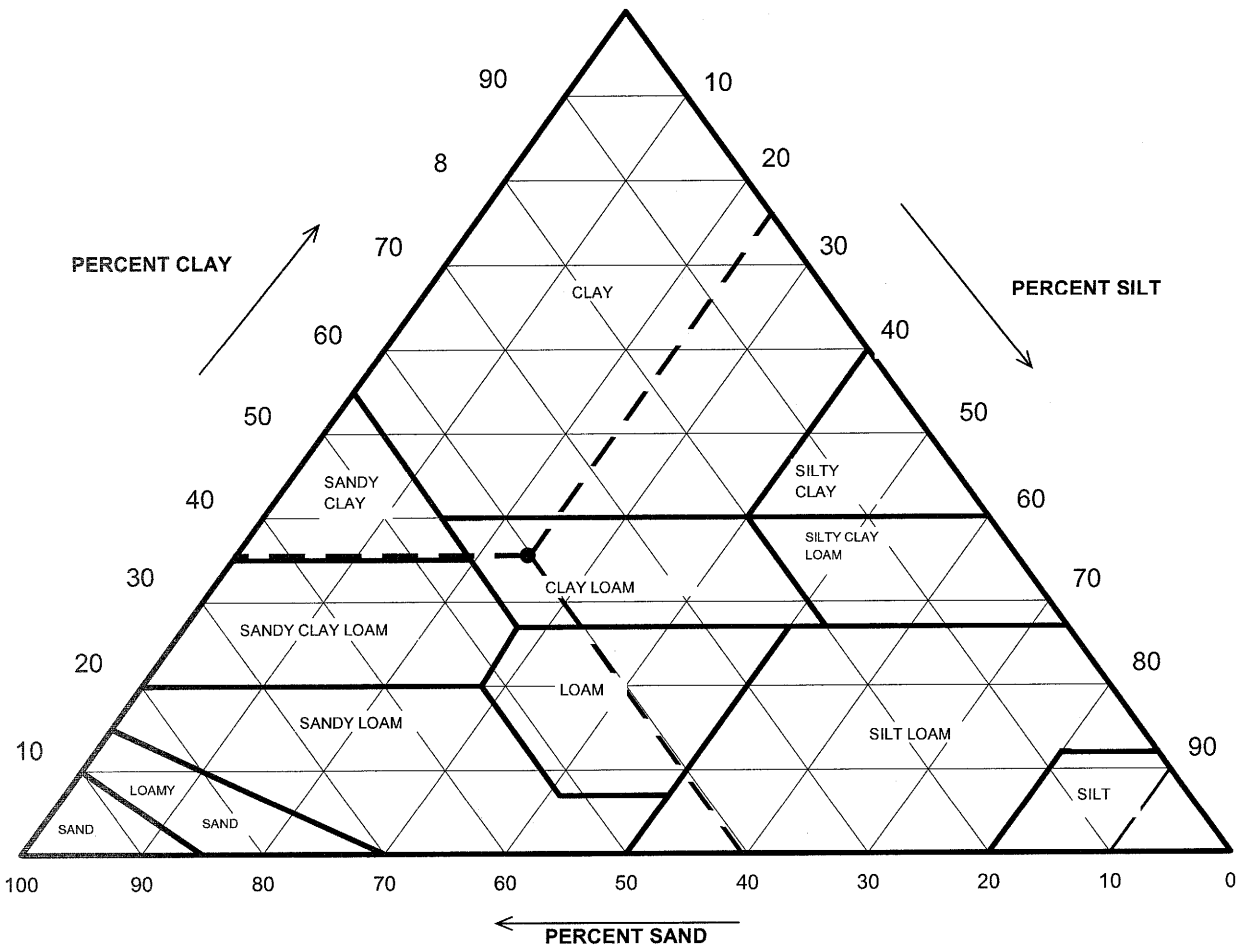
Geotechnics
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Soil Color	RED BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.00	**0.00**
2	100.00	*Sand*	40.35	**40.35**
0.05	59.65	*Silt*	24.11	**24.11**
0.002	35.55	*Clay*	35.55	**35.55**

USDA Classification: ***CLAY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-22 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Soil Color	**RED BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	307	Tare No.	M-1
Wgt.Tare + Wet Soil (gm)	677.90	Wgt.Tare + Wet Soil (gm)	36.74
Wgt.Tare + Dry Soil (gm)	557.82	Wgt.Tare + Dry Soil (gm)	36.24
Weight of Tare (gm)	111.10	Weight of Tare (gm)	15.96
Weight of Water (gm)	120.08	Weight of Water (gm)	0.50
Weight of Dry Soil (gm)	446.72	Weight of Dry Soil (gm)	20.28
Moisture Content (%)	**26.9**	**Moisture Content (%)**	**2.5**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	566.80	Weight of the Dry Sample (gm)	544.35
Dry Weight +#10 Material(gm)	446.7	Weight of minus #200 material (gm)	60.81
Wet Weight Hydro. Material.(gm)	100.04	Weight of plus #200 material (gm)	483.54
Dry Weight Hydro. Material (gm)	97.63		
Total Dry Weight Sample (gm)	544.35	**J-FACTOR (%FINER THAN #10)**	**1.0000**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.00	0.00	0.00	100.00	**100.00**
#20	0.85	5.00	5.12	5.12	94.88	**94.88**
#40	0.425	8.12	8.32	13.44	86.56	**86.56**
#60	0.250	7.10	7.27	20.71	79.29	**79.29**
#140	0.106	12.40	12.70	33.41	66.59	**66.59**
#200	0.075	4.20	4.30	37.71	62.29	**62.29**
Pan	-	60.81	62.29	100.00	-	-

Notes :

Tested By SD Date 7/16/2008 Checked By GBM Date 7-28-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-22 #10 Split Hydro rev 8.xls]Sheet1*

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Geotechnics
INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Soil Color	**RED BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	58.0	58.0	23.5	3.94	54.1	54.8	0.01290	0.0238	**54.8**
5		53.0	23.5	3.94	49.1	49.7	0.01290	0.0159	**49.7**
15		50.0	23.5	3.94	46.1	46.7	0.01290	0.0095	**46.7**
30		47.0	23.5	3.94	43.1	43.7	0.01290	0.0069	**43.7**
60		44.0	23.8	3.85	40.2	40.7	0.01285	0.0050	**40.7**
250		40.0	24.3	3.70	36.3	36.8	0.01278	0.0025	**36.8**
1440		35.0	25.8	3.27	31.7	32.2	0.01256	0.0011	**32.2**

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	97.63	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	100.00
Weight of Dry Material (gm)	97.63		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/15/2008 Checked By GBM Date 7-28-08

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Geotechnics
INTEGRITY IN TESTING

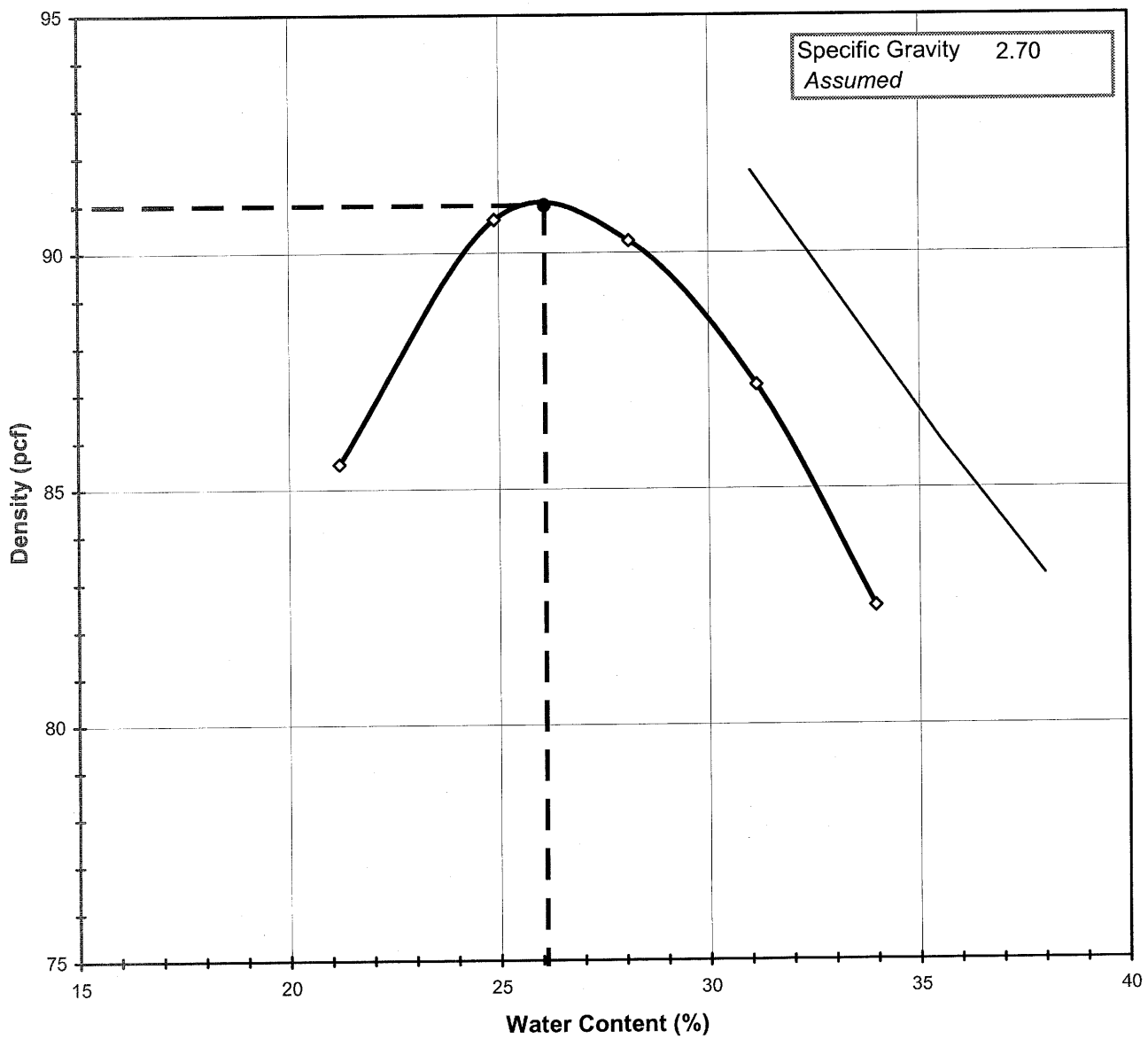
MOISTURE DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22	Test Method	**STANDARD**

Visual Description: RED BROWN SANDY SILT

Optimum Water Content	**26.1**
Maximum Dry Density	**91.0**



Tested By DW *Date* 7/11/2008 *Checked By* GEM *Date* 7-28-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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Geotechnics
INTEGRITY IN TESTING

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-22		

Visual Description: RED BROWN SANDY SILT

Total Weight of the Sample (gm)	21164
As Received Water Content(%)	27
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	1
Percent Retained on 3/8"	NA
Percent Retained on #4	2
Oversize Material	Not included
Procedure Used	A

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	172
Mold diameter		4"
Weight of the Mold		4326
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	5883	6027	6062	6043	5986
Wt.of Mold (gm)	4326	4326	4326	4326	4326
Wt. of WS	1557	1702	1737	1718	1660
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	250	200	216	399	K-7
Wt. of Tare & WS (gm)	697.80	689.70	519.20	451.70	437.20
Wt. of Tare & DS (gm)	605.35	586.40	442.67	364.96	354.37
Wt. of Tare (gm)	169.20	171.50	170.30	86.40	110.40
Wt. of Water (gm)	92.45	103.30	76.53	86.74	82.83
Wt. of DS (gm)	436.15	414.90	272.37	278.56	243.97

Wet Density (gm/cc)	1.66	1.82	1.85	1.83	1.77
Wet Density (pcf)	103.7	113.3	115.6	114.3	110.5
Moisture Content (%)	**21.2**	**24.9**	**28.1**	**31.1**	**34.0**
Dry Density (pcf)	**85.5**	**90.7**	**90.2**	**87.2**	**82.5**

Zero Air Voids

Moisture Content (%)	31.0	35.5	38.0	
Dry Unit Weight (pcf)	91.7	86.0	83.2	

Tested By DW *Date* 7/11/2008 *Checked By* GCM *Date* 7-28-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics
INTEGRITY IN TESTING

PERMOMETER METHOD

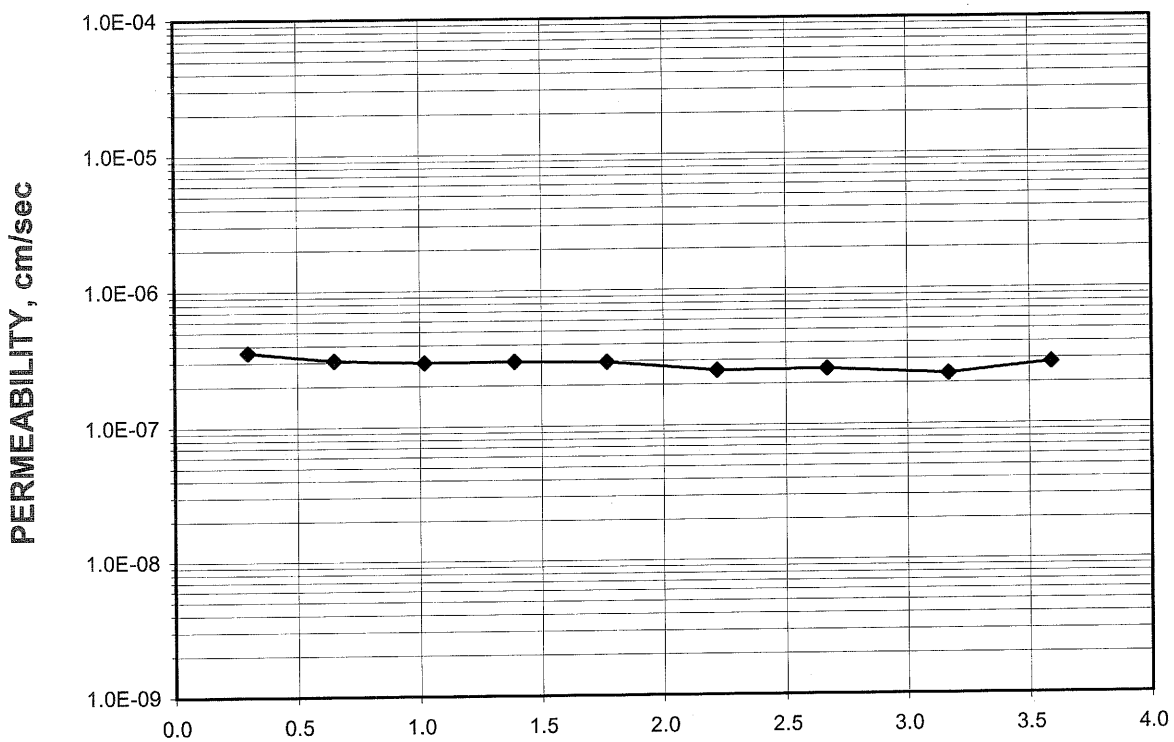
ASTM D 5084-97
(SOP-S22C)

Client	CDM	Boring No.	B-618
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-22		

Visual Description: RED/BROWN SANDY SILT

AVERAGE PERMEABILITY = 2.5E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.5E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS Date: 7/16/2008 Checked By: GBM Date: 7-28-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-22 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics
INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-618
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-22		
		Specific Gravity	2.70 Assumed
		Sample Condition	Remolded

Visual Description: RED/BROWN SANDY SILT

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	317	305
Wt. of Tare & WS (gm.)	377.20	429.84
Wt. of Tare & DS (gm.)	312.16	343.07
Wt. of Tare (gm.)	84.14	84.47
Wt. of Water (gm.)	65.04	86.77
Wt. of DS (gm.)	228.02	258.60
Moisture Content (%)	**28.5**	**33.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	768.96	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	768.96	799.05
Length 1 (in.)	4.012	4.059
Length 2 (in.)	4.012	4.065
Length 3 (in.)	4.012	4.057
Top Diameter (in.)	2.872	2.861
Middle Diameter (in.)	2.872	2.861
Bottom Diameter (in.)	2.872	2.859
Average Length (in.)	4.01	4.06
Average Area (in.^{2})	6.48	6.43
Sample Volume (cm^3)	425.91	427.55
Unit Wet Wt. (gm./ cm^3)	1.805	1.869
Unit Wet Wt. (pcf)	112.7	116.7
Unit Dry Wt. (pcf)	87.7	87.4
Unit Dry Wt. (gm./ cm^3)	1.405	1.399
Void Ratio, e	0.922	0.929
Porosity, n	0.480	0.482
Pore Volume (cm^3)	204.3	206.0

Tested By: TMS Date: 7/16/2008 Checked By: GEM Date: 7-28-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-22 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-618
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-22		

Test Pressures		**Final Sample Dimensions**	
Cell Pressure(psi)	55.0	Sample Length (cm), L	10.31
Back Pressure(psi)	50.0	Sample Area (cm^2), A	41.46
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	95	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1.75

AVERAGE PERMEABILITY = 2.5E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.5E-09 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	FLOW CONDITION (0 flow)	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)	(cm/sec)
7/16/08	8	54.3	0	10.5	11.1	0	23.1	NA
7/16/08	8	54.6	0	10.4	11.0	0	23.1	3.6E-07
7/16/08	8	54.9	1	10.3	10.8	0	23.1	3.1E-07
7/16/08	8	55.3	1	10.2	10.7	0	23.1	2.9E-07
7/16/08	8	55.7	1	10.1	10.6	0	23.1	3.0E-07
7/16/08	8	56.1	2	10.0	10.4	0	23.1	2.9E-07
7/16/08	8	56.5	2	9.9	10.3	0	23.1	2.5E-07
7/16/08	8	57	3	9.8	10.2	0	23.1	2.5E-07
7/16/08	8	57.5	3	9.7	10.1	0	23.1	2.3E-07
7/16/08	8	57.9	4	9.6	9.9	1	23.1	2.8E-07

Tested By: TMS Date: 7/16/2008 Checked By: GCM Date: 7-28-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-22 PERMOM.xls]Sheet1

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geotechnics
INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Soil Color	**DARK BROWN**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200

USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	56.74
Finer Than #200	*Silt & Clay*	43.26

USCS Symbol ***sm, ASSUMED***

USCS Classification ***SILTY SAND***

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 #10 Split Hydro rev 8.xls]Sheet1*

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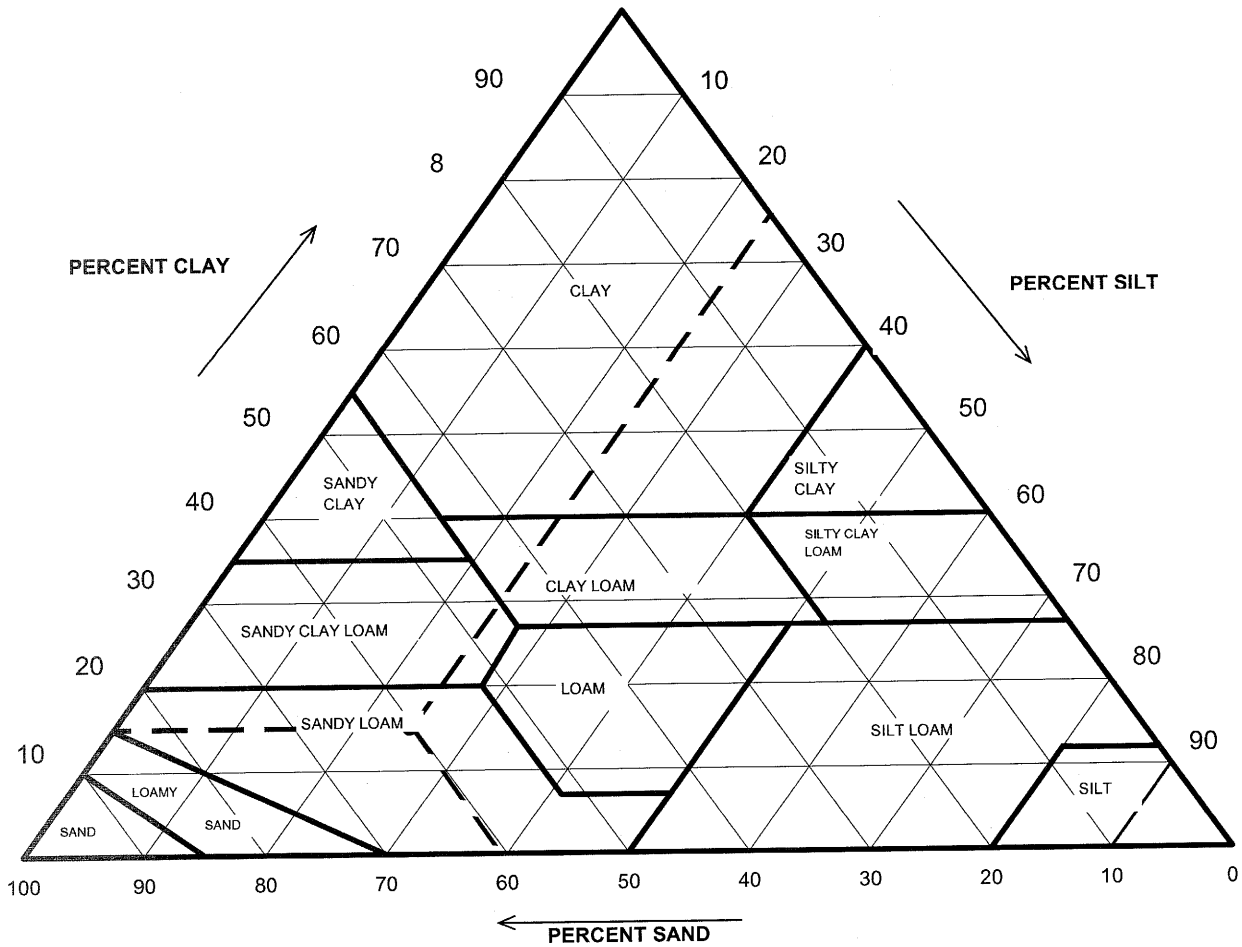
Geotechnics
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Soil Color	DARK BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.00	**0.00**
2	100.00	*Sand*	60.41	**60.41**
0.05	39.59	*Silt*	24.48	**24.48**
0.002	15.10	*Clay*	15.10	**15.10**

USDA Classification: ***SANDY LOAM***

DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 #10 Split Hydro rev 8.xls]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Soil Color	**DARK BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	318	Tare No.	C-2
Wgt.Tare + Wet Soil (gm)	600.50	Wgt.Tare + Wet Soil (gm)	50.35
Wgt.Tare + Dry Soil (gm)	530.79	Wgt.Tare + Dry Soil (gm)	49.75
Weight of Tare (gm)	86.60	Weight of Tare (gm)	15.63
Weight of Water (gm)	69.71	Weight of Water (gm)	0.60
Weight of Dry Soil (gm)	444.19	Weight of Dry Soil (gm)	34.12
Moisture Content (%)	**15.7**	**Moisture Content (%)**	**1.8**

Soil Specimen Data			
Wet Weight +#10 Material (gm)	513.90	Weight of the Dry Sample (gm)	542.48
Dry Weight +#10 Material(gm)	444.2	Weight of minus #200 material (gm)	42.52
Wet Weight Hydro. Material.(gm)	100.02	Weight of plus #200 material (gm)	499.96
Dry Weight Hydro. Material (gm)	98.29		
Total Dry Weight Sample (gm)	542.48	**J-FACTOR (%FINER THAN #10)**	**1.0000**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	0.00	0.00	0.00	100.00	**100.00**
#20	0.85	9.64	9.81	9.81	90.19	**90.19**
#40	0.425	9.47	9.63	19.44	80.56	**80.56**
#60	0.250	10.45	10.63	30.07	69.93	**69.93**
#140	0.106	20.20	20.55	50.62	49.38	**49.38**
#200	0.075	6.01	6.11	56.74	43.26	**43.26**
Pan	-	42.52	43.26	100.00	-	-

Notes :

Tested By SD Date 7/18/2008 Checked By GEM Date 7-28-08

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Geotechnics
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HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Soil Color	**DARK BROWN**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	38.0	38.0	24.3	3.70	34.3	34.5	0.01278	0.0287	**34.5**
5		35.0	24.3	3.70	31.3	31.5	0.01278	0.0186	**31.5**
15		28.0	24.3	3.70	24.3	24.5	0.01278	0.0113	**24.5**
31		26.0	24.3	3.70	22.3	22.5	0.01278	0.0080	**22.5**
60		24.0	24.3	3.70	20.3	20.4	0.01278	0.0058	**20.4**
250		20.0	24.4	3.67	16.3	16.4	0.01276	0.0029	**16.4**
1440		17.0	24.3	3.70	13.3	13.4	0.01278	0.0012	**13.4**

Soil Specimen Data		**Other Corrections**	
Tare + Dry Material (gm)	98.29	a - Factor	0.99
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	100.00
Weight of Dry Material (gm)	98.29		
		Specific Gravity	2.7 Assumed

Note:

Tested By JBD Date 7/14/2008 Checked By GEM Date 7-28-08

DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 #10 Split Hydro rev 8.xls]Sheet1*

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Geotechnics
INTEGRITY IN TESTING

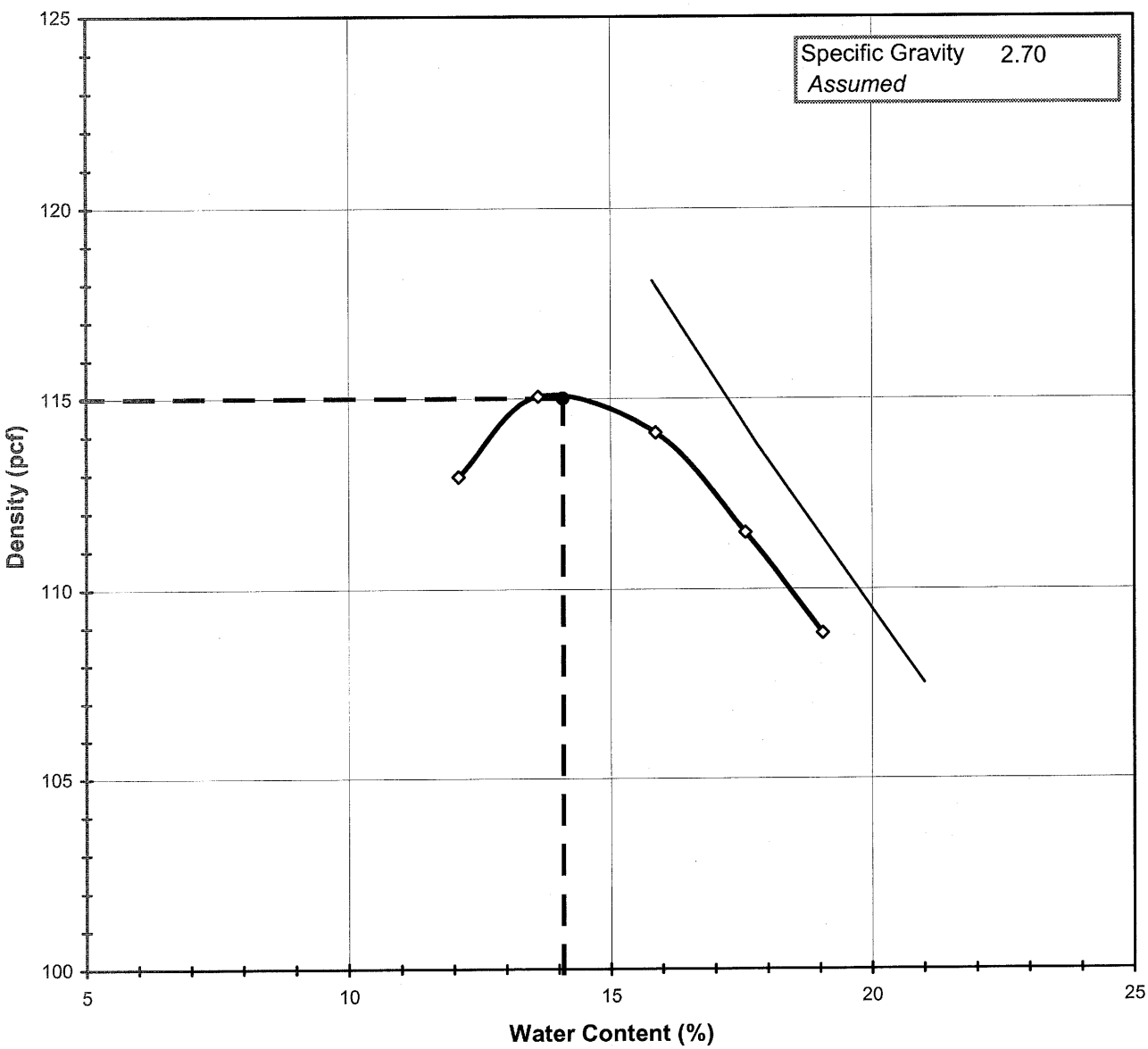
MOISTURE DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23	Test Method	**STANDARD**

Visual Description DARK BROWN SILTY SAND

Optimum Water Content **14.1**
Maximum Dry Density **115.0**



Tested By DW *Date* 7/11/2008 *Checked By* GCM *Date* 7-28-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 Proctor.XLS]Sheet1

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Geotechnics
INTEGRITY IN TESTING

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	CDM	Boring No.	B-619
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID	2008-598-01-23		

Visual Description: DARK BROWN SILTY SAND

Total Weight of the Sample (gm)	22625
As Received Water Content(%)	16
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	1
Percent Retained on 3/8"	NA
Percent Retained on #4	6
Oversize Material	Not included
Procedure Used	B

TestType		**STANDARD**
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	172
Mold diameter		4"
Weight of the Mold		4326
Volume of the Mold(cc)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & WS (gm)	6227	6289	6311	6295	6272
Wt.of Mold (gm)	4326	4326	4326	4326	4326
Wt. of WS	1902	1963	1986	1969	1946
Mold Volume (cc)	937	937	937	937	937

Moisture Content / Density

Tare Number	314	315	309	305	310
Wt. of Tare & WS (gm)	520.10	561.00	516.00	659.50	681.90
Wt. of Tare & DS (gm)	473.14	507.01	460.36	573.53	590.42
Wt. of Tare (gm)	84.70	110.40	109.70	84.40	110.30
Wt. of Water (gm)	46.96	53.99	55.64	85.97	91.48
Wt. of DS (gm)	388.44	396.61	350.66	489.13	480.12
Wet Density (gm/cc)	2.03	2.09	2.12	2.10	2.08
Wet Density (pcf)	126.6	130.7	132.2	131.1	129.6
Moisture Content (%)	**12.1**	**13.6**	**15.9**	**17.6**	**19.1**
Dry Density (pcf)	**112.9**	**115.1**	**114.1**	**111.5**	**108.8**

Zero Air Voids

Moisture Content (%)	15.8	17.8	21.0
Dry Unit Weight (pcf)	118.1	113.8	107.5

Tested By DW *Date* 7/11/2008 *Checked By* GBM *Date* 7-28-08

DCN:CT-S12 DATE:12/11/00 REVISION 5

\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 Proctor.XLS]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics
INTEGRITY IN TESTING

PERMOMETER METHOD

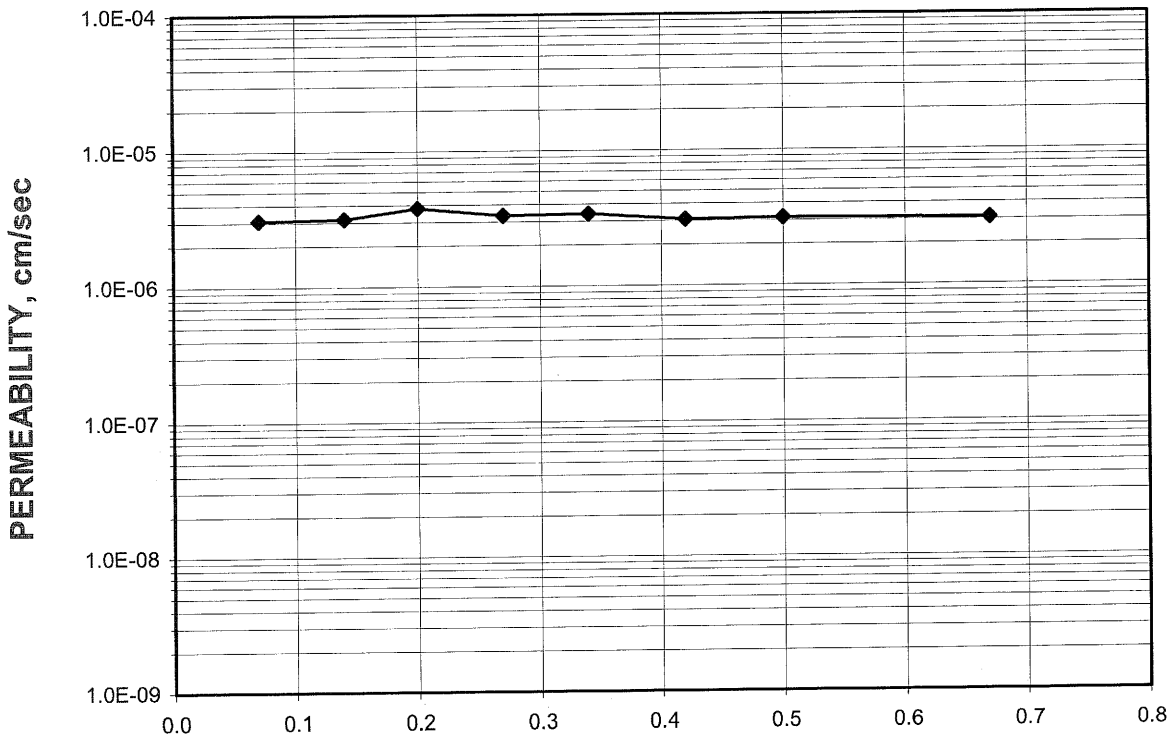
ASTM D 5084-97
(SOP-S22C)

Client	CDM	Boring No.	B-619
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-23		

Visual Description: DARK BROWN SILTY SAND

AVERAGE PERMEABILITY = 3.2E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.2E-08 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS Date: 7/16/2008 Checked By: GCM Date: 7-28-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-619
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-23		
		Specific Gravity	2.70 Assumed
		Sample Condition	Remolded

Visual Description: DARK BROWN SILTY SAND

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	K-7	310
Wt. of Tare & WS (gm.)	302.02	600.65
Wt. of Tare & DS (gm.)	276.01	526.61
Wt. of Tare (gm.)	110.36	109.98
Wt. of Water (gm.)	26.01	74.04
Wt. of DS (gm.)	165.65	416.63
Moisture Content (%)	**15.7**	**17.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	875.25	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	875.25	890.90
Length 1 (in.)	4.012	3.991
Length 2 (in.)	4.012	4.040
Length 3 (in.)	4.012	4.042
Top Diameter (in.)	2.872	2.837
Middle Diameter (in.)	2.872	2.834
Bottom Diameter (in.)	2.872	2.842
Average Length (in.)	4.01	4.02
Average Area (in.^{2})	6.48	6.32
Sample Volume (cm^3)	425.91	417.07
Unit Wet Wt. (gm./ cm^3)	2.055	2.136
Unit Wet Wt. (pcf)	128.3	133.3
Unit Dry Wt. (pcf)	110.9	113.2
Unit Dry Wt. (gm./ cm^3)	1.776	1.814
Void Ratio, e	0.520	0.489
Porosity, n	0.342	0.328
Pore Volume (cm^3)	145.7	136.9

Tested By: TMS Date: 7/16/2008 Checked By: GEM Date: 7-28-08

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	B-619
Client Project	BUNCOMBE CO. C&D LF EXP.	Depth (ft.)	0-6
Project No.	2008-598-01	Sample No.	NA
Lab ID No.	2008-598-01-23		

Test Pressures	
Cell Pressure(psi)	55.0
Back Pressure(psi)	50.0
Eff. Cons. Pressure(psi)	5.0
Response (%)	95

Final Sample Dimensions	
Sample Length (cm), L	10.22
Sample Area (cm^2), A	40.80
Pipette Area (cm^2), a_p	0.03142
Annulus Area (cm^2), a_a	0.76712
Equilibrium Level (cm), R_{eq}	1.75

AVERAGE PERMEABILITY = 3.2E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.2E-08 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	FLOW CONDITION (0 flow)	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)	(cm/sec)
7/16/08	8	4.58	0	10.5	11.2	0	23.1	NA
7/16/08	8	4.65	0	10.3	10.9	0	23.1	3.1E-06
7/16/08	8	4.72	0	10.1	10.7	0	23.1	3.2E-06
7/16/08	8	4.78	0	9.9	10.4	0	23.1	3.8E-06
7/16/08	8	4.85	0	9.7	10.2	0	23.1	3.3E-06
7/16/08	8	4.92	0	9.5	9.9	0	23.1	3.4E-06
7/16/08	8	5	0	9.3	9.6	0	23.1	3.0E-06
7/16/08	8	5.08	1	9.1	9.4	0	23.1	3.1E-06
7/16/08	8	5.25	1	8.7	8.9	1	23.1	3.1E-06

Tested By: TMS Date: 7/16/2008 Checked By: GSM Date: 7-28-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-01-23 PERMOM.xls]Sheet1

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Geotechnics

.....GEOTECHNICAL, GEOENVIRONMENTAL, AND GEOSYNTHETIC LABORATORIES

July 24, 2008

Project No. 2008-598-02

Mr. Mat Colone
CDM
5400 Glenwood Ave., Suite 300
Raleigh, NC 27612

Transmittal
Laboratory Test Results
Buncombe County C & D Landfill Expansion

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was faxed to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens which were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectively submitted,
Geotechnics, Inc.

Michael P. Smith
Regional Manager

We understand that you have a choice in your laboratory services and we thank you for choosing Geotechnics.

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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-05 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	13.5-15.5
Project No.	2008-598-02	Sample No.	T-1
Lab ID	2008-598-02-04	Soil Description	**LIGHT BROWN SILT**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

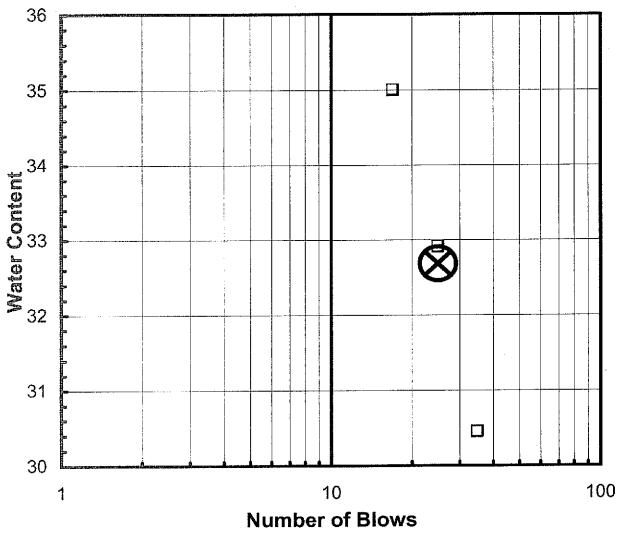
Liquid Limit Test	**1**	**2**	**3**	MULTIPOINT
Tare Number	J	O	M	
Wt. of Tare & WS (gm)	28.37	28.68	29.74	
Wt. of Tare & DS (gm)	24.94	25.35	26.33	
Wt. of Tare (gm)	15.14	15.23	15.13	
Wt. of Water (gm)	3.4	3.3	3.4	
Wt. of DS (gm)	9.8	10.1	11.2	
Moisture Content (%)	**35.0**	**32.9**	**30.4**	
Number of Blows	**17**	**25**	**35**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	W	P	
Wt. of Tare & WS (gm)	23.63	21.69	
Wt. of Tare & DS (gm)	21.96	20.38	
Wt. of Tare (gm)	15.14	15.19	
Wt. of Water (gm)	1.7	1.3	
Wt. of DS (gm)	6.8	5.2	
Moisture Content (%)	**24.5**	**25.2**	**-0.8**

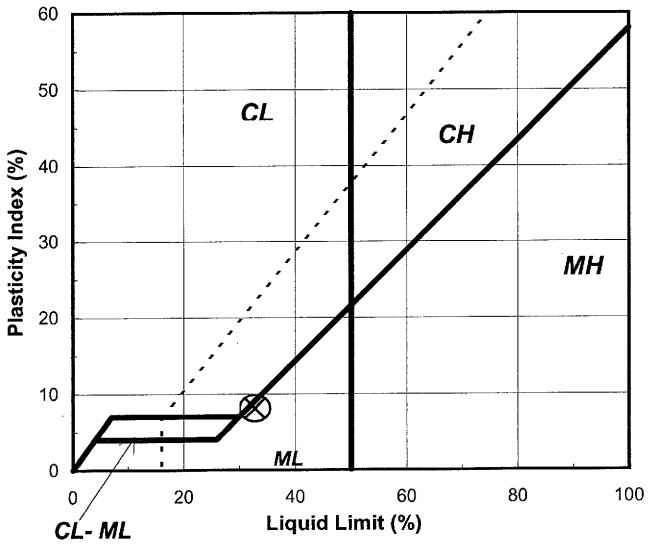
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**33**
Plastic Limit (%)	**25**
Plasticity Index (%)	**8**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



Tested By SD *Date* 7/23/2008 *Checked By* [signature] *Date* 7-24-08

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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-05 / AASHTO T89 (SOP - S4A)

Client	CDM	Boring No.	618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	7-9
Project No.	2008-598-02	Sample No.	T-1
Lab ID	2008-598-02-05	Soil Description	**BROWN SILT**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

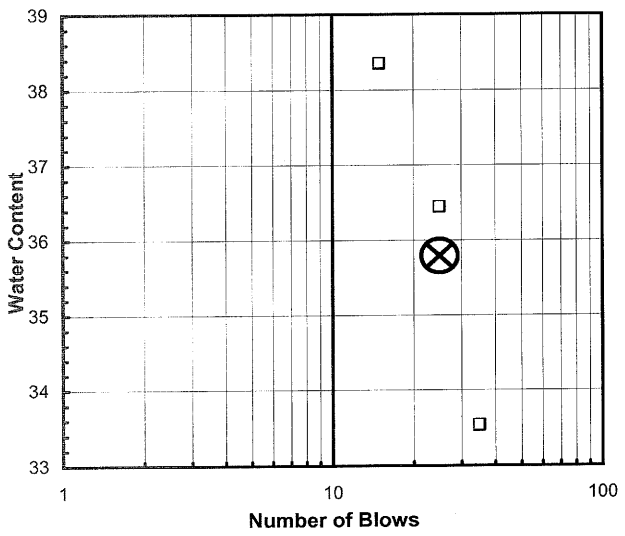
Liquid Limit Test	**1**	**2**	**3**	MULTIPOINT
Tare Number	K-A	A-L	A-C	
Wt. of Tare & WS (gm)	28.74	28.10	29.07	
Wt. of Tare & DS (gm)	25.07	24.74	25.68	
Wt. of Tare (gm)	15.50	15.52	15.57	
Wt. of Water (gm)	3.7	3.4	3.4	
Wt. of DS (gm)	9.6	9.2	10.1	
Moisture Content (%)	**38.3**	**36.4**	**33.5**	
Number of Blows	**15**	**25**	**35**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	I	D	
Wt. of Tare & WS (gm)	21.68	23.41	
Wt. of Tare & DS (gm)	20.09	21.42	
Wt. of Tare (gm)	15.22	15.14	
Wt. of Water (gm)	1.6	2.0	
Wt. of DS (gm)	4.9	6.3	
Moisture Content (%)	**32.6**	**31.7**	**1.0**

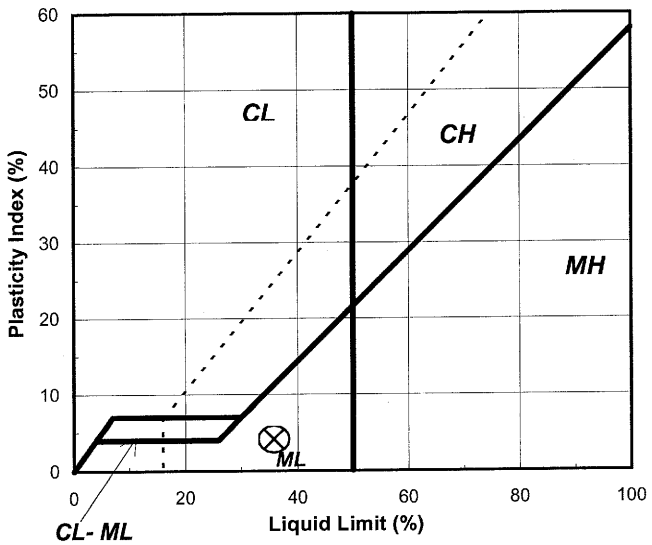
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**36**
Plastic Limit (%)	**32**
Plasticity Index (%)	**4**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



Tested By JBD *Date* 7/23/2008 *Checked By* GBM *Date* 7-24-08

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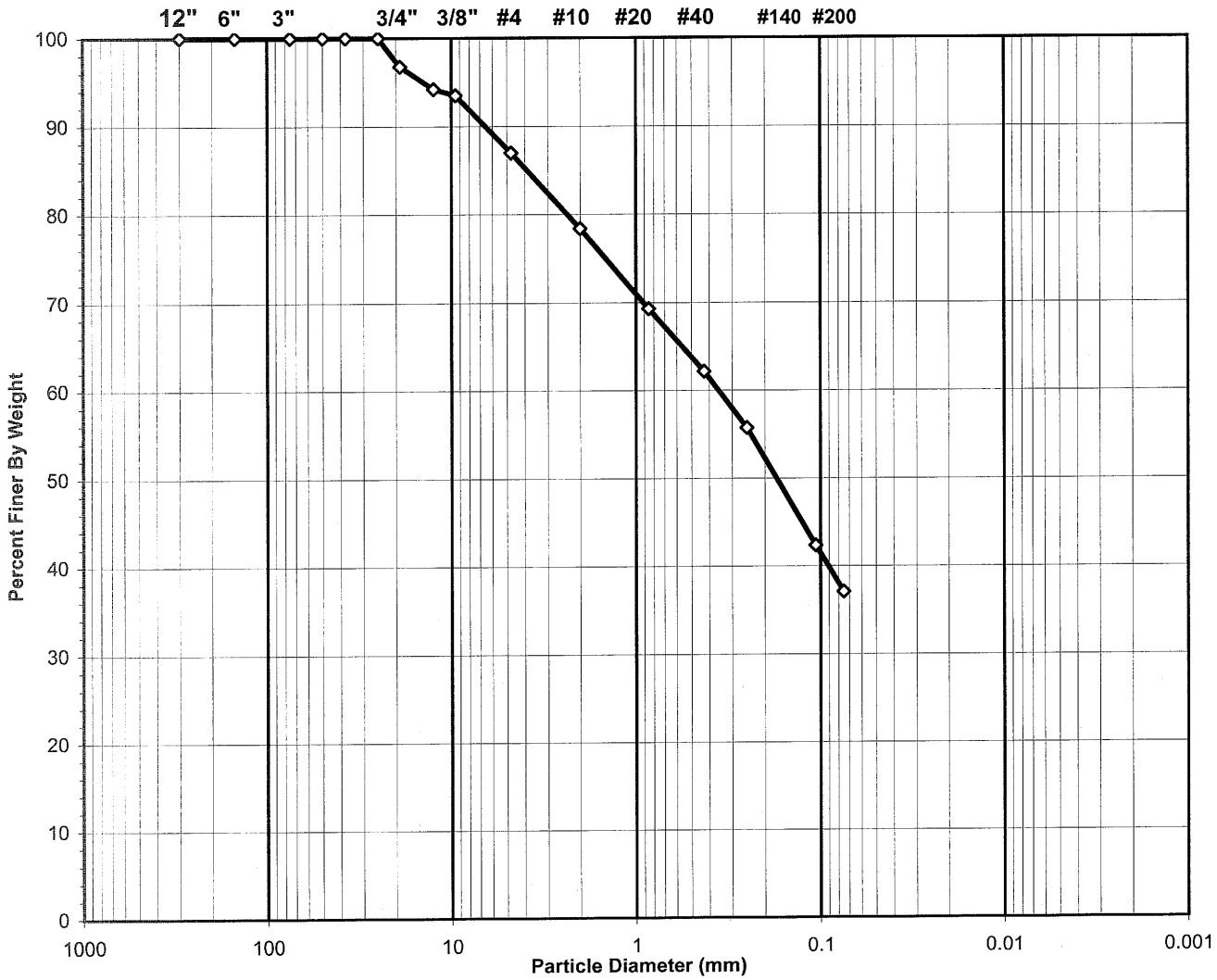
Geotechnics
INTEGRITY IN TESTING

SIEVE ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	13.5-15.5
Project No.	2008-598-02	Sample No.	T-1
Lab ID	2008-598-02-04	Soil Color	**LIGHT BROWN**

	SIEVE ANALYSIS		HYDROMETER
USCS	gravel	sand	silt and clay



USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

Tested By SD Date 7/23/2008 Checked By GEM Date 7-24-08

DCN: CT-S3C DATE 6-25-98 REVISION: 2

\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-04 SIEVON REV 4.XLS]Sheet1

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	615
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	13.5-15.5
Project No.	2008-598-02	Sample No.	T-1
Lab ID	2008-598-02-04	Soil Color	**LIGHT BROWN**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	213	Tare No.	NA
Wgt.Tare + Wet Specimen (gm)	633.82	Wgt.Tare + Wet Specimen (gm)	NA
Wgt.Tare + Dry Specimen (gm)	597.59	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	173.30	Weight of Tare (gm)	NA
Weight of Water (gm)	36.23	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	424.29	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**8.5**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	424.29
Dry Weight - 3/4" Sample (gm)	253.3	Weight of minus #200 material (gm)	157.27
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	267.02
Dry Weight + 3/4" Sample (gm)	13.74		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	13.74	3.2	3.2	96.8	**96.8**
1/2"	12.50	10.86	2.6	5.8	94.2	**94.2**
3/8"	9.50	2.90	0.7	6.5	93.5	**93.5**
#4	4.75	27.88	6.6	13.1	86.9	**86.9**
#10	2.00	36.38	8.6	21.6	78.4	**78.4**
#20	0.850	38.54	9.1	30.7	69.3	**69.3**
#40	0.425	30.26	7.1	37.8	62.2	**62.2**
#60	0.250	27.25	6.4	44.3	55.7	**55.7**
#140	0.106	56.79	13.4	57.6	42.4	**42.4**
#200	0.075	22.42	5.3	62.9	37.1	**37.1**
Pan	-	157.27	37.1	100.0	-	-

Tested By SD Date 7/23/2008 Checked By GEM Date 7-24-08

DCN: CT-S3C DATE 6-25-98 REVISION: 2

\\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-04 SIEVON REV 4.XLS]Sheet1

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Geotechnics
INTEGRITY IN TESTING

SIEVE ANALYSIS
ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	7-9
Project No.	2008-598-02	Sample No.	T-1
Lab ID	2008-598-02-05	Soil Color	**BROWN**

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay

USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND***

Tested By SD Date 7/23/2008 Checked By GEM Date 7.24.08

DCN: CT-S3C DATE 6-25-98 REVISION: 2

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Geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	CDM	Boring No.	618
Client Reference	BUNCOMBE CO. C&D LF EXP.	Depth (ft)	7-9
Project No.	2008-598-02	Sample No.	T-1
Lab ID	2008-598-02-05	Soil Color	**BROWN**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	209	Tare No.	NA
Wgt.Tare + Wet Specimen (gm)	349.88	Wgt.Tare + Wet Specimen (gm)	NA
Wgt.Tare + Dry Specimen (gm)	332.11	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	171.76	Weight of Tare (gm)	NA
Weight of Water (gm)	17.77	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	160.35	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**11.1**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	160.35
Dry Weight - 3/4" Sample (gm)	82.6	Weight of minus #200 material (gm)	77.78
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	82.57
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.50	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.96	0.6	0.6	99.4	**99.4**
#10	2.00	2.34	1.5	2.1	97.9	**97.9**
#20	0.850	9.21	5.7	7.8	92.2	**92.2**
#40	0.425	12.62	7.9	15.7	84.3	**84.3**
#60	0.250	10.54	6.6	22.2	77.8	**77.8**
#140	0.106	31.90	19.9	42.1	57.9	**57.9**
#200	0.075	15.00	9.4	51.5	48.5	**48.5**
Pan	-	77.78	48.5	100.0	-	-

Tested By SD Date 7/23/2008 Checked By GEM Date 7-24-08

DCN: CT-S3C DATE 6-25-98 REVISION: 2

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics
INTEGRITY IN TESTING

PERMOMETER METHOD

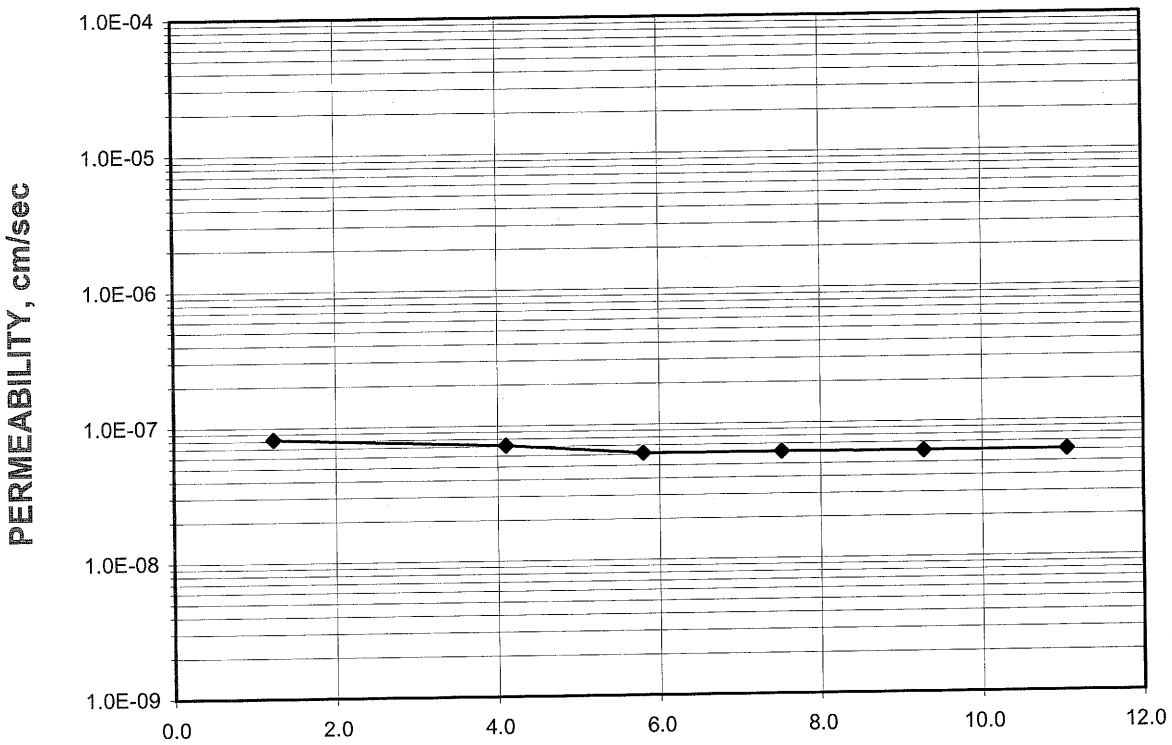
ASTM D 5084-97
(SOP-S22C)

Client	CDM	Boring No.	623
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	1.0-3.0
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-03		

Visual Description: DARK BROWN CLAY

AVERAGE PERMEABILITY = 6.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS Date: 7/17/2008 Checked By: GM Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-03 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	623
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	1.0-3.0
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-03		
		Specific Gravity	2.70 Assumed
		Sample Condition	Undisturbed

Visual Description: DARK BROWN CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	309	315
Wt. of Tare & WS (gm.)	243.42	472.82
Wt. of Tare & DS (gm.)	205.78	365.97
Wt. of Tare (gm.)	109.45	110.36
Wt. of Water (gm.)	37.64	106.85
Wt. of DS (gm.)	96.33	255.61
Moisture Content (%)	**39.1**	**41.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	703.02	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	703.02	716.81
Length 1 (in.)	3.744	3.777
Length 2 (in.)	3.749	3.774
Length 3 (in.)	3.745	3.745
Top Diameter (in.)	2.805	2.789
Middle Diameter (in.)	2.811	2.763
Bottom Diameter (in.)	2.802	2.961
Average Length (in.)	3.75	3.77
Average Area (in.^{2})	6.18	6.32
Sample Volume (cm^3)	379.61	390.23
Unit Wet Wt. (gm./ cm^3)	1.852	1.837
Unit Wet Wt. (pcf)	115.6	114.7
Unit Dry Wt. (pcf)	83.1	80.9
Unit Dry Wt. (gm./ cm^3)	1.332	1.295
Void Ratio, e	1.028	1.084
Porosity, n	0.507	0.520
Pore Volume (cm^3)	192.4	203.0

Tested By: TMS Date: 7/17/2008 Checked By: GEM Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-03 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	623
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	1.0-3.0
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-03		

Test Pressures	
Cell Pressure(psi)	45.0
Back Pressure(psi)	40.0
Eff. Cons. Pressure(psi)	5.0
Response (%)	96

Final Sample Dimensions	
Sample Length (cm), L	9.56
Sample Area (cm^2), A	40.80
Pipette Area (cm^2), a_p	0.03142
Annulus Area (cm^2), a_a	0.76712
Equilibrium Level (cm), R_{eq}	1.75

AVERAGE PERMEABILITY = 6.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.1E-10 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	FLOW CONDITION (0 flow)	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)	(cm/sec)
7/17/08	9	52.9	0	10.5	11.9	0	23.0	NA
7/17/08	9	54.1	1	10.4	11.8	0	23.0	8.2E-08
7/17/08	9	57	4	10.2	11.5	0	23.0	7.1E-08
7/17/08	9	58.7	6	10.1	11.4	0	23.0	6.1E-08
7/17/08	10	0.42	8	10.0	11.3	0	23.0	6.1E-08
7/17/08	10	2.18	9	9.9	11.1	0	23.0	6.1E-08
7/17/08	10	3.95	11	9.8	11.0	1	23.0	6.1E-08

Tested By: TMS Date: 7/17/2008 Checked By: GEM Date: 7-24-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-03 PERMOM.xls]Sheet1

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PERMEABILITY TEST

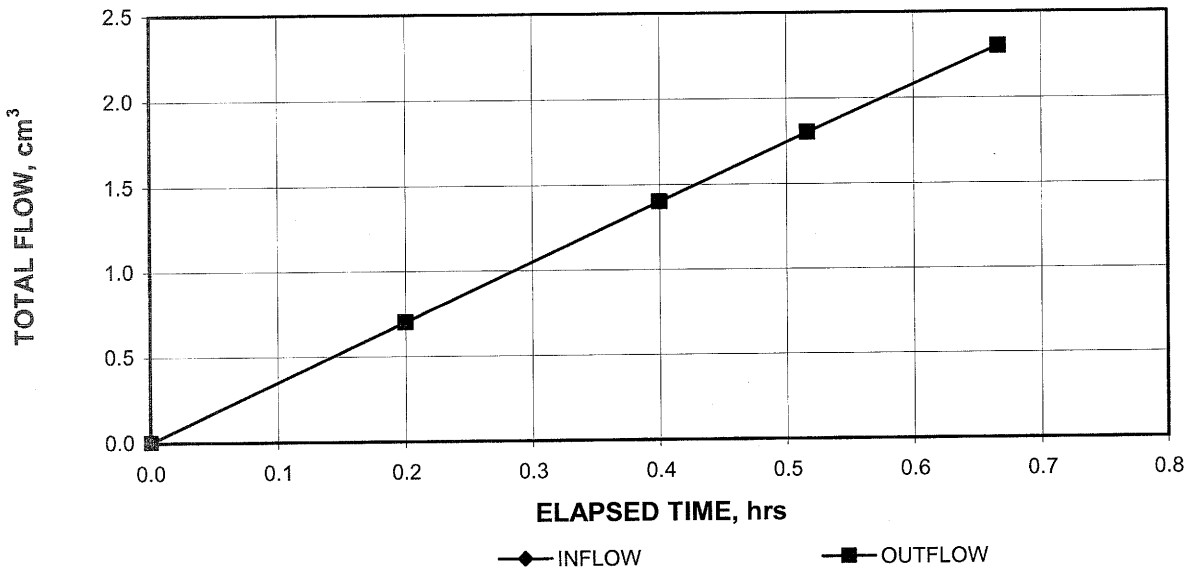
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

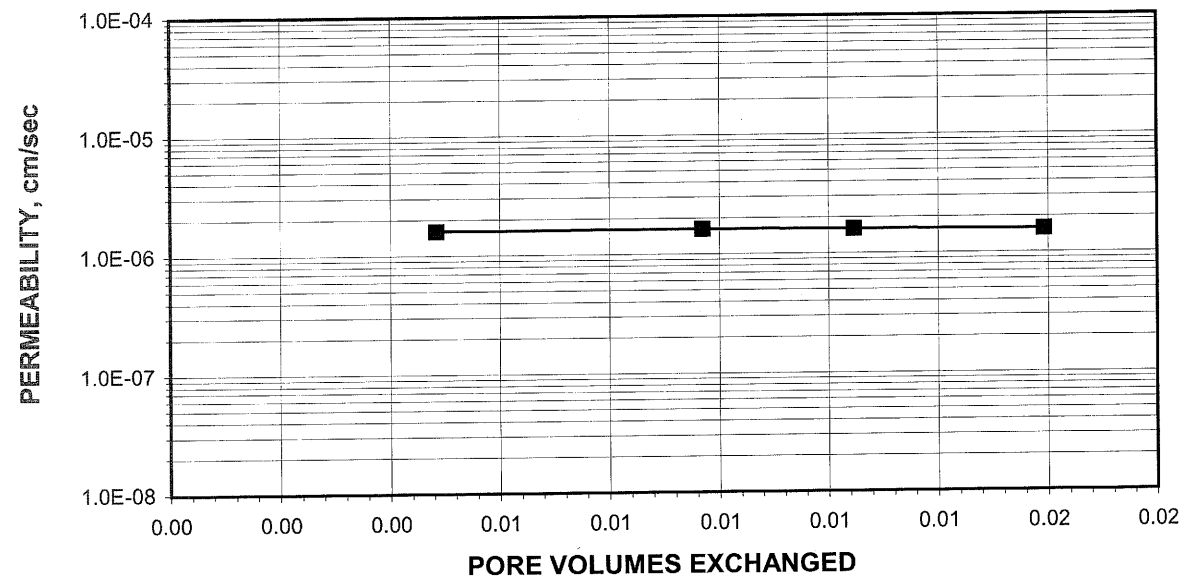
Client	CDM	Boring No.	615
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	13.5-15.5
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-04		

AVERAGE PERMEABILITY = 1.6E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.6E-08 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: TMS Date: 7/17/2008 Checked By: GEM Date: 7-21-08

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

Geotechnics
INTEGRITY IN TESTING

Client	CDM	Boring No.	615
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	13.5-15.5
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-04		
		Specific Gravity	2.70 Assumed
		Sample Condition	Undisturbed

Visual Description: TAN SANDY CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-1	305
Wt. of Tare & WS (gm.)	284.98	406.82
Wt. of Tare & DS (gm.)	262.63	351.32
Wt. of Tare (gm.)	97.90	84.55
Wt. of Water (gm.)	22.35	55.50
Wt. of DS (gm.)	164.73	266.77
Moisture Content (%)	**13.6**	**20.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	747.63	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	747.63	795.27
Length 1 (in.)	3.645	3.653
Length 2 (in.)	3.655	3.607
Length 3 (in.)	3.618	3.660
Top Diameter (in.)	2.908	2.904
Middle Diameter (in.)	2.869	2.852
Bottom Diameter (in.)	2.875	2.880
Average Length (in.)	3.64	3.64
Average Area (in.^{2})	6.53	6.51
Sample Volume (cm^3)	389.59	388.22
Unit Wet Wt. (gm./ cm^3)	1.92	2.05
Unit Wet Wt. (pcf)	119.8	127.9
Unit Dry Wt. (pcf)	105.5	105.9
Unit Dry Wt. (gm./ cm^3)	1.69	1.70
Void Ratio, e	0.60	0.59
Porosity, n	0.37	0.37
Pore Volume (cm^3)	145.8	144.4

Tested By: TMS Date: 7/17/2008 Checked By: GEM Date: 7-24-08

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

Geotechnics
INTEGRITY IN TESTING

Client	CDM	Boring No.	615
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	13.5-15.5
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-04		

Pressure Heads (Constant)	
Top Cap (psi)	38.6
Bottom Cap (psi)	40.0
Cell (psi)	45.0
Total Pressure Head (cm)	98.4
Hydraulic Gradient	10.65

Final Sample Dimensions	
Sample Length (cm), L	9.25
Sample Diameter (cm)	7.31
Sample Area (cm^2), A	41.99
Inflow Burette Area (cm^2), a-in	0.891
Outflow Burette Area (cm^2), a-out	0.883
B Parameter (%)	96

AVERAGE PERMEABILITY = 1.6E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.6E-08 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	TOTAL INFLOW	TOTAL OUTFLOW	TOTAL HEAD h	FLOW (0 flow)	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(hr)	(cm^3)	(cm^3)	(cm)	(1 stop)	(°C)	(cm/sec)
7/17/2008	10	29	0.0	0.0	0.0	124.9	0	23.0	NA
7/17/2008	10	41	0.2	0.7	0.7	123.3	0	23.0	1.6E-06
7/17/2008	10	53	0.4	1.4	1.4	121.7	0	23.0	1.6E-06
7/17/2008	11	0	0.5	1.8	1.8	120.8	0	23.0	1.6E-06
7/17/2008	11	9	0.7	2.3	2.3	119.7	1	23.0	1.6E-06

Tested By: TMS Date: 7/17/2008 Checked By: GEM Date: 7-21-08

DCN: CT-22 DATE: 01-08-99 REVISION:2 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-04 PERM.xls]Sheet1

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PERMEABILITY TEST

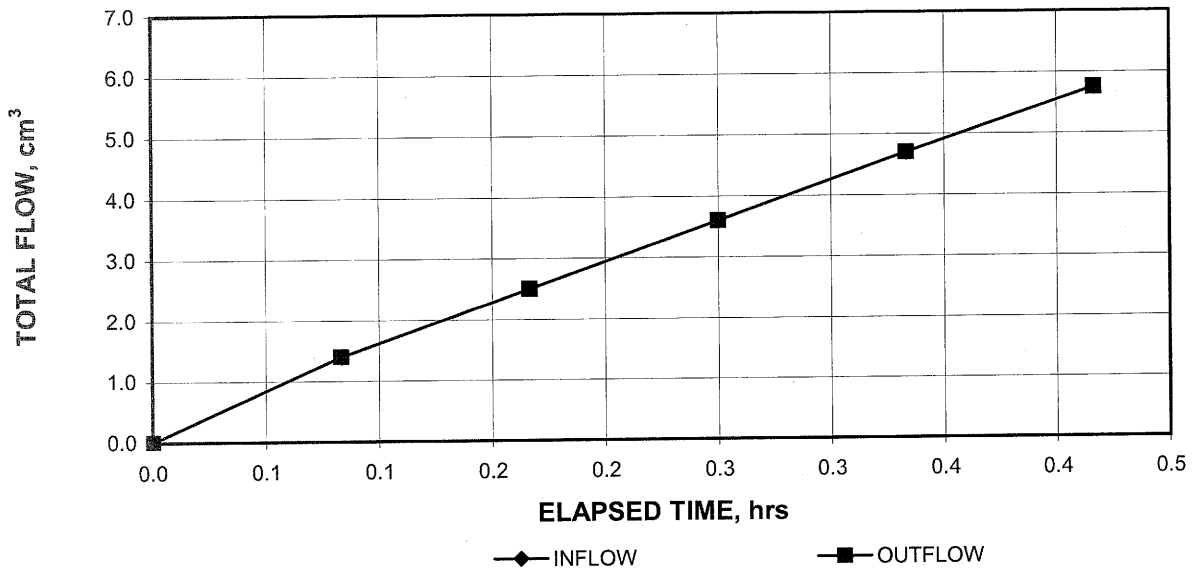
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

Geotechnics
INTEGRITY IN TESTING

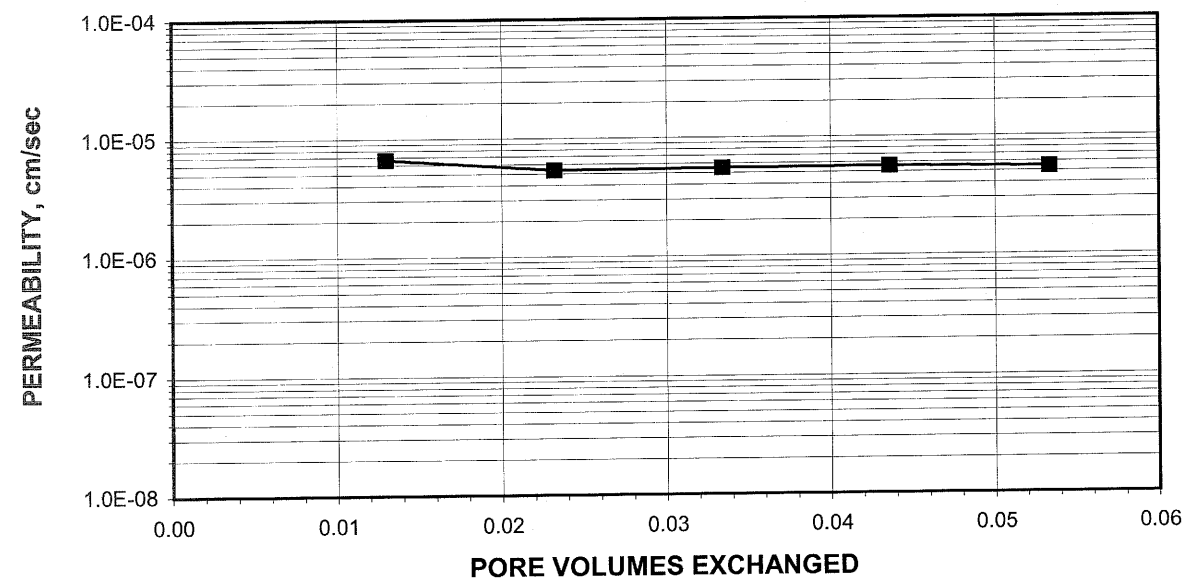
Client	CDM	Boring No.	618
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	7.0-9.0
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-05		

AVERAGE PERMEABILITY = 5.5E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 5.5E-08 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: TMS Date: 7/17/2008 Checked By: GEM Date: 7-21-08

DCN: CT-22 DATE: 01-08-99 REVISION:2\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-05 PERM.xls]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

Geotechnics
INTEGRITY IN TESTING

Client	CDM	Boring No.	618
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	7.0-9.0
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-05		
		Specific Gravity	2.70 Assumed
		Sample Condition	Undisturbed

Visual Description: TAN SANDY SILT

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	A-5	312
Wt. of Tare & WS (gm.)	400.54	623.06
Wt. of Tare & DS (gm.)	379.49	506.86
Wt. of Tare (gm.)	98.98	84.22
Wt. of Water (gm.)	21.05	116.20
Wt. of DS (gm.)	280.51	422.64
Moisture Content (%)	**7.5**	**27.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	530.54	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	530.54	629.19
Length 1 (in.)	2.912	2.799
Length 2 (in.)	2.910	2.874
Length 3 (in.)	2.905	2.833
Top Diameter (in.)	2.852	2.821
Middle Diameter (in.)	2.845	2.812
Bottom Diameter (in.)	2.850	2.832
Average Length (in.)	2.91	2.84
Average Area (in.^{2})	6.37	6.25
Sample Volume (cm^3)	303.89	290.54
Unit Wet Wt. (gm./ cm^3)	1.75	2.17
Unit Wet Wt. (pcf)	109.0	135.2
Unit Dry Wt. (pcf)	101.4	106.0
Unit Dry Wt. (gm./ cm^3)	1.62	1.70
Void Ratio, e	0.66	0.59
Porosity, n	0.40	0.37
Pore Volume (cm^3)	121.1	107.8

Tested By: TMS Date: 7/17/2008 Checked By: GAM Date: 7-21-08

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

Geotechnics
INTEGRITY IN TESTING

Client	CDM	Boring No.	618
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	7.0-9.0
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-05		

Pressure Heads (Constant)	
Top Cap (psi)	48.7
Bottom Cap (psi)	50.0
Cell (psi)	55.0
Total Pressure Head (cm)	91.4
Hydraulic Gradient	12.69

Final Sample Dimensions	
Sample Length (cm), L	7.20
Sample Diameter (cm)	7.17
Sample Area (cm^2), A	40.34
Inflow Burette Area (cm^2), a-in	0.877
Outflow Burette Area (cm^2), a-out	0.886
B Parameter (%)	95

AVERAGE PERMEABILITY = 5.5E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 5.5E-08 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	TOTAL INFLOW	TOTAL OUTFLOW	TOTAL HEAD h	FLOW (0 flow)	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(hr)	(cm^3)	(cm^3)	(cm)	(1 stop)	(°C)	(cm/sec)
7/17/2008	11	23	0.0	0.0	0.0	116.9	0	23.0	NA
7/17/2008	11	28	0.1	1.4	1.4	113.8	0	23.0	6.6E-06
7/17/2008	11	33	0.2	2.5	2.5	111.3	0	23.0	5.3E-06
7/17/2008	11	38	0.3	3.6	3.6	108.9	0	23.0	5.5E-06
7/17/2008	11	43	0.3	4.7	4.7	106.4	0	23.0	5.6E-06
7/17/2008	11	48	0.4	5.8	5.8	104.1	1	23.0	5.5E-06

Tested By: TMS Date: 7/17/2008 Checked By: GBM Date: 7-21-08

DCN: CT-22 DATE: 01-08-99 REVISION:2 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-05 PERM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics
INTEGRITY IN TESTING

PERMOMETER METHOD

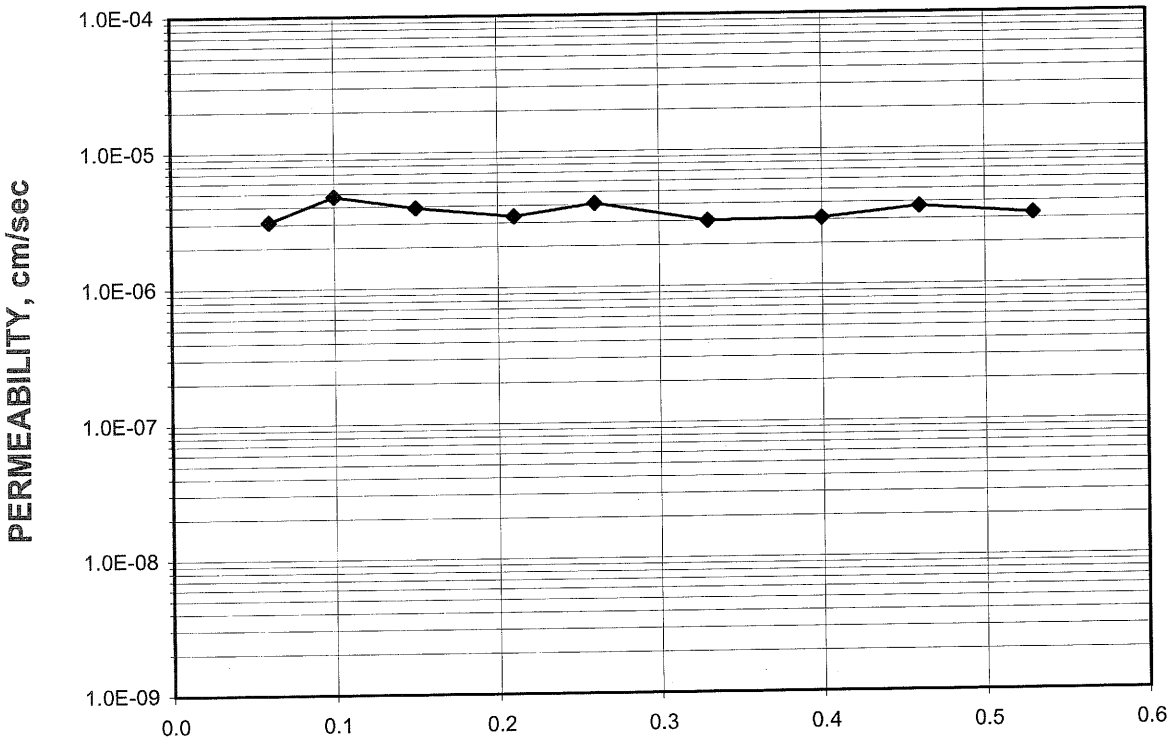
ASTM D 5084-97
(SOP-S22C)

Client	CDM	Boring No.	627D
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	1.0-3.5
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-06		

Visual Description: DARK BROWN SANDY SILT

AVERAGE PERMEABILITY = 3.3E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.3E-08 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS Date: 7/17/2008 Checked By: Gen Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-06 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	627D
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	1.0-3.5
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-06		
		Specific Gravity	2.70 Assumed
		Sample Condition	Undisturbed

Visual Description: DARK BROWN SANDY SILT

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	SS-2	K-7
Wt. of Tare & WS (gm.)	302.20	523.57
Wt. of Tare & DS (gm.)	278.53	474.55
Wt. of Tare (gm.)	100.35	110.44
Wt. of Water (gm.)	23.67	49.02
Wt. of DS (gm.)	178.18	364.11
Moisture Content (%)	**13.3**	**13.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	784.09	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	784.09	785.33
Length 1 (in.)	3.436	3.375
Length 2 (in.)	3.433	3.442
Length 3 (in.)	3.410	3.424
Top Diameter (in.)	2.855	2.822
Middle Diameter (in.)	2.822	2.817
Bottom Diameter (in.)	2.863	2.828
Average Length (in.)	3.43	3.41
Average Area (in.^{2})	6.36	6.26
Sample Volume (cm^3)	357.35	349.97
Unit Wet Wt. (gm./ cm^3)	2.194	2.244
Unit Wet Wt. (pcf)	137.0	140.1
Unit Dry Wt. (pcf)	120.9	123.5
Unit Dry Wt. (gm./ cm^3)	1.937	1.978
Void Ratio, e	0.394	0.365
Porosity, n	0.283	0.268
Pore Volume (cm^3)	101.0	93.6

Tested By: TMS Date: 7/17/2008 Checked By: GEM Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-06 PERMOM.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

Geotechnics INTEGRITY IN TESTING

PERMOMETER METHOD

ASTM D 5084-03
(SOP-S22A & B)

Client	CDM	Boring No.	627D
Client Project	BUNCOMBE COUNTY C&D LF EXP.	Depth (ft.)	1.0-3.5
Project No.	2008-598-02	Sample No.	T-1
Lab ID No.	2008-598-02-06		

Test Pressures	
Cell Pressure(psi)	45.0
Back Pressure(psi)	40.0
Eff. Cons. Pressure(psi)	5.0
Response (%)	95

Final Sample Dimensions	
Sample Length (cm), L	8.67
Sample Area (cm^2), A	40.36
Pipette Area (cm^2), a_p	0.03142
Annulus Area (cm^2), a_a	0.76712
Equilibrium Level (cm), R_{eq}	1.75

AVERAGE PERMEABILITY = 3.3E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.3E-08 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	FLOW CONDITION (0 flow)	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)	(cm/sec)
7/17/08	10	8.67	0	10.5	13.2	0	23.0	NA
7/17/08	10	8.73	0	10.3	12.9	0	23.0	3.1E-06
7/17/08	10	8.77	0	10.1	12.6	0	23.0	4.7E-06
7/17/08	10	8.82	0	9.9	12.3	0	23.0	3.9E-06
7/17/08	10	8.88	0	9.7	12.0	0	23.0	3.3E-06
7/17/08	10	8.93	0	9.5	11.7	0	23.0	4.1E-06
7/17/08	10	9	0	9.3	11.4	0	23.0	3.0E-06
7/17/08	10	9.07	0	9.1	11.1	0	23.0	3.1E-06
7/17/08	10	9.13	0	8.9	10.8	0	23.0	3.7E-06
7/17/08	10	9.2	1	8.7	10.5	1	23.0	3.3E-06

Tested By: TMS Date: 7/17/2008 Checked By: GEM Date: 7-21-08

DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Server\c\2008 PROJECTS\2008-598 CDM\[2008-598-02-06 PERMOM.xls]Sheet1

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Appendix C

NCDENR DWR/USGS Hydrographs

North Carolina Department of Environment and Natural Resources

Division of Water Resources

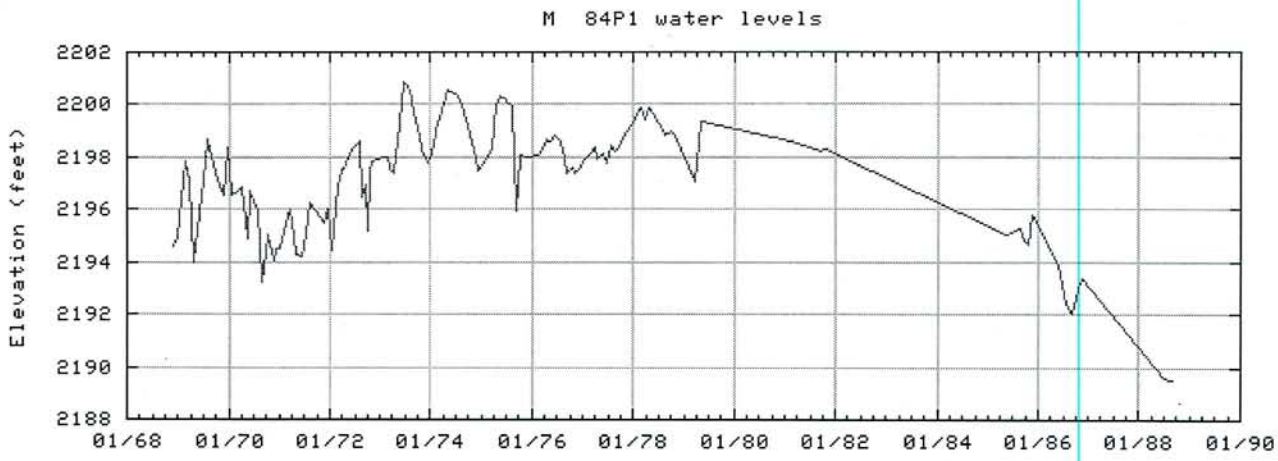
DWR Monitoring Database Detail for M 84P1

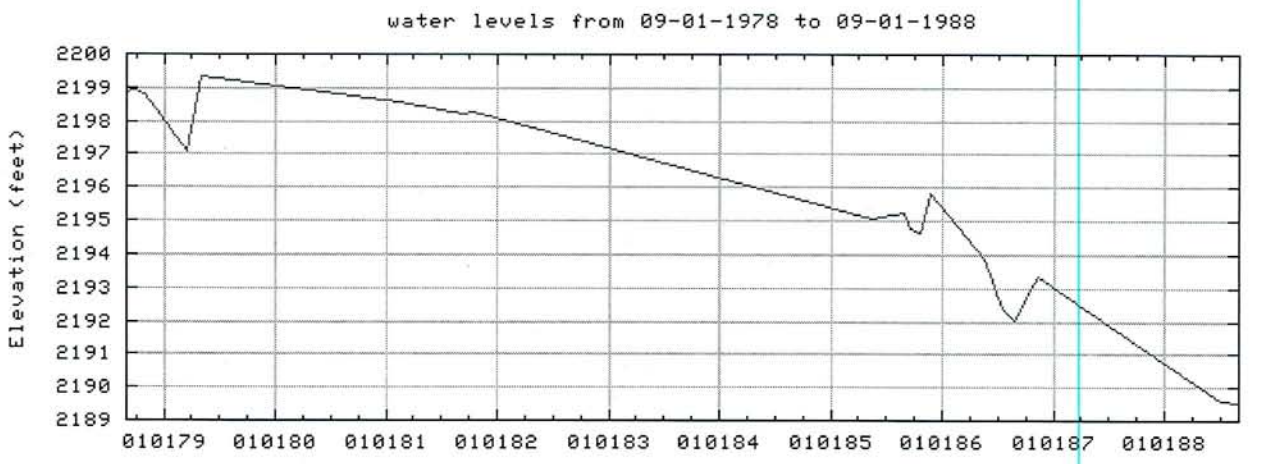
Show Map -- Monthly Statistics Plot -- Station Levels (may include USGS data)

Field	Data
County	Buncombe
Quad	M 84P1
Name	Swannanoa
Latitude	35.606667
Longitude	-82.410556
Location Accuracy	Map
Netname (link to USGS data)	
USGS ID	
Aquifer	Bedrock
Land Surface	2,244.25
Date Constructed	
Stickup,	
Depth	99.00
Diameter	6.00
Yield	0.00
Exists?	y
Recorder Box?	n
Top of Screen	0.00
Bottom of Screen	0.00
Number of Water Levels {date * feet below land surface * elevation}	124
11/22/1968 to 09/01/1988	** 999.99 feet below land surface value indicates dry well

output file is tab-delimited text

return to well table





Start Date: 09 - 01 - 1978 End Date: 09 - 01 - 1988 Replot

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DWR Monitoring Database Detail for Q 85N1

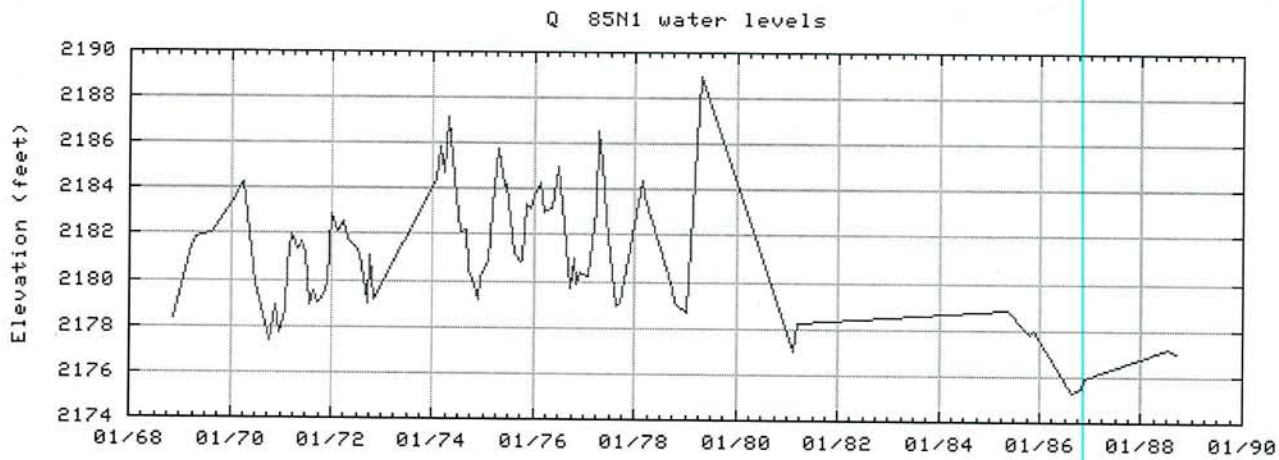
Show Map -- Monthly Statistics Plot -- Station Levels (may include USGS data)

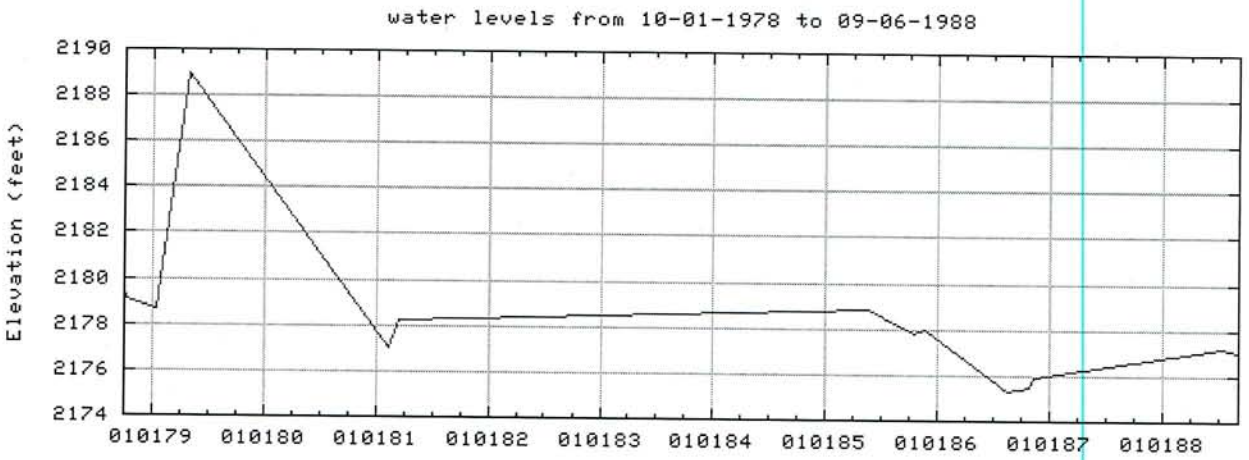
Field	Data
County	Henderson
Quad	Q 85N1
Name	Hendersonville
Latitude	35.284167
Longitude	-82.481389
Location Accuracy	Map
Netname (link to USGS data)	
USGS ID	
Aquifer	Bedrock
Land Surface	2,199.00
Date Constructed	
Stickup,	
Depth	48.00
Diameter	6.00
Yield	15.00
Exists?	?
Recorder Box?	n
Top of Screen	0.00
Bottom of Screen	0.00
Number of Water Levels {date * feet below land surface * elevation} 11/14/1968 to 09/06/1988	90

** 999.99 feet below land surface value indicates dry well

output file is tab-delimited text

return to well table





Start Date: 10 - 01 - 1978 End Date: 09 - 06 - 1988 Replot

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North Carolina Department of Environment and Natural Resources

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DWR Monitoring Database Detail for P 84G2

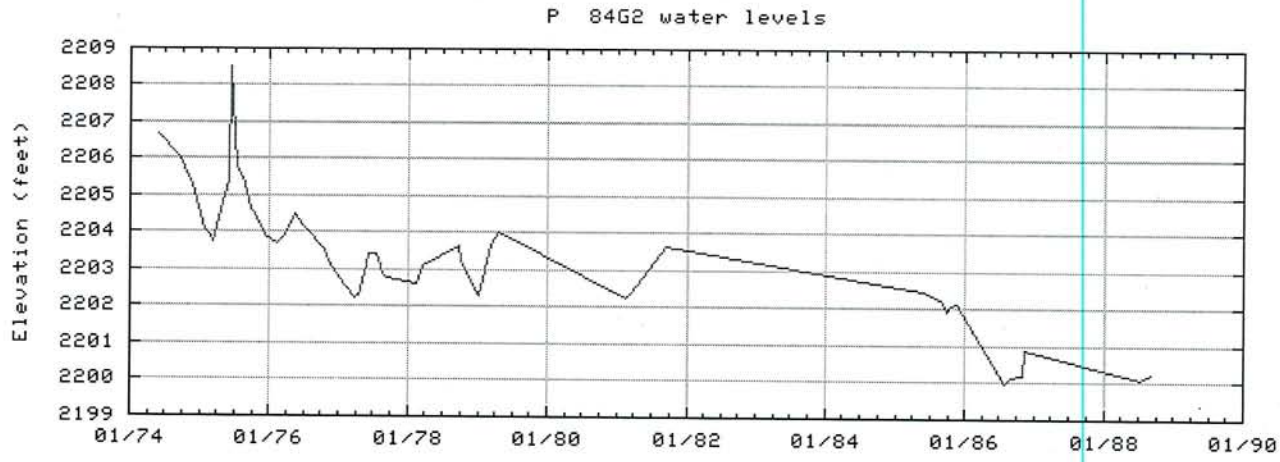
Show Map -- Monthly Statistics Plot -- Station Levels (may include USGS data)

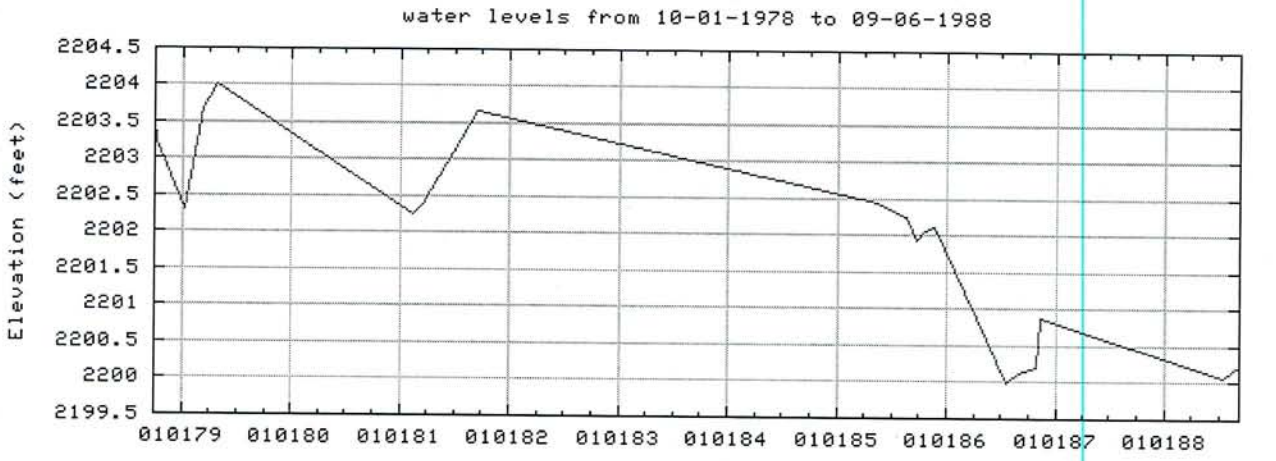
Field	Data
County	Henderson
Quad	P 84G2
Name	Hendersonville
Latitude	35.397778
Longitude	-82.390000
Location Accuracy	Map
Netname (link to USGS data)	
USGS ID	
Aquifer	Saprolite
Land Surface	2,239.50
Date Constructed	05/29/1974
Stickup, 05/29/1974	0.50
Depth	44.00
Diameter	24.00
Yield	0.00
Exists?	y
Recorder Box?	n
Top of Screen	0.00
Bottom of Screen	0.00
Number of Water Levels {date * feet below land surface * elevation} 05/29/1974 to 09/06/1988	52

** 999.99 feet below land surface value indicates dry well

output file is tab-delimited text

return to well table





Start Date: 10 - 01 - 1978 End Date: 09 - 06 - 1988 Replot

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North Carolina Department of Environment and Natural Resources

Division of Water Resources

Field	Data
County	Haywood
Quad	M 90T1
Name	Canton Watershed RS 1
Latitude	35.603611
Longitude	-82.843611
Location Accuracy	Map
Netname (link to USGS data)	
USGS ID	
Aquifer	Saprolite
Land Surface	3,897.00
Date Constructed	06/04/1985
Stickup, 11/16/1987	3.00
Depth	35.00
Diameter	4.00
Yield	0.00
Exists?	y
Recorder Box?	n
Top of Screen	13.00
Bottom of Screen	35.00
Number of Water Levels {date * feet below land surface * elevation} 06/04/1985 to 12/26/1990	59

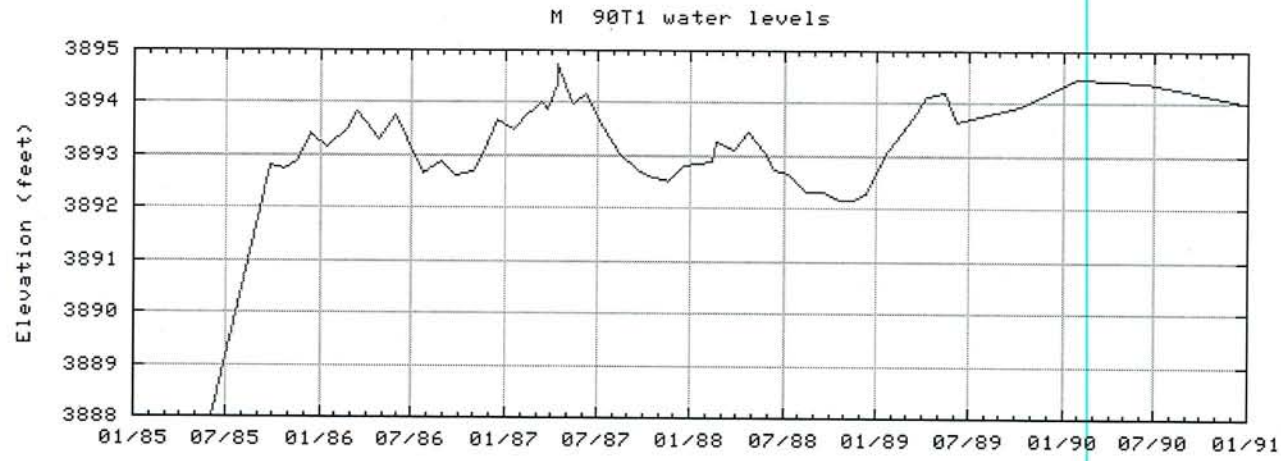
** 999.99 feet below land surface value indicates dry well

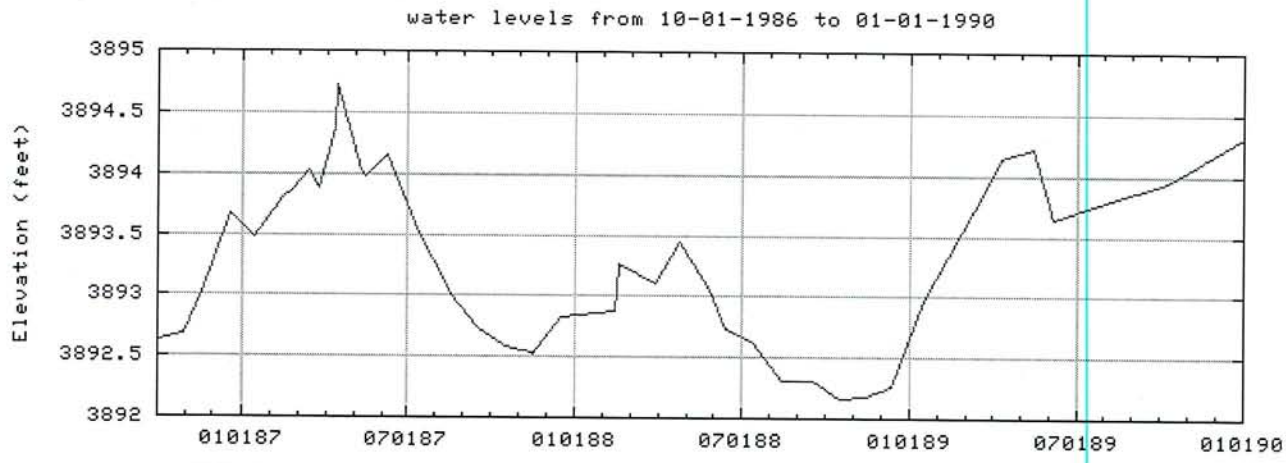
output file is tab-delimited text

return to well table

DWR Monitoring Database Detail for M 90T1

Show Map -- Monthly Statistics Plot -- Station Levels (may include USGS data)





Start Date: 10 - 01 - 1986 End Date: 01 - 01 - 1990 Replot

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North Carolina Department of Environment and Natural Resources

Division of Water Resources

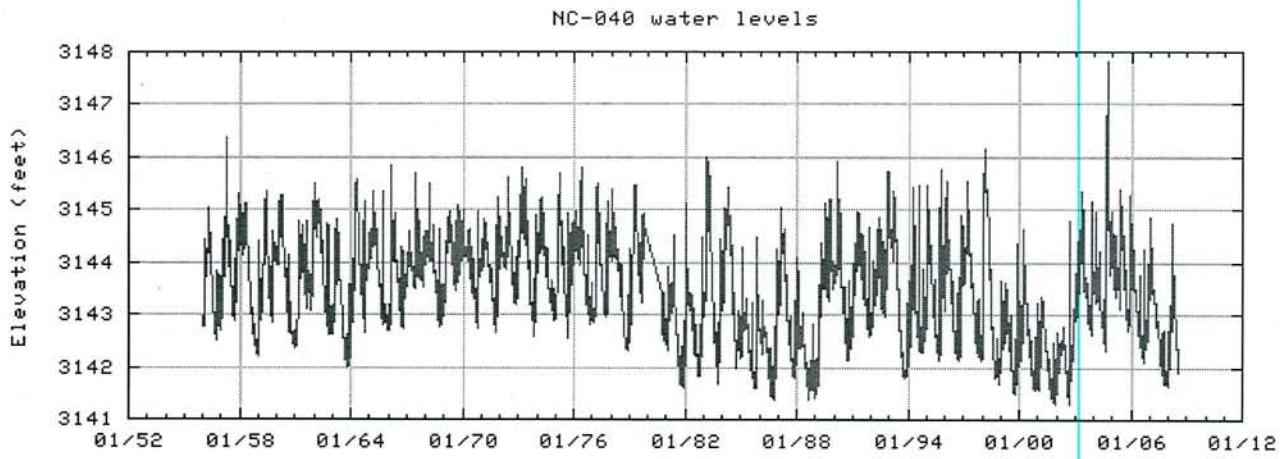
USGS Monitoring Database Detail for NC-040

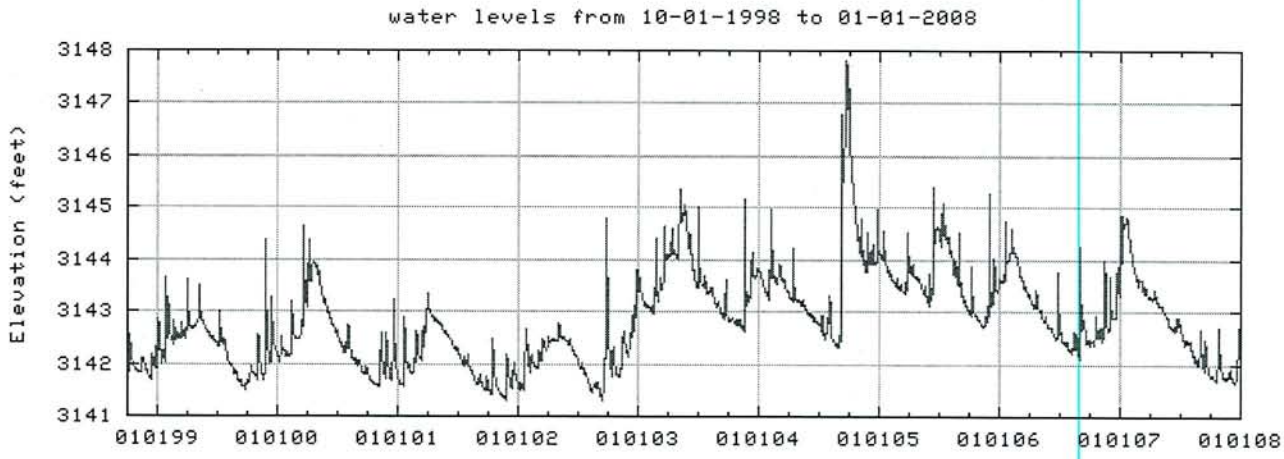
Show Map -- Monthly Statistics Plot

Field	Data
County	Haywood
Quad	
Name	HW-047 (NC-40) CHAMPION
Latitude	35.387500
Longitude	-82.812222
Netname (link to USGS data)	NC-040
USGS ID Real-time Data	352315082484401
Aquifer	Bedrock
Land Surface	3,148.26
Date Constructed	12/08/1955
Stickup	1.00
Depth	18.50
Diameter	12.00
Top of Screen	0.00
Bottom of Screen	0.00
Number of Water Levels {date * feet below land surface * elevation} 01/01/1956 to 08/03/2008	18,409

output file is tab-delimited text

return to well table





Start Date: 10 - 01 - 1998 End Date: 01 - 01 - 2008 Replot

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North Carolina Department of Environment and Natural Resources

Division of Water Resources

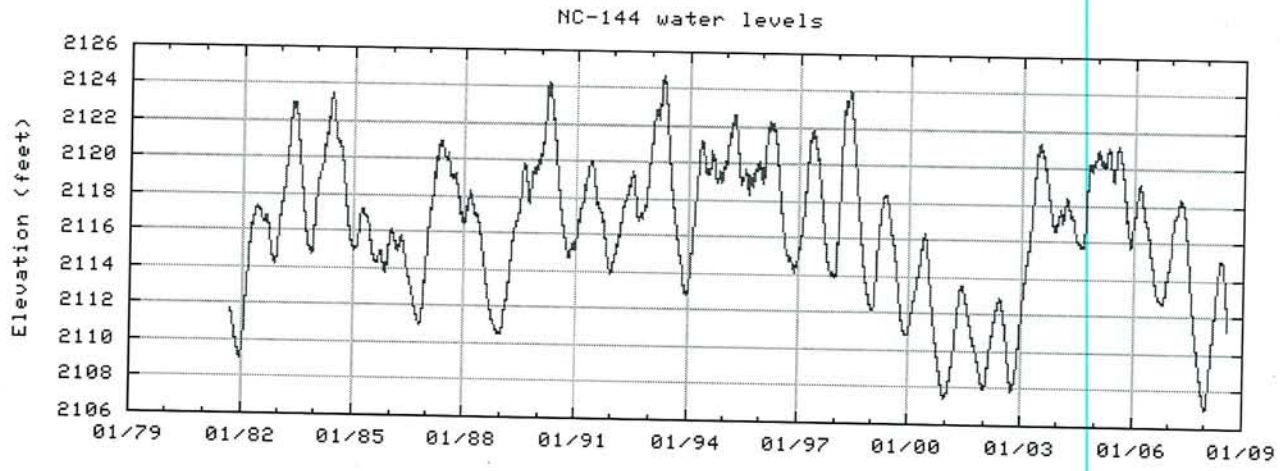
Field	Data
County	Transylvania
Quad	
Name	TR-065 (NC-144) BLANTYRE
Latitude	35.302222
Longitude	-82.628611
Netname (link to USGS data)	NC-144
USGS ID Real-time Data	351808082374302
Aquifer	Saprolite
Land Surface	2,147.00
Date Constructed	09/10/1981
Stickup	1.30
Depth	58.00
Diameter	4.00
Top of Screen	15.00
Bottom of Screen	58.00
Number of Water Levels {date * feet below land surface * elevation}	9,674
09/16/1981 to 08/03/2008	

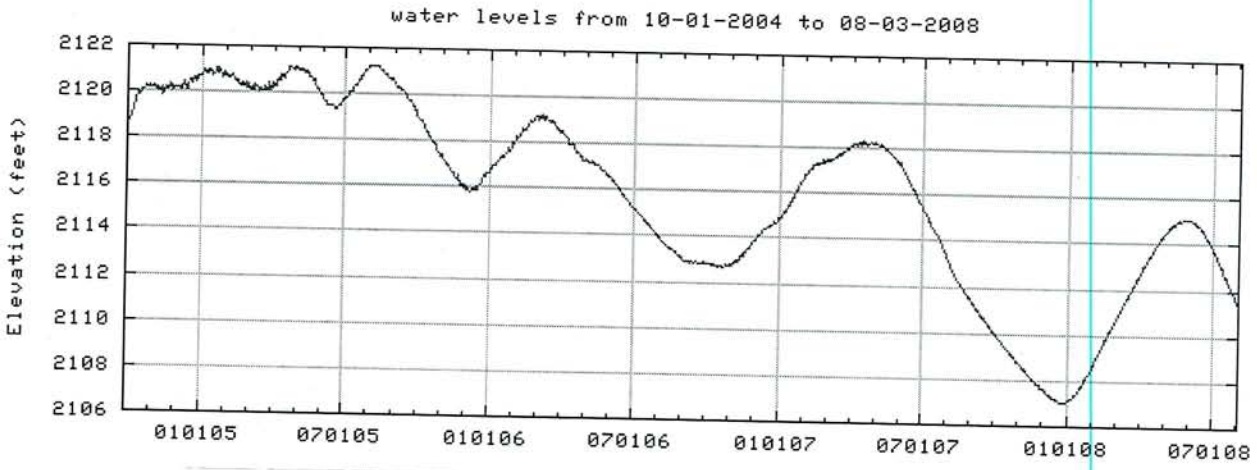
output file is tab-delimited text

return to well table

USGS Monitoring Database Detail for NC-144

Show Map -- Monthly Statistics Plot





Start Date: 10 . 01 . 2004 End Date: 08 . 03 . 2008 Replot

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Appendix D

Field Notes

Projects

5/29/2008

9:40 DC + MC on site for marking borings, met w/ dozer driver (William)

13:00 Boring sites marked
Returning to Raleigh

David Caldwell

6/2/08 Buncombe Co Landfill

10:00 DC on site, waiting for drillers

10:30 Drillers arrive, filling up water tanks, etc.

10:55 Drillers unloading rig, etc. Setting up on 614

13:00 Drillers back from lunch Starting on 614

17:00 Completed 614, 617 to refusal
Started on 616
Landfill closing for the day
Meeting drillers at 7:30 a.m.

David Caldwell

6/3/08 Buncombe LF

8:00 DC & Drillers on site
Continuing on 616

9:30 Setting up on 619
Drillers out to receive delivery of materials

10:00 Drillers return, resume work on 619

19:00 Completed 619, 620, 621 to refusal
Cored 10' on 619
End of day

David Caldwell

6/4/08 Buncombe Co LF

7:30 DC + Drillers on-site
Moving vehicles off of 619

9:30 Setting up on 618

12:00 Break for lunch

13:30 Finished 618
Moving to 615

18:00 Completed 615, 622
End of Day
David Caldwell

6/5/08 Buncombe Co LF

7:45 DC + Drillers on-site
Setting up on 624

10:55 Well 361 WL @ 58.2'
below top of PVC

11:30 Setting up on 623
Break for lunch

16:30 Well 234 WL @ 60.0'
below top of casing

18:30 Completed 623
End of Day
David Caldwell

6/6/08 Buncombe Co. LF

7:30 DC + Drillers on-site
Moving to 627

9:00 Had to clear more road
for site of 627 -
Setting up drill rig

16:40 Water level on 623
@ 22.5'
Finished coring 627
Reaming out to set well

17:00 Will return & finish Mon-Tues
June 9-10

David Caldwell

6/9/08

12:15 DC on-site
Drillers arrived 11:45,
breaking down from 627

Spoke to Dan Forbes about getting
a well in at 627. OK to pull
tri-cone reamer and complete
with air hammer rig.

13:10 Pulling ST @ 627 from
1'365'
Moving to 626

17:00 626, 625 completed
Need more road cleared to
reach 628, will complete
on 6/10

David Caldwell

6/10/08

7:45 DG & Drillers on site William is finishing dozer work to access 628

WL in 606 @ 75.5' below top of PVC

WL in 234 @ 60.0' below top of PVC

★ WL in 619 @ 8.5' BGS

WL in 361 @ 58.3' below top of PVC

★ WL in 623 @ 24.5' BGS

WL in 227 @ 10.5' below top of PVC

★ WL in 627 @ 3.0' BGS

★ - Rock core borings

6/10/08 Continued

11:00 Completed 628 Drillers starting to load equipment for return to Greenville

11:45 Air rig arrives, loading material for well installation

13:00 Setting up on 614

14:30 Completed 614 Setting up on 619 (Nested Pair)

15:30 Completed nested pair at 619 (Deep & Shallow)

Starting on 621 in the morning

David Caldwell

6/11/08

8:30 DC on site, waiting for drillers

9:00 Drillers arrive, using dozer to scrape road after rain last night

9:45 Setting up on 621

11:45 Completed 621 after considerable delay in charging drilling battery

12:40 Return from lunch
Set up on 620

16:00 Completed 620
Set up on 616
Finished 616
Set upon 617, to finish tomorrow

6/12/08

8:30 DC on-site, waiting for drillers at 617

9:10 Drillers arrive at 617

10:00 Completed 617
Moving to 618
Dozer will need to do more clearing

11:00 Set up on 618

12:15 Completed 618
Break for lunch

13:00 Set up on 615, charging battery

14:30 Completed 615
Rig in for battery charging
Driller out to inspect roads on West spur
DC to check water levels

Time	Boring	Depth from surface to water
14:40	618	45'
15:00	620	48'
15:15	621	35'
15:20	619s	10'
15:20	619d	12'
15:35	616	12'
15:45	617	45'
15:55	614	42'
15:50	361	56.5'
16:00	615	33.5'

16:10 Returning to hotel

David Caldwell

6/13/08

9:00 PC & Driller on-site
Waiting for support crew and well supplies

11:30 Completed 625
Moving to 628

13:00 Completed 628
Moving to 623
Break for lunch

14:00 Setting up on 623

15:30 Completed 623
Returning to Raleigh

David Caldwell

6-17-08 68° Sunny

1015- Forbes onsite to complete CMD Expansion drilling

- Drill Crew is set up on 627. 627 was augered to refusal in the middle of the access road. Buncombe Co. asked to keep the wells off the access road if possible. Upon arrival, the drill crew and equipment operator have built a pad just off the road near the original auger location. Pad is 4-6ft higher in elevation compared to access road

1040- Begin drilling 627d

627d

- Bedrock (±) 14 ft - Competent @ (±) 17 Ft PWR
- H_2O at contact zone (14Ft)
- 18-41 Ft - competent rock / producing a Gray rock flour
- 41-61 Ft - competent rock
- 61-81 Ft - Competent rock / rock flour is dry
- 81-100 ft - competent rock
- Allow to sit for 15 minutes. Blew H_2O out but is most likely from contact zone.

1140- Called Matt Colone of CDM to discuss. Will drill to 120 to find H_2O.

- 118 (±) small Fracture
- 124 Terminate boring
- Drill rod is set at (±) 117 ft

Well 227 TD = 22.23
WL = 10.16

6-17-08 72° Sunny

627d

Screen → 124 - 114
Sand → 112 - 124
Bentonite → 110 - 112
Grout → 0 - 110

1230- Break for lunch

1255 - Begin drilling 627

- PWR/Bedrock @ 14ft.
- Soft @ 16ft/
- Competent @ 17 ft
- Terminate boring @ 18ft

627

18-13 → Screen
11-18 → Sand
9-11 → Bentonite
0-9 → Grout

1535- Mob to 626

1400 — Setting up to drill 626

626

- (±) 12ft Bebrock / soft
- 16-17.5 Soft zone
- Drill to 24 ft to see if H_2O is present. let sit for 5 minutes. No H_2O.
- Cuttings are weathered (weathered granitic gneiss)

6-17-08 78° Sunny

626 Continued

- (I) 28 More competent - Gray rock flour
- (I) 38 - 38.5 ft - soft (OF) zone
- 41 Ft let sit to see if H_2O is in soft zone at 38 ft. No H_2O
- 46 - 51 ft Fracture / H_2O / soft zone filled with (PP) sediment / Cuttings and sediment are brown in color
- 51 - 57 ft - gray rock flour

Terminate boring @ 57 ft

* Not enough PVC to install well. Will leave borehole open and install PVC in the morning

1550 - Check in with Jerry Mears. Obtain well keys to collect H_2O levels from existing wells.

1605 - Offsite

6-17-08

Drilling Summary Page

- Reuben Caldwell Drilling Inc.
- Drill Rig - Schramm T450 WS Rotadrill
- Driller - Billy Nash
- Helper - Donald Nash
- Equipment Operator - William Crow
- 6" Air Hammer / 2-inch PVC / #2 SAND FILTER

Well Total Depths

Loc	TD
614	42
615	51.25
616	31
617	61
618	50
619s	14
619d	30
620	51.5
621	45
623	99
625	62
626	57
627d	124
627	18
628	63.5
624 shallow	20
622	46
624 deep	40

Total Drilling Footage = 905.25

6-18-08 66° Sunny

0825- Forbes onsite. Begin collecting water levels while waiting for the drill crew to arrive

Loc	DTW (TOC)	DTW (Ground)	
615	35.71	33.56	
618	46.47	44.24	
MW-12D	14.44		
MW-12	13.05		
??? B-609	35.43	- No well tag or ID on PVC Located across from MW-14 cluster	
MW-14	33.92		
MW-14d	34.23		
627 shallow	7.83	4.86	
627 deep	9.08	6.51	
623	87.18	84.66	
234-B	59.95		
B-227	10.16		Collected on
614	42.47		6/19/08
617	48.78		6/19/08
616	15.41		6/19/08
619s	11.84	9.17	6/19/08
619d	14.95		6/19/08
620	49.70	46.40	6/19/08
621	37.87		6/19/08
B-361	58.45		
B-606	75.58		
628	56.64	54.04	
625	49.65	47.48	

6-18-08 70° Sunny

Loc	DTW (TOC)	DTW (ground)
626	48.77	46.70 Collected on 6/19/08
624s	Dry	
624d	33.21	6/19/08
622	14.50	6/19/08

- All water levels collected prior to development

Wells that have been completed with Pro-cover, pad, and ID tag as of 6/19/08

614	624 deep	621
617	628	
622	616	
624 shallow	619 deep	

Wells that have not been fully completed as of 6/19/08

627 shallow	615
627 deep	618
626	619 shallow
623	620
625	

626 has not been completed prior to gauging H2O level. Measured 27 Ft. From ground surface to H2O in open hole

6-18-08 70° Sunny

0915- Drill crew onsite. Install PVC in 626. Set up to install 624d

1030- Begin drilling 624d

624d

- Rock @ ± 6ft
  - Soft zone from 8-9ft (±)
  - let sit to see if H_2O is on top
  - Soft zone from 11-12 ft
    Drilled to 13 and let sit
    No H_2O - Continue drilling
  - Drilled to 20ft. Let sit. Pulled air-hammer up at 13ft and appeared to have some moisture on it
    - Cuttings are a white/gray rock flour
- Drilled to 21 ft and terminated boring
  - About 5 ft of water in boring
- 1100- Called Mat Colone of CDM to see about installing a nested pair
  Will continue drilling till 1st H_2O producing fracture is encountered

23-25 - soft zone / fracture
27-28 - soft zone / fracture
33-37 - Large Fracture / cuttings change from white/gray rock flour to brown / producing good H_2O

- Terminate boring @ 40 ft

6-18-08 72° Sunny

624d

40-30 → Screen
28-40 → Sand
26-28 → Bentonite
0-26 → Grout

1145- Break for lunch
- Collect H_2O levels while drill crew is at lunch

1220- Return to drill crew. Driller is at 18ft and says there is no H_2O. 624 is 5ft in front of 624d. Drill to 20 ft and let sit for 10 minutes. Pull hammer up and appears to be moist. Will set well to see if any H_2O comes in

624

20-10 → Screen
8-20 → Sand
6-8 → Grout/Bentonite
0-6 → Grout

1500- Mob to 622
- Collected a bucket of soil for testing. Not much cuttings left from Augering 1/4 bucket is from Augered location and the rest is surficial from where the dozer was clearing

6-18-08 76° Sunny

622

- Bedrock @ 12 Ft (soft/weathered)
- 12 + 26 Intermediate soft zones from 17-18 and 23-25. Allow to sit to see if H_2O is present. No H_2O. Continue drilling
- More competent @ ± 27 ft - dark gray rock floor
- Fracture @ 31 Ft
- Fracture @ 34 Ft
  > (±) 6 inches each fracture
- Drill to 36 Ft and let sit
- Little H_2O Fracture at 39-41 Ft (brown cuttings)
- Drill to 46 Ft. / Pull rod and hammer H_2O is (±) 7ft up on drill rod from bottom of hammer
- Terminate boring at 46 Ft

622

46 - 36 → Screen
34 - 46 → Sand
32 - 34 → Bentonite
0 - 32 → Grout

1430 - Drill crew offsite.
Proceed to 625 to begin slug testing
- Setting up to Slug Test

1610 - Setting up to slug test 627 shallow

6-18-08 50° Sunny

Slug Test

625 Slug In - 1450
- 1524 STOP TEST
Slug out - 1526
- 1535 STOP TEST

627 shallow Slug In - 1621
- 1709 STOP TEST
Slug out - 1706
- 1717 STOP TEST
Checked H_2O level prior to stopping slug out Test. Had Recovered 100%

1730 - Offsite

6-19-08 64° Sunny

0800 - Forbes onsite

0820 - Setting up to Slug Test

615 Slug In - 0830
- 0902 STOP TEST
Slug out - 0903
- 0958 STOP TEST

- Checked H_2O level prior to stopping test
Fully recovered

619 Deep Slug In - 0948
- 1019 STOP TEST
Slug out - 1020
1054 STOP TEST

0940 - Billie and Donnie Nash onsite to continue developing well construction

Billie is going to try to complete 615, 618, 619 shallow, and 620

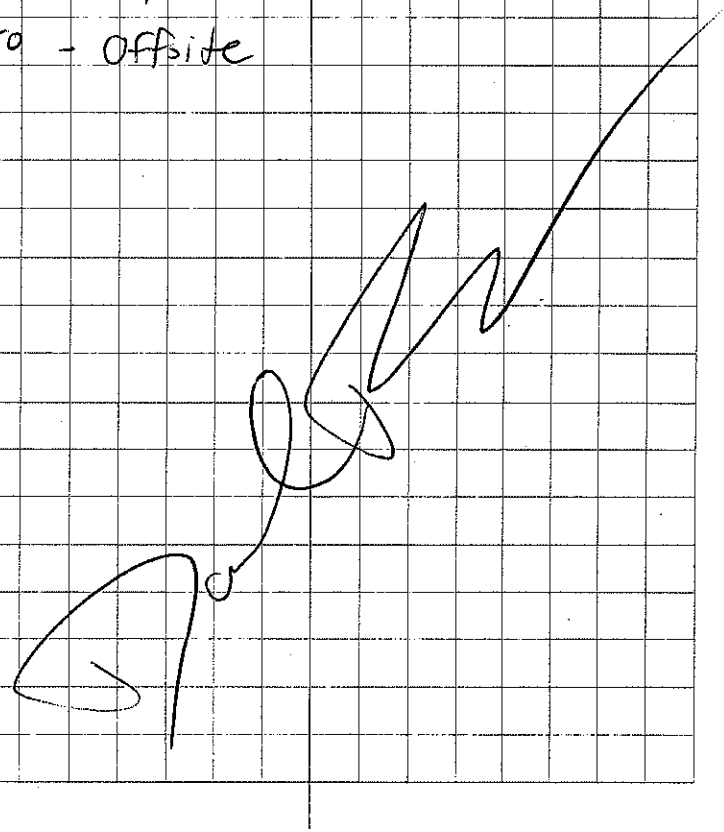
617 Slug In - 1106
- 1137 STOP TEST
Slug out - 1139
1206 STOP TEST

6-19-08 72° Sunny

RETEST 625 Slug in - 1221
- 1258 STOP TEST
Slug out - 1300
1338 STOP TEST

1330 - Gave survey crew the well location map. Surveyor's are going to provide TOC and ground elevation for the newly installed wells (18 total)

1350 - Offsite



7/17/08 72° Sunny

1120 - Forbes onsite to collect water levels From the newly installed wells and existing wells

Loc	DTW	Comments
B-227 ✓	10.16	Needs lock
627s ✓	7.90	
627d ✓	(E) 1-inch from top of casing - Needs lock	
626 ✓	49.67	Cover was open with cap on top
623 ✓	87.67	" "
B-234 ✓	60.11	Needs lock
625 ✓	44.13	Needs tag - Cover was open with cap on top
622 ✓	13.81	
624s ✓	Dry	
624d ✓	31.80	
B-606 ✓	75.79	Needs lock
628 ✓	55.82	"
MW-12d ✓	14.51	
MW-12s ✓	13.60	
B-609 ✓	35.07	Needs lock
MW-14s ✓	33.42	
MW-14d ✓	33.91	Wasp nest inside cover
615 ✓	38.95	Needs lock
618 ✓	46.75	"
614 ✓	43.51	
B-361 ✓	58.[illegible]8	Lid is rusty and will not close due to PVC sticking out

7/17/08 80° Sunny

Water levels Continued

Loc	DTW	Comments
617 ✓	48.62	Cover was open with cap on top
618 ✓	15.97	" "
619d ✓	14.97	" "
619s ✓	12.03	" "
620 ✓	50.24	Needs lock / Tag was on ground
621 ✓	38.00	
B-365 ✓	11.58	Needs lock and cap

1520 - Return well keys

1530 - Offsite

8-12-08 75°F Sunny

1050 A. Weisfenning on site to collect water level measurements

Well	DTW (ft)	Comments
MW-4	14.64	
MW-4d	15.71	
MW-5	37.37	
MW-5d	39.25	
MW-6	31.18	
B-364	—	Knocked over and box busted
MW-617	49.16	
B-361	59.31	No well cover, no locks
MW-621	38.14	
MW-620	50.27	No locks
MW-618	46.87	No locks
MW-619s	12.82	
MW-619d	15.38	
MW-615	41.80	No locks
MW-616	16.91	
B-365	—	Couldn't locate
MW-614	44.15	
MW-12	14.19	
MW-12d	15.79	
B-609	35.74	

8-12-08 75° Sunny

Water Levels continued

Well	DTW (ft)	
MW-14	34.19	
MW-14d	34.53	
B-606	75.95	
MW-628	57.60	
B-409	—	no longer exists
MW-625	44.03	
MW-622	15.29	
MW-624s	dry	
MW-624d	35.08	
~~MW-623~~	—	
MW-627s	9.55	Got a strong signal (MW-7 dry)
MW-627d	0.02	Cap top of casing
MW-623	87.95	
BC-127	—	Not needed / Not existing
BC-227	10.20	
B-234	60.23	
626	49.65	

1500 Off site

9-10-08 72° Partly Sunny

1135- Forbes onsite to collect water levels

Loc	DTW	Loc	DTW
B-227	10.17	619	15.10
627	8.76	619d	12.51
627d	Toc	626	50.62
626	49.86	621	38.13
623	88.25	B-365	11.70
B-234	60.42		
625	43.58		
622	14.24		
624	Dry		
624d	37.87		
B-606	76.17		
628	58.71		
B-609	35.87		
MW-14	34.16		
MW-14d	34.60		
MW-12	14.14		
MW-12d	15.78		
615	44.08		
618	47.06		
614	44.47		
B-361	59.63		
617	49.57		
616	17.82		

1400 - Offsite

CDM
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(919) 787-5620

Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 614	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of	
Project Location: Buncombe County Landfill	Driller: Lee Brown	Total Depth:	Elevation:
Project Number: 6447- -fld.rt	Drilling Method: HSA Type: 8½" OD	N:	E:

Hammer Weight: 140 lbs Hammer Drop Height: 30" Bit size/ Hole size: 11" Spoon Size: 2" OD ( ) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:				Elevations / Depths	Logged By: D. Caldwell
	Depth to Water	Depth	Date	Time	Ground Surface:	Title: Geotechnical Eng.
					Top of Casing:	Date Start: 6/2/08
	Total Samples	disturbed	undisturbed		Top of Screen:	Date Finish:
					Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	WOH WOH 2 3		24/16			dry, v soft, brown, SILT, little f. sand
2							
3							SAA
4	S-2	5 5 7 10		24/24			SAA
5							dry, stiff, light gray + orange mottled, SILT some sand, little clay
6							
7							
8							
9	S-3	50/6		6/6			dry, v. dense, light gray f-m SAND, little silt
0							

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):			and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff: 8-15	some	20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff: 15-30	little	10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard: >30	trace	<10%
								Moisture, density, color	

Remarks: CME 750X

Updated On: 04/09/01

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Test Boring Log

Client:	Buncombe County	Project Location:	Buncombe County landfill	Boring No.:	614
Project Name:	C&D Landfill Expansion	Project Number:	6447- -rt.fld	Page:	2 of
		Logged By:	D. Caldwell	Date:	6/2/08

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
							difficult drilling
1							AR@ 11.5'
2							
3							
4							
5							
6							
7							
8							
9							
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
0							

Remarks:

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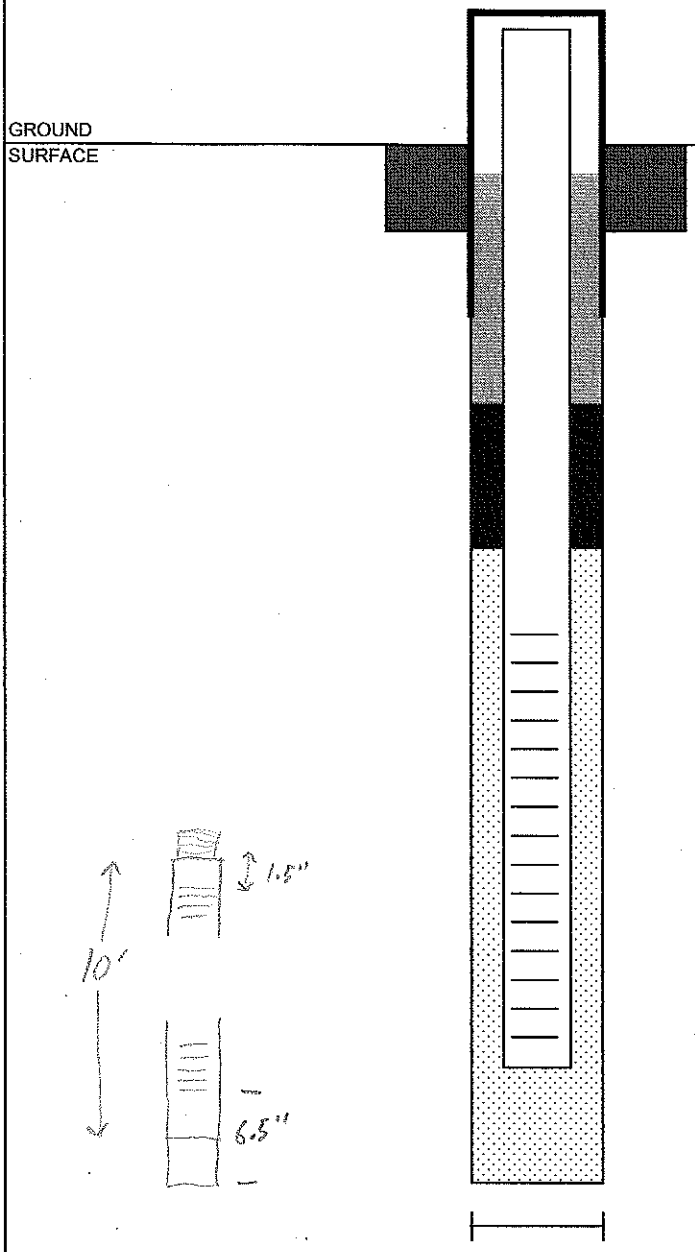
Monitoring Well Installation Log

Client:	Buncombe Co.	Contractor:	Caldwell Drilling	Boring/Well No.:	614
Project Name:		Driller:	Billie	Date Installed:	6/10/08
Project Location:		Ground EL:		Logged By:	DC
Project Number:		Riser EL:		Page:	1 of



SURFACE SEAL: (Thickness & Type)

BACKFILL MATERIAL: (Type)

TOP OF SEAL: 28

SEAL CONSTRUCTION: (Thickness & Type) 2' Bentonite Chips

TOP OF SANDPACK: 30'

RISER CONSTRUCTION: (Type, Diameter & Material) 2" PVC

TOP OF SCREEN: 32.5'

SANDPACK TYPE: #2 Filter (4 bags)

SCREEN MATERIAL: (Type, Slot, Diameter & Material) 2" PVC, Sch. 40, Slot 10

BOTTOM OF SCREEN: 41.5'

BOTTOM OF BOREHOLE: 42'

BOREHOLE DIAMETER: 6"

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks: 4th fracture was water-bearing

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 615
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of
Project Location: Buncombe County Landfill	Driller:	Total Depth: Elevation:
Project Number: 6447- -fld.rt	Drilling Method: Type:	N: E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: | Spoon Size: 2" OD | ( ) Auto ( ) Manual Hammer

Location Sketch

Monitoring Equipment Used:

Depth to Water	Depth	Date	Time

Total Samples	disturbed	undisturbed

Elevations / Depths: Ground Surface: | Top of Casing: | Top of Screen: | Bottom of Screen:

Logged By: D. Caldwell
Title: Geotechnical Eng.
Date Start: 6/4
Date Finish:

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	5, 8, 8, 9		24/10			dry, m dnse, brown, f-c SAND, some silt, trace gravel; relict fabric visible
4	S-2	5, 7, 9, 9		24/24			dry, m dnse, ltgray/brown/black mottled f-m SAND, some silt
9	S-3	14, 20, 21, 31		24/18			dry, dense, ltgray/dkgray/reddish brown f-c SAND, some silt

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):			and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff: 8-15	some	20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff: 15-30	little	10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard: >30	trace	<10%
								Moisture, density, color	

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client:	Buncombe County	Project Location:	Buncombe County landfill	Boring No.:	615
Project Name:	C&D Landfill Expansion	Project Number:	6447- -rt.fld	Page:	2 of
		Logged By:	D. Caldwell	Date:	6/4

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-3						
2							
3							ST from 12.5-15.5
4		5		24/24			
5	S-4	3 5 8				T	dry, loose, yellowish brown, f-m SAND some silt
6						B	SA S-3 but loose
7							
8							
9		50/4		4/4			dry, v dense, gray, GRAVEL, some sand, little silt
0	S-5						
1							AR @ 21.5'
2							
3							
4							
5							
6							
7							
8							
9							
0							

Remarks:

Updated On: 04/09/01

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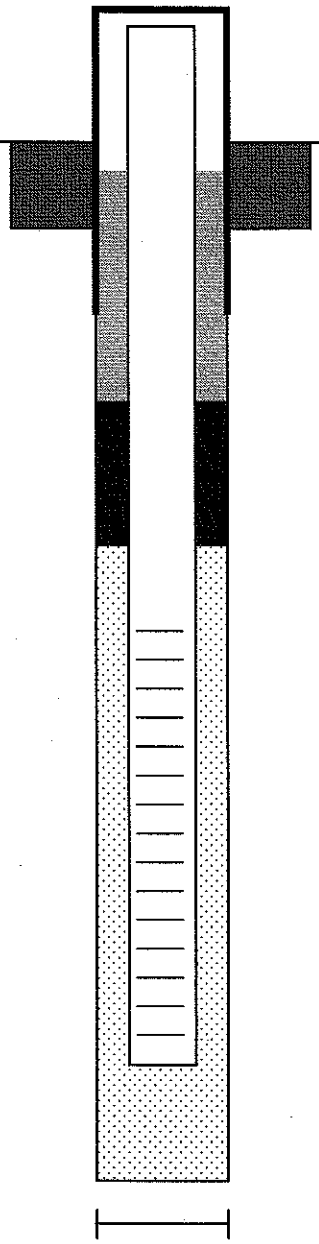
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	615
Project Name:		Driller:		Date Installed:	6/12
Project Location:		Ground EL:		Logged By:	
Project Number:		Riser EL:		Page:	of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: _____
(Thickness & Type)

BACKFILL MATERIAL: _____
(Type)

TOP OF SEAL: _____

SEAL CONSTRUCTION: _____
(Thickness & Type)

TOP OF SANDPACK: 40'

RISER CONSTRUCTION: _____
(Type, Diameter & Material)

TOP OF SCREEN: 41.75'

SANDPACK TYPE: #2 (3½ bags)

SCREEN MATERIAL: _____
(Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 50.75'

BOTTOM OF BOREHOLE: 51.25'

BOREHOLE DIAMETER: 6"

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: G16	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of	
Project Location: Buncombe County Landfill	Driller: Lee	Total Depth:	Elevation:
Project Number: 6447- -fld.rt	Drilling Method: HSA Type:	N:	E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: | Spoon Size: 2" OD | (✓) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:				Elevations / Depths	Logged By: D. Caldwell
	Depth to Water	Depth	Date	Time	Ground Surface:	Title: Geotechnical Eng.
					Top of Casing:	Date Start: 6/2
	Total Samples	disturbed	undisturbed		Top of Screen:	Date Finish:
					Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	1 1 1 2		24/18			moist, v.soft-soft, brown, SILTY f. SAND few rooty trace clay
2							
3							☆ good material for ST from 2.5-4.5 ☆
4		1			PP 2.5		
5	S-2	9 18 32		24/24	PP 1.5		SAA
6							dry, m dense, gray-orange, f. SAND, some silt
7							
8							
9	S-3	16 20 50/4		16/15			dry, v dense, lt-dk gray mottled, f-c SAND little silt
0							

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):			and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff: 8-15	some	20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff: 15-30	little	10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard: >30	trace	<10%
								Moisture, density, color	

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client:	Buncombe County	Project Location:	Buncombe County landfill	Boring No.:	616
Project Name:	C&D Landfill Expansion	Project Number:	6447- -rt.fld	Page:	2 of 2
		Logged By:	D. Caldwell	Date:	6/2/08

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
	S-3						
1							
							ARC DF 1869
2							
3							
4							
5							
6							
7							
8							
9							
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
0							

Remarks:

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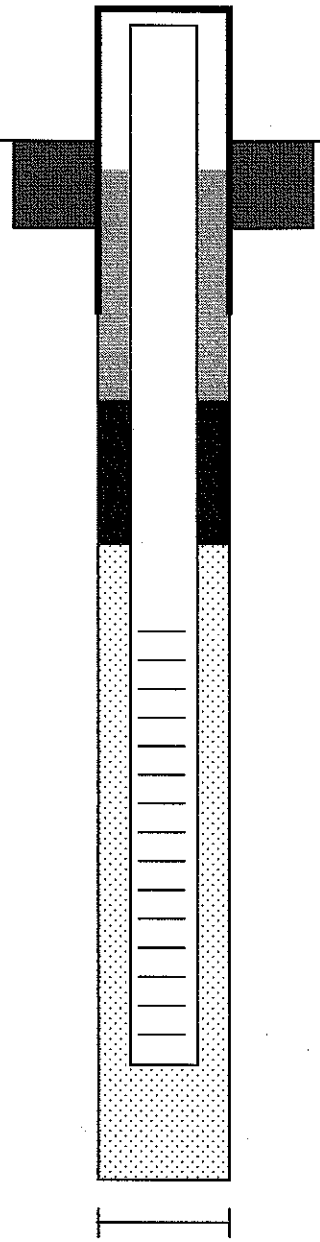
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	6/6
Project Name:		Driller:		Date Installed:	6/11/09
Project Location:		Ground EL:		Logged By:	DC
Project Number:		Riser EL:		Page:	1 of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: _____
(Thickness & Type)

BACKFILL MATERIAL: _____
(Type)

TOP OF SEAL: 18.5

SEAL CONSTRUCTION: 2' Bentonite
(Thickness & Type)

TOP OF SANDPACK: 20.5

RISER CONSTRUCTION: _____
(Type, Diameter & Material)

TOP OF SCREEN: 21.5'

SANDPACK TYPE: #2 (4 bags)

SCREEN MATERIAL: 2" PVC, 10 slot
(Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 30.5'

BOTTOM OF BOREHOLE: 31'

BOREHOLE DIAMETER: 6"

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks:

Updated On: 04/09/01

CDM
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5400 Glenwood Avenue
Suite 300
Raleigh, NC 27612
(919) 787-5620

Test Boring Log

Client: Buncombe County	Drilling Contractor		Boring No.: 617
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.		Page: 1 of
Project Location: Buncombe County Landfill	Driller:		Total Depth: Elevation:
Project Number: 6447- -fld.rt	Drilling Method: HSA Type: 8½" OD		N: E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: 11" | Spoon Size: 2" OD . (X) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:			Elevations / Depths	Logged By:	D. Caldwell
	Depth to Water	Depth	Date	Time	Ground Surface:	Title: Geotechnical Eng.
					Top of Casing:	Date Start: 6/2
	Total Samples	disturbed	undisturbed		Top of Screen:	Date Finish:
					Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	1 5 15 25		24/17			dry, m dense, gray/blk/yellow mottled f-c SAND little silt, tr. gravel
2							
3							
4	S-2	17 35 50/6		18/18			dry, v dense, gray/blk/yellow mottled f-c SAND, little gravel, tr. clay/silt
5							
6							
7							
8							
9	S-3	17 49 50/5		15/15			dry, v dense, gray/orange mottled f-c SAND, little gravel, tr clay/silt
0							

Sample Types	Consistency vs. Blowcount / Foot						Burmeister Classification	
	Granular (Sand):				Fine Grained (Clay):			
S -- Split Spoon	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff:	8-15	and	35-50%
U -- Undisturbed Tube	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff:	15-30	some	20-35%
C -- Rock Core	M. Dense:	10-30			M. Stiff:	4-8	Hard:	>30	little	10-20%
A -- Auger Cuttings									trace	<10%
									Moisture, density, color	

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client:	Buncombe County	Project Location:	Buncombe County landfill	Boring No.:	617
Project Name:	C&D Landfill Expansion	Project Number:	6447- -rt.fld	Page:	2 of 2
		Logged By:	D. Caldwell	Date:	6/2

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
13	S-4	50/3		3/3			dry v. dense dk.gray/black GRAVEL some f-c sand
15							AR @ 13.5'

Remarks:

Updated On: 04/09/01

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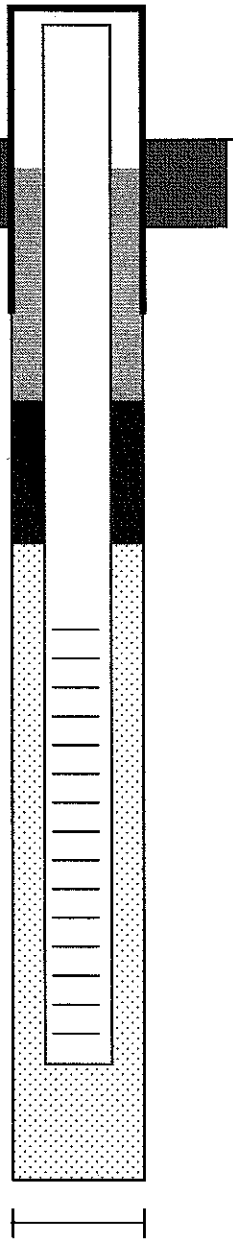
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	617
Project Name:		Driller:		Date Installed:	6/12
Project Location:		Ground EL:		Logged By:	
Project Number:		Riser EL:		Page:	1 of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: (Thickness & Type)

BACKFILL MATERIAL: (Type)

TOP OF SEAL: 47

SEAL CONSTRUCTION: (Thickness & Type) 2' Bentonite

TOP OF SANDPACK: 49'

RISER CONSTRUCTION: (Type, Diameter & Material)

TOP OF SCREEN: 51.5'

SANDPACK TYPE: #2 Filter (4 bags)

SCREEN MATERIAL: (Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 60.5'

BOTTOM OF BOREHOLE: 61'

BOREHOLE DIAMETER: 6"

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks:

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 618	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of	
Project Location: Buncombe County Landfill	Driller:	Total Depth:	Elevation:
Project Number: 6447- -fld.rt	Drilling Method: Type:	N:	E:

Hammer Weight: 140 lbs Hammer Drop Height: 30" Bit size/ Hole size: Spoon Size: 2" OD ( ) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:				Elevations / Depths	Logged By: D. Caldwell
	Depth to Water	Depth	Date	Time	Ground Surface:	Title: Geotechnical Eng.
					Top of Casing:	Date Start: 6/4
	Total Samples	disturbed	undisturbed		Top of Screen:	Date Finish:
					Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	3 4 5 6		24/14		T	moist stiff orangish brown SILT, some sand few roots relict fabric visible
2						B	dry loose light brown f-m SAND some silt
3							
4							SAA
5	S-2	5 6 8 9		24/16			dry w/dense white/light gray/orange mottled f-m SAND, some silt
6							
7							
8	ST-1						
9							
0	S-3	4 5 6 10		24/16			SAA

Sample Types	Consistency vs. Blowcount / Foot								Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):				and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff:	8-15	some	20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff:	15-30	little	10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard:	>30	trace	<10%
									Moisture, density, color	

Remarks:

Updated On: 04/09/01

6 13 21 26

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Test Boring Log

Client:	Buncombe County	Project Location:	Buncombe County landfill	Boring No.:	618
Project Name:	C&D Landfill Expansion	Project Number:	6447- -rt.fld	Page:	2 of
		Logged By:	D. Caldwell	Date:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
4		6					dry dense gray f-c SAND, little silt
5	S-4	13 21 26		24/15			
6							
9		50/3		3/3			dry v dense gray-brown f-c SAND, little silt trace gravel
0	S-5						
4		12					SAA
5	S-6	13 50/5		17/17			
6							
8							AR @ 29'
9							
0							

Remarks:

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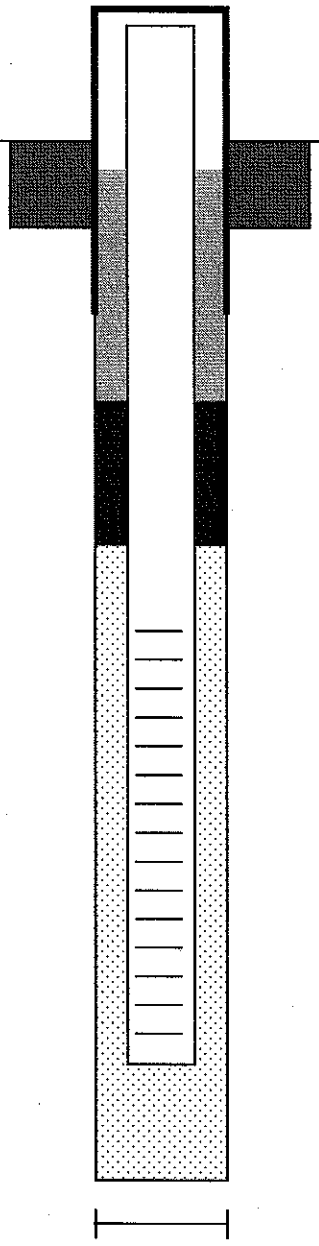
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	618
Project Name:		Driller:		Date Installed:	6/12
Project Location:		Ground EL:		Logged By:	
Project Number:		Riser EL:		Page:	of



LOCKED PROTECTIVE CASING

SURFACE SEAL: _____
(Thickness & Type)

BACKFILL MATERIAL: _____
(Type)

TOP OF SEAL: 36.5

SEAL CONSTRUCTION: 2' Bentonite
(Thickness & Type)

TOP OF SANDPACK: 38.5

RISER CONSTRUCTION: _____
(Type, Diameter & Material)

TOP OF SCREEN: 40.5

SANDPACK TYPE: #2 (1½ bags)

SCREEN MATERIAL: _____
(Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 49.5'

BOTTOM OF BOREHOLE: 50'

BOREHOLE DIAMETER: _____

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks: Well elevation is 4-6' above level of original boring due to bulldozer work for air rig.

WL@ 45' 6/12/08 14:40

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 619	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of	
Project Location: Buncombe County Landfill	Driller: Lee	Total Depth:	Elevation:
Project Number: 6447- -fld.rt	Drilling Method: HSA Type: 8½ OD	N:	E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: 11 | Spoon Size: 2" OD | (✓) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:	Elevations / Depths	Logged By: D. Caldwell
	Depth to Water: Depth / Date / Time	Ground Surface:	Title: Geotechnical Eng.
		Top of Casing:	Date Start: 6/3
	Total Samples: disturbed / undisturbed	Top of Screen:	Date Finish:
		Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1							No sample at top, material was moved into place with bulldozer start sampling @ 3' BGS
2							
3							
4		3		24/24	3.5	T	moist, stiff, brown, SILT some f-c sand trace gravel
5	S-1	6 8 9				B	
6							dry, m dense, brown/grey, f-c SAND some silt, relict fabric visible
7							
8							
9		14		24/24			dry, m dense, brown/grey/orange mottled f-c SAND, little gravel, silt relict fabric visible
0	S-2	9 10 14					

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):			and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff: 8-15	some	20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff: 15-30	little	10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard: >30	trace	<10%
								Moisture, density, color	

Remarks: Deep well installed in this boring. shallow well went in next to it

Updated On: 04/09/01

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Test Boring Log

Client:	Buncombe County	Project Location:	Buncombe County landfill	Boring No.:	619
Project Name:	C&D Landfill Expansion	Project Number:	6447- -rt.fld	Page:	2 of 2
		Logged By:	D. Caldwell	Date:	6/13

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1							
2							
3	S-3	50/1		1/0			NO RECOVERY
4							AR @ 14.5' BGS
5							
6							
7							
8							
9							
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
0							

Remarks:

CDM

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919-781-5730

Core Boring Log

Client:	Buncombe County	Drilling Contractor		Boring No.:	619
Project Name:	C&D LF Expansion	Company:	Caldwell Drilling, Inc	Page:	1 of 1
Project Location:	Buncombe Co. LF	Driller:	Lee	Logged By:	D. Caldwell
Project Number:	6447-	Drilling Method:			

Core Barrel Type: NQ Core Barrel Diameter:

Sample Depth (ft)	Drill Rate min/ft	Core Number / Depth Range	Recovery in.	Recovery %	Weath.	Strata Change	Sample Description
14.5		12"	10.5"	87			RQD=0
15.5	1:10		REC 53"				Hard, Fresh - C.W., gray/pink/blk aphanitic - coarse GRANITIC GNEISS
	2:10	C-1					heavily foliated. horizontal to mod dipping
	3:10						extremely close
	4:20	60"	RQD 33.5"				joint set horizontal, very close - moderate
	6:20						rough, stepped, open
20.5	1:00		REC 57"				
	2:00						SAA, more gray/blk than pink
	3:10	C-2					
	4:15	60"	RQD 51"				
25.5	5:45						

Field Hardness			Weathering		Bedding	Joints	Spacing (in.)
Very Hard	-	Knife can't scratch					
Hard	-	Scractches with difficulty	Fresh	Mod. Severe	Very Thin	Very Close	less than 2.
Med. Hard	-	Scratches readily	Very Slight	Severe	Thin	Close	2-12
Medium	-	Grooves or gouges with diff.	Slight	Very Severe	Medium	Mod. Close	12-36
Soft	-	Grooves or gouges readily	Moderate	Complete	Thick	Wide	36-128
Very Soft	-	Carves with knife			Very Thick	Very Wide	more than 128

Attitude	Angle
Horizontal	0 to 5
Shallow or Low Angle	5 to 35
Moderatly Dipping	35 to55
Steep or High Angle	55 to 85
Vertical	85 to 90

Rock Continuity	
Extremely Fractured	Drill core stem less than 1 inch
Moderately Fractured	Drill core stem 1 to 4 inches
Slightly Fractured	Drill core stem 4 to 8 inches
Sound	Drill core stem more than 8 inches

Remarks:

CDM
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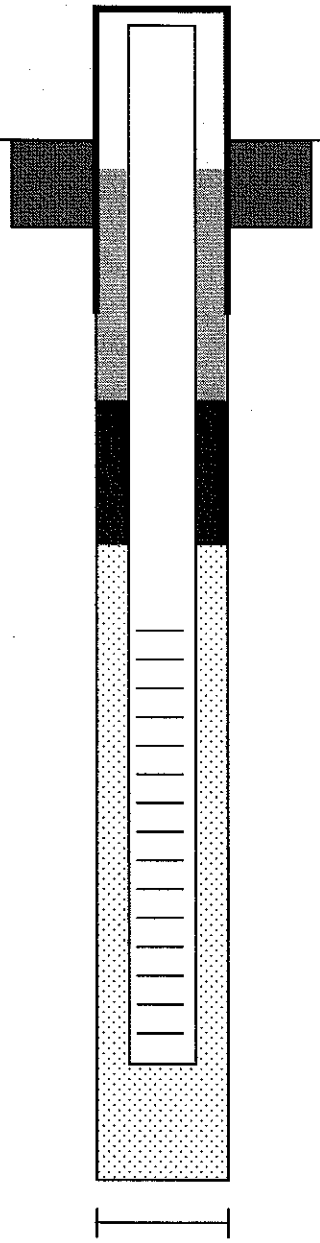
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	619 Shallow
Project Name:		Driller:		Date Installed:	6/10/08
Project Location:		Ground EL:		Logged By:	DC
Project Number:		Riser EL:		Page:	1 of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: (Thickness & Type)

BACKFILL MATERIAL: (Type)

TOP OF SEAL: 2'

SEAL CONSTRUCTION: (Thickness & Type) 2' Bentonite Chips

TOP OF SANDPACK: 4'

RISER CONSTRUCTION: (Type, Diameter & Material)

TOP OF SCREEN: 4.5'

SANDPACK TYPE: #2 Filter (3½ bags)

SCREEN MATERIAL: (Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 13.5'

BOTTOM OF BOREHOLE: 14'

BOREHOLE DIAMETER: 6"

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks: Part of nested pair @ 619
No sampling in this boring

Updated On: 04/09/01

GDM

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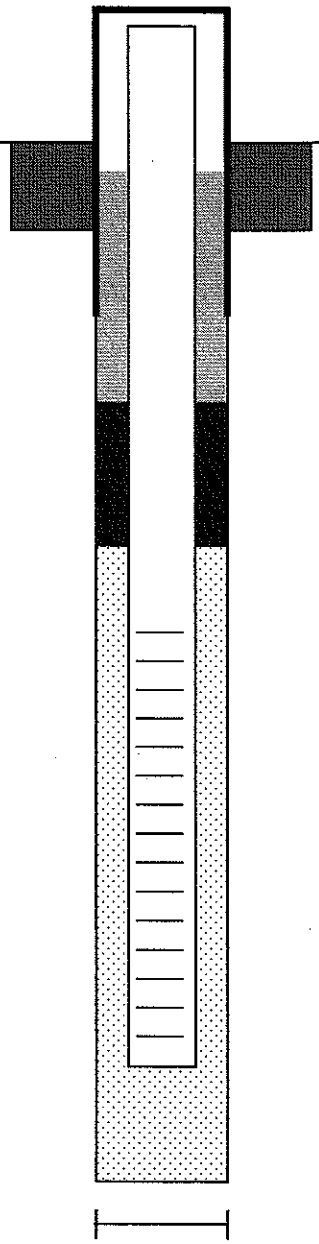
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	619 Deep
Project Name:		Driller:		Date Installed:	6/10/08
Project Location:		Ground EL:		Logged By:	DC
Project Number:		Riser EL:		Page:	1 of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: (Thickness & Type)

BACKFILL MATERIAL: (Type)

TOP OF SEAL: 15'

SEAL CONSTRUCTION: (Thickness & Type) 2' Bentonite

TOP OF SANDPACK: 17'

RISER CONSTRUCTION: (Type, Diameter & Material)

TOP OF SCREEN: 20.5'

SANDPACK TYPE: #2 Filter (3 bags)

SCREEN MATERIAL: (Type, Slot, Diameter & Material) 2" PVC, Sch. 40 10-slot

BOTTOM OF SCREEN: 29.5'

BOTTOM OF BOREHOLE: 30'

BOREHOLE DIAMETER: 6"

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks: Part of nested pair @ 619
Installed in boring that was sampled

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 620
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of
Project Location: Buncombe County Landfill	Driller:	Total Depth: Elevation:
Project Number: 6447- -fld.rt	Drilling Method: Type:	N: E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: | Spoon Size: 2" OD | ( ) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:	Elevations / Depths	Logged By: D. Caldwell
	Depth to Water: Depth / Date / Time	Ground Surface:	Title: Geotechnical Eng.
		Top of Casing:	Date Start: 6/3
	Total Samples: disturbed / undisturbed	Top of Screen:	Date Finish:
		Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	1 2 2 3		24/12			moist, v. loose-loose, brown, f-c SAND some silt
2							AR @ 3.5' on second try
3							
4							
5							
6							
7							
8							
9							
0							

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):			and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff:	8-15	some 20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff:	15-30	little 10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard:	>30	trace <10%
									Moisture, density, color

Remarks: AR @ 3' on first try, offset ~20' south for second try

Updated On: 04/09/01

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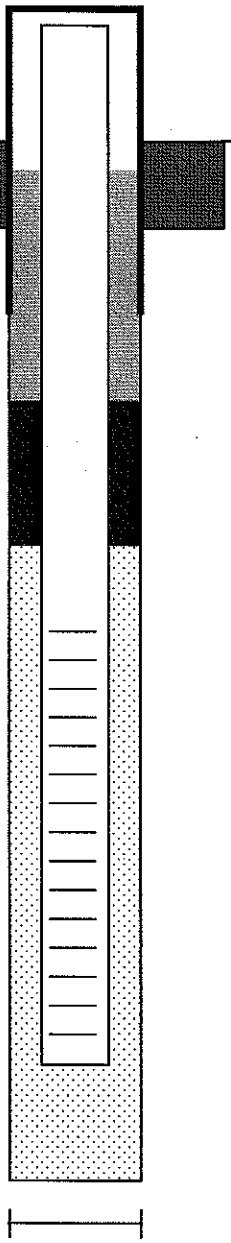
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	620
Project Name:		Driller:		Date Installed:	6/11/08
Project Location:		Ground EL:		Logged By:	DC
Project Number:		Riser EL:		Page:	1 of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: _____
(Thickness & Type)

BACKFILL MATERIAL: _____
(Type)

TOP OF SEAL: 39

SEAL CONSTRUCTION: 2' Bentonite
(Thickness & Type)

TOP OF SANDPACK: 41'

RISER CONSTRUCTION: _____
(Type, Diameter & Material)

TOP OF SCREEN: 42'

SANDPACK TYPE: #2 (4 bags)

SCREEN MATERIAL: 2" PVC, 10 slot
(Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 51'

BOTTOM OF BOREHOLE: 51.5'

BOREHOLE DIAMETER: 6"

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 621	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of 1	
Project Location: Buncombe County Landfill	Driller:	Total Depth:	Elevation:
Project Number: 6447- -fld.rt	Drilling Method: Type:	N:	E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: | Spoon Size: 2" OD | ( ) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:			Elevations / Depths	Logged By: D. Caldwell
	Depth to Water	Depth	Date	Time	Ground Surface:	Title: Geotechnical Eng.
					Top of Casing:	Date Start: 6/3
	Total Samples	disturbed	undisturbed		Top of Screen:	Date Finish:
					Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	4 5 6 6		24/16			dry, m dense, brown/orange/blk mottled f-c SAND, some silt relict fabric visible
2							
3							
4		9 16		16/16			dry, v dense, brown/orange/blk mottled f-m SAND, some silt
5	S-2	50/4					
6							
7							
8							
9							
0	S-3	50/6		6/6			dry, v dense, gray/tan/blk, mottled f-m SAND, little silt AR @ 10.5'

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):				and 35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff:	8-15	some 20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff:	15-30	little 10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard:	>30	trace <10%
									Moisture, density, color

Remarks:

Updated On: 04/09/01

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5400 Glenwood Avenue
Suite 300
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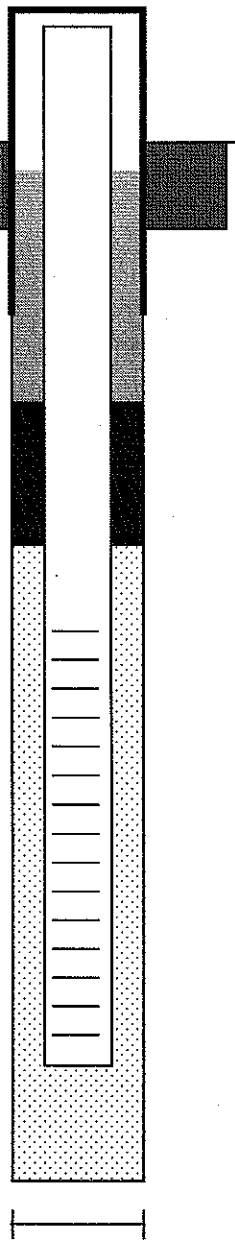
(919) 787-5620

Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	621
Project Name:		Driller:		Date Installed:	6/11
Project Location:		Ground EL:		Logged By:	DC
Project Number:		Riser EL:		Page:	1 of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: _____
(Thickness & Type)

BACKFILL MATERIAL: _____
(Type)

TOP OF SEAL: 32

SEAL CONSTRUCTION: 2' Bentonite
(Thickness & Type)

TOP OF SANDPACK: 34

RISER CONSTRUCTION: _____
(Type, Diameter & Material)

TOP OF SCREEN: 35.5'

SANDPACK TYPE: #2 Filter (3½ bags)

SCREEN MATERIAL: _____
(Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 44.5'

BOTTOM OF BOREHOLE: 45'

BOREHOLE DIAMETER: 6"

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 622
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of
Project Location: Buncombe County Landfill	Driller:	Total Depth: Elevation:
Project Number: 6447- -fld.rt	Drilling Method: Type:	N: E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: | Spoon Size: 2" OD | ( ) Auto ( ) Manual Hammer

Location Sketch

Monitoring Equipment Used:

Depth to Water	Depth	Date	Time

Total Samples	disturbed	undisturbed

Elevations / Depths: Ground Surface: | Top of Casing: | Top of Screen: | Bottom of Screen:

Logged By: D. Caldwell
Title: Geotechnical Eng.
Date Start: 6/4
Date Finish:

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	2 3 3 3		24/17			dry loose brown f-c SAND, some silt, trace gravel, few roots ST from 1-3'
2							
3							
4		4					moist, m dense, brown/yellow mottled
5	S-2	10 8 7		24/20			f-c SAND, some silt, little gravel
6							
7							
8							
9							
0	S-3	50/5		5/5			dry, v. dense, gray/black/orange mottled f-c SAND, little silt, trace gravel AR@12'

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):			and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff: 8-15	some	20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff: 15-30	little	10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard: >30	trace	<10%
								Moisture, density, color	

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 623	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of	
Project Location: Buncombe County Landfill	Driller:	Total Depth:	Elevation:
Project Number: 6447- -fld.rt	Drilling Method: Type:	N:	E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: | Spoon Size: 2" OD | ( ) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:			Elevations / Depths	Logged By: D. Caldwell
	Depth to Water	Depth	Date / Time	Ground Surface:	Title: Geotechnical Eng.
				Top of Casing:	Date Start: 6/5
	Total Samples	disturbed	undisturbed	Top of Screen:	Date Finish:
				Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	1 3 5 4		24/16			moist, loose, brown, fm SAND some silt
2							
3							
4							
5	S-2	4 4 5 6		24/24	1.25 tsf		moist, loose, reddish brown, f SAND some silt, micaceous relict fabric visible
6							
7							
8							
9							
0	S-3	6 7 7 12		24/24			SAA moist, m. dense, yellow/blk/gray mottled f sand, some silt

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):			and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff: 8-15	some	20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff: 15-30	little	10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard: >30	trace	<10%
								Moisture, density, color	

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client:	Buncombe County	Project Location:	Buncombe County landfill	Boring No.:	623
Project Name:	C&D Landfill Expansion	Project Number:	6447- -rt.fld	Page:	2 of
		Logged By:	D. Caldwell	Date:	6/5

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
15	S-4	8 19 21 34		24/20			moist dense, gray/reddish brown/blk mottled f-m SAND some silt
20	S-5	16 26 35 50/5		23/22			dry, v. dense, white/gray/yellow mottled f-m SAND, some silt
25	S-6	50/4		5/5			SAA
30	S-7	50/4		4/2			dry, very dense, black/white f-c SAND some gravel, tr. silt AR @ 29.5

Remarks:

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Core Boring Log

Client:	Buncombe County	Drilling Contractor		Boring No.:	623
Project Name:	C&D LF Expansion	Company:	Caldwell Drilling, Inc	Page:	1 of 1
Project Location:	Buncombe Co. LF	Driller:		Logged By:	D. Caldwell
Project Number:	6447-	Drilling Method:			6/5/08

Core Barrel Type: _____ Core Barrel Diameter: _____

Sample Depth (ft)	Drill Rate min/ft	Core Number / Depth Range	Recovery in.	Recovery %	Weath.	Strata Change	Sample Description
31.5	0:35	C-1	24"	40			mod hard, slightly-completely weathered white/blackish/gray, f-m grained, quartz/biotite GNEISS foliated, horizontal to mod. dipping, very close-close joint set horizontal, very close to close rough, undulating, discolored to disintegrated, open
	1:20						
	2:15	60"	RQD 6"	10			
	3:05						
	4:20						
36.5	1:00	C-2	41"	68			SAA
	2:15						
	3:30	60"	RQD 22"	37			
	4:30						
	5:35						
41.5							

Field Hardness			Weathering		Bedding	Joints	Spacing (in.)
Very Hard	-	Knife can't scratch					
Hard	-	Scractches with difficulty	Fresh	Mod. Severe	Very Thin	Very Close	less than 2.
Med. Hard	-	Scratches readily	Very Slight	Severe	Thin	Close	2-12
Medium	-	Grooves or gouges with diff.	Slight	Very Severe	Medium	Mod. Close	12-36
Soft	-	Grooves or gouges readily	Moderate	Complete	Thick	Wide	36-128
Very Soft	-	Carves with knife			Very Thick	Very Wide	more than 128

Attitude	Angle	Rock Continuity	
Horizontal	0 to 5		
Shallow or Low Angle	5 to 35	Extremely Fractured	Drill core stem less than 1 inch
Moderatly Dipping	35 to55	Moderately Fractured	Drill core stem 1 to 4 inches
Steep or High Angle	55 to 85	Slightly Fractured	Drill core stem 4 to 8 inches
Vertical	85 to 90	Sound	Drill core stem more than 8 inches

Remarks:

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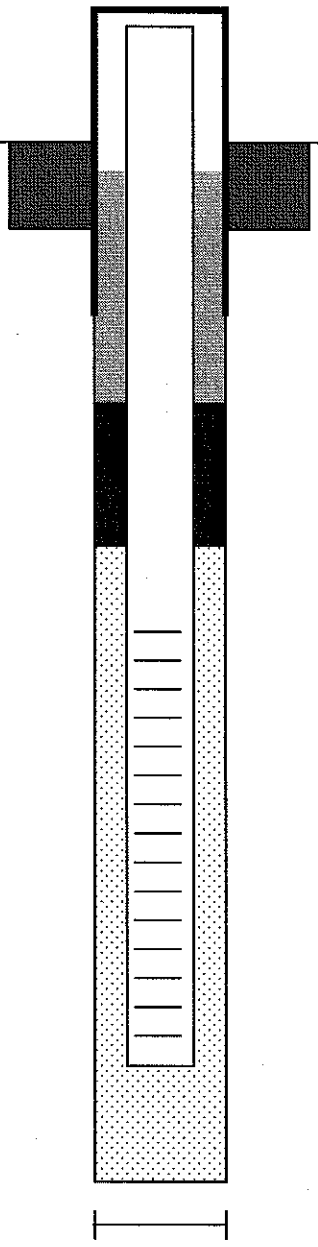
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	623
Project Name:		Driller:		Date Installed:	6/13/08
Project Location:		Ground EL:		Logged By:	DC
Project Number:		Riser EL:		Page:	of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: _____
(Thickness & Type)

BACKFILL MATERIAL: _____
(Type)

TOP OF SEAL: 86'

SEAL CONSTRUCTION: 2' Bentonite
(Thickness & Type)

TOP OF SANDPACK: 88'

RISER CONSTRUCTION: _____
(Type, Diameter & Material)

TOP OF SCREEN: 89.5'

SANDPACK TYPE: #2 (4 bags)

SCREEN MATERIAL: _____
(Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 98.5'

BOTTOM OF BOREHOLE: 99'

BOREHOLE DIAMETER: _____

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 624	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of	
Project Location: Buncombe County Landfill	Driller:	Total Depth: Elevation:	
Project Number: 6447- -fld.rt	Drilling Method: Type:	N: E:	

Hammer Weight: 140 lbs Hammer Drop Height: 30" Bit size/ Hole size: Spoon Size: 2" OD ( ) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:			Elevations / Depths	Logged By: D. Caldwell
	Depth to Water	Depth	Date / Time	Ground Surface:	Title: Geotechnical Eng.
				Top of Casing:	Date Start: 6/5
	Total Samples	disturbed	undisturbed	Top of Screen:	Date Finish:
				Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	1 1 5 3		24/18			moist, loose, reddish brown, f-c SAND, some silt, trace gravel
2							difficult drilling
3							
4		16 50/4		16/12			dry, v dense, orange/brown mottled f-c SAND, some gravel, little silt, relict fabric visible
5	S-2						
6							difficult drilling
7							
8							difficult drilling
9		50/1		1/1			rock fragments
0	S-3						AR @ 9.5

Sample Types	Consistency vs. Blowcount / Foot						Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):			
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff:	8-15	and	35-50%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff:	15-30	some	20-35%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard:	>30	little	10-20%
									trace	<10%
									Moisture, density, color	

Remarks: First try AR @ 3.5', moving forward 5'
Second try AR @ 3', moving back 10'
Third try AR @ 5', took samples S-1, 2, moving back 40'

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 625	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of	
Project Location: Buncombe County Landfill	Driller:	Total Depth:	Elevation:
Project Number: 6447- -fld.rt	Drilling Method: HSA Type:	N:	E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: | Spoon Size: 2" OD | ( ) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:			Elevations / Depths	Logged By: D. Caldwell
	Depth to Water	Depth	Date	Time	Ground Surface:	Title: Geotechnical Eng.
					Top of Casing:	Date Start: 6/9/08
	Total Samples	disturbed	undisturbed		Top of Screen:	Date Finish:
					Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1							Material at surface deposited by dozer start sampling at 4'
2							Very powdery, dry
3			A				dry, v dense, brown, f-c SAND little gravel, silt
4	S-1	10 50/4	38 32 35 50/2	16/14	20/20	T B	
5							dry, v dense, brownish gray f-c SAND little gravel, silt
6			B				AR@ 7.5' on second try
7							
8							
9							
0							

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):				and 35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff:	8-15	some 20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff:	15-30	little 10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard:	>30	trace <10%
									Moisture, density, color

Remarks: AR@ 5.5' first try, moving rpt 20'

Updated On: 04/09/01

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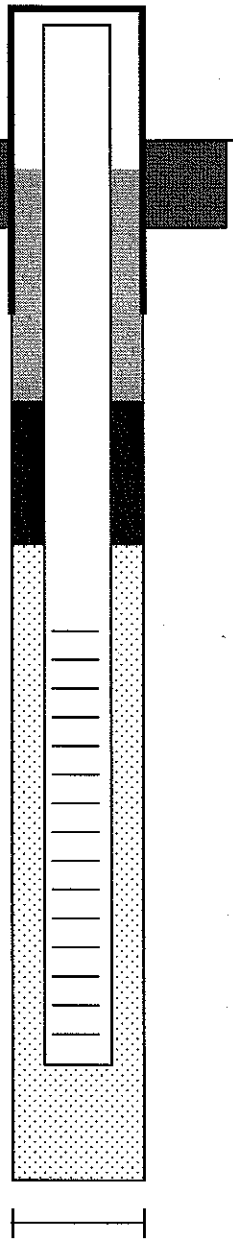
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	625
Project Name:		Driller:		Date Installed:	6/13
Project Location:		Ground EL:		Logged By:	DC
Project Number:		Riser EL:		Page:	1 of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: _____
(Thickness & Type)

BACKFILL MATERIAL: _____
(Type)

TOP OF SEAL: 49.5'

SEAL CONSTRUCTION: 2' Bentonite
(Thickness & Type)

TOP OF SANDPACK: 51.5'

RISER CONSTRUCTION: _____
(Type, Diameter & Material)

TOP OF SCREEN: 52.5'

SANDPACK TYPE: #2 (3½ bags)

SCREEN MATERIAL: _____
(Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 61.5'

BOTTOM OF BOREHOLE: 62'

BOREHOLE DIAMETER: _____

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks:

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 626	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of	
Project Location: Buncombe County Landfill	Driller:	Total Depth:	Elevation:
Project Number: 6447- -fld.rt	Drilling Method: HSA Type:	N:	E:

Hammer Weight: 140 lbs | Hammer Drop Height: 30" | Bit size/ Hole size: | Spoon Size: 2" OD | ( ) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:				Elevations / Depths	Logged By: D. Caldwell
	Depth to Water	Depth	Date	Time	Ground Surface:	Title: Geotechnical Eng.
					Top of Casing:	Date Start: 6/9/08
	Total Samples	disturbed	undisturbed		Top of Screen:	Date Finish:
					Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	2 3 2 3		24/16		T	moist loose brown f-m SAND, some silt, trace gravel
2						B	dry, loose, grayish brown, f-c SAND some silt relict fabric visible
3							
4	S-2	9 9 11 15		24/18			SAA, but medium dense
5							
6							
7							AR@ 7.5'
8							
9							
0							

Sample Types	Consistency vs. Blowcount / Foot							Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):			and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff: 8-15	some	20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff: 15-30	little	10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard: >30	trace	<10%
								Moisture, density, color	

Remarks:

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 627	
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of	
Project Location: Buncombe County Landfill	Driller:	Total Depth: Elevation:	
Project Number: 6447- -fld.rt	Drilling Method: Type:	N: E:	

Hammer Weight: 140 lbs Hammer Drop Height: 30" Bit size/ Hole size: Spoon Size: 2" OD ( ) Auto ( ) Manual Hammer

Location Sketch	Monitoring Equipment Used:				Elevations / Depths	Logged By: D. Caldwell
	Depth to Water	Depth	Date	Time	Ground Surface:	Title: Geotechnical Eng.
					Top of Casing:	Date Start: 6/6
	Total Samples	disturbed	undisturbed		Top of Screen:	Date Finish:
					Bottom of Screen:	

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	4 6 4 4		24/6			moist, loose-m dense, brown, f-c SAND some silt, little gravel
2							
3							
4							
5	S-2	5 8 6 5		24/18			SAA, but m. dense
6							
7							
8							
9	S-3	12 50/4		10/10			moist, v dense, black/brown mottled f-m SAND, some silt rock fragments in shoe
0							AR @ 11'

Sample Types	Consistency vs. Blowcount / Foot								Burmeister Classification	
S -- Split Spoon	Granular (Sand):				Fine Grained (Clay):				and	35-50%
U -- Undisturbed Tube	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff:	8-15	some	20-35%
C -- Rock Core	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff:	15-30	little	10-20%
A -- Auger Cuttings	M. Dense:	10-30			M. Stiff:	4-8	Hard:	>30	trace	<10%
									Moisture, density, color	

Remarks: First try, AR @ 1', moving down ravine towards B-227
Second try, AR @ 3' moving up ravine again
Lots of cobble, small boulders in silty/sandy matrix

Updated On: 04/09/01

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60
.68
300
360

Core Boring Log

Client:	Buncombe County	Drilling Contractor		Boring No.:	627
Project Name:	C&D LF Expansion	Company:	Caldwell Drilling, Inc	Page:	of
Project Location:	Buncombe Co. LF	Driller:		Logged By:	D. Caldwell
Project Number:	6447-	Drilling Method:			

Core Barrel Type: _____ Core Barrel Diameter: _____

Sample Depth (ft)	Drill Rate min/ft	Core Number / Depth Range	Recovery in.	Recovery %	Weath.	Strata Change	Sample Description
11.5	1:45						
	3:40	C-1	60	100			hard, fr-core, light to dolk gray, f-m grained mica hornblende GNEISS, foliated, high angle, tt close; joint set hor-low angle, ex close-close, rough, stepped, fr-disint., open
	6:05	60" RQD	35	60			
	8:45						
	11:40						
16.5							
	1:15						SAA, but joints low-high angle
	2:30	C-2	48	80			
	3:40						
	5:00	60" RQD	43	72			
21.5	6:20						

Field Hardness			Weathering		Bedding	Joints	Spacing (in.)
Very Hard	-	Knife can't scratch					
Hard	-	Scractches with difficulty	Fresh	Mod. Severe	Very Thin	Very Close	less than 2.
Med. Hard	-	Scratches readily	Very Slight	Severe	Thin	Close	2-12
Medium	-	Grooves or gouges with diff.	Slight	Very Severe	Medium	Mod. Close	12-36
Soft	-	Grooves or gouges readily	Moderate	Complete	Thick	Wide	36-128
Very Soft	-	Carves with knife			Very Thick	Very Wide	more than 128

Attitude	Angle	Rock Continuity	
Horizontal	0 to 5		
Shallow or Low Angle	5 to 35	Extremely Fractured	Drill core stem less than 1 inch
Moderatly Dipping	35 to55	Moderately Fractured	Drill core stem 1 to 4 inches
Steep or High Angle	55 to 85	Slightly Fractured	Drill core stem 4 to 8 inches
Vertical	85 to 90	Sound	Drill core stem more than 8 inches

Remarks: Bottom of casing @ 11.5'

Updated On: 04/09/01

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Test Boring Log

Client: Buncombe County	Drilling Contractor	Boring No.: 628
Project Name: C&D Landfill Expansion	Company: Caldwell Drilling, Inc.	Page: 1 of
Project Location: Buncombe County Landfill	Driller:	Total Depth: Elevation:
Project Number: 6447- -fld.rt	Drilling Method: Type:	N: E:

Hammer Weight: 140 lbs Hammer Drop Height: 30" Bit size/ Hole size: Spoon Size: 2" OD ( ) Auto ( ) Manual Hammer

Location Sketch

Monitoring Equipment Used:

Depth to Water	Depth	Date	Time

Total Samples	disturbed	undisturbed

Elevations / Depths: Ground Surface: ; Top of Casing: ; Top of Screen: ; Bottom of Screen:

Logged By: D. Caldwell
Title: Geotechnical Eng.
Date Start: 6/10/08
Date Finish:

Depth	Sample No.	Blows per 6"	Sample Depth	Advance / Recov.	In Situ Test	Strata Change	Sample Description
1	S-1	2, 4, 4, 6		24/10			dry, loose, brown, f-m SAND, some gravel + silt
4		15		17/10			dry, v dense, brown + gray, f-c SAND some gravel + silt relict fabric visible
5	S-2	50/5					
9	S-3	50/3		3/2			dry, v dense, brown/gray/light green mottled f-c SAND, some gravel, little silt AR @ 11.5'
0							

Sample Types	Consistency vs. Blowcount / Foot						Burmeister Classification	
	Granular (Sand):				Fine Grained (Clay):			
S -- Split Spoon	V. loose:	0-4	Dense:	30-50	V.Soft:	< 2	Stiff:	8-15	and	35-50%
U -- Undisturbed Tube	Loose:	4-10	V. Dense:	>50	Soft:	2-4	V. Stiff:	15-30	some	20-35%
C -- Rock Core	M. Dense:	10-30			M. Stiff:	4-8	Hard:	>30	little	10-20%
A -- Auger Cuttings									trace	<10%
									Moisture, density, color	

Remarks: AR @ 6' on first try, moving east 20'

Updated On: 04/09/01

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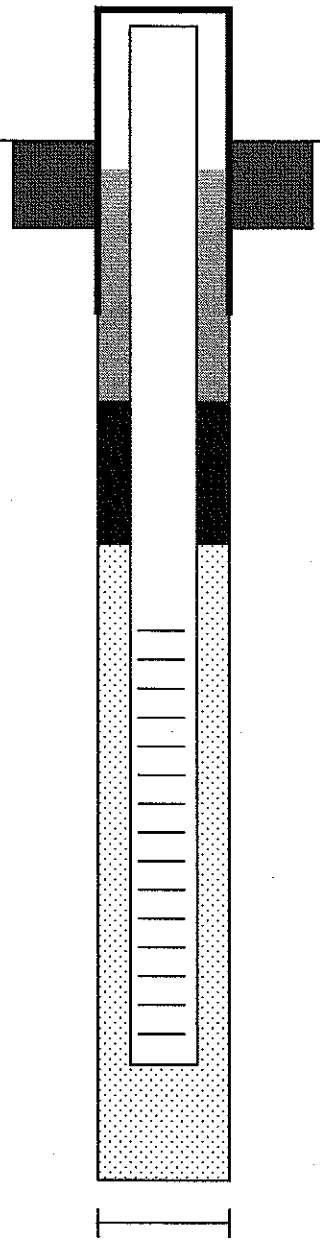
Monitoring Well Installation Log

Client:		Contractor:		Boring/Well No.:	628
Project Name:		Driller:		Date Installed:	6/12
Project Location:		Ground EL:		Logged By:	
Project Number:		Riser EL:		Page:	of



GROUND SURFACE

LOCKED PROTECTIVE CASING

SURFACE SEAL: _____
(Thickness & Type)

BACKFILL MATERIAL: _____
(Type)

TOP OF SEAL: 50'

SEAL CONSTRUCTION: 2' Bentonite
(Thickness & Type)

TOP OF SANDPACK: 52'

RISER CONSTRUCTION: _____
(Type, Diameter & Material)

TOP OF SCREEN: 54.0'

SANDPACK TYPE: #2 (4 bags)

SCREEN MATERIAL: _____
(Type, Slot, Diameter & Material)

BOTTOM OF SCREEN: 63.0'

BOTTOM OF BOREHOLE: 63.5'

BOREHOLE DIAMETER: _____

NOTE: All depths are in feet below ground surface, unless noted otherwise.

Remarks:

Updated On: 04/09/01

Appendix E

Slug Test Raw Data and Calculations

Slug Test Calculations
Buncombe County Construction and Demolition Landfill Expansion
Site Hydrogeologic Investigation
Buncombe County

Well ID	Boring Depth (ft)	Boring Depth (inches)	Aquifer Monitored Interval	Lw	r_w	A	B	C	H	Le	1.1/ln(Lw/rw)	A+B	ln((H-lw)/rw) or C	$\ln(R_e/r_w)$	r_c	t	y_o	y_t	K (in/sec)	K (ft/min)	K (ft/day)	K (cm/sec)
B-615 Slug In	51	612	Bedrock	205	3	2.7	0.5	2.3	2400	120	0.260392151	3.2	2.3	3.1457	1	220	2.82	0.01	3.4E-04	1.68E-03	2.42	8.5E-04
B-615 Slug Out	51	612	Bedrock	205	3	2.7	0.5	2.3	2400	120	0.260392151	3.2	2.3	3.1457	1	410	2.8	0.01	1.8E-04	9.01E-04	1.30	4.6E-04
B-617 Slug In	61	732	Bedrock	192	3	2.7	0.5	2.3	2400	120	0.264494091	3.2	2.3	3.1056	1	1910	2.75	0.01	3.8E-05	1.90E-04	0.27	9.7E-05
B-617 Slug Out	61	732	Bedrock	192	3	2.7	0.5	2.3	2400	120	0.264494091	3.2	2.3	3.1056	1	720	2.21	0.01	9.7E-05	4.85E-04	0.70	2.5E-04
B-619d Slug In	30	360	Bedrock	221	3	2.7	0.5	2.3	2400	120	0.255840703	3.2	2.3	3.1914	1	1185	3.05	0.1	3.8E-05	1.92E-04	0.28	9.7E-05
B-619d Slug Out	30	360	Bedrock	221	3	2.7	0.5	2.3	2400	120	0.255840703	3.2	2.3	3.1914	1	2225	1.87	0.01	3.1E-05	1.56E-04	0.23	7.9E-05
B-625 Slug In	62	744	Bedrock	178	3	2.7	0.5	2.3	2400	120	0.269398448	3.2	2.3	2.2056	1	115	1.8	0.01	4.1E-04	2.07E-03	2.99	1.1E-03
B-625 Slug Out	62	744	Bedrock	178	3	2.7	0.5	2.3	2400	120	0.269398448	3.2	2.3	2.2056	1	130	0.5	0.01	2.8E-04	1.38E-03	1.99	7.0E-04
B-625re Slug In	62	744	Bedrock	178	3	2.7	0.5	2.3	2400	120	0.269398448	3.2	2.3	3.0591	1	315	1.2	0.01	1.9E-04	9.69E-04	1.39	4.9E-04
B-625re Slug Out	62	744	Bedrock	178	3	2.7	0.5	2.3	2400	120	0.269398448	3.2	2.3	3.0591	1	210	0.81	0.01	2.7E-04	1.33E-03	1.92	6.8E-04
B-627s Slug In	18	216	Saprolite/Bedrock	157	3	2.7	0.5	2.3	2400	120	0.277943876	3.2	2.3	2.1648	1	118	2.7	0.01	4.3E-04	2.14E-03	3.08	1.1E-03
B-627s Slug Out	18	216	Saprolite/Bedrock	157	3	2.7	0.5	2.3	2400	120	0.277943876	3.2	2.3	2.1648	1	105	2	0.01	4.6E-04	2.28E-03	3.28	1.2E-03

Notes:

Equation used for partially penetrating piezometers:

$$\ln R_e/r_w = [1.1/\ln (Lw/r_w) + (A+B \ln[(H-Lw)/r_w]/(L_e/r_w)]^{-1}$$

$$K = (r_c^2 \ln(R_e/r_w)/2Le) (1/t) (\ln y_o/y_t)$$

Equation used for fully penetrating deep piezometers (screened at top of bedrock):

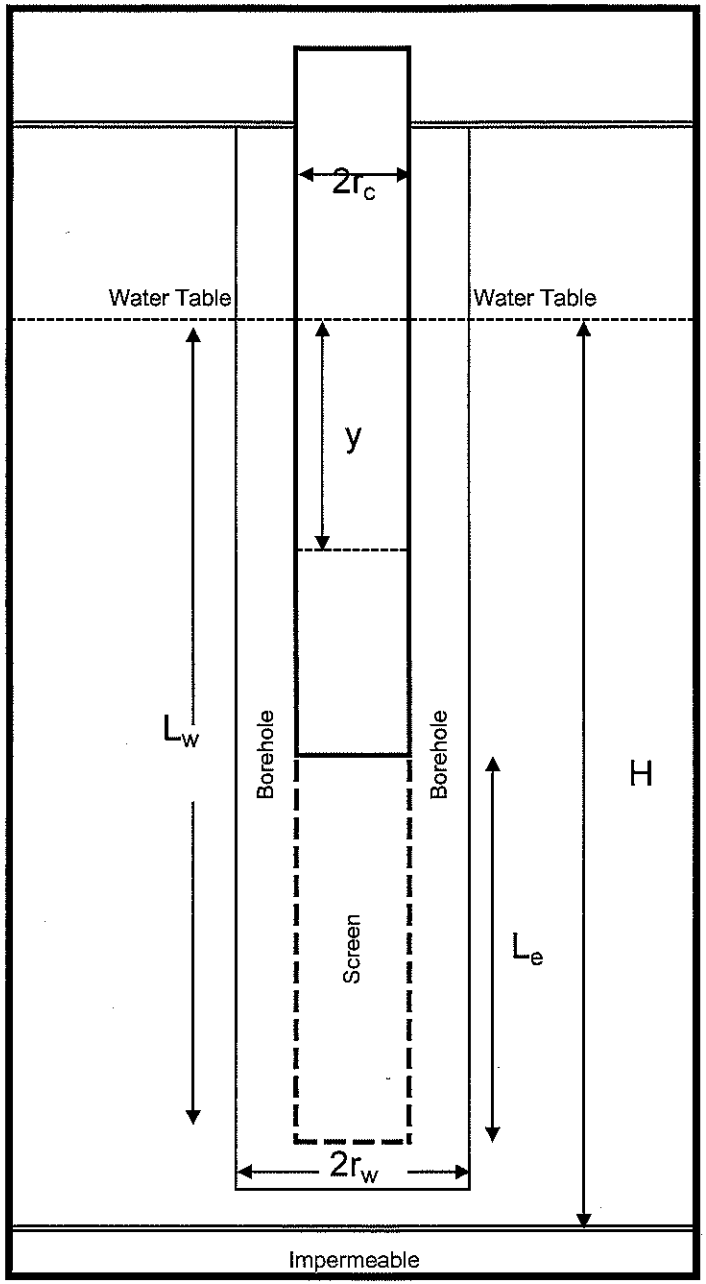
$$\ln Re/rw = [1.1/\ln (Lw/rw) + C/(Le/rw)]-1$$

$$K = (rc2 \ln(Re/rw)/2Le) (1/t) (\ln yo/yt)$$

Where:

r_c = radius of the unscreened part of the well where the head is rising
r_w = horizontal distance from well center to undisturbed aquifer
R_e = radial distance over which the difference in head, ho, is dissipated in the flow system of the aquifer
L_e = length of the saturated gravel pack or open section of the well
y_o = displacement in the well at time to = 0
y_t = dispacement in the well at time t > to
Lw = head in the well before slug test
A = dimensionless parameter which is a function of d/rw
B = dimensionless parameter which is a function of d/rw
C = dimensionless parameter which is a function of d/rw
H = saturated thickness of the aquifer
t = time (seconds)
K = hydraulic conductivity (units given above)

All measurements of length (e.g., radius, distance, head, thickness) are in inches unless specified otherwise.



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	17.1
L_e	Feet	10
H*	Feet	200
y_0	Feet	2.82
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	220

Solutions
Hydraulic Conductivity in Feet/Second
2.79E-05
Hydraulic Conductivity in Feet/Minute
1.68E-03
Hydraulic Conductivity in Feet/Day
2.41E+00

* - Assumed value

Calculations			
Term	Units		3.137
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{partial\ penetration}$ =
A	None	2.780	2.496
B	None	0.430	$\ln(R_e/r_W)_{full\ penetration}$ =
C	None	2.336	3.137

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

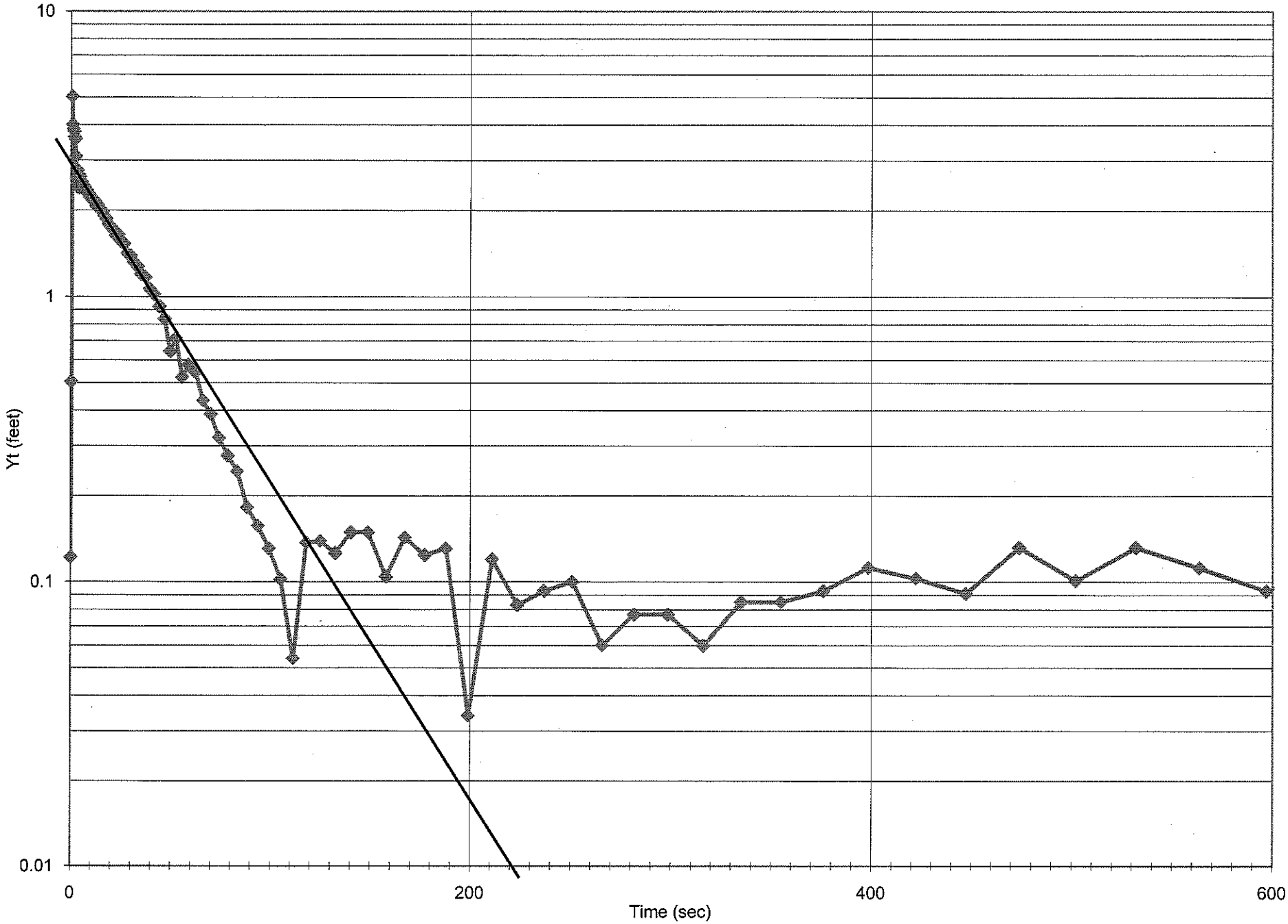
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

615 Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



615 Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gene 6/20/2008 13:15:51
Report from ...\SN07633 2008-06-19 083040 615 Slug In.bin
Win-Situ® V 4.57.0.0

Serial numbe 7633
Firmware Ve 3.09
Unit name: Buncombe

Test name: 615 Slug In

Test defined 6/19/2008 8:29:39
Test started 6/19/2008 8:30:40
Test stoppec 6/19/2008 9:02:03

Data gathered using Logarithmic testing
Maximum Seconds.
Number of 120

TOTAL DAT 120

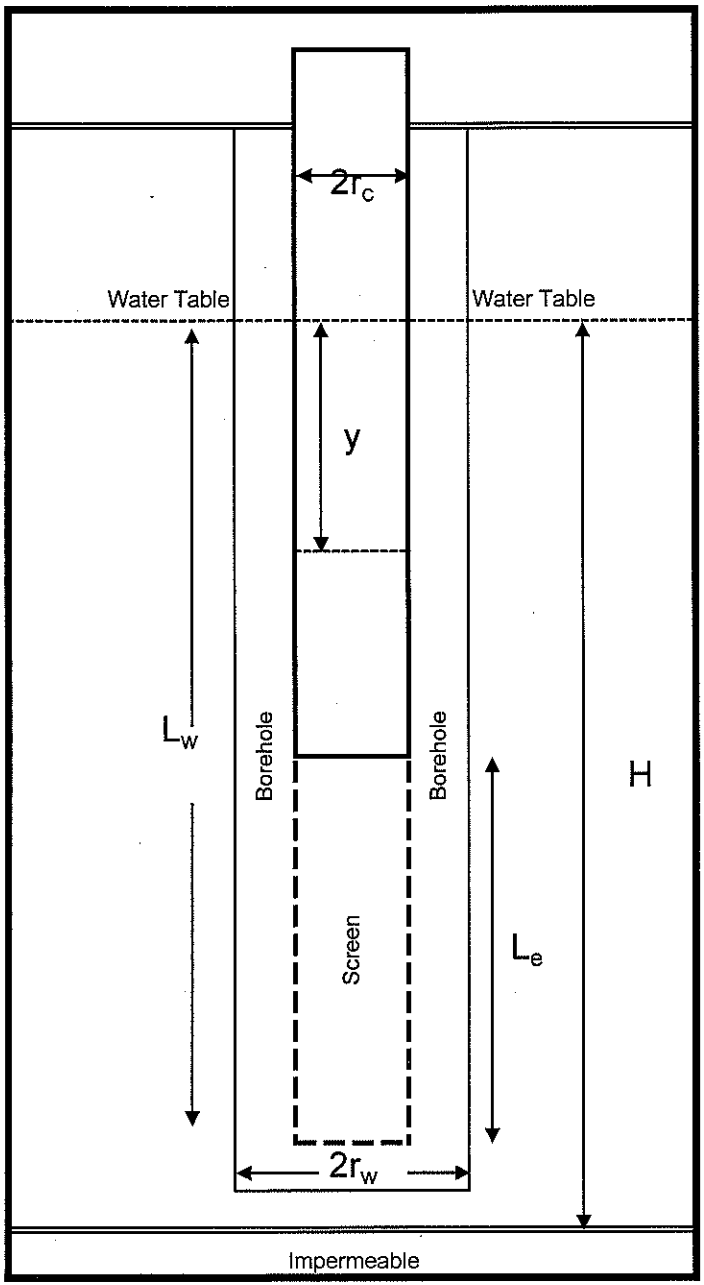
Channel number [1]
Measureme Temperature
Channel name:

Channel number [2]
Measureme Pressure
Channel name:
Sensor Rar 30 PSIG.
Sensor Offs 0.000 psi
Specific gra 1

Date	Time	ET (sec	Chan[1] Temperat Fahrenhei	Chan[2] Pressure Feet H2O	Yt
6/19/2008	8:30:40	0	56.18	15.322	0.122
6/19/2008	8:30:40	0.3	56.23	15.705	0.505
6/19/2008	8:30:40	0.6	56.23	20.228	5.028
6/19/2008	8:30:41	0.9	56.25	19.207	4.007
6/19/2008	8:30:41	1.2	56.25	19.074	3.874
6/19/2008	8:30:41	1.5	56.28	18.999	3.799
6/19/2008	8:30:42	1.8	56.28	18.828	3.628
6/19/2008	8:30:42	2.1	56.28	18.767	3.567
6/19/2008	8:30:42	2.4	56.28	18.292	3.092
6/19/2008	8:30:42	2.7	56.28	17.796	2.596
6/19/2008	8:30:43	3	56.28	17.689	2.489
6/19/2008	8:30:43	3.3	56.28	17.965	2.765
6/19/2008	8:30:43	3.6	56.28	17.607	2.407
6/19/2008	8:30:44	3.9	56.3	17.873	2.673
6/19/2008	8:30:44	4.2	56.3	17.603	2.403
6/19/2008	8:30:44	4.5	56.3	17.823	2.623
6/19/2008	8:30:45	4.8	56.3	17.613	2.413

6/19/2008	8:30:45	5.1	56.3	17.722	2.522
6/19/2008	8:30:45	5.4	56.3	17.611	2.411
6/19/2008	8:30:45	5.7	56.3	17.669	2.469
6/19/2008	8:30:46	6	56.3	17.646	2.446
6/19/2008	8:30:46	6.4	56.3	17.638	2.438
6/19/2008	8:30:47	6.7	56.3	17.618	2.418
6/19/2008	8:30:47	7.1	56.3	17.601	2.401
6/19/2008	8:30:47	7.5	56.3	17.56	2.36
6/19/2008	8:30:48	8	56.3	17.546	2.346
6/19/2008	8:30:48	8.4	56.3	17.496	2.296
6/19/2008	8:30:49	8.9	56.3	17.5	2.3
6/19/2008	8:30:49	9.5	56.3	17.43	2.23
6/19/2008	8:30:50	10	56.28	17.418	2.218
6/19/2008	8:30:50	10.6	56.28	17.37	2.17
6/19/2008	8:30:51	11.3	56.28	17.383	2.183
6/19/2008	8:30:52	11.9	56.28	17.36	2.16
6/19/2008	8:30:52	12.6	56.28	17.265	2.065
6/19/2008	8:30:53	13.4	56.28	17.29	2.09
6/19/2008	8:30:54	14.2	56.25	17.22	2.02
6/19/2008	8:30:55	15	56.25	17.212	2.012
6/19/2008	8:30:56	15.9	56.25	17.193	1.993
6/19/2008	8:30:57	16.8	56.25	17.111	1.911
6/19/2008	8:30:58	17.8	56.25	17.067	1.867
6/19/2008	8:30:59	18.9	56.25	16.985	1.785
6/19/2008	8:31:00	20	56.25	16.952	1.752
6/19/2008	8:31:01	21.2	56.25	16.911	1.711
6/19/2008	8:31:02	22.4	56.25	16.835	1.635
6/19/2008	8:31:04	23.8	56.25	16.845	1.645
6/19/2008	8:31:05	25.2	56.25	16.755	1.555
6/19/2008	8:31:06	26.7	56.25	16.73	1.53
6/19/2008	8:31:08	28.2	56.25	16.613	1.413
6/19/2008	8:31:10	29.8	56.25	16.588	1.388
6/19/2008	8:31:11	31.5	56.25	16.518	1.318
6/19/2008	8:31:13	33.3	56.25	16.475	1.275
6/19/2008	8:31:15	35.2	56.25	16.401	1.201
6/19/2008	8:31:17	37.3	56.25	16.37	1.17
6/19/2008	8:31:19	39.5	56.25	16.263	1.063
6/19/2008	8:31:22	41.8	56.25	16.218	1.018
6/19/2008	8:31:24	44.3	56.25	16.125	0.925
6/19/2008	8:31:27	46.9	56.25	16.037	0.837
6/19/2008	8:31:29	49.7	56.25	15.843	0.643
6/19/2008	8:31:32	52.6	56.25	15.913	0.713
6/19/2008	8:31:35	55.7	56.25	15.724	0.524
6/19/2008	8:31:39	59	56.25	15.777	0.577
6/19/2008	8:31:42	62.5	56.25	15.744	0.544
6/19/2008	8:31:46	66.2	56.25	15.633	0.433
6/19/2008	8:31:50	70.1	56.25	15.588	0.388
6/19/2008	8:31:54	74.3	56.25	15.52	0.32
6/19/2008	8:31:58	78.7	56.23	15.477	0.277
6/19/2008	8:32:03	83.4	56.23	15.444	0.244
6/19/2008	8:32:08	88.4	56.25	15.382	0.182
6/19/2008	8:32:13	93.7	56.23	15.357	0.157
6/19/2008	8:32:19	99.3	56.23	15.331	0.131
6/19/2008	8:32:25	105.2	56.23	15.302	0.102
6/19/2008	8:32:31	111.5	56.23	15.254	0.054

6/19/2008	8:32:38	118.1	56.23	15.337	0.137
6/19/2008	8:32:45	125.1	56.23	15.339	0.139
6/19/2008	8:32:52	132.6	56.23	15.326	0.126
6/19/2008	8:33:00	140.5	56.23	15.349	0.149
6/19/2008	8:33:09	148.9	56.23	15.349	0.149
6/19/2008	8:33:18	157.8	56.23	15.304	0.104
6/19/2008	8:33:27	167.2	56.23	15.343	0.143
6/19/2008	8:33:37	177.2	56.23	15.324	0.124
6/19/2008	8:33:48	187.8	56.23	15.331	0.131
6/19/2008	8:33:59	199	56.23	15.234	0.034
6/19/2008	8:34:11	210.9	56.23	15.32	0.12
6/19/2008	8:34:23	223.5	56.23	15.283	0.083
6/19/2008	8:34:37	236.8	56.23	15.293	0.093
6/19/2008	8:34:51	250.9	56.23	15.3	0.1
6/19/2008	8:35:06	265.8	56.21	15.26	0.06
6/19/2008	8:35:21	281.6	56.21	15.277	0.077
6/19/2008	8:35:38	298.4	56.21	15.277	0.077
6/19/2008	8:35:56	316.2	56.21	15.26	0.06
6/19/2008	8:36:15	335	56.21	15.285	0.085
6/19/2008	8:36:35	354.9	56.21	15.285	0.085
6/19/2008	8:36:56	376	56.21	15.293	0.093
6/19/2008	8:37:18	398.4	56.21	15.312	0.112
6/19/2008	8:37:42	422.1	56.21	15.303	0.103
6/19/2008	8:38:07	447.2	56.21	15.291	0.091
6/19/2008	8:38:34	473.8	56.21	15.332	0.132
6/19/2008	8:39:02	502	56.21	15.301	0.101
6/19/2008	8:39:32	531.9	56.21	15.332	0.132
6/19/2008	8:40:03	563.5	56.21	15.312	0.112
6/19/2008	8:40:37	597	56.21	15.293	0.093
6/19/2008	8:41:12	632.5	56.21	15.318	0.118
6/19/2008	8:41:50	670.1	56.21	15.262	0.062
6/19/2008	8:42:30	709.9	56.18	15.299	0.099
6/19/2008	8:43:12	752.1	56.18	15.289	0.089
6/19/2008	8:43:57	796.8	56.18	15.293	0.093
6/19/2008	8:44:44	844.2	56.18	15.287	0.087
6/19/2008	8:45:34	894.4	56.18	15.231	0.031
6/19/2008	8:46:27	947.5	56.18	15.229	0.029
6/19/2008	8:47:24	1003.8	56.18	15.235	0.035
6/19/2008	8:48:23	1063.4	56.18	15.301	0.101
6/19/2008	8:49:26	1126.6	56.18	15.334	0.134
6/19/2008	8:50:33	1193.5	56.18	15.207	0.007
6/19/2008	8:51:44	1264.4	56.18	15.225	0.025
6/19/2008	8:52:59	1339.5	56.18	15.34	0.14
6/19/2008	8:54:19	1419	56.18	15.305	0.105
6/19/2008	8:55:43	1503.3	56.18	15.207	0.007
6/19/2008	8:57:12	1592.6	56.16	15.268	0.068
6/19/2008	8:58:47	1687.1	56.16	15.35	0.15
6/19/2008	9:00:27	1787.2	56.16	15.253	0.053



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	17.1
L_e	Feet	10
H*	Feet	200
y_0	Feet	2.8
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	410

Solutions
Hydraulic Conductivity in Feet/Second
1.50E-05
Hydraulic Conductivity in Feet/Minute
8.98E-04
Hydraulic Conductivity in Feet/Day
1.29E+00

* - Assumed value

Calculations			
Term	Units		3.137
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{partial\ penetration}$ =
A	None	2.780	2.496
B	None	0.430	$\ln(R_e/r_W)_{full\ penetration}$ =
C	None	2.336	3.137

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

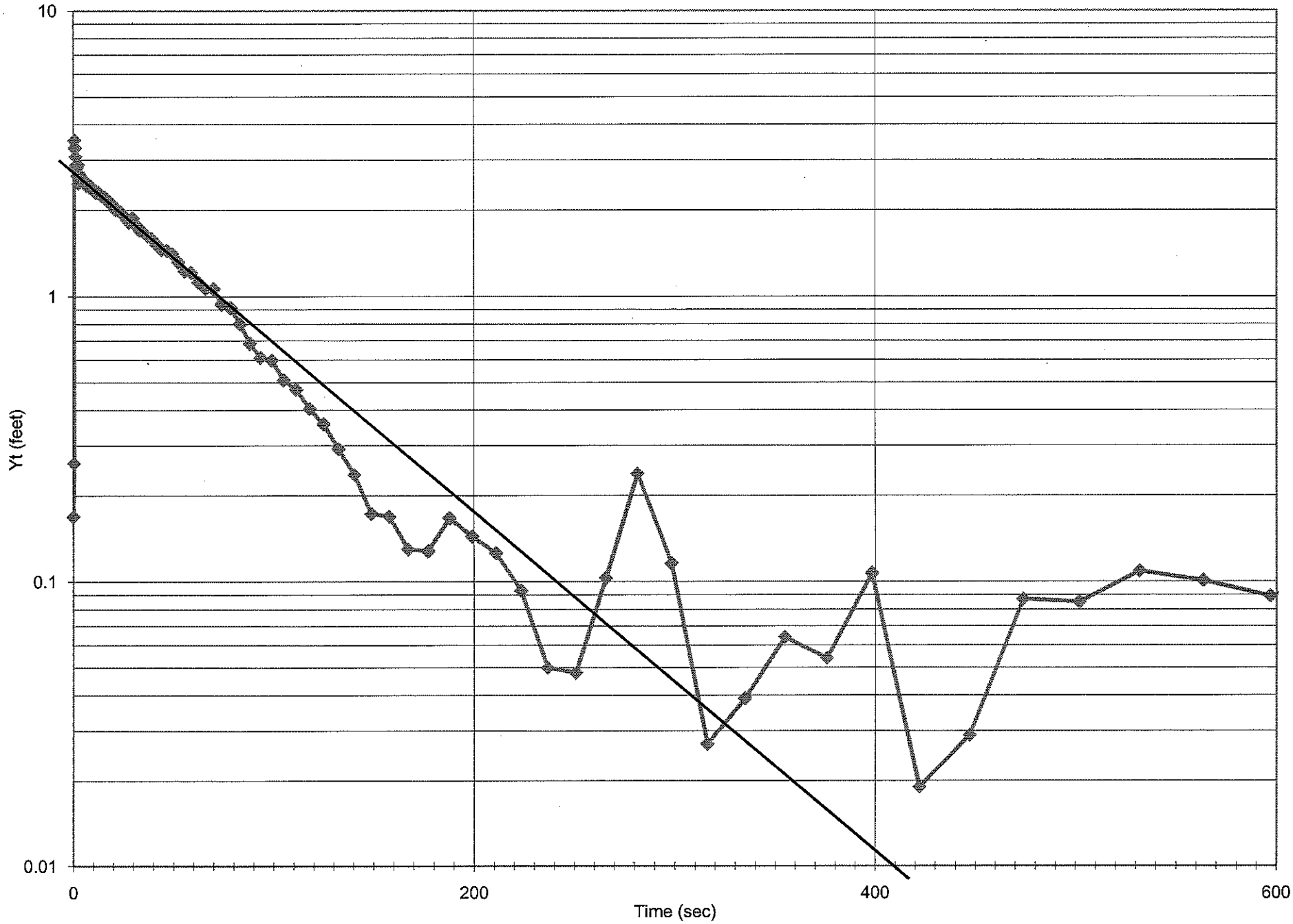
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

615 Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



615 Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:16:48
Report fron ...\SN07633 2008-06-19 090332 615 Slug Out.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 615 Slug Out

Test define 6/19/2008 9:02:40
Test startec 6/19/2008 9:03:32
Test stoppe 6/19/2008 9:28:02

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 116

TOTAL DA 116

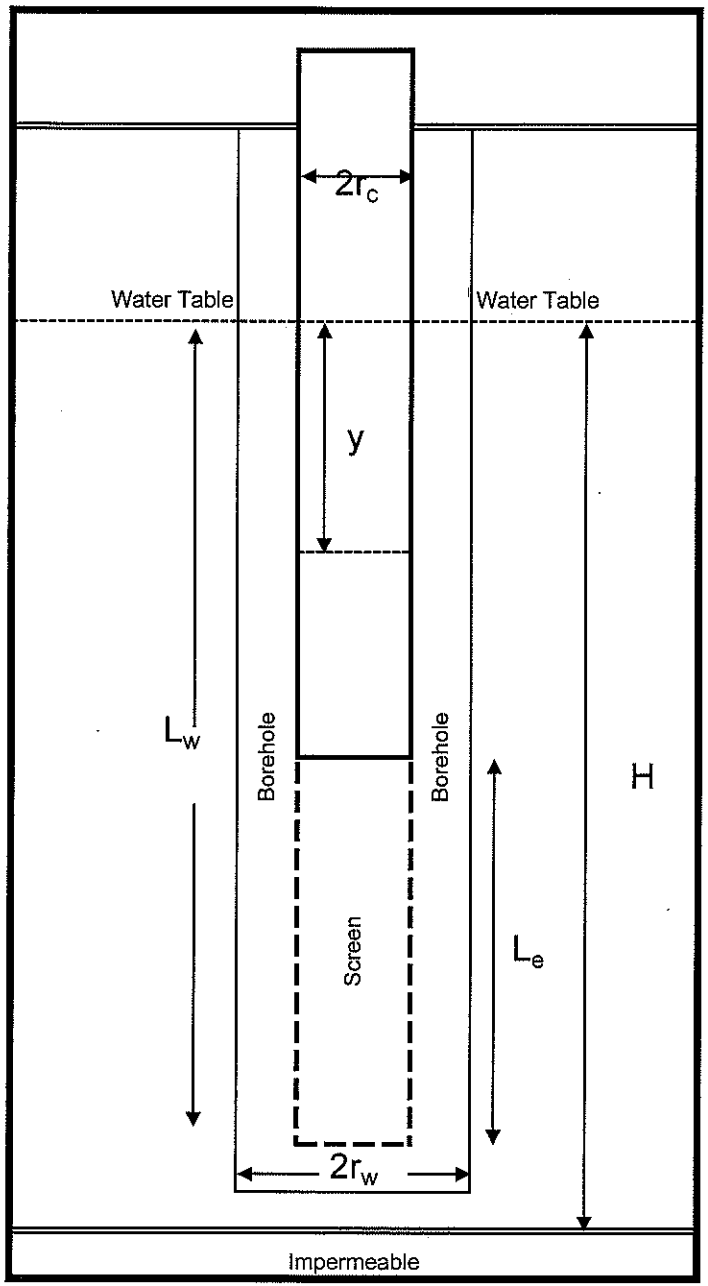
Channel number [1]
Measuren Temperature
Channel name:

Channel number [2]
Measuren Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	
6/19/2008	9:03:32	0	56.16	15.181	0.169
6/19/2008	9:03:32	0.3	56.21	15.09	0.26
6/19/2008	9:03:32	0.6	56.21	11.828	3.522
6/19/2008	9:03:33	0.9	56.23	12.036	3.314
6/19/2008	9:03:33	1.2	56.23	12.261	3.089
6/19/2008	9:03:33	1.5	56.23	12.466	2.884
6/19/2008	9:03:33	1.8	56.25	12.533	2.817
6/19/2008	9:03:34	2.1	56.25	12.693	2.657
6/19/2008	9:03:34	2.4	56.25	12.465	2.885
6/19/2008	9:03:34	2.7	56.25	12.862	2.488
6/19/2008	9:03:35	3	56.25	12.732	2.618
6/19/2008	9:03:35	3.3	56.25	12.677	2.673
6/19/2008	9:03:35	3.6	56.28	12.821	2.529
6/19/2008	9:03:36	3.9	56.28	12.747	2.603
6/19/2008	9:03:36	4.2	56.28	12.813	2.537
6/19/2008	9:03:36	4.5	56.28	12.807	2.543
6/19/2008	9:03:36	4.8	56.28	12.786	2.564
6/19/2008	9:03:37	5.1	56.28	12.813	2.537
6/19/2008	9:03:37	5.4	56.28	12.841	2.509
6/19/2008	9:03:37	5.7	56.28	12.872	2.478
6/19/2008	9:03:38	6	56.28	12.85	2.5
6/19/2008	9:03:38	6.4	56.28	12.848	2.502
6/19/2008	9:03:38	6.7	56.28	12.909	2.441
6/19/2008	9:03:39	7.1	56.28	12.885	2.465
6/19/2008	9:03:39	7.5	56.28	12.885	2.465

6/19/2008	9:03:40	8	56.28	12.93	2.42
6/19/2008	9:03:40	8.4	56.28	12.934	2.416
6/19/2008	9:03:41	8.9	56.3	12.93	2.42
6/19/2008	9:03:41	9.5	56.3	12.967	2.383
6/19/2008	9:03:42	10	56.28	12.955	2.395
6/19/2008	9:03:42	10.6	56.25	13.002	2.348
6/19/2008	9:03:43	11.3	56.25	13.039	2.311
6/19/2008	9:03:44	11.9	56.25	13.035	2.315
6/19/2008	9:03:44	12.6	56.25	13.035	2.315
6/19/2008	9:03:45	13.4	56.25	13.063	2.287
6/19/2008	9:03:46	14.2	56.25	13.094	2.256
6/19/2008	9:03:47	15	56.23	13.121	2.229
6/19/2008	9:03:48	15.9	56.23	13.131	2.219
6/19/2008	9:03:49	16.8	56.23	13.178	2.172
6/19/2008	9:03:50	17.8	56.23	13.213	2.137
6/19/2008	9:03:51	18.9	56.23	13.228	2.122
6/19/2008	9:03:52	20	56.23	13.257	2.093
6/19/2008	9:03:53	21.2	56.23	13.335	2.015
6/19/2008	9:03:54	22.4	56.23	13.345	2.005
6/19/2008	9:03:55	23.8	56.23	13.376	1.974
6/19/2008	9:03:57	25.2	56.23	13.421	1.929
6/19/2008	9:03:58	26.7	56.23	13.483	1.867
6/19/2008	9:04:00	28.2	56.23	13.538	1.812
6/19/2008	9:04:01	29.8	56.23	13.473	1.877
6/19/2008	9:04:03	31.5	56.23	13.573	1.777
6/19/2008	9:04:05	33.3	56.23	13.645	1.705
6/19/2008	9:04:07	35.2	56.23	13.668	1.682
6/19/2008	9:04:09	37.3	56.23	13.724	1.626
6/19/2008	9:04:11	39.5	56.23	13.759	1.591
6/19/2008	9:04:13	41.8	56.21	13.83	1.52
6/19/2008	9:04:16	44.3	56.21	13.896	1.454
6/19/2008	9:04:19	46.9	56.21	13.904	1.446
6/19/2008	9:04:21	49.7	56.21	13.939	1.411
6/19/2008	9:04:24	52.6	56.21	14.032	1.318
6/19/2008	9:04:27	55.7	56.21	14.127	1.223
6/19/2008	9:04:31	59	56.21	14.137	1.213
6/19/2008	9:04:34	62.5	56.21	14.227	1.123
6/19/2008	9:04:38	66.2	56.18	14.285	1.065
6/19/2008	9:04:42	70.1	56.18	14.287	1.063
6/19/2008	9:04:46	74.3	56.18	14.41	0.94
6/19/2008	9:04:50	78.7	56.18	14.437	0.913
6/19/2008	9:04:55	83.4	56.18	14.548	0.802
6/19/2008	9:05:00	88.4	56.18	14.665	0.685
6/19/2008	9:05:05	93.7	56.18	14.739	0.611
6/19/2008	9:05:11	99.3	56.16	14.751	0.599
6/19/2008	9:05:17	105.2	56.16	14.84	0.51
6/19/2008	9:05:23	111.5	56.16	14.877	0.473
6/19/2008	9:05:30	118.1	56.16	14.945	0.405
6/19/2008	9:05:37	125.1	56.16	14.992	0.358
6/19/2008	9:05:44	132.6	56.16	15.058	0.292
6/19/2008	9:05:52	140.5	56.14	15.113	0.237
6/19/2008	9:06:01	148.9	56.14	15.177	0.173
6/19/2008	9:06:09	157.8	56.14	15.181	0.169
6/19/2008	9:06:19	167.2	56.14	15.22	0.13
6/19/2008	9:06:29	177.2	56.14	15.222	0.128
6/19/2008	9:06:39	187.8	56.14	15.183	0.167
6/19/2008	9:06:51	199	56.14	15.206	0.144
6/19/2008	9:07:03	210.9	56.14	15.224	0.126
6/19/2008	9:07:15	223.5	56.12	15.257	0.093
6/19/2008	9:07:28	236.8	56.12	15.3	0.05
6/19/2008	9:07:43	250.9	56.12	15.302	0.048
6/19/2008	9:07:57	265.8	56.12	15.247	0.103
6/19/2008	9:08:13	281.6	56.12	15.111	0.239
6/19/2008	9:08:30	298.4	56.12	15.234	0.116

6/19/2008	9:08:48	316.2	56.12	15.323	0.027
6/19/2008	9:09:07	335	56.12	15.311	0.039
6/19/2008	9:09:27	354.9	56.12	15.286	0.064
6/19/2008	9:09:48	376	56.12	15.296	0.054
6/19/2008	9:10:10	398.4	56.12	15.243	0.107
6/19/2008	9:10:34	422.1	56.12	15.331	0.019
6/19/2008	9:10:59	447.2	56.12	15.321	0.029
6/19/2008	9:11:25	473.8	56.12	15.263	0.087
6/19/2008	9:11:54	502	56.12	15.265	0.085
6/19/2008	9:12:24	531.9	56.12	15.241	0.109
6/19/2008	9:12:55	563.5	56.12	15.249	0.101
6/19/2008	9:13:29	597	56.12	15.261	0.089
6/19/2008	9:14:04	632.5	56.12	15.241	0.109
6/19/2008	9:14:42	670.1	56.12	15.237	0.113
6/19/2008	9:15:22	709.9	56.12	15.218	0.132
6/19/2008	9:16:04	752.1	56.12	15.274	0.076
6/19/2008	9:16:48	796.8	56.12	15.21	0.14
6/19/2008	9:17:36	844.2	56.12	15.247	0.103
6/19/2008	9:18:26	894.4	56.12	15.208	0.142
6/19/2008	9:19:19	947.5	56.12	15.23	0.12
6/19/2008	9:20:15	1003.8	56.12	15.232	0.118
6/19/2008	9:21:15	1063.4	56.12	15.241	0.109
6/19/2008	9:22:18	1126.6	56.12	15.212	0.138
6/19/2008	9:23:25	1193.5	56.12	15.273	0.077
6/19/2008	9:24:36	1264.4	56.12	15.29	0.06
6/19/2008	9:25:51	1339.5	56.12	15.236	0.114
6/19/2008	9:27:11	1419	56.12	15.216	0.134



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	16
L_e	Feet	10
H*	Feet	200
y_0	Feet	2.75
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	1910

Solutions
Hydraulic Conductivity in Feet/Second
3.16E-06
Hydraulic Conductivity in Feet/Minute
1.90E-04
Hydraulic Conductivity in Feet/Day
2.73E-01

* - Assumed value

Calculations			
Term	Units		3.097
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{partial\ penetration}$ =
A	None	2.780	2.470
B	None	0.430	$\ln(R_e/r_W)_{full\ penetration}$ =
C	None	2.336	3.097

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

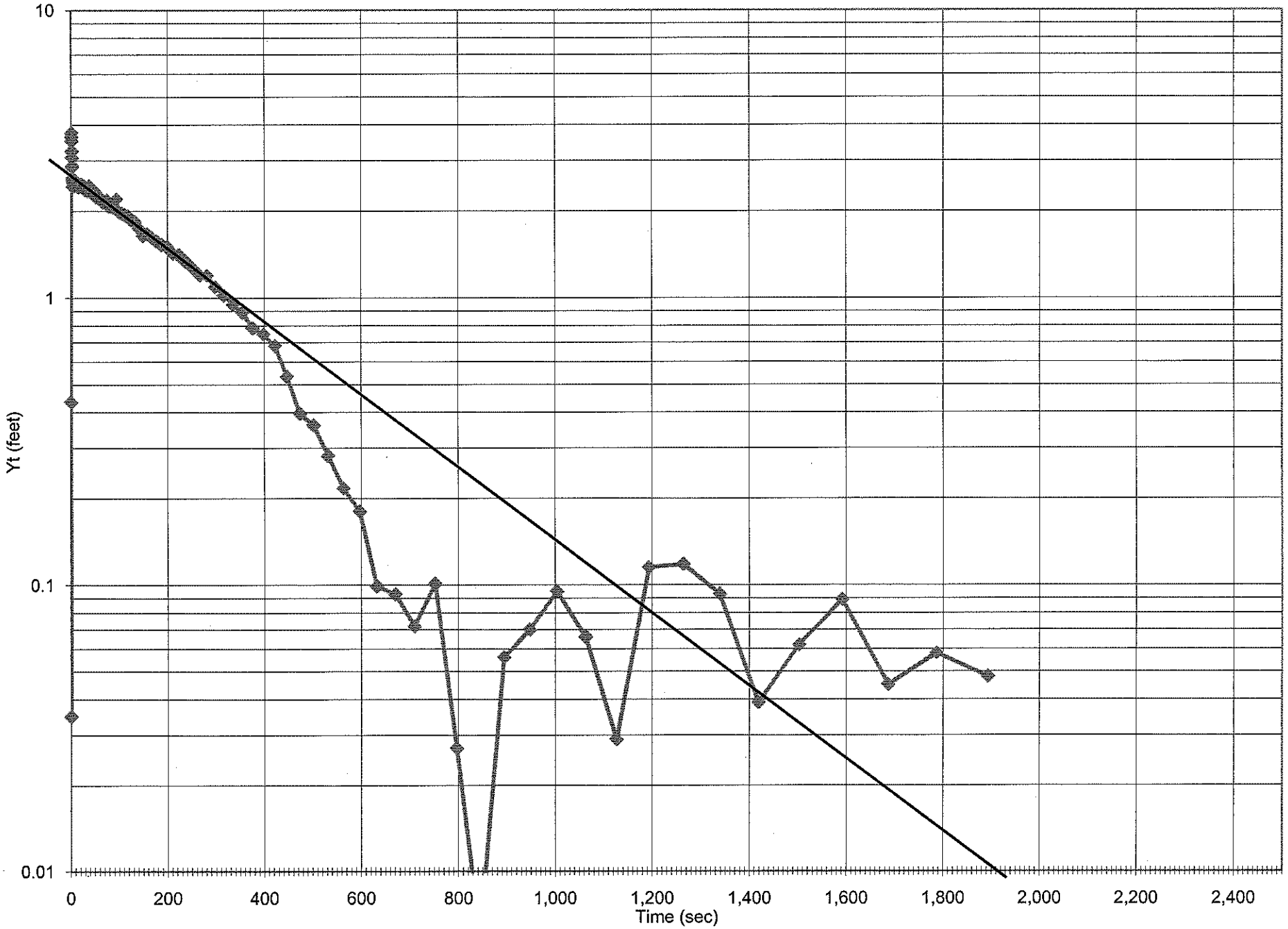
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

617 Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



617 Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:19:40
Report fron ...\SN07633 2008-06-19 110603 617 Slug In.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 617 Slug In

Test define 6/19/2008 11:05:04
Test started 6/19/2008 11:06:03
Test stoppe 6/19/2008 11:37:57

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 121

TOTAL DA' 121

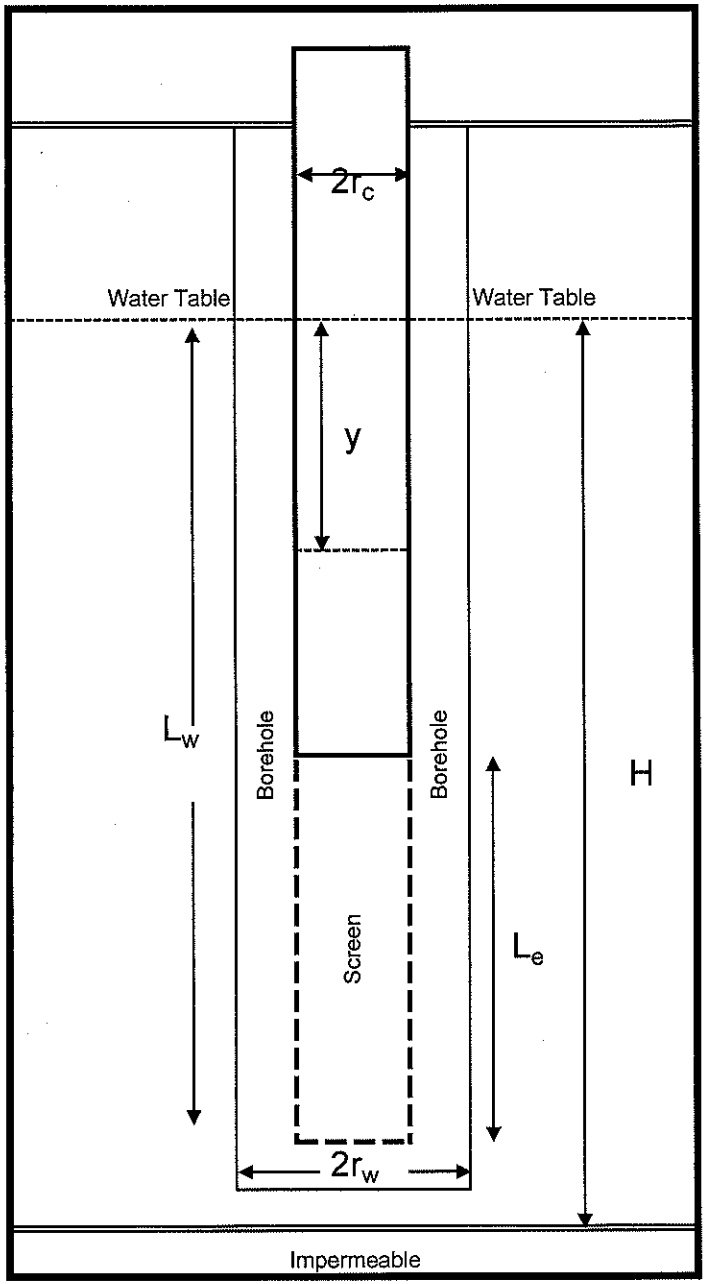
Channel number [1]
Measuren Temperature
Channel name:

Channel number [2]
Measuren Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	yt
6/19/2008	11:06:03	0	54.94	13.995	0.035
6/19/2008	11:06:03	0.3	54.96	14.395	0.435
6/19/2008	11:06:03	0.6	54.98	17.716	3.756
6/19/2008	11:06:04	0.9	54.98	17.588	3.628
6/19/2008	11:06:04	1.2	55.01	17.476	3.516
6/19/2008	11:06:04	1.5	55.01	17.195	3.235
6/19/2008	11:06:05	1.8	55.01	17.034	3.074
6/19/2008	11:06:05	2.1	55.03	16.837	2.877
6/19/2008	11:06:05	2.4	55.03	16.815	2.855
6/19/2008	11:06:06	2.7	55.03	16.805	2.845
6/19/2008	11:06:06	3	55.03	16.577	2.617
6/19/2008	11:06:06	3.3	55.03	16.396	2.436
6/19/2008	11:06:06	3.6	55.03	16.529	2.569
6/19/2008	11:06:07	3.9	55.03	16.529	2.569
6/19/2008	11:06:07	4.2	55.03	16.482	2.522
6/19/2008	11:06:07	4.5	55.03	16.507	2.547
6/19/2008	11:06:08	4.8	55.05	16.503	2.543
6/19/2008	11:06:08	5.1	55.05	16.486	2.526
6/19/2008	11:06:08	5.4	55.05	16.495	2.535
6/19/2008	11:06:09	5.7	55.05	16.482	2.522
6/19/2008	11:06:09	6	55.05	16.476	2.516
6/19/2008	11:06:09	6.4	55.05	16.472	2.512
6/19/2008	11:06:10	6.7	55.05	16.482	2.522

6/19/2008	11:06:10	7.1	55.05	16.478	2.518
6/19/2008	11:06:10	7.5	55.05	16.456	2.496
6/19/2008	11:06:11	8	55.05	16.466	2.506
6/19/2008	11:06:11	8.4	55.05	16.416	2.456
6/19/2008	11:06:12	8.9	55.05	16.468	2.508
6/19/2008	11:06:12	9.5	55.05	16.468	2.508
6/19/2008	11:06:13	10	55.03	16.461	2.501
6/19/2008	11:06:13	10.6	55.03	16.461	2.501
6/19/2008	11:06:14	11.3	55.03	16.451	2.491
6/19/2008	11:06:15	11.9	55.03	16.447	2.487
6/19/2008	11:06:15	12.6	55.03	16.437	2.477
6/19/2008	11:06:16	13.4	55.03	16.416	2.456
6/19/2008	11:06:17	14.2	55.01	16.395	2.435
6/19/2008	11:06:18	15	55.01	16.408	2.448
6/19/2008	11:06:19	15.9	55.01	16.395	2.435
6/19/2008	11:06:20	16.8	55.01	16.404	2.444
6/19/2008	11:06:21	17.8	55.01	16.439	2.479
6/19/2008	11:06:22	18.9	55.01	16.434	2.474
6/19/2008	11:06:23	20	55.01	16.42	2.46
6/19/2008	11:06:24	21.2	55.01	16.443	2.483
6/19/2008	11:06:25	22.4	55.01	16.434	2.474
6/19/2008	11:06:27	23.8	55.01	16.383	2.423
6/19/2008	11:06:28	25.2	55.01	16.383	2.423
6/19/2008	11:06:30	26.7	55.01	16.402	2.442
6/19/2008	11:06:31	28.2	55.01	16.391	2.431
6/19/2008	11:06:33	29.8	55.01	16.34	2.38
6/19/2008	11:06:34	31.5	55.01	16.34	2.38
6/19/2008	11:06:36	33.3	55.01	16.315	2.355
6/19/2008	11:06:38	35.2	55.01	16.325	2.365
6/19/2008	11:06:40	37.3	55.01	16.41	2.45
6/19/2008	11:06:42	39.5	55.01	16.317	2.357
6/19/2008	11:06:45	41.8	55.01	16.309	2.349
6/19/2008	11:06:47	44.3	55.01	16.292	2.332
6/19/2008	11:06:50	46.9	55.01	16.262	2.302
6/19/2008	11:06:53	49.7	54.98	16.296	2.336
6/19/2008	11:06:55	52.6	54.98	16.2	2.24
6/19/2008	11:06:59	55.7	54.98	16.208	2.248
6/19/2008	11:07:02	59	54.98	16.195	2.235
6/19/2008	11:07:05	62.5	54.98	16.167	2.207
6/19/2008	11:07:09	66.2	54.98	16.117	2.157
6/19/2008	11:07:13	70.1	54.98	16.121	2.161
6/19/2008	11:07:17	74.3	54.98	16.144	2.184
6/19/2008	11:07:22	78.7	54.98	16.045	2.085
6/19/2008	11:07:26	83.4	54.98	16.041	2.081
6/19/2008	11:07:31	88.4	54.96	16.024	2.064
6/19/2008	11:07:37	93.7	54.96	16.158	2.198
6/19/2008	11:07:42	99.3	54.96	15.948	1.988
6/19/2008	11:07:48	105.2	54.96	15.928	1.968
6/19/2008	11:07:54	111.5	54.96	15.901	1.941
6/19/2008	11:08:01	118.1	54.96	15.885	1.925
6/19/2008	11:08:08	125.1	54.96	15.823	1.863
6/19/2008	11:08:15	132.6	54.96	15.794	1.834
6/19/2008	11:08:23	140.5	54.96	15.705	1.745
6/19/2008	11:08:32	148.9	54.96	15.599	1.639
6/19/2008	11:08:41	157.8	54.96	15.625	1.665
6/19/2008	11:08:50	167.2	54.96	15.582	1.622
6/19/2008	11:09:00	177.2	54.96	15.533	1.573
6/19/2008	11:09:11	187.8	54.94	15.487	1.527
6/19/2008	11:09:22	199	54.94	15.464	1.504
6/19/2008	11:09:34	210.9	54.94	15.388	1.428
6/19/2008	11:09:46	223.5	54.94	15.368	1.408
6/19/2008	11:10:00	236.8	54.94	15.298	1.338

6/19/2008	11:10:14	250.9	54.94	15.234	1.274
6/19/2008	11:10:29	265.8	54.94	15.16	1.2
6/19/2008	11:10:44	281.6	54.94	15.154	1.194
6/19/2008	11:11:01	298.4	54.94	15.053	1.093
6/19/2008	11:11:19	316.2	54.94	14.981	1.021
6/19/2008	11:11:38	335	54.94	14.909	0.949
6/19/2008	11:11:58	354.9	54.94	14.851	0.891
6/19/2008	11:12:19	376	54.94	14.746	0.786
6/19/2008	11:12:41	398.4	54.94	14.709	0.749
6/19/2008	11:13:05	422.1	54.94	14.642	0.682
6/19/2008	11:13:30	447.2	54.94	14.493	0.533
6/19/2008	11:13:57	473.8	54.94	14.356	0.396
6/19/2008	11:14:25	502	54.94	14.321	0.361
6/19/2008	11:14:55	531.9	54.94	14.242	0.282
6/19/2008	11:15:26	563.5	54.94	14.177	0.217
6/19/2008	11:16:00	597	54.94	14.14	0.18
6/19/2008	11:16:35	632.5	54.94	14.059	0.099
6/19/2008	11:17:13	670.1	54.94	14.053	0.093
6/19/2008	11:17:53	709.9	54.94	14.032	0.072
6/19/2008	11:18:35	752.1	54.94	14.061	0.101
6/19/2008	11:19:20	796.8	54.94	13.987	0.027
6/19/2008	11:20:07	844.2	54.91	13.966	0.006
6/19/2008	11:20:57	894.4	54.94	14.016	0.056
6/19/2008	11:21:50	947.5	54.91	14.03	0.07
6/19/2008	11:22:47	1003.8	54.91	14.055	0.095
6/19/2008	11:23:46	1063.4	54.91	14.026	0.066
6/19/2008	11:24:49	1126.6	54.91	13.989	0.029
6/19/2008	11:25:56	1193.5	54.91	14.075	0.115
6/19/2008	11:27:07	1264.4	54.94	14.078	0.118
6/19/2008	11:28:22	1339.5	54.91	14.053	0.093
6/19/2008	11:29:42	1419	54.91	13.999	0.039
6/19/2008	11:31:06	1503.3	54.91	14.022	0.062
6/19/2008	11:32:35	1592.6	54.91	14.049	0.089
6/19/2008	11:34:10	1687.1	54.91	14.005	0.045
6/19/2008	11:35:50	1787.2	54.91	14.018	0.058
6/19/2008	11:37:36	1893.3	54.91	14.008	0.048



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	16
L_e	Feet	10
H^*	Feet	200
y_0	Feet	2.21
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	720

Solutions
Hydraulic Conductivity in Feet/Second
8.06E-06
Hydraulic Conductivity in Feet/Minute
4.84E-04
Hydraulic Conductivity in Feet/Day
6.97E-01

* - Assumed value

Calculations			
Term	Units		3.097
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{partial\ penetration}$ =
A	None	2.780	2.470
B	None	0.430	$\ln(R_e/r_W)_{full\ penetration}$ =
C	None	2.336	3.097

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

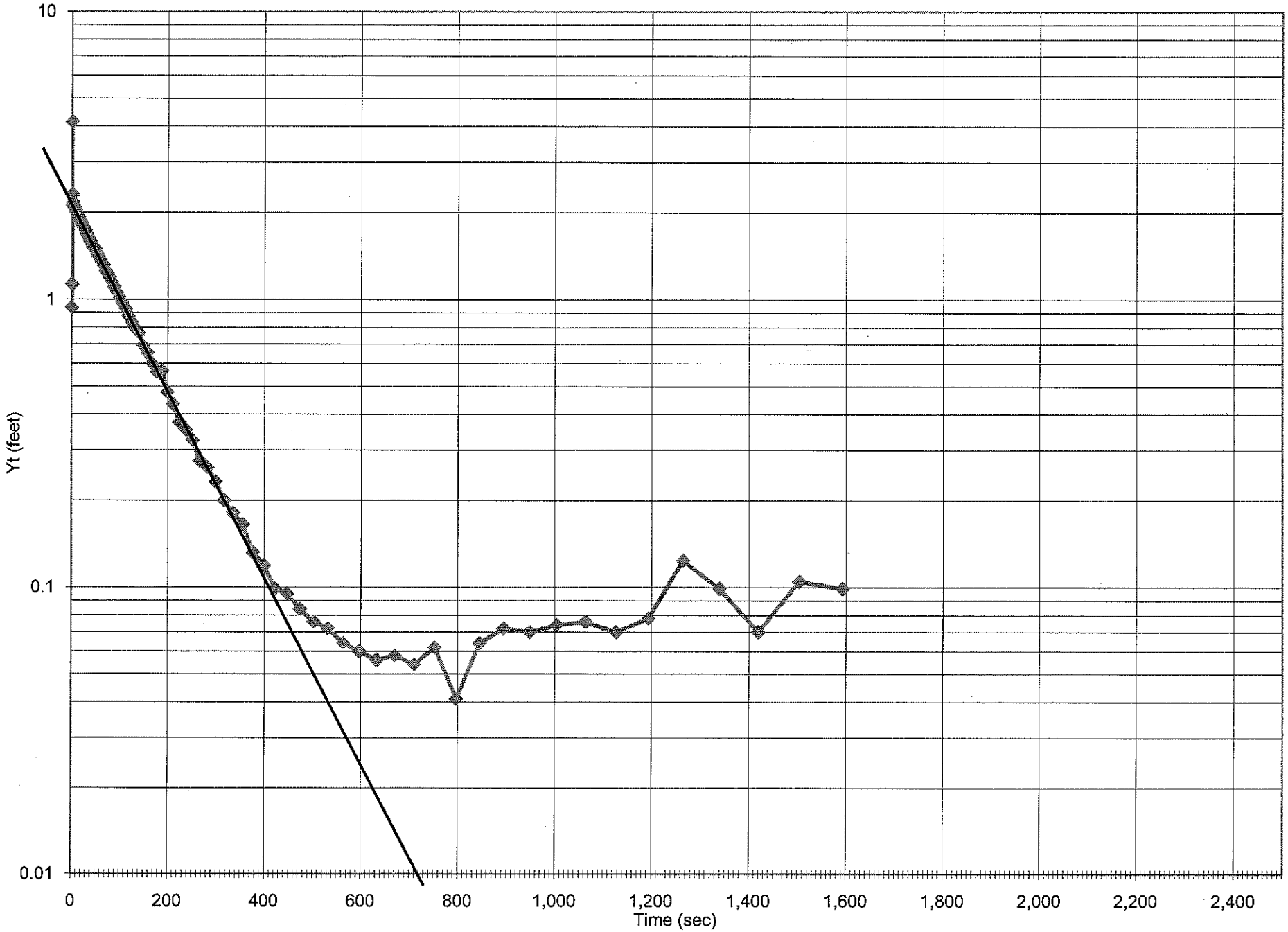
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

617 Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



617 Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:20:33
Report fron ...\SN07633 2008-06-19 113900 617 Slug Out.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 617 Slug Out

Test define 6/19/2008 11:38:34
Test startec 6/19/2008 11:39:00
Test stoppe 6/19/2008 12:06:57

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 118

TOTAL DA 118

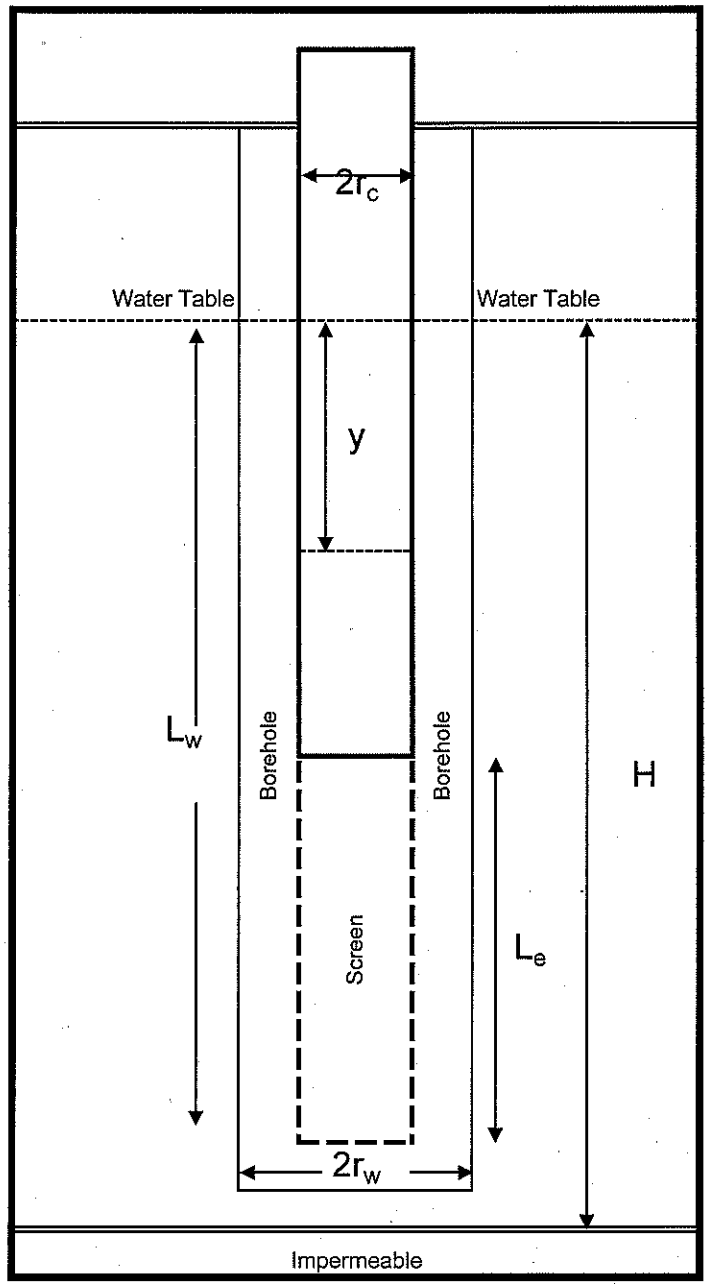
Channel number [1]
Measurem Temperature
Channel name:

Channel number [2]
Measurem Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	
6/19/2008	11:39:00	0	54.94	13.014	0.936
6/19/2008	11:39:00	0.3	54.96	9.807	4.143
6/19/2008	11:39:00	0.6	54.96	12.821	1.129
6/19/2008	11:39:00	0.9	54.98	11.651	2.299
6/19/2008	11:39:01	1.2	54.98	11.628	2.322
6/19/2008	11:39:01	1.5	55.01	11.832	2.118
6/19/2008	11:39:01	1.8	55.01	11.801	2.149
6/19/2008	11:39:02	2.1	55.01	11.781	2.169
6/19/2008	11:39:02	2.4	55.01	11.807	2.143
6/19/2008	11:39:02	2.7	55.01	11.803	2.147
6/19/2008	11:39:03	3	55.01	11.828	2.122
6/19/2008	11:39:03	3.3	55.03	11.83	2.12
6/19/2008	11:39:03	3.6	55.03	11.826	2.124
6/19/2008	11:39:03	3.9	55.03	11.839	2.111
6/19/2008	11:39:04	4.2	55.03	11.849	2.101
6/19/2008	11:39:04	4.5	55.03	11.851	2.099
6/19/2008	11:39:04	4.8	55.03	11.857	2.093
6/19/2008	11:39:05	5.1	55.03	11.861	2.089

6/19/2008	11:39:05	5.4	55.03	11.88	2.07
6/19/2008	11:39:05	5.7	55.03	11.878	2.072
6/19/2008	11:39:06	6	55.03	11.863	2.087
6/19/2008	11:39:06	6.4	55.03	11.892	2.058
6/19/2008	11:39:06	6.7	55.03	11.898	2.052
6/19/2008	11:39:07	7.1	55.03	11.9	2.05
6/19/2008	11:39:07	7.5	55.03	11.908	2.042
6/19/2008	11:39:07	8	55.05	11.936	2.014
6/19/2008	11:39:08	8.4	55.03	11.946	2.004
6/19/2008	11:39:08	8.9	55.05	11.948	2.002
6/19/2008	11:39:09	9.5	55.05	11.952	1.998
6/19/2008	11:39:10	10	55.03	11.946	2.004
6/19/2008	11:39:10	10.6	55.03	11.962	1.988
6/19/2008	11:39:11	11.3	55.01	11.974	1.976
6/19/2008	11:39:11	11.9	55.01	11.988	1.962
6/19/2008	11:39:12	12.6	55.01	11.993	1.957
6/19/2008	11:39:13	13.4	55.01	12.013	1.937
6/19/2008	11:39:14	14.2	55.01	12.023	1.927
6/19/2008	11:39:15	15	55.01	12.052	1.898
6/19/2008	11:39:15	15.9	55.01	12.052	1.898
6/19/2008	11:39:16	16.8	55.01	12.063	1.887
6/19/2008	11:39:17	17.8	55.01	12.079	1.871
6/19/2008	11:39:18	18.9	55.01	12.097	1.853
6/19/2008	11:39:20	20	54.98	12.122	1.828
6/19/2008	11:39:21	21.2	54.98	12.128	1.822
6/19/2008	11:39:22	22.4	54.98	12.153	1.797
6/19/2008	11:39:23	23.8	54.98	12.165	1.785
6/19/2008	11:39:25	25.2	54.98	12.184	1.766
6/19/2008	11:39:26	26.7	54.98	12.204	1.746
6/19/2008	11:39:28	28.2	54.98	12.221	1.729
6/19/2008	11:39:29	29.8	54.98	12.245	1.705
6/19/2008	11:39:31	31.5	54.98	12.272	1.678
6/19/2008	11:39:33	33.3	54.98	12.297	1.653
6/19/2008	11:39:35	35.2	54.98	12.315	1.635
6/19/2008	11:39:37	37.3	54.98	12.352	1.598
6/19/2008	11:39:39	39.5	54.98	12.367	1.583
6/19/2008	11:39:41	41.8	54.98	12.408	1.542
6/19/2008	11:39:44	44.3	54.98	12.441	1.509
6/19/2008	11:39:46	46.9	54.98	12.451	1.499
6/19/2008	11:39:49	49.7	54.98	12.453	1.497
6/19/2008	11:39:52	52.6	54.98	12.509	1.441
6/19/2008	11:39:55	55.7	54.98	12.546	1.404
6/19/2008	11:39:58	59	54.96	12.58	1.37
6/19/2008	11:40:02	62.5	54.96	12.613	1.337
6/19/2008	11:40:06	66.2	54.96	12.638	1.312
6/19/2008	11:40:10	70.1	54.96	12.691	1.259
6/19/2008	11:40:14	74.3	54.96	12.722	1.228
6/19/2008	11:40:18	78.7	54.96	12.757	1.193
6/19/2008	11:40:23	83.4	54.96	12.801	1.149
6/19/2008	11:40:28	88.4	54.96	12.846	1.104
6/19/2008	11:40:33	93.7	54.96	12.891	1.059
6/19/2008	11:40:39	99.3	54.96	12.934	1.016
6/19/2008	11:40:45	105.2	54.96	12.975	0.975
6/19/2008	11:40:51	111.5	54.94	13.02	0.93
6/19/2008	11:40:58	118.1	54.94	13.074	0.876
6/19/2008	11:41:05	125.1	54.94	13.117	0.833
6/19/2008	11:41:12	132.6	54.94	13.158	0.792

6/19/2008	11:41:20	140.5	54.94	13.187	0.763
6/19/2008	11:41:28	148.9	54.94	13.259	0.691
6/19/2008	11:41:37	157.8	54.94	13.296	0.654
6/19/2008	11:41:47	167.2	54.94	13.35	0.6
6/19/2008	11:41:57	177.2	54.94	13.389	0.561
6/19/2008	11:42:07	187.8	54.94	13.384	0.566
6/19/2008	11:42:18	199	54.94	13.473	0.477
6/19/2008	11:42:30	210.9	54.94	13.516	0.434
6/19/2008	11:42:43	223.5	54.94	13.574	0.376
6/19/2008	11:42:56	236.8	54.91	13.596	0.354
6/19/2008	11:43:10	250.9	54.91	13.625	0.325
6/19/2008	11:43:25	265.8	54.91	13.674	0.276
6/19/2008	11:43:41	281.6	54.91	13.689	0.261
6/19/2008	11:43:58	298.4	54.91	13.717	0.233
6/19/2008	11:44:16	316.2	54.91	13.75	0.2
6/19/2008	11:44:34	335	54.91	13.769	0.181
6/19/2008	11:44:54	354.9	54.91	13.785	0.165
6/19/2008	11:45:15	376	54.91	13.818	0.132
6/19/2008	11:45:38	398.4	54.91	13.831	0.119
6/19/2008	11:46:02	422.1	54.91	13.851	0.099
6/19/2008	11:46:27	447.2	54.91	13.855	0.095
6/19/2008	11:46:53	473.8	54.91	13.866	0.084
6/19/2008	11:47:21	502	54.91	13.874	0.076
6/19/2008	11:47:51	531.9	54.91	13.878	0.072
6/19/2008	11:48:23	563.5	54.91	13.886	0.064
6/19/2008	11:48:56	597	54.91	13.89	0.06
6/19/2008	11:49:32	632.5	54.91	13.894	0.056
6/19/2008	11:50:10	670.1	54.91	13.892	0.058
6/19/2008	11:50:49	709.9	54.91	13.896	0.054
6/19/2008	11:51:32	752.1	54.91	13.888	0.062
6/19/2008	11:52:16	796.8	54.91	13.909	0.041
6/19/2008	11:53:04	844.2	54.91	13.886	0.064
6/19/2008	11:53:54	894.4	54.91	13.878	0.072
6/19/2008	11:54:47	947.5	54.91	13.88	0.07
6/19/2008	11:55:43	1003.8	54.91	13.876	0.074
6/19/2008	11:56:43	1063.4	54.91	13.874	0.076
6/19/2008	11:57:46	1126.6	54.91	13.88	0.07
6/19/2008	11:58:53	1193.5	54.91	13.872	0.078
6/19/2008	12:00:04	1264.4	54.91	13.826	0.124
6/19/2008	12:01:19	1339.5	54.91	13.851	0.099
6/19/2008	12:02:38	1419	54.91	13.88	0.07
6/19/2008	12:04:03	1503.3	54.91	13.845	0.105
6/19/2008	12:05:32	1592.6	54.91	13.851	0.099



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	18.4
L_e	Feet	10
H*	Feet	200
y_0	Feet	3.05
t_0	Seconds	0
y_t	Feet	0.1
t	Seconds	1185

Solutions
Hydraulic Conductivity in Feet/Second
3.19E-06
Hydraulic Conductivity in Feet/Minute
1.91E-04
Hydraulic Conductivity in Feet/Day
2.75E-01

* - Assumed value

Calculations			
Term	Units		3.182
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{partial\ penetration}$ =
A	None	2.780	2.524
B	None	0.430	$\ln(R_e/r_W)_{full\ penetration}$ =
C	None	2.336	3.182

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

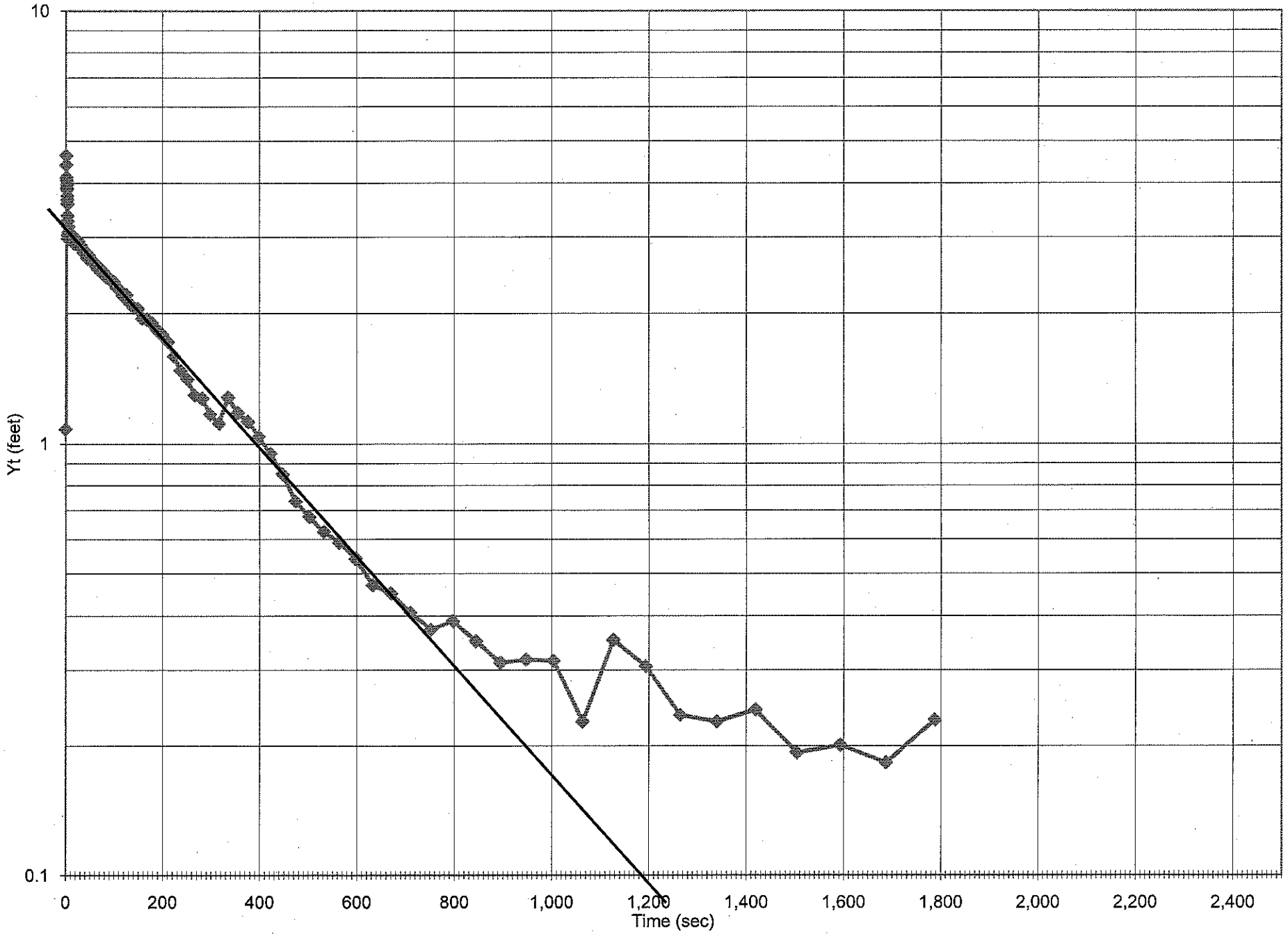
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

619d Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



619d Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:17:51
Report fron ...\SN07633 2008-06-19 094831 619d Slug In.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 619d Slug In

Test define 6/19/2008 9:47:27
Test startec 6/19/2008 9:48:31
Test stoppe 6/19/2008 10:19:16

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 120

TOTAL DA 120

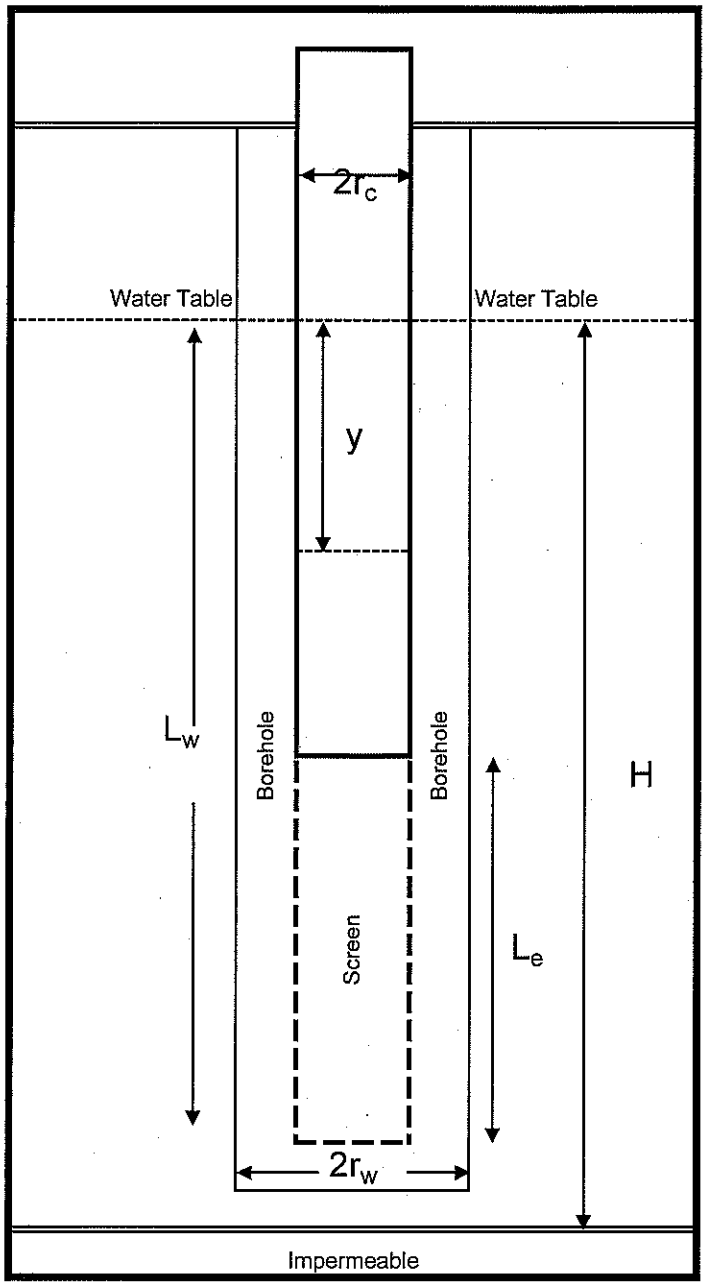
Channel number [1]
Measuren Temperature
Channel name:

Channel number [2]
Measuren Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	yt
6/19/2008	9:48:31	0	53.87	16.883	1.083
6/19/2008	9:48:31	0.3	53.92	20.209	4.409
6/19/2008	9:48:32	0.6	53.92	20.437	4.637
6/19/2008	9:48:32	0.9	53.94	19.934	4.134
6/19/2008	9:48:32	1.2	53.94	19.902	4.102
6/19/2008	9:48:32	1.5	53.96	19.849	4.049
6/19/2008	9:48:33	1.8	53.96	19.766	3.966
6/19/2008	9:48:33	2.1	53.96	19.702	3.902
6/19/2008	9:48:33	2.4	53.96	19.67	3.87
6/19/2008	9:48:34	2.7	53.96	19.538	3.738
6/19/2008	9:48:34	3	53.98	19.463	3.663
6/19/2008	9:48:34	3.3	53.96	19.388	3.588
6/19/2008	9:48:35	3.6	53.96	19.16	3.36
6/19/2008	9:48:35	3.9	53.96	19.073	3.273
6/19/2008	9:48:35	4.2	53.98	18.771	2.971
6/19/2008	9:48:35	4.5	53.98	18.833	3.033
6/19/2008	9:48:36	4.8	53.98	18.979	3.179
6/19/2008	9:48:36	5.1	53.98	18.851	3.051

6/19/2008	9:48:36	5.4	53.98	18.817	3.017
6/19/2008	9:48:37	5.7	53.98	18.884	3.084
6/19/2008	9:48:37	6	53.98	18.86	3.06
6/19/2008	9:48:37	6.4	53.98	18.817	3.017
6/19/2008	9:48:38	6.7	53.98	18.831	3.031
6/19/2008	9:48:38	7.1	53.98	18.866	3.066
6/19/2008	9:48:39	7.5	53.98	18.841	3.041
6/19/2008	9:48:39	8	53.98	18.845	3.045
6/19/2008	9:48:39	8.4	53.98	18.837	3.037
6/19/2008	9:48:40	8.9	53.98	18.841	3.041
6/19/2008	9:48:40	9.5	53.98	18.814	3.014
6/19/2008	9:48:41	10	53.96	18.789	2.989
6/19/2008	9:48:42	10.6	53.96	18.814	3.014
6/19/2008	9:48:42	11.3	53.96	18.755	2.955
6/19/2008	9:48:43	11.9	53.96	18.816	3.016
6/19/2008	9:48:44	12.6	53.94	18.793	2.993
6/19/2008	9:48:44	13.4	53.94	18.765	2.965
6/19/2008	9:48:45	14.2	53.94	18.787	2.987
6/19/2008	9:48:46	15	53.94	18.779	2.979
6/19/2008	9:48:47	15.9	53.94	18.812	3.012
6/19/2008	9:48:48	16.8	53.94	18.697	2.897
6/19/2008	9:48:49	17.8	53.94	18.795	2.995
6/19/2008	9:48:50	18.9	53.94	18.729	2.929
6/19/2008	9:48:51	20	53.94	18.754	2.954
6/19/2008	9:48:52	21.2	53.94	18.74	2.94
6/19/2008	9:48:53	22.4	53.92	18.735	2.935
6/19/2008	9:48:55	23.8	53.94	18.727	2.927
6/19/2008	9:48:56	25.2	53.94	18.707	2.907
6/19/2008	9:48:58	26.7	53.94	18.725	2.925
6/19/2008	9:48:59	28.2	53.92	18.688	2.888
6/19/2008	9:49:01	29.8	53.92	18.672	2.872
6/19/2008	9:49:02	31.5	53.92	18.659	2.859
6/19/2008	9:49:04	33.3	53.92	18.612	2.812
6/19/2008	9:49:06	35.2	53.92	18.62	2.82
6/19/2008	9:49:08	37.3	53.92	18.561	2.761
6/19/2008	9:49:10	39.5	53.92	18.579	2.779
6/19/2008	9:49:13	41.8	53.92	18.561	2.761
6/19/2008	9:49:15	44.3	53.92	18.478	2.678
6/19/2008	9:49:18	46.9	53.92	18.524	2.724
6/19/2008	9:49:21	49.7	53.92	18.495	2.695
6/19/2008	9:49:24	52.6	53.89	18.472	2.672
6/19/2008	9:49:27	55.7	53.89	18.447	2.647
6/19/2008	9:49:30	59	53.89	18.42	2.62
6/19/2008	9:49:33	62.5	53.89	18.373	2.573
6/19/2008	9:49:37	66.2	53.89	18.326	2.526
6/19/2008	9:49:41	70.1	53.89	18.34	2.54
6/19/2008	9:49:45	74.3	53.89	18.315	2.515
6/19/2008	9:49:50	78.7	53.89	18.285	2.485
6/19/2008	9:49:54	83.4	53.87	18.231	2.431
6/19/2008	9:49:59	88.4	53.87	18.218	2.418
6/19/2008	9:50:05	93.7	53.87	18.181	2.381
6/19/2008	9:50:10	99.3	53.87	18.171	2.371
6/19/2008	9:50:16	105.2	53.87	18.099	2.299
6/19/2008	9:50:22	111.5	53.87	18.066	2.266
6/19/2008	9:50:29	118.1	53.87	17.998	2.198
6/19/2008	9:50:36	125.1	53.85	18.006	2.206
6/19/2008	9:50:44	132.6	53.87	17.912	2.112

6/19/2008	9:50:51	140.5	53.85	17.862	2.062
6/19/2008	9:51:00	148.9	53.85	17.85	2.05
6/19/2008	9:51:09	157.8	53.85	17.751	1.951
6/19/2008	9:51:18	167.2	53.85	17.743	1.943
6/19/2008	9:51:28	177.2	53.85	17.704	1.904
6/19/2008	9:51:39	187.8	53.83	17.638	1.838
6/19/2008	9:51:50	199	53.83	17.588	1.788
6/19/2008	9:52:02	210.9	53.83	17.524	1.724
6/19/2008	9:52:14	223.5	53.83	17.397	1.597
6/19/2008	9:52:28	236.8	53.83	17.278	1.478
6/19/2008	9:52:42	250.9	53.83	17.212	1.412
6/19/2008	9:52:57	265.8	53.83	17.097	1.297
6/19/2008	9:53:13	281.6	53.83	17.074	1.274
6/19/2008	9:53:29	298.4	53.83	16.971	1.171
6/19/2008	9:53:47	316.2	53.83	16.915	1.115
6/19/2008	9:54:06	335	53.83	17.082	1.282
6/19/2008	9:54:26	354.9	53.83	16.981	1.181
6/19/2008	9:54:47	376	53.8	16.927	1.127
6/19/2008	9:55:09	398.4	53.8	16.841	1.041
6/19/2008	9:55:33	422.1	53.83	16.749	0.949
6/19/2008	9:55:58	447.2	53.8	16.65	0.85
6/19/2008	9:56:25	473.8	53.8	16.535	0.735
6/19/2008	9:56:53	502	53.8	16.477	0.677
6/19/2008	9:57:23	531.9	53.8	16.426	0.626
6/19/2008	9:57:54	563.5	53.8	16.391	0.591
6/19/2008	9:58:28	597	53.8	16.343	0.543
6/19/2008	9:59:03	632.5	53.8	16.271	0.471
6/19/2008	9:59:41	670.1	53.8	16.251	0.451
6/19/2008	10:00:21	709.9	53.8	16.207	0.407
6/19/2008	10:01:03	752.1	53.78	16.172	0.372
6/19/2008	10:01:48	796.8	53.8	16.189	0.389
6/19/2008	10:02:35	844.2	53.8	16.15	0.35
6/19/2008	10:03:25	894.4	53.78	16.112	0.312
6/19/2008	10:04:18	947.5	53.8	16.117	0.317
6/19/2008	10:05:15	1003.8	53.78	16.115	0.315
6/19/2008	10:06:14	1063.4	53.78	16.028	0.228
6/19/2008	10:07:18	1126.6	53.78	16.152	0.352
6/19/2008	10:08:24	1193.5	53.78	16.106	0.306
6/19/2008	10:09:35	1264.4	53.78	16.036	0.236
6/19/2008	10:10:50	1339.5	53.78	16.028	0.228
6/19/2008	10:12:10	1419	53.78	16.043	0.243
6/19/2008	10:13:34	1503.3	53.78	15.993	0.193
6/19/2008	10:15:04	1592.6	53.78	16.001	0.201
6/19/2008	10:16:38	1687.1	53.78	15.983	0.183
6/19/2008	10:18:18	1787.2	53.78	16.03	0.23



Input Data		
Term	Units	
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$2r_W$	Inches	6
L_w	Feet	18.4
L_e	Feet	10
H*	Feet	200
y_0	Feet	1.87
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	2225

Solutions
Hydraulic Conductivity in Feet/Second
2.60E-06
Hydraulic Conductivity in Feet/Minute
1.56E-04
Hydraulic Conductivity in Feet/Day
2.24E-01

* - Assumed value

Calculations			
Term	Units		3.182
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{partial\ penetration}$ =
A	None	2.780	2.524
B	None	0.430	$\ln(R_e/r_W)_{full\ penetration}$ =
C	None	2.336	3.182

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

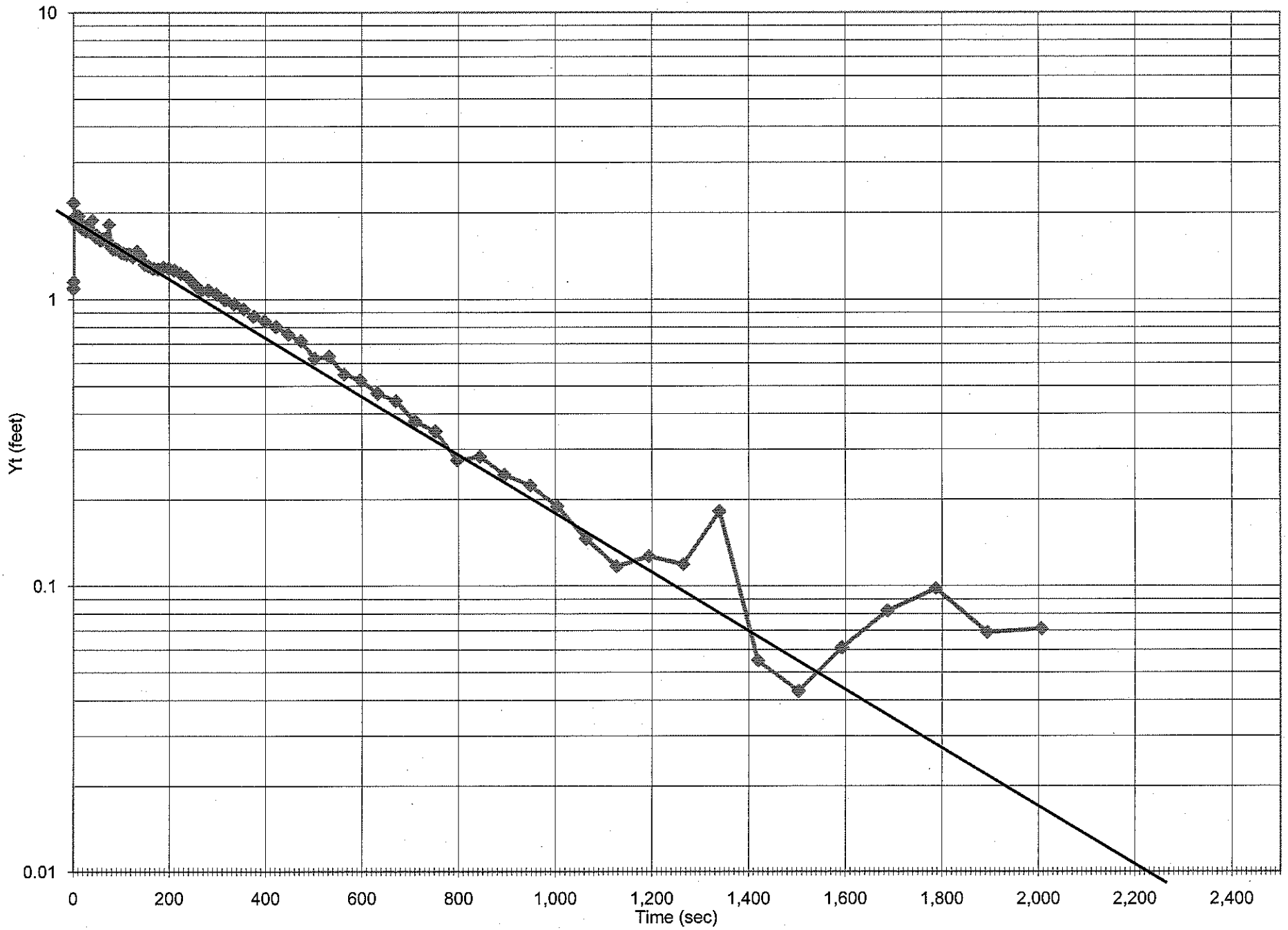
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

CDM

619d Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation



619d Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:18:46
Report fron ...\SN07633 2008-06-19 102047 619d Slug Out.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 619d Slug Out

Test define 6/19/2008 10:19:59
Test startec 6/19/2008 10:20:47
Test stoppe 6/19/2008 10:54:25

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 122

TOTAL DA 122

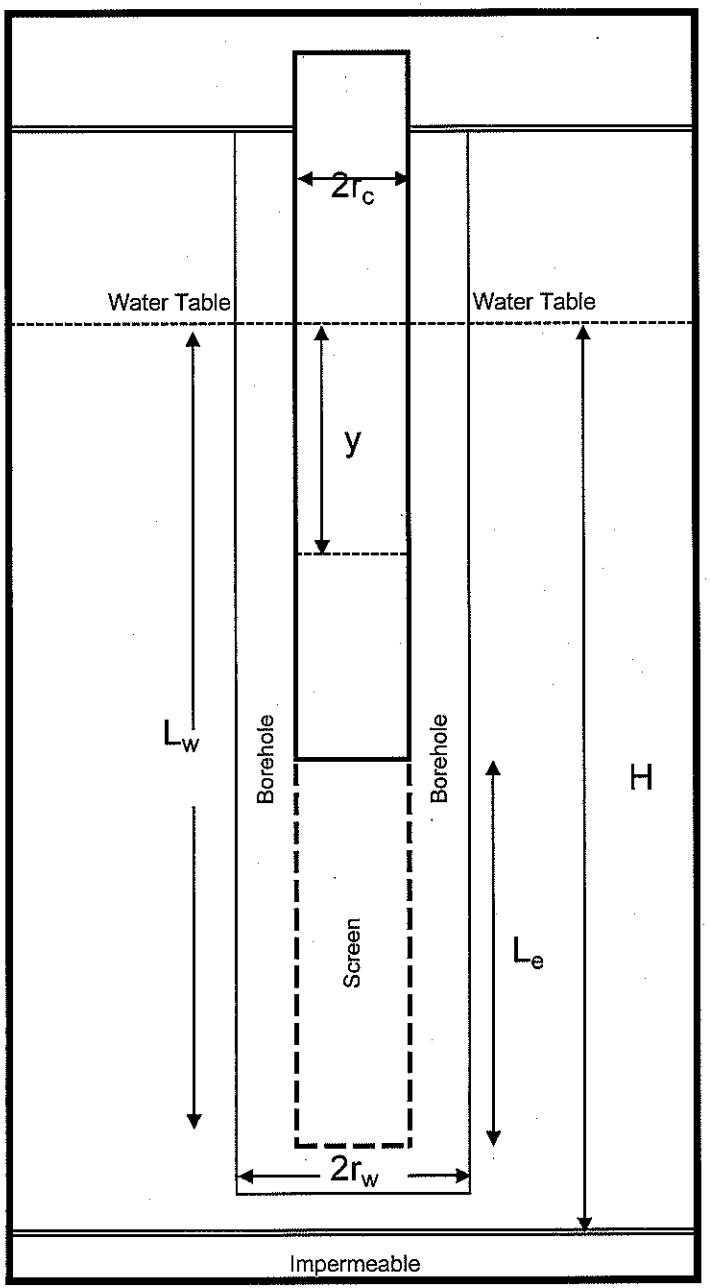
Channel number [1]
Measurem Temperature
Channel name:

Channel number [2]
Measurem Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	yt
6/19/2008	10:20:47	0	53.78	14.808	1.092
6/19/2008	10:20:47	0.3	53.8	14.749	1.151
6/19/2008	10:20:48	0.6	53.83	13.731	2.169
6/19/2008	10:20:48	0.9	53.85	13.99	1.91
6/19/2008	10:20:48	1.2	53.85	14.001	1.899
6/19/2008	10:20:49	1.5	53.85	13.972	1.928
6/19/2008	10:20:49	1.8	53.85	13.997	1.903
6/19/2008	10:20:49	2.1	53.87	13.993	1.907
6/19/2008	10:20:50	2.4	53.87	13.999	1.901
6/19/2008	10:20:50	2.7	53.87	13.98	1.92
6/19/2008	10:20:50	3	53.87	13.997	1.903
6/19/2008	10:20:50	3.3	53.87	14.003	1.897
6/19/2008	10:20:51	3.6	53.87	14.028	1.872
6/19/2008	10:20:51	3.9	53.87	14.009	1.891
6/19/2008	10:20:51	4.2	53.87	14.009	1.891
6/19/2008	10:20:52	4.5	53.87	13.999	1.901
6/19/2008	10:20:52	4.8	53.87	13.974	1.926
6/19/2008	10:20:52	5.1	53.89	13.946	1.954

6/19/2008	10:20:53	5.4	53.89	14.005	1.895
6/19/2008	10:20:53	5.7	53.89	13.989	1.911
6/19/2008	10:20:53	6	53.89	14.005	1.895
6/19/2008	10:20:53	6.4	53.89	14.011	1.889
6/19/2008	10:20:54	6.7	53.89	13.997	1.903
6/19/2008	10:20:54	7.1	53.89	14.015	1.885
6/19/2008	10:20:55	7.5	53.89	14.022	1.878
6/19/2008	10:20:55	8	53.89	13.976	1.924
6/19/2008	10:20:56	8.4	53.89	14.022	1.878
6/19/2008	10:20:56	8.9	53.89	14.044	1.856
6/19/2008	10:20:57	9.5	53.89	14.04	1.86
6/19/2008	10:20:57	10	53.87	14.036	1.864
6/19/2008	10:20:58	10.6	53.87	13.951	1.949
6/19/2008	10:20:58	11.3	53.87	14.052	1.848
6/19/2008	10:20:59	11.9	53.87	14.058	1.842
6/19/2008	10:21:00	12.6	53.87	14.089	1.811
6/19/2008	10:21:00	13.4	53.85	14.064	1.836
6/19/2008	10:21:01	14.2	53.85	14.072	1.828
6/19/2008	10:21:02	15	53.85	14.079	1.821
6/19/2008	10:21:03	15.9	53.85	14.095	1.805
6/19/2008	10:21:04	16.8	53.85	14.124	1.776
6/19/2008	10:21:05	17.8	53.85	14.085	1.815
6/19/2008	10:21:06	18.9	53.85	14.138	1.762
6/19/2008	10:21:07	20	53.85	14.114	1.786
6/19/2008	10:21:08	21.2	53.85	14.12	1.78
6/19/2008	10:21:10	22.4	53.85	14.145	1.755
6/19/2008	10:21:11	23.8	53.85	14.105	1.795
6/19/2008	10:21:12	25.2	53.85	14.126	1.774
6/19/2008	10:21:14	26.7	53.85	14.171	1.729
6/19/2008	10:21:15	28.2	53.85	14.157	1.743
6/19/2008	10:21:17	29.8	53.85	14.145	1.755
6/19/2008	10:21:19	31.5	53.85	14.153	1.747
6/19/2008	10:21:20	33.3	53.85	14.177	1.723
6/19/2008	10:21:22	35.2	53.85	14.171	1.729
6/19/2008	10:21:24	37.3	53.85	14.188	1.712
6/19/2008	10:21:27	39.5	53.85	14.015	1.885
6/19/2008	10:21:29	41.8	53.85	14.212	1.688
6/19/2008	10:21:31	44.3	53.85	14.219	1.681
6/19/2008	10:21:34	46.9	53.83	14.253	1.647
6/19/2008	10:21:37	49.7	53.85	14.231	1.669
6/19/2008	10:21:40	52.6	53.83	14.247	1.653
6/19/2008	10:21:43	55.7	53.83	14.296	1.604
6/19/2008	10:21:46	59	53.83	14.29	1.61
6/19/2008	10:21:50	62.5	53.83	14.278	1.622
6/19/2008	10:21:53	66.2	53.83	14.276	1.624
6/19/2008	10:21:57	70.1	53.83	14.292	1.608
6/19/2008	10:22:01	74.3	53.83	14.08	1.82
6/19/2008	10:22:06	78.7	53.83	14.377	1.523
6/19/2008	10:22:11	83.4	53.83	14.405	1.495
6/19/2008	10:22:16	88.4	53.83	14.403	1.497
6/19/2008	10:22:21	93.7	53.8	14.415	1.485
6/19/2008	10:22:26	99.3	53.8	14.448	1.452
6/19/2008	10:22:32	105.2	53.8	14.453	1.447
6/19/2008	10:22:39	111.5	53.8	14.469	1.431
6/19/2008	10:22:45	118.1	53.8	14.463	1.437
6/19/2008	10:22:52	125.1	53.8	14.496	1.404
6/19/2008	10:23:00	132.6	53.8	14.43	1.47

6/19/2008	10:23:08	140.5	53.8	14.477	1.423
6/19/2008	10:23:16	148.9	53.8	14.578	1.322
6/19/2008	10:23:25	157.8	53.8	14.597	1.303
6/19/2008	10:23:34	167.2	53.8	14.621	1.279
6/19/2008	10:23:44	177.2	53.8	14.629	1.271
6/19/2008	10:23:55	187.8	53.8	14.607	1.293
6/19/2008	10:24:06	199	53.78	14.619	1.281
6/19/2008	10:24:18	210.9	53.8	14.638	1.262
6/19/2008	10:24:31	223.5	53.78	14.67	1.23
6/19/2008	10:24:44	236.8	53.78	14.699	1.201
6/19/2008	10:24:58	250.9	53.78	14.765	1.135
6/19/2008	10:25:13	265.8	53.78	14.825	1.075
6/19/2008	10:25:29	281.6	53.78	14.825	1.075
6/19/2008	10:25:46	298.4	53.78	14.858	1.042
6/19/2008	10:26:03	316.2	53.78	14.905	0.995
6/19/2008	10:26:22	335	53.78	14.936	0.964
6/19/2008	10:26:42	354.9	53.78	14.975	0.925
6/19/2008	10:27:03	376	53.78	15.028	0.872
6/19/2008	10:27:26	398.4	53.78	15.059	0.841
6/19/2008	10:27:49	422.1	53.78	15.096	0.804
6/19/2008	10:28:14	447.2	53.78	15.144	0.756
6/19/2008	10:28:41	473.8	53.78	15.183	0.717
6/19/2008	10:29:09	502	53.78	15.277	0.623
6/19/2008	10:29:39	531.9	53.78	15.267	0.633
6/19/2008	10:30:11	563.5	53.78	15.351	0.549
6/19/2008	10:30:44	597	53.78	15.376	0.524
6/19/2008	10:31:20	632.5	53.78	15.429	0.471
6/19/2008	10:31:57	670.1	53.78	15.456	0.444
6/19/2008	10:32:37	709.9	53.78	15.524	0.376
6/19/2008	10:33:19	752.1	53.78	15.553	0.347
6/19/2008	10:34:04	796.8	53.78	15.625	0.275
6/19/2008	10:34:51	844.2	53.78	15.617	0.283
6/19/2008	10:35:42	894.4	53.78	15.656	0.244
6/19/2008	10:36:35	947.5	53.78	15.676	0.224
6/19/2008	10:37:31	1003.8	53.78	15.711	0.189
6/19/2008	10:38:31	1063.4	53.78	15.754	0.146
6/19/2008	10:39:34	1126.6	53.76	15.783	0.117
6/19/2008	10:40:41	1193.5	53.78	15.773	0.127
6/19/2008	10:41:52	1264.4	53.78	15.781	0.119
6/19/2008	10:43:07	1339.5	53.78	15.718	0.182
6/19/2008	10:44:26	1419	53.76	15.845	0.055
6/19/2008	10:45:50	1503.3	53.76	15.857	0.043
6/19/2008	10:47:20	1592.6	53.76	15.839	0.061
6/19/2008	10:48:54	1687.1	53.76	15.818	0.082
6/19/2008	10:50:34	1787.2	53.76	15.802	0.098
6/19/2008	10:52:20	1893.3	53.78	15.831	0.069
6/19/2008	10:54:13	2005.7	53.78	15.829	0.071



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	14.9
L_e	Feet	10
H*	Feet	200
y_0	Feet	1.8
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	115

Solutions
Hydraulic Conductivity in Feet/Second
4.79E-05
Hydraulic Conductivity in Feet/Minute
2.87E-03
Hydraulic Conductivity in Feet/Day
4.14E+00

* - Assumed value

Calculations			
Term	Units		3.053
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{partial\ penetration}$ =
A	None	2.780	2.442
B	None	0.430	$\ln(R_e/r_W)_{full\ penetration}$ =
C	None	2.336	3.053

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

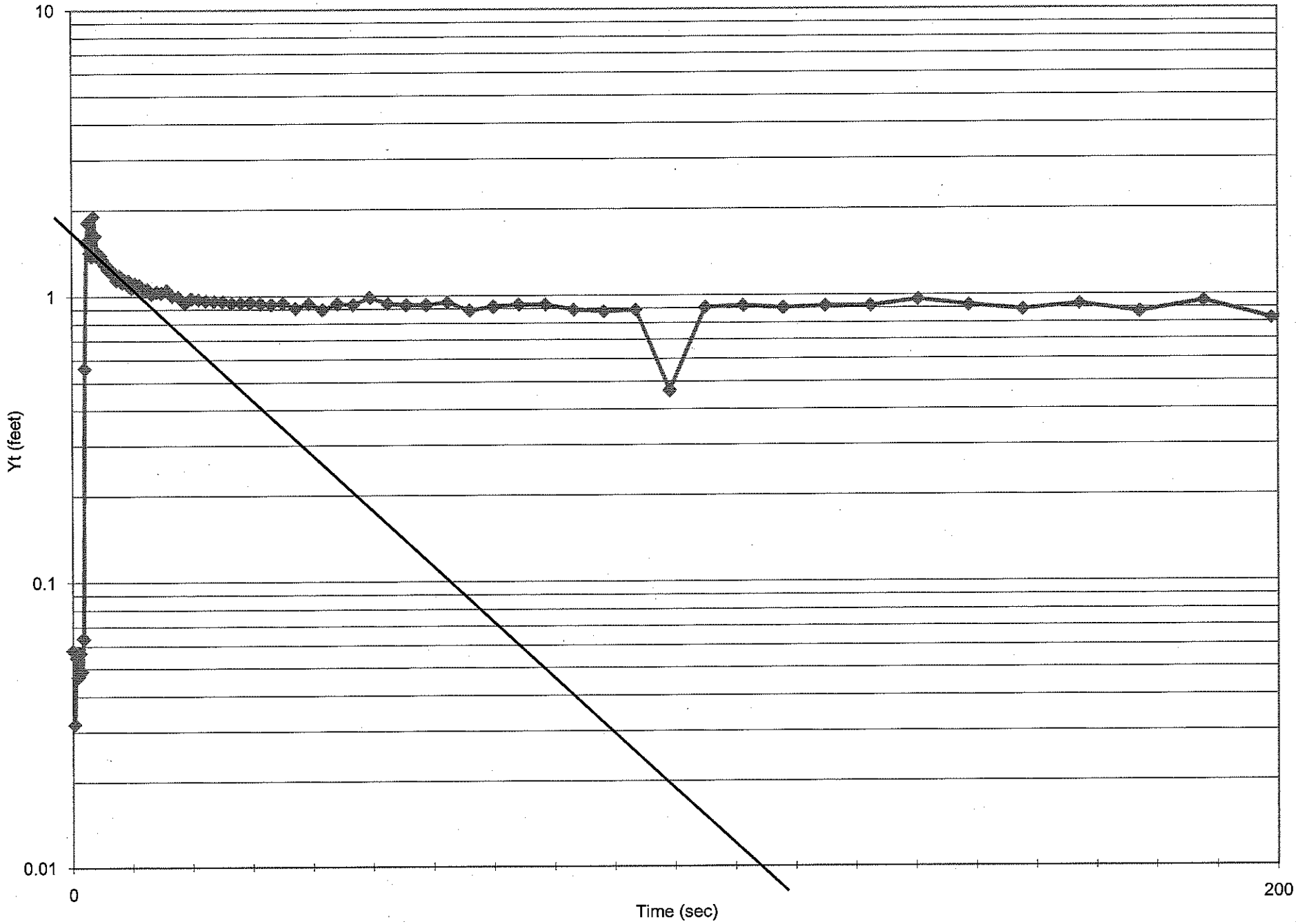
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

625 Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



625 Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:04:19
Report fron ...\SN07633 2008-06-18 145022 625 Slug In.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 625 Slug In

Test define 6/18/2008 14:48:49
Test startec 6/18/2008 14:50:22
Test stoppe 6/18/2008 15:24:15

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 122

TOTAL DA 122

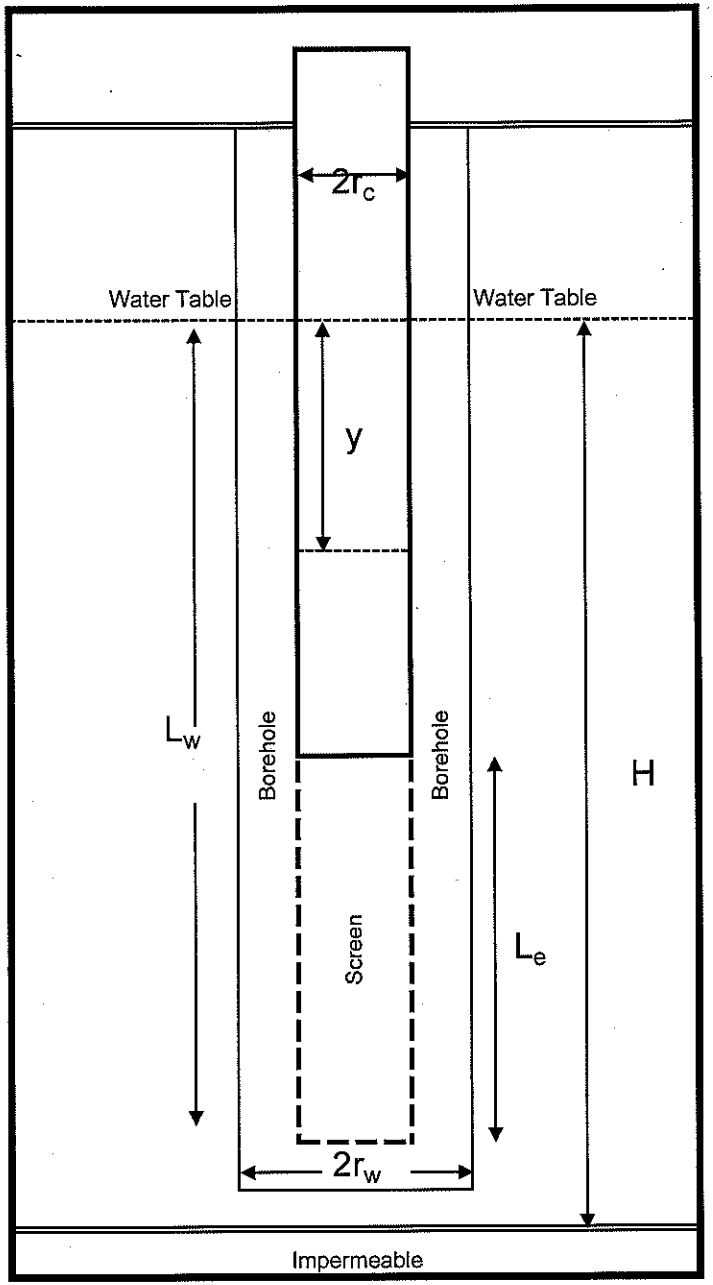
Channel number [1]
Measuren Temperature
Channel name:

Channel number [2]
Measuren Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	yt
6/18/2008	14:50:22	0	55.62	13.158	0.058
6/18/2008	14:50:22	0.3	55.66	13.132	0.032
6/18/2008	14:50:23	0.6	55.69	13.155	0.055
6/18/2008	14:50:23	0.9	55.69	13.147	0.047
6/18/2008	14:50:23	1.2	55.69	13.157	0.057
6/18/2008	14:50:24	1.5	55.71	13.149	0.049
6/18/2008	14:50:24	1.8	55.71	13.164	0.064
6/18/2008	14:50:24	2.1	55.71	13.662	0.562
6/18/2008	14:50:24	2.4	55.71	14.643	1.543
6/18/2008	14:50:25	2.7	55.73	14.909	1.809
6/18/2008	14:50:25	3	55.73	14.524	1.424
6/18/2008	14:50:25	3.3	55.73	14.485	1.385
6/18/2008	14:50:26	3.6	55.73	15.001	1.901
6/18/2008	14:50:26	3.9	55.73	14.73	1.63
6/18/2008	14:50:26	4.2	55.73	14.485	1.385
6/18/2008	14:50:27	4.5	55.73	14.514	1.414
6/18/2008	14:50:27	4.8	55.73	14.491	1.391
6/18/2008	14:50:27	5.1	55.73	14.45	1.35

6/18/2008	14:50:27	5.4	55.73	14.4	1.3
6/18/2008	14:50:28	5.7	55.73	14.394	1.294
6/18/2008	14:50:28	6	55.73	14.347	1.247
6/18/2008	14:50:28	6.4	55.73	14.353	1.253
6/18/2008	14:50:29	6.7	55.73	14.328	1.228
6/18/2008	14:50:29	7.1	55.73	14.285	1.185
6/18/2008	14:50:30	7.5	55.75	14.24	1.14
6/18/2008	14:50:30	8	55.75	14.281	1.181
6/18/2008	14:50:30	8.4	55.75	14.22	1.12
6/18/2008	14:50:31	8.9	55.75	14.234	1.134
6/18/2008	14:50:32	9.5	55.75	14.234	1.134
6/18/2008	14:50:32	10	55.73	14.17	1.07
6/18/2008	14:50:33	10.6	55.71	14.211	1.111
6/18/2008	14:50:33	11.3	55.71	14.196	1.096
6/18/2008	14:50:34	11.9	55.71	14.143	1.043
6/18/2008	14:50:35	12.6	55.71	14.161	1.061
6/18/2008	14:50:35	13.4	55.71	14.122	1.022
6/18/2008	14:50:36	14.2	55.71	14.139	1.039
6/18/2008	14:50:37	15	55.71	14.129	1.029
6/18/2008	14:50:38	15.9	55.71	14.151	1.051
6/18/2008	14:50:39	16.8	55.69	14.102	1.002
6/18/2008	14:50:40	17.8	55.69	14.097	0.997
6/18/2008	14:50:41	18.9	55.69	14.046	0.946
6/18/2008	14:50:42	20	55.69	14.081	0.981
6/18/2008	14:50:43	21.2	55.69	14.073	0.973
6/18/2008	14:50:45	22.4	55.69	14.065	0.965
6/18/2008	14:50:46	23.8	55.69	14.06	0.96
6/18/2008	14:50:47	25.2	55.69	14.06	0.96
6/18/2008	14:50:49	26.7	55.69	14.046	0.946
6/18/2008	14:50:50	28.2	55.69	14.048	0.948
6/18/2008	14:50:52	29.8	55.69	14.05	0.95
6/18/2008	14:50:54	31.5	55.69	14.042	0.942
6/18/2008	14:50:55	33.3	55.69	14.036	0.936
6/18/2008	14:50:57	35.2	55.69	14.044	0.944
6/18/2008	14:50:59	37.3	55.69	14.007	0.907
6/18/2008	14:51:02	39.5	55.69	14.042	0.942
6/18/2008	14:51:04	41.8	55.69	13.997	0.897
6/18/2008	14:51:06	44.3	55.69	14.04	0.94
6/18/2008	14:51:09	46.9	55.69	14.032	0.932
6/18/2008	14:51:12	49.7	55.69	14.087	0.987
6/18/2008	14:51:15	52.6	55.66	14.04	0.94
6/18/2008	14:51:18	55.7	55.66	14.029	0.929
6/18/2008	14:51:21	59	55.66	14.029	0.929
6/18/2008	14:51:25	62.5	55.66	14.048	0.948
6/18/2008	14:51:28	66.2	55.66	13.988	0.888
6/18/2008	14:51:32	70.1	55.66	14.015	0.915
6/18/2008	14:51:36	74.3	55.66	14.031	0.931
6/18/2008	14:51:41	78.7	55.64	14.029	0.929
6/18/2008	14:51:45	83.4	55.64	13.992	0.892
6/18/2008	14:51:50	88.4	55.64	13.98	0.88
6/18/2008	14:51:56	93.7	55.64	13.988	0.888
6/18/2008	14:52:01	99.3	55.64	13.566	0.466
6/18/2008	14:52:07	105.2	55.64	14.008	0.908
6/18/2008	14:52:14	111.5	55.64	14.019	0.919
6/18/2008	14:52:20	118.1	55.64	14.002	0.902
6/18/2008	14:52:27	125.1	55.62	14.016	0.916
6/18/2008	14:52:35	132.6	55.62	14.018	0.918

6/18/2008	14:52:43	140.5	55.62	14.064	0.964
6/18/2008	14:52:51	148.9	55.62	14.02	0.92
6/18/2008	14:53:00	157.8	55.62	13.988	0.888
6/18/2008	14:53:09	167.2	55.62	14.027	0.927
6/18/2008	14:53:19	177.2	55.62	13.969	0.869
6/18/2008	14:53:30	187.8	55.62	14.047	0.947
6/18/2008	14:53:41	199	55.62	13.924	0.824
6/18/2008	14:53:53	210.9	55.59	14.002	0.902
6/18/2008	14:54:06	223.5	55.59	13.882	0.782
6/18/2008	14:54:19	236.8	55.59	13.979	0.879
6/18/2008	14:54:33	250.9	55.59	14.01	0.91
6/18/2008	14:54:48	265.8	55.59	13.963	0.863
6/18/2008	14:55:04	281.6	55.59	13.958	0.858
6/18/2008	14:55:20	298.4	55.59	14.035	0.935
6/18/2008	14:55:38	316.2	55.59	13.975	0.875
6/18/2008	14:55:57	335	55.59	13.993	0.893
6/18/2008	14:56:17	354.9	55.57	14.02	0.92
6/18/2008	14:56:38	376	55.57	13.901	0.801
6/18/2008	14:57:00	398.4	55.57	13.987	0.887
6/18/2008	14:57:24	422.1	55.57	13.94	0.84
6/18/2008	14:57:49	447.2	55.57	13.971	0.871
6/18/2008	14:58:16	473.8	55.57	13.94	0.84
6/18/2008	14:58:44	502	55.57	14.008	0.908
6/18/2008	14:59:14	531.9	55.57	13.919	0.819
6/18/2008	14:59:46	563.5	55.55	13.958	0.858
6/18/2008	15:00:19	597	55.55	13.962	0.862
6/18/2008	15:00:55	632.5	55.55	13.966	0.866
6/18/2008	15:01:32	670.1	55.55	13.976	0.876
6/18/2008	15:02:12	709.9	55.55	13.974	0.874
6/18/2008	15:02:54	752.1	55.55	13.911	0.811
6/18/2008	15:03:39	796.8	55.55	13.917	0.817
6/18/2008	15:04:26	844.2	55.55	13.931	0.831
6/18/2008	15:05:16	894.4	55.53	13.958	0.858
6/18/2008	15:06:10	947.5	55.53	13.894	0.794
6/18/2008	15:07:06	1003.8	55.53	13.941	0.841
6/18/2008	15:08:05	1063.4	55.53	13.931	0.831
6/18/2008	15:09:09	1126.6	55.53	13.958	0.858
6/18/2008	15:10:16	1193.5	55.53	13.923	0.823
6/18/2008	15:11:26	1264.4	55.53	13.912	0.812
6/18/2008	15:12:42	1339.5	55.5	13.972	0.872
6/18/2008	15:14:01	1419	55.5	13.963	0.863
6/18/2008	15:15:25	1503.3	55.5	13.904	0.804
6/18/2008	15:16:55	1592.6	55.5	13.926	0.826
6/18/2008	15:18:29	1687.1	55.5	13.883	0.783
6/18/2008	15:20:09	1787.2	55.5	13.937	0.837
6/18/2008	15:21:55	1893.3	55.5	13.881	0.781
6/18/2008	15:23:48	2005.7	55.48	14.091	0.991



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	14.9
L_e	Feet	10
H*	Feet	200
y_0	Feet	1.2
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	315

Solutions
Hydraulic Conductivity in Feet/Second
1.61E-05
Hydraulic Conductivity in Feet/Minute
9.67E-04
Hydraulic Conductivity in Feet/Day
1.39E+00

* - Assumed value

Calculations			
Term	Units		3.053
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{partial\ penetration}$ =
A	None	2.780	2.442
B	None	0.430	$\ln(R_e/r_W)_{full\ penetration}$ =
C	None	2.336	3.053

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

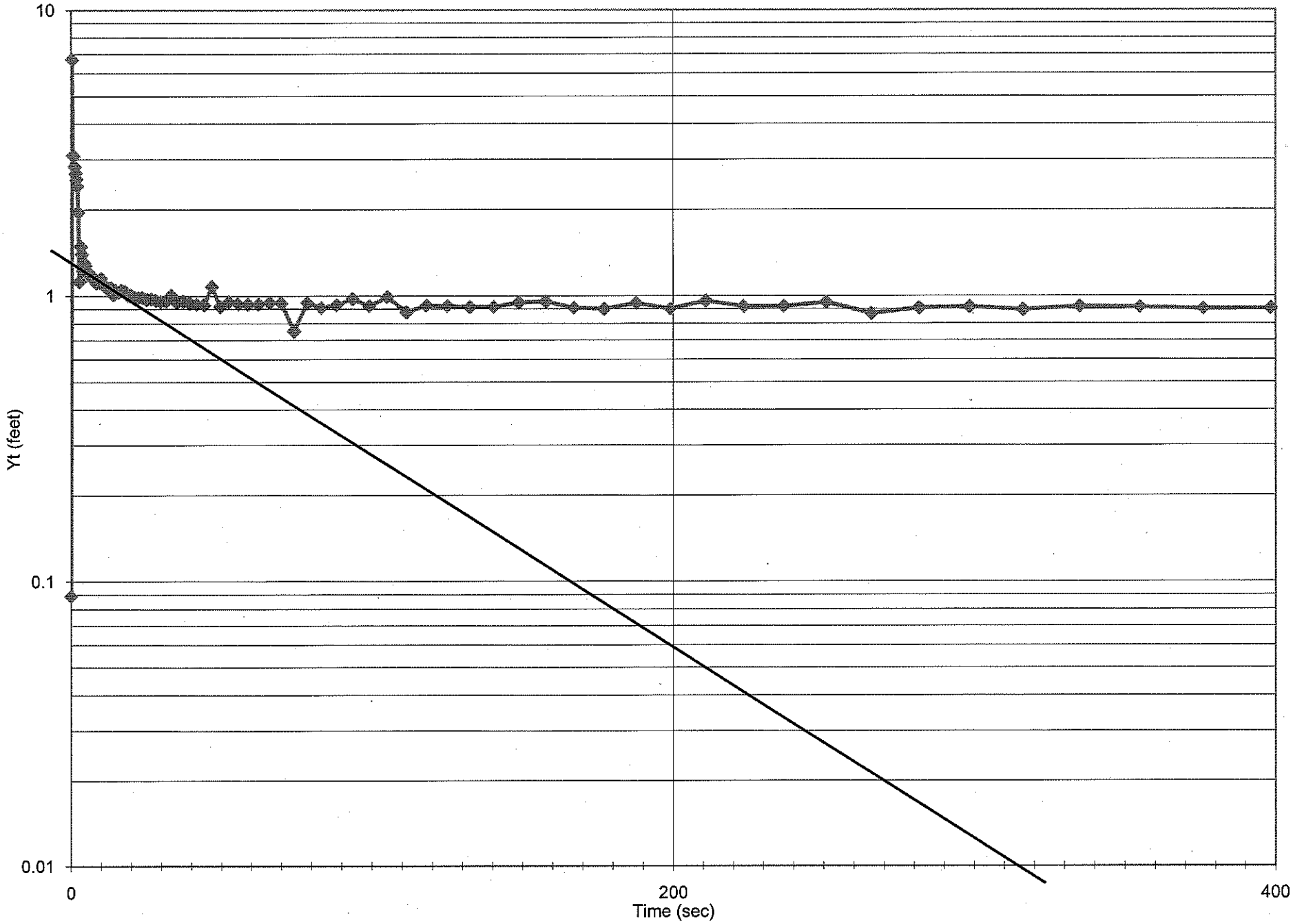
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B\ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

625 re-test Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



625 re-test Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:21:28
Report fron ...\SN07633 2008-06-19 122103 625re Slug In.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 625re Slug In

Test define 6/19/2008 12:19:50
Test startec 6/19/2008 12:21:03
Test stoppe 6/19/2008 12:58:56

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 124

TOTAL DA 124

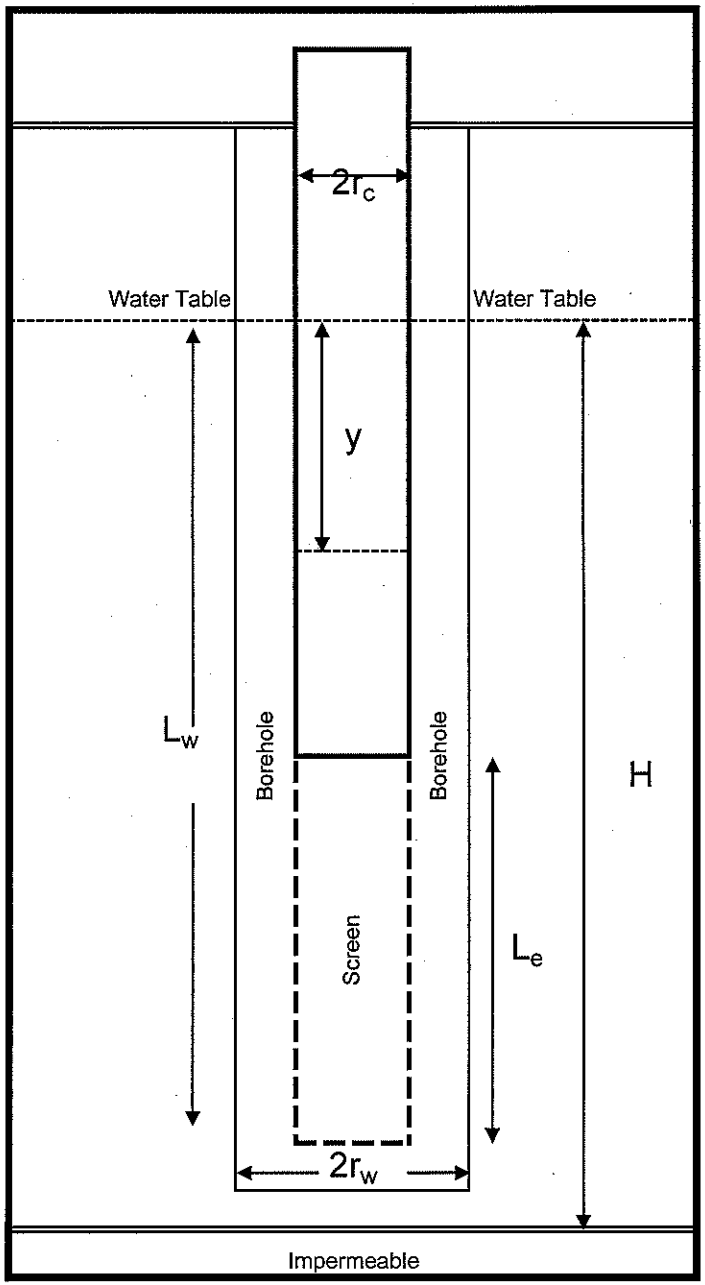
Channel number [1]
Measuren Temperature
Channel name:

Channel number [2]
Measuren Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	yt
6/19/2008	12:21:03	0	55.57	13.989	0.089
6/19/2008	12:21:03	0.3	55.62	20.609	6.709
6/19/2008	12:21:03	0.6	55.62	16.992	3.092
6/19/2008	12:21:03	0.9	55.64	16.984	3.084
6/19/2008	12:21:04	1.2	55.64	16.733	2.833
6/19/2008	12:21:04	1.5	55.66	16.584	2.684
6/19/2008	12:21:04	1.8	55.66	16.457	2.557
6/19/2008	12:21:05	2.1	55.66	16.321	2.421
6/19/2008	12:21:05	2.4	55.66	15.865	1.965
6/19/2008	12:21:05	2.7	55.66	15.019	1.119
6/19/2008	12:21:06	3	55.66	15.027	1.127
6/19/2008	12:21:06	3.3	55.69	15.389	1.489
6/19/2008	12:21:06	3.6	55.69	15.301	1.401
6/19/2008	12:21:06	3.9	55.69	15.13	1.23
6/19/2008	12:21:07	4.2	55.69	15.188	1.288
6/19/2008	12:21:07	4.5	55.69	15.198	1.298
6/19/2008	12:21:07	4.8	55.69	15.176	1.276
6/19/2008	12:21:08	5.1	55.69	15.118	1.218

6/19/2008	12:21:08	5.4	55.69	15.106	1.206
6/19/2008	12:21:08	5.7	55.69	15.101	1.201
6/19/2008	12:21:09	6	55.69	15.103	1.203
6/19/2008	12:21:09	6.4	55.69	15.091	1.191
6/19/2008	12:21:09	6.7	55.69	15.064	1.164
6/19/2008	12:21:10	7.1	55.69	15.058	1.158
6/19/2008	12:21:10	7.5	55.69	15.054	1.154
6/19/2008	12:21:11	8	55.69	15.042	1.142
6/19/2008	12:21:11	8.4	55.69	15.005	1.105
6/19/2008	12:21:12	8.9	55.69	15.029	1.129
6/19/2008	12:21:12	9.5	55.69	15.015	1.115
6/19/2008	12:21:13	10	55.66	15.05	1.15
6/19/2008	12:21:13	10.6	55.66	14.996	1.096
6/19/2008	12:21:14	11.3	55.66	14.982	1.082
6/19/2008	12:21:14	11.9	55.66	14.969	1.069
6/19/2008	12:21:15	12.6	55.66	14.963	1.063
6/19/2008	12:21:16	13.4	55.66	14.969	1.069
6/19/2008	12:21:17	14.2	55.64	14.912	1.012
6/19/2008	12:21:18	15	55.64	14.944	1.044
6/19/2008	12:21:18	15.9	55.64	14.932	1.032
6/19/2008	12:21:19	16.8	55.64	14.945	1.045
6/19/2008	12:21:20	17.8	55.64	14.938	1.038
6/19/2008	12:21:21	18.9	55.64	14.907	1.007
6/19/2008	12:21:23	20	55.64	14.907	1.007
6/19/2008	12:21:24	21.2	55.64	14.887	0.987
6/19/2008	12:21:25	22.4	55.64	14.885	0.985
6/19/2008	12:21:26	23.8	55.64	14.887	0.987
6/19/2008	12:21:28	25.2	55.64	14.873	0.973
6/19/2008	12:21:29	26.7	55.62	14.876	0.976
6/19/2008	12:21:31	28.2	55.64	14.866	0.966
6/19/2008	12:21:32	29.8	55.62	14.856	0.956
6/19/2008	12:21:34	31.5	55.62	14.858	0.958
6/19/2008	12:21:36	33.3	55.62	14.903	1.003
6/19/2008	12:21:38	35.2	55.62	14.847	0.947
6/19/2008	12:21:40	37.3	55.62	14.858	0.958
6/19/2008	12:21:42	39.5	55.62	14.843	0.943
6/19/2008	12:21:44	41.8	55.62	14.837	0.937
6/19/2008	12:21:47	44.3	55.62	14.831	0.931
6/19/2008	12:21:49	46.9	55.62	14.977	1.077
6/19/2008	12:21:52	49.7	55.59	14.818	0.918
6/19/2008	12:21:55	52.6	55.59	14.855	0.955
6/19/2008	12:21:58	55.7	55.59	14.839	0.939
6/19/2008	12:22:02	59	55.59	14.835	0.935
6/19/2008	12:22:05	62.5	55.59	14.835	0.935
6/19/2008	12:22:09	66.2	55.59	14.847	0.947
6/19/2008	12:22:13	70.1	55.59	14.845	0.945
6/19/2008	12:22:17	74.3	55.59	14.654	0.754
6/19/2008	12:22:21	78.7	55.57	14.845	0.945
6/19/2008	12:22:26	83.4	55.59	14.81	0.91
6/19/2008	12:22:31	88.4	55.57	14.831	0.931
6/19/2008	12:22:36	93.7	55.57	14.876	0.976
6/19/2008	12:22:42	99.3	55.57	14.822	0.922
6/19/2008	12:22:48	105.2	55.57	14.892	0.992
6/19/2008	12:22:54	111.5	55.55	14.777	0.877
6/19/2008	12:23:01	118.1	55.55	14.826	0.926
6/19/2008	12:23:08	125.1	55.55	14.822	0.922
6/19/2008	12:23:15	132.6	55.55	14.814	0.914

6/19/2008	12:23:23	140.5	55.55	14.816	0.916
6/19/2008	12:23:31	148.9	55.53	14.848	0.948
6/19/2008	12:23:40	157.8	55.53	14.855	0.955
6/19/2008	12:23:50	167.2	55.53	14.809	0.909
6/19/2008	12:24:00	177.2	55.53	14.801	0.901
6/19/2008	12:24:10	187.8	55.53	14.844	0.944
6/19/2008	12:24:22	199	55.5	14.801	0.901
6/19/2008	12:24:33	210.9	55.5	14.86	0.96
6/19/2008	12:24:46	223.5	55.5	14.819	0.919
6/19/2008	12:24:59	236.8	55.5	14.819	0.919
6/19/2008	12:25:13	250.9	55.5	14.85	0.95
6/19/2008	12:25:28	265.8	55.5	14.768	0.868
6/19/2008	12:25:44	281.6	55.48	14.807	0.907
6/19/2008	12:26:01	298.4	55.5	14.815	0.915
6/19/2008	12:26:19	316.2	55.48	14.794	0.894
6/19/2008	12:26:38	335	55.48	14.819	0.919
6/19/2008	12:26:57	354.9	55.48	14.813	0.913
6/19/2008	12:27:19	376	55.48	14.801	0.901
6/19/2008	12:27:41	398.4	55.48	14.805	0.905
6/19/2008	12:28:05	422.1	55.48	14.799	0.899
6/19/2008	12:28:30	447.2	55.48	14.84	0.94
6/19/2008	12:28:56	473.8	55.46	14.835	0.935
6/19/2008	12:29:25	502	55.46	14.809	0.909
6/19/2008	12:29:54	531.9	55.48	14.745	0.845
6/19/2008	12:30:26	563.5	55.46	14.804	0.904
6/19/2008	12:31:00	597	55.46	14.786	0.886
6/19/2008	12:31:35	632.5	55.46	14.819	0.919
6/19/2008	12:32:13	670.1	55.46	14.78	0.88
6/19/2008	12:32:52	709.9	55.46	14.664	0.764
6/19/2008	12:33:35	752.1	55.46	14.557	0.657
6/19/2008	12:34:19	796.8	55.46	14.712	0.812
6/19/2008	12:35:07	844.2	55.46	14.778	0.878
6/19/2008	12:35:57	894.4	55.46	14.994	1.094
6/19/2008	12:36:50	947.5	55.46	14.808	0.908
6/19/2008	12:37:46	1003.8	55.46	14.767	0.867
6/19/2008	12:38:46	1063.4	55.46	14.761	0.861
6/19/2008	12:39:49	1126.6	55.44	14.761	0.861
6/19/2008	12:40:56	1193.5	55.44	14.734	0.834
6/19/2008	12:42:07	1264.4	55.44	14.769	0.869
6/19/2008	12:43:22	1339.5	55.44	14.771	0.871
6/19/2008	12:44:42	1419	55.44	14.718	0.818
6/19/2008	12:46:06	1503.3	55.44	14.749	0.849
6/19/2008	12:47:35	1592.6	55.44	14.654	0.754
6/19/2008	12:49:10	1687.1	55.44	14.784	0.884
6/19/2008	12:50:50	1787.2	55.44	14.687	0.787
6/19/2008	12:52:36	1893.3	55.44	14.72	0.82
6/19/2008	12:54:28	2005.7	55.44	14.738	0.838
6/19/2008	12:56:27	2124.7	55.44	14.718	0.818
6/19/2008	12:58:33	2250.8	55.44	14.742	0.842



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	14.9
L_e	Feet	10
H*	Feet	200
y_0	Feet	0.5
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	130

Solutions
Hydraulic Conductivity in Feet/Second
3.19E-05
Hydraulic Conductivity in Feet/Minute
1.91E-03
Hydraulic Conductivity in Feet/Day
2.76E+00

* - Assumed value

Calculations			
Term	Units		3.053
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{\text{partial penetration}}$ =
A	None	2.780	2.442
B	None	0.430	$\ln(R_e/r_W)_{\text{full penetration}}$ =
C	None	2.336	3.053

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

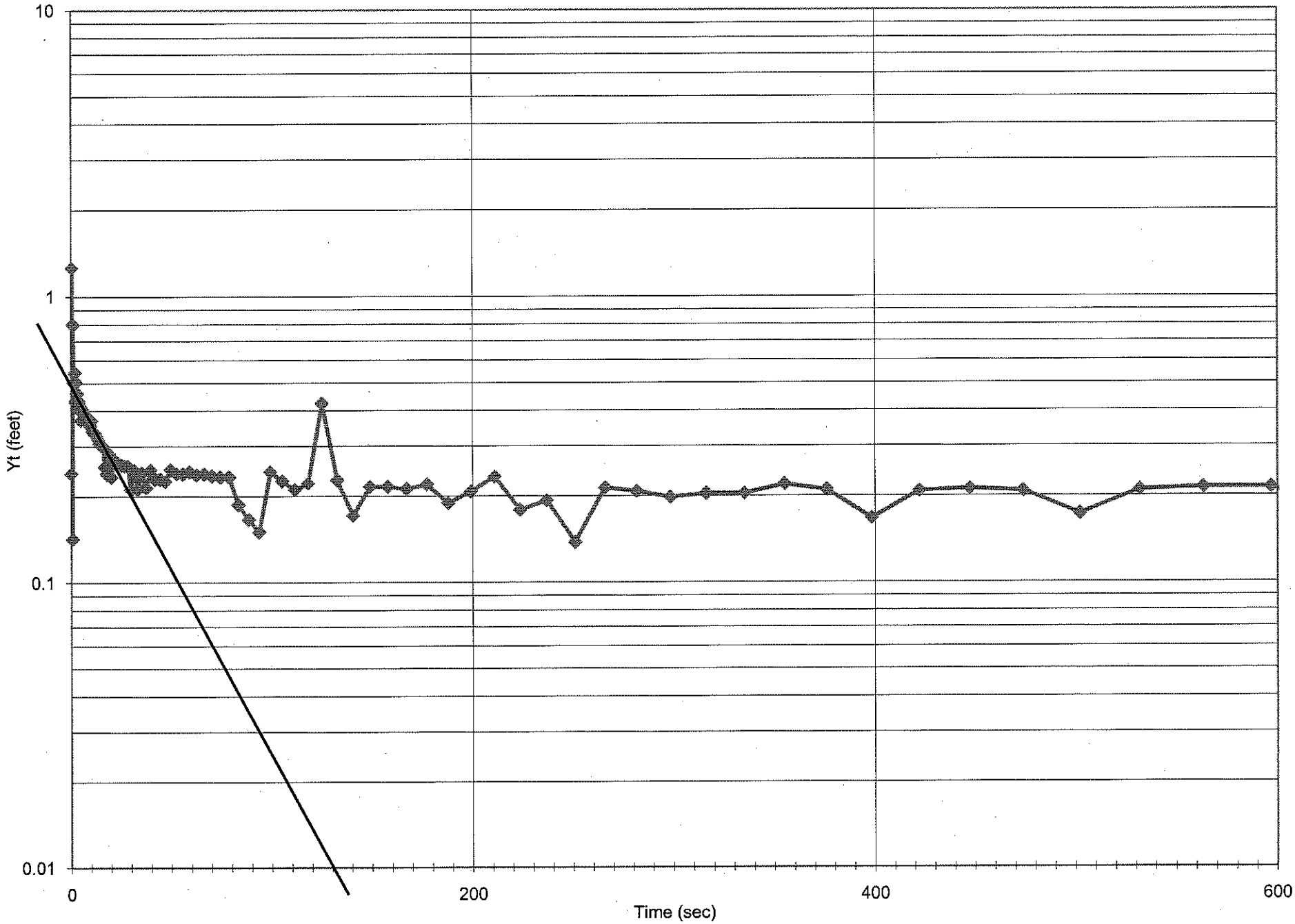
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

625 Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



625 Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:12:11
Report fron ...\SN07633 2008-06-18 152633 625 Slug Out.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 625 Slug Out

Test define 6/18/2008 15:25:40
Test startec 6/18/2008 15:26:33
Test stoppe 6/18/2008 15:55:15

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 119

TOTAL DA 119

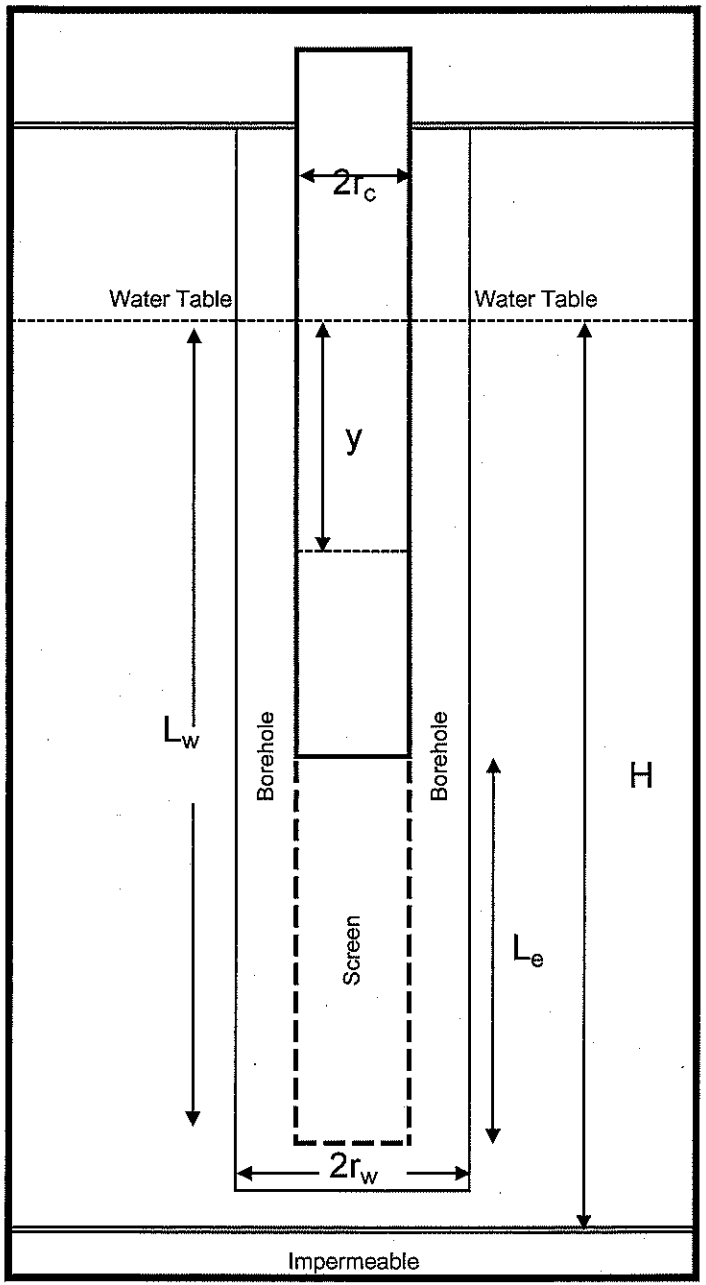
Channel number [1]
Measuren Temperature
Channel name:

Channel number [2]
Measuren Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	
6/18/2008	15:26:33	0	55.48	12.959	0.241
6/18/2008	15:26:34	0.3	55.53	11.943	1.257
6/18/2008	15:26:34	0.6	55.53	13.058	0.142
6/18/2008	15:26:34	0.9	55.55	12.4	0.8
6/18/2008	15:26:35	1.2	55.55	12.697	0.503
6/18/2008	15:26:35	1.5	55.55	12.697	0.503
6/18/2008	15:26:35	1.8	55.57	12.656	0.544
6/18/2008	15:26:35	2.1	55.57	12.769	0.431
6/18/2008	15:26:36	2.4	55.57	12.695	0.505
6/18/2008	15:26:36	2.7	55.57	12.738	0.462
6/18/2008	15:26:36	3	55.57	12.74	0.46
6/18/2008	15:26:37	3.3	55.59	12.792	0.408
6/18/2008	15:26:37	3.6	55.59	12.765	0.435
6/18/2008	15:26:37	3.9	55.59	12.773	0.427
6/18/2008	15:26:38	4.2	55.59	12.782	0.418
6/18/2008	15:26:38	4.5	55.59	12.786	0.414
6/18/2008	15:26:38	4.8	55.59	12.829	0.371
6/18/2008	15:26:38	5.1	55.59	12.798	0.402

6/18/2008	15:26:39	5.4	55.59	12.794	0.406
6/18/2008	15:26:39	5.7	55.59	12.808	0.392
6/18/2008	15:26:39	6	55.59	12.804	0.396
6/18/2008	15:26:40	6.4	55.59	12.808	0.392
6/18/2008	15:26:40	6.7	55.59	12.819	0.381
6/18/2008	15:26:40	7.1	55.59	12.827	0.373
6/18/2008	15:26:41	7.5	55.59	12.825	0.375
6/18/2008	15:26:41	8	55.59	12.825	0.375
6/18/2008	15:26:42	8.4	55.59	12.831	0.369
6/18/2008	15:26:42	8.9	55.59	12.837	0.363
6/18/2008	15:26:43	9.5	55.62	12.846	0.354
6/18/2008	15:26:43	10	55.59	12.831	0.369
6/18/2008	15:26:44	10.6	55.59	12.86	0.34
6/18/2008	15:26:45	11.3	55.57	12.866	0.334
6/18/2008	15:26:45	11.9	55.57	12.868	0.332
6/18/2008	15:26:46	12.6	55.57	12.874	0.326
6/18/2008	15:26:47	13.4	55.57	12.882	0.318
6/18/2008	15:26:48	14.2	55.57	12.892	0.308
6/18/2008	15:26:48	15	55.57	12.897	0.303
6/18/2008	15:26:49	15.9	55.57	12.899	0.301
6/18/2008	15:26:50	16.8	55.55	12.946	0.254
6/18/2008	15:26:51	17.8	55.55	12.96	0.24
6/18/2008	15:26:52	18.9	55.55	12.917	0.283
6/18/2008	15:26:53	20	55.55	12.966	0.234
6/18/2008	15:26:55	21.2	55.55	12.935	0.265
6/18/2008	15:26:56	22.4	55.55	12.935	0.265
6/18/2008	15:26:57	23.8	55.55	12.939	0.261
6/18/2008	15:26:59	25.2	55.55	12.942	0.258
6/18/2008	15:27:00	26.7	55.55	12.944	0.256
6/18/2008	15:27:02	28.2	55.55	12.944	0.256
6/18/2008	15:27:03	29.8	55.55	12.989	0.211
6/18/2008	15:27:05	31.5	55.55	12.952	0.248
6/18/2008	15:27:07	33.3	55.55	12.987	0.213
6/18/2008	15:27:09	35.2	55.55	12.958	0.242
6/18/2008	15:27:11	37.3	55.55	12.985	0.215
6/18/2008	15:27:13	39.5	55.55	12.952	0.248
6/18/2008	15:27:15	41.8	55.55	12.97	0.23
6/18/2008	15:27:18	44.3	55.55	12.97	0.23
6/18/2008	15:27:20	46.9	55.55	12.974	0.226
6/18/2008	15:27:23	49.7	55.55	12.952	0.248
6/18/2008	15:27:26	52.6	55.55	12.96	0.24
6/18/2008	15:27:29	55.7	55.53	12.96	0.24
6/18/2008	15:27:32	59	55.53	12.956	0.244
6/18/2008	15:27:36	62.5	55.53	12.962	0.238
6/18/2008	15:27:40	66.2	55.53	12.96	0.24
6/18/2008	15:27:43	70.1	55.53	12.964	0.236
6/18/2008	15:27:48	74.3	55.53	12.966	0.234
6/18/2008	15:27:52	78.7	55.53	12.966	0.234
6/18/2008	15:27:57	83.4	55.53	13.013	0.187
6/18/2008	15:28:02	88.4	55.53	13.034	0.166
6/18/2008	15:28:07	93.7	55.53	13.05	0.15
6/18/2008	15:28:13	99.3	55.53	12.956	0.244
6/18/2008	15:28:19	105.2	55.53	12.974	0.226
6/18/2008	15:28:25	111.5	55.53	12.989	0.211
6/18/2008	15:28:31	118.1	55.5	12.978	0.222
6/18/2008	15:28:38	125.1	55.5	12.776	0.424
6/18/2008	15:28:46	132.6	55.5	12.972	0.228

6/18/2008	15:28:54	140.5	55.5	13.029	0.171
6/18/2008	15:29:02	148.9	55.5	12.984	0.216
6/18/2008	15:29:11	157.8	55.5	12.984	0.216
6/18/2008	15:29:21	167.2	55.5	12.988	0.212
6/18/2008	15:29:31	177.2	55.5	12.98	0.22
6/18/2008	15:29:41	187.8	55.5	13.011	0.189
6/18/2008	15:29:52	199	55.5	12.992	0.208
6/18/2008	15:30:04	210.9	55.5	12.966	0.234
6/18/2008	15:30:17	223.5	55.5	13.021	0.179
6/18/2008	15:30:30	236.8	55.48	13.007	0.193
6/18/2008	15:30:44	250.9	55.48	13.062	0.138
6/18/2008	15:30:59	265.8	55.48	12.986	0.214
6/18/2008	15:31:15	281.6	55.48	12.992	0.208
6/18/2008	15:31:32	298.4	55.48	13.002	0.198
6/18/2008	15:31:50	316.2	55.48	12.996	0.204
6/18/2008	15:32:08	335	55.48	12.996	0.204
6/18/2008	15:32:28	354.9	55.48	12.98	0.22
6/18/2008	15:32:49	376	55.48	12.99	0.21
6/18/2008	15:33:12	398.4	55.48	13.033	0.167
6/18/2008	15:33:35	422.1	55.48	12.992	0.208
6/18/2008	15:34:01	447.2	55.48	12.988	0.212
6/18/2008	15:34:27	473.8	55.46	12.992	0.208
6/18/2008	15:34:55	502	55.46	13.027	0.173
6/18/2008	15:35:25	531.9	55.46	12.99	0.21
6/18/2008	15:35:57	563.5	55.46	12.986	0.214
6/18/2008	15:36:30	597	55.46	12.986	0.214
6/18/2008	15:37:06	632.5	55.46	13.023	0.177
6/18/2008	15:37:43	670.1	55.46	13.01	0.19
6/18/2008	15:38:23	709.9	55.46	13.012	0.188
6/18/2008	15:39:05	752.1	55.46	13.031	0.169
6/18/2008	15:39:50	796.8	55.46	12.887	0.313
6/18/2008	15:40:38	844.2	55.46	12.984	0.216
6/18/2008	15:41:28	894.4	55.46	13.037	0.163
6/18/2008	15:42:21	947.5	55.46	13.021	0.179
6/18/2008	15:43:17	1003.8	55.46	12.994	0.206
6/18/2008	15:44:17	1063.4	55.44	12.992	0.208
6/18/2008	15:45:20	1126.6	55.46	13.008	0.192
6/18/2008	15:46:27	1193.5	55.44	13	0.2
6/18/2008	15:47:38	1264.4	55.44	13.014	0.186
6/18/2008	15:48:53	1339.5	55.44	12.987	0.213
6/18/2008	15:50:12	1419	55.44	12.971	0.229
6/18/2008	15:51:37	1503.3	55.44	12.981	0.219
6/18/2008	15:53:06	1592.6	55.44	12.971	0.229
6/18/2008	15:54:40	1687.1	55.44	12.983	0.217



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	14.9
L_e	Feet	10
H*	Feet	200
y_0	Feet	0.81
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	210

Solutions
Hydraulic Conductivity in Feet/Second
2.22E-05
Hydraulic Conductivity in Feet/Minute
1.33E-03
Hydraulic Conductivity in Feet/Day
1.92E+00

* - Assumed value

Calculations			
Term	Units		
L_e/r_W	Feet/Foot	40.00	3.053
A	None	2.780	$\ln(R_e/r_W)_{partial\ penetration}$ =
B	None	0.430	2.442
C	None	2.336	$\ln(R_e/r_W)_{full\ penetration}$ =
			3.053

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

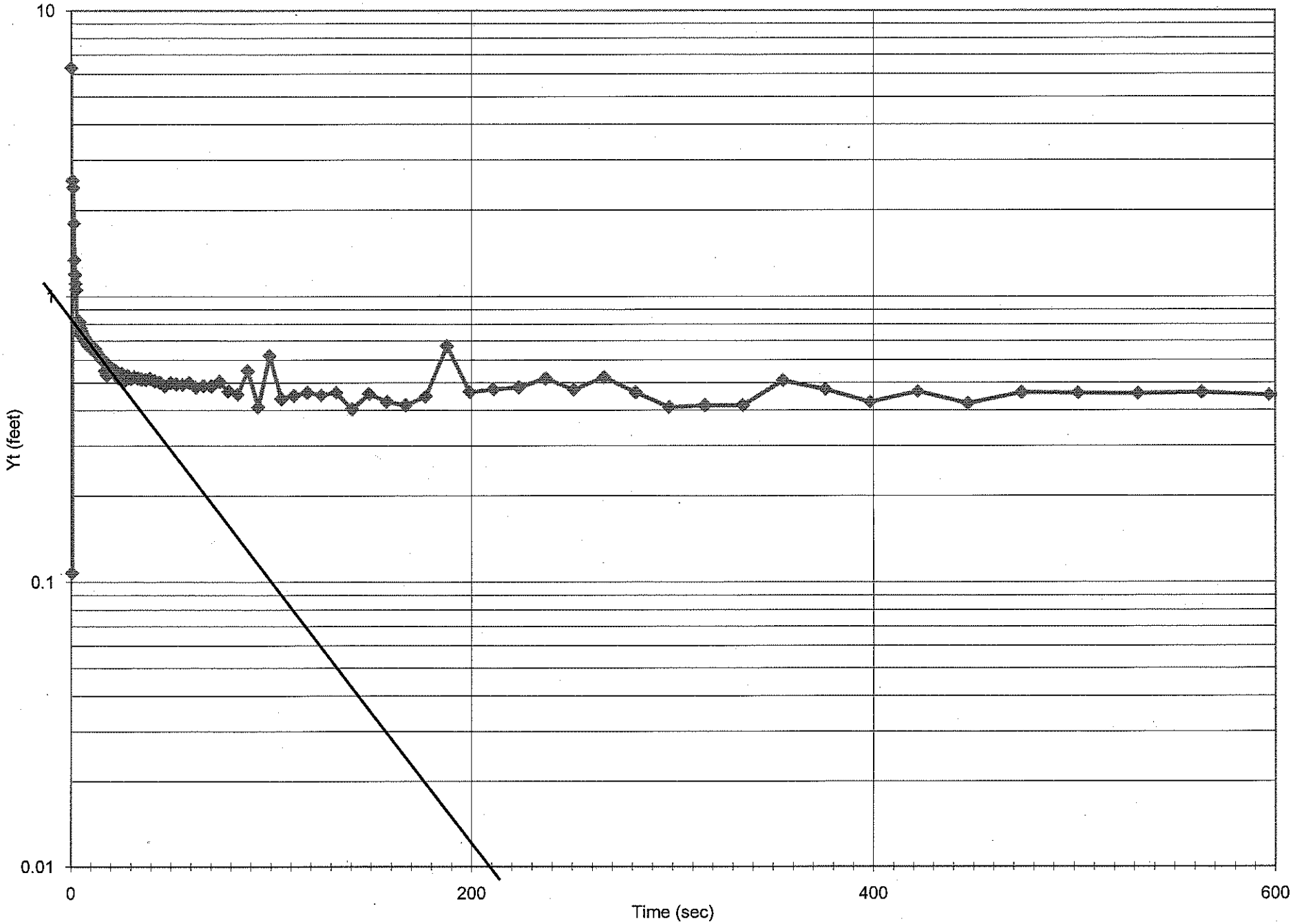
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

625 re-test Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



625 re-test Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:22:29
Report fron ...\SN07633 2008-06-19 130020 625re Slug Out.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 625re Slug Out

Test define 6/19/2008 12:59:46
Test startec 6/19/2008 13:00:20
Test stoppe 6/19/2008 13:38:52

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 124

TOTAL DA 124

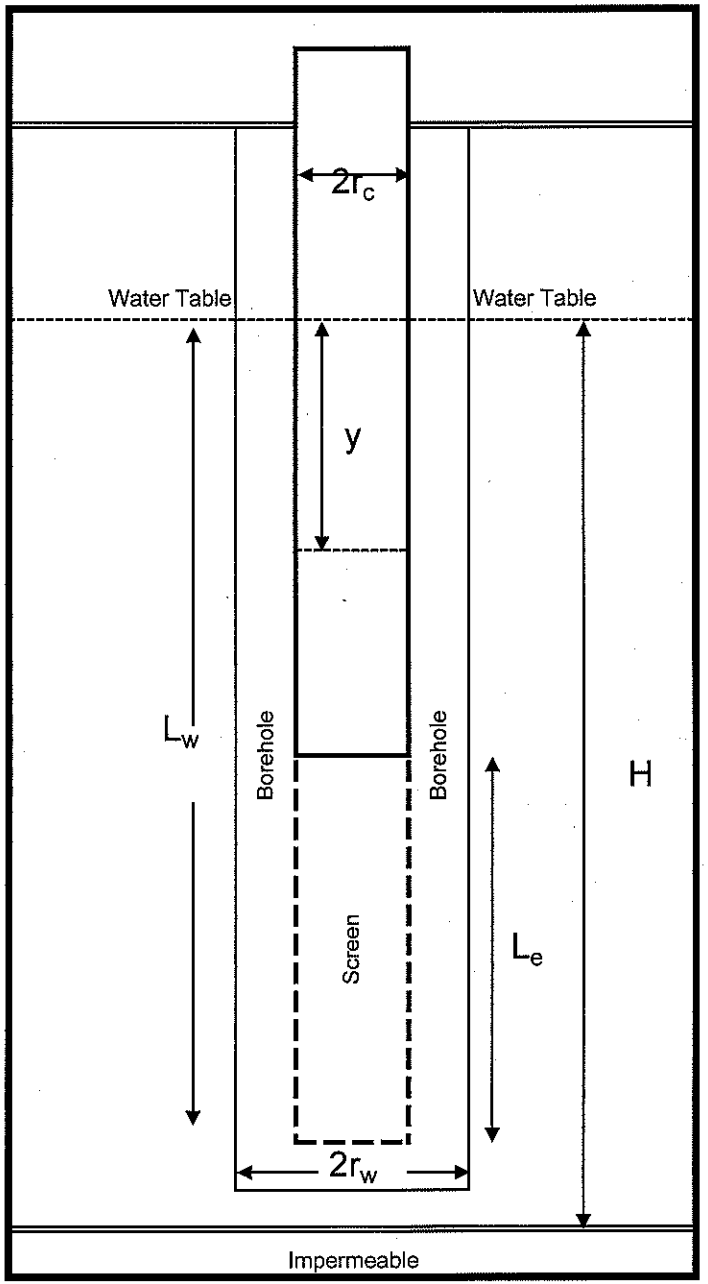
Channel number [1]
Measuren Temperature
Channel name:

Channel number [2]
Measuren Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	yt
6/19/2008	13:00:20	0	55.44	7.25	6.3
6/19/2008	13:00:20	0.3	55.46	13.442	0.108
6/19/2008	13:00:21	0.6	55.48	11.006	2.544
6/19/2008	13:00:21	0.9	55.5	11.149	2.401
6/19/2008	13:00:21	1.2	55.5	11.75	1.8
6/19/2008	13:00:21	1.5	55.5	12.21	1.34
6/19/2008	13:00:22	1.8	55.5	12.357	1.193
6/19/2008	13:00:22	2.1	55.5	12.441	1.109
6/19/2008	13:00:22	2.4	55.53	12.493	1.057
6/19/2008	13:00:23	2.7	55.53	12.738	0.812
6/19/2008	13:00:23	3	55.53	12.736	0.814
6/19/2008	13:00:23	3.3	55.53	12.721	0.829
6/19/2008	13:00:24	3.6	55.53	12.76	0.79
6/19/2008	13:00:24	3.9	55.53	12.733	0.817
6/19/2008	13:00:24	4.2	55.53	12.797	0.753
6/19/2008	13:00:24	4.5	55.53	12.816	0.734
6/19/2008	13:00:25	4.8	55.53	12.773	0.777
6/19/2008	13:00:25	5.1	55.53	12.793	0.757

6/19/2008	13:00:25	5.4	55.55	12.804	0.746
6/19/2008	13:00:26	5.7	55.55	12.814	0.736
6/19/2008	13:00:26	6	55.55	12.826	0.724
6/19/2008	13:00:26	6.4	55.55	12.832	0.718
6/19/2008	13:00:27	6.7	55.55	12.828	0.722
6/19/2008	13:00:27	7.1	55.55	12.851	0.699
6/19/2008	13:00:27	7.5	55.55	12.853	0.697
6/19/2008	13:00:28	8	55.55	12.87	0.68
6/19/2008	13:00:28	8.4	55.55	12.87	0.68
6/19/2008	13:00:29	8.9	55.55	12.876	0.674
6/19/2008	13:00:29	9.5	55.55	12.869	0.681
6/19/2008	13:00:30	10	55.53	12.89	0.66
6/19/2008	13:00:31	10.6	55.53	12.896	0.654
6/19/2008	13:00:31	11.3	55.53	12.902	0.648
6/19/2008	13:00:32	11.9	55.5	12.894	0.656
6/19/2008	13:00:33	12.6	55.5	12.91	0.64
6/19/2008	13:00:33	13.4	55.5	12.924	0.626
6/19/2008	13:00:34	14.2	55.5	12.931	0.619
6/19/2008	13:00:35	15	55.5	12.947	0.603
6/19/2008	13:00:36	15.9	55.5	12.945	0.605
6/19/2008	13:00:37	16.8	55.5	12.999	0.551
6/19/2008	13:00:38	17.8	55.5	13.019	0.531
6/19/2008	13:00:39	18.9	55.5	12.98	0.57
6/19/2008	13:00:40	20	55.5	12.988	0.562
6/19/2008	13:00:41	21.2	55.5	12.994	0.556
6/19/2008	13:00:42	22.4	55.5	13.001	0.549
6/19/2008	13:00:44	23.8	55.5	13.031	0.519
6/19/2008	13:00:45	25.2	55.5	13.011	0.539
6/19/2008	13:00:47	26.7	55.5	13.044	0.506
6/19/2008	13:00:48	28.2	55.5	13.021	0.529
6/19/2008	13:00:50	29.8	55.5	13.033	0.517
6/19/2008	13:00:51	31.5	55.5	13.025	0.525
6/19/2008	13:00:53	33.3	55.5	13.031	0.519
6/19/2008	13:00:55	35.2	55.5	13.036	0.514
6/19/2008	13:00:57	37.3	55.5	13.038	0.512
6/19/2008	13:00:59	39.5	55.5	13.033	0.517
6/19/2008	13:01:02	41.8	55.48	13.043	0.507
6/19/2008	13:01:04	44.3	55.48	13.048	0.502
6/19/2008	13:01:07	46.9	55.48	13.064	0.486
6/19/2008	13:01:10	49.7	55.48	13.05	0.5
6/19/2008	13:01:13	52.6	55.48	13.056	0.494
6/19/2008	13:01:16	55.7	55.48	13.058	0.492
6/19/2008	13:01:19	59	55.48	13.05	0.5
6/19/2008	13:01:22	62.5	55.48	13.068	0.482
6/19/2008	13:01:26	66.2	55.48	13.062	0.488
6/19/2008	13:01:30	70.1	55.48	13.064	0.486
6/19/2008	13:01:34	74.3	55.48	13.046	0.504
6/19/2008	13:01:39	78.7	55.48	13.083	0.467
6/19/2008	13:01:43	83.4	55.46	13.095	0.455
6/19/2008	13:01:48	88.4	55.46	13	0.55
6/19/2008	13:01:54	93.7	55.46	13.14	0.41
6/19/2008	13:01:59	99.3	55.46	12.928	0.622
6/19/2008	13:02:05	105.2	55.46	13.111	0.439
6/19/2008	13:02:11	111.5	55.46	13.099	0.451
6/19/2008	13:02:18	118.1	55.46	13.088	0.462
6/19/2008	13:02:25	125.1	55.46	13.097	0.453
6/19/2008	13:02:33	132.6	55.46	13.088	0.462

6/19/2008	13:02:40	140.5	55.46	13.146	0.404
6/19/2008	13:02:49	148.9	55.46	13.093	0.457
6/19/2008	13:02:58	157.8	55.46	13.121	0.429
6/19/2008	13:03:07	167.2	55.44	13.133	0.417
6/19/2008	13:03:17	177.2	55.44	13.103	0.447
6/19/2008	13:03:28	187.8	55.44	12.878	0.672
6/19/2008	13:03:39	199	55.44	13.086	0.464
6/19/2008	13:03:51	210.9	55.44	13.076	0.474
6/19/2008	13:04:03	223.5	55.44	13.068	0.482
6/19/2008	13:04:17	236.8	55.44	13.033	0.517
6/19/2008	13:04:31	250.9	55.44	13.078	0.472
6/19/2008	13:04:46	265.8	55.44	13.027	0.523
6/19/2008	13:05:02	281.6	55.44	13.088	0.462
6/19/2008	13:05:18	298.4	55.44	13.14	0.41
6/19/2008	13:05:36	316.2	55.44	13.134	0.416
6/19/2008	13:05:55	335	55.44	13.133	0.417
6/19/2008	13:06:15	354.9	55.44	13.041	0.509
6/19/2008	13:06:36	376	55.44	13.076	0.474
6/19/2008	13:06:58	398.4	55.44	13.123	0.427
6/19/2008	13:07:22	422.1	55.44	13.084	0.466
6/19/2008	13:07:47	447.2	55.44	13.127	0.423
6/19/2008	13:08:14	473.8	55.44	13.088	0.462
6/19/2008	13:08:42	502	55.41	13.09	0.46
6/19/2008	13:09:12	531.9	55.44	13.092	0.458
6/19/2008	13:09:43	563.5	55.44	13.088	0.462
6/19/2008	13:10:17	597	55.44	13.098	0.452
6/19/2008	13:10:52	632.5	55.41	13.102	0.448
6/19/2008	13:11:30	670.1	55.41	13.106	0.444
6/19/2008	13:12:10	709.9	55.41	13.115	0.435
6/19/2008	13:12:52	752.1	55.41	13.113	0.437
6/19/2008	13:13:37	796.8	55.41	13.121	0.429
6/19/2008	13:14:24	844.2	55.41	13.111	0.439
6/19/2008	13:15:14	894.4	55.41	13.131	0.419
6/19/2008	13:16:07	947.5	55.41	13.125	0.425
6/19/2008	13:17:04	1003.8	55.41	13.135	0.415
6/19/2008	13:18:03	1063.4	55.41	13.15	0.4
6/19/2008	13:19:07	1126.6	55.41	13.144	0.406
6/19/2008	13:20:13	1193.5	55.41	13.193	0.357
6/19/2008	13:21:24	1264.4	55.41	13.096	0.454
6/19/2008	13:22:39	1339.5	55.41	13.1	0.45
6/19/2008	13:23:59	1419	55.41	13.162	0.388
6/19/2008	13:25:23	1503.3	55.41	13.189	0.361
6/19/2008	13:26:53	1592.6	55.41	13.176	0.374
6/19/2008	13:28:27	1687.1	55.41	13.154	0.396
6/19/2008	13:30:07	1787.2	55.41	13.181	0.369
6/19/2008	13:31:53	1893.3	55.41	13.183	0.367
6/19/2008	13:33:46	2005.7	55.41	13.201	0.349
6/19/2008	13:35:45	2124.7	55.41	13.17	0.38
6/19/2008	13:37:51	2250.8	55.41	13.201	0.349



Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	13.1
L_e	Feet	10
H*	Feet	200
y_0	Feet	2.7
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	118

Solutions
Hydraulic Conductivity in Feet/Second
4.90E-05
Hydraulic Conductivity in Feet/Minute
2.94E-03
Hydraulic Conductivity in Feet/Day
4.23E+00

* - Assumed value

Calculations			
Term	Units		2.974
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{\text{partial penetration}}$ =
A	None	2.780	2.390
B	None	0.430	$\ln(R_e/r_W)_{\text{full penetration}}$ =
C	None	2.336	2.974

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

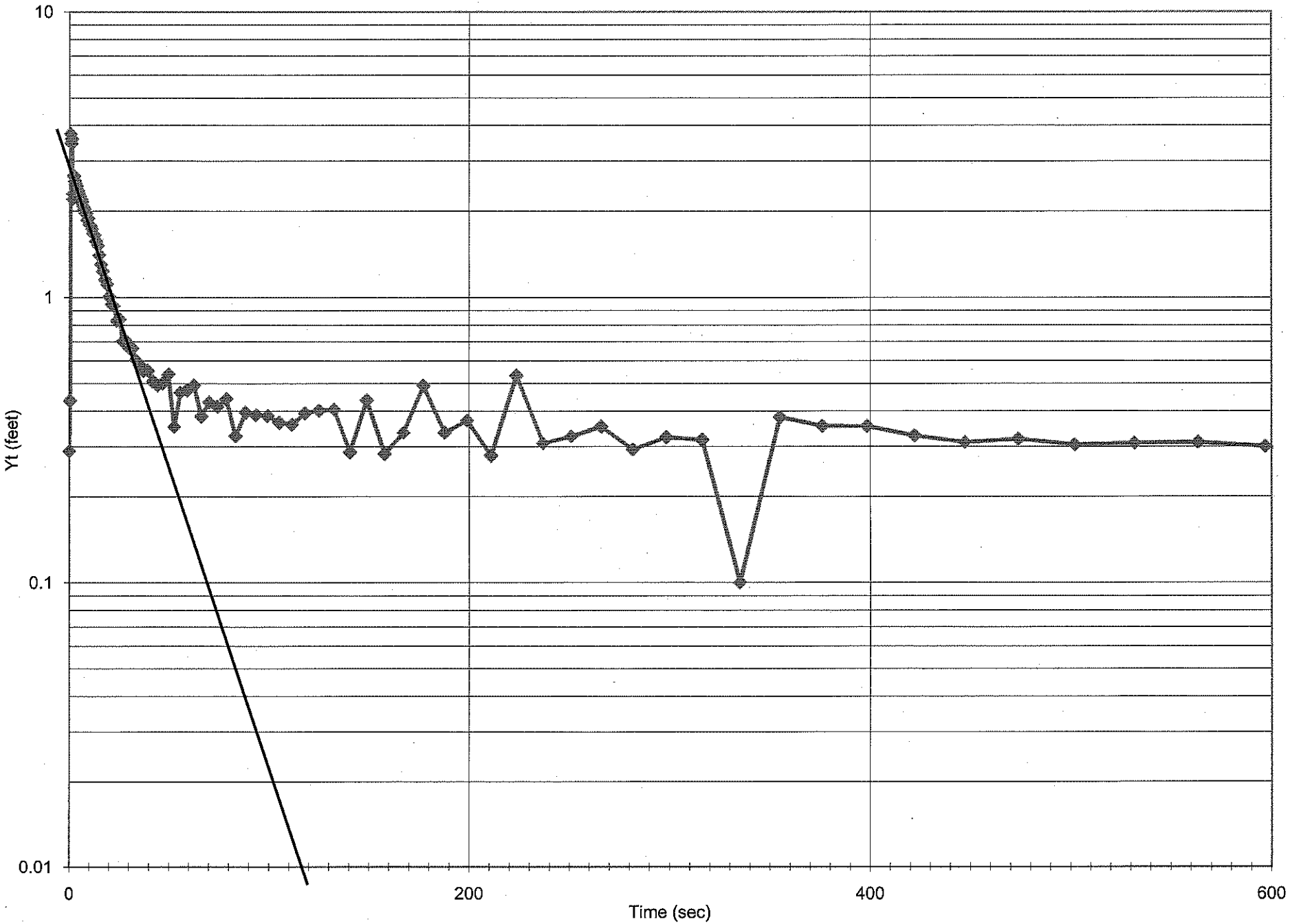
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B\ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

627s Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



627s Slug In
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:13:31
Report fron ...\SN07633 2008-06-18 162142 627s Slug In.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 627s Slug In

Test define 6/18/2008 16:21:06
Test startec 6/18/2008 16:21:42
Test stoppe 6/18/2008 17:03:59

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 126

TOTAL DA 126

Channel number [1]
Measurem Temperature
Channel name:

Channel number [2]
Measurem Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	yt
6/18/2008	16:21:42	0	53.21	12.139	0.289
6/18/2008	16:21:42	0.3	53.26	12.286	0.436
6/18/2008	16:21:42	0.6	53.26	15.591	3.741
6/18/2008	16:21:43	0.9	53.28	15.32	3.47
6/18/2008	16:21:43	1.2	53.28	15.44	3.59
6/18/2008	16:21:43	1.5	53.3	14.06	2.21
6/18/2008	16:21:44	1.8	53.3	14.164	2.314
6/18/2008	16:21:44	2.1	53.3	14.529	2.679
6/18/2008	16:21:44	2.4	53.3	14.5	2.65
6/18/2008	16:21:44	2.7	53.3	14.409	2.559
6/18/2008	16:21:45	3	53.3	14.368	2.518
6/18/2008	16:21:45	3.3	53.3	14.315	2.465
6/18/2008	16:21:45	3.6	53.33	14.311	2.461
6/18/2008	16:21:46	3.9	53.33	14.237	2.387
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6/18/2008	16:21:47	5.7	53.33	14.062	2.212
6/18/2008	16:21:48	6	53.33	14.006	2.156
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6/18/2008	16:21:54	12.6	53.3	13.504	1.654
6/18/2008	16:21:55	13.4	53.3	13.42	1.57
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6/18/2008	16:38:26	1003.8	53.1	12.171	0.321
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6/18/2008	16:41:35	1193.5	53.1	12.191	0.341
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6/18/2008	16:49:49	1687.1	53.08	12.14	0.29
6/18/2008	16:51:29	1787.2	53.08	12.138	0.288
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6/18/2008	16:55:07	2005.7	53.08	12.164	0.314
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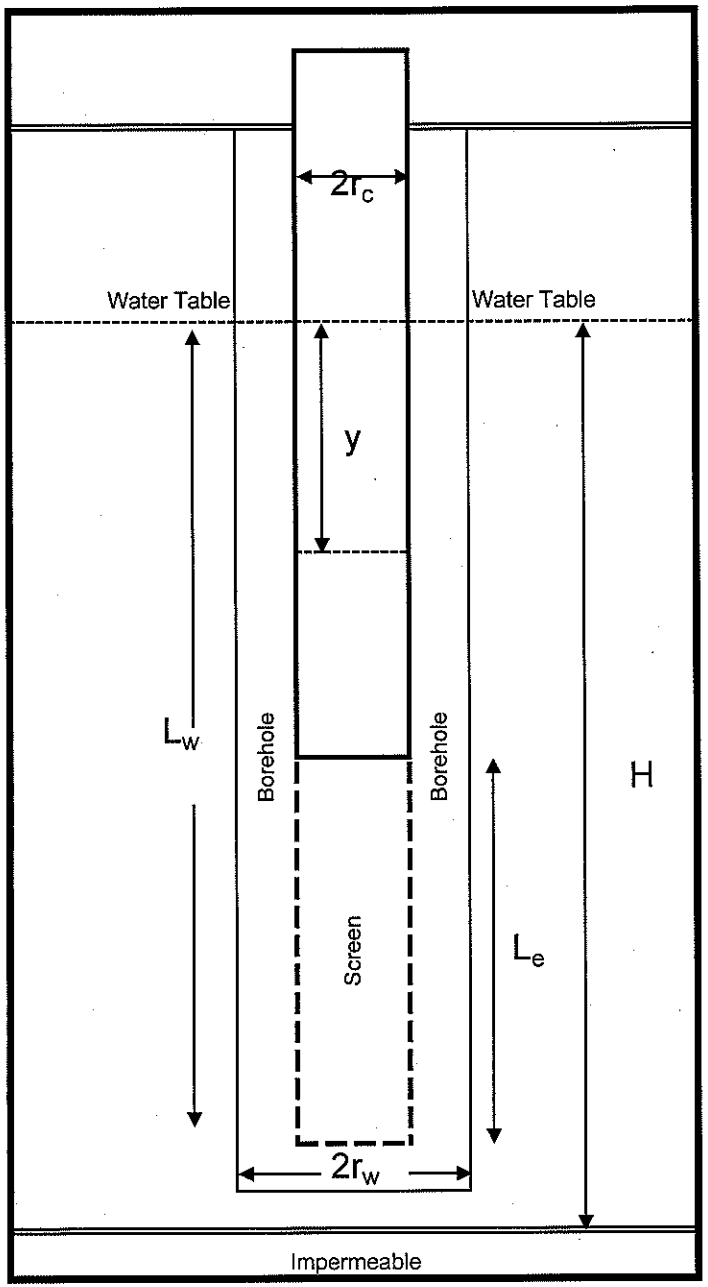


Input Data		
Term	Units	
$2r_c$	Inches	2
$2r_W$	Inches	6
L_w	Feet	13.1
L_e	Feet	10
H*	Feet	200
y_0	Feet	2
t_0	Seconds	0
y_t	Feet	0.01
t	Seconds	105

Solutions
Hydraulic Conductivity in Feet/Second
5.21E-05
Hydraulic Conductivity in Feet/Minute
3.13E-03
Hydraulic Conductivity in Feet/Day
4.50E+00

* - Assumed value

Calculations			
Term	Units		2.974
L_e/r_W	Feet/Foot	40.00	$\ln(R_e/r_W)_{partial\ penetration}$ =
A	None	2.780	2.390
B	None	0.430	$\ln(R_e/r_W)_{full\ penetration}$ =
C	None	2.336	2.974

General Equations

$$K = \frac{r_c^2 \ln(R_e/r_W)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

Where

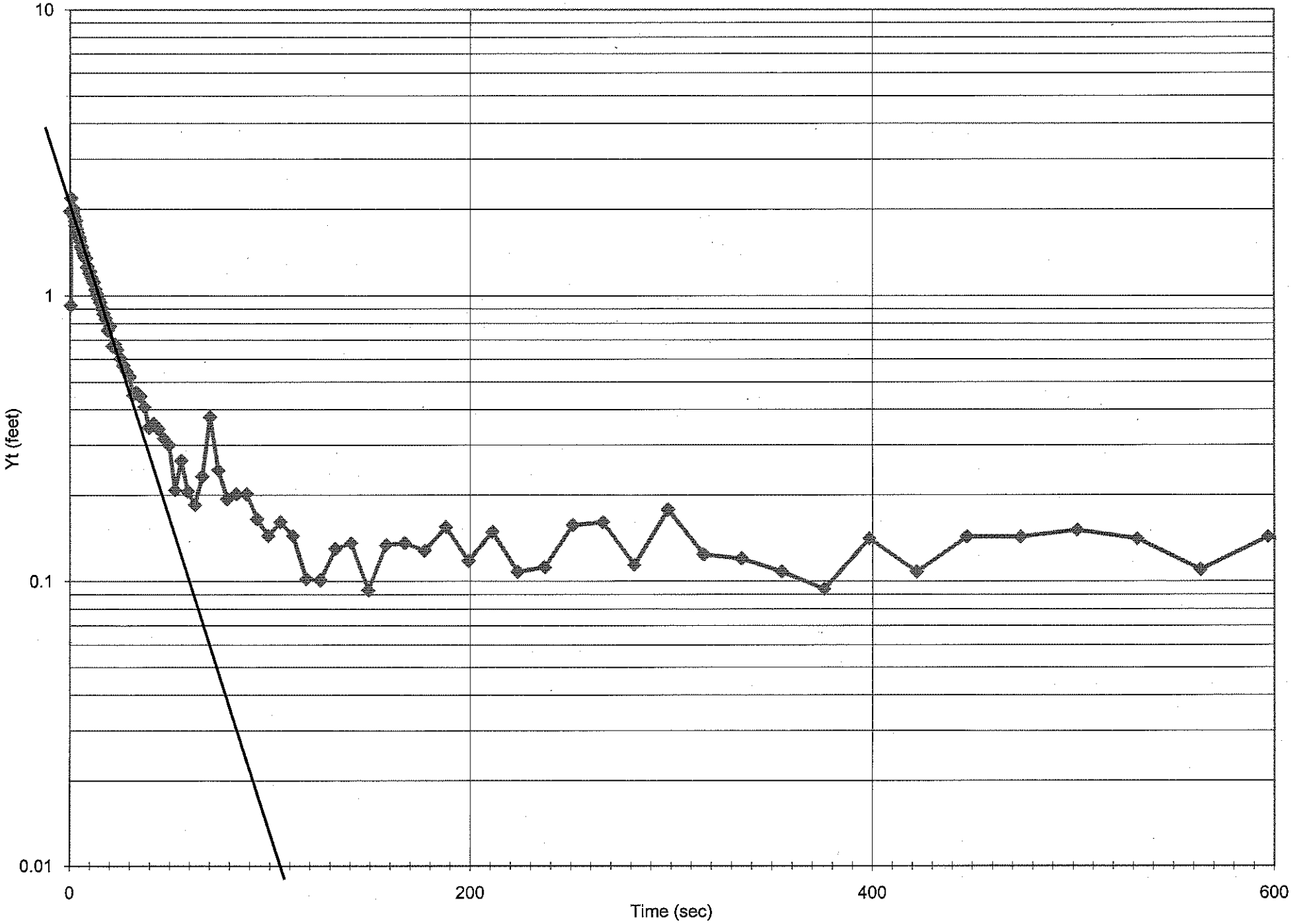
$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{A + B \ln[(H - L_W)/r_W]}{L_e/r_W}\right\}^{-1}$$

For partial penetration or the equation below for full penetration

$$\ln(Re/r_W) = \left\{\frac{1.1}{\ln(L_W/r_W)} + \frac{C}{L_e/r_W}\right\}^{-1}$$

627s Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM



627s Slug Out
Buncombe County C&D Facility Expansion
Site Hydrogeologic Investigation

CDM

In-Situ Inc. MiniTroll Pro

Report gen 6/20/2008 13:14:51
Report fron ...\SN07633 2008-06-18 170615 627s Slug Out.bin
Win-Situ® ' 4.57.0.0

Serial numl 7633
Firmware V 3.09
Unit name: Buncombe

Test name: 627s Slug Out

Test define 6/18/2008 17:04:56
Test started 6/18/2008 17:06:15
Test stoppe 6/18/2008 17:17:59

Data gathered using Logarithmic testing
Maximum Seconds.
Number c 103

TOTAL DA 103

Channel number [1]
Measuren Temperature
Channel name:

Channel number [2]
Measuren Pressure
Channel name:
Sensor Ra 30 PSIG.
Sensor Of 0.000 psi
Specific g 1

Date	Time	ET (sec)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	yt
6/18/2008	17:06:15	0	53.08	10.231	1.969
6/18/2008	17:06:15	0.3	53.1	11.274	0.926
6/18/2008	17:06:15	0.6	53.12	10.009	2.191
6/18/2008	17:06:16	0.9	53.12	10.209	1.991
6/18/2008	17:06:16	1.2	53.14	10.232	1.968
6/18/2008	17:06:16	1.5	53.14	10.261	1.939
6/18/2008	17:06:17	1.8	53.14	10.191	2.009
6/18/2008	17:06:17	2.1	53.14	10.31	1.89
6/18/2008	17:06:17	2.4	53.14	10.378	1.822
6/18/2008	17:06:17	2.7	53.17	10.438	1.762
6/18/2008	17:06:18	3	53.17	10.374	1.826
6/18/2008	17:06:18	3.3	53.17	10.483	1.717
6/18/2008	17:06:18	3.6	53.17	10.555	1.645
6/18/2008	17:06:19	3.9	53.17	10.543	1.657
6/18/2008	17:06:19	4.2	53.17	10.6	1.6
6/18/2008	17:06:19	4.5	53.17	10.596	1.604
6/18/2008	17:06:20	4.8	53.17	10.619	1.581
6/18/2008	17:06:20	5.1	53.17	10.652	1.548

6/18/2008	17:06:20	5.4	53.17	10.72	1.48
6/18/2008	17:06:20	5.7	53.19	10.736	1.464
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6/18/2008	17:06:23	8	53.19	10.849	1.351
6/18/2008	17:06:23	8.4	53.19	10.946	1.254
6/18/2008	17:06:24	8.9	53.19	10.932	1.268
6/18/2008	17:06:24	9.5	53.19	10.999	1.201
6/18/2008	17:06:25	10	53.17	10.985	1.215
6/18/2008	17:06:25	10.6	53.17	11.042	1.158
6/18/2008	17:06:26	11.3	53.17	11.067	1.133
6/18/2008	17:06:27	11.9	53.17	11.088	1.112
6/18/2008	17:06:27	12.6	53.14	11.147	1.053
6/18/2008	17:06:28	13.4	53.14	11.182	1.018
6/18/2008	17:06:29	14.2	53.14	11.221	0.979
6/18/2008	17:06:30	15	53.14	11.252	0.948
6/18/2008	17:06:31	15.9	53.14	11.295	0.905
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6/18/2008	17:06:35	20	53.14	11.416	0.784
6/18/2008	17:06:36	21.2	53.14	11.534	0.666
6/18/2008	17:06:37	22.4	53.14	11.523	0.677
6/18/2008	17:06:39	23.8	53.14	11.55	0.65
6/18/2008	17:06:40	25.2	53.14	11.595	0.605
6/18/2008	17:06:41	26.7	53.14	11.628	0.572
6/18/2008	17:06:43	28.2	53.14	11.655	0.545
6/18/2008	17:06:45	29.8	53.14	11.678	0.522
6/18/2008	17:06:46	31.5	53.12	11.751	0.449
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6/18/2008	17:06:52	37.3	53.12	11.791	0.409
6/18/2008	17:06:54	39.5	53.12	11.854	0.346
6/18/2008	17:06:57	41.8	53.12	11.842	0.358
6/18/2008	17:06:59	44.3	53.12	11.858	0.342
6/18/2008	17:07:02	46.9	53.12	11.883	0.317
6/18/2008	17:07:04	49.7	53.12	11.9	0.3
6/18/2008	17:07:07	52.6	53.12	11.992	0.208
6/18/2008	17:07:10	55.7	53.12	11.935	0.265
6/18/2008	17:07:14	59	53.12	11.994	0.206
6/18/2008	17:07:17	62.5	53.12	12.015	0.185
6/18/2008	17:07:21	66.2	53.1	11.967	0.233
6/18/2008	17:07:25	70.1	53.1	11.823	0.377
6/18/2008	17:07:29	74.3	53.1	11.955	0.245
6/18/2008	17:07:33	78.7	53.1	12.006	0.194
6/18/2008	17:07:38	83.4	53.1	11.998	0.202
6/18/2008	17:07:43	88.4	53.1	11.998	0.202
6/18/2008	17:07:48	93.7	53.1	12.035	0.165
6/18/2008	17:07:54	99.3	53.1	12.056	0.144
6/18/2008	17:08:00	105.2	53.08	12.039	0.161
6/18/2008	17:08:06	111.5	53.1	12.056	0.144
6/18/2008	17:08:13	118.1	53.08	12.098	0.102
6/18/2008	17:08:20	125.1	53.08	12.099	0.101
6/18/2008	17:08:27	132.6	53.08	12.07	0.13

6/18/2008	17:08:35	140.5	53.08	12.064	0.136
6/18/2008	17:08:44	148.9	53.08	12.107	0.093
6/18/2008	17:08:53	157.8	53.08	12.066	0.134
6/18/2008	17:09:02	167.2	53.08	12.064	0.136
6/18/2008	17:09:12	177.2	53.08	12.072	0.128
6/18/2008	17:09:23	187.8	53.05	12.045	0.155
6/18/2008	17:09:34	199	53.05	12.082	0.118
6/18/2008	17:09:46	210.9	53.05	12.051	0.149
6/18/2008	17:09:58	223.5	53.05	12.092	0.108
6/18/2008	17:10:12	236.8	53.05	12.088	0.112
6/18/2008	17:10:26	250.9	53.05	12.043	0.157
6/18/2008	17:10:41	265.8	53.05	12.039	0.161
6/18/2008	17:10:56	281.6	53.05	12.086	0.114
6/18/2008	17:11:13	298.4	53.05	12.022	0.178
6/18/2008	17:11:31	316.2	53.05	12.076	0.124
6/18/2008	17:11:50	335	53.05	12.08	0.12
6/18/2008	17:12:10	354.9	53.05	12.092	0.108
6/18/2008	17:12:31	376	53.05	12.106	0.094
6/18/2008	17:12:53	398.4	53.05	12.059	0.141
6/18/2008	17:13:17	422.1	53.05	12.092	0.108
6/18/2008	17:13:42	447.2	53.05	12.057	0.143
6/18/2008	17:14:09	473.8	53.05	12.057	0.143
6/18/2008	17:14:37	502	53.05	12.049	0.151
6/18/2008	17:15:07	531.9	53.05	12.059	0.141
6/18/2008	17:15:38	563.5	53.05	12.09	0.11
6/18/2008	17:16:12	597	53.05	12.057	0.143
6/18/2008	17:16:47	632.5	53.05	12.074	0.126
6/18/2008	17:17:25	670.1	53.05	11.969	0.231

Buncombe County, North Carolina

Buncombe County Solid Waste Management Facility

C&D Landfill Expansion
Part 3: Facility Plan

April 2009
REVISED APRIL 2015 BY MCGILL ASSOCIATES, P.A.

Part 3: Facility Plan Contents

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Appendices

Appendix A Facility Plan Drawings
Appendix B Location Restrictions

Section 1
Facility Drawings

A set of facility drawings have been prepared in compliance with Rule .0537 (d). These drawings include conceptual site development and landfill operation sheets and are included in Appendix A.

1.1 Site Development

Three drawings were prepared on topographic maps representative of existing site conditions. The first drawing, Sheet SD-1, contains a topographical survey of the entire site representative of existing site conditions locating all property boundaries for the proposed landfill facility certified by an individual licensed to practice land surveying in the State of North Carolina. Also included is the following:

- areal limits of all solid waste management facilities and facility infrastructure, including landfill units and buffer requirements set forth in 15A NCAC 13B .0540(1);
- areal limits of borrow and stockpile; and
- any physical features referenced in Rule 15A NCAC 13B .0536 (Location Restrictions).

Sheet SD-2 illustrates the phases of development and areal limits of grading. Sheet SD-3 depicts the proposed final contours for the C&D landfill unit and facility feature for closure.

1.2 Landfill Operation

Landfill Operation Sheets 1-5 show the proposed transitional contours and construction grading for the new phases. Five drawings were prepared detailing the long-term operation of the C&D landfill unit. Proposed transitional contours and final grades for each phase of development (Phases 5 through 8) are shown on Drawings LO-1 through LO-5.

Section 2
Facility Report

This facility report contains characteristics of the waste stream to be received at the landfill facility and of the landfill capacity as required by Rule .0537(e).

2.1 Waste Stream

Per Rule .0537(e)(1), a discussion of the characteristics of the waste received at the facility and facility specific management plans is as follows.

2.1.1 Types of Waste Specified for Disposal

From the Permit to Operate – Asbestos Modification, dated March 5, 2008, the County is permitted to dispose of construction or demolition debris, inert debris, land-clearing debris, and asphalt in accordance with the corresponding General Statute. The C&D landfill is also permitted to dispose of asbestos waste in accordance with Rule .0542(c) and must be managed per 40 CFR 61.

Waste, listed in Rule .0542(e), may not be accepted for disposal including, but not limited to yard trash, municipal solid waste, and liquid or industrial wastes.

The County will continue to dispose of waste types as specified in the current Permit to Operate.

2.1.2 Disposal Rates

Table 2-1 presents yearly disposal rates as provided by the County scale house and includes a representative daily rate assuming 284 operating days (365 days - 52 Sundays - 26 Saturdays (half days) - 3 holidays). It is anticipated that the annual amount of waste to be disposed will be approximately 63,000 tons of C&D waste per year (222 tons per day).

Table 2-1 – Disposal Rates

FY[1]	Tons Disposed	Daily Rate (tons/day)
98-99	30,898	109
99-00	43,147	152
00-01	43,370	153
01-02	24,238	85
02-03	8,209	29
03-04	29,889	105
04-05	39,252	138
05-06	58,730	207
06-07	66,388	234
07-08	62,849	222

[1]Fiscal year is from July to June.

2.1.3 Areas Served by the Facility

The Buncombe County C&D landfill will serve only waste streams originating from Buncombe County. Buncombe County, approximately 659 square miles in area, includes the incorporated municipalities of Asheville, Biltmore Forest, Black Mountain, Montreat, Weaverville, and Woodfin.

2.1.4 Segregated Management

The Buncombe County Solid Waste Management Facility staff place a high priority on proper management of incoming waste. The same level of concern and effort is put forth for the operation of the C&D landfill. Waste screening and segregation procedures are included in the Operation Plan.

2.1.5 Landfill Equipment

Equipment currently owned by the County and utilized at the C&D landfill includes the following:

- 1 – 390-E Trashmaster
- 1 – D-6 CAT Dozer
- 1 – Waste Screening Vehicle (Ford F-150 Truck)

No additional equipment purchases are anticipated as a result of expanding the C&D disposal capacity.

2.2 Landfill Capacity

2.2.1 Gross Capacity

AutoCAD Civil 3D 2008 software was used to estimate the gross capacity between the base grades and the top of the proposed final cover grades for the proposed C&D landfill. The gross capacity (waste and daily, intermediate, and final cover) of the landfill is approximately 1.7 million cubic yards (cy).

2.2.2 Phased Gross Capacity

AutoCAD Civil 3D 2008 software was used to estimate the phased gross capacity and is presented in Table 2-2.

[1]Table 2-2 – Phased Gross Capacity

Phase	Gross Capacity (cy)
5	285,500
5 EXPANSION	150,000
6	607,700
7	612,600
8	159,700
Total	1,815,500

2.2.3 Soil Required for Landfill Construction

Soil is required for landfill construction to install access/haul roads, stormwater control measures, and, when necessary, to establish the required minimum four feet separation between the bottom elevation of waste and seasonal high groundwater table and the bedrock datum plane contours. For the Buncombe County C&D landfill, seasonal high groundwater table is below bedrock, so the bedrock contours govern the four feet separation when applicable.

2.2.4 Soil Required for Final Cover

The final cover material volume required to construct the three-foot thick cover system for each phase is determined by delineating final slopes (see Table 3-3).

[1] Revision for Phase 5 Expansion prepared by McGill Associates, P.A. in April 2015.

Required Final Cover = Final Cover Area x 3-foot Thick Cover System

2.2.5 Soil Required for Operations

It is anticipated that the County will use an alternative cover material for the required weekly cover. An intermediate, stabilizing material will be used for areas which will not have additional wastes placed on them for three months or more, but where final termination of disposal operations has not occurred. When the County resumes disposal in these areas, they will scrap off the intermediate cover and use it for the final cover once areas are at final grades.

2.2.6 Net Capacity

Table 3-3 present the net capacity available for C&D debris disposal is calculated as:

Net Capacity = Gross Capacity – Final Cover

2.2.7 C&D Landfill Operating Life

The first step in calculating the operating life of each C&D landfill phase is to convert available net airspace to available C&D debris tonnage. From the July 2008 Airspace Analysis Report, the C&D in-place density is 0.65 tons per cubic yard (cy) (the calculated in-place density includes operational soils). Available tonnage is calculated as:

Available Tonnage = Net Capacity x 0.65 tons/ cy

The approximate average disposal rate for the C&D landfill for the past three fiscal years is 63,000 tons per year from Table 2-1. An average disposal rate of 63,000 tons per year is used in the following calculation. Table 2-3 presents the estimated operating life for the C&D disposal unit is, therefore, calculated as:

Operating Life = Available Tonnage/Average Disposal Rate

[2] Table 2-3 – Operating Life

Phase	Final Cover Area (acre)	Soil Required for Final Cover (cy)	Available Net Airspace (cy)	Operating Life (yrs)
5	10.7	51,800	381,290	2.4
5 EXPANSION	0.48	2,323	125,000	1.3
6	5.9	28,600	579,100	6.0
7	7.7	37,300	575,300	5.9
8	5.4	26,200	133,600	1.4
TOTAL			**1,646,700**	**17**

2.2.8 Net Balance of On-site Soils

Earthwork fill volume associated with the construction of each phase of the C&D landfill was estimated based on the proposed base grades and governing four feet of separation. A volume computation, using AutoCAD Civil 3D 2008, resulted in an even cut/fill soil balance for the construction of Phase 5. Phase 6 soil balance during construction was calculated to be a soil surplus of approximately 104,000 cy. Phases 7 and 8 are vertical expansions and will not require soil for construction. Table 2-4 presents the net soil required for construction and closure of each phase and was calculated by the following:

Fill + Final Cover = Net Soil Required

[2]Table 2-4 – Net Soils Balance

Phase	Net Soil Required (yd^3)		
	Construction	Final Cover	TOTAL
5	0	54,210	54,210
6	-104,000	28,600	-75,400
7	0	37,300	37,300
8	0	26,200	26,200

[2] Revision for Phase 5 Expansion prepared by McGill Associates, P.A. in April 2015.

Soil materials for construction of the landfill base and cap will be obtained from the on-site borrow areas as presented on Sheet SD-1. The current borrow source area is being exhausted and the County proposes to move into the proposed borrow source area as delineated on Sheet SD-1 on contingency of North Carolina Department of Environment and Natural Resources, Solid Waste Section (NCDENR SWS) approval. The proposed borrow source area has a potential soil volume of approximately 645,000 cy. Assuming a swell factor of 1.25 the loose soil volume is approximately 806,000 cy. Also, assuming the County using 300 cy of soil a day, working 284 days per year, the proposed borrow source life is approximately 9 to 10 years.

As stated, the proposed borrow source area will provide adequate soil for operations and final cover for the proposed C&D landfill expansion.

2.3 Special Engineering Features

2.3.1 Containment and Environmental Control Systems

2.3.1.1 Closure Cap System

A closure cap will be designed and constructed when portions of the C&D landfill are at closure grades to reduce the infiltration and erosion per Rule .0543 (c)(1). The cap system will be 3-foot thick and be designed and constructed to:

(A) have a permeability less than or equal to soils underlying the landfill, or the permeability specified for the final cover in the effective permit, or a permeability no greater than 1.0×10^{-5} cm/sec, whichever is less;

(B) minimize infiltration through the closed C&DLF unit by the use of a low-permeability barrier that contains a minimum 18 inches of earthen material; and

(C) minimize erosion of the cap system and protect the low-permeability barrier from root penetration by use of an erosion layer that contains a minimum of 18 inches of earthen material that is capable of sustaining native plant growth.

A gas venting or collection system will be installed below the low-permeability barrier to minimize pressures exerted on the barrier.

2.3.1.2 Sedimentation and Erosion Control

A Sedimentation and Erosion Control Plan will be submitted for approval to the NCDENR, Land Quality Section before construction of each phase. Internal stormwater berms will be utilized to minimize the amount of stormwater that comes in contact with waste. Temporary erosion control measures, such as silt fences, fast germinating vegetation, rock check dams, etc. will be installed as necessary to reduce the amount of sedimentation and erosion during construction activities.

2.3.1.3 Landfill Subgrade

Per Rule .0540 (2), each proposed phase will be constructed so that the post-settlement bottom elevation of waste is a minimum of four feet above the seasonal high groundwater table as established in the Design Hydrogeological Report (see Part 5 of this report). Additionally, per Rule .0540 (2)(b), on-site soils will be used to construct the upper two feet of separation since they meet and/or exceed the required soil classifications.

Part 3
Facility Plan

Appendix A
Facility Plan Drawings

BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL PERMIT DRAWINGS

LOCATION MAP

VICINITY MAP

VICINITY MAP
NOT TO SCALE

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FACILITY PLAN DRAWINGS

SD–1 SITE DEVELOPMENT EXISTING CONDITIONS
SD–2 SITE DEVELOPMENT C&D LANDFILL EXPANSION
SD–3 SITE DEVELOPMENT FINAL CLOSURE
LO–1 LANDFILL OPERATION TRANSITION CONTOURS – PHASE 5 BASEGRADES
LO–2 LANDFILL OPERATION TRANSITION CONTOURS – PHASE 5 CLOSURE / PHASE 6 BASEGRADES
LO–3 LANDFILL OPERATION TRANSITION CONTOURS – PHASE 6 CLOSURE / PHASE 7 BASEGRADES
LO–4 LANDFILL OPERATION TRANSITION CONTOURS – PHASE 7 CLOSURE / PHASE 8 BASEGRADES
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EP–4 BEDROCK SURFACE CONTOUR MAP
EP–5 ESTIMATED SEASONAL HIGH GROUNDWATER SURFACE MAP
EP–6 CLOSURE GRADING PLAN
EP–7 EROSION AND SEDIMENTATION CONTROL DETAILS (1 OF 2)
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EP–9 CLOSURE DETAILS

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OP–2 GRADING PLAN
OP–3 TRANSITION CONTOURS – YEAR 1
OP–4 TRANSITION CONTOURS – YEAR 2
OP–5 TRANSITION CONTOURS – FINAL CLOSURE

APRIL 2009

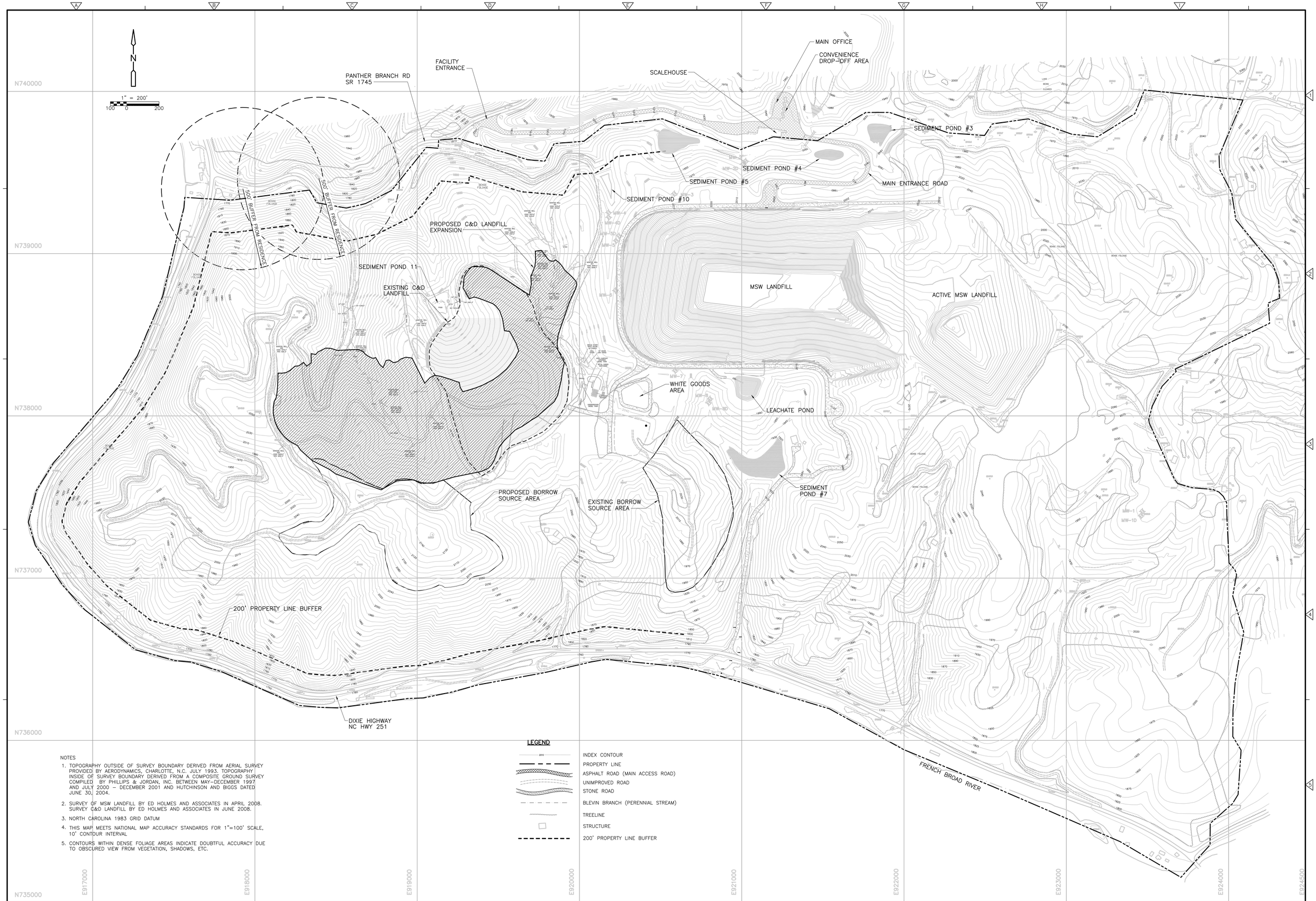
PREPARED BY

CDM Camp Dresser & McKee

consulting engineering construction operations

5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: 919–787–5620 Fax: 919–781–5730

6447–65973



NOTES

1. TOPOGRAPHY OUTSIDE OF SURVEY BOUNDARY DERIVED FROM AERIAL SURVEY PROVIDED BY AERODYNAMICS, CHARLOTTE, N.C. JULY 1993. TOPOGRAPHY INSIDE OF SURVEY BOUNDARY DERIVED FROM A COMPOSITE GROUND SURVEY COMPILED BY PHILLIPS & JORDAN, INC. BETWEEN MAY–DECEMBER 1997 AND JULY 2000 – DECEMBER 2001 AND HUTCHINSON AND BIGGS DATED JUNE 30, 2004.
2. SURVEY OF MSW LANDFILL BY ED HOLMES AND ASSOCIATES IN APRIL 2008. SURVEY C&D LANDFILL BY ED HOLMES AND ASSOCIATES IN JUNE 2008.
3. NORTH CAROLINA 1983 GRID DATUM
4. THIS MAP MEETS NATIONAL MAP ACCURACY STANDARDS FOR 1"=100' SCALE, 10' CONTOUR INTERVAL
5. CONTOURS WITHIN DENSE FOLIAGE AREAS INDICATE DOUBTFUL ACCURACY DUE TO OBSCURED VIEW FROM VEGETATION, SHADOWS, ETC.

LEGEND

- INDEX CONTOUR
- PROPERTY LINE
- ASPHALT ROAD (MAIN ACCESS ROAD)
- UNIMPROVED ROAD
- STONE ROAD
- BLEVIN BRANCH (PERENNIAL STREAM)
- TREELINE
- STRUCTURE
- 200' PROPERTY LINE BUFFER

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY: K. YANG
CROSS CHK'D BY: C. GABEL
APPROVED BY: K. YANG
DATE: APRIL 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

SITE DEVELOPMENT
EXISTING CONDITIONS

PROJECT NO. 6447-65973
FILE NAME: SD-1.DWG

SHEET NO.
SD-1

NOT FOR CONSTRUCTION

PHASE 5
(11.7 ACRES)

PHASE 6,7,8
(18.1 ACRES)

ASBESTOS
DISPOSAL
AREA

PHASE 7
(VERTICAL EXPANSION
EL. 2030.0 TO EL. 2090.0)

PHASE 8
(VERTICAL EXPANSION
EL. 2090.0 TO EL. 2143.0)

REV. NO.	DATE	DRWN	CHKD	REMARKS

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Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

SITE DEVELOPMENT
C&D LANDFILL EXPANSION

PROJECT NO. 6447-65973
FILE NAME: SD-2.DWG

SHEET NO.
SD-2

NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY: K. YANG
CROSS CHK'D BY: C. GABEL
APPROVED BY: K. YANG
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CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

SITE DEVELOPMENT
FINAL CLOSURE

PROJECT NO. 6447-65973
FILE NAME: SD-3.DWG
SHEET NO.
SD-3

NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY: K. YANG
CROSS CHK'D BY: C. GABEL
APPROVED BY: K. YANG
DATE: APRIL 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

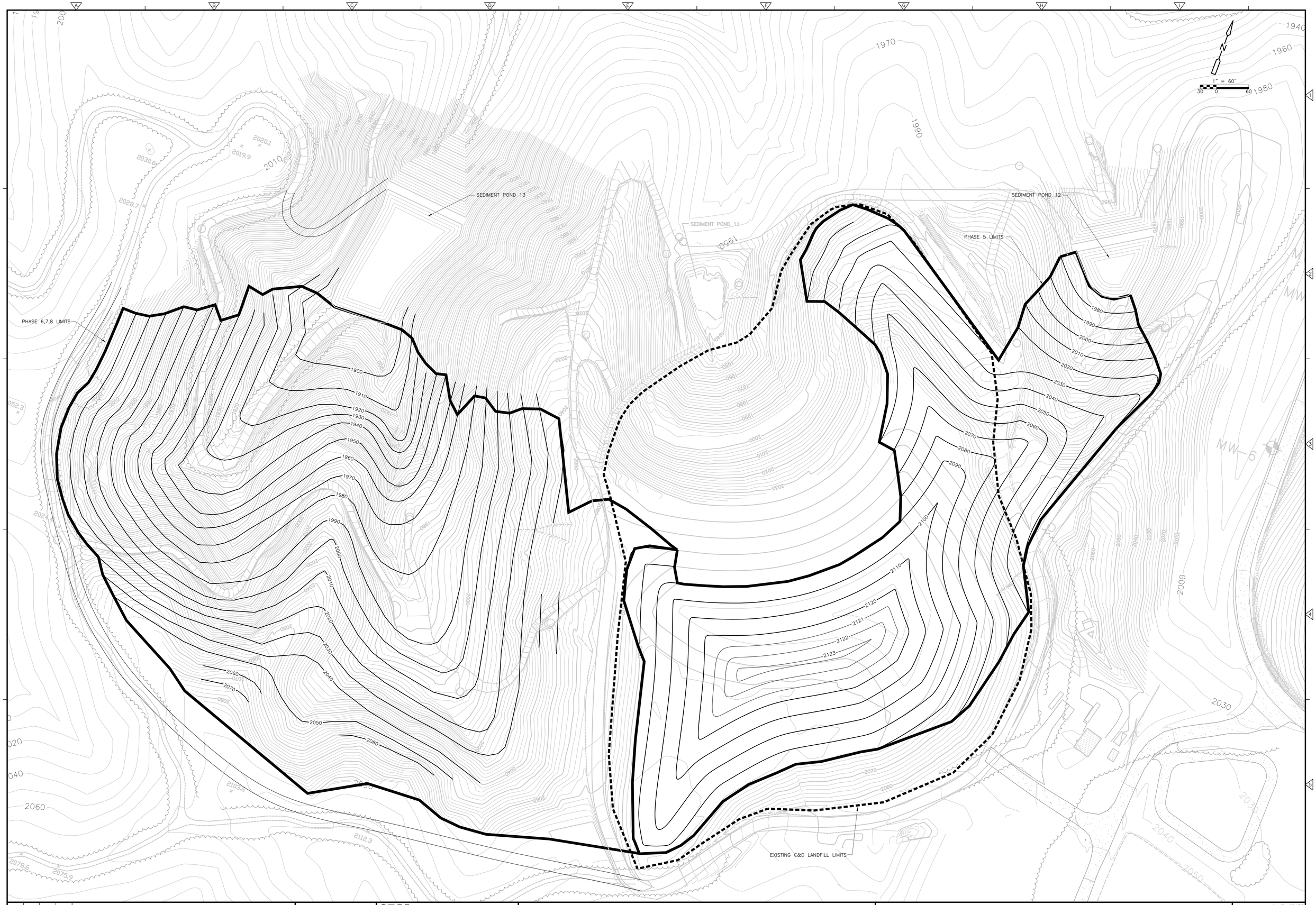
BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 5 BASEGRADES

PROJECT NO. 6447-65973
FILE NAME: LO-1.DWG

SHEET NO.
LO-1

NOT FOR CONSTRUCTION



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Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

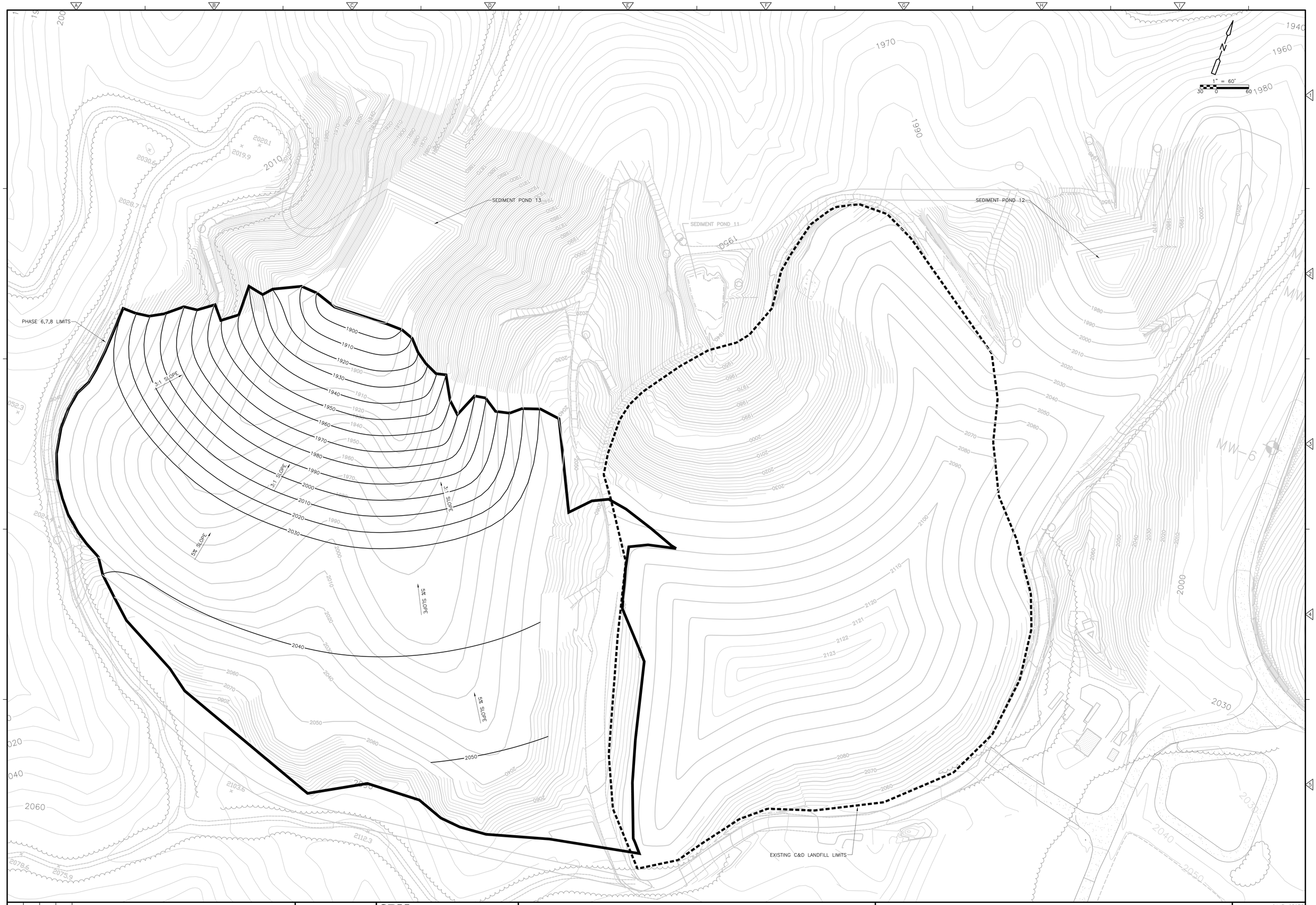
BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 5 CLOSURE / PHASE 6 BASEGRADES

PROJECT NO. 6447-65973
FILE NAME: LO-2.DWG
SHEET NO.
LO-2

NOT FOR CONSTRUCTION



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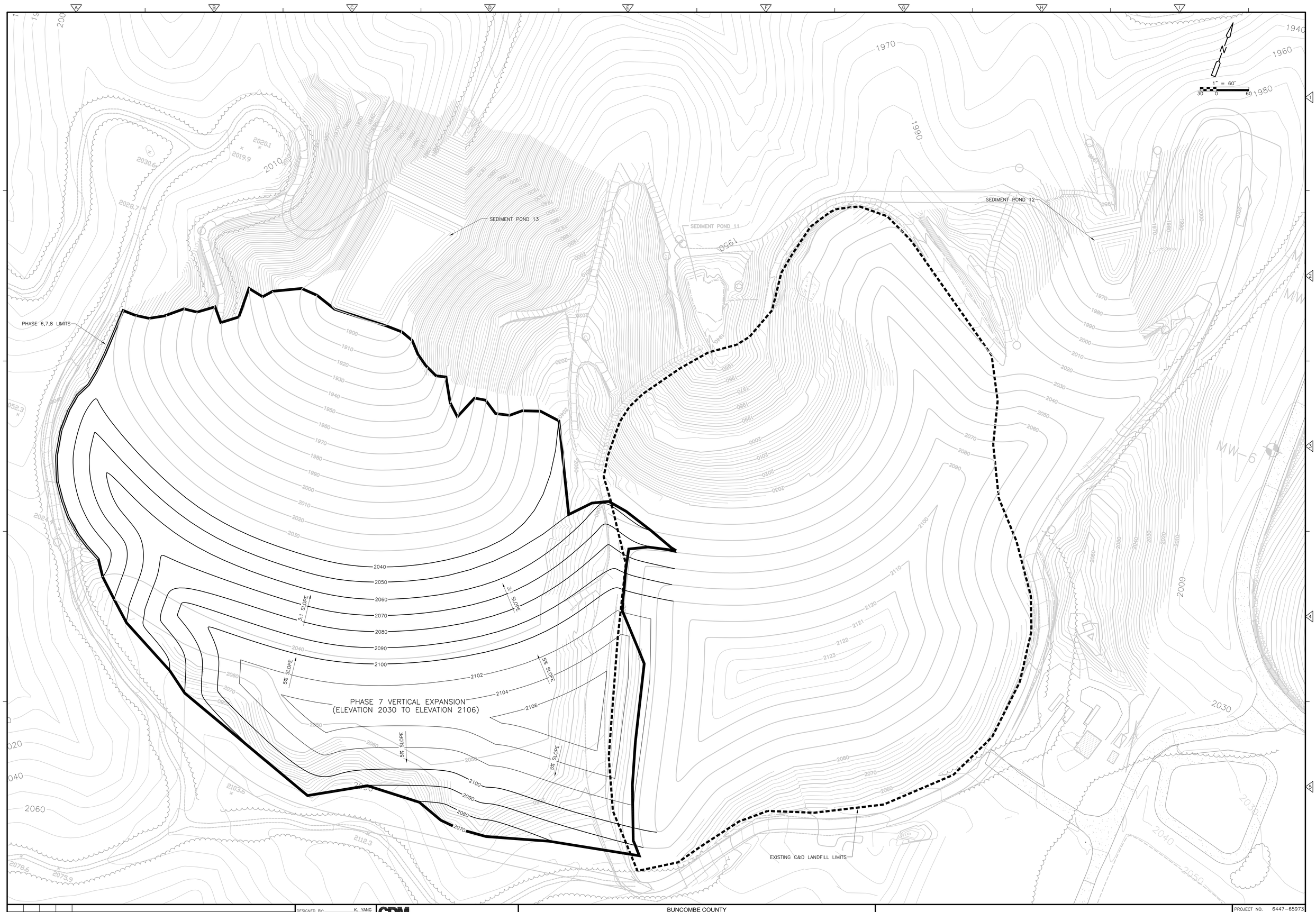
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 6 CLOSURE / PHASE 7 BASEGRADES

PROJECT NO. 6447-65973
FILE NAME: LO-3.DWG
SHEET NO.
LO-3

NOT FOR CONSTRUCTION



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CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

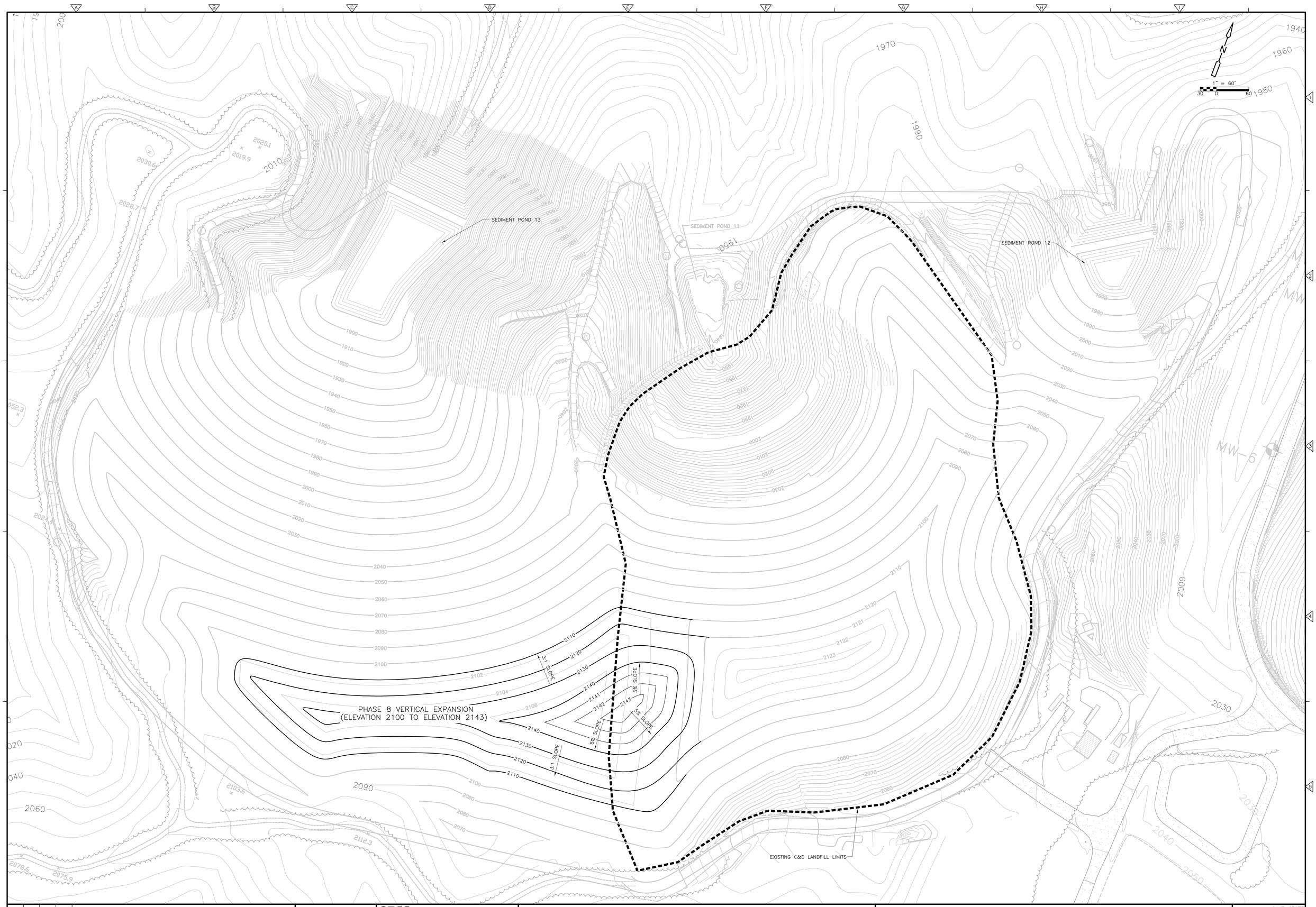
BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 7 CLOSURE / PHASE 8 BASEGRADES

PROJECT NO. 6447-65973
FILE NAME: LO-4.DWG

SHEET NO.
LO-4

NOT FOR CONSTRUCTION



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BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 8 CLOSURE

PROJECT NO. 6447-65973
FILE NAME: LO-5.DWG
SHEET NO.
LO-5

NOT FOR CONSTRUCTION

Part 3
Facility Plan

Appendix B
Location Restrictions

Appendix B – Location Restrictions
Facility Plan – C&D Landfill
Contents

Section 1 – Location Restrictions

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1.4 Cultural Resources 1-3
1.5 State Nature and Historic Preserves 1-4
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1.7 Endangered and Threatened Species 1-5

Attachments

Attachment A – Floodplain Map
Attachment B – PCN Form and Nationwide Permitting Approval Letters
Attachment C – State Historic Preservation Office/
Department of Cultural Resources Correspondence
Attachment D – Natural Heritage Program Correspondence
Attachment E – US Fish and Wildlife Service Correspondence

Section 1
Location Restrictions

Rule .0539 (d)(1)(D) of the North Carolina Solid Waste Management Rules requires that a report be prepared and submitted demonstrating compliance with the location restriction criteria in Rule .0536. Rule .0536 requires documentation or approvals by agencies other than the Division of Waste Management, Solid Waste Section that demonstrate compliance with specific location criteria. It is the intent of this section to provide location restriction demonstration for the C&D landfill facility plan. The location restrictions include:

- Floodplains;
- Wetlands;
- Unstable areas;
- Cultural resources;
- State nature and historic preserve;
- Water supply watersheds; and
- Endangered and threatened species.

CDM has reviewed available information pertaining to location restriction criteria relative to the proposed Buncombe County C&D landfill expansion. The following sections summarize the findings.

1.1 Floodplains

Rule .0536(c)(4), floodplain location restrictions, states:

(A) C&DLF units or constructed embankments used to construct a C&DLF unit must not be located in a 100-year floodplain unless a variance for the facility has been issued in accordance with N.C.G.S. 143-215.54A.

(B) C&DLF units must not be located in floodplains unless the owners or operators demonstrate that the unit will not restrict the flow of the flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste so as to pose a hazard to human health and the environment.

Based on floodplain maps for the Buncombe County area, no portion of the Buncombe County property resides in the 100-year floodplain (see Attachment A). Areas around the French Broad River and Flat Creek are denoted as AE; area inundated by 100-year flooding, before flood elevation have been determined.

1.2 Wetlands

1.2.1 Regulatory Background

Rule .0536 (c)(5) requires that new C&DLF units or lateral expansions must not be located in wetlands, unless the owner or operator can make the following demonstrations to the Division:

(A) Where applicable under Section 404 of the Clean Water Act or applicable State wetlands laws, the presumption that a practicable alternative to the proposed landfill facility is available which does not involve wetlands is clearly rebutted.

(B) The construction and operation of the C&DLF unit(s) will not cause or contribute to violations of any applicable State water quality standards and will not violate any applicable toxic effluent standard or prohibition under Section 307 of the Clean Water Act.

(C) The construction and operation of the C&DLF unit(s) will not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of a critical habitat, protected under the Federal Endangered Species Act of 1973. The construction and operation of the C&DLF unit(s) will not violate any requirement under the Marine Protection, Research, and Sanctuaries Act of 1972 for the protection of a marine sanctuary.

(D) The construction and operation of the C&DLF unit(s) will not cause or contribute to significant degradation of wetlands.

(E) The owner or operator must demonstrate the integrity of the C&DLF unit(s) and its ability to protect ecological resources by addressing the following factors: (1) erosion, stability, and migration potential of native wetland soils, muds and deposits used to support the C&DLF unit; (2) erosion, stability, and migration potential of dredged and fill materials used to support the C&DLF unit; the volume and chemical nature of the waste managed in the C&DLF unit; (3) impacts on fish, wildlife, and other aquatic resources and their habitat from release of the solid waste; (4) the potential effects of catastrophic release of waste to the wetland and the resulting impacts on the environment; and (5) any additional factors, as necessary, to demonstrate that ecological resources in the wetland are sufficiently protected to the extent required under Section 404 of the Clean Water Act or applicable State wetlands laws.

(F) The owner or operator must demonstrate that steps have been taken to attempt to achieve no net loss of wetlands (as defined by acreage and function) by first avoiding impacts to wetlands to the maximum extent practicable as required by Part (c)(5)(A) – (D) of this Rule, then minimizing unavoidable impacts to the maximum extent practicable, and finally

offsetting remaining unavoidable wetland impacts through all appropriate and practicable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands).

(G) The owner or operator must also demonstrate that sufficient information is available to make a reasonable determination with respect to each of the demonstrations required by this Rule.

1.2.2 Compliance Issues

CDM and the US Army Corps of Engineers (USACE) conducted a site visit on October 28, 2008 to determine if drainage features located north of each expansion site were jurisdictional, as subject to regulations under the Clean Water Act. Jurisdictional waters were determined and the County prepared and submitted a Preconstruction Notification (PCN), which served as a joint application for a Section 404 Permit from USACE and a 401 Water Quality Certification from the North Carolina Division of Water Quality (NCDWQ). Included as Attachment B are the PCN form and the approval letters.

1.3 Unstable Areas

1.3.1 Regulatory Background

Rule .0536 (c)(6) states that owners and operators of new C&DLF unit(s) and lateral expansions proposed for location in an unstable area must demonstrate that engineering measures have been incorporated in the C&DLF unit's design to ensure that the integrity of any structural components of the C&DLF unit will not be disrupted. The owner and operator must consider the following factors, at a minimum, when determining whether an area is unstable:

(A) On-site or local soil conditions that may result in significant differential settling;

(B) On-site or local geologic or geomorphologic features; and

(C) On-site or local human-made features or events (both surface and subsurface).

1.3.2 Compliance Issues

Based on the site and design hydrogeological and geotechnical investigation completed for this report and previously approved reports, the geological and soil conditions that are presumed to be throughout the site are not prone to unstable conditions.

1.4 Cultural Resources

Rule .0536 (c)(7) states that a new C&DLF unit or lateral expansion must not damage or destroy a property of archaeological or historical significance which has been listed or determined eligible for a listing in the National Register of Historic Places.

Correspondence with the State Historic Preservation Office in the Department of Cultural Resources is included in Attachment C.

Based on the correspondence, there is no documentation that significant cultural resources exist within or in the vicinity of the site. No cultural resources are expected to be adversely affected by the C&D landfill development.

1.5 State Nature and Historic Preserves

Rule .0536 (c)(8) states that a new C&DLF unit or lateral expansion must not have an adverse impact, considering the purposes for designation of the Preserve lands and the location, access, size and operation of the landfill, on any lands included in the State Nature and Historic Preserve.

The NC Natural Heritage Program (NHP) was contacted to determine if any state natural preserves exist within or in the vicinity of the proposed C&D landfill expansion (see Attachment D). Based on the NHP correspondence, no state nature or historical preserves would be impacted by development within the facility boundary.

1.6 Water Supply Watersheds

Rule .0536 (c)(9)(A) states that a new C&DLF unit or lateral expansion must not be located in the critical area of a water supply watershed, or in the watershed for a stream segment classified as WS-I, or in watersheds of other water bodies which indicate that no new landfills are allowed in accordance with the rules codified at 15A NCAC 02B Section .0200 entitled "Classifications and Water Quality Standards Applicable To Surface Waters Of North Carolina."

The State has classified all surface waters and watersheds throughout the state as required by 15A NCAC 2B .0311 as referenced by Rule 2B .0200. These classifications are made available by NCDENR Division of Water Quality.

Based on the classification list and NC OneMap program data and on-line map (used on April 2009) from NCDENR, CGIA, the proposed site is not located in an area that will impact or discharge to a WS-1, WS-II, WS-III, or WS-IV watershed. Therefore, the proposed location is in compliance with Water Supply Watershed rules.

Rule .0536 (c)(9)(B) states that any new C&DLF unit or lateral expansion, which proposes to discharge leachate to surface waters must obtain a National Pollution Discharge Elimination System (NPDES) Permit from the Division of Environmental Management pursuant to Section 402 of the United States Clean Water Act, must not be located within watersheds classified as WS-II or WS-III, or in watersheds of other

water bodies which indicate that no new discharging landfills are allowed, in accordance with the rules codified at 15A NCAC 02B Section .0200.

The C&D landfill facility is not located within any of these classified watersheds and will not discharge leachate into any surface water locations and therefore is not expected to apply for a NPDES permit.

1.7 Endangered and Threatened Species

Rule .0536 (c)(10) states that a new C&DLF unit or lateral expansion must not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of a critical habitat, protected under the Federal Endangered Species Act of 1973.

CDM contacted US Fish and Wildlife Service (US FWS) office to determine whether there was any documentation that endangered or threatened species existed within the site or its vicinity. Correspondence with the US FWS is included in Attachment E.

Based on the US FWS, there are no federally-listed endangered or threatened species, their formally designated critical habitat, or species currently proposed for listing under the Endangered Species Act within the proposed facility boundary.

Part 3 - Facility Plan
Appendix B – Location Restrictions

Attachment A
Floodplain Map

Legend

- 100 Year Flood
- 500 Year Flood
- Proposed C + D Landfill Expansion
- Proposed C + D Landfill Expansion
- Landfill Property Boundary

Attachment A - Floodplain Map
Buncome County Solid Waste Management Facility

CDM

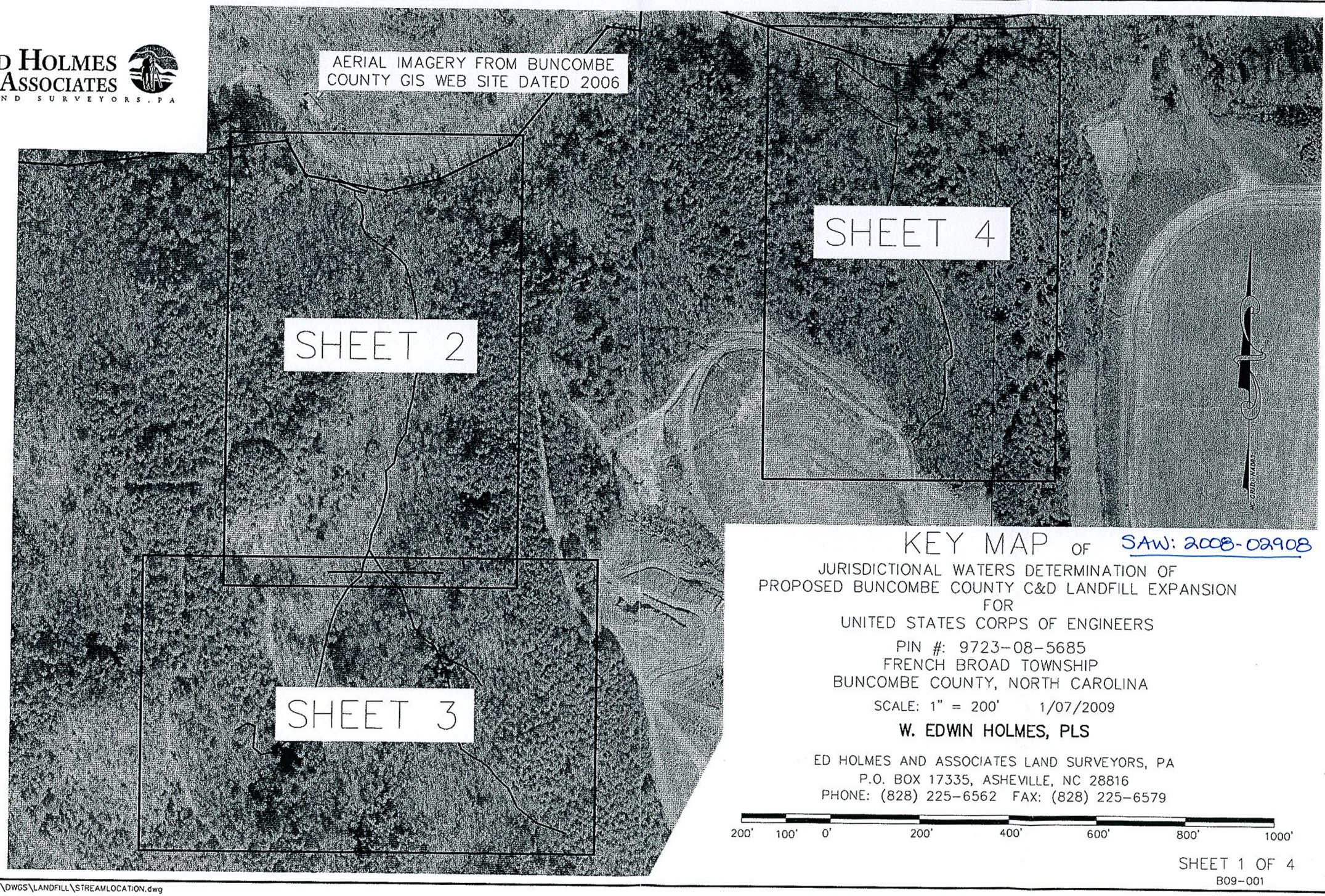
Part 3 - Facility Plan
Appendix B – Location Restrictions

Attachment B
PCN Form and Nationwide Permitting
Approval Letters

Part 3 - Facility Plan
Appendix B – Location Restrictions

Attachment B1
USACE Jurisdictional Determination

ED HOLMES & ASSOCIATES
LAND SURVEYORS, PA



KEY MAP OF SAW: 2008-02908

JURISDICTIONAL WATERS DETERMINATION OF
PROPOSED BUNCOMBE COUNTY C&D LANDFILL EXPANSION
FOR
UNITED STATES CORPS OF ENGINEERS

PIN #: 9723-08-5685
FRENCH BROAD TOWNSHIP
BUNCOMBE COUNTY, NORTH CAROLINA

SCALE: 1" = 200' 1/07/2009

W. EDWIN HOLMES, PLS

ED HOLMES AND ASSOCIATES LAND SURVEYORS, PA
P.O. BOX 17335, ASHEVILLE, NC 28816
PHONE: (828) 225-6562 FAX: (828) 225-6579

200' 100' 0' 200' 400' 600' 800' 1000'

SHEET 1 OF 4
B09-001

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ED HOLMES & ASSOCIATES
LAND SURVEYORS, PA

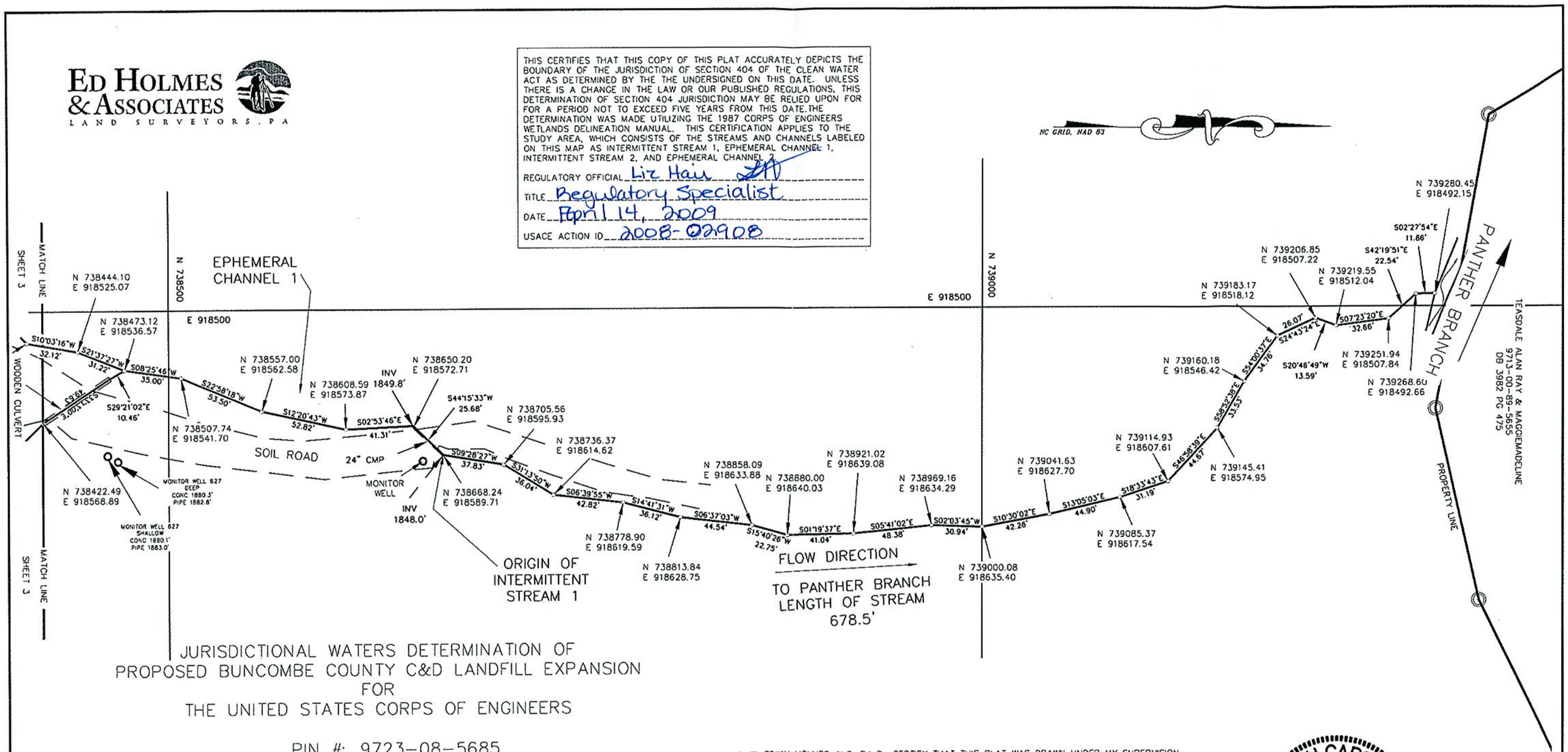
THIS CERTIFIES THAT THIS COPY OF THIS PLAT ACCURATELY DEPICTS THE BOUNDARY OF THE JURISDICTION OF SECTION 404 OF THE CLEAN WATER ACT AS DETERMINED BY THE THE UNDERSIGNED ON THIS DATE. UNLESS THERE IS A CHANGE IN THE LAW OR OUR PUBLISHED REGULATIONS, THIS DETERMINATION OF SECTION 404 JURISDICTION MAY BE RELIED UPON FOR FOR A PERIOD NOT TO EXCEED FIVE YEARS FROM THIS DATE.THE DETERMINATION WAS MADE UTILIZING THE 1987 CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. THIS CERTIFICATION APPLIES TO THE STUDY AREA, WHICH CONSISTS OF THE STREAMS AND CHANNELS LABELED ON THIS MAP AS INTERMITTENT STREAM 1, EPHEMERAL CHANNEL 1, INTERMITTENT STREAM 2, AND EPHEMERAL CHANNEL 2.

REGULATORY OFFICIAL Liz Hall

TITLE Regulatory Specialist

DATE April 14, 2009

USACE ACTION ID 2008-02908



JURISDICTIONAL WATERS DETERMINATION OF PROPOSED BUNCOMBE COUNTY C&D LANDFILL EXPANSION FOR THE UNITED STATES CORPS OF ENGINEERS

PIN #: 9723-08-5685
FRENCH BROAD TOWNSHIP
BUNCOMBE COUNTY, NORTH CAROLINA

SCALE: 1" = 60' 1/07/2009

W. EDWIN HOLMES, PLS

ED HOLMES AND ASSOCIATES LAND SURVEYORS, PA
P.O. BOX 17335, ASHEVILLE, NC 28816
PHONE: (828) 225-6562 FAX: (828) 225-6579

60' 30' 0' 60' 120' 180' 240' 300'

I, W. EDWIN HOLMES, N.C. P.L.S., CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (PROPERTY DESCRIPTION RECORDED IN DEED BOOKS AS SHOWN); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED BY DASHED LINES AS DRAWN FROM INFORMATION FOUND IN DEED BOOKS AS SHOWN; THAT THE RATIO OF PRECISION AS CALCULATED IS 1:10,000 OR GREATER.

WITNESS MY SIGNATURE, LICENSE NUMBER, AND SEAL THIS 13TH DAY OF FEB, A.D., 2009.

N.C. PROFESSIONAL LAND SURVEYOR

L-2755
LICENSE #

NORTH CAROLINA PROFESSIONAL SEAL L-2755 LAND SURVEYOR W. EDWIN HOLMES

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JURISDICTIONAL WATERS DETERMINATION OF PROPOSED BUNCOMBE COUNTY C&D LANDFILL EXPANSION FOR THE UNITED STATES CORPS OF ENGINEERS

PIN#: 9723-08-5685
FRENCH BROAD TOWNSHIP
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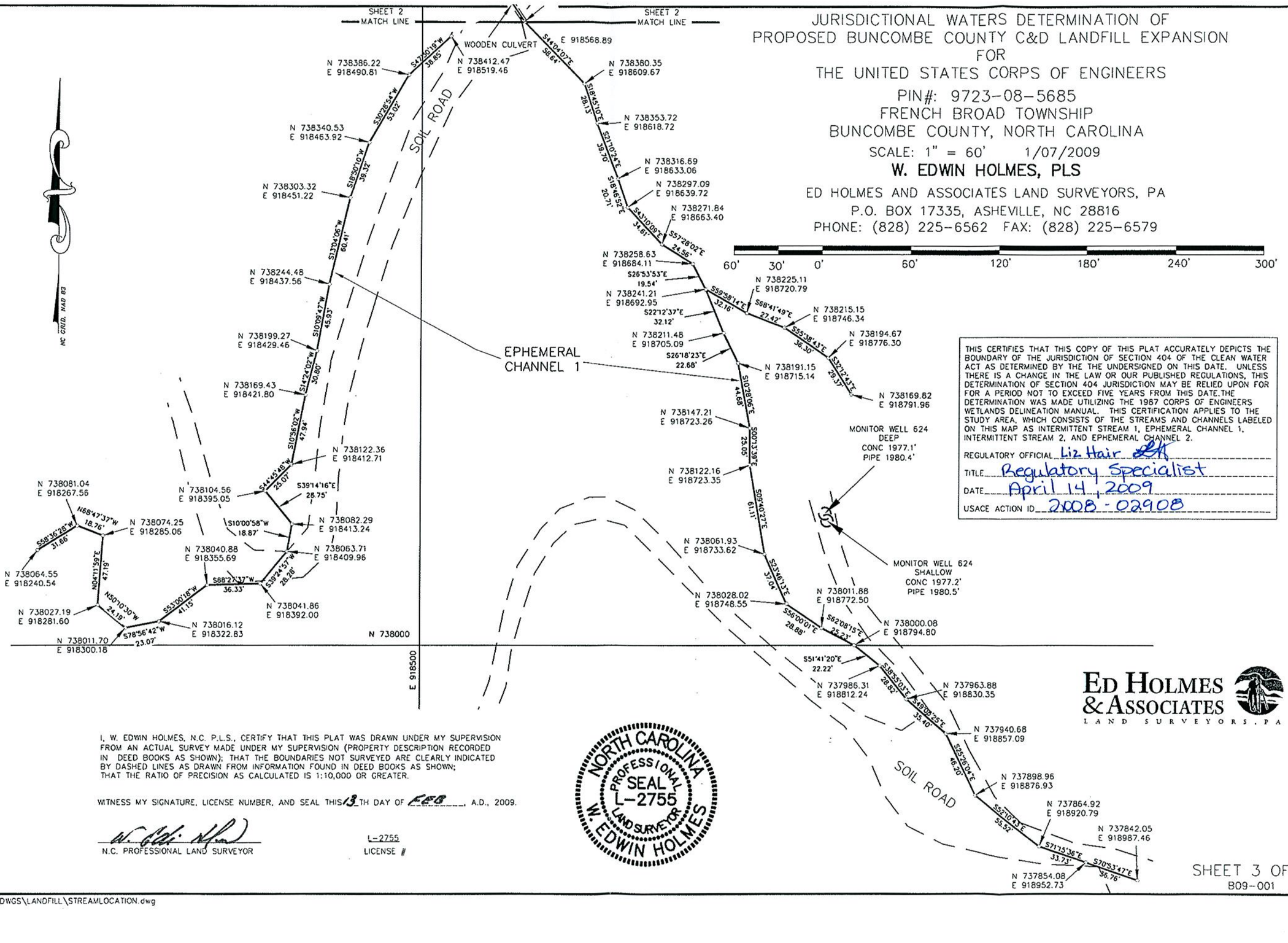

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REGULATORY OFFICIAL Liz Hair
TITLE Regulatory Specialist
DATE April 14, 2009
USACE ACTION ID 2008-02908

I, W. EDWIN HOLMES, N.C. P.L.S., CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (PROPERTY DESCRIPTION RECORDED IN DEED BOOKS AS SHOWN); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED BY DASHED LINES AS DRAWN FROM INFORMATION FOUND IN DEED BOOKS AS SHOWN; THAT THE RATIO OF PRECISION AS CALCULATED IS 1:10,000 OR GREATER.

WITNESS MY SIGNATURE, LICENSE NUMBER, AND SEAL THIS 13TH DAY OF Feb, A.D., 2009.

W. Edwin Holmes
N.C. PROFESSIONAL LAND SURVEYOR

L-2755
LICENSE #

NORTH CAROLINA PROFESSIONAL SEAL L-2755 LAND SURVEYOR W. EDWIN HOLMES

ED HOLMES & ASSOCIATES LAND SURVEYORS, PA

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ED HOLMES & ASSOCIATES
LAND SURVEYORS, PA

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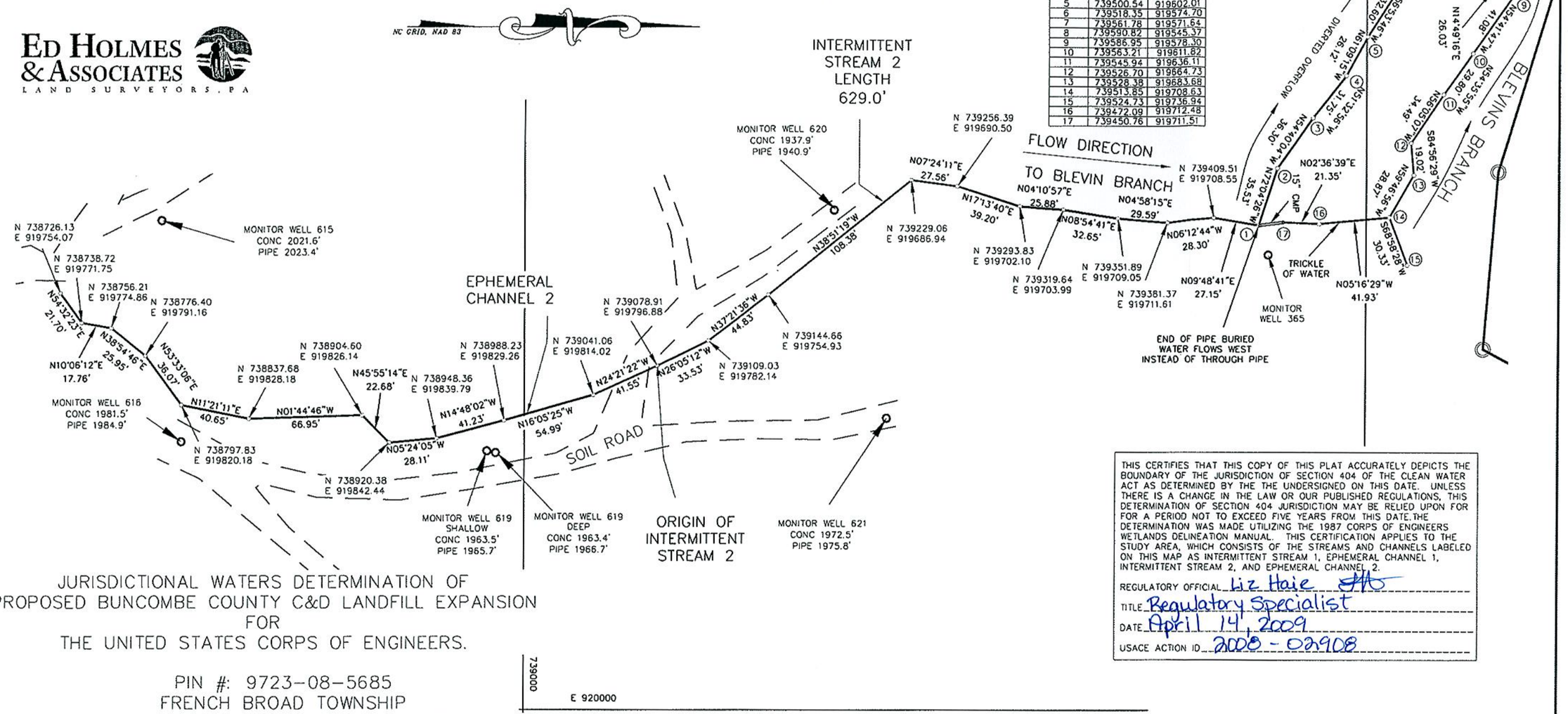

POINT	NORTHING	EASTING
1	739436.27	919713.18
2	739447.20	919679.37
3	739468.19	919649.76
4	739487.94	919624.89
5	739500.54	919602.01
6	739518.35	919574.70
7	739561.78	919571.64
8	739590.82	919545.37
9	739586.95	919578.30
10	739563.21	919611.82
11	739545.94	919636.11
12	739526.70	919664.73
13	739528.38	919683.68
14	739513.85	919708.63
15	739524.73	919736.94
16	739472.09	919712.48
17	739450.76	919711.51

JURISDICTIONAL WATERS DETERMINATION OF PROPOSED BUNCOMBE COUNTY C&D LANDFILL EXPANSION FOR THE UNITED STATES CORPS OF ENGINEERS.

PIN #: 9723-08-5685
FRENCH BROAD TOWNSHIP
BUNCOMBE COUNTY, NORTH CAROLINA

SCALE: 1" = 60' 1/07/2009

W. EDWIN HOLMES, PLS

ED HOLMES AND ASSOCIATES LAND SURVEYORS, PA
P.O. BOX 17335, ASHEVILLE, NC 28816
PHONE: (828) 225-6562 FAX: (828) 225-6579

60' 30' 0' 60' 120' 180' 240' 300'

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REGULATORY OFFICIAL Liz Haie
TITLE Regulatory Specialist
DATE April 14, 2009
USACE ACTION ID 2008-02908

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WITNESS MY SIGNATURE, LICENSE NUMBER, AND SEAL THIS 13TH DAY OF FEB, A.D., 2009.

W. Edwin Holmes
N.C. PROFESSIONAL LAND SURVEYOR

L-2755
LICENSE #

NORTH CAROLINA PROFESSIONAL SEAL L-2755 LAND SURVEYOR W. EDWIN HOLMES

N: \USERS\JOEKANE\DWGS\LANDFILL\STREAMLOCATION.dwg

Part 3 - Facility Plan
Appendix B – Location Restrictions

Attachment B2
PCN Form

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

March 9, 2009

Mountain Region Coordinator
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786

Subject: Buncombe County Solid Waste Management Facility
C&D Landfill Expansion
Preconstruction Notification

To Whom it May Concern:

Buncombe County proposes to expand the existing construction and demolition (C&D) landfill at the Buncombe County Solid Waste Management Facility. The project includes an additional 15 years of landfill capacity. The project has been designed to avoid jurisdictional waters where possible and minimize impacts where they are unavoidable. Total impacts will be less than 150 feet of stream (see Figures No. 1 and 2 and Sheets 1 through 4).

Enclosed please find one (1) copy of a Preconstruction Notification (PCN) form for the project with supporting documentation. Please call me at (919) 325-3574 if you have questions. Thank you for your assistance.

Very truly yours,

Kenton J. Yang, P.E.
Camp Dresser & McKee

Enclosure: Preconstruction Notification Form with Attachments A through F (one copy)

cc: J. Creighton/J. Mears/K. Smith, BCSWMF
J. Wiseman/K. Boone, CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

March 9, 2009

Ms. Liz Hair
US Army Corps of Engineers
Asheville Regulatory Field Office
151 Patton Avenue
Room 208
Asheville, North Carolina 28801-5006

Subject: Buncombe County Solid Waste Management Facility
C&D Landfill Expansion
Preconstruction Notification

Dear Ms. Hair:

Buncombe County proposes to expand the existing construction and demolition (C&D) landfill at the Buncombe County Solid Waste Management Facility. The project includes an additional 15 years of landfill capacity. The project has been designed to avoid jurisdictional waters where possible and minimize impacts where they are unavoidable. Total impacts will be less than 150 feet of stream (see Figures No. 1 and 2 and Sheets 1 through 4). CDM provided you with Sheets 1 through 4 of the stream delineation and requested a certifying signature on February 16, 2009.

Enclosed please find one (1) copy of a Preconstruction Notification (PCN) form for the project with supporting documentation. Please call me at (919) 325-3574 if you have questions. Thank you for your assistance.

Very truly yours,

Kenton J. Yang, P.E.
Camp Dresser & McKee

Enclosure: Preconstruction Notification Form with Attachments A through F (one copy)

cc: J. Creighton/J. Mears/K. Smith, BCSWMF
J. Wiseman/K. Boone, CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

March 9, 2009

Ms. Cyndi Karoly
North Carolina Division of Water Quality
401 Unit
2321 Crabtree Boulevard
Raleigh, North Carolina 27604

Subject: Buncombe County Solid Waste Management Facility
C&D Landfill Expansion
Preconstruction Notification

Dear Ms. Karoly:

Buncombe County proposes to expand the existing construction and demolition (C&D) landfill at the Buncombe County Solid Waste Management Facility. The project includes an additional 15 years of landfill capacity. The project has been designed to avoid jurisdictional waters where possible and minimize impacts where they are unavoidable. Total impacts will be less than 150 feet of stream (see Figures No. 1 and 2 and Sheets 1 through 4).

Enclosed please find five (5) copies of a Preconstruction Notification (PCN) form for the project with supporting documentation. A check for $240 is also enclosed. Please call me at (919) 325-3574 if you have questions. Thank you for your assistance.

Very truly yours,

Kenton J. Yang, P.E.
Camp Dresser & McKee

Enclosure: Preconstruction Notification Form with Attachments A through F (five copies)
Check for permit fee

cc: J. Creighton/J. Mears/K. Smith, BCSWMF
J. Wiseman/K. Boone, CDM

Office Use Only:
Corps action ID no. _____
DWQ project no. _____
Form Version 1.3 Dec 10 2008

Pre-Construction Notification (PCN) Form

A. Applicant Information

1. Processing

1a. Type(s) of approval sought from the Corps:	☒ Section 404 Permit	☐ Section 10 Permit
1b. Specify Nationwide Permit (NWP) number: NWP 39 or General Permit (GP) number: GC 3402		
1c. Has the NWP or GP number been verified by the Corps?	☒ Yes	☐ No
1d. Type(s) of approval sought from the DWQ (check all that apply): ☒ 401 Water Quality Certification – Regular ☐ 401 Water Quality Certification – Express ☐ Non-404 Jurisdictional General Permit ☐ Riparian Buffer Authorization		
1e. Is this notification solely for the record because written approval is not required?	For the record only for DWQ 401 Certification: ☐ Yes ☒ No	For the record only for Corps Permit: ☐ Yes ☒ No
1f. Is payment into a mitigation bank or in-lieu fee program proposed for mitigation of impacts? If so, attach the acceptance letter from mitigation bank or in-lieu fee program.	☐ Yes	☒ No
1g. Is the project located in any of NC's twenty coastal counties. If yes, answer 1h below.	☐ Yes	☒ No
1h. Is the project located within a NC DCM Area of Environmental Concern (AEC)?	☐ Yes	☒ No

2. Project Information

2a. Name of project:	Buncombe County Solid Waste Management Facility - Construction and Demolition (C&D) Debris Landfill Expansion
2b. County:	Buncombe County
2c. Nearest municipality / town:	Alexander
2d. Subdivision name:	N/A
2e. NCDOT only, T.I.P. or state project no:	N/A

3. Owner Information

3a. Name(s) on Recorded Deed:	Buncombe County
3b. Deed Book and Page No.	DB 1851 / PG 0097
3c. Responsible Party (for LLC if applicable):	N/A
3d. Street address:	Buncombe County Solid Waste Management Facility 81 Panther Branch Road
3e. City, state, zip:	Alexander, NC 28701
3f. Telephone no.:	(828) 250-5460 (Mr. Jerry Mears, Landfill Manager)
3g. Fax no.:	(828) 250-5478
3h. Email address:	jerry.mears@buncombecounty.org

4. **Applicant Information (if different from owner)**	
4a. Applicant is:	☐ Agent ☐ Other, specify:
4b. Name:	
4c. Business name (if applicable):	
4d. Street address:	
4e. City, state, zip:	
4f. Telephone no.:	
4g. Fax no.:	
4h. Email address:	
5. Agent/Consultant Information (if applicable)	
5a. Name:	Kelly Boone / Kenton Yang
5b. Business name (if applicable):	CDM
5c. Street address:	5400 Glenwood Avenue, Suite 300
5d. City, state, zip:	Raleigh, NC 27612
5e. Telephone no.:	(919) 325-3508 / (919) 325-3574
5f. Fax no.:	(919) 781-5730
5g. Email address:	boonekr@cdm.com / yangkj@cdm.com

B. Project Information and Prior Project History	
1. Property Identification	
1a. Property identification no. (tax PIN or parcel ID):	9723-08-5685-00000
1b. Site coordinates (in decimal degrees):	Latitude: 35.7265 (DD.DDDDDD) Longitude: -82.6416 (-DD.DDDDDD)
1c. Property size:	604.5 acres (Buncombe Co. Solid Waste Management Facility site)
2. Surface Waters	
2a. Name of nearest body of water (stream, river, etc.) to proposed project:	Panther Branch
2b. Water Quality Classification of nearest receiving water:	C
2c. River basin:	French Broad
3. Project Description	
3a. Describe the existing conditions on the site and the general land use in the vicinity of the project at the time of this application: The Construction Demolition (C&D) Debris Landfill Expansion is located on the Buncombe County Solid Waste Management Facility site. The site contains an existing Subtitle D Landfill, an existing Construction and Demolition (C&D) Debris Landfill, and associated buildings and facilities.	
3b. List the total estimated acreage of all existing wetlands on the property: The wetlands delineation study that was performed in the 1990s prior to development of the overall Buncombe County Solid Waste Management Facility noted that there are approximately 7 acres of jurisdictional wetlands on the 604.5-acre site.	
3c. List the total estimated linear feet of all existing streams (intermittent and perennial) on the property: The wetlands delineation study that was performed in the 1990s prior to development of the overall Buncombe County Solid Waste Management Facility noted that there are approximately 20,400 linear feet of stream channel on the 604.5-acre site.	
3d. Explain the purpose of the proposed project: The purpose of the project is to expand Buncombe County's existing construction and demolition (C&D) debris landfill, which is located at the site of the Buncombe County Solid Waste Management Facility. The landfill serves Buncombe County. The C&D landfill will provide area for disposal of construction or demolition debris, inert debris, land-clearing debris, asphalt, and asbestos.	
3e. Describe the overall project in detail, including the type of equipment to be used: The project includes an expansion of Buncombe County's existing construction and demolition (C&D) debris landfill, which is located at the Buncombe County Solid Waste Management Facility. The expanded C&D landfill area will be located adjacent to and surrounding and on top of the existing C&D landfill on property that is already part of the Buncombe County Solid Waste Management Facility. Construction of the C&D landfill expansion will involve clearing, grading, and earth moving activities. Sedimentation ponds will be constructed as required by State regulations to remove sediment from stormwater runoff. Equipment to be used during construction will include excavators, trackhoes, dump trucks, and other earth-moving equipment. The C&D landfill expansion will be designed, permitted, and constructed per NC Solid Waste Regulations.	

B. Project Information and Prior Project History

4. Jurisdictional Determinations	
4a. Have jurisdictional wetland or stream determinations by the Corps or State been requested or obtained for this property / project (including all prior phases) in the past? Comments: Determinations were obtained only for portion of property on which water treatment plant and associated facilities will be located.	☒ Yes ☐ No ☐ Unknown
4b. If the Corps made the jurisdictional determination, what type of determination was made?	☐ Preliminary ☒ Final
4c. If yes, who delineated the jurisdictional areas? Name (if known): Kelly Boone, Rob Hopper	Agency/Consultant Company: CDM Other:
4d. If yes, list the dates of the Corps jurisdictional determinations or State determinations and attach documentation. USACE has visited the site to verify the origins of jurisdictional streams in the C&D landfill expansion project area. A JD map has been prepared and was submitted to USACE on 2/16/2009. See attached map (Attachment B).	
5. Project History	
5a. Have permits or certifications been requested or obtained for this project (including all prior phases) in the past?	☒ Yes ☐ No ☐ Unknown
5b. If yes, explain in detail according to "help file" instructions. A Section 404 permit was requested for construction of the original C&D debris and Subtitle D landfill facilities on December 29, 1993. A permit was requested under Nationwide Permit 26 for filling 1.77 acres of jurisdictional waters. The permit was received, and the facilities were constructed in the 1990s.	
6. Future Project Plans	
6a. Is this a phased project?	☒ Yes ☐ No
6b. If yes, explain. The C&D landfill expansion project will be constructed in 4 phases; however, all impacts to Waters of the US will occur in the first phase. This permit covers all impacts for all phases of the C&D landfill expansion project. Future phases of the C&D landfill expansion include vertical expansions and earthwork with no stream or wetland impacts.	

C. Proposed Impacts Inventory

1. Impacts Summary

1a. Which sections were completed below for your project (check all that apply):

☐ Wetlands ☒ Streams - tributaries ☐ Buffers

☐ Open Waters ☐ Pond Construction

2. Wetland Impacts

If there are wetland impacts proposed on the site, then complete this question for each wetland area impacted.

2a. Wetland impact number – Permanent (P) or Temporary (T)	2b. Type of impact	2c. Type of wetland (if known)	2d. Forested	2e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	2f. Area of impact (acres)
W1 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
W2 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
W3 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
W4 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
W5 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
W6 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
				2g. **Total wetland impacts**	N/A

2h. Comments:

3. Stream Impacts

If there are perennial or intermittent stream impacts (including temporary impacts) proposed on the site, then complete this question for all stream sites impacted.

3a. Stream impact number - Permanent (P) or Temporary (T)	3b. Type of impact	3c. Stream name	3d. Perennial (PER) or intermittent (INT)?	3e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	3f. Average stream width (feet)	3g. Impact length (linear feet)
S1 ☒ P ☐ T	Clearing, grading, and filling of stream channel for construction of new landfill	UT to Panther Branch	☐ PER ☒ INT	☒ Corps ☐ DWQ	3-5 feet	147
S2 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
S3 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
S4 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		

S5 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
S6 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
					3h. **Total stream and tributary impacts**	147 ft.

3i. Comments:

4. Open Water Impacts

If there are proposed impacts to lakes, ponds, estuaries, tributaries, sounds, the Atlantic Ocean, or any other open water of the U.S. then individually list all open water impacts below.

4a. Open water impact number – Permanent (P) or Temporary (T)	4b. Name of waterbody (if applicable)	4c. Type of impact	4d. Waterbody type	4e. Area of impact (acres)
O1 ☐ P ☐ T				
O2 ☐ P ☐ T				
O3 ☐ P ☐ T				
O4 ☐ P ☐ T				
			4f. Total open water impacts	N/A

4g. Comments:

5. Pond or Lake Construction

If pond or lake construction proposed, then complete the chart below.

5a. Pond ID number	5b. Proposed use or purpose of pond	5c. Wetland Impacts (acres)			5d. Stream Impacts (feet)			5e. Upland (acres)
		Flooded	Filled	Excavated	Flooded	Filled	Excavated	Flooded
P1								
P2								
	5f. Total							

5g. Comments:

5h. Is a dam high hazard permit required?	☐ Yes ☐ No If yes, permit ID no:
5i. Expected pond surface area (acres):	N/A
5j. Size of pond watershed (acres):	N/A
5k. Method of construction:	N/A

6. Buffer Impacts (for DWQ)

If project will impact a protected riparian buffer, then complete the chart below. If yes, then individually list all buffer impacts below. If any impacts require mitigation, then you **MUST** fill out Section D of this form.

6a. Project is in which protected basin?			☐ Neuse ☐ Catawba	☐ Tar-Pamlico ☐ Randleman	☐ Other:
6b. Buffer impact number – Permanent (P) or Temporary (T)	6c. Reason for impact	6d. Stream name	6e. Buffer mitigation required?	6f. Zone 1 impact (square feet)	6g. Zone 2 impact (square feet)
B1 ☐ P ☐ T			☐ Yes ☐ No		
B2 ☐ P ☐ T			☐ Yes ☐ No		
B3 ☐ P ☐ T			☐ Yes ☐ No		
		6h. **Total buffer impacts**		N/A	N/A
6i. Comments:					

D. Impact Justification and Mitigation

1. Avoidance and Minimization

1a. Specifically describe measures taken to avoid or minimize the proposed impacts in designing project.

In designing the footprint of the proposed C&D landfill expansion, jurisdictional waters were avoided to the extent practicable. After delineating jurisdictional waters, the footprint of the landfill was further modified and the landfill capacity decreased to avoid impacts to Intermittent Channel 2 and minimize impacts to Intermittent Channel 1 as much as possible. Impacts to Channel 1 are the minimum necessary to achieve the minimum landfill capacity needed and install a required sediment pond. A detailed grading plan has been developed to establish accurate limits of construction, and side slopes were maximized to minimize fill in jurisdictional waters. Existing topography was used to minimize earthwork. A retaining wall was considered but determined to be impracticable for this application. Expanding the existing C&D landfill rather than construction a new landfill allows the landfill footprint to be minimized by constructing the expansion against the side slopes and on top of the existing landfill. This results in much less impact than siting a C&D landfill in a new location. The overall Solid Waste Management Facility contains no other location that would result in less impact.

1b. Specifically describe measures taken to avoid or minimize the proposed impacts through construction techniques.

Construction will be subject to a sediment and erosion control plan, which will protect downstream surface waters. Construction sequencing will be specified so that all sediment and erosion control measures are in place prior to construction of the landfill. Limits of disturbance will be shown on the construction plans and enforced during construction. All stockpiles of soil will occur in upland areas within the limits of disturbance. Construction access into jurisdictional waters that are not included in the footprint of the landfill and associated sediment pond will be allowed. Excavation during construction will be minimized, because the landfill expansion will be constructed against the side slopes and on top of the existing C&D landfill. This results in less disturbance within the landfill expansion project area. Existing topography was used to minimize earthwork, which will result in less disturbance during construction.

2. Compensatory Mitigation for Impacts to Waters of the U.S. or Waters of the State

2a. Does the project require Compensatory Mitigation for impacts to Waters of the U.S. or Waters of the State?	☐ Yes ☒ No
2b. If yes, mitigation is required by (check all that apply):	☐ DWQ ☐ Corps N/A
2c. If yes, which mitigation option will be used for this project?	☐ Mitigation bank ☐ Payment to in-lieu fee program ☐ Permittee Responsible Mitigation

3. Complete If Using a Mitigation Bank

3a. Name of Mitigation Bank: N/A

3b. Credits Purchased (attach receipt and letter)	Type	Quantity

3c. Comments: N/A	
4. Complete if Making a Payment to In-lieu Fee Program	
4a. Approval letter from in-lieu fee program is attached.	☐ Yes
4b. Stream mitigation requested:	linear feet
4c. If using stream mitigation, stream temperature:	☐ warm ☐ cool ☐ cold
4d. Buffer mitigation requested (DWQ only):	square feet
4e. Riparian wetland mitigation requested:	acres
4f. Non-riparian wetland mitigation requested:	acres
4g. Coastal (tidal) wetland mitigation requested:	acres
4h. Comments:	
5. Complete if Using a Permittee Responsible Mitigation Plan	
5a. If using a permittee responsible mitigation plan, provide a description of the proposed mitigation plan. N/A	
6. Buffer Mitigation (State Regulated Riparian Buffer Rules) – required by DWQ	
6a. Will the project result in an impact within a protected riparian buffer that requires buffer mitigation?	☐ Yes ☒ No

6b. If yes, then identify the square feet of impact to each zone of the riparian buffer that requires mitigation. Calculate the amount of mitigation required.

Zone	6c. Reason for impact	6d. Total impact (square feet)	Multiplier	6e. Required mitigation (square feet)
Zone 1			3 (2 for Catawba)	N/A
Zone 2			1.5	N/A
		6f. **Total buffer mitigation required:**		N/A

6g. If buffer mitigation is required, discuss what type of mitigation is proposed (e.g., payment to private mitigation bank, permittee responsible riparian buffer restoration, payment into an approved in-lieu fee fund). N/A
6h. Comments: N/A

E. Stormwater Management and Diffuse Flow Plan (required by DWQ)	
1. Diffuse Flow Plan	
1a. Does the project include or is it adjacent to protected riparian buffers identified within one of the NC Riparian Buffer Protection Rules?	☐ Yes ☒ No
1b. If yes, then is a diffuse flow plan included? If no, explain why. Comments: N/A	☐ Yes ☐ No
2. Stormwater Management Plan	
2a. What is the overall percent imperviousness of this project?	0%
2b. Does this project require a Stormwater Management Plan?	☐ Yes ☒ No
2c. If this project DOES NOT require a Stormwater Management Plan, explain why: Project results in less than 24% imperviousness.	
2d. If this project DOES require a Stormwater Management Plan, then provide a brief, narrative description of the plan: N/A	
2e. Who will be responsible for the review of the Stormwater Management Plan? N/A	☐ Certified Local Government ☐ DWQ Stormwater Program ☐ DWQ 401 Unit
3. Certified Local Government Stormwater Review	
3a. In which local government's jurisdiction is this project?	Buncombe County
3b. Which of the following locally-implemented stormwater management programs apply (check all that apply): N/A	☐ Phase II ☐ NSW ☐ USMP ☐ Water Supply Watershed ☐ Other:
3c. Has the approved Stormwater Management Plan with proof of approval been attached? N/A	☐ Yes ☐ No N/A
4. DWQ Stormwater Program Review	
4a. Which of the following state-implemented stormwater management programs apply (check all that apply): N/A	☐ Coastal counties ☐ HQW ☐ ORW ☐ Session Law 2006-246 ☐ Other:
4b. Has the approved Stormwater Management Plan with proof of approval been attached? N/A	☐ Yes ☐ No N/A
5. DWQ 401 Unit Stormwater Review	
5a. Does the Stormwater Management Plan meet the appropriate requirements? N/A	☐ Yes ☐ No
5b. Have all of the 401 Unit submittal requirements been met? N/A	☐ Yes ☐ No

F. Supplementary Information		
1. Environmental Documentation (DWQ Requirement)		
1a. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land?	☒ Yes	☐ No
1b. If you answered "yes" to the above, does the project require preparation of an environmental document pursuant to the requirements of the National or State (North Carolina) Environmental Policy Act (NEPA/SEPA)?	☐ Yes	☒ No
1c. If you answered "yes" to the above, has the document review been finalized by the State Clearing House? (If so, attach a copy of the NEPA or SEPA final approval letter.) Comments: N/A	☐ Yes	☐ No
2. Violations (DWQ Requirement)		
2a. Is the site in violation of DWQ Wetland Rules (15A NCAC 2H .0500), Isolated Wetland Rules (15A NCAC 2H .1300), DWQ Surface Water or Wetland Standards, or Riparian Buffer Rules (15A NCAC 2B .0200)?	☐ Yes	☒ No
2b. Is this an after-the-fact permit application?	☐ Yes	☒ No
2c. If you answered "yes" to one or both of the above questions, provide an explanation of the violation(s):		
3. Cumulative Impacts (DWQ Requirement)		
3a. Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality?	☐ Yes	☒ No
3b. If you answered "yes" to the above, submit a qualitative or quantitative cumulative impact analysis in accordance with the most recent DWQ policy. If you answered "no," provide a short narrative description. This project will not cause growth or development. This project provides the ability for Buncombe County to dispose of construction and demolition debris at its solid waste facility rather than transporting this waste elsewhere for disposal.		
4. Sewage Disposal (DWQ Requirement)		
4a. 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. This project will not generate any wastewater.		

5. Endangered Species and Designated Critical Habitat (Corps Requirement)		
5a. Will this project occur in or near an area with federally protected species or habitat?	☐ Yes	☒ No
5b. Have you checked with the USFWS concerning Endangered Species Act impacts?	☐ Yes	☒ No
5c. If yes, indicate the USFWS Field Office you have contacted.	☐ Raleigh ☐ Asheville	

5d. What data sources did you use to determine whether your site would impact Endangered Species or Designated Critical Habitat?

A protected species survey of the entire Buncombe County Solid Waste Management Facility site was conducted in the 1990s when the facility was originally developed (*Protected Species Survey, Buncombe County Landfill, NC*, Robert J. Goldstein and Associates, Inc. Inc., August 18, 1992). The survey was submitted to and reviewed by the NC Natural Heritage Program. The survey noted that potential habitat was found on the overall Solid Waste Management Facility site for 15 state or federally protected plant and animal species, including the federally-protected Virginia spiraea (*Spiraea viginiana*) and spotfin chub (*Erimonax monachus*). However, none of these 15 state or federally protected species was found during on-foot investigations of the potential habitat areas. The survey report concluded that the proposed landfill will have no adverse impacts on state or federally protected species.

6. Essential Fish Habitat (Corps Requirement)		
6a. Will this project occur in or near an area designated as essential fish habitat?	☐ Yes	☒ No

6b. What data sources did you use to determine whether your site would impact Essential Fish Habitat?

There are no areas of essential fish habitat in the project area according to the NMFS map website (http://ocean.floridamarine.org/efh_coral/ims/viewer.htm).

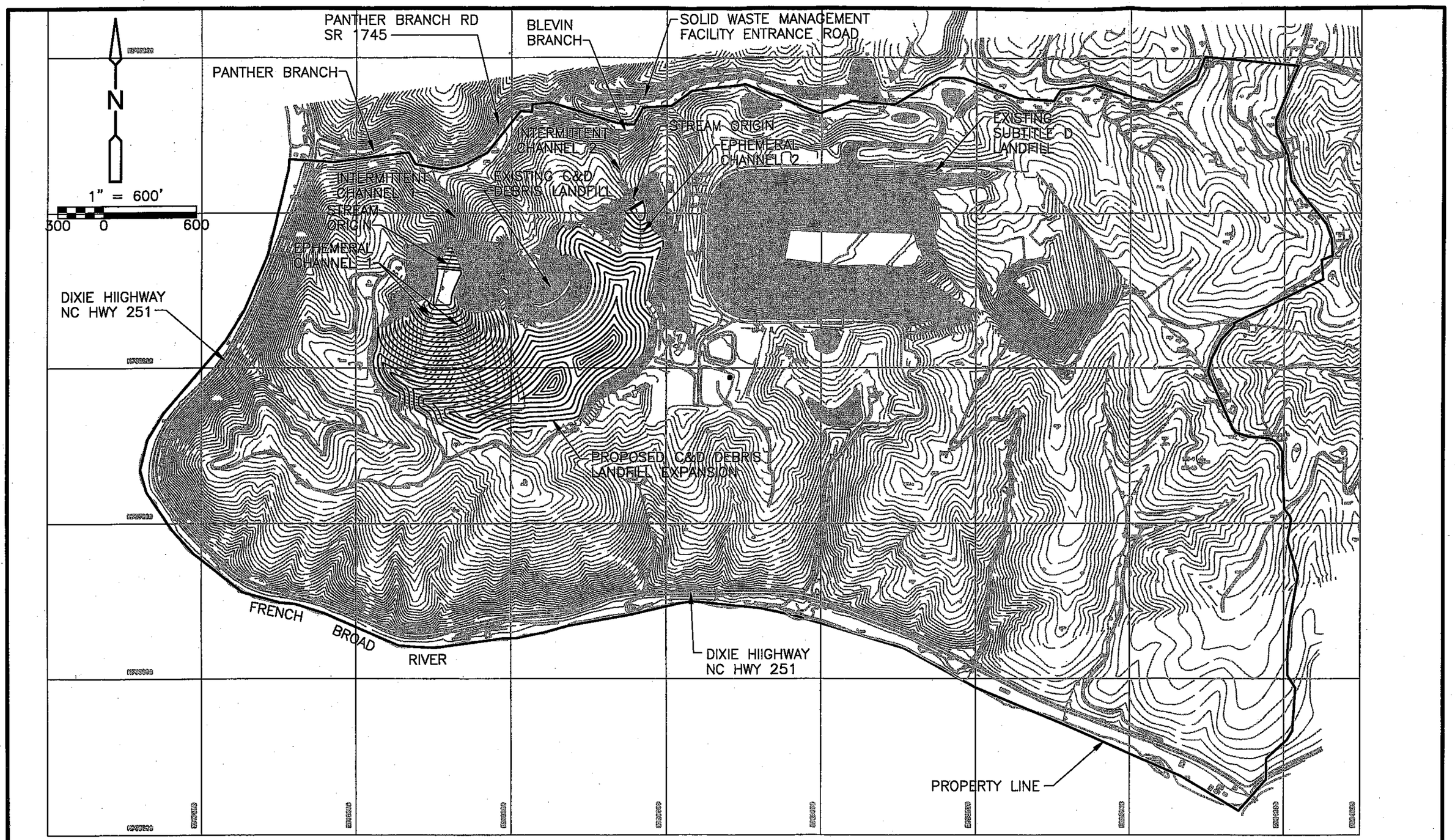
7. Historic or Prehistoric Cultural Resources (Corps Requirement)		
7a. Will this project occur in or near an area that the state, federal or tribal governments have designated as having historic or cultural preservation status (e.g., National Historic Trust designation or properties significant in North Carolina history and archaeology)?	☐ Yes	☒ No

7b. What data sources did you use to determine whether your site would impact historic or archeological resources?

An archaeological resources survey of the entire Buncombe County Solid Waste Management Facility site was conducted in the 1990s when the facility was originally developed (*An Archaeological Survey of the Proposed Buncombe County Landfill, Alexander Vicinity, Buncombe County, NC*, Archaeological Research Consultants, Inc., April 1993). The survey was submitted to and reviewed by the State Historic Preservation Office. The survey noted 8 sites in the project area. None of these sites is located in the footprint of the proposed C&D debris landfill expansion that is covered by this Section 404/401 permit.

8. Flood Zone Designation (Corps Requirement)		
8a. Will this project occur in a FEMA-designated 100-year floodplain?	☐ Yes	☒ No
8b. If yes, explain how project meets FEMA requirements: N/A		
8c. What source(s) did you use to make the floodplain determination? NC/FEMA Floodplain Mapping Program website (http://www.ncfloodmaps.com).		

Jon Creighton Applicant/~~Agent~~'s Printed Name	Applicant/~~Agent~~'s Signature (Agent's signature is valid only if an authorization letter from the applicant is provided.)	2-5-09 Date



CDM

consulting • engineering • construction • operations

Figure No. 1
Buncombe County Solid Waste
Management Facility Site Plan

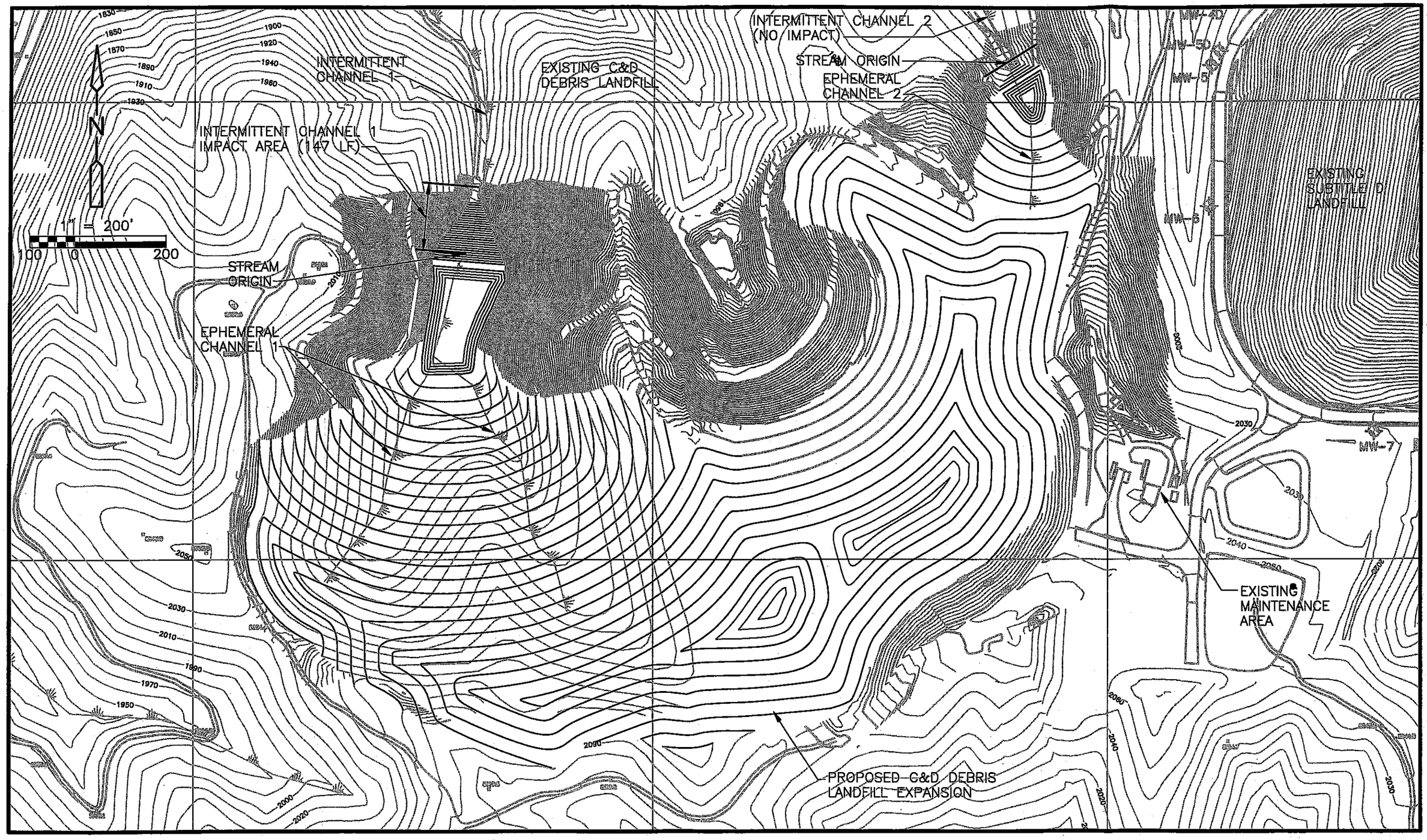


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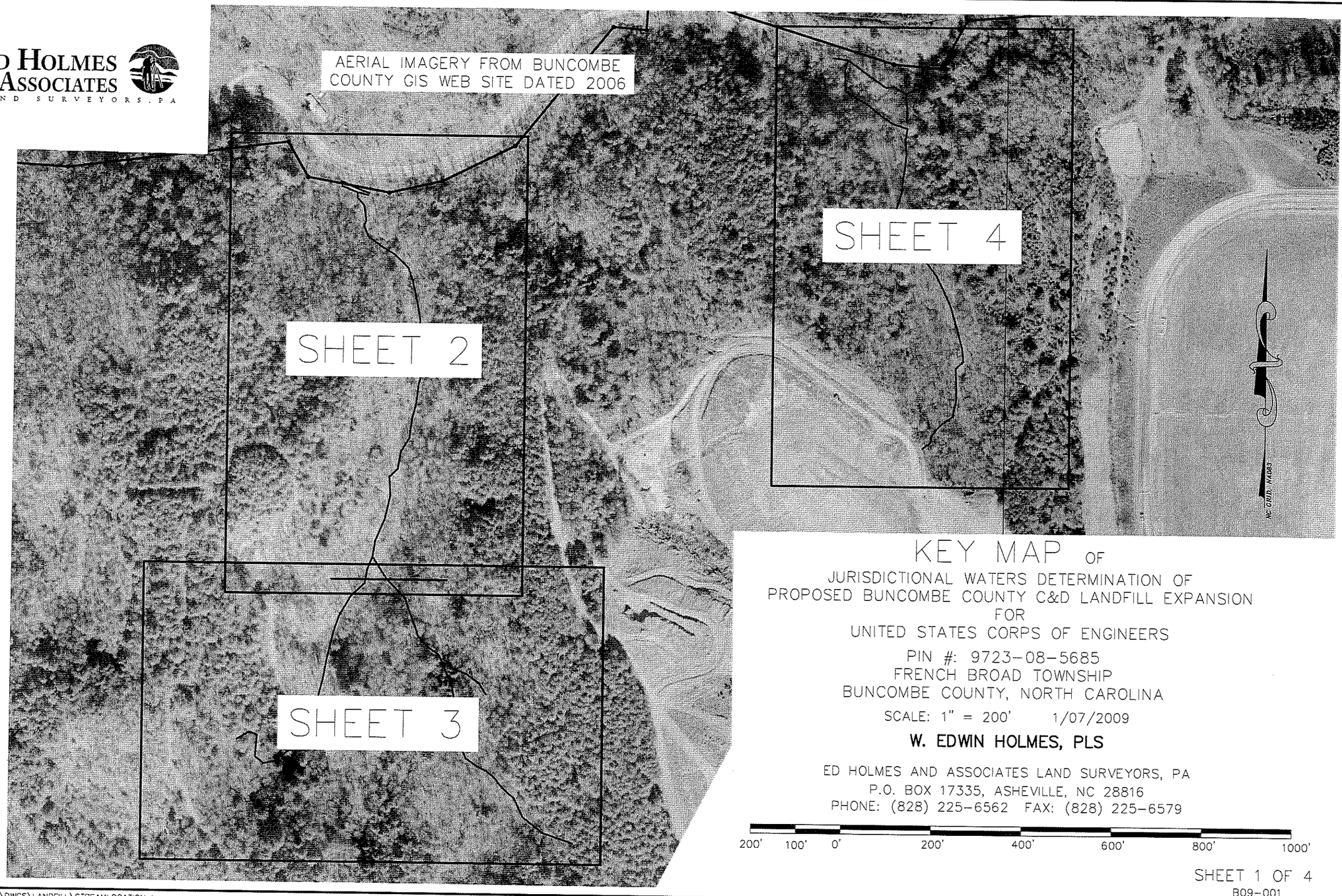
Figure No. 2
Buncombe County C&D Debris Landfill Expansion
Jurisdictional Waters Impacts

ED HOLMES & ASSOCIATES
LAND SURVEYORS, PA



KEY MAP OF

JURISDICTIONAL WATERS DETERMINATION OF
PROPOSED BUNCOMBE COUNTY C&D LANDFILL EXPANSION
FOR
UNITED STATES CORPS OF ENGINEERS

PIN #: 9723-08-5685
FRENCH BROAD TOWNSHIP
BUNCOMBE COUNTY, NORTH CAROLINA

SCALE: 1" = 200' 1/07/2009

W. EDWIN HOLMES, PLS

ED HOLMES AND ASSOCIATES LAND SURVEYORS, PA
P.O. BOX 17335, ASHEVILLE, NC 28816
PHONE: (828) 225-6562 FAX: (828) 225-6579

200' 100' 0' 200' 400' 600' 800' 1000'

B09-001

N:\USERS\JOEKANE\DWGS\LANDFILL\STREAMLOCATION.dwg

ED HOLMES & ASSOCIATES
LAND SURVEYORS, PA

THIS CERTIFIES THAT THIS COPY OF THIS PLAT ACCURATELY DEPICTS THE BOUNDARY OF THE JURISDICTION OF SECTION 404 OF THE CLEAN WATER ACT AS DETERMINED BY THE THE UNDERSIGNED ON THIS DATE. UNLESS THERE IS A CHANGE IN THE LAW OR OUR PUBLISHED REGULATIONS, THIS DETERMINATION OF SECTION 404 JURISDICTION MAY BE RELIED UPON FOR FOR A PERIOD NOT TO EXCEED FIVE YEARS FROM THIS DATE.THE DETERMINATION WAS MADE UTILIZING THE 1987 CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. THIS CERTIFICATION APPLIES TO THE STUDY AREA, WHICH CONSISTS OF THE STREAMS AND CHANNELS LABELED ON THIS MAP AS INTERMITTENT STREAM 1, EPHEMERAL CHANNEL 1, INTERMITTENT STREAM 2, AND EPHEMERAL CHANNEL 2.

REGULATORY OFFICIAL_____

TITLE_____

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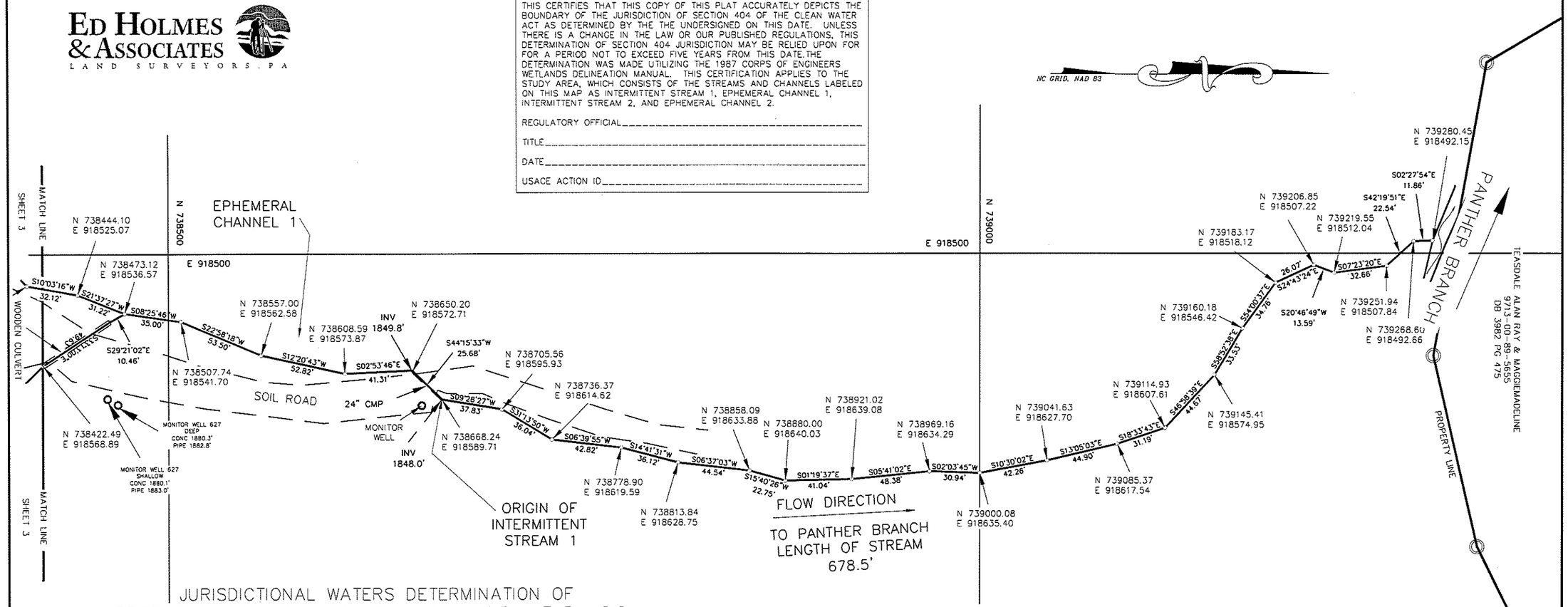

JURISDICTIONAL WATERS DETERMINATION OF PROPOSED BUNCOMBE COUNTY C&D LANDFILL EXPANSION FOR THE UNITED STATES CORPS OF ENGINEERS

PIN #: 9723-08-5685
FRENCH BROAD TOWNSHIP
BUNCOMBE COUNTY, NORTH CAROLINA

SCALE: 1" = 60' 1/07/2009

W. EDWIN HOLMES, PLS

ED HOLMES AND ASSOCIATES LAND SURVEYORS, PA
P.O. BOX 17335, ASHEVILLE, NC 28816
PHONE: (828) 225-6562 FAX: (828) 225-6579

60' 30' 0' 60' 120' 180' 240' 300'

I, W. EDWIN HOLMES, N.C. P.L.S., CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (PROPERTY DESCRIPTION RECORDED IN DEED BOOKS AS SHOWN); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED BY DASHED LINES AS DRAWN FROM INFORMATION FOUND IN DEED BOOKS AS SHOWN; THAT THE RATIO OF PRECISION AS CALCULATED IS 1:10,000 OR GREATER.

WITNESS MY SIGNATURE, LICENSE NUMBER, AND SEAL THIS 17TH DAY OF FEB, A.D., 2009.

N.C. PROFESSIONAL LAND SURVEYOR

L-2755
LICENSE #

NORTH CAROLINA PROFESSIONAL SEAL L-2755 LAND SURVEYOR W. EDWIN HOLMES

N: \USERS\JOEKANE\DWGS\LANDFILL\STREAMLOCATION.dwg

JURISDICTIONAL WATERS DETERMINATION OF PROPOSED BUNCOMBE COUNTY C&D LANDFILL EXPANSION FOR THE UNITED STATES CORPS OF ENGINEERS

PIN#: 9723-08-5685
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60' 30' 0' 60' 120' 180' 240' 300'

NC GRID, NAD 83

SHEET 2 MATCH LINE

SHEET 2 MATCH LINE

WOODEN CULVERT
N 738412.47
E 918519.46

SOIL ROAD

EPHEMERAL CHANNEL 1

N 738386.22 E 918490.81
S42°50'19"W 38.85'
S30°28'54"W 53.02'
N 738340.53 E 918463.92
S18°30'10"W 38.32'
N 738303.32 E 918451.22
S13°04'06"W 60.41'
N 738244.48 E 918437.56
S10°09'47"W 45.93'
N 738199.27 E 918429.46
S14°24'02"W 30.80'
N 738169.43 E 918421.80
S10°36'02"W 47.94'
N 738122.36 E 918412.71
S44°45'48"W 25.07'
N 738104.56 E 918395.05
S39°14'16"E 28.75'
N 738082.29 E 918413.24
S10°00'58"W 18.87'
N 738063.71 E 918409.96
S39°24'57"W 28.28'
N 738041.86 E 918392.00
S88°27'37"W 36.33'
N 738040.88 E 918355.69
S55°00'18"W 41.15'
N 738016.12 E 918322.83
S78°56'42"W 23.07'
N 738011.70 E 918300.18
N50°10'30"W 24.19'
N 738027.19 E 918281.60
N04°11'59"E 47.19'
N 738064.55 E 918240.54
S58°36'28"W 31.66'
N68°47'37"W 18.76'
N 738081.04 E 918267.56
N 738074.25 E 918285.06

N 738000
E 918500

S44°04'07"E 38.64'
N 738380.35 E 918609.67
S18°45'10"E 28.13'
N 738353.72 E 918618.72
S21°10'24"E 39.70'
N 738316.69 E 918633.06
S18°46'52"E 20.71'
N 738297.09 E 918639.72
S43°10'09"E 34.61'
N 738271.84 E 918663.40
S57°28'02"E 24.56'
N 738258.63 E 918684.11
S26°53'53"E 19.54'
N 738241.21 E 918692.95
S22°12'37"E 32.12'
N 738211.48 E 918705.09
S26°18'23"E 22.68'
N 738191.15 E 918715.14
S10°28'05"E 44.68'
N 738147.21 E 918723.26
S00°13'39"E 25.05'
N 738122.16 E 918723.35
S69°40'27"E 61.11'
N 738061.93 E 918733.62
S23°46'13"E 37.04'
N 738028.02 E 918748.55
S56°00'01"E 28.88'
N 738011.88 E 918772.50
S62°08'15"E 25.23'
N 738000.08 E 918794.80
S51°41'20"E 22.22'
N 737986.31 E 918812.24
S18°55'03"E 28.82'
N 737963.88 E 918830.35
S33°00'25"E 35.40'
N 737940.68 E 918857.09
S25°26'01"E 46.20'
N 737898.96 E 918876.93
S52°10'43"E 55.52'
N 737864.92 E 918920.79
S71°15'36"E 33.73'
N 737854.08 E 918952.73
S70°53'47"E 36.76'

N 738215.15 E 918746.34
S68°41'49"E 27.42'
N 738225.11 E 918720.79
S59°58'14"E 32.16'
N 738194.67 E 918776.30
S55°38'43"E 36.30'
N 738169.82 E 918791.96
S32°17'43"E 25.37'

MONITOR WELL 624 DEEP
CONC 1977.1'
PIPE 1980.4'

MONITOR WELL 624 SHALLOW
CONC 1977.2'
PIPE 1980.5'

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REGULATORY OFFICIAL_____

TITLE_____

DATE_____

USACE ACTION ID_____

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WITNESS MY SIGNATURE, LICENSE NUMBER, AND SEAL THIS 13TH DAY OF FEB, A.D., 2009.

W. Edwin Holmes
N.C. PROFESSIONAL LAND SURVEYOR

L-2755
LICENSE #

NORTH CAROLINA PROFESSIONAL SEAL L-2755 LAND SURVEYOR W. EDWIN HOLMES

ED HOLMES & ASSOCIATES LAND SURVEYORS, PA

N:\USERS\JOEKANE\DWGS\LANDFILL\STREAMLOCATION.dwg

ED HOLMES & ASSOCIATES
LAND SURVEYORS, PA

NC GRID, NAD 83

POINT	NORTHING	EASTING
1	739436.27	919713.18
2	739447.20	919679.37
3	739468.19	919649.76
4	739487.94	919624.89
5	739500.54	919602.01
6	739518.35	919574.70
7	739561.78	919571.64
8	739590.82	919545.37
9	739586.95	919578.30
10	739563.21	919611.82
11	739545.94	919636.11
12	739526.70	919664.73
13	739528.38	919683.68
14	739513.85	919708.63
15	739524.73	919736.94
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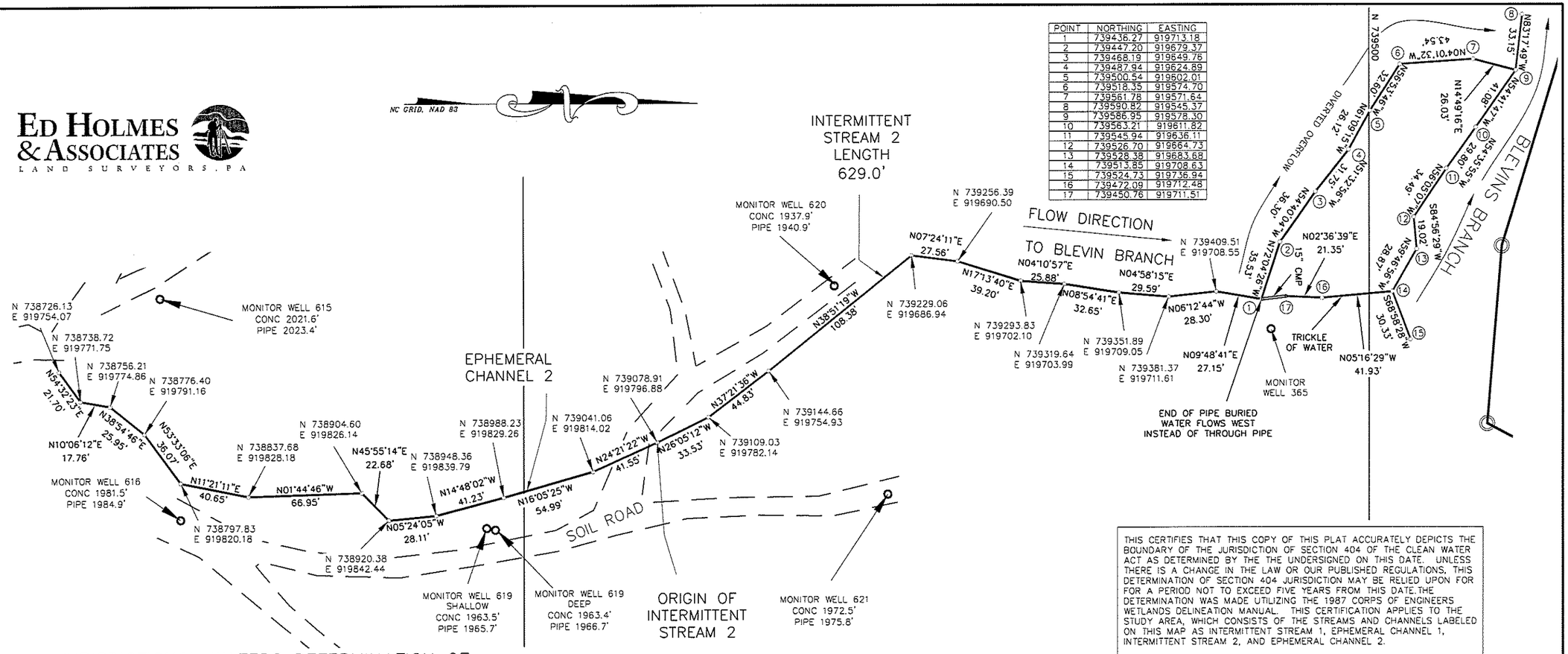

JURISDICTIONAL WATERS DETERMINATION OF
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DATE_____

USACE ACTION ID_____

I, W. EDWIN HOLMES, N.C. P.L.S., CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (PROPERTY DESCRIPTION RECORDED IN DEED BOOKS AS SHOWN); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED BY DASHED LINES AS DRAWN FROM INFORMATION FOUND IN DEED BOOKS AS SHOWN; THAT THE RATIO OF PRECISION AS CALCULATED IS 1:10,000 OR GREATER.

WITNESS MY SIGNATURE, LICENSE NUMBER, AND SEAL THIS 13TH DAY OF FEB, A.D., 2009.

N.C. PROFESSIONAL LAND SURVEYOR

L-2755
LICENSE #

NORTH CAROLINA PROFESSIONAL SEAL L-2755 LAND SURVEYOR W. EDWIN HOLMES

N:\USERS\JOEKANE\DWGS\LANDFILL\STREAMLOCATION.dwg

Part 3 - Facility Plan
Appendix B – Location Restrictions

Attachment B3
Nationwide Permitting
Approval Letters

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Water Quality

Beverly Eaves Perdue
Governor

Coleen H. Sullins
Director

Dee Freeman
Secretary

April 23, 2009

RECEIVED
APR 2 - 2009

Mr. Jerry Mears, Landfill Manager
Buncombe County Solid Waste Management Facility
81 Panther Branch Road
Alexander, NC 28701

Subject: **Activities Deemed Certified**
Buncombe County Landfill – Construction and Demolition Debris Landfill Expansion
DWQ Project # 93-1066 ver2
Buncombe County
FRB02 / UT Panther Branch / 6-90 / C

Dear Mr. Mears:

The Division of Water Quality (Division) has completed the review of the 401 Water Quality Certification application associated with the project listed above.

It has been determined that the subject project does not require written concurrence from the Division and has been deemed certified, if the conditions required by Water Quality Certification No. 3705 are followed (attached). In addition, the County should obtain or otherwise comply with any other required federal, state or local permits before proceeding with the project, including (but not limited to) Erosion and Sediment Control regulations.

This letter completes the review of your application by the Division under Section 401 of the Clean Water Act. If you have any questions, please contact Susan A. Wilson in the Asheville Regional Office at 828-296-4665.

Sincerely,

Roger C. Edwards
Regional Office Supervisor, Surface Water Protection Section

CHS/*saw*
w/attachment
cc: USACE Asheville Regulatory Field Office
Wildlife Resources Commission – David McHenry
401 Permitting Unit – Central Office
ARO File Copy

G:\WPDATA\DEMWQ\Buncombe\401s\Buncombe Co Landfill\93-1066 v2 no 401 reqd 4 23 2009.doc

Water Quality Certification N°. 3705

GENERAL CERTIFICATION FOR PROJECTS ELIGIBLE FOR U.S. ARMY CORPS OF ENGINEERS NATIONWIDE PERMIT NUMBERS 18 (MINOR DISCHARGES), 29 (RESIDENTIAL DEVELOPMENT), 39 (COMMERCIAL AND INSTITUTIONAL DEVELOPMENTS), 41 (RESHAPING EXISTING DRAINAGE DITCHES), 42 (RECREATIONAL FACILITIES), 44 (MINING ACTIVITIES), AND 46 (DISCHARGES IN DITCHES), AND RIPARIAN AREA PROTECTION RULES (BUFFER RULES)

Water Quality Certification Number 3705 is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Quality (DWQ) Regulations in 15A NCAC 2H, Section .0500 and 15A NCAC 2B .0200 for the discharge of fill material to waters and adjacent wetland areas or to wetland areas that are not a part of the surface tributary system to interstate waters or navigable waters of the United States () as described in 33 CFR 330 Appendix A (B) (18, 29, 39, 41, 42, 43, 44, and 46) of the Corps of Engineers regulations (i.e., Nationwide Permit No. 39) and for the Riparian Area Protection Rules (Buffer Rules) in 15A NCAC 2B .0200.

The State of North Carolina certifies that the general category of activity will not violate [illegible] if conducted in accordance with the conditions hereinafter set forth.

Activities meeting any one (1) of the following criteria require *written approval* from the Division of Water Quality (the "Division"):

I. Stream and/or buffer impacts:
   a. Any impacts to perennial waters (as depicted on the most recent USGS 1:24000 topographic map or as otherwise determined by the local government,) and their associated riparian buffers in Water Supply (WS), High Quality Water (HQW), or Outstanding Resource Water (ORW) watersheds. Only water-dependent activities, public projects, and structures with diminimus increases in impervious surfaces will be allowed as outlined in those rules [15A NCAC 2B .0212 through .0215]. All other activities require a variance from the delegated local government and/or the NC Environmental Management Commission before the application for the 401 Water Quality Certification can be processed.
   b. Any impacts to streams and buffers in the Neuse, Tar-Pamlico, Randleman and Catawba River Basins (or any other basins with Riparian Area Protection Rules [Buffer Rules] in effect at the time of application [in accordance with 15A NCAC 2B .0200]), *unless* the activities are listed as "EXEMPT" from these Rules.
   c. Any impacts to streams involving excavation or dredging.
   d. Total stream impacts equal to or greater than 150 linear feet of intermittent and/or perennial stream to be filled, culverted, rip rapped, or relocated, including temporary and/or permanent impacts.

II. Impacts (temporary and/or permanent) to waters:
   a. Equal to or greater than one-third (1/3) of an acre East of Interstate 95 (I-95).
   b. Equal to or greater than one-tenth (1/10) acre West of Interstate 95 (I-95).

III. Wetland impacts (temporary and/or permanent):
   a. Equal to or greater than one-third (1/3) acre East of Interstate-95.
   b. Equal to or greater than one-tenth (1/10) acre West of Interstate-95.
   c. Any impacts to wetlands adjacent to waters designated as: ORW, SA, WS-I, WS-II, or Trout, or wetlands contiguous to waters designated as a North Carolina or National Wild and Scenic River.
   d. Any impacts to coastal wetlands [15A NCAC 7H .0205)], or Unique Wetlands (UWL) [15A NCAC 2H .0506].

Water Quality Certification N°. 3705

IV. If the activity is associated with or in response to a Notice of Violation or an enforcement action initiated by the Division and/or the Division of Land Resources.

In accordance with North Carolina General Statute Section 143-215.3D(e), written approval for a 401 Water Quality General Certification must include the appropriate fee. If a project also requires a CAMA Permit, then one payment to both agencies shall be submitted and will be the higher of the two fees.

Activities that are below the thresholds, or otherwise do not meet the criteria listed above in this General Certification do *not* require written approval from the Division of Water Quality as long as they comply with the Conditions of Certification listed below, including the Stormwater Management Plan condition. If the project requires a Stormwater Management Plan, but is otherwise below the written approval thresholds, the applicant may provide a courtesy copy of the Pre-Construction Notification along with a copy of the Stormwater Management Plan (and approval letter from the appropriate locally delegated state program where applicable). If any of these Conditions cannot be met, then written approval from the Division is required.

Conditions of Certification:

1. No Impacts Beyond those Authorized in the Written Approval or Beyond the Threshold of Use of this Certification

   No waste, spoil, solids, or fill of any kind shall occur in wetlands, waters, or riparian areas beyond the footprint of the impacts depicted in the Pre-Construction Notification and authorized in the written approval from the Division, including incidental impacts. All construction activities, including the design, installation, operation, and maintenance of sediment and erosion control Best Management Practices, shall be performed so that no violations of state water quality standards, statutes, or rules occur.

2. Standard Erosion and Sediment Control Practices

   Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices:

   a. Design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual.* The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.
   b. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual.*
   c. Reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971.
   d. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.
   e. If the project occurs in waters or watersheds classified as Primary Nursery Areas (PNAs), Trout (Tr), SA, WS-I, WS-II, High Quality (HQW), or Outstanding Resource (ORW) waters, then the sediment and erosion control requirements contained within *Design Standards in Sensitive Watersheds* (15A NCAC 04B .0124) supercede all other sediment and erosion control requirements.

Water Quality Certification N°. 3705

3. No Sediment and Erosion Control Measures in Wetlands or Waters

   Sediment and erosion control measures should not be placed in wetlands or waters without prior approval by the Division. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, then design and placement of temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or stream beds or banks, adjacent to or upstream and down stream of the above structures. All sediment and erosion control devices shall be removed and the natural grade restored within two (2) months of the date that the Division of Land Resources or locally delegated program has released the project.

4. Construction Stormwater Permit NCG010000

   Upon the approval of an Erosion and Sedimentation Control Plan issued by the Division of Land Resources (DLR) or a DLR delegated local erosion and sedimentation control program, an NPDES General stormwater permit (NCG010000) administered by the Division is automatically issued to the project. This General Permit allows stormwater to be discharged during land disturbing construction activities as stipulated by conditions in the permit. If your project is covered by this permit [applicable to construction projects that disturb one (1) or more acres], full compliance with permit conditions including the sedimentation control plan, self-monitoring, record keeping and reporting requirements are required. A copy of this permit and monitoring report forms may be found at *http://h2o.enr.state.nc.us/su/Forms_Documents.htm*.

5. Construction Moratoriums and Coordination

   If activities must occur during periods of high biological activity (i.e. sea turtle or bird nesting), then biological monitoring may be required at the request of other state or federal agencies and coordinated with these activities. This condition can be waived through written concurrence on a case by case basis upon reasonable justification.

   All moratoriums on construction activities established by the NC Wildlife Resources Commission (WRC), US Fish and Wildlife Service (USFWS), NC Division of Marine Fisheries (DMF), or National Marine Fisheries Service (NMFS) to lessen impacts on trout, anadromous fish, larval/post-larval fishes and crustaceans, or other aquatic species of concern shall be implemented. This condition can be waived through written concurrence on a case by case basis upon reasonable justification.

   Work within the twenty-five (25) designated trout counties or identified state or federal endangered or threatened species habitat shall be coordinated with the appropriate WRC, USFWS, NMFS, and/or DMF personnel.

6. Work in the Dry

   All work in or adjacent to stream waters shall be conducted in a dry work area. Approved best management practices from the most current version of the NC Sediment and Erosion Control Manual, or the NC DOT Construction and Maintenance Activities Manual, such as sandbags, rock berms, cofferdams, and other diversion structures shall be used to minimize excavation in flowing water. Exceptions to this condition require submittal to, and approval by, the Division of Water Quality.

Water Quality Certification N°. 3705

7. Riparian Area Protection (Buffer) Rules

   Activities located in the protected 50-foot wide riparian areas (whether jurisdictional wetlands or not), within the Neuse, Tar-Pamlico, Catawba, or Randleman (or any other basin with buffer rules), shall be limited to "uses" identified within and constructed in accordance with 15A NCAC 2B .0233, .0259, .0250 and .0243, and shall be located, designed, constructed, and maintained to have minimal disturbance to protect water quality to the maximum extent practicable through the use of best management practices. All buffer rule requirements, including diffuse flow requirements, must be met.

8. Water Supply Watershed Buffers

   The 30-foot wide vegetative buffer (low-density development) or the 100-foot wide vegetative buffer (high-density development) shall be maintained adjacent to all perennial waters except for allowances as provided in the Water Supply Watershed Protection Rules [15A NCAC 2B .0212 through .0215].

9. If concrete is used during the construction, then a dry work area should be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete should not be discharged to surface waters due to the potential for elevated pH and possible aquatic life/fish kills.

10. Compensatory Mitigation

    In accordance with 15A NCAC 2H .0506 (h), compensatory mitigation may be required for losses of 150 linear feet or more of streams and/or one (1) acre or more of wetlands. For linear, public transportation projects, impacts equal to or exceeding 150 linear feet per stream shall require mitigation.

    Compensatory stream mitigation shall be required at a 1:1 ratio for all perennial and intermittent stream impacts in watersheds classified as ORW, HQW, Trout, WS-I and WS-II.

    Buffer mitigation may be required for any project with Buffer Rules in effect at the time of application for buffer impacts resulting from activities classified as "Allowable with Mitigation" within the "Table of Uses" section of the Buffer Rules or require a variance under the Buffer Rules.

    A determination of buffer, wetland and stream mitigation requirements shall be made for any General Water Quality Certification for this Nationwide Permit. Design and monitoring protocols shall follow the US Army Corps of Engineers Wilmington District *Stream Mitigation Guidelines* (April 2003), or its subsequent updates. Compensatory mitigation plans shall be submitted for written Division approval as required in those protocols. Alternatively, the Division will accept payment into an in-lieu fee program or credit purchase from a mitigation bank.

    Finally, the mitigation plan must be implemented and/or constructed before any permanent building or structure on site is occupied. In the case of public road projects, the mitigation plan must be implemented before the road is opened to the public. Proof of payment to an in-lieu fee program or mitigation bank must be provided to the Division to satisfy this requirement.

Water Quality Certification N°. 3705

11. For all activities requiring re-alignment of streams, a stream relocation plan must be included for written Division approval. Relocated stream designs should include the same dimensions, patterns and profiles as the existing channel (or a stable reference reach if the existing channel is unstable), to the maximum extent practical. The new channel should be constructed in the dry and water shall not be turned into the new channel until the banks are stabilized. Vegetation used for bank stabilization shall be limited to native woody species, and should include establishment of a 30-foot wide wooded and an adjacent 20-foot wide vegetated buffer on both sides of the relocated channel to the maximum extent practical. A transitional phase incorporating appropriate erosion control matting materials and seedling establishment is allowable. Rip-rap, A-Jacks, concrete, gabions or other hard structures may be allowed if it is necessary to maintain the physical integrity of the stream; however, the applicant must provide written justification and any calculations used to determine the extent of rip-rap coverage. Please note that if the stream relocation is conducted as a stream restoration as defined in the US Army Corps of Engineers Wilmington District, April 2003 *Stream Mitigation Guidelines* (or its subsequent updates), the restored length can be used as compensatory mitigation for the impacts resulting from the relocation.

12. Stormwater Management Plan Requirements

    A. For applicants other than the North Carolina Department of Transportation, a Stormwater Management Plan in accordance with the version of *Stormwater Management Plan (SMP) Requirements for Applicants other than the North Caroline Department of Transportation* posted on the Division web site at the time of application shall be provided for any project that meets both of the following two criteria:

        i. Requires a 404 Permit or Isolated Wetlands Permit (regardless of whether written authorization is required by the Division), AND

        ii. Contains one or more drainage areas that are anticipated to have impervious surface cover of equal to or greater than 24 percent. When drainage areas are difficult to delineate or when a pocket of high density exists within a drainage area, the Division shall use best professional judgment to apply the SMP requirement as appropriate.

    B. For the North Carolina Department of Transportation, compliance with NCDOT's Individual NPDES permit NCS000250 shall serve to satisfy this condition.

13. Placement of Culverts and Other Structures in Waters and Wetlands

    Culverts required for this project shall be designed and installed in such a manner that the original stream profiles are not altered and allow for aquatic life movement during low flows. Existing stream dimensions (including the cross section dimensions, pattern, and longitudinal profile) must be maintained above and below locations of each culvert. Placement of culverts and other structures in waters and streams must be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than or equal to 48 inches, to allow low flow passage of water and aquatic life.

    Installation of culverts in wetlands must ensure continuity of water movement and be designed to adequately accommodate high water or flood conditions. Additionally, when roadways, causeways or other fill projects are constructed across FEMA-designated floodways or wetlands, openings such as culverts or bridges must be provided to maintain the natural hydrology of the system as well as prevent constriction of the floodway that may result in destabilization of streams or wetlands.

Water Quality Certification N°. 3705

If site-specific topographic constraints preclude the ability to bury the culverts as described above and/or the applicant can demonstrate that burying the culvert would result in destabilization of the channel and head-cutting upstream, the Division will consider alternative design proposals.

Any riprap required for normal pipe burial and stabilization shall be buried such that the original stream elevation is restored and maintained.

The establishment of native, woody vegetation and other soft stream bank stabilization techniques must be used where practicable instead of riprap or other bank hardening methods.

14. Additional site-specific conditions may be added to the written approval letter for projects proposed under this Water Quality Certification in order to ensure compliance with all applicable water quality and effluent standards.

15. If an environmental document is required under the National or State Environmental Policy Act (NEPA or SEPA), then this General Certification is not valid until a Finding of No Significant Impact (FONSI) or Record of Decision (ROD) is issued by the State Clearinghouse.

16. If this Water Quality Certification is used to access building sites, then all lots owned by the applicant must be buildable without additional impacts to streams or wetlands. The applicant is required to provide evidence that the lots are buildable without requiring additional impacts to wetlands, waters or buffers if required to do so in writing by the Division. For road construction purposes, this Certification shall only be utilized from natural high ground to natural high ground.

17. Deed notifications or similar mechanisms shall be placed on all retained jurisdictional wetlands, waters and protective buffers in order to assure compliance for future wetland, water and buffer impact. These mechanisms shall be put in place at the time of recording of the property, or of individual lots, whichever is appropriate. A sample deed notification can be downloaded from the 401/Wetlands Unit web site at http://h2o.enr.state.nc.us/ncwetlands. The text of the sample deed notification may be modified as appropriate to suit to a specific project.

18. When written authorization is required for use of this certification, upon completion of all permitted impacts included within the approval and any subsequent modifications, the applicant shall be required to return the certificate of completion attached to the approval. One copy of the certificate shall be sent to the DWQ Central Office in Raleigh at 1650 Mail Service Center, Raleigh, NC, 27699-1650.

19. This General Certification shall expire three (3) years from the date of issuance of the written letter from the Division or on the same day as the expiration date of the corresponding Nationwide Permit The conditions in effect on the date of issuance of Certification for a specific project shall remain in effect for the life of the project, regardless of the expiration date of this Certification. If the construction process for approved activities will overlap the expiration and renewal date of the corresponding 404 Permit and the Corps allows for continued use of the 404 Permit, then the General Certification shall also remain in effect without requiring re-application and re-approval to use this Certification for the specific impacts already approved.

Water Quality Certification N°. 3705

20. The applicant/permittee and their authorized agents shall conduct all activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act), and any other appropriate requirements of State and Federal Law. If the Division determines that such standards or laws are not being met, including failure to sustain a designated or achieved use, or that State or Federal law is being violated, or that further conditions are necessary to assure compliance, then the Division may reevaluate and modify this General Water Quality Certification.

Non-compliance with or violation of the conditions herein set forth by a specific fill project may result in revocation of this General Certification for the project and may also result in criminal and/or civil penalties.

The Director of the North Carolina Division of Water Quality may require submission of a formal application for Individual Certification for any project in this category of activity, if it is determined that the project is likely to have a significant adverse effect upon water quality including state or federally listed endangered or threatened aquatic species or degrade the waters so that existing uses of the wetland or downstream waters are precluded.

Public hearings may be held for specific applications or group of applications prior to a Certification decision if deemed in the public's best interest by the Director of the North Carolina Division of Water Quality.

Effective date: November 1, 2007

DIVISION OF WATER QUALITY

By

Coleen H. Sullins

Director

History Note: Water Quality Certification Number 3705 replaces Water Quality Certification Numbers 3106 and 3108 issued on February 11, 1997, Water Quality Certification Number 3287 issued on June 1, 2000, Water Quality Certification Number 3362 issued March 18, 2002, Water Quality Certification Number 3402 issued March, 2003, and Water Quality Certification Number 3631 issued March 19, 2007. This Water Quality Certification is rescinded when the Corps of Engineers re-authorizes Nationwide Permits 18, 29, 39, 41, 42, 43 or 44 or when deemed appropriate by the Director of the Division of Water Quality.

Copy Furnished:
CDM; Attn: Mr. Kenton Yang, 5400 Glenwood Avenue, Suite 300 Raleigh, NC 27612

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID. **SAW-2008-02908** County: **Buncombe** USGS Quad: **Leicester**

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Property Owner / Authorized Agent: **Buncombe County Solid Waste Management Facility-Construction Demolition and Debris Landfill**
Address: **81 Panther Branch Road**
Alexander, NC 28701

Size and location of property (water body, road name/number, town, etc.): **The proposed project site is located along an unnamed tributary to Panther Branch, within the existing 604.5 acres of the Buncombe County Solid Waste Management Facility on Panther Branch Road, in the town of Alexander, Buncombe County, North Carolina. 35.7265 N and -82.6416 W.**

Description of projects area and activity: **This verification authorizes impacts to jurisdictional waters of the U.S. for the expansion of the existing Construction Demolition and Debris landfill. Impacts authorized total 147 linear feet for the placemen t of fill material into an intermittent unnamed tributary to Panther Branch.**

Applicable Law: ☒ **Section 404 (Clean Water Act, 33 USC 1344)**
☐ Section 10 (Rivers and Harbors Act, 33 USC 403)
Authorization: Regional General Permit Number:
Nationwide Permit Number: 39

Your work is authorized by the above referenced permit provided it is accomplished in strict accordance with the attached conditions and your submitted plans. Any violation of the attached conditions or deviation from your submitted plans may subject the permittee to a stop work order, a restoration order and/or appropriate legal action.

This verification will remain valid until the expiration date identified below unless the nationwide authorization is modified, suspended or revoked. If, prior to the expiration date identified below, the nationwide permit authorization is reissued and/or modified, this verification will remain valid until the expiration date identified below, provided it complies with all requirements of the modified nationwide permit. If the nationwide permit authorization expires or is suspended, revoked, or is modified, such that the activity would no longer comply with the terms and conditions of the nationwide permit, activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon the nationwide permit, will remain authorized provided the activity is completed within twelve months of the date of the nationwide permit's expiration, modification or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend or revoke the authorization.

Activities subject to Section 404 (as indicated above) may also require an individual Section 401 Water Quality Certification. You should contact the NC Division of Water Quality (telephone (919) 733-1786) to determine Section 401 requirements.

For activities occurring within the twenty coastal counties subject to regulation under the Coastal Area Management Act (CAMA), prior to beginning work you must contact the N.C. Division of Coastal Management.

This Department of the Army verification does not relieve the permittee of the responsibility to obtain any other required Federal, State or local approvals/permits.

If there are any questions regarding this verification, any of the conditions of the Permit, or the Corps of Engineers regulatory program, please contact Liz Hair at 828-271-7980.

Corps Regulatory Official Liz Hair Date: **April 14, 2009**

Expiration Date of Verification: **April 14, 2011**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the attached customer Satisfaction Survey or visit http://www.saw.usace.army.mil/WETLANDS/index.html to complete the survey online.

Determination of Jurisdiction:

A. ☐ Based on preliminary information, there appear to be waters of the US including wetlands within the above described project area. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

B. ☐ There are Navigable Waters of the United States within the above described project area subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. 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.

C. ☒ **There are waters of the US and/or wetlands within the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(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. This jurisdictional determination applies to the area described as the study area only.**

D. ☐ The jurisdictional areas within the above described project area have been identified under a previous action. Please reference jurisdictional determination issued ___. Action ID

Basis of Jurisdictional Determination: The site contains wetlands as determined by the USACE 1987 Wetland Delineation Manual and is adjacent to stream channels that exhibit indicators of ordinary high water marks. The stream channel on the property is an unnamed tributary to Panther Branch which flows into the French Broad River and ultimately flows to the Gulf of Mexico through the UT to Panther Branch> Panther Branch> French Broad River, a section 10 navigable water of the U.S..

Appeals Information: (This information does not apply to preliminary determinations as indicated by paragraph A. above).

Attached to this verification is an approved jurisdictional determination. If you are not in agreement with that approved jurisdictional determination, you can make an administrative appeal under 33 CFR 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

District Engineer, Wilmington Regulatory Program
Attn: Liz Hair, Project Manager
151 Patton Avenue, Room 208
Asheville, North Carolina 28801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address within 60 days from the *Issue Date* below.

It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: Liz Hair

Issue Date: **April 14, 2009**

Expiration Date: Five years from *Issue Date*

SURVEY PLATS, FIELD SKETCH, WETLAND DELINEATION FORMS, PROJECT PLANS, ETC., MUST BE ATTACHED TO THE FILE COPY OF THIS FORM, IF REQUIRED OR AVAILABLE.

North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

March 13, 2009

Ms. Liz Hair
U.S. Army Corps of Engineers, Regulatory Branch
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006

MAR 13 2009

SUBJECT: Nationwide Permit Application for Buncombe County Solid Waste Management Facility Culvert in UT Panther Branch, Buncombe County

Dear Ms. Hair:

The Buncombe County Solid Waste Management Facility requested a letter of concurrence from the North Carolina Wildlife Resources Commission (Commission) for a 404 Permit from the U.S. Army Corps of Engineers. Comments from the Commission are provided under provisions of the Clean Water Act of 1977 (33 U.S.C. 466 et seq.) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

The project involves putting 147 feet of culvert in a tributary to Panther Branch near Alexander to accommodate a landfill expansion.

The project should not harm trout. The Commission has no major concerns with this project provided the Nationwide and Final Regional conditions are adhered to (except trout moratorium is unnecessary) and if effective sediment and erosion control measures are used and maintained.

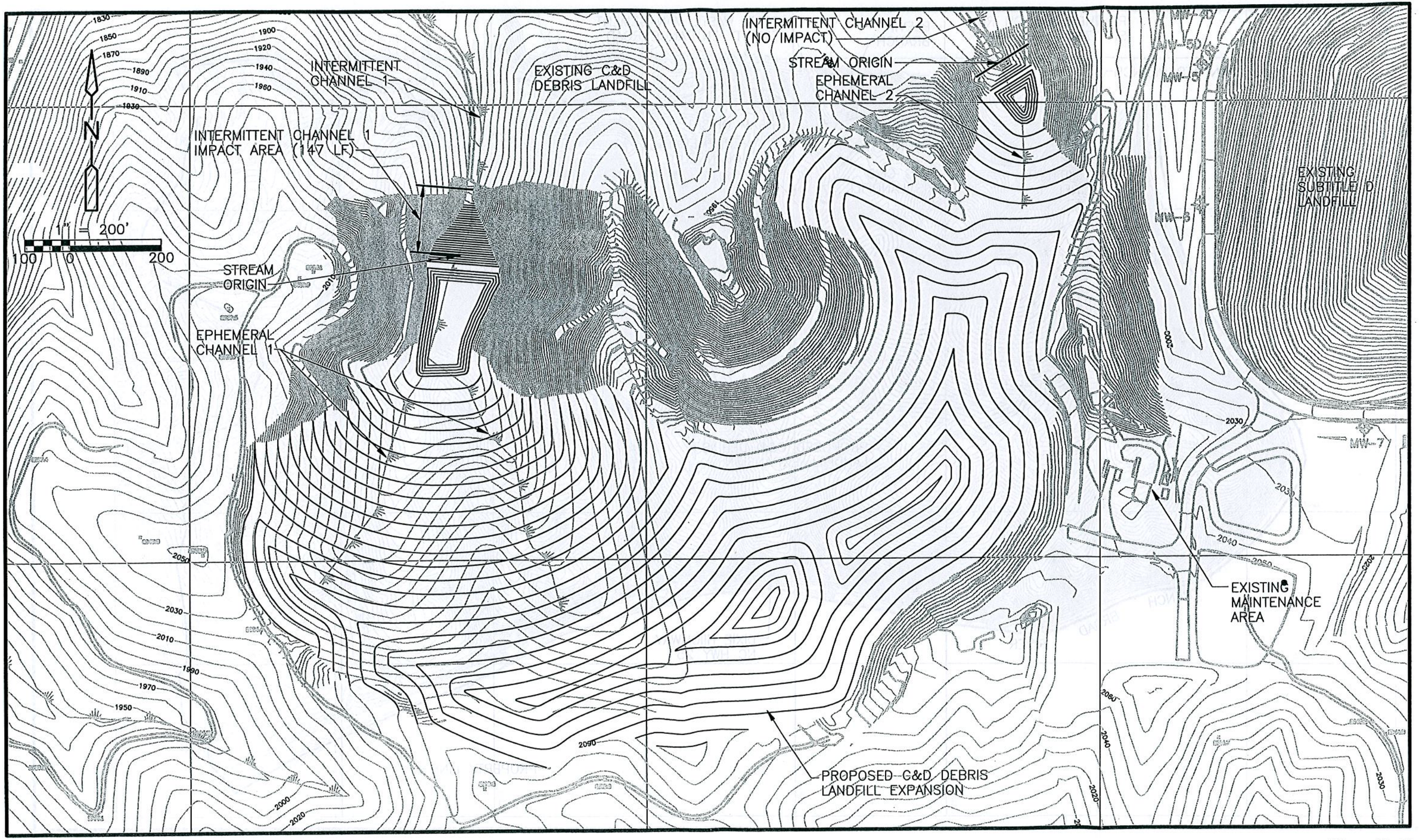
Thank you for the opportunity to review and comment on this project. If there are any questions regarding these comments, please contact me at (828) 452-2546 extension 24.

Sincerely,

Dave McHenry
Mountain Region Coordinator, Habitat Conservation Program

cc: K.J. Yang, Camp Dresser & McKee

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028



CDM
consulting • engineering • construction • operations

Figure No. 2
Buncombe County C&D Debris Landfill Expansion
Jurisdictional Waters Impacts

Part 3 - Facility Plan
Appendix B – Location Restrictions

Attachment C
State Historic Preservation Office/
Department of Cultural Resources Correspondence

North Carolina Department of Cultural Resources

State Historic Preservation Office

Peter B. Sandbeck, Administrator

Beverly Eaves Perdue, Governor
Linda A. Carlisle, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

March 12, 2009

Kenton Yang
Camp Dresser & McKee
5400 Glenwood Avenue
Suite 300
Raleigh, NC 27612

Re: Buncombe County Solid Waste Management Facility, C&D Landfill Expansion, Buncombe County, ER 08-2378

Dear Mr. Yang:

Thank you for your letter of September 29, 2008, concerning the above project. We apologize for the delay in our response.

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 919-807-6579. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Peter Sandbeck

Part 3 - Facility Plan
Appendix B – Location Restrictions

Attachment D
Natural Heritage Program Correspondence

NCDENR

North Carolina Department of Environment and Natural Resources

Michael F. Easley, Governor

William G. Ross Jr., Secretary

October 6, 2008

Mr. Kenton J. Yang
CDM
5400 Glenwood Avenue, Suite 300
Raleigh, NC 27612

Reference: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion
CDM Project Number 6447-65973

Dear Mr. Yang:

The NC Natural Heritage Program has two records of rare species and one Significant Natural Heritage Area within the landfill property boundary and several additional records of rare species and state nature preserves within two miles of the project site shown on your map of September 29, 2008.

The Panther Cliffs Significant Natural Heritage Area is located along the western property boundary, facing the French Broad River. This area supports two rare plant species, Branching Draba (*Draba ramosissima*), NC Significantly Rare, and Carolina Saxifrage (*Micranthes caroliniana* or *Saxifraga caroliniana*), US Federal Species of Concern and NC Significantly Rare.

Additional species reported within two miles of the project site include:

- Piratebush (*Buckleya distichophylla*), US Federal Species of Concern and NC Endangered
- Southern Zigzag Salamander (*Plethodon ventralis*), NC Special Concern
- Striped Shiner (*Luxilus chrysocephalus*), NC Special Concern
- American Barberry (*Berberis canadensis*), NC Significantly Rare
- Bleeding Heart (*Dicentra eximia*), NC Significantly Rare
- Climbing Fumatory (*Adlumia fungosa*), NC Significantly Rare
- Slender Corydalis (*Corydalis micrantha ssp. micrantha*), NC Significantly Rare

The Sandymush Game Land is located on the west bank of the French Broad River, across from the landfill property boundary.

You may wish to consult with the NC Plant Conservation Program or the NC Wildlife Resources Commission if direct or indirect impacts are expected to affect protected species habitat.

1601 Mail Service Center, Raleigh, North Carolina 27699-1601
Phone: 919-715-8700 \ Email: misty.buchanan@ncmail.net \ www.ncnhp.org

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NORTH CAROLINA Natural Heritage Program
SCIENCE GUIDING CONSERVATION

use of Natural Heritage Program data should not be substituted for actual field surveys, particularly if the project area contains suitable habitat for rare species, significant natural communities, or priority natural areas. You may wish to check the Natural Heritage Program database website at www.ncnhp.org for a listing of rare plants and animals and significant natural communities in the county and on the quad map.

Our Program also has a website that allows users to obtain information on element occurrences and significant natural heritage areas within two miles of a given location: http://nhpweb.enr.state.nc.us/nhis/public/gmap75_main.phtml. The user name is "public" and the password is "heritage". You may want to click "Help" to download the user's manual before you use the application. This website gives you instant answers to information requests about specific locations, without waiting for NHP staff to respond.

NC OneMap provides digital Natural Heritage data online for free. This service provides site specific information on GIS layers with Natural Heritage Program rare species occurrences and Significant Natural Heritage Areas. The NC OneMap website provides Element Occurrence (EO) ID numbers (instead of species name), and the data user is then encouraged to contact the Natural Heritage Program for detailed information. This service allows the user to quickly and efficiently get site specific NHP data without visiting the NHP workroom or waiting for the Information Request to be answered by NHP staff. For more information about data formats and access, visit www.nconemap.com, then click on "FTP Data Download", and then "nheo.zip" [to the right of "Natural Heritage Element Occurrences"]. You may also e-mail NC OneMap at dataq@ncmail.net for more information.

We appreciate your interest in Natural Heritage Program data. If you have any questions or need additional information, please contact me at (919) 715-8700.

Sincerely,

Misty Buchanan

Misty Buchanan
Botanist

1601 Mail Service Center, Raleigh, North Carolina 27699-1601
Phone: 919-715-8700 \ Email: misty.buchanan@ncmail.net \ www.ncnhp.org

NORTH CAROLINA
Natural Heritage Program
SCIENCE GUIDING CONSERVATION

Part 3 - Facility Plan
Appendix B – Location Restrictions

Attachment E
US Fish and Wildlife Service Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Field Office
160 Zillicoa Street
Asheville, North Carolina 28801

October 20, 2008

Mr. Kenton J. Yang, P.E.
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612

Dear Mr. Yang:

Subject: Buncombe County Solid Waste Management Facility, C&D Landfill Expansion, Buncombe County, North Carolina (CDM Project Number 6447-65973)

In your letter dated September 29, 2008, you requested our comments about the subject project. The following comments are provided in accordance with the provisions of section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) (Act).

According to our records and a review of the information you provided, no federally listed species or their habitats occur on the site. Therefore, we believe the requirements under section 7 of the Act are fulfilled. However, obligations under section 7 of the Act must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner that was not considered in this review, or (3) a new species is listed or critical habitat is determined that may be affected by the identified action.

Thank you for allowing us to comment on this project. Please contact Mr. Allen Ratzlaff of our staff at 828/258-3939, Ext. 229, if you have any questions. In any future correspondence concerning this project, please reference our Log Number 4-2-09-001.

Sincerely,

for

Brian P. Cole
Field Supervisor

Buncombe County, North Carolina

Buncombe County Solid Waste Management Facility

C&D Landfill Expansion
Part 4: Local Government Approval

April 2009

Part 4: Local Government Approval Contents

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Appendix B – Legal Advertisement
Appendix C – Public Notice Letters
Appendix D – Public Notice Documentation
Appendix E – Delivery Confirmations
Appendix F – Public Meeting Sign-in Sheet
Appendix G – Zoning Letter

Section 1
Purpose

As part of the substantial amendment requirements, see Rule .0535(c)(2), local government approval documents are required. Per Rule .0536(c)(11), local government approval for this project requires the following:

- Rule .0536(c)(11)(A) – project approval of the governing board (see Section 2);
- Rule .0536(c)(11)(C) and (D) – one public meeting to inform the community of the project and public notice and meeting documentation (see Section 3); and
- Rule .0536(c)(11)(E) – a letter from the unit of local government having zoning jurisdiction over the site which states that the project meets all the requirements of the local zoning ordinance (see Section 4).

Section 2
Board Approval

Per Rule .0537(c)(11)(A), project approval by the governing board, Buncombe County Board of County Commissioners, is required. This approval was obtain on the April 21, 2009 Commissioners' Meeting and is provided as Appendix A as a vote on a resolution.

Section 3
Public Meeting

Per Rule .0537(c)(11)(C), one (1) public meeting to inform the community of the project is required. The public meeting was held on March 31, 2009 at 7:00 PM in Asheville, North Carolina.

3.1 Public Notice

Public notice of the meeting was provided 30 days prior to the public meeting in the form of a legal advertisement placed in the Asheville Citizen-Times (see Appendix B).

Also required was the notification of the property owners of all property that share a common border with the landfill property. Table 3-1 and Figure 1 present all the adjacent property owners. Appendix C includes public notice letters to all thirty-three (33) adjacent property owners. Appendix D includes the public notice documentation that was provided with the public notice letters. As required by Rule .0537(c)(11)(C), FedEx® delivery confirmations and US Postal Service return receipts are provided in Appendix E.

3.1.1 Public Response

A number of property owners contacted CDM during the 30-day period. This information is presented in Table 3-1.

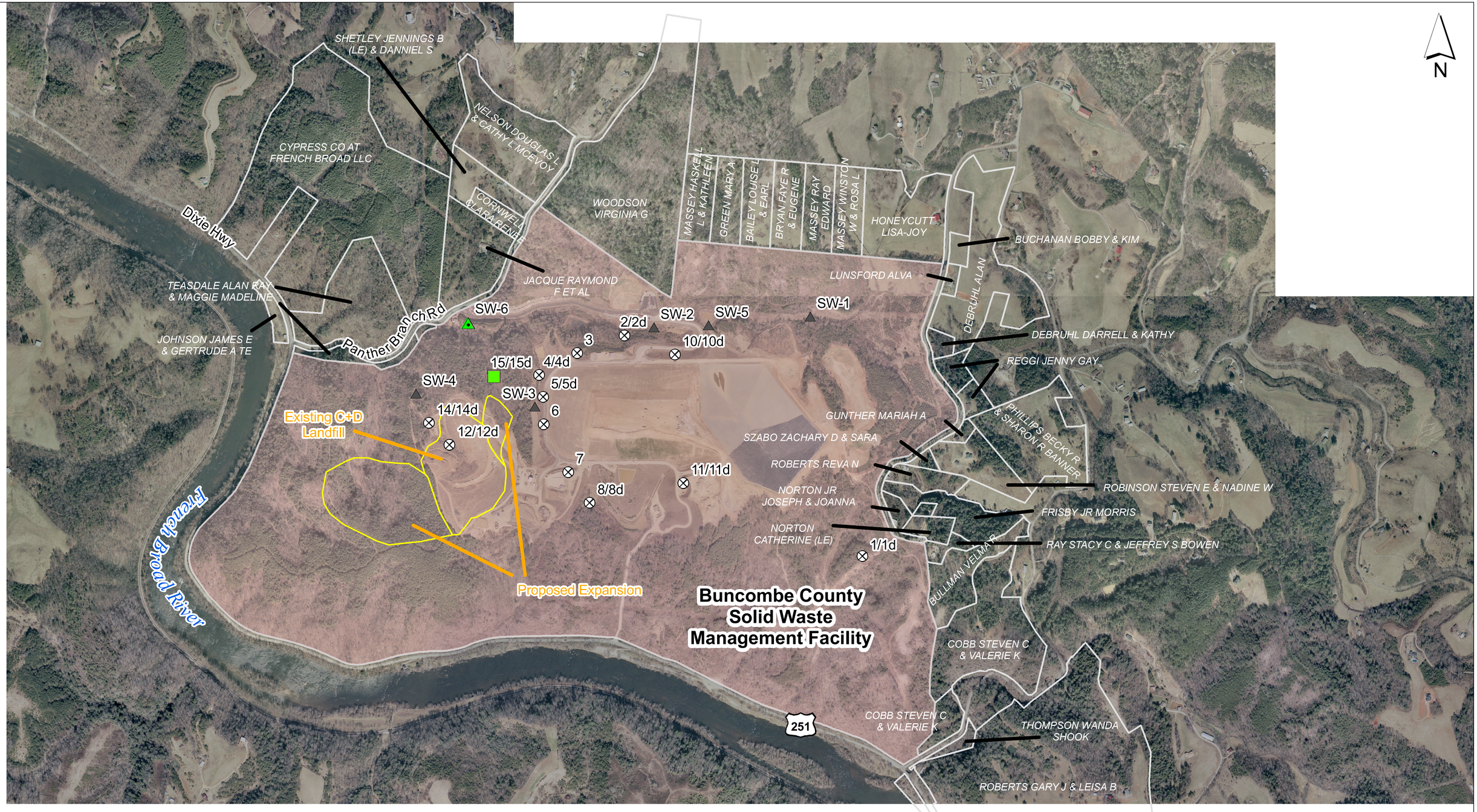
3.1.2. Public Meeting Documentation

Per Rule .0537(c)(11)(D), public meeting documentation is included as a digital WAV file in the CD-R in the front cover of this permit application with the PDF of the permit. The sign-in sheet is included in Appendix F.

Buncombe County
C&D Landfill Expansion

Table 3-1 - Adajcent Property Owners

OWNER	DELIVERY	CONTACT	MAIN CONCERN	COMMENT
BRYAN FAYE R & EUGENE	FedEx - Yes			
BUCHANAN BOBBY & KIM	FedEx - Yes	Call - 03/02	Is County taking property?	
BULLMAN VELMA R	FedEx - Yes			
CORNWELL CLARA RENEE	FedEx - Yes	Call - 03/06	Is County taking property?	
DEBRUHL ALAN	FedEx - Yes			
FRISBY JR MORRIS	FedEx - Yes			
GREEN MARY A	FedEx - Yes	Call - 02/27	Is County taking property?	
GUNTHER MARIAH A	FedEx - Yes	Call - 03/02	Is County taking property?	
HONEYCUTT LISA-JOY	--	Call - 03/04	Is County taking property?	Email as well, located in Hawaii, no confirmation
JACQUE RAYMOND F ET AL	FedEx - Yes			
JOHNSON JAMES E & GERTRUDE A TE	FedEx - Yes			
LUNSFORD ALVA	FedEx - Yes			
MASSEY HASKELL L & KATHLEEN	FedEx - Yes	Call - 03/02	Offered to sell	
MASSEY RAY EDWARD	FedEx - Yes			
MASSEY WINSTON W & ROSA L	FedEx - Yes	Call - 03/12	Offered to sell	
NELSON DOUGLAS L & CATHY L MCEVOY	FedEx - Yes			
NORTON CATHERINE (LE)	FedEx - Yes			
NORTON JR JOSEPH & JOANNA	FedEx - Yes			
RAY STACY C & JEFFREY S BOWEN	FedEx - Yes			
REGGI JENNY GAY	FedEx - Yes			
ROBINSON STEVEN E & NADINE W	FedEx - Yes	Call - 03/02	Is County taking property?	
SHETLEY JENNINGS B (LE) & DANNIEL S	FedEx - Yes			
TEASDALE ALAN RAY & MAGGIE MADELINE	FedEx - Yes	Call - 03/25	Is County taking property?	
THOMPSON WANDA SHOOK	FedEx - Yes			
WOODSON VIRGINIA G	FedEx - Yes			
BAILEY LOUISE L & EARL	USPS - Yes			
CYPRESS CO AT FRENCH BROAD LLC	USPS - Yes			
PHILLIPS BECKY R & SHARON R BANNER	USPS - Yes			
ROBERTS GARY J & LEISA B	USPS - Yes			
SZABO ZACHARY D & SARA	USPS - Yes			
COBB STEVEN C & VALERIE K	FedEx - Returned			
ROBERTS REVA N	FedEx - Returned			
DEBRUHL DARRELL & KATHY	USPS - Returned			
ROBERTA GOFORTH	--	Call - 03/03	Is County taking property?	Not an adjacent property owner



Legend

- ⊗ Existing Monitoring Well
- ▲ Surface Water Sampling Location
- Parcels
- ■ Proposed Monitoring Well Location
- ▲ Proposed Surface Water Sampling Location
- Landfill Property Boundary

Figure 1
Buncombe County
Solid Waste Management Facility
Adjacent Property Owners

CDM

Section 4
Local Zoning Ordinance

Per Rule .0537(c)(11)(E), a letter from the local government, Buncombe County Board of County Commissioners, is required that states that the project meets all the requirements of the local zoning ordinance. The zoning letter is included in Appendix G.

Part 4
Local Government Approval

Appendix A
Buncombe County
Board of County Commissioners'
Project Approval

RESOLUTION NO. 09-04-08

RESOLUTION APPROVING THE EXPANSION OF THE CONSTRUCTION & DEMOLITION (C&D) LANDFILL

WHEREAS, the County of Buncombe is committed to achieving the waste reduction goals identified in the Buncombe County Solid Waste Management Plan and improving the health and safety of all citizens by disposing of waste in the most effective and efficient manner possible; and

WHEREAS, construction and demolition debris consists of treated paint or wood, sheetrock, concrete, blocks, bricks, and clean dirt, and represents approximately 24% of the waste stream generated by Buncombe County and its municipalities;

WHEREAS, since 1998, the Buncombe County Solid Waste Department has operated a Construction and Demolition (C&D) landfill area at the Buncombe County Solid Waste Management Facility and Landfill on Panther Branch Road, which emphasizes reducing and recycling construction and debris materials to conserve landfill space thereby fostering markets for recovered and recycled materials; and

WHEREAS, the existing C&D landfill is expected to reach capacity in approximately two years, and the Board of Commissioners recognizes the need to expand the C&D landfill at its Solid Waste Management Facility; and

WHEREAS, in accordance with requirements set forth in 15A NCAC 13B .0536(11), the Buncombe County Board of Commissioners has informed the community about the proposed expansion, obtained input, and provided assurance that the site meets local zoning requirements; and

WHEREAS, the design and operation of the C&D landfill expansion will comply with 15A NCAC 13B .0536 through 0.544, and the expansion otherwise complies with all other applicable County laws and ordinances; and

WHEREAS, the Board supports the expansion of the C&D landfill in order to continue offering an environmentally sound and effective option for managing the residual materials from construction and demolition waste.

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners for the County of Buncombe as follows:

1. That the Board hereby endorses and approves the expansion of the Construction and Demolition (C&D) landfill area at the Buncombe County Solid Waste Management Facility and Landfill and authorizes the execution and submission of the necessary permits required to expand the C&D landfill area and other documents as may be necessary to complete the expansion project.

2. That this Resolution shall be effective upon its adoption.

Adopted this 21st day of April, 2009.

ATTEST:

Kathy Hughes, Clerk to the Board

BOARD OF COMMISSIONERS
FOR THE COUNTY OF BUNCOMBE

By: David Gantt, Chairman

APPROVED AS TO FORM:

Joe A. Connolly

Part 4
Local Government Approval

Appendix B
Legal Advertisement

Start Date : 3/1/2009

Stop Date : 3/1/2009

Customer Type : C - Contract

Rate : ZLEG - LEGAL ADS STARTS NMT

Width : 2

Depth : 65

Ad Rated Cost : $227.50

Extra : $0.00

Discount % : $0.00

Class Code : 1001 - LEGALS

List 2 :

Ad Sales Rep. : 0102 - ASH Disabled

Foreign Account Number : 118171A0

Notes :

LEGAL NOTICE FOR PUBLIC MEETING

Buncombe County Solid Waste Management Facility C&D Landfill
Buncombe County, North Carolina

Public Meeting Date: Tuesday, March 31, 2009 at 7:00 p.m.

Notice of public meeting on the proposed construction and demolition debris landfill (C&DLF) facility expansion for Permit Number 11-07 to increase the approved capacity of the Buncombe County C&DLF, located in Buncombe County, pursuant to 15A NCAC 13B .0536 (c)(11) of the Solid Waste Management Rules is hereby given.

In general, the proposed facility expansion increases the C&DLF to the northeast and west of the existing C&DLF area. This modification adheres to all permitting boundary buffers, and does not change the tonnage rate or the characteristics of the waste stream.

A public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room at 199 College Street, Asheville, North Carolina 28801. All attendees will have the opportunity to present statements regarding the proposed facility expansion and/or to submit written comments and data. Written comments may be presented at the public meeting or sent directly to Mr. Jerry Mears, Landfill Manager at the following address:

81 Panther Branch Road
Alexander, NC 28701

A Fact Sheet and copies of the proposed C&DLF facility expansion and facility location will be available for public review on March 2, 2009 through March 31, 2009 at the following locations:

Buncombe County Solid
Waste Management Facility
Landfill - Main Office
81 Panther Branch Road
Alexander, NC 28701

Buncombe County Library
Pack Memorial Library
67 Haywood Street
Asheville, NC 28801

County Manager's Office
Administrative Services Building
205 College Street
Asheville, NC 28801 Planning & Development
46 Valley Street
Asheville, NC 28801

March 1, 2009 5518)

Business/ Opportunity

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nd your next car th Cars.com at tizen-times.com

ANTS

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th full kitchen en history of . $245,000

n restaurants. fidentiality nent necessary 9,000.

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LEGAL NOTICE FOR PUBLIC MEETING

Buncombe County Solid Waste Management Facility C&D Landfill
Buncombe County, North Carolina

Public Meeting Date: Tuesday, March 31, 2009 at 7:00 p.m.

Notice of public meeting on the proposed construction and demolition debris landfill (C&DLF) facility expansion for Permit Number 11-07 to increase the approved capacity of the Buncombe County C&DLF, located in Buncombe County, pursuant to 15A NCAC 13B .0536 (c)(11) of the Solid Waste Management Rules is hereby given.

In general, the proposed facility expansion increases the C&DLF to the northeast and west of the existing C&DLF area. This modification adheres to all permitting boundary buffers, and does not change the tonnage rate or the characteristics of the waste stream.

A public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room at 199 College Street, Asheville, North Carolina 28801. All attendees will have the opportunity to present statements regarding the proposed facility expansion and/or to submit written comments and data. Written comments may be presented at the public meeting or sent directly to Mr. Jerry Mears, Landfill Manager at the following address:

81 Panther Branch Road
Alexander, NC 28701

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Buncombe County Solid
Waste Management Facility
Landfill - Main Office
81 Panther Branch Road
Alexander, NC 28701

Buncombe County Library
Pack Memorial Library
67 Haywood Street
Asheville, NC 28801

County Manager's Office
Administrative Services Building
205 College Street
Asheville, NC 28801 Planning & Development
46 Valley Street
Asheville, NC 28801

March 1, 2009
5518)

PUBLIC NOTICE

This is to inform the public that a public hearing

SPECIAL NOTICE
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH, NC

DESIGN BUILD REQUEST FOR QUALIFICATIONS (RFQ)

The North Carolina Department of Transportation (NCDOT) is requesting interested Design-Build Teams to submit qualifications for a Design-Build project. The project consists of tip # I-4744, which widens I-40 from west of Wade Avenue to east of Jones Franklin Road, as well as the signing improvements previously included in TIP # I-4902. The project is located in Wake County.

Interested parties should send request by email; only to:
brawls@ncdot.gov and **rlhiggins@ncdot.gov** for a formal package detailing the requirements for submitting a Statement of Qualifications. The following contact information must be included in the email request: Company Name; Physical Address; City; State; Zip Code; Contact Person, Phone Number, and current E-mail Address. The Statement of Qualifications must be received by 4:00 p.m., March 25, 2009 at the address shown below:

Mr. Randy Garris, PE
State Contract Officer
NCDOT-Contract Standards
and Development Unit
Century Center - Building B
Entrance B2
1020 Birch Ridge Drive
Raleigh, NC 27610

All available Design-Build Project information is on the NCDOT website at **www.ncdot.org/** under *"Business."* Project information is continually being added, so it is advisable to monitor this website for the most up to date information.

Technical questions related to the RFQ package or other project related questions, should be sent via email to **designbuild@ncturnpike.org**. For tracking purposes, questions will ***only*** be answered through e-mail requests.

When making requests by e-mail, it is advisable
March 1, 2009 (5532)

PUBLIC COMMENT PERIOD OPEN AND NOTICE OF PUBLIC HEARING

DRAFT ECONOMIC STIMULUS PROJECT REQUEST LISTS FOR THE FRENCH BROAD RIVER METROPOLITAN PLANNING ORGANIZATION REGION

COMMENT PERIOD OPEN: The public is invited to review the list of potential economic stimulus projects compiled by the North Carolina Department of Transportation and the supplemental list prepared by the French Broad River Metropolitan Planning Organization (FBRMPO). Projects identified on these lists were chosen because of their readiness to begin construction within the timeframe specified by

Part 4
Local Government Approval

Appendix C
Public Notice Letters

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Ms. Lisa-Joy Honeycutt
111 Gordon Road
Wahiawa, HI 96786

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Honeycutt:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 27 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

Call 02/27
Returned 02/27
- take land?
Narrative →

February 26, 2009

Ms. Mary Green
145 Idlewood Circle
West Columbia, SC 29170

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Green:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 22 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Stacy Ray and Jeffrey Bowen
201 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Ray and Mr. Bowen:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 8 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Ms. Jenni Gay Reggi
126 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Reggi:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your properties, identified as 15 and 38 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Gary and Leisa Roberts
P. O. Box 8
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. & Mrs. Roberts:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your properties, identified as 10 and 13 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Ms. Reva Roberts
162 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Roberts:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 4 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Steven and Nadine Robinson
325 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. and Mrs. Robinson:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 2 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Zachary and Sara Szabo
P. O. Box 374
Barnardsville, NC 28709

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. and Mrs. Szabo:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 3 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Alan and Maggie Teasdale
499 Green Valley Road
Leicester, NC 28748

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. and Mrs. Szabo:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your properties, identified as 32 and 37 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Wanda Shook Thompson
1184 Lower Flat Creek Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Thompson:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 12 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Ms. Velma R. Bullman
320 Lower Flat Creek Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Bullman:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 7 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Ms. Virginia Woodson
42 Princeton Drive
Asheville, NC 28806

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Woodson:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 16 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Bobby and Kim Buchanan
62 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. and Mrs. Buchanan:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 31 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Steven and Valerie Cobb
2943 E. Norcroft Street
Mesa, AZ 85213

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. and Mrs. Cobb:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your properties, identified as 9 and 11 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Darrell and Kathy DeBruhl
P. O. Box 68
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. & Mrs. DeBruhl:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 36 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Mr. Alan DeBruhl
76 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. DeBruhl:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 21 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Faye and Eugene Bryan
8559 Damascus Drive
West Palm Beach, FL 33418

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. and Mrs. Bryan:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 24 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Mr. Morris Frisby, Jr.
500 Tillery Branch Road
Marshall, NC 28753

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. Frisby:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 14 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Jennings and Danniel Shetley
240 Panther Branch Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. & Mrs. Shetley.:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 19 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Ms. Clara Renee Cornwell
242 Panther Branch Road
Alexander. NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Cornwell:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 28 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Haskell and Kathleen Massey
4405 Oliver Street
Hyattsville, MD 20781

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. & Mrs. Massey:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 20 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Cypress Co. at French Broad LLC
P. O. Box 7598
St. Petersburg, FL 33734

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

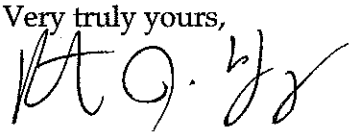
The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your properties, identified as 17 and 35 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,



Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Ms. Mariah A. Gunther
130 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Gunther:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 1 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Mr. Raymond F. Jacque
200 Panther Branch Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. Jacque:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 29 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

James and Gertrude Johnson
1040 Illahee Road
Brevard, NC 28712

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. & Mrs. Johnson:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 34 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Louise and Earl Bailey
P. O. Box 65
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. & Mrs. Bailey:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 23 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Ms. Alva Lunsford
68 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Lunsford:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 33 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Mr. Ray Massey
4202 Gertrude Street
Dearborn Heights, MI 48125

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. Massey:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 25 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Winston and Rosa Massey
270 Hominy Hill Road
Nancy, KY 42544

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. & Mrs. Massey:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 26 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Douglas Nelson and Cathy McEvoy
294 Lone Pine Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. Nelson and Ms. McEvoy:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 18 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Ms. Catherine Norton
202 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Norton:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 6 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

CDM

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Joseph and Joanna Norton, Jr.
192 Murray De Bruhl Road
Alexander, NC 28701

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Mr. & Mrs. Norton, Jr.:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 5 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,

Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

CDM
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
tel: 919 787-5620
fax: 919 781-5730

February 26, 2009

Becky Phillips and Sharon Banner
P. O. Box 1346
Weaverville, NC 28787

Subject: Buncombe County, North Carolina
Buncombe County Solid Waste Management Facility
C&D Landfill Expansion - Public Notice

Dear Ms. Phillips and Ms. Banner:

CDM has been contracted by Buncombe County (County) to permit a proposed expansion to the existing construction and demolition (C&D) debris landfill located at the County's solid waste management facility off Panther Branch Road in Alexander, North Carolina. The C&D landfill is an integral part of the County's solid waste management facility, which also includes a municipal solid waste landfill, recycling and white goods services, and used tire drop-off area.

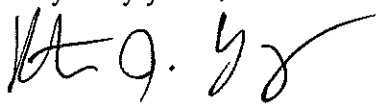
The current C&D landfill area is near capacity. As a result, the County is proposing to expand their existing C&D landfill to include areas to the northeast and west of the existing facility. This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533 (a)(3)(A), requires C&D landfill owners to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities. Additionally, public notice of the meeting shall be provided at least 30 days prior to the meeting to all property owners that share a common border with the facility.

Since your property, identified as 0 on Figure 1, are adjacent to the County's solid waste management property, please accept this letter as notice for the public meeting as required in the above referenced Rule. Also, please see the attached report for the proposed facility plan description.

The public meeting will be held on Tuesday, March 31, 2009 at 7:00 p.m. at the Buncombe County Training Room located at 199 College Street, Asheville, North Carolina 28801.

Please feel free to contact me at (919) 325-3574, should you have any questions.

Very truly yours,



Kenton J. Yang
Project Engineer
Camp Dresser & McKee

cc: J. Mears/K. Smith/J. Creighton – BC
J. Wiseman/C. Gabel/M. Colone – CDM

Part 4
Local Government Approval

Appendix D
Public Notice Documentation

CDM

Buncombe County, North Carolina

Buncombe County Solid Waste Management Facility

Public Meeting Information

February 2009

PROJECT SUMMARY SHEET
PERMIT NUMBER: 11-07

FACILITY:	Buncombe County Solid Waste Management Facility – C&D Landfill
COUNTY:	Buncombe
CITY:	Alexander, North Carolina
OWNER/ OPERATOR:	Buncombe County 81 Panther Branch Road Alexander, North Carolina 28701

Description

Buncombe County (County) currently operates a construction and demolition (C&D) landfill located off Panther Branch Road in Buncombe County. The C&D landfill area is nearing capacity. The County also operates a Subtitle D landfill which accepts municipal solid waste.

Project Purpose

The County proposes to expand their existing C&D landfill to include areas to the northeast and west (see Sheet SD-1). This will provide the County with additional C&D disposal volume for approximately 16 years. The proposed increase of the C&D landfill capacity results in expanding the landfill which, per North Carolina Solid Waste Management Rule 15A NCAC 13B .0533(a)(3)(A), requires C&D landfill owners or operators to submit an amended facility plan. As part of the amended facility plan, local government approval is required and the jurisdictional local government shall hold at least one public meeting to inform the community of the proposed waste management activities.

Public Meeting Requirements

Rule .0536(c)(11)(C) requires the following to be presented at the public meeting:

- Areal location and final elevation of all waste disposal units - see attached Sheet SD-3.

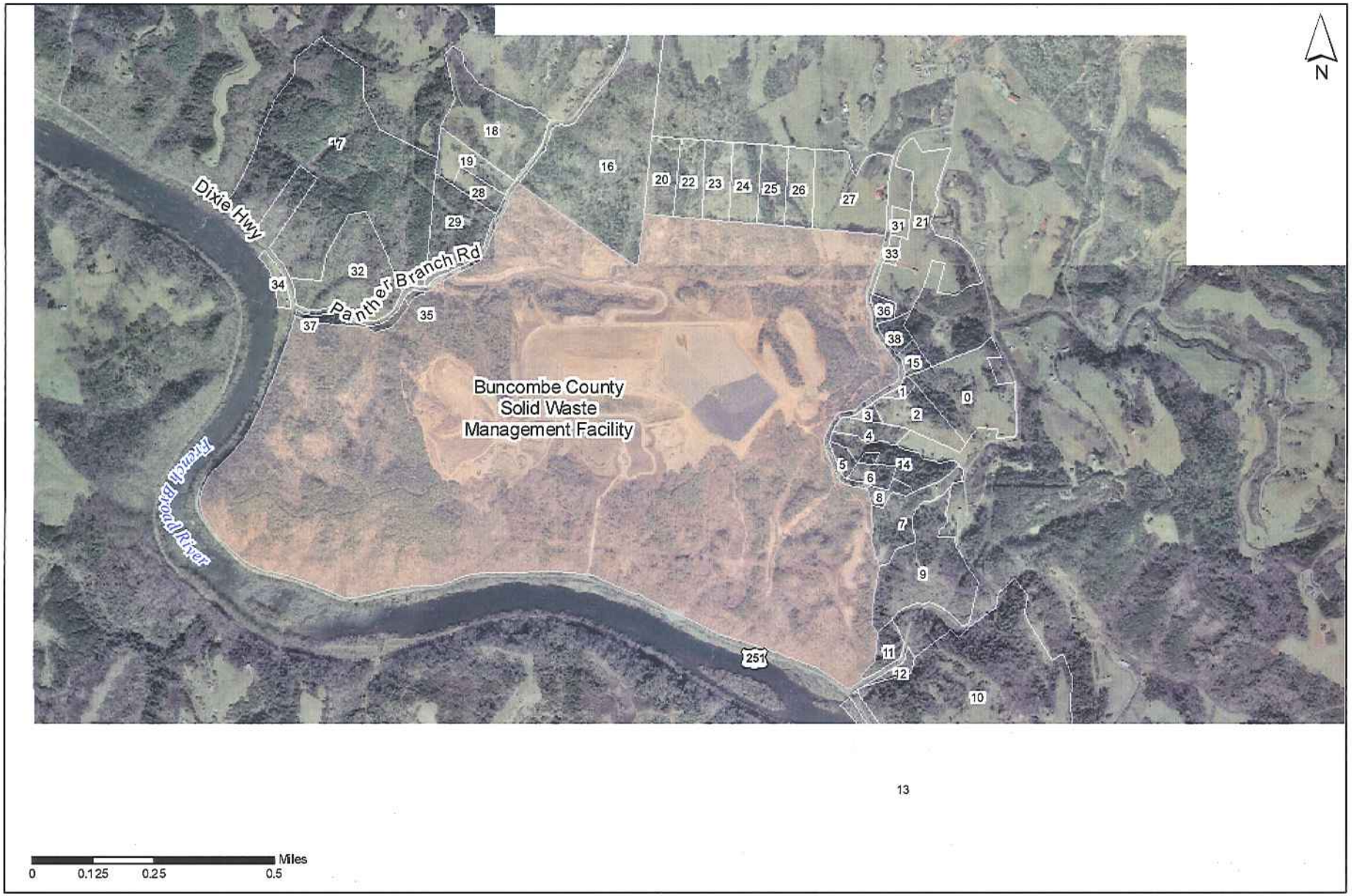
- Type and amount of waste to be disposed at the landfill - from attached Section 3.1.1, the proposed C&D landfill will dispose of construction and demolition debris, inert debris, land-clearing debris, asphalt, and asbestos. The C&D landfill units shall not receive yard trash, municipal solid waste, hazardous waste, or liquid waste. From attached Section 3.1.2, Table 1 presents yearly disposal rates from the NC Annual Solid Waste Management Report (FY07-08).

Table 1 - Disposal Rates

FY	Tons Disposed
98-99	30,898
99-00	43,147
00-01	43,370
01-02	24,238
02-03	8,209
03-04	29,889
04-05	39,252
05-06	58,730
06-07	66,388
07-08	62,849

- Any other waste management activities to be conducted at the facility - the County owns and operates a Subtitle D landfill which accepts approximately 400 tons per day. The County also operates a recycling drop-off center, a used tires drop-off area, and a white goods disposal area.

- The proposed location of the entrance to the facility - the location of the facility entrance will remain off of Panther Branch Road.



Legend

- Landfill Property Boundary
- Parcels

Figure 1
Buncombe County
Solid Waste Management Facility
Adjacent Property Owners

CDM

Facility Plan Contents

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Section 1
Introduction

Rule .0535(c) requires that a conceptual plan for the development of the facility including drawings and a report must be prepared which includes the drawings and reports described in Subparagraphs (d) and (e) of Rule .0537. The facility plan includes the following drawings and reports:

- Site Development drawings, Rule .0537(d)(1): The Site Development drawings must locate or delineate the following:

  (A) Delineate the areal limits of all landfill units, and incorporate the buffer requirements set forth in Item (1) of Rule .0540;

  (B) Locate all solid waste management facilities and facility infrastructure, including landfill units;

  (C) Delineate the areal limits of grading, including borrow areas;

  (D) Define phases of development, which do not exceed approximately five years of operating capacity;

  (E) Delineate proposed final contours for the C&DLF unit(s) and facility features for closure; and

  (F) Delineate physical features including floodplains, wetlands, unstable areas, and cultural resource areas as defined in Rule .0536.

- Landfill Operation, Rule .0537(d)(2): The Landfill Operation drawings shall relate long-term operation of the C&D landfill unit(s) including proposed transitional contours for each phase of development including operational grades for existing phase(s) and construction grading for the new phase(s).

- Waste Stream, Rule .0537(e)(1): The report shall include a discussion of the characteristics of the wastes received at the facility and facility specific management plans must incorporate:

  (A) the types of waste specified for disposal;

  (B) average yearly disposal rates in tons and a representative daily rate that is consistent with the local government approval in accordance with Rule .0536 of this Section;

  (C) the area served by the facility;

  (D) procedures for segregated management at different on-site facilities; and

  (E) equipment requirements for operation of the C&DLF unit(s).

- Landfill Capacity, Rule .0537(e)(2): An analysis of landfill capacity and soil resources must be performed. The data and assumptions used in the analysis must be included with the facility drawings and disposal rates specified in the facility

plan and representative of operational requirements and conditions. The conclusions must provide:

(A) estimates of gross capacity of the C&DLF unit;

(B) gross capacity for each phase of development of the C&DLF unit;

(C) the estimated operating life of all C&DLF units in years;

(D) required quantities of soil for landfill construction, operation, and closure;

(E) and available soil resources from on-site.

Gross capacity is defined as the volume of the landfill calculated from the elevation of the initial waste placement through the top of the final cover, including any periodic cover.

Section 2
Facility Drawings

A set of facility drawings have been prepared in compliance with Rule .0537 (d). These drawings include conceptual site development and landfill operation sheets.

2.1 Site Development

Three drawings were prepared on topographic maps representative of existing site conditions. The first drawing, Sheet SD-1, contains a topographical survey of the entire site representative of existing site conditions locating all property boundaries for the proposed landfill facility certified by an individual licensed to practice land surveying in the State of North Carolina. Also included is the following:

- areal limits of all solid waste management facilities and facility infrastructure, including landfill units and buffer requirements set forth in 15A NCAC 13B .0540(1);
- areal limits of borrow and stockpile; and
- any physical features referenced in Rule 15A NCAC 13B .0536 (Location Restrictions).

Sheet SD-2 illustrates the phases of development and areal limits of grading. Sheet SD-3 depicts the proposed final contours for the C&D landfill unit and facility feature for closure.

2.2 Landfill Operation

Landfill Operation Sheets 1-5 show the proposed transitional contours and construction grading for the new phases. Five drawings were prepared detailing the long-term operation of the C&D landfill unit. Proposed transitional contours and final grades for each phase of development (Phases 5 through 8) are shown on Drawings LO-1 through LO-5.

Section 3
Facility Report

This facility report contains characteristics of the waste stream to be received at the landfill facility and of the landfill capacity as required by Rule .0537(e).

3.1 Waste Stream

Per Rule .0537(e)(1), a discussion of the characteristics of the waste received at the facility and facility specific management plans is as follows.

3.1.1 Types of Waste Specified for Disposal

From the Permit to Operate – Asbestos Modification, dated March 5, 2008, the County is permitted to dispose of construction or demolition debris, inert debris, land-clearing debris, and asphalt in accordance with the corresponding General Statute. The C&D landfill is also permitted to dispose of asbestos waste in accordance with Rule .0542(c) and must be managed per 40 CFR 61.

Waste, listed in Rule .0542(e), may not be accepted for disposal including, but not limited to yard trash, municipal solid waste, and liquid or industrial wastes.

The County will continue to dispose of waste types as specified in the current Permit to Operate.

3.1.2 Disposal Rates

Table 3-1 presents yearly disposal rates as provided by the County scale house and includes a representative daily rate assuming 284 operating days (365 days - 52 Sundays - 26 Saturdays (half days) - 3 holidays). It is anticipated that the annual amount of waste to be disposed will be approximately 63,000 tons of C&D waste per year (222 tons per day).

Table 3-1 - Disposal Rates

FY[1]	Tons Disposed	Daily Rate (tons/day)
98-99	30,898	109
99-00	43,147	152
00-01	43,370	153
01-02	24,238	85
02-03	8,209	29
03-04	29,889	105
04-05	39,252	138
05-06	58,730	207
06-07	66,388	234
07-08	62,849	222

[1]Fiscal year is from July to June.

3.1.3 Areas Served by the Facility

The Buncombe County C&D landfill will serve only waste streams originating from Buncombe County. Buncombe County, approximately 659 square miles in area, includes the incorporated municipalities of Asheville, Biltmore Forest, Black Mountain, Montreat, Weaverville, and Woodfin.

3.1.4 Segregated Management

The Buncombe County Solid Waste Management Facility staff place a high priority on proper management of incoming waste. The same level of concern and effort is put forth for the operation of the C&D landfill. Waste screening and segregation procedures are included in the Operation Plan.

3.1.5 Landfill Equipment

Equipment currently owned by the County and utilized at the C&D landfill includes the following:

- 1 - 390-E Trashmaster
- 1 - D-6 CAT Dozer
- 1 - Waste Screening Vehicle (Ford F-150 Truck)

No additional equipment purchases are anticipated as a result of expanding the C&D disposal capacity.

3.2 Landfill Capacity

3.2.1 Gross Capacity

AutoCAD Civil 3D 2008 software was used to estimate the gross capacity between the base grades and the top of the proposed final cover grades for the proposed C&D landfill. The gross capacity (waste and daily, intermediate, and final cover) of the landfill is approximately 1.7 million cubic yards (cy).

3.2.2 Phased Gross Capacity

AutoCAD Civil 3D 2008 software was used to estimate the phased gross capacity and is presented in Table 3-2.

Table 3-2 – Phased Gross Capacity

Phase	Gross Capacity (cy)
5	285,500
6	607,700
7	612,600
8	159,700
Total	1,665,500

3.2.3 Soil Required for Landfill Construction

Soil is required for landfill construction to install access/haul roads, stormwater control measures, and, when necessary, to establish the required minimum four feet separation between the bottom elevation of waste and seasonal high groundwater table and the bedrock datum plane contours. For the Buncombe County C&D landfill, seasonal high groundwater table is below bedrock, so the bedrock contours govern the four feet separation when applicable.

3.2.4 Soil Required for Final Cover

The final cover material volume required to construct the three-foot thick cover system for each phase is determined by delineating final slopes (see Table 3-3).

Required Final Cover = Final Cover Area x 3-foot Thick Cover System

3.2.5 Soil Required for Operations

It is anticipated that the County will use an alternative cover material for the required weekly cover. An intermediate, stabilizing material will be used for areas which will not have additional wastes placed on them for three months or more, but where final termination of disposal operations has not occurred. When the County resumes disposal in these areas, they will scrap off the intermediate cover and use it for the final cover once areas are at final grades.

3.2.6 Net Capacity

Table 3-3 present the net capacity available for C&D debris disposal is calculated as:

Net Capacity = Gross Capacity – Final Cover

3.2.7 C&D Landfill Operating Life

The first step in calculating the operating life of each C&D landfill phase is to convert available net airspace to available C&D debris tonnage. From the July 2008 Airspace Analysis Report, the C&D in-place density is 0.65 tons per cubic yard (cy) (the calculated in-place density includes operational soils). Available tonnage is calculated as:

Available Tonnage = Net Capacity x 0.65 tons/cy

The approximate average disposal rate for the C&D landfill for the past three fiscal years is 63,000 tons per year from Table 3-1. An average disposal rate of 63,000 tons per year is used in the following calculation. Table 3-3 presents the estimated operating life for the C&D disposal unit is, therefore, calculated as:

Operating Life = Available Tonnage/Average Disposal Rate

Table 3-3 – Operating Life

Phase	Final Cover Area (acre)	Soil Required for Final Cover (cy)	Available Net Airspace (cy)	Operating Life (yrs)
5	10.7	51,800	233,700	2.4
6	5.9	28,600	579,100	6.0
7	7.7	37,300	575,300	5.9
8	5.4	26,200	133,600	1.4
TOTAL			**1,521,700**	**16**

3.2.8 Net Balance of On-site Soils

Earthwork fill volume associated with the construction of each phase of the C&D landfill was estimated based on the proposed base grades and governing four feet of separation. A volume computation, using AutoCAD Civil 3D 2008, resulted in an even cut/fill soil balance for the construction of Phase 5. Phase 6 soil balance during construction was calculated to be a soil surplus of approximately 104,000 cy. Phases 7 and 8 are vertical expansions and will not require soil for construction. Table 3-4 presents the net soil required for construction and closure of each phase and was calculated by the following:

Fill + Final Cover = Net Soil Required

Table 3-4 - Net Soils Balance

Phase	Net Soil Required (yd^3)		
	Construction	Final Cover	TOTAL
5	0	51,800	51,800
6	-104,000	28,600	-75,400
7	0	37,300	37,300
8	0	26,200	26,200

Soil materials for construction of the landfill base and cap will be obtained from the on-site borrow areas as presented on Sheet SD-1. The current borrow source area is being exhausted and the County proposes to move into the proposed borrow source area as delineated on Sheet SD-1 on contingency of North Carolina Department of Environment and Natural Resources, Solid Waste Section (NCDENR SWS) approval. The proposed borrow source area has a potential soil volume of approximately 645,000 cy. Assuming a swell factor of 1.25 the loose soil volume is approximately 806,000 cy. Also, assuming the County using 300 cy of soil a day, working 284 days per year, the proposed borrow source life is approximately 9 to 10 years.

As stated, the proposed borrow source area will provide adequate soil for operations and final cover for the proposed C&D landfill expansion.

3.3 Special Engineering Features

3.3.1 Containment and Environmental Control Systems

3.3.1.1 Closure Cap System

A closure cap will be designed and constructed when portions of the C&D landfill are at closure grades to reduce the infiltration and erosion per Rule .0543 (c)(1). The cap system will be 3-foot thick and be designed and constructed to:

(A) have a permeability less than or equal to soils underlying the landfill, or the permeability specified for the final cover in the effective permit, or a permeability no greater than 1.0×10^{-5} cm/sec, whichever is less;

(B) minimize infiltration through the closed C&DLF unit by the use of a low-permeability barrier that contains a minimum 18 inches of earthen material; and

(C) minimize erosion of the cap system and protect the low-permeability barrier from root penetration by use of an erosion layer that contains a minimum of 18 inches of earthen material that is capable of sustaining native plant growth.

A gas venting or collection system will be installed below the low-permeability barrier to minimize pressures exerted on the barrier.

3.3.1.2 Sedimentation and Erosion Control

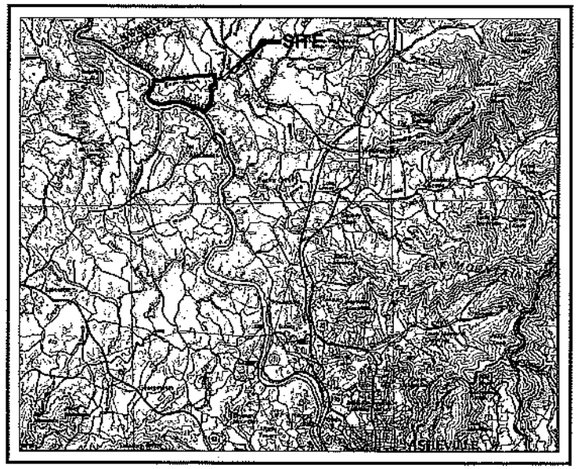
A Sedimentation and Erosion Control Plan will be submitted for approval to the NCDENR, Land Quality Section before construction of each phase. Internal stormwater berms will be utilized to minimize the amount of stormwater that comes in contact with waste. Temporary erosion control measures, such as silt fences, fast germinating vegetation, rock check dams, etc. will be installed as necessary to reduce the amount of sedimentation and erosion during construction activities.

3.3.1.3 Landfill Subgrade

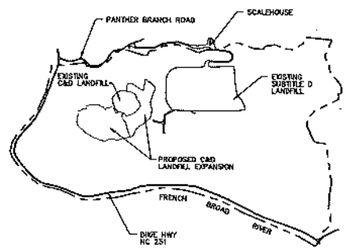
Per Rule .0540 (2), each proposed phase will be constructed so that the post-settlement bottom elevation of waste is a minimum of four feet above the seasonal high groundwater table as established in the Design Hydrogeological Report (see Part 5 of this report). Additionally, per Rule .0540 (2)(b), on-site soils will be used to construct the upper two feet of separation since they meet and/or exceed the required soil classifications.

BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN



LOCATION MAP



VICINITY MAP

VICINITY MAP
NOT TO SCALE

INDEX OF DRAWINGS

SD-1 SITE DEVELOPMENT EXISTING CONDITIONS

SD-2 SITE DEVELOPMENT C&D LANDFILL EXPANSION

SD-3 SITE DEVELOPMENT FINAL CLOSURE

LO-1 LANDFILL OPERATION TRANSITION CONTOURS – PHASE 5 BASEGRADES

LO-2 LANDFILL OPERATION TRANSITION CONTOURS – PHASE 5 CLOSURE / PHASE 6 BASEGRADES

LO-3 LANDFILL OPERATION TRANSITION CONTOURS – PHASE 6 CLOSURE / PHASE 7 BASEGRADES

LO-4 LANDFILL OPERATION TRANSITION CONTOURS – PHASE 7 CLOSURE / PHASE 8 BASEGRADES

LO-5 LANDFILL OPERATION TRANSITION CONTOURS – PHASE 8 CLOSURE

FEBRUARY 2009

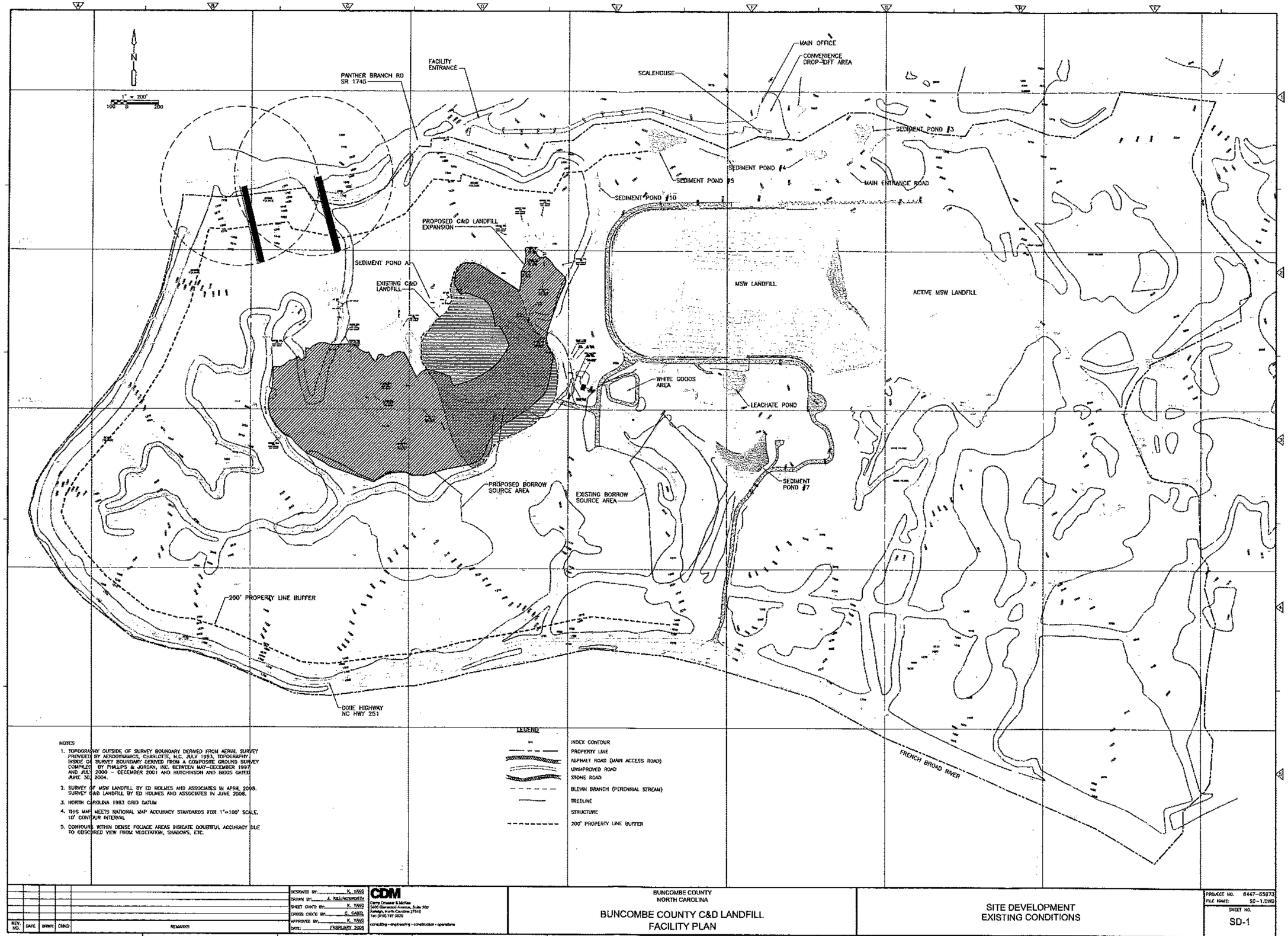
PREPARED BY

CDM Camp Dresser & McKee

consulting engineering construction operations

5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: 919-787-5620 Fax: 919-781-5730

6447-65973



NOTES

1. TOPOGRAPHY OUTSIDE OF SURVEY BOUNDARY DERIVED FROM AERIAL SURVEY PROVIDED BY AERODYNAMICS, CHARLOTTE, N.C. JULY 1993. TOPOGRAPHY INSIDE OF SURVEY BOUNDARY DERIVED FROM A COMPOSITE GROUND SURVEY COMPILED BY PHILLIPS & JORDAN, INC. BETWEEN MAY–DECEMBER 1997 AND JULY, 2000 – DECEMBER 2001 AND HUTCHINSON AND BIGGS DATED JUNE 30, 2004.
2. SURVEY OF MSW LANDFILL BY ED HOLMES AND ASSOCIATES IN APRIL 2008. SURVEY C&D LANDFILL BY ED HOLMES AND ASSOCIATES IN JUNE 2008.
3. NORTH CAROLINA 1983 GRID DATUM
4. THIS MAP MEETS NATIONAL MAP ACCURACY STANDARDS FOR 1"=100' SCALE, 10' CONTOUR INTERVAL
5. CONTOURS WITHIN DENSE FOLIAGE AREAS INDICATE DOUBTFUL ACCURACY DUE TO OBSCURED VIEW FROM VEGETATION, SHADOWS, ETC.

LEGEND

- INDEX CONTOUR
- PROPERTY LINE
- ASPHALT ROAD (MAIN ACCESS ROAD)
- UNIMPROVED ROAD
- STONE ROAD
- BLEVAN BRANCH (PERENNIAL STREAM)
- TREELINE
- STRUCTURE
- 200' PROPERTY LINE BUFFER

REV. NO.	DATE	DRAWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
DIRECT CHK'D BY: K. YANG
CROSS CHK'D BY: C. CABEL
APPROVED BY: K. YANG
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 309
Raleigh, North Carolina 27612
Tel: (919) 787-3620
consulting · engineering · construction · operations

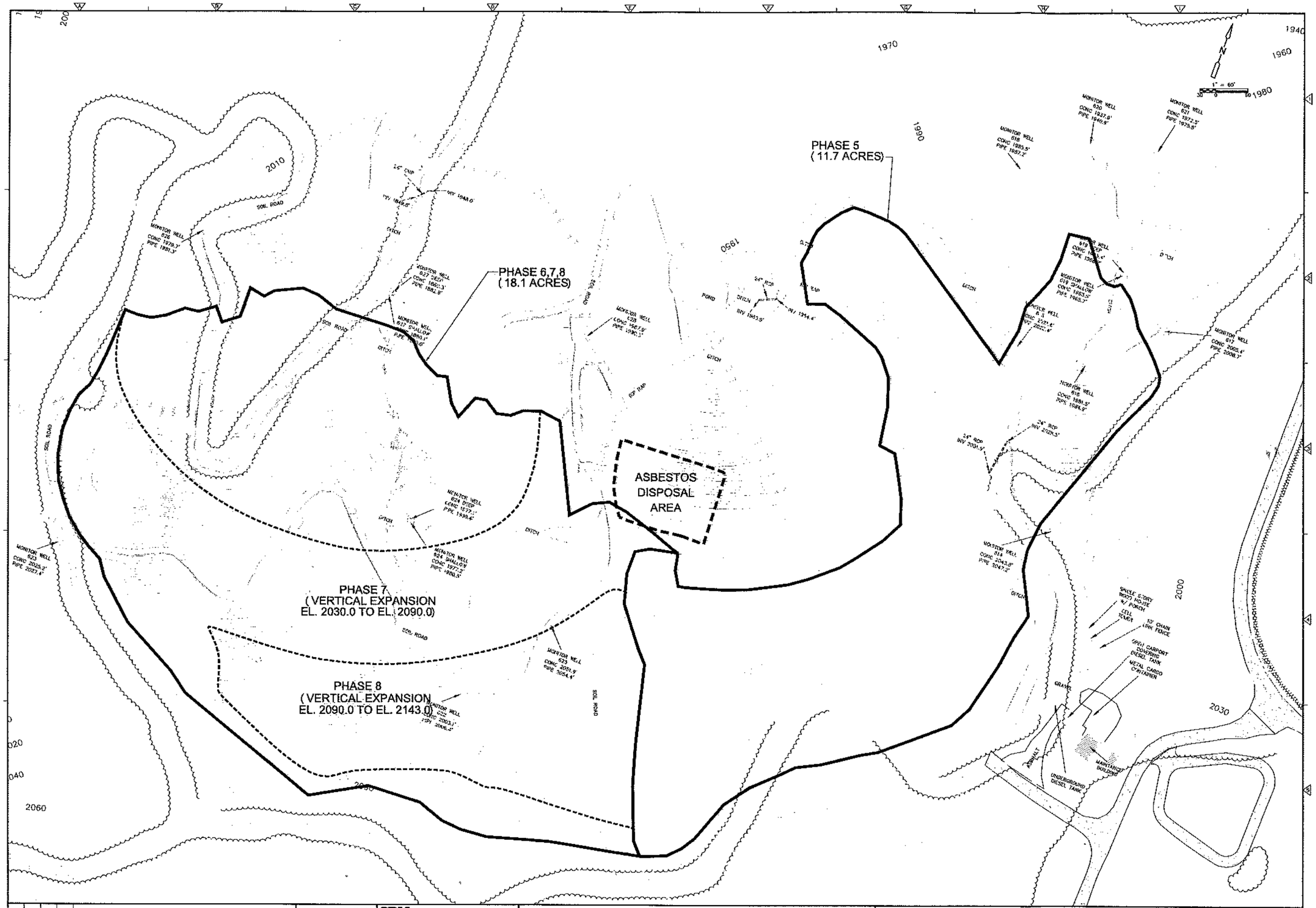
BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

SITE DEVELOPMENT
EXISTING CONDITIONS

PROJECT NO. 6447-85973
FILE NAME: SD-1.DWG
SHEET NO.
SD-1

NOT FOR CONSTRUCTION



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
DIRECT CHK'D BY: K. YANG
CROSS CHK'D BY: C. CARR
APPROVED BY: K. YANG
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
3600 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel. (919) 787-5630
consulting • engineering • construction • operations

BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

SITE DEVELOPMENT
C&D LANDFILL EXPANSION

PROJECT NO. 6447-65973
FILE NAME: SD-2.DWG
SHEET NO.
SD-2

NOT FOR CONSTRUCTION

SEDIMENT POND C

SEDIMENT POND A

SEDIMENT POND B

1" = 60'

REV NO.	DATE	DRAWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY: K. YANG
CROSS CHK'D BY: C. CAREL
APPROVED BY: K. YANG
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel. (919) 787-5629
consulting · engineering · construction · operations

BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

SITE DEVELOPMENT
FINAL CLOSURE

PROJECT NO. 6447-65973
FILE NAME: SD-3.DWG
SHEET NO.
SD-3

NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. HOLLINGSWORTH
SHEET CHKD BY: K. YANG
CROSS CHKD BY: C. CHEN
APPROVED BY: K. YANG
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-0520
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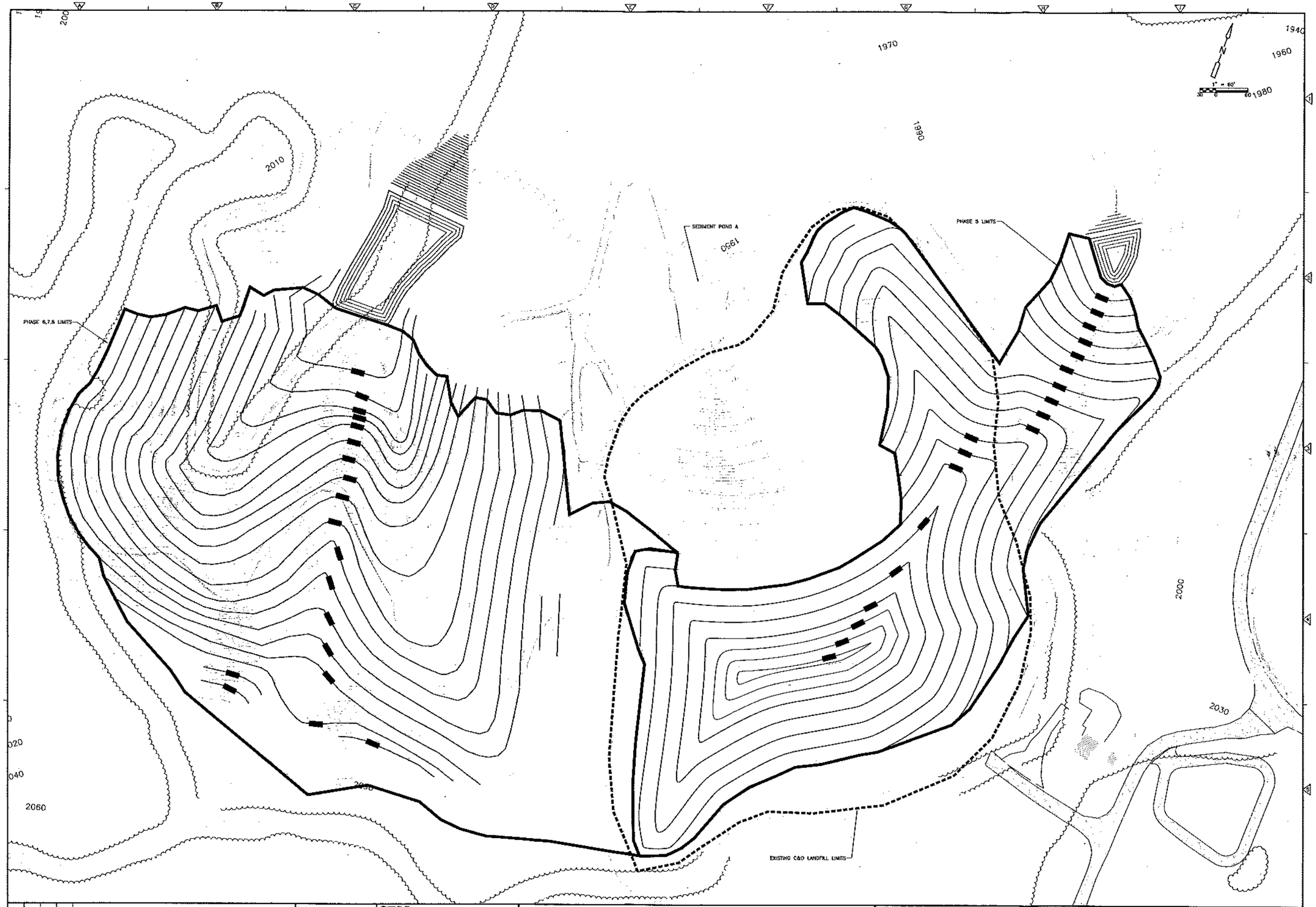
BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 5 BASEGRADES

PROJECT NO. 6447-65973
FILE NAME: LO-1.DWG
SHEET NO.
LO-1

NOT FOR CONSTRUCTION



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY: K. YANG
CROSS CHK'D BY: C. CARR
APPROVED BY: K. YANG
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
2400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-9520
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BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 5 CLOSURE / PHASE 6 BASEGRADES

PROJECT NO. 6447-65973
FILE NAME: LO-2.DWG
SHEET NO.
LO-2

NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY: K. YANG
CROSS CHK'D BY: C. GABEL
APPROVED BY: K. YANG
DATE: FEBRUARY, 2007

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612
Tel: (919) 787-5620
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BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 6 CLOSURE / PHASE 7 BASEGRADES

PROJECT NO. 6447-85973
FILE NAME LO-3.DWG
SHEET NO. LO-3

NOT FOR CONSTRUCTION

REV NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY: K. YANG
CROSS CHK'D BY: C. CABLE
APPROVED BY: K. YANG
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
3400 Glenwood Avenue, Suite 100
Raleigh, North Carolina 27612
Tel: (919) 787-0630
consulting · engineering · construction · operations

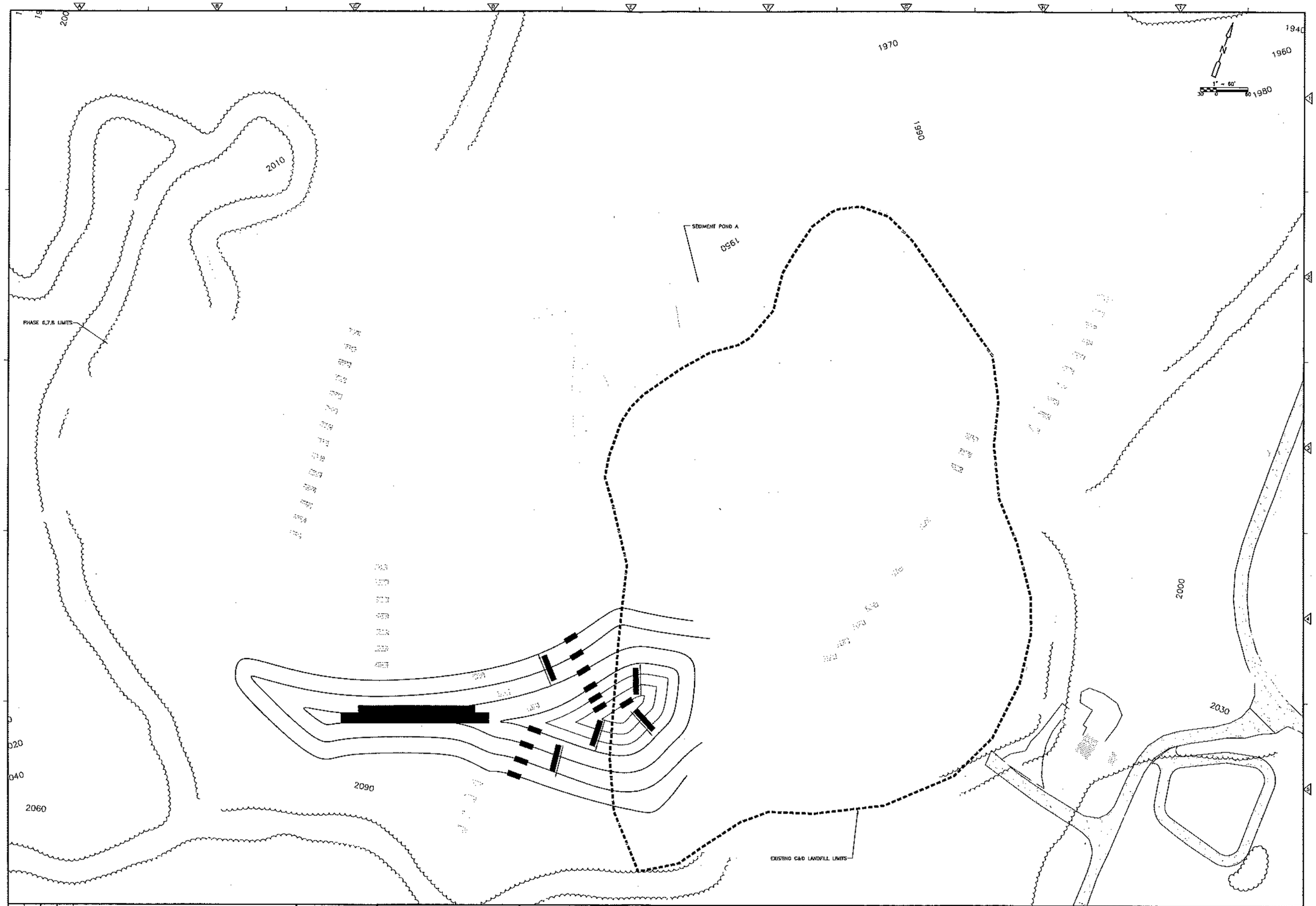
BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 7 CLOSURE / PHASE 8 BASEGRADES

PROJECT NO. 6447-65973
FILE NAME: LO-4.DWG
SHEET NO.
LO-4

NOT FOR CONSTRUCTION



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: K. YANG
DRAWN BY: J. KILLINGSWORTH
SHEET CHKD BY: K. YANG
CROSS CHKD BY: C. GANN
APPROVED BY: K. YANG
DATE: FEBRUARY 2009

CDM
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 203
Raleigh, North Carolina 27612
Tel: (919) 787-0629
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BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY C&D LANDFILL
FACILITY PLAN

LANDFILL OPERATION
TRANSITION CONTOURS - PHASE 8 CLOSURE

PROJECT NO. 6447-65973
FILE NAME: LO-5.DWG
SHEET NO.
LO-5

NOT FOR CONSTRUCTION

Part 4
Local Government Approval

Appendix E
Delivery Confirmations

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 9:32 AM
To: Yang, Kenton
Subject: FedEx Shipment 796381172455 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 9:28 AM
Sign for by:	F.BRYAN
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 796381172455

Shipper Information	Recipient Information
KENTON YANG	FAYE and/or EUGENE BRYAN
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	8559 DAMASCUS DR
RALEIGH	WEST PALM BEACH
NC	FL
US	US
27612	33418

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 8:32 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Saturday, February 28, 2009 11:37 AM
To: Yang, Kenton
Subject: FedEx Shipment 796380882470 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Door Tag number:	DT101934320469
Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 28, 2009 11:36 AM
Sign for by:	R.BUCHANAN
Delivered to:	FedEx Location
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 796380882470

Shipper Information	Recipient Information
KENTON YANG	BOBBY and/or KIM BUCHANAN
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	62 MURRAY De BRUHL ROAD
RALEIGH	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 10:37 AM CST on 02/28/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
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Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Monday, March 02, 2009 2:19 PM
To: Yang, Kenton
Subject: FedEx Shipment 796380842694 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Door Tag number:	DT101934320458
Reference:	6447-65973 - jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Mar 2, 2009 2:15 PM
Sign for by:	R.BULLMAN
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 796380842694

Shipper Information	Recipient Information
KENTON YANG	MS. VELMA R. BULLMAN
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	320 LOWER FLAT CREEK RD
RALEIGH	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 1:19 PM CST on 03/02/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 11:40 AM
To: Yang, Kenton
Subject: FedEx Shipment 797369180654 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 11:35 AM
Sign for by:	A.SHETTLEY
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 797369180654

Shipper Information	Recipient Information
KENTON YANG	MS. CLARA RENEE CORNWELL
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	242 PANTHER BRANCH ROAD
RALEIGH	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 10:40 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 10:51 AM
To: Yang, Kenton
Subject: FedEx Shipment 796380913955 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 10:46 AM
Sign for by:	H.DEBRUHL
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 796380913955

Shipper Information	Recipient Information
KENTON YANG	MR. ALAN DeBRUHL
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	76 MURRAY DE BRUHL RD
RALEIGH	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 9:51 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Tuesday, March 03, 2009 2:17 PM
To: Yang, Kenton
Subject: FedEx Shipment 796381023785 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Door Tag number:	DT101934320506
Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Mar 3, 2009 2:03 PM
Sign for by:	G.FRISBY
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 796381023785

Shipper Information	Recipient Information
KENTON YANG	MR. MORRIS FRISBY, JR
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	500 TILLERY BRANCH RD
RALEIGH	MARSHALL
NC	NC
US	US
27612	28753

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 1:17 PM CST on 03/03/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
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Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 9:58 AM
To: Yang, Kenton
Subject: FedEx Shipment 796381134443 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 9:51 AM
Sign for by:	M.GREEN
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 796381134443

Shipper Information	Recipient Information
KENTON YANG	MS. MARY GREEN
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	145 IDLEWOOD CIR
RALEIGH	WEST COLUMBIA
NC	SC
US	US
27612	29170

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 8:57 AM CST on 02/27/2009.
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All weights are estimated.

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Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 10:57 AM
To: Yang, Kenton
Subject: FedEx Shipment 797369052743 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 10:54 AM
Sign for by:	K.GUTHER
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 797369052743

Shipper Information	Recipient Information
Admin Area	Ms. Mariah A. Gunther
CDM	...
5400 Glenwood Avenue; Suite 300	130 MURRAY DE BRUHL RD
Raleigh	ALEXANDER
NC	NC
US	US
27612	28701

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Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
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Thank you for your business.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 11:44 AM
To: Yang, Kenton
Subject: FedEx Shipment 796380670942 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 11:39 AM
Sign for by:	M.JACQUE
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 796380670942

Shipper Information	Recipient Information
KENTON YANG	MR. RAYMOND F. JACQUE
CDM	***
5400 Glenwood Avenue; Suite 300	200 PANTHER BRANCH ROAD
Raleigh	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 10:43 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
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Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 1:49 PM
To: Yang, Kenton
Subject: FedEx Shipment 796380576797 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973/clar
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 1:45 PM
Sign for by:	S.JOHNSON
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 796380576797

Shipper Information	Recipient Information
Admin Area	James and Gertrude Johnson
CDM	...
5400 Glenwood Avenue; Suite 300	1040 ILLAHEE RD
Raleigh	BREVARD
NC	NC
US	US
27612	28712

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 12:48 PM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

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Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 10:47 AM
To: Yang, Kenton
Subject: FedEx Shipment 796380314716 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65793/clar
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 10:42 AM
Sign for by:	A.LUNSFORD
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 796380314716

Shipper Information	Recipient Information
Admin Area	Ms. Alva Lunsford
CDM	...
5400 Glenwood Avenue; Suite 300	68 Murray De Bruhl Road
Raleigh	Alexander
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 9:46 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

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Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 10:19 AM
To: Yang, Kenton
Subject: FedEx Shipment 797369025030 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973/clar
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 10:13 AM
Sign for by:	H.MASSEY
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 797369025030

Shipper Information	Recipient Information
Admin Area	Haskel and Kathleen Massey
CDM	...
5400 Glenwood Avenue; Suite 300	4405 OLIVER ST
Raleigh	HYATTSVILLE
NC	MD
US	US
27612	20781

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Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 1:43 PM
To: Yang, Kenton
Subject: FedEx Shipment 796380503184 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Door Tag number:	DT101903522972
Reference:	6447-65973/clar
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 1:39 PM
Sign for by:	R.MASSEY
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 796380503184

Shipper Information	Recipient Information
Admin Area	Mr. Ray Massey
CDM	...
5400 Glenwood Avenue; Suite 300	4202 GERTRUDE ST
Raleigh	DEARBORN HEIGHTS
NC	MI
US	US
27612	48125

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 12:43 PM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 4:27 PM
To: Yang, Kenton
Subject: FedEx Shipment 796380294798 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65793/clar
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 4:19 PM
Sign for by:	W.MASSEY
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 796380294798

Shipper Information	Recipient Information
Admin Area	Winston and Rosa Massey
CDM	...
5400 Glenwood Avenue; Suite 300	270 HOMINY HILL RD
Raleigh	NANCY
NC	KY
US	US
27612	42544

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 3:26 PM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 11:26 AM
To: Yang, Kenton
Subject: FedEx Shipment 796380302252 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65793/clar
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 11:22 AM
Sign for by:	D.NELSON
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 796380302252

Shipper Information	Recipient Information
Admin Area	Douglas Nelson and Cathy McEvoy
CDM	...
5400 Glenwood Avenue; Suite 300	294 LONE PINE RD
Raleigh	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 10:25 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 11:08 AM
To: Yang, Kenton
Subject: FedEx Shipment 797368722559 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65793/clar
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 11:02 AM
Sign for by:	R.NORTON
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 797368722559

Shipper Information	Recipient Information
Admin Area	Ms. Catherine Norton
CDM	...
5400 Glenwood Avenue; Suite 300	202 MURRAY DE BRUHL RD
Raleigh	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 10:08 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 11:04 AM
To: Yang, Kenton
Subject: FedEx Shipment 797368716737 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65793/clar
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 10:58 AM
Sign for by:	J.NORTON
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 797368716737

Shipper Information	Recipient Information
Admin Area	Joseph and Joanne Norton, Jr.
CDM	...
5400 Glenwood Avenue; Suite 300	192 MURRAY DE BRUHL RD
Raleigh	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 10:03 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 11:05 AM
To: Yang, Kenton
Subject: FedEx Shipment 797368707581 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: Admin Area
E-mail: spencerca@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65873/clar
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 11:00 AM
Sign for by:	S.BOWEN
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 797368707581

Shipper Information	Recipient Information
Admin Area	Stacy Ray and Jeffrey Bowen
CDM	...
5400 Glenwood Avenue; Suite 300	201 MURRAY DE BRUHL RD
Raleigh	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 10:05 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 10:57 AM
To: Yang, Kenton
Subject: FedEx Shipment 797370615028 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 10:51 AM
Sign for by:	J.REGGI
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 797370615028

Shipper Information	Recipient Information
KENTON YANG	MS.JENNI GAY REGGI
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	126 MURRAY De BRUHL ROAD
RALEIGH	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 9:57 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 11:16 AM
To: Yang, Kenton
Subject: FedEx Shipment 797370506465 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 11:12 AM
Sign for by:	S.ROBINSON
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 797370506465

Shipper Information	Recipient Information
KENTON YANG	STEVEN and/or NADINE ROBINSON
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	325 MURRAY De BRUHL ROAD
RALEIGH	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 10:16 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 11:40 AM
To: Yang, Kenton
Subject: FedEx Shipment 797369423623 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 11:36 AM
Sign for by:	A.SHELETTY
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 797369423623

Shipper Information	Recipient Information
KENTON YANG	JENNINGS and/or DANNIEL SHETLEY
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	240 PANTHER BRANCH RD
RALEIGH	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 10:40 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Monday, March 02, 2009 5:58 PM
To: Yang, Kenton
Subject: FedEx Shipment 796382237794 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Door Tag number:	DT101956656039
Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Mar 2, 2009 5:54 PM
Sign for by:	A.TEASDALE
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery
	Direct Signature Required
	Deliver Weekday

Tracking number: 796382237794

Shipper Information	Recipient Information
KENTON YANG	ALAN and/or MAGGIE TEASDALE
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	499 GREEN VALLEY ROAD
RALEIGH	LEICESTER
NC	NC
US	US
27612	28748

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 4:57 PM CST on 03/02/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
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Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 10:28 AM
To: Yang, Kenton
Subject: FedEx Shipment 797369217081 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 10:23 AM
Sign for by:	W.THOMPSON
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	1.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 797369217081

Shipper Information	Recipient Information
KENTON YANG	WANDA SHOOK THOMPSON
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	1184 LOWER FLAT CREEK RD
RALEIGH	ALEXANDER
NC	NC
US	US
27612	28701

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 9:28 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Yang, Kenton

From: TrackingUpdates@fedex.com
Sent: Friday, February 27, 2009 12:01 PM
To: Yang, Kenton
Subject: FedEx Shipment 796381070677 Delivered

This tracking update has been requested by:

Company Name: CDM
Name: KENTON YANG
E-mail: paynej@cdm.com

Our records indicate that the following shipment has been delivered:

Reference:	6447-65973 - Jas
Ship (P/U) date:	Feb 26, 2009
Delivery date:	Feb 27, 2009 11:56 AM
Sign for by:	R.WILLIS
Delivered to:	Residence
Service type:	FedEx Priority Overnight
Packaging type:	FedEx Pak
Number of pieces:	1
Weight:	2.00 lb.
Special handling/Services:	Residential Delivery Direct Signature Required Deliver Weekday

Tracking number: 796381070677

Shipper Information	Recipient Information
KENTON YANG	MS. VIRGINIA WOODSON
CDM	***
5400 GLENWOOD AVENUE; SUITE 300	42 PRINCETON DR
RALEIGH	ASHEVILLE
NC	NC
US	US
27612	28806

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 11:01 AM CST on 02/27/2009.
Learn more about new ways to track with FedEx.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Louise and Earl Bailey
P.O. Box 65
Alexander, NC 28701

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Earl Bailey — ☐ Agent ☐ Addressee

B. Received by (Printed Name): Earl Bailey — C. Date of Delivery: 2-28-09

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label): 7003 3110 0005 2474 1246

PS Form 3811, August 2001 — Domestic Return Receipt — 102595-02-M-1540

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Cypress Co. at French Broad LLC
P.O. Box 7598
St. Petersburg, FL 33734

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X David Jarrett — ☐ Agent ☐ Addressee

B. Received by (Printed Name): David Jarrett — C. Date of Delivery: 3-7-09

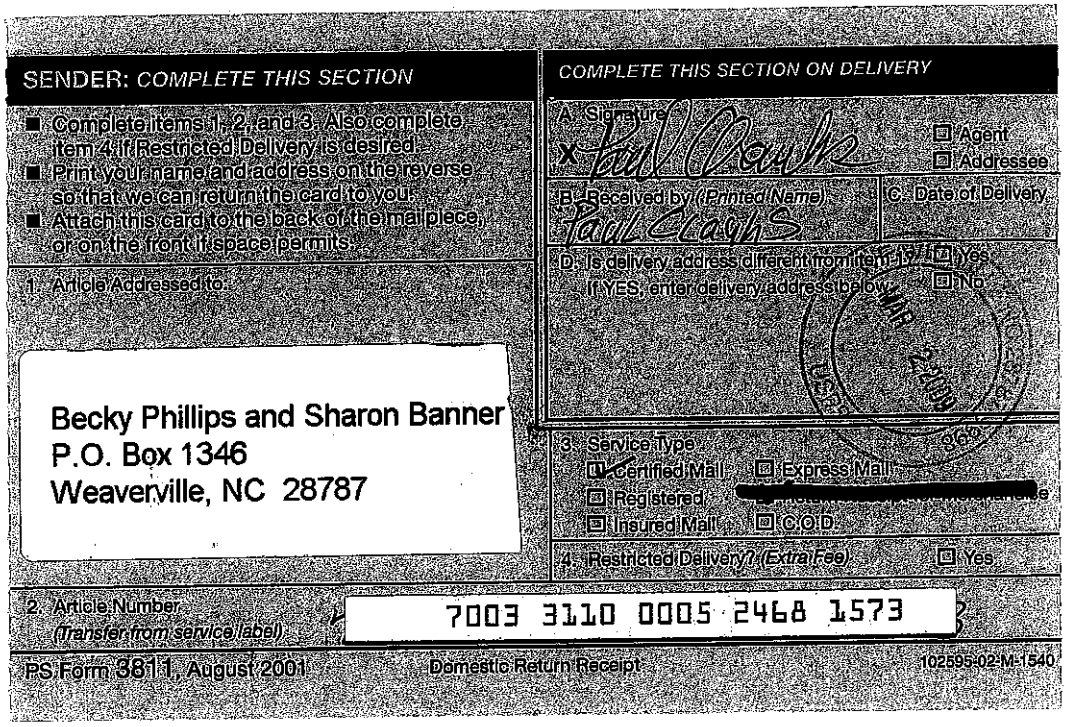
D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label): 7003 3110 0005 2474 1253

PS Form 3811, August 2001 — Domestic Return Receipt — 102595-02-M-1540



SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Becky Phillips and Sharon Banner
P.O. Box 1346
Weaverville, NC 28787

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Paul Claughs
☐ Agent
☐ Addressee

B. Received by (*Printed Name*) Paul Claughs

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

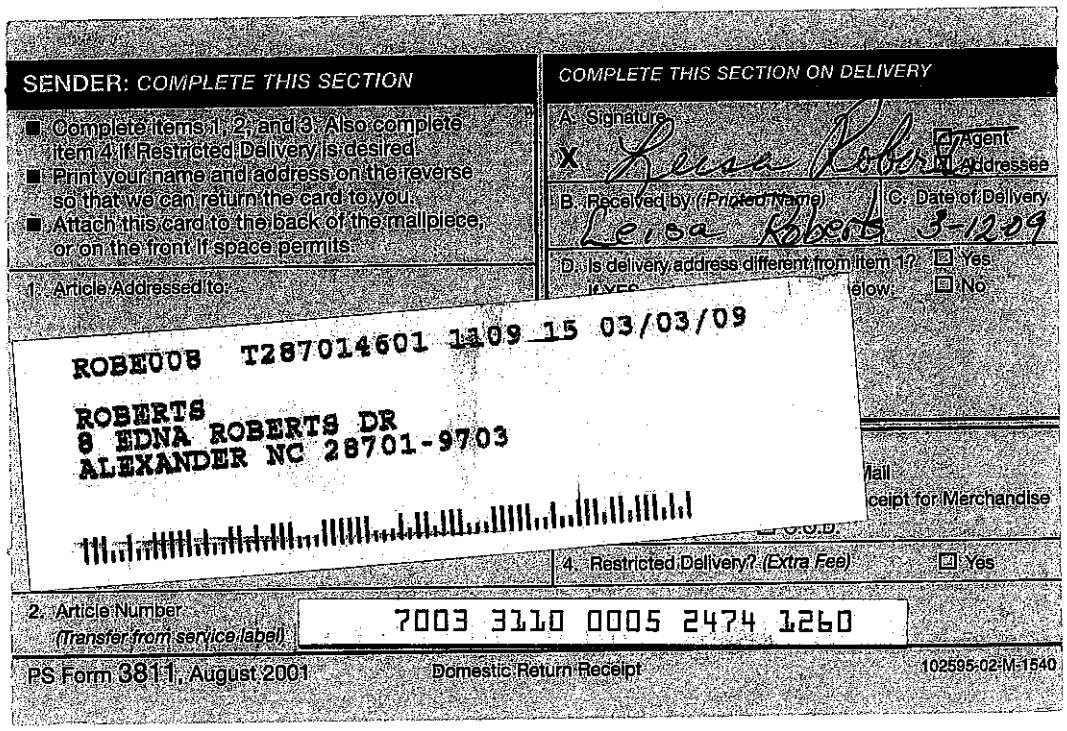
MAR 2 2009

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered [redacted]
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number (*Transfer from service label*) 7003 3110 0005 2468 1573

PS Form 3811, August 2001 Domestic Return Receipt 102595-02-M-1540



SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

ROBE008 T287014601 1109 15 03/03/09

ROBERTS
8 EDNA ROBERTS DR
ALEXANDER NC 28701-9703

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Leisa Roberts
☐ Agent
☐ Addressee

B. Received by (*Printed Name*) Leisa Roberts

C. Date of Delivery 3-12-09

D. Is delivery address different from item 1? ☐ Yes
If YES, ... below: ☐ No

...Mail
...ceipt for Merchandise
☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number (*Transfer from service label*) 7003 3110 0005 2474 1260

PS Form 3811, August 2001 Domestic Return Receipt 102595-02-M-1540

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Zachary and Sara Szabo
P.O. Box 374
Barnardsville, NC 28709

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Sara Szabo ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) C. Date of Delivery 3-11-09

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number (*Transfer from service label*) 7003 3110 0005 2474 1222

PS Form 3811, August 2001 Domestic Return Receipt 102595-02-M-1540

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mr. Darrell Debuhl

RETURN TO SENDER
UNCLAIMED
BY ADDRESSEE
UNITED STATES POSTAL SERVICE
PN#FL1975

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number (*Transfer from service label*) 7003 3110 0005 2474 1239

PS Form 3811, August 2001 Domestic Return Receipt 102595-02-M-1540

Yang, Kenton

From: Payne, Jasmeen
Sent: Tuesday, March 10, 2009 10:46 AM
To: Yang, Kenton
Subject: Here's One

Importance: High

Detailed Results

- **Detailed Results**
- Notifications

Tracking no.: 797369644318

E-mail notifications

In transit

In transit

Delivery exception
TEMPE, AZ

Shipment Dates

Ship date

Feb 26, 2009

Destination

MESA, AZ

Shipment Facts

Help
Service type
Priority Pak - Direct Signature Required

Weight
2.0 lbs/0.9 kg

Reference
6447-65973 - Jas

Status

Shipment Travel History

Help
Select time zone:
Select time format:
12H
|
24H

All shipment travel activity is displayed in local time for the location
Date/Time
Activity

Location
Details
Mar 6, 2009 11:30 AM
Package returned to shipper
TEMPE, AZ
Package returned to shipper:406027335410
Mar 5, 2009 4:14 PM
At local FedEx facility
TEMPE, AZ
Mar 4, 2009 4:31 PM
At local FedEx facility
TEMPE, AZ
Mar 3, 2009 4:16 PM
Held at FedEx location for recipient pickup
TEMPE, AZ
Package available for pickup at: 8210 S HARDY DR
Mar 3, 2009 4:09 PM
At local FedEx facility
TEMPE, AZ
Mar 3, 2009 10:02 AM
Delivery exception
TEMPE, AZ
Customer not available or business closed - Signature required
Mar 3, 2009 8:34 AM
On FedEx vehicle for delivery
TEMPE, AZ
Mar 2, 2009 5:37 PM
At local FedEx facility
TEMPE, AZ
Mar 2, 2009 9:46 AM
Delivery exception
TEMPE, AZ
Customer not available or business closed - Signature required
Mar 2, 2009 8:04 AM
On FedEx vehicle for delivery
TEMPE, AZ
Feb 27, 2009 3:55 PM
At local FedEx facility
TEMPE, AZ
Feb 27, 2009 10:03 AM
Delivery exception
TEMPE, AZ
Customer not available or business closed - Signature required
Feb 27, 2009 8:27 AM
On FedEx vehicle for delivery
TEMPE, AZ
Feb 27, 2009 7:08 AM
At local FedEx facility
TEMPE, AZ
Feb 27, 2009 5:51 AM
At dest sort facility
PHOENIX, AZ
Feb 27, 2009 4:26 AM
Departed FedEx location
INDIANAPOLIS, IN
Feb 27, 2009 12:40 AM
Arrived at FedEx location
INDIANAPOLIS, IN
Feb 26, 2009 9:13 PM
Left FedEx origin facility
RALEIGH, NC
Feb 26, 2009 3:56 PM
Picked up
RALEIGH, NC
Feb 26, 2009 12:18 PM
Shipment information sent to FedEx

Yang, Kenton

From: Payne, Jasmeen
Sent: Tuesday, March 10, 2009 10:49 AM
To: Yang, Kenton
Subject: Other Package

Importance: High

Results

- **Detailed Results**
- Notifications

Tracking no.: 869065071900

E-mail notifications

Delivered

Delivered

Signed for by:

J.PAYNE

Shipment Dates

Ship date

Mar 5, 2009

Delivery date

Mar 10, 2009 9:01 AM

Destination

Signature Proof of Delivery

Shipment Facts

Help

Service type
Express Saver Pak

Weight
2.0 lbs/0.9 kg

Delivered to
Mailroom

Reference
796382018473

Status

Shipment Travel History

Help

Select time zone:
Select time format:
12H
|
24H

All shipment travel activity is displayed in local time for the location
Date/Time
Activity
Location
Details
Mar 10, 2009 9:01 AM
Delivered
Mar 10, 2009 8:00 AM
On FedEx vehicle for delivery
RALEIGH, NC
Mar 9, 2009 9:53 AM
At local FedEx facility
RALEIGH, NC
Mar 9, 2009 9:30 AM
At local FedEx facility
RALEIGH, NC
Package not due for delivery
Mar 9, 2009 7:49 AM
At local FedEx facility
RALEIGH, NC
Mar 6, 2009 6:39 PM
At dest sort facility
RALEIGH, NC
Mar 6, 2009 4:34 PM
In transit
MEMPHIS, TN
Mar 6, 2009 4:19 PM
Departed FedEx location
MEMPHIS, TN
Mar 6, 2009 9:18 AM
Arrived at FedEx location
MEMPHIS, TN
Mar 5, 2009 8:30 PM
Left FedEx origin facility
ASHEVILLE, NC
Mar 5, 2009 9:59 AM
Picked up
ASHEVILLE, NC

Part 4
Local Government Approval

Appendix F
Public Meeting Sign-in Sheet

Buncombe County Solid Waste Management Facility
C&D Landfill Expansion Project
Public Meeting
March 31, 2009 at 7:00 PM
Buncombe County Training Room
199 College Street, Asheville, NC 28801

ATTENDANCE SHEET

NAME	COMPANY/DEPARTMENT	EMAIL	PHONE NO.
DAN Nelson	Douglas Nelson's Land		828 8087058
TONY & Reva Anders			
Alan DeBruhl	Alan DeBruhl (Alan DeBruhl Land.)		828-645-5613
Stacy Bowen	Murray Debruhl		
Mariah Gunther	Mariah Gunther		8282758842
Jodi Stevenson	Representing V. Watson		255-7703
James Banner	LANDOWNER		645-7085

CDM

Part 4
Local Government Approval

Appendix G
Zoning Letter

BUNCOMBE COUNTY
NORTH CAROLINA
GOVERNMENT

Buncombe County Commissioners

David Gantt, Chairman
Bill Stanley, Vice-Chairman
Carol Weir Peterson, Commissioner
K. Ray Bailey, Commissioner
Holly Jones, Commissioner

March 24, 2009

Mr. Jerry Mears, Landfill Manager
Buncombe County Solid Waste
81 Panther Branch Road
Alexander, NC 28701

Dear Mr. Mears:

The planned C&D landfill expansion project at the Buncombe County Solid Waste Management Facility site meets with existing zoning regulations, as the Panther Branch site was in existence prior to County Wide Zoning.

Expansion of the landfill and the subsequent development of planned phases are permitted within the regulations of the Zoning Ordinance, and do not require a Conditional Use Permit.

Sincerely,

David Gantt
Chairman

205 College St., Suite 300 ~ Asheville, NC 28801
p. 828 . 250 . 4105
f. 828 . 255 . 6077
buncombecounty.org