

Fac/Perm/Co ID #	Initials Trail	Date	Doc ID #
26-08	Geoffrey H. Little	03/09/2012	16315

March 9, 2012

Mr. Geof Little  
Permitting Engineer  
North Carolina Department of Environment and Natural Resources  
Division of Waste Management  
Solid Waste Section  
217 West Jones Street  
Raleigh, NC 27603

Re: Phase II Expansion CQA Letter Report  
Fort Bragg C&D Landfill  
Permit No. 26-08

Dear Mr. Little:

HDR Engineering, Inc. of the Carolinas (HDR) is pleased to submit this Construction Quality Assurance (CQA) Letter Report for the construction of Phase II expansion of the Fort Bragg C&D Landfill. This report is being submitted to satisfy the requirements of the project CQA Plan, the Phase II Permit to Construct dated April 28, 2011, the solid waste management rules, and acceptable engineering practices. Phase I is currently very close to capacity, therefore an expedited review is requested.

## **INTRODUCTION**

The 6.03 acre Phase II expansion of the Fort Bragg C&D landfill is located immediately north and west of active Phase I. The central portion of Phase I is located in an area consisting of a prepared soil base. The eastern portion of Phase II is located in an area where C&D waste was previously placed prior to the permitting of Phase I as authorized by an older permit. The western portion of Phase II is located over a closed Land Clearing and Inert Debris (LCID) landfill. Since the eastern and western portions of Phase II overlay existing waste, this CQA report is limited to the documentation of construction activities associated with the central portion of Phase II consisting of approximately 2.6 acres.

## **PHASE II GRADING, CQC, AND CQA ACTIVITIES**

The following paragraphs contain a chronological description of the grading, Construction Quality Control (CQC), and Construction Quality Assurance (CQA) activities that occurred during construction of the Phase II C&D landfill expansion. Phase II construction was self-

performed by Fort Bragg Directorate of Public Works (DPW) staff. CQC activities were performed by Froehling & Robertson, Inc., of Fayetteville, North Carolina (F&R). CQA activities were performed by HDR Engineering, Inc. of the Carolinas located in Raleigh,

North Carolina (HDR). Construction photographs are provided in Attachment A. CQC and CQA daily field reports and test results are provided in Attachments B and C, respectively. A certified survey of the completed Phase II subgrade is provided in Attachment D.

### **Proposed Basegrades**

Proposed basegrades for the Phase II expansion were provided with the Construction Permit Application prepared by HDR dated May 2010, revised March 2011. The Phase II grading area was previously rough graded to approximate permitted basegrades during borrow operations. Due to the need to expedite construction of Phase II since capacity within Phase I was rapidly being completed, DPW elected not to perform any additional excavation in the area. The Phase II basegrades are therefore generally above the permitted elevations.

### **Access Road Test Pits**

An access road currently exists within the western portion of Phase II. Originally, the access road was to be removed by excavating down to permitted basegrades. DPW elected not to remove the access road due to the need to expedite construction of Phase II since Phase I was rapidly reaching capacity. Since it was unknown whether the access road was constructed over natural ground or previously placed waste, DPW elected to perform test pits within the roadway embankment to determine subsurface conditions. The test pits were performed on August 18, 2011 and determined that the road was constructed over undisturbed clayey soils as shown in the construction photographs contained in Attachment A. The presence of undisturbed clayey soils beneath the road was confirmed during the Phase II basegrade/subgrade preparation as described below.

### **Basegrade/Subgrade Preparation**

Vegetation and organic soils were stripped from the Phase II basegrade/subgrade area on February 7, 2012. The stripped materials were either stockpiled within the Phase II area for removal or placed outside of the grading area. The exposed basegrade/subgrade was inspected by both CQC and CQA personnel. Some areas exhibited excessively wet and/or soft conditions that would not pass proofrolling. Upon recommendations from CQC, DPW elected to disc these areas and allow several days for the soils to dry before recompacting prior to proofrolling.

## **Basegrade/Subgrade Inspection**

Thomas Yanoschak, PE of HDR inspected the exposed Phase II basegrade/subgrade in accordance with permit condition No. 12 on February 13, 2012. All soils observed appeared to be naturally occurring clayey soils meeting the requirements of 15A NCAC 13B .0540(2)(b). There were no anomalies observed that would indicate that the area was unsuitable for the design, construction, or operation of the landfill. CQC collected 3 and CQA collected 2 soil samples for classification testing to verify that the basegrade/subgrade soils met the requirements of 15A NCAC 13B .0540(2)(b). Approximate sample locations are attached to the February 13, 2012 CQA daily field report in Attachment C. These samples were collected to confirm the results of the Phase II subsurface investigation performed by HDR in 2004. A copy of this investigation was included in Appendix I of the Phase II Construction Permit Application.

## **Proofrolling**

Proofrolling of the prepared Phase II basegrade/subgrade was conducted in general accordance with the project specifications on February 13, 2012. Proofrolling was performed by a tandem dump truck loaded with 6 tons of crusher run gravel and was directed by CQC personnel and observed by CQA personnel. Prior to proofrolling, the basegrade/subgrade was compacted by a sheepsfoot roller. Proofrolling did not show any areas that exhibited excessive deformation or pumping. All areas appeared to possess sufficient strength to support landfill development.

## **Compacted Fill Placement**

A topographic survey had indicated that portions of the Phase II grading area were below permitted basegrade elevations. These areas were limited to the low (i.e. north) end of Phase II and were backfilled with compacted clayey soils from an offsite source on February 29, 2012. The low areas consisted of approximately 5,000 square feet and typically required less than 1 foot of fill to achieve permitted basegrades. CQC performed testing on the backfill materials including a standard Proctor compaction test (ASTM D 698), field density tests, and classification tests to verify that the material met the requirements of 15A NCAC 13B .0540(2)(b). Copies of these test reports are provided in Attachment B.

## **Final Basegrade Inspection**

Thomas Yanoschak, PE performed a final inspection of the Phase II basegrade on March 1, 2012. The backfilled materials appeared to meet the requirements of 15A NCAC 13B .0540(2)(b) and all areas appeared to be suitable for landfill development.

## CERTIFICATION

Construction of the Phase II expansion of the Fort Bragg C&D Landfill has been completed. To the best of my knowledge, the construction has been completed in general accordance with the requirements of the project CQA Plan, the Phase II Permit to Construct dated April 28, 2011, the solid waste management rules, and acceptable engineering practices. A certified survey of the completed Phase II basegrades is provided in Attachment D.

## Closing

If, during your review or at any subsequent time, you have any questions, please do not hesitate to contact me at 919-232-6618.

Respectfully submitted,

**HDR Engineering, Inc. of the Carolinas**  
**NC Engineering Board No. F0116**



Thomas M. Yanoschak, PE  
Senior Project Manager

TY/apb

cc: Audrey Oxendine, DPW  
Dan Messier, DPW



- Attachments: A Phase II Construction Photographs  
B CQC Daily Field Reports and Test Results  
C CQA Daily Field Reports and Test Results  
D Certified Survey of Phase II Basegrades

**Attachment A**  
**Phase II Construction Photographs**

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Subject:	Phase II C&D Landfill Construction Photos	Date:	See individual photos.
Location:	Fort Bragg, North Carolina	Photographer:	Thomas Yanoschak, PE
Project Owner:	Fort Bragg Directorate of Public Works	HDR Project No.	11236-120265-018



Photo No.	01
<i>Description:</i> August 18, 2011	
Excavating test pit to determine if waste was present beneath access road in Phase II.	
<i>Comments:</i>	
None.	



Photo No.	02
<i>Description:</i> August 18, 2011	
Test pit beneath access road in Phase II.	
<i>Comments:</i>	
Test pit indicates access road is underlain by undisturbed clayey soil. No waste found.	

Subject:	Phase II C&D Landfill Construction Photos	Date:	See individual photos.
Location:	Fort Bragg, North Carolina	Photographer:	Thomas Yanoschak, PE
Project Owner:	Fort Bragg Directorate of Public Works	HDR Project No.	11236-120265-018

	Photo No.	03
	<i>Description:</i> August 18, 2011	
	Test pit beneath access road in Phase II.	
	<i>Comments:</i>	
		Test pit indicates access road is underlain by undisturbed clayey soil. No waste found.

	Photo No.	04
	<i>Description:</i> August 18, 2011	
	Test pit beneath access road in Phase II.	
	<i>Comments:</i>	
		Test pit indicates access road is underlain by undisturbed clayey soil. No waste found.

Subject:	Phase II C&D Landfill Construction Photos	Date:	See individual photos.
Location:	Fort Bragg, North Carolina	Photographer:	Thomas Yanoschak, PE
Project Owner:	Fort Bragg Directorate of Public Works	HDR Project No.	11236-120265-018

	Photo No.	05
	<i>Description:</i> February 7, 2012	
	Stripping vegetation and organic soils from Phase II subgrade/basegrade.	
	<i>Comments:</i>	
		None.

	Photo No.	06
	<i>Description:</i> February 7, 2012	
	Stripping vegetation and organic soils from Phase II subgrade/basegrade.	
	<i>Comments:</i>	
		None.

Subject:	<b>Phase II C&amp;D Landfill Construction Photos</b>	Date:	<b>See individual photos.</b>
Location:	<b>Fort Bragg, North Carolina</b>	Photographer:	<b>Thomas Yanoschak, PE</b>
Project Owner:	<b>Fort Bragg Directorate of Public Works</b>	HDR Project No.	<b>11236-120265-018</b>

	Photo No.	07
	<i>Description:</i> February 7, 2012	
	Stripping vegetation and organic soils from Phase II subgrade/basegrade.	
	<i>Comments:</i>	
		None.

	Photo No.	08
	<i>Description:</i> February 7, 2012	
	Stripping vegetation and organic soils from Phase II subgrade/basegrade.	
	<i>Comments:</i>	
		None.

Subject:	Phase II C&D Landfill Construction Photos	Date:	See individual photos.
Location:	Fort Bragg, North Carolina	Photographer:	Thomas Yanoschak, PE
Project Owner:	Fort Bragg Directorate of Public Works	HDR Project No.	11236-120265-018

	Photo No.	09
	<i>Description:</i> February 13, 2012	
	Proofrolling Phase II compacted subgrade/basegrade.	
	<i>Comments:</i>	
		Tandem dump truck loaded with approximately 6 tons of crusher-run stone.

	Photo No.	10
	<i>Description:</i> February 13, 2012	
	Compacted Phase II subgrade/basegrade.	
	<i>Comments:</i>	
		None.

Subject:	Phase II C&D Landfill Construction Photos	Date:	See individual photos.
Location:	Fort Bragg, North Carolina	Photographer:	Thomas Yanoschak, PE
Project Owner:	Fort Bragg Directorate of Public Works	HDR Project No.	11236-120265-018

	Photo No.	11
	Description: February 13, 2012	
	Proofrolling Phase II compacted subgrade/basegrade.	
	Comments:	
		CQC observing proofroll.

	Photo No.	12
	Description: February 13, 2012	
	Proofrolling Phase II compacted subgrade/basegrade.	
	Comments:	
		CQC observing proofroll.

Subject:	Phase II C&D Landfill Construction Photos	Date:	See individual photos.
Location:	Fort Bragg, North Carolina	Photographer:	Thomas Yanoschak, PE
Project Owner:	Fort Bragg Directorate of Public Works	HDR Project No.	11236-120265-018

	Photo No.	13
	<i>Description:</i> February 13, 2012	
	Phase II compacted subgrade/basegrade after proofrolling.	
	<i>Comments:</i>	
		None.

	Photo No.	14
	<i>Description:</i> February 13, 2012	
	Obtaining CQC sample of Phase II subgrade/basegrade material for classification testing.	
	<i>Comments:</i>	
		None.

Subject:	<b>Phase II C&amp;D Landfill Construction Photos</b>	Date:	<b>See individual photos.</b>
Location:	<b>Fort Bragg, North Carolina</b>	Photographer:	<b>Thomas Yanoschak, PE</b>
Project Owner:	<b>Fort Bragg Directorate of Public Works</b>	HDR Project No.	<b>11236-120265-018</b>

	Photo No.	15
	<i>Description:</i> March 1, 2012	
	Phase II basegrade after placement of compacted clayey fill in low areas.	
	<i>Comments:</i>	
		Red soil is fill.

	Photo No.	16
	<i>Description:</i> March 1, 2012	
	Phase II basegrade after placement of compacted clayey fill in low areas.	
	<i>Comments:</i>	

**Attachment B**  
**CQC Daily Field Reports and Test Results**

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# FROEHLING & ROBERTSON, INC.

*Engineering Stability Since 1881*

327 East Jenkins Street  
Fayetteville, North Carolina 28306 | USA  
T 910.323.9832 | F 910.323.5455  
NC License # F-0266

March 8, 2012

Ms. Audrey D. Oxendine  
Chief, Environmental Compliance Branch  
Directorate of Public Works  
Bldg. 3-1137, Butner Road  
Fort Bragg, North Carolina 28310

Reference: **Report of Proofroll Services – Report No. 1**  
Fort Bragg C&D Landfill – Phase 2  
Fort Bragg, North Carolina  
F&R Record No. 64N-0104

Dear Ms. Oxendine:

This report documents the work performed by Froehling & Robertson, Inc. (F&R) at the above referenced project. This report summarizes the proofroll services performed on February 13, 2012.

### Proofrolling Services

On the above date, as requested, F&R made a visit to the above referenced site in order to evaluate the suitability of the subgrade for the proposed Fort Bragg C&D Landfill Phase 2 subgrade area prior to fill placement. At the time of our arrival and per our previous recommendations, the contractor had scarified, moisture conditioned and re-compacted the existing wet soils in the upper 1 to 2 feet below existing grade. The area was proofrolled (See attached drawing), using a loaded tandem axle dump truck under observations from F&R, Mr. Thomas Yanoschak with HDR and representatives from Fort Bragg DPW. Minor pumping and rutting was observed under the weight of the loaded dump truck at various locations throughout the proofroll area. Mr. Yanoschak informed all parties present that the subgrade was suitable for fill placement. Per request of Mr. Yanoschak, three (3) samples were removed from the subgrade area brought back to our Fayetteville office for classification purposes; HDR collected two (2) additional samples from the subgrade area and those samples will be analyzed and classified by Geotechnics.



F&R, Inc. appreciates the opportunity to provide proofrolling and soil classification services during this phase of your project as your materials consultant. If you have any questions concerning this report, please feel free to contact us at your convenience.

Very truly yours,  
FROEHLING & ROBERTSON, INC.

A. Craig Mintz  
Construction Services Manager

Gilles Bellot, PE  
Fayetteville Branch Manager

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cc: Ms. Audrey D. Oxendine – DPW (1 original + 1 electronic)  
Mr. Steve Coffey, PE – DPW (1 electronic)  
Mr. Thomas M. Yanoschak, PE – HDR (1 electronic)  
Mr. Daniel J. Messier – DPW (1 electronic)  
Mr. Sid Williamson – DPW (1 electronic)  
Mr. Leland D. Strother, PLS – Strother Land Surveying (1 electronic)



**LEGEND**

- ▨ APPROXIMATE LOCATION OF POREFOOT
- ⊙ APPROXIMATE LOCATION OF CLASS SAMPLES TAKEN BY F&P
- HDR1- APPROXIMATE LOCATION OF CLASS SAMPLES TAKEN BY HDR

DDL-C  
N: 507.34  
E: 1978.1

EXISTING DROP INLET

MH4

PHASE I LIMIT  
(15.70 AC.)

PHASE II LIMIT  
(6.03 AC.)

ACCESS ROAD

EXISTING SOIL STOCKPILE

EXISTING RETENTION POND

EXISTING RECYCLING AREA

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**FROEHLING & ROBERTSON, INC.**

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February 17, 2012

Ms. Audrey D. Oxendine  
Chief, Environmental Compliance Branch  
Directorate of Public Works  
Bldg. 3-1137, Butner Road  
Fort Bragg, North Carolina 28310

Reference: **Report of Laboratory Testing Services – Report No. 1**  
Fort Bragg C&D Landfill – Phase 2  
Fort Bragg, North Carolina  
F&R Record No. 64N-0104

Dear Ms. Oxendine:

As requested, F&R has completed the laboratory testing of Soil Sample No. 3 on the above referenced project. The soil sample was taken from the Southeast portion of the proposed landfill area and transported to our laboratory on February 13, 2012 for classification in accordance with ASTM D2487-10. The sample was tested in accordance with the following ASTM procedures:

1. D2216-10 for moisture for moisture content (as received in lab).
2. C136-6 for grain size.
3. D4318-10 for liquid and plastic limits, and plastic index calculation.

Sieve Size	(% Passing)
No. 4	100
No. 10	99
No. 40	82
No. 200	48
Liquid Limit	33
Plastic Limit	16
Plastic Index	17

Based on the results of the laboratory testing performed, the soil sample was classified as a SC material.



We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, please do not hesitate to contact us.

Very truly yours,  
FROEHLING & ROBERTSON, INC.

A handwritten signature in black ink, appearing to read 'A. Craig Mintz'.

A. Craig Mintz  
Construction Services Manager

A handwritten signature in black ink, appearing to read 'Gilles Bellot'.

Gilles Bellot, PE  
Fayetteville Branch Manager

cc: Ms. Audrey D. Oxendine – DPW (1 original + 1 electronic)  
Mr. Steve Coffey, PE – DPW (1 electronic)  
Mr. Thomas M. Yanoschak, PE – HDR (1 electronic)  
Mr. Daniel J. Messier – DPW (1 electronic)  
Mr. Sid Williamson – DPW (1 electronic)  
Mr. Leland D. Strother, PLS – Strother Land Surveying (1 electronic)



**FROEHLING & ROBERTSON, INC.**

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February 20, 2012

Ms. Audrey D. Oxendine  
Chief, Environmental Compliance Branch  
Directorate of Public Works  
Bldg. 3-1137, Butner Road  
Fort Bragg, North Carolina 28310

Reference: **Report of Laboratory Testing Services – Report No. 2**  
Fort Bragg C&D Landfill – Phase 2  
Fort Bragg, North Carolina  
F&R Record No. 64N-0104

Dear Ms. Oxendine:

As requested, F&R has completed the laboratory testing of Soil Sample No. 2 on the above referenced project. The soil sample was taken from the Northeast portion of the proposed landfill area and transported to our laboratory on February 13, 2012 for classification in accordance with ASTM D2487-10. The sample was tested in accordance with the following ASTM procedures:

1. D2216-10 for moisture for moisture content (as received in lab).
2. C136-6 for grain size.
3. D4318-10 for liquid and plastic limits, and plastic index calculation.

Sieve Size	(% Passing)
No. 4	100
No. 10	99
No. 40	90
No. 200	60
Liquid Limit	38
Plastic Limit	16
Plastic Index	22

Based on the results of the laboratory testing performed, the soil sample was classified as a CL material.



We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, please do not hesitate to contact us.

Very truly yours,  
FROEHLING & ROBERTSON, INC.

A. Craig Mintz  
Construction Services Manager

Gilles Bellot, PE  
Fayetteville Branch Manager

cc: Ms. Audrey D. Oxendine – DPW (1 original + 1 electronic)  
Mr. Steve Coffey, PE – DPW (1 electronic)  
Mr. Thomas M. Yanoschak, PE – HDR (1 electronic)  
Mr. Daniel J. Messier – DPW (1 electronic)  
Mr. Sid Williamson – DPW (1 electronic)  
Mr. Leland D. Strother, PLS – Strother Land Surveying (1 electronic)



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February 20, 2012

Ms. Audrey D. Oxendine  
Chief, Environmental Compliance Branch  
Directorate of Public Works  
Bldg. 3-1137, Butner Road  
Fort Bragg, North Carolina 28310

Reference: **Report of Laboratory Testing Services – Report No. 3**  
Fort Bragg C&D Landfill – Phase 2  
Fort Bragg, North Carolina  
F&R Record No. 64N-0104

Dear Ms. Oxendine:

As requested, F&R has completed the laboratory testing of Soil Sample No. 1 on the above referenced project. The soil sample was taken from the Southwest portion of the proposed landfill area and transported to our laboratory on February 13, 2012 for classification in accordance with ASTM D2487-10. The sample was tested in accordance with the following ASTM procedures:

1. D2216-10 for moisture for moisture content (as received in lab).
2. C136-6 for grain size.
3. D4318-10 for liquid and plastic limits, and plastic index calculation.

Sieve Size	(% Passing)
No. 4	100
No. 10	99
No. 40	94
No. 200	50
Liquid Limit	36
Plastic Limit	18
Plastic Index	18

Based on the results of the laboratory testing performed, the soil sample was classified as a CL material.



We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, please do not hesitate to contact us.

Very truly yours,  
FROEHLING & ROBERTSON, INC.

A. Craig Mintz  
Construction Services Manager

Gilles Bellot, PE  
Fayetteville Branch Manager

- cc:
- Ms. Audrey D. Oxendine -- DPW (1 original + 1 electronic)
  - Mr. Steve Coffey, PE -- DPW (1 electronic)
  - Mr. Thomas M. Yanoschak, PE -- HDR (1 electronic)
  - Mr. Daniel J. Messier -- DPW (1 electronic)
  - Mr. Sid Williamson -- DPW (1 electronic)
  - Mr. Leland D. Strother, PLS -- Strother Land Surveying (1 electronic)



# FROEHLING & ROBERTSON, INC.

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NC License # F-0266

March 8, 2012

Ms. Audrey D. Oxendine  
Chief, Environmental Compliance Branch  
Directorate of Public Works  
Bldg. 3-1137, Butner Road  
Fort Bragg, North Carolina 28310

Reference: **Report of Field Density Services – Report No. 1**  
Fort Bragg C&D Landfill – Phase 2  
Fort Bragg, North Carolina  
F&R Record No. 64N-0104

Dear Ms. Oxendine:

This report documents the work performed by Froehling & Robertson, Inc. (F&R) at the above referenced project. This report summarizes the field density services performed on February 29, 2012.

### Field Density Testing

On the above date, F&R Engineering Technician Eric Hoffmann performed field density testing on the fill material placed at the above referenced site. Four (4) density tests (Test Nos. 1 through 4) were performed on a spot check basis using the sand cone (ASTM D1556) and the nuclear gauge testing method (ASTM D6938). Please refer to the "Field Density Summary Sheet", and the attached drawing included in this report for the test results and approximate test locations. We understand that the minimum compaction requirement for the fill material is 90 percent of the Standard Proctor Maximum Dry Density (ASTM D698).

Based on the results of the testing performed, the field density tests revealed in-place densities exceeding the minimum compaction requirements of the project specifications. The results of the field density test performed, along with a copy of the Standard Proctor moisture/density relationships performed on the fill material is enclosed for your review.



F&R, Inc. appreciates the opportunity to provide field density testing services during this phase of your project as your materials consultant. If you have any questions concerning this report, please feel free to contact us at your convenience.

Very truly yours,  
**FROEHLING & ROBERTSON, INC.**

A. Craig Mintz  
Construction Services Manager

Gilles Bellot, PE  
Fayetteville Branch Manager

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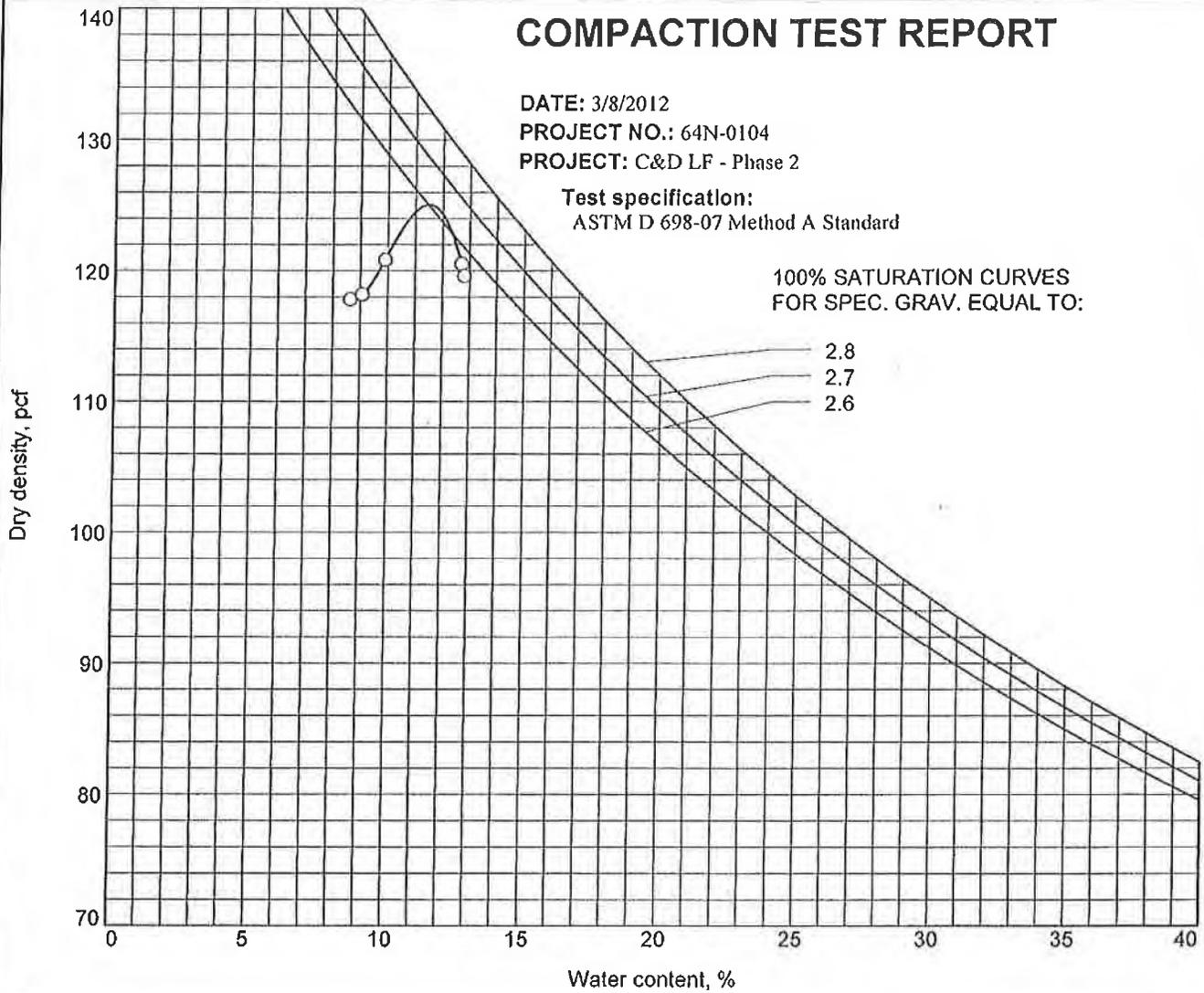
cc: Ms. Audrey D. Oxendine – DPW (1 original + 1 electronic)  
Mr. Steve Coffey, PE – DPW (1 electronic)  
Mr. Thomas M. Yanoschak, PE – HDR (1 electronic)  
Mr. Daniel J. Messier – DPW (1 electronic)  
Mr. Sid Williamson – DPW (1 electronic)  
Mr. Leland D. Strother, PLS – Strother Land Surveying (1 electronic)



# COMPACTION TEST REPORT

DATE: 3/8/2012  
 PROJECT NO.: 64N-0104  
 PROJECT: C&D LF - Phase 2

Test specification:  
 ASTM D 698-07 Method A Standard



No.	LOCATION AND DESCRIPTION							REMARKS
○ 115187	Sample Number: 115187 Reddish Brown Silty Sand							
No.	USCS	LL	PI	NAT. MOIST.	OVERSIZE	% < No.200	MAX. DRY DEN.	OPT. MOIST.
○ 115187	SM	NP	NP	9.15	%>#4=1	18 %	125.1	11.5 %

Figure

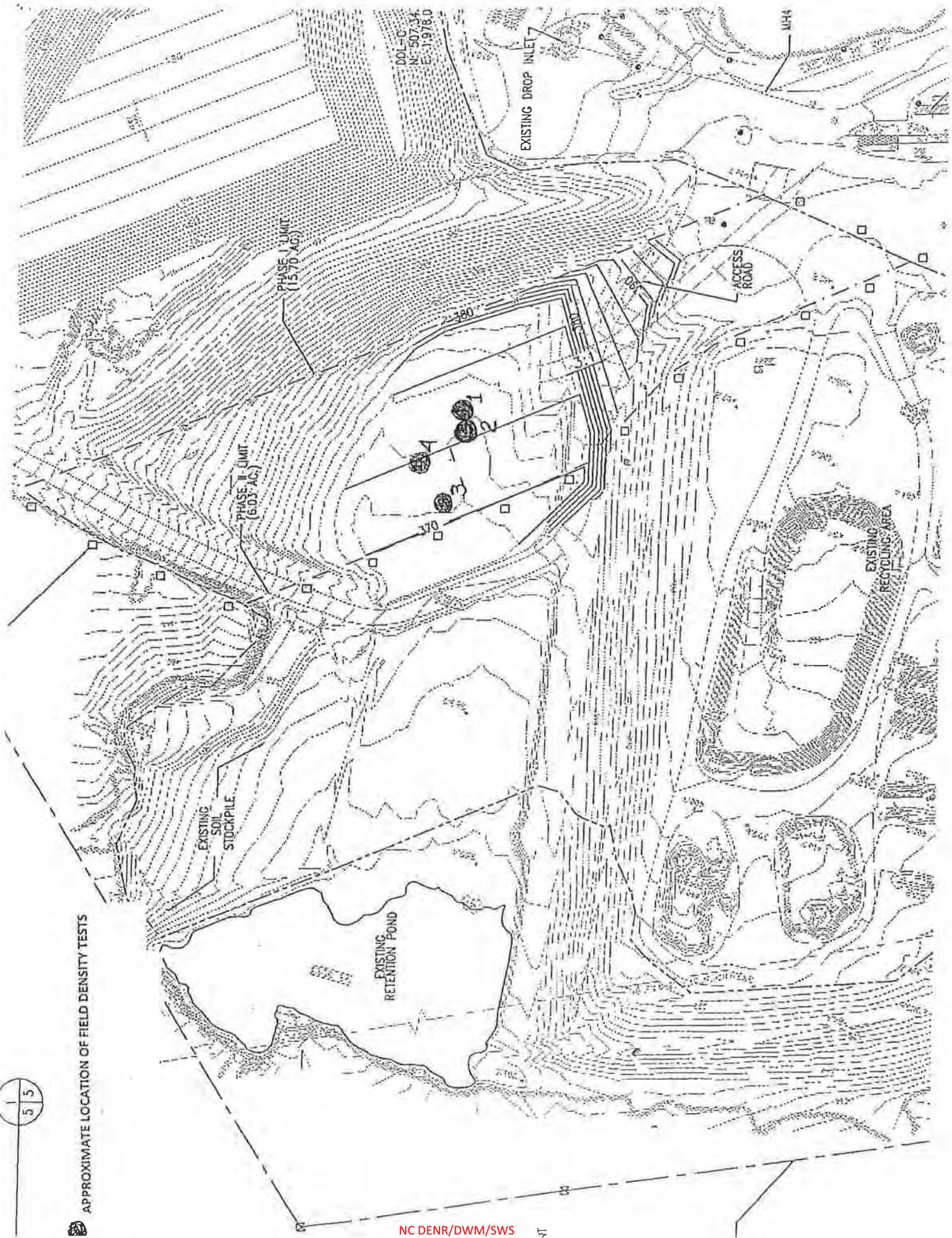
FROEHLING & ROBERTSON, INC.

Tested By: Amy

Checked By: N Magnum



APPROXIMATE LOCATION OF FIELD DENSITY TESTS



SINCE



1881

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# DAILY REPORT

Project Name: Fort Bragg C and D Landfill F & R Job No.: 64N-0104

Client's Name: DPW Date: 2/29/12

Inspection of: Soil-Phase 2 Technician: E. Hofmann

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.  
**THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.**

F&R was on site to perform density testing of soil fill placed on phase 2 of the construction and demolition landfill, at approximate elevation of 375 feet. Technician performed density tests in three locations of the fill area, and a one point proctor. Density test data indicated the fill was at least 90% compact.

Total Hours Billed	Density Gauge	Mileage	Owner's Representative <i>[Signature]</i> 3/29/12
--------------------	---------------	---------	--

**Attachment C**  
**CQA Daily Field Reports and Test Results**

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# Daily Field Report

Project Name: Fort Bragg C&D Landfill Phase II Construction	Date: February 7, 2012	Day: 1
Project Owner: Fort Bragg Directorate of Public Works	Contractor: Self-Performed by DPW	
HDR Project No. 11236-120265-018	Address: Lamont Rd ., Fort Bragg, NC	

**Weather Conditions:**

Temperature		Phenomena		Precipitation
Max. 60's F	Min. 50's F	Clear	Yes	Other
				None

Contractor's Employees:			Subcontractor's Employees:		
No.	Craft		No.	Name	Craft
1	Equipment Operator		1	F&R	CQC
			2	Grand Total	

**Work Being Done**  
 Work Observed:  
 Observed removal of vegetation and organic soils from the Phase II basegrade/subgrade. Organics and vegetation were being stockpiled for removal or placed outside of basegrade. Walked basegrade/subgrade with Ft. Bragg staff and CQC representative from F&R. Some areas were noted as being excessively wet and/or soft and probably would not pass proofrolling. F&R recommended that the soft areas be disced and allowed to dry and then compacted prior to proofrolling. Ft. Bragg agreed to do this. Suggested building berm to keep stormwater from flowing onto basegrade/subgrade.

Work Not Observed, But in Progress:  
 None.

**Requested Revisions and/or Interpretations**  
 None.

**Construction Deficiencies Reported to Gen. Contractor This Day and/or Corrected This Day**  
 None.

**Remarks**  
 Contractor appeared to be doing a good job removing organics from basegrade/subgrade. Proposed course of action to dry out soils prior to proofrolling appears to be reasonable.

HDR Field Representative: *Thomas M. Yanoschak, P.E.*

Distribution:  File  Project Manager  Resident



# Daily Field Report

Project Name: Fort Bragg C&D Landfill Phase II Construction	Date: February 13, 2012	Day: 2
Project Owner: Fort Bragg Directorate of Public Works	Contractor: Self-Performed by DPW	
HDR Project No. 11236-120265-018	Address: Lamont Rd ., Fort Bragg, NC	

Weather Conditions:				
Temperature		Phenomena		Precipitation
Max. 60's F	Min. 50's F	Clear Yes	Other	None

Contractor's Employees:		Subcontractor's Employees:		
No.	Craft	No.	Name	Craft
1	Equipment Operator	1	F&R	CQC
		2	Grand Total	

**Work Being Done**  
 Work Observed:  
 Observed exposed basegrade/subgrade in accordance with Condition No. 12 of the Permit to Construct Phase II, dated April 28, 2011. All soils observed appeared to be naturally occurring clayey soils meeting the requirements of 15A NCAC 13B .0540(2)(b). Exposed soil appeared to be essentially homogenous without significant discontinuities or differences in properties that would adversely affect the design, construction, or operation of the landfill.  
 Observed proofrolling of compacted subgrade. Subgrade had been previously compacted with a sheepfoot roller. Proofrolling was performed using a tandem dump truck loaded with 6 tons of crusher run gravel. CQC directed and observed proofrolling. CQA did not observe any areas that exhibited excessive pumping or deformation. All areas appeared to be suitable for landfill development.  
 After proofrolling, CQC obtained 3 bucket samples of basegrade/subgrade soils for classification testing at the F&R geotechnical lab. CQA obtained 2 bucket samples for classification testing and delivered them to Geotechnics in Raleigh, NC for testing. Testing results will be provided within the CQA report submitted to NCDENR. A sketch of the CQC and CQA sample locations is attached to this report.

Work Not Observed, But in Progress:  
 None.

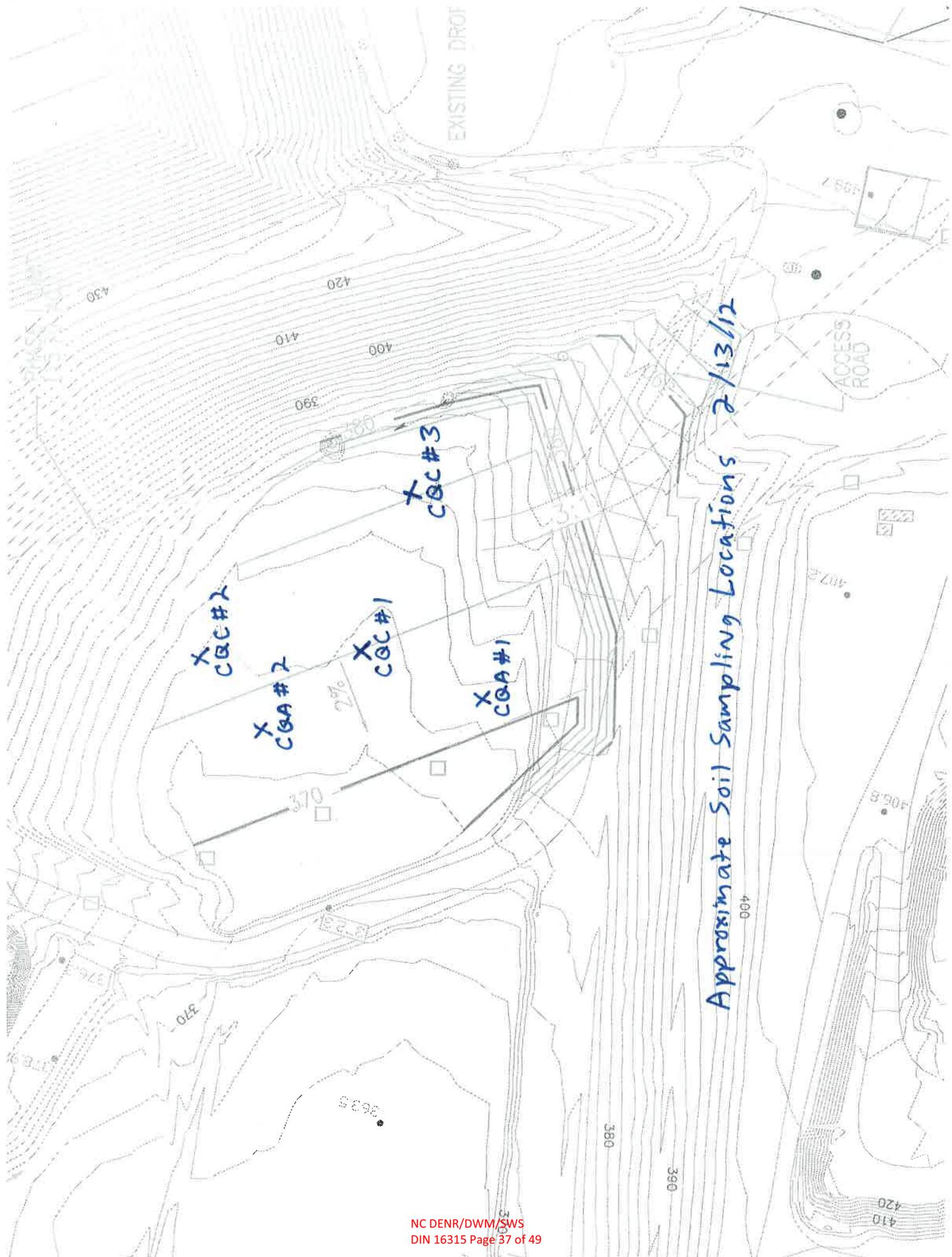
**Requested Revisions and/or Interpretations**  
 None.

**Construction Deficiencies Reported to Gen. Contractor This Day and/or Corrected This Day**  
 None.

**Remarks**  
 Basegrade/subgrade appeared to be in good condition and suitable for landfill development.

HDR Field Representative: *Thomas M. Yanoschak, PE*

Distribution:  File  Project Manager  Resident





# Daily Field Report

Project Name: Fort Bragg C&D Landfill Phase II Construction	Date: March 1, 2012	Day: 3
Project Owner: Fort Bragg Directorate of Public Works	Contractor: Self-Performed by DPW	
HDR Project No. 11236-120265-018	Address: Lamont Rd ., Fort Bragg, NC	

Weather Conditions:				
Temperature		Phenomena		Precipitation
Max. 70's F	Min. 50's F	Clear Partly Cloudy	Other	None

Contractor's Employees:		Subcontractor's Employees:		
No.	Craft	No.	Name	Craft
	None	1	Leland Strother	Surveyor
		1	Grand Total	

**Work Being Done**  
 Work Observed:  
 Observed completed Phase II basegrade. One lift of fill was placed over approximately 5,000 SF of Phase II yesterday in areas that were below the permitted basegrade elevations. F&R performed QC testing of the compacted fill including standard Proctor, density tests, and Soil classification tests yesterday. Results of the testing will be provided within the Phase II CQA Report. Fill soils appeared to meet the Requirements of 15A NCAC 13B .0540(2)(b).

Work Not Observed, But in Progress:  
 None.

**Requested Revisions and/or Interpretations**  
 None.

**Construction Deficiencies Reported to Gen. Contractor This Day and/or Corrected This Day**  
 None.

**Remarks**  
 Basegrade appeared to be in good condition and suitable for landfill development.

HDR Field Representative: *Thomas M. Yanoschak, PE*

Distribution:  File  Project Manager  Resident



February 16, 2012

Project No. 2012-627-01

Mr. Thomas Yanoschak  
HDR Engineering, Inc.  
3733 National Drive, Suite 207  
Raleigh, NC 27612'  
tyanoschak@hdrinc.com

**Transmittal**  
**Laboratory Test Results**  
**Ft. Bragg C&D Landfill, Phase 2**

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.***

### ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89 (SOP - S4A)

Client	HDR ENGINEERING, INC.	Boring No.	CQA#1
Client Reference	FT. BRAGG C&D LF PH2	Depth (ft)	NA
Project No.	2012-627-01	Sample No.	NA
Lab ID	2012-627-01-01	Soil Description	<b>LIGHT BROWN LEAN CLAY</b>

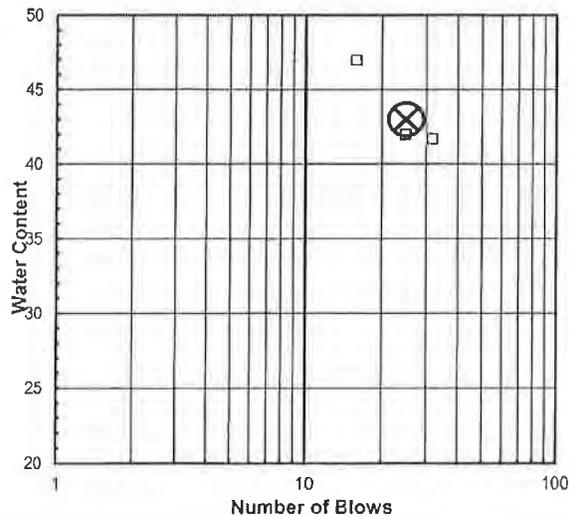
*Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

Liquid Limit Test	1	2	3	
Tare Number	B	I	G	<b>M</b>
Wt. of Tare & WS (gm)	22.87	24.21	23.43	<b>U</b>
Wt. of Tare & DS (gm)	20.60	21.55	20.74	<b>L</b>
Wt. of Tare (gm)	15.15	15.21	15.01	<b>T</b>
Wt. of Water (gm)	2.3	2.7	2.7	<b>I</b>
Wt. of DS (gm)	5.5	6.3	5.7	<b>P</b>
				<b>O</b>
				<b>I</b>
<b>Moisture Content (%)</b>	<b>41.7</b>	<b>42.0</b>	<b>46.9</b>	<b>N</b>
<b>Number of Blows</b>	<b>32</b>	<b>25</b>	<b>16</b>	<b>T</b>

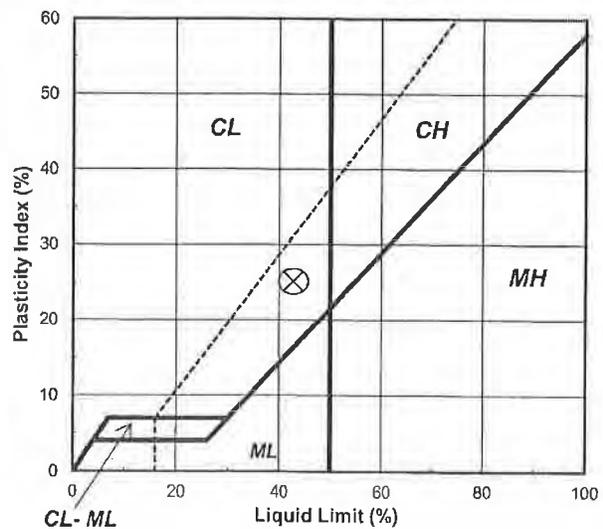
Plastic Limit Test	1	2	Range	Test Results	
Tare Number	S	J		<b>Liquid Limit (%)</b>	<b>43</b>
Wt. of Tare & WS (gm)	22.97	22.33		<b>Plastic Limit (%)</b>	<b>18</b>
Wt. of Tare & DS (gm)	21.76	21.22		<b>Plasticity Index (%)</b>	<b>25</b>
Wt. of Tare (gm)	15.18	15.11		<b>USCS Symbol</b>	<b>CL</b>
Wt. of Water (gm)	1.2	1.1			
Wt. of DS (gm)	6.6	6.1			
<b>Moisture Content (%)</b>	<b>18.4</b>	<b>18.2</b>	<b>0.2</b>		

*Note: The acceptable range of the two Moisture contents is ± 2.6*

Flow Curve



Plasticity Chart



Tested By SD Date 2/14/2012 Checked By GEM Date 2-15-12  
 page 1 of 1 DCN: CT-S4B DATE: 12/20/2006 REVISION: 3

### ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89 (SOP - S4A)

Client	HDR ENGINEERING, INC.	Boring No.	CQA#2
Client Reference	FT. BRAGG C&D LF PH2	Depth (ft)	NA
Project No.	2012-627-01	Sample No.	NA
Lab ID	2012-627-01-02	Soil Description	<b>LIGHT BROWN LEAN CLAY</b>

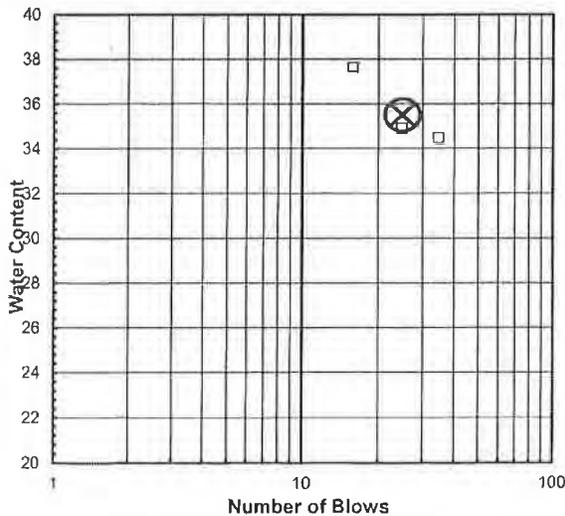
*Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. (Minus No. 40 sieve material, Airdried) See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

Liquid Limit Test	1	2	3	
Tare Number	V-2	3-M	W-5	M
Wt. of Tare & WS (gm)	24.96	24.06	26.62	U
Wt. of Tare & DS (gm)	22.57	21.86	23.60	L
Wt. of Tare (gm)	15.63	15.55	15.57	T
Wt. of Water (gm)	2.4	2.2	3.0	I
Wt. of DS (gm)	6.9	6.3	8.0	P
<b>Moisture Content (%)</b>	<b>34.4</b>	<b>34.9</b>	<b>37.6</b>	<b>O</b>
<b>Number of Blows</b>	<b>35</b>	<b>25</b>	<b>16</b>	<b>I</b>
				<b>N</b>
				<b>T</b>

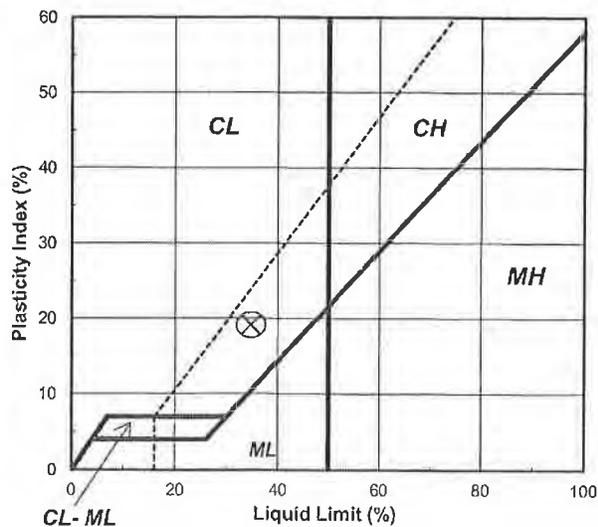
Plastic Limit Test	1	2	Range	Test Results
Tare Number	Z-4	1M		Liquid Limit (%) 35
Wt. of Tare & WS (gm)	22.79	23.97		Plastic Limit (%) 16
Wt. of Tare & DS (gm)	21.78	22.87		Plasticity Index (%) 19
Wt. of Tare (gm)	15.55	15.91		USCS Symbol CL
Wt. of Water (gm)	1.0	1.1		
Wt. of DS (gm)	6.2	7.0		
<b>Moisture Content (%)</b>	<b>16.2</b>	<b>15.8</b>	<b>0.4</b>	

*Note: The acceptable range of the two Moisture contents is ± 2.6*

Flow Curve



Plasticity Chart

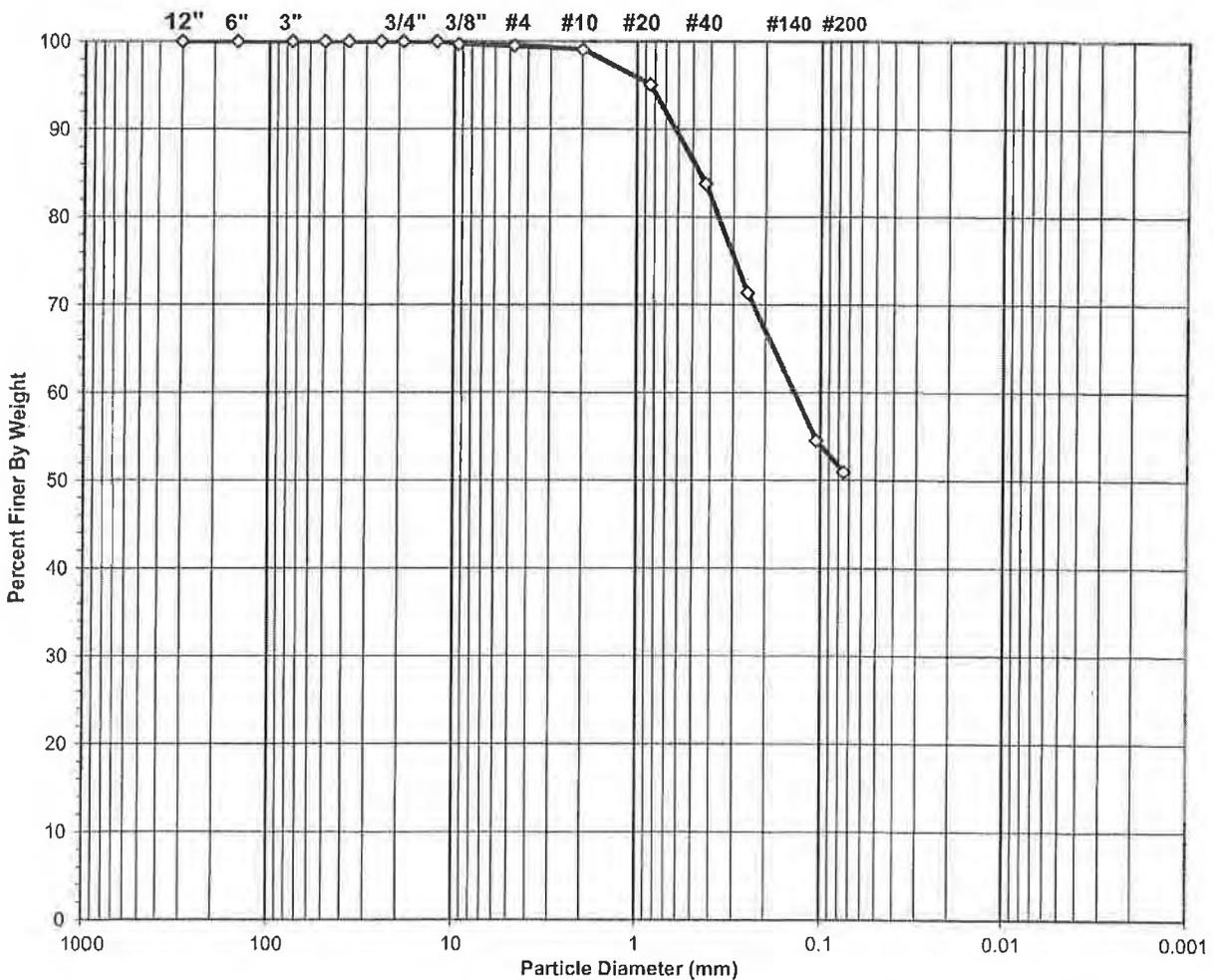


Tested By SD Date 2/14/2012 Checked By GJM Date 2-16-12  
 page 1 of 1 DCN: CT-S4B DATE: 12/20/2006 REVISION: 3

**SIEVE ANALYSIS**  
ASTM D 422-63 (SOP-S3)

Client	HDR ENGINEERING, INC.	Boring No.	CQA#1
Client Reference	FT. BRAGG C&D LF PH2	Depth (ft)	NA
Project No.	2012-627-01	Sample No.	NA
Lab ID	2012-627-01-01	Soil Color	LIGHT BROWN

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



**USCS Symbol**      **CL, TESTED**

**USCS Classification** **SANDY LEAN CLAY**

Tested By JBD      Date 2/16/2012      Checked By GAM      Date 2-16-12  
 page 1 of 2      DCN: CT-S3C DATE 6-25-98 REVISION: 2      Z:\2012 PROJECTS\2012-627-HDR\2012-627-01-01 SIEVON REV 4 wHeader.xls\Sheet1

### WASH SIEVE ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	HDR ENGINEERING, INC.	Boring No.	CQA#1
Client Reference	FT. BRAGG C&D LF PH2	Depth (ft)	NA
Project No.	2012-627-01	Sample No.	NA
Lab ID	2012-627-01-01	Soil Color	<b>LIGHT BROWN</b>

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)	647.09	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	604.42	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	171.67	Weight of Tare (gm)	NA
Weight of Water (gm)	42.67	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	432.75	Weight of Dry Soil (gm)	NA
<b>Moisture Content (%)</b>	<b>9.9</b>	<b>Moisture Content (%)</b>	<b>NA</b>

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	432.75
Dry Weight - 3/4" Sample (gm)	212.1	Weight of minus #200 material (gm)	220.64
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	212.11
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	1.22	0.3	0.3	99.7	99.7
#4	4.75	0.80	0.2	0.5	99.5	99.5
#10	2.00	1.85	0.4	0.9	99.1	99.1
#20	0.850	17.15	4.0	4.9	95.1	95.1
#40	0.425	48.90	11.3	16.2	83.8	83.8
#60	0.250	53.78	12.4	28.6	71.4	71.4
#140	0.106	72.78	16.8	45.4	54.6	54.6
#200	0.075	15.63	3.6	49.0	51.0	51.0
Pan	-	220.64	51.0	100.0	-	-

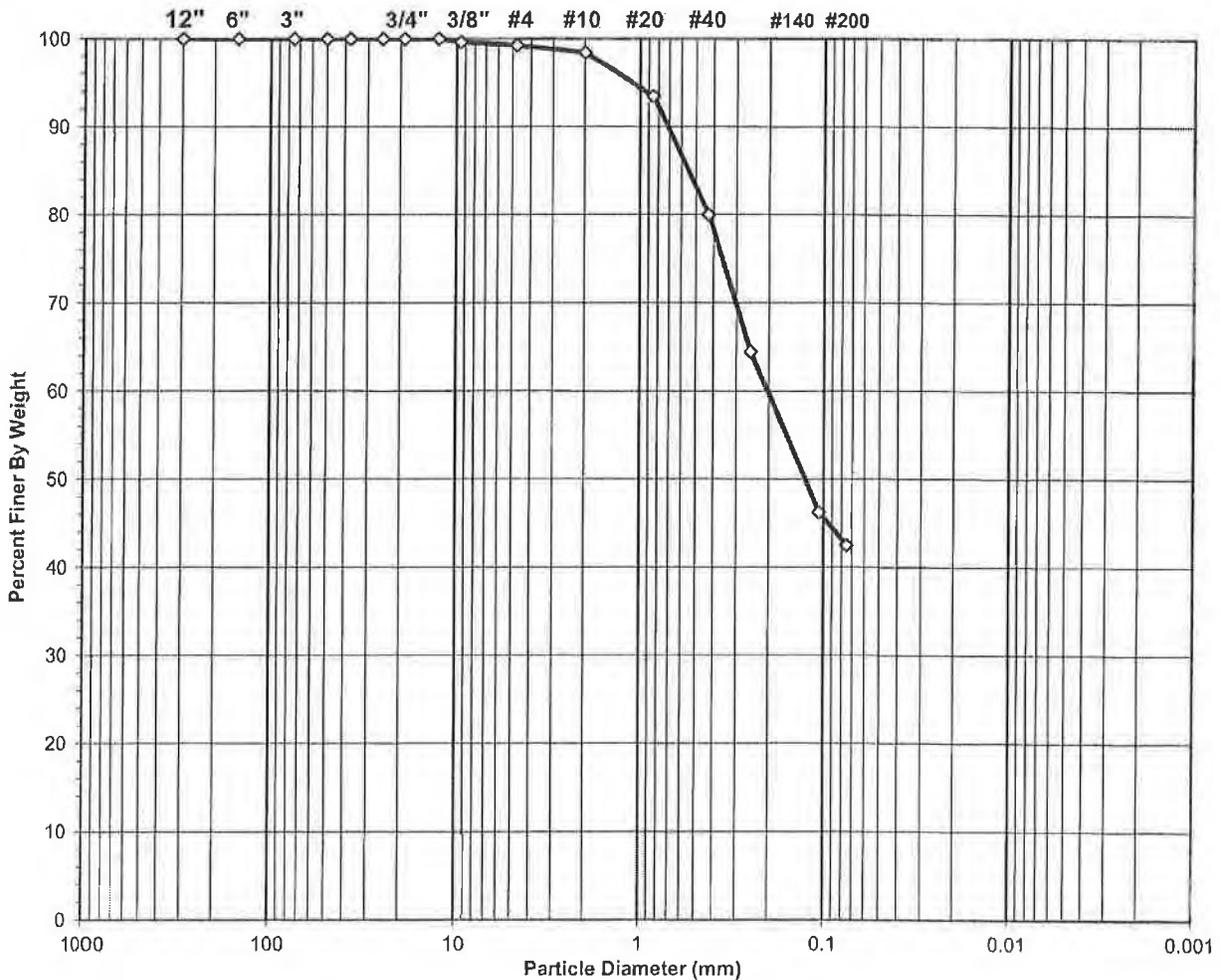
Tested By JBD Date 2/16/2012 Checked By GEM Date 2-16-12

**SIEVE ANALYSIS**  
ASTM D 422-63 (SOP-S3)

Client                   HDR ENGINEERING, INC.  
Client Reference      FT. BRAGG C&D LF PH2  
Project No.            2012-627-01  
Lab ID                 2012-627-01-02

Boring No.            CQA#2  
Depth (ft)            NA  
Sample No.            NA  
Soil Color             BROWN

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



**USCS Symbol**        **SC, TESTED**

**USCS Classification** **CLAYEY SAND**

Tested By    JBD        Date    2/16/2012   Checked By    *GEM*        Date    2-16-12

page 1 of 2        DCN: CT-S3C DATE 6-25-98 REVISION: 2        Z:\2012 PROJECTS\2012-627 HDR\2012-627-01-02 SIEVON REV 4 wHeader.xls\Sheet1

### WASH SIEVE ANALYSIS

ASTM D 422-63 (SOP-S3)

Client	HDR ENGINEERING, INC.	Boring No.	CQA#2
Client Reference	FT. BRAGG C&D LF PH2	Depth (ft)	NA
Project No.	2012-627-01	Sample No.	NA
Lab ID	2012-627-01-02	Soil Color	<b>BROWN</b>

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)	653.35	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	601.74	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	173.21	Weight of Tare (gm)	NA
Weight of Water (gm)	51.61	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	428.53	Weight of Dry Soil (gm)	NA
<b>Moisture Content (%)</b>	<b>12.0</b>	<b>Moisture Content (%)</b>	<b>NA</b>

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	428.53
Dry Weight - 3/4" Sample (gm)	246.4	Weight of minus #200 material (gm)	182.13
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	246.40
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	1.52	0.4	0.4	99.6	99.6
#4	4.75	1.64	0.4	0.7	99.3	99.3
#10	2.00	3.55	0.8	1.6	98.4	98.4
#20	0.850	21.24	5.0	6.5	93.5	93.5
#40	0.425	57.56	13.4	20.0	80.0	80.0
#60	0.250	66.77	15.6	35.5	64.5	64.5
#140	0.106	78.05	18.2	53.7	46.3	46.3
#200	0.075	16.07	3.8	57.5	42.5	42.5
Pan	-	182.13	42.5	100.0	-	-

Tested By **JBD** Date **2/16/2012** Checked By **GEM** Date **2-16-12**

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**Attachment D**  
**Certified Survey of Phase II Basegrades**

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