Location: Bulkhead and Morgan Creek Channels are located within Carteret County, North Carolina. Bulkhead Channel is a shallow draft navigation channel that branches off of Morehead City Harbor to east side of Radio Island (Figure A-1). Morgan Creek Channel branches off of Bulkhead Channel in the vicinity of Range 2A (Figure A-2). Bulkhead Channel has a project depth of -15 feet Mean Lower Low Water (MLLW), while Morgan Creek project depth is -14 feet MLLW. The channels have a cumulative length of 2.6 miles which wind around the backbarrier shallow waters between the Town of Beaufort, Radio Island, Carrot Island, and Pivers Island. Two near shore disposal areas that are designated for sandy dredge material are located immediately offshore and adjacent to the Morehead City Harbor ship channel (see Figure A-1).

Background: USACE plans to dredge portions of Bulkhead Channel and Morgan Creek Channel which contain supporting geotechnical soils information, utilizing a government plant in the first quarter of FY2019 (Figure A-2). Historically, USACE dredged Bulkhead Channel with its own fleet and conducted near shore disposal as part of its beneficial use of dredged material initiative. In 2018, Wilmington District conducted a limited environmental assessment of Bulkhead Channel in order to gain formal environmental clearance to dispose of sandy material in the near shore placement area while using a government plant.

The channel segments shown in Figure A-2 were evaluated for the best disposal option, based on existing geotechnical information. Current disposal options include; 1) near-shore placement areas on either side of Morehead City Harbor - Range A; or 2) utilizing an upland disposal area. Material removed from channel segments that do not contain supporting geotechnical data will be designated for upland disposal by default.

<u>Geologic Setting and Stratigraphy:</u> The project site lies within the North Carolina coastal plain, which generally consists of an eastward dipping and thickening sequence of sand, silt, clay and limestone, with varying degrees of consolidation and cementation. Figure A-1 shows geologic exposures in the vicinity of Bulkhead Channel, consisting of surficial Quaternary deposits of sand, clay, gravel and peat, which were deposited originally in marine, fluvial, aeolian, and lacustrine environments (NCGS, 1998).

Subsurface Investigations: USACE re-evaluated vibracore borings that were originally drilled in Bulkhead Channel in 2006 and 2008. USACE has not conducted any additional subsurface exploration in the area. Wilmington District Navigation Section identified areas of active shoaling that regularly impinge upon the project depth in Bulkhead Channel, Ranges 1 and 2 using historical survey and dredging records (Figure A-3). Material that was removed from these areas were placed in near-shore disposal areas due to its high sand content. In 2018, Carteret County contracted a subsurface investigation through Moffatt and Nichol to determine the sediment quality within other in-shoal areas of Bulkhead Channel, namely, Ranges 5, 6 and 7, and Morgan Creek in an effort to incorporate them into the government's upcoming dredging operation. Moffatt and Nichol's subcontractor, Athena Technologies, drilled three vibracores into Bulkhead Channel Ranges 5 to 7, and four vibracores within the southern extent of Morgan Creek; the results of which are included in Attachment 1. The location of all vibracores drilled to date in Bulkhead and Morgan Creek Channels is shown in Figure A-4. Drilling logs and lab data are included in Attachments 1 and 2.

Field Methods: No new fieldwork was conducted by USACE; the only recent fieldwork conducted was commissioned by Carteret County, NC. The field methods employed by the contractor generally involved using a 35-foot research vessel that was immobilized to the seabed using a triple point anchor system. Once on station, the crew geolocated the boring location using Hypack software, and the depth determination and tidal corrections were conducted using a Champion TKO Global Navigation Satellite System. All boring elevations were referenced to MLLW. The crew advanced a 3-inch diameter steel sample barrel through the seabed to termination depth or vibracore refusal. The power to advance the vibracore sampler was applied using a generator with a mechanical vibrating head. Vibracore refusal is defined as penetration of less than 0.1 feet per 10 seconds interval. All of the recently drilled borings penetrated to -17.5 feet, MLLW (project depth is -15 feet, MLLW).

The vibracores were split open, photographed, logged and the soils were visually classified in accordance with the Unified Soil Classification System. Drilling logs were provided to USACE as a professional courtesy. The contractor identified and composited soil samples that lie between the channel bottom and maximum project depth, and sent it off to a third-party lab for gradation and % carbonate testing. A total of seven samples were tested and the results are provided in Attachment 1. Drilling logs and gradation testing from the 2006 and 2008 USACE vibracores are also provided in Attachment 2, for reference.

Evaluation: Bulkhead Channel was evaluated based on a combination of survey and dredging history and vibracore sampling that was historically conducted by USACE, and recently by Carteret County. The evaluation of material quality for near shore placement is constricted to a few areas in Bulkhead and Morgan Creek Channel where natural tidal/current influence causes deposition of sandy shoals which impinge upon the project depth of the navigation channel. Wilmington District, Navigation Section identified two areas in Bulkhead Channel, Ranges 1 and 2, where persistent sedimentation has regularly impinged upon the established project depth (Figure A-3). Because of the historical precedence in dredging material from these areas, and past geotechnical sampling, there is a reasonably high degree of confidence in the material quality present within the present-day shoal formation.

In contrast, Morgan Creek Channel is infrequently dredged by USACE and there is no historical geotechnical data on file to provide insight to the character of sedimentation within Morgan Creek channel. Historical records indicate that the last time Morgan Creek Channel was dredged was in 1999. On April 30, 2013, Wilmington District conducted a before dredge survey but no after dredge survey was conducted. A condition survey taken on October 21, 2013 shows little to no change in the channel bottom, indicating that the planned dredging was canceled for unknown reasons. No other information is known regarding the upper reaches of Morgan Creek Channel.

A total of 13 vibracores spanning 2006 to 2018 were used to evaluate the quality of the shoal material within the sampled channel ranges. The soils that were sampled by the vibracores are summarized in Table 2. Soils that are considered desirable for near shore beneficial use disposal are: SP, SW, SP-SM, SW-SM or SM.

Doring ID	Drilling Agonor	Boring	Predominant Material	USCS	%	% Sand	%
bornig ID	Drining Agency	Туре		USCS	Graver	Sanu	rmes
MHC-06-		.1	Fine-medium poorly graded	GD	0		0.1
29	USACE	vibracore	sand	SP	0	> 99.0	< 0.1
MHC-06-			Fine-medium poorly graded				
30	USACE	vibracore	sand	SP	2	> 98.0	< 0.1
MHC-08-			Fine-medium poorly graded				
V-62	USACE	vibracore	sand	SP	< 2	> 97.0	0.6
MHC-08-							
V-63	USACE	vibracore	Fine poorly-graded sand	SP	0	99.0	< 1.0
MHC-08-							
V-64	USACE	vibracore	Fine poorly-graded sand	SP	0	99.0	1.0
MHC-08-							
V-65	USACE	vibracore	Fine poorly-graded sand	SP	< 0.1	99.0	1.0
			Fine-medium poorly-graded				
BHC-01	Athena Technologies	vibracore	sand	SP	0.18	98.51	1.31
			Fine poorly-graded sand and				
BHC-02	Athena Technologies	vibracore	silty fine sand	SP-SM	0.00	92.55	7.45
BHC-03	Athena Technologies	vibracore	Fine poorly-graded sand	SP	0.00	98.38	1.62
MC-01	Athena Technologies	vibracore	Fine poorly-graded sand	SP	1.21	97.52	1.27
			Fine-medium poorly-graded				
MC-02	Athena Technologies	vibracore	Sand	SP	0.08	97.40	2.52
MC-03	Athena Technologies	vibracore	Fine poorly-graded sand	SP	0.01	97.21	2.78
MC-04	Athena Technologies	vibracore	Fine poorly-graded sand	SP	2.08	95.90	2.02

Table 1. Geotechnical Data Summary, Bulkhead & Morgan Creek Channel Borings

Refer to Figure A-5 and Table 1. The amount of shoaling present within Bulkhead Channel Ranges 1 and 2 is relatively small as shown by the color-coded bathymetry. Ranges 1 and 2 lie west of a perpetual sand shoal located offshore of Carrot Island, and east of a stone jetty that protects the shoreline of Radio Island, making them ideal sediment traps. The geotechnical data indicates that accumulated shoal material consists of clean, fine to medium-grained poorly graded sand (SP). This material was is thought to be derived from Carrot Island and its perpetual offshore sand shoal. It is considered likely that future material accumulation will consist of similar sandy material. With exception to the two shoaling areas in Ranges 1 and 2 (Figure A-5), most of the channel bottom of Bulkhead Channel lie at or below the project depth of -15 feet MLLW, and should not require maintenance dredging. Historical records indicate that the proposed channel widener in Range 1 has been previously dredged to project depth several times. Based upon its dredging record and down drift proximity to Carrot Island and Bulkhead Channel, Range 1, dredged material from the proposed widener can be designated for near shore placement.

Bulkhead Channel Ranges 4 through 6 are not usually dredged, however; historical records indicate the last dredging activity conducted was in 2003. A limited amount of shoaling is shown on the color contoured bathymetry map in Figure A-5. Three borings were drilled by Athena Technologies, which penetrated and sampled these shoals (see Table 1 and Attachment 1). BHC-01 and BHC-03 indicate that the accumulated material is composed of predominantly fine-grained, poorly graded sand (SP), with some fine silty sand (SM) at -14.2 feet MLLW in BHC-02. Gradational soils testing indicates that the overlying strata is predominantly sandy and is

suitable for beach disposal. However, there is no historical data (dredging record or geotechnical sampling) to provide a trend assessment of what future in-shoal material would be in these channel segments. Source material for in-shoal material may be a sand dominated island, or alternatively a nearby mud flat or sub-aerially exposed mud bed. Beyond the shoal areas color contoured light blue to light green (Figure A-5), there is little active accumulation. Much of the channel bottom lies at or below the project depth of -14 feet MLLW.

Most of Morgan Creek Channel has significant shoal accumulation above -12 feet MLLW (Figure A-5). Borings that were drilled by Athena Technologies only sampled the shoal material that lies within Range 1. The sampled shoal material consists of fine-grained poorly graded sand with lenses of fine poorly graded sand with silt (SP-SM). Due to the lack of borings in Ranges 2 and 3, no characterization can be made. Material dredged from these ranges should only be disposed of in an upland site, until additional sampling can verify material suitability.

Recommendations:

- 1. Accumulated shoal material found within Bulkhead Channel Ranges 1 (vicinity Sta. 14+50 to Sta. 26+00) and 2 (vicinity Sta. 2+50 to Sta. 9+00) to include the proposed widener may be utilized for near shore placement indefinitely, barring a major ecological or physical change in the coastal system.
- 2. Accumulated shoal material within the confines of the navigation channel, in Bulkhead Channel Ranges 4, 5, and 6 may be utilized for a one-time near shore disposal. Future beneficial use determination and disposal practices must be augmented by vibracore sampling to verify material quality in order to establish a predictive sedimentation trend.
- 3. Accumulated shoal material from Morgan Creek Channel, Range 1 may be used for a one-time near shore disposal. Future beneficial use determination and disposal practices must be augmented by vibracore sampling to verify material quality in order to establish a predictive sedimentation trend.
- 4. The sediment characteristics of Morgan Creek Channel, Ranges 2 and 3 remain unknown. Until additional sampling in these ranges is conducted, any dredged material from these ranges should be disposed of in an upland site.
- 5. Channel segments that do not have supporting geotechnical soils information that characterizes the shoal material to be removed by dredging, is to be disposed of in an upland disposal site.

Reference Cited:

The North Carolina Dept. of Environment, Health, and Natural Resources, Division of Land Resources, NC Geological Survey, in cooperation with the NC Center for Geographic Information and Analysis, 1998 (updated 2007), Geology - North Carolina (1:250,000), coverage data file geol250.





4,000 6,000 Figure A-2. Bulkhead Channel and Morgan's Creek Channel

Ranges Subject to USACE **Government Plant Dredging**





Figure A-4. Bulkhead and Morgan's Creek Channel **Geotechnical Boring Locations** vs. Historical Dredging Areas

Legend

Geotechnical Borings Year Drilled/Drilling Agency **2006-USACE** \bigcirc 2008-USACE • 2018-Athena Technologies **Navigation Channel** Channels outside project area **Bulkhead & Morgan's Creek Channels**

Authourized Channel Limits

Historical Dredging Areas by Government Plant





Historical High Shoaling & Dredging Areas Remainder of channel segments are typically at project depth.

2,000 Feet



Figure A-5. Bulkhead and Morgan's Creek Channel Geotechnical Boring Locations and Bathymetric Surveys

Legend **Geotechnical Borings** Year Drilled/Drilling Agency **2006-USACE** 2008-USACE • 2018-Athena Technologies **Navigation Channel Bulkhead & Morgan's Creek Channels** Authorized Channel Limits **Bathymetric Condition Survey 20180522** Depth In Feet 4 and Shallower 6 - 4 7 - 6 8 - 7 10 - 8 **Bulkhead Channel** Project Depth -15 MLLW 12 - 10 14 - 12 Morgan's Creek Channel 15 - 14 Project Depth -14 MLLW

15 and Deeper



ATTACHMENT 1 TO GEOTECHNICAL APPENDIX ATHENA TECHNOLOGIES FIELD REPORT OF FINDINGS BULKHEAD CHANNEL AND MORGAN CREEK FOR MOFFITT & NICHOL, LLC



16 April 2018

Mr. Robert Neal Moffatt & Nichol 272 N. Front Street, Suite 204 Wilmington, NC 28401

RE: Geotechnical Data Summary Bulkhead Channel and Morgan Creek Carteret County Navigation Project North Carolina

Dear Mr. Neal,

Athena Technologies, Inc. is pleased to submit this Preliminary Data Summary for the abovementioned project areas. Should you have any questions or concerns regarding the attached data summary, please don't hesitate to contact me via the information below.

Respectfully,

in Freeze

J. Adam Freeze Vice President / Geologist





GEOTECHNICAL DATA SUMMARY

BULKHEAD CHANNEL AND MORGAN CREEK CARTERET COUNTY NAVIGATION PROJECT NORTH CAROLINA

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APPENDICES

- Appendix A: Core Photographs and Logs
- Appendix B: Laboratory Analytical Reports Physical Analyses



		HORIZONTAL AND V BULKHEAD CHAN	TABLE 1 ERTICAL DATA CONV INEL AND MORGAN C	/ERSION SUMMARY REEK CHANNEL		
	Data	Conversion Input Paramete	rs ^[1]	Data	a Conversion Output Parame	ters
Boring ID	State Plane C	oordinates ^[2]	Elevation ^[3]	Geographic	Coordinates	Elevation
	East (x)	North (y)	(NAVD 88)	Latitude	Longitude	(MLLW)
BHC-01	2,699,976.13	361,294.74	1.19	34.7201236	-76.6703167	3.24
BHC-02	2,700,053.30	360,461.41	1.23	34.7178283	-76.6701271	3.31
BHC-03	2,700,073.21	359,890.95	1.06	34.7162457	-76.6701178	3.16
MC-01	2,697,688.84	359,160.59	0.85	34.7144471	-76.6780866	2.99
MC-02	2,697,647.45	359,401.03	0.32	34.7151335	-76.6782540	2.46
MC-03	2,697,654.27	359,655.53	1.12	34.7157788	-76.6781633	3.26
MC-04	2,697,874.49	359,238.35	-0.84	34.7146488	-76.6774597	1.30
	^[1] = Coordinate and elevation conv	version conducted via the National (Oceanic and Atmospheric Administ	ration's (NOAA) Vertical Datum Tra	ansformation (VDatum) software, Ve	ersion 3.6.1.
	^[2] = Horizontal coordinates were re	ecorded in the field and are reference	ced to North American Datum of 19	83, State Plane Coordinate Syster	n, North Carolina (Zone 3200), US S	Survey Feet.
Notes	^[3] = Elevation data were recorded	in the field using a Champion TKO	Global Navigation Satellite System	unit interfaced with the North Carc	lina Continuously Operating Refere	nce Station (CORS) Network.
	NAVD 88 = North American Vertica	al Datum of 1988				
	MLLW = Mean Lower Low Water					



1293 Graham Farm Road, PO Box 68 McClellanville, South Carolina 29458 (843) 887-3800 www.athenatechnologies.com

						TABLE 2					
				GEO	FECHNICA	L VIBRACC		IARY			
			В	ULKHEAD	CHANNEL	AND MORO	GAN CREE		EL		
Boring ID	Collection	Timo	Coordir	nates ^[1]	Tide	Water Depth	Sediment Surface	Bottom Elevation of	Penetration	Recovery	Notos
Bonng ib	Date	Time	East (x)	North (y)	(ft MLLW)	(ft)	Elevation (ft MLLW)	Core (ft MLLW)	(ft)	(ft)	Notes
BHC-01	3/22/2018	11:47	2,699,976.13	361,294.74	3.24	13.2	-9.9	-18.4	9.0	8.5	
BHC-02	3/22/2018	12:42	2,700,053.30	360,461.41	3.31	14.8	-11.5	-18.8	8.0	7.3	Moved location to edge of channel to reach shallower water.
BHC-03	3/22/2018	13:20	2,700,073.21	359,890.95	3.16	14.3	-11.2	-18.8	8.5	7.7	
MC-01	3/22/2018	10:52	2,697,688.84	359,160.59	2.99	15.5	-12.5	-20.1	8.5	7.6	
MC-02	3/22/2018	9:43	2,697,647.45	359,401.03	2.46	7.1	-4.6	-18.7	15.0	14.1	
MC-03	3/22/2018	11:17	2,697,654.27	359,655.53	3.26	10.7	-7.4	-20.2	14.0	12.8	
MC-04	3/22/2018	8:11	2,697,874.49	359,238.35	1.30	10.2	-8.9	-18.8	11.0	9.9	
	^[1] = Coordinat	es were recor	ded in North Ame	rican Datum of ²	1983, State Pla	ne Coordinate	System, Nort	n Carolina (Zor	ne 3200), US S	urvey Feet.	
Notes	^[2] = Elevation (CORS) Netwo	data were rec ork.	orded in the field	using a Champio	on TKO Global	Navigation Sat	ellite System	unit interfaced	with the North	Carolina Conti	nuously Operating Reference Station
	ft = feet										
	MLLW = Mear	Lower Low V	Vater								



		BULI	SUMMARY OI KHEAD CHANNE	TABLE 3 F PHYSICAL PAR L AND MORGAN	AMETERS CREEK CHANNE	EL		
Boring ID	Sample ID	Sample (ft bss)	Interval (ft MLLW)	Laboratory USCS Classification	Percent Gravel-Size Fraction ^[1]	Percent Sand-Size Fraction ^[2]	Percent Fine-Grained Fraction ^[3]	Percent Carbonate ^[4]
BHC-01-0318	C2	0 to 7.6	-9.9 to -17.5	SP	0.18	98.51	1.31	7.1
BHC-02-0318	C2	0 to 6.0	-11.5 to -17.5	SP-SM	0.00	92.55	7.45	3.9
BHC-03-0318	C2	0 to 6.3	-11.2 to -17.5	SP	0.00	98.38	1.62	3.8
MC-01-0318	C1	0 to 5.0	-12.5 to -17.5	SP	1.21	97.52	1.27	11.7
MC-02-0318	C2	0 to 12.9	-4.6 to -17.5	SP	0.08	97.40	2.52	7.6
MC-03-0318	C1	0 to 10.1	-7.4 to -17.5	SP	0.01	97.21	2.78	4.7
MC-04-0318	C2	0 to 8 6	-8.9 to -17.5	SP	2 08	95.90	2.02	12 1

Notes

NOLES	
ft bss	= feet below sediment surface
ft MLLW	= feet relative to mean lower low water
USCS	= Unified Soil Classification System
[1]	= Defined as the sample fraction which is retained on the Number 4 sieve (i.e., greater than 4.75 millimeters).
[2]	= Defined as the sample fraction that is retained on various sieves between the Number 4 and Number 200 sieves (i.e., size between 4.75 and 0.074 millimeters, respectively).
[3]	= Defined as the sample fraction which passes the Number 200 sieve (i.e., less than 0.074 millimeters).
[4]	= Percent carbonate determined using the Twenhofel and Tyler acid digestion method (1941).
С	= composite sample



Appendix A: Core Photographs and Logs





BHC-01

Bulkhead Channel, Carteret County Navigation Project, North Carolina

Moffatt & Nichol, Inc.

Notes: Scale in Feet Photo Mosaic Image



Boring Designation BHC-01

				-				0.155			
DRI	LLING	LOG	Moff	att & Nich	ol		PR	OJEC Carte	ret Co	NNER SHEET 1 County. North Carolina OF 1 SHE	EETS
1. PRO	JECT				-		9.	SIZE	AND	DTYPE OF BIT 3.0 In.	
С	Carteret Cou	unty Se	ediment Pro	ject			10	. co	ORDI	INATE SYSTEM/DATUM HORIZONTAL VERTICAL	
С	Carteret Cou	unty, N	orth Carolin	a				Ν	IC Sta	tate Plane NAD 1983 MLLW	
2. BOR	ING DESIGN	ATION		LOCATION	I COORD	INATES	11.	. MA	NUFA	ACTURER'S DESIGNATION OF DRILL 🛛 AUTO HAMME	ER
В	BHC-01			X = 2,69	99,976	Y = 361,295				MANUAL HAN	IMER
3. DRIL	LING AGEN	CY			CONTR	ACTOR FILE NO.	12	то	ται s	DISTURBED UNDISTURBED	D (UD)
A	thena Tech	nologi	es, Inc.				<u> </u>			1	
4. NAM		ER					13	. то	TAL N	NUMBER CORE BOXES	
P	² . McClellan						14	. WA	TER D	DEPTH 13.2 Ft.	
	VERTICAL	BORING	3	VERTICA			15	. DA	ГЕ ВО	ORING STARTED COMPLETED 03-22-18 11:47 03-22-18	
6. ТНІС	KNESS OF	OVERB	BURDEN	0.0 Ft.		•	16	. ELE	VATI	-9.9 Ft.	
7. DEP	TH DRILLED	інто	ROCK	0.0 Ft.			17.	. то	TAL R	RECOVERY FOR BORING 8.5 Ft.	
в. тот	AL DEPTH O	F BOR	ING 9.() Ft.			18	. SIG	NATU Ere		
ELEV. (ft)	SCALE (ft)	LEGEND	Ci Depths an	LASSIFICA d elevatior	TION OF	MATERIALS on measured value	es	REC.	BOX OR SAMPLE	REMARKS	
	-		Fine sand-s layers occas	quartz SAI sized shell), trace org ional burro	ND, trac (primari ganic and ow, poor	e fine to coarse ily in thin [<0.1'] d inorganic silt in ly graded, loose,					
-12.9	- 3.0		subrour Fine to	nded, light	brownis (SP).	h gray (2.5Y-6/2),				Sample #C2, Depth = 7.6'	
-14.1	- 4.2		coarse s laminatior silt ri	and-sized is (primaril p-up at 3.4	shell, tra ly betwe 4', poorly	ace inorganic silt in en 3.0-3.4'), organ graded, loose,	ic		C2	Mean (mm): 0.33, Phi Sorting: 0.73 Carbonate: 7.1%, Fines (#200) - 1.31 (SP)	
16.1	- 62		Fine, gra few fir inorganic poorly	brounded, ding to fin- ne to coars and orgar y graded, l (5Y	gray (5 e to mec se sand-s nic silt in oose, su (-5/1), (5	Y-5/1), (SP). lium, quartz SAND sized shell, trace occasional burrow ibrounded, gray SP).	, , ,				
-10.1	-		Fine to coarse s matrix gravel-size loose, se	o medium and-sized and burro ed charcoa ubroundec	quartz S shell, tra ws, woo al clast a I (Bordel	AND, few fine to ace inorganic silt in d debris and fine t 6.9', poorly grade fine SP-SM), dark	d			4	
-18.0	- 8.1			gray (5Y-4/1),	(SP)					
-18.4	- 8.5	••••	Fine c occas sand su	uartz SAN sional burr -sized she brounded,	ND, trace row, trac II, poorly gray (5)	e inorganic silt in e fine to coarse / graded, loose, Y-5/1), (SP).	ſ				
	_			En	d of Bor	ing					
	-										
	-										
	-										



BHC-02

Bulkhead Channel, Carteret County Navigation Project, North Carolina

Moffatt & Nichol, Inc.

Notes: Scale in Feet Photo Mosaic Image



Boring Designation BHC-02

			CLIENT				DD	O.IEC		NFR		SHEET 4
DRI	LLING	LOG	Moff	att & Nicho	bl		PR	Carte	ret Co	ounty, North Card	lina	OF 1 SHEETS
1. PROJ	IECT						9.	SIZE	AND	TYPE OF BIT	3.0 ln.	
С	arteret Cou	unty Se	ediment Proj	ject			10.	. co	ORDIN	NATE SYSTEM/DA		L VERTICAL
C	arteret Cou	unty, N	orth Carolin	а				Ν	IC Sta	ate Plane	NAD 198	3 MLLW
2. BORI	NG DESIGN	IATION	•	LOCATION	COORD		11.	. MA	NUFA	CTURER'S DESIG	NATION OF DRILL	
3 DRII	HC-02	CY	!	X = 2,70	0,053	Y = 360,461	├				DISTURBED	
J. DRIL	thena Tech	nologi	es Inc		CONTR	ACTOR FILE NO.	12.	. то	TAL S	AMPLES		(OD)
4. NAMI	E OF DRILL	ER					13.	. то	TAL N	UMBER CORE BO	XES	
P	. McClellan	I					44		TED		14.0 5+	
5. DIRE		BORING	3	DEG. FRO	M	BEARING	 14 .			PP I H	I4.0 FL	
	NCLINED						15.	DA	ГЕ ВО	RING	03-22-18 12:42	2 03-22-18
6. THIC	KNESS OF	OVERE	BURDEN	0 0 Ft		•	16.	ELE	VATI	ON TOP OF BORI	IG -11.5 Ft	
							17	то			PING 73 Et	
7. DEPT	'H DRILLED	ΙΝΤΟ	ROCK	0.0 Ft.			18	SIG	NATL	IRE AND TITLE OF		
в. тота	L DEPTH O	F BOR	ING 8.() Ft.				A	. Free	eze		
ELEV. (ft) -11.5	SCALE (ft)	LEGEND	CL Depths and	ASSIFICAT	FION OF s based	MATERIALS on measured value	es	REC.	BOX OR SAMPLE		REMARKS	
-13.2	1.7		Fine quar and burro shell, po	tz SAND, t ows, trace orly graded gray (t	fine to r fine to r d, loose, 5Y-5/2), race inc	organic silt in matri nedium sand-sized subrounded, olive (SP). rganic silt in matri	x I					
			poorly	graded, loo	ose, sub	rounded, heavily	~,			Sample #C2, D	epth = 6.0'	
-14.0	2.5	•••	biotu	irbated, da	rk gray	(5Y-4/1), (SP).				Mean (mm): 0.	15, Phi Sorting: 0.46	3
-14 7	- 32	· · · ·	burrows, p	poorly grad	ed, loos	e, subrounded, gra	ay		8	Carbonate: 3.9	%, Fines (#200) - 7.	45 (SP-SM)
		<u>ttt</u>	\	(5Y-	-5/1), (S	SP).	_/		-			
-			Silty, fin matrix, sand-siz 6.3', clay subrounde	e quartz S lamination red shell, o r rip-ups at ed, heavily (5Y-	AND, lit s and b rganic s 7.1', po bioturba -3/1), (S	tle inorganic silt in urrows, trace fine ilt rip-ups at 5.8' & iorly graded, loose, ated, very dark gra M).	ıy					
-18.8	7.3						_					
-				End	d of Bor	ing						
	_											
ľ	-											
ŀ												
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ŀ												
┝												



BHC-03

Bulkhead Channel, Carteret County Navigation Project, North Carolina

Moffatt & Nichol, Inc.

Notes: Scale in Feet Photo Mosaic Image



Boring Designation BHC-03

			CLIENT				PR	OJEC	TOW	NER	SHEET 1
		200	Moff	att & Nicho	ol		<u> </u>	Carte	ret C	ounty, North Carolina	OF 1 SHEETS
1.	Carteret Cou	intv S4	ediment Proi	iect			9.	SIZE	AND	TYPE OF BIT 3.0 ln.	
	Carteret Cou	intv N	lorth Carolin	a			10.	. CO		NATE SYSTEM/DATUM HORIZONTAL	
2.	BORING DESIGN				I COORD	INATES	11.	. MA	NUFA		
	BHC-03			X = 2,70	0,073	Y = 359,891					MANUAL HAMMER
3.	DRILLING AGEN	CY	•		CONTR	ACTOR FILE NO.	12	. то	TAL S		NDISTURBED (UD)
4	Athena Tech	nologi	ies, Inc.				┣	_	_		
4.	P McClellan						13.	. то	TAL N	IUMBER CORE BOXES	
5.	DIRECTION OF E	BORIN	G	DEG. FRO	рм	BEARING	14.	. WA	TER	DEPTH 14.3 Ft.	
	VERTICAL			VERTICA	L		15.	. DA	TE BO	STARTED C 03-22-18 13:20	03-22-18
6.	THICKNESS OF	OVER	BURDEN	0.0 Ft.			16.	. ELI	EVATI	ON TOP OF BORING -11.2 Ft.	
7.	DEPTH DRILLED	інто	ROCK (0.0 Ft.			17.	. то	TAL R	RECOVERY FOR BORING 7.6 Ft.	
8.	TOTAL DEPTH O	F BOR	RING 8.5	5 Ft.			18.	. sig	NATU Fre	JRE AND TITLE OF INSPECTOR	
EL (1	EV. SCALE (ft) (ft)	LEGEND	CL Depths and	ASSIFICA d elevation	TION OF	MATERIALS on measured value	es	, REC.	BOX OR SAMPLE	REMARKS	
1	- - - 8.8 7.6		Fine c occas sand-siz 2.2', 3.2', subrounde li	juartz SAN ional burro zed shell, t 4.6', 6.8', ed, color g ight olive g	ID, trace ow and r trace org & 7.0', p rades to gray (5Y-	inorganic silt in ip-up, trace fine anic silt rip-ups at orly graded, loose gray (5Y 5/1) from 6/2), (SP).	2 , 1,		C2	Sample #C2, Depth = 6.3' Mean (mm): 0.20, Phi Sorting: 0.49 Carbonate: 3.8%, Fines (#200) - 1.62 (- SP) - -
	-			En	d of Bori	ng					-
SA JUN	J FORM 183	6	MODIFIE	D FOR	THE F	LORIDA DEP					



MC-01

Morgan Creek, Carteret County Navigation Project, North Carolina

Moffatt & Nichol, Inc.

Notes: Scale in Feet Photo Mosaic Image



Boring Designation MC-01

							1					
DR	ILLING	LOG	CLIENT	att & Nich	ol		PR	ojec Carte	τ ow ret Ca	NER ounty, North Caro	lina	SHEET 1 OF 1 SHEFTS
1. PRC	JECT						9.	SIZE	AND	TYPE OF BIT	3.0 ln.	C OILEIG
(Carteret Cou	inty Se	ediment Proj	ect			10.	. co	ORDI	NATE SYSTEM/DAT		L VERTICAL
(Carteret Cou	inty, N	orth Carolin	а				Ν	IC Sta	ate Plane	NAD 1983	B MLLW
2. BOF	RING DESIGN		•	LOCATION	COORD	INATES	11.	. MA	NUFA	CTURER'S DESIGN	ATION OF DRILL	AUTO HAMMER
	MC-01			X = 2,69	7,689	Y = 359,161					[MANUAL HAMMER
3. DRI		CY			CONTR	ACTOR FILE NO.	12.	. то	TAL S	AMPLES	DISTURBED	UNDISTURBED (UD)
4 NA	Athena Tech	inologi	es, Inc.		!		├				<u>1</u>	!
4. NAN	P McClellan	ER					13.	. то	TAL N	UMBER CORE BO	(ES	
5. DIR		BORING	G	DEG. FRO	DM	BEARING	14.	. WA	TER	DEPTH	15.5 Ft.	
	VERTICAL			VERTICA	L		15.	. DA	ГЕ ВО	RING	STARTED	COMPLETED
<u>6.</u> тні	CKNESS OF	OVERE	BURDEN	: 0 0 Ft		:	16.	ELE	VATI	ON TOP OF BORIN	G -12.5 Ft	05-22-10
7 DER		INTO	ROCK (0 Et			17.	. то	TAL R	ECOVERY FOR BO	RING 7.6 Ft.	
7. DEP				J.U FL.			18.	. SIG	NATU	JRE AND TITLE OF	INSPECTOR	
8. TO1	TAL DEPTH O		ING 8.5	5 Ft.			L	Α	. Fre	eze		
ELEV. (ft) -12.5	SCALE (ft) 0.0	LEGEND	CL Depths and	ASSIFICA d elevation	TION OF Is based	MATERIALS	es	REC.	BOX OR SAMPLE		REMARKS	
	-		Fine sand- occasi sul	quartz SA -sized she ional burro brounded,	ND, few II, trace w, poor gray (5	v fine to coarse inorganic silt in ly graded, loose, Y-5/1), (SP).				Sample #C1, D Mean (mm): 0.2	epth = 5.0' 26, Phi Sorting: 0.97	97 (97)
-15.0	- 4.4		Fine of sand-sized trace co (primarily sul	quartz SAI d shell, tra parse sanc in layer at brounded,	ND, few ice inorg d to fine : 3.8'), p gray (5'	fine to medium ganic silt in burrows gravel-sized shell oorly graded, loose Y-5/1), (SP).	; ,		C1	Carbonate: 11.7	7%, Fines (#200) - 1	.27 (SP) -
-17.5	5.0	· · · · ·	Fine qua gravel-siz poorly g	artz SAND ed shell, tr raded, me gray (s), little fin race ino edium de 5Y-5/1),	ne sand to coarse rganic silt in matrix ense, subrounded, , (SP).	, 					-
20.1	- 76		Fine quart in laminat sand- sul	z SAND, t ions at 6.4 -sized she brounded,	race inc I-6.6'), ti II, poorly gray (5'	organic silt (primaril race fine to mediun / graded, loose, Y-6/1), (SP).	y n					-
-20.1	-			En	d of Bor	ing						-
	-											-
	-											-
	-											-
SAJ F	ORM 183	6		D FOR	THE F	LORIDA DEP						



MC-02

Morgan Creek, Carteret County Navigation Project, North Carolina

Moffatt & Nichol, Inc.

Notes: Scale in Feet Photo Mosaic Image



Boring Designation MC-02

	100	CLIENT			PROJ	IECT	ow	WNER SHEET 1	
	LUG	Moffatt & Nic	chol		Ca	artere	et Co	County, North Carolina OF 1 SHEET	s
Carteret Co	intv Sed	liment Project			9. S	IZE A	AND	D TYPE OF BIT 3.0 In.	
Carteret Cou	inty Seu	rth Carolina			10. (נססו אור	RDII		
2. BORING DESIGN	IATION	LOCATIO	ON COORD	DINATES	11.	MAN	UFA	ACTURER'S DESIGNATION OF DRILL AUTO HAMMER	
MC-02		X = 2,0	697,647	Y = 359,401					R
3. DRILLING AGEN	CY		CONTR	RACTOR FILE NO.	12.	тоти	AL S	DISTURBED UNDISTURBED (U	D)
Athena Tech	nologies	s, Inc.						<u>i 1 i</u>	_
P. McClellan					13.	тоти	AL N	NUMBER CORE BOXES	_
5. DIRECTION OF E	BORING	DEG. F	ROM	BEARING	14. 1	WAT	ER	7.1 Ft.	_
		VERTR	JAL		15. 1	DATE	Е ВО	ORING 03-22-18 09:43 03-22-18	
6. THICKNESS OF	OVERBU	JRDEN 0.0 Ft.		•	16.	ELEV		TION TOP OF BORING -4.6 Ft	
					17.	тоти	AL R	RECOVERY FOR BORING 14 1 Ft	
		U.U F[.			18.	SIGN	ΑΤΙ	FURE AND TITLE OF INSPECTOR	
3. TOTAL DEPTH O	F BORIN	NG 15.0 Ft.				A.	Fre	eeze	
ELEV. SCALE (ft) -4.6 0.0	LEGEND	CLASSIFIC Depths and elevati	ATION OF	MATERIALS I on measured value	s RE	د.	BOX OR SAMPLE	REMARKS	
- - 		Fine to mediun coarse sand-size burrows, poorly gr (5Y 5/1) and,	n quartz S ed shell, tr aded, loos olive gray	SAND, few fine to ace inorganic silt in se, subrounded, gra ((5Y-5/2), (SP).	у				
-13.7 - 9.1		Fine quartz S/ burrows, laminatio sand-sized shell, poorly graded (5	AND, trace ons, and fl , notable s , loose, su 5Y-5/1), (\$	e inorganic silt in aser beds, trace fin silt layer at 4.1-4.2', ubrounded, gray SP).	e		C2	Sample #C2, Depth = 12.9' Mean (mm): 0.21, Phi Sorting: 0.77 Carbonate: 7.6%, Fines (#200) - 2.52 (SP)	
		Fine quartz S	AND, trac	e fine to coarse					
-	•••••	laminations betwe	en 10.2-1	0.3'), poorly graded	l,				
-15.3 10.7		loose, subrou	nded, gray	y (5Y-6/1), (SP).					
-16.6 12.0		Fine quartz SA laminations and b sand-sized shell, poorly graded (5 Fine to medium q	AND, trace burrows, tr bidirectior l, loose, su 5Y-5/1), (S uartz SAN	e inorganic silt in race fine to medium nal bedding at 11.5' ubrounded, gray SP). ID, little fine sand to	, , ,				
		sand, poorly grave	ea sneii, i ded, loose	race coarse quartz , subrounded. arav					
-17.9 13.3	••••	(5	5Y-6/1), (S	SP).					
-18.7 - 14.1		Fine quartz S sand-sized shell, poorly graded (5	AND, trac trace inor l, loose, su 5Y-6/1), (\$	e fine to coarse rganic silt in matrix, ubrounded, gray SP).					
AJ FORM 183	6 M			LORIDA DEP				<u> </u>	



MC-03

Morgan Creek, Carteret County Navigation Project, North Carolina

Moffatt & Nichol, Inc.

Notes: Scale in Feet Photo Mosaic Image



Boring Designation MC-03

			CLIENT			PR	OJEC	TOW	NER			SHEET 1
DR	ILLING	LOG	Moff	att & Nichol			Carte	ret C	ounty, North Caro	lina		OF 1 SHEETS
1. PRO	JECT					9.	SIZE		TYPE OF BIT	3.0 ln.		
(Carteret Cou	inty Se	ediment Proj	ject		10.	CO	ORDI	NATE SYSTEM/DAT	TUM HOR	ZONTAL	VERTICAL
	Carteret Col	inty, N	orth Carolin				N	IC St	ate Plane		AD 1983	MLLW
2. BOR	MC-03	ATION		X = 2.697.654	Y = 359.656	111.	WA	NUFA	CTURER'S DESIG	NATION OF D		AUTO HAMMER
. DRI	LLING AGEN	CY		CONTR	ACTOR FILE NO.	┢				DISTURBED	, _	UNDISTURBED (UD)
A	Athena Tech	inologi	es, Inc.			12.	то	TAL S	AMPLES	1		
4. NAN	IE OF DRILL	ER				13.	то		IUMBER CORE BO	KES		
F	P. McClellan			·	1	14.	WA	TER I	DEPTH	10.7	Ft.	
5. DIRI	ECTION OF E VERTICAL INCLINED	BORING	3	DEG. FROM VERTICAL	BEARING	15.	DA	те вс	RING	STARTED 03-22-18	3 11:17	COMPLETED 03-22-18
6. THI	CKNESS OF	OVERB	URDEN	0.0 Ft.	•	16.	ELE	EVAT	ON TOP OF BORIN	IG -7.4 F		
7. DFP		ΙΝΤΟ	ROCK (17.	то	TAL R	ECOVERY FOR BO	RING 12	2.6 Ft.	
				0.011.		18.	SIG	NATI	JRE AND TITLE OF	INSPECTOR		
в. тот	AL DEPTH O	F BOR	ING 14	.0 Ft.			Α	. Fre	eze			
ELEV. (ft) -7.4	SCALE (ft) 0.0	LEGEND	CL Depths and	ASSIFICATION OF d elevations based	MATERIALS on measured value	es I	REC.	BOX OR SAMPLE		REM	ARKS	
-14.9	- - - - 7.5		Fine of sand-size lamination 3.2', num poorly	quartz SAND, trac d shell, trace inorg n, and flaser beds, iber of burrows ind y graded, loose, su (5Y-5/1), (S	e fine to coarse ganic silt in burrows organic silt rip-up creases with depth ubrounded, gray SP).	s, at ,		G	Sample #C1, D Mean (mm): 0. Carbonate: 4.7'	epth = 10.1' 19, Phi Sortir %, Fines (#20	ng: 0.59 00) - 2.78	(SP)
-17.2	- 9.8		Fine quar laminatior shell, hea subrou	rtz SAND, few inor ns, and burrows, tr avily bioturbated, po nded, dark gray (5	rganic silt in matrix race fine sand-size oorly graded, loose Y-4/1), (SP-SM).	, d ,						
-20 0	- 126		Fine to coarse s su	o medium quartz S and-sized shell, po brounded, gray (51	AND, few fine to orly graded, loose, Y-6/1), (SP).							
-20.0	-	••		End of Dori	ing							
		ı I				- I.						



MC-04

Morgan Creek, Carteret County Navigation Project, North Carolina

Moffatt & Nichol, Inc.

Notes: Scale in Feet Photo Mosaic Image



Boring Designation MC-04

			CI IENT			PP4	OJEC	TOW	NER			C L	EET 1
DRI	LLING	LOG	i Moffatt 8	& Nichol			Carte	ret Co	ounty, North Card	olina		0	F 1 SHEETS
. PRO	JECT					9.	SIZE	AND	TYPE OF BIT	3.0 Ir	1.		
C	Carteret Cou	inty Se	diment Project			10.	co	ORDI	NATE SYSTEM/DA	тим	HORIZONTAL	VE	RTICAL
C	Carteret Cou	inty, N	orth Carolina				N	IC Sta	ate Plane		NAD 1983		MLLW
. BOR		ATION	LOC	ATION COORD	INATES	11.	MA	NUFA	CTURER'S DESIG	NATION			
	IING AGEN	CY		= 2,097,874	Y = 359,238					DIST			
Α	Athena Tech	noloai	es. Inc.			12.	TO	TAL S	AMPLES	1	KBEB		
I. NAM	E OF DRILL	ER	,	i		13.	то	TAL N	IUMBER CORE BO	XES			
F	P. McClellan					14	WA	TED			10.2 Et		
	ECTION OF E	BORING	DE VE	G. FROM	BEARING	<u> </u>				STAR		COMP	
	INCLINED					15.	DA	ГЕ ВО	RING	03-	22-18 08:11	03-	22-18
6. тніс	CKNESS OF	OVERE	URDEN 0.(0 Ft.		16.	ELE	VATI	ON TOP OF BORI	NG	-8.9 Ft.		
						17.	то	TAL R	ECOVERY FOR BO	DRING	10 Ft		
. DEP				Ft.		18.	SIG	NATU	JRE AND TITLE O	F INSPE	CTOR		
в. тот	AL DEPTH O	F BOR	ING 11.0 F	⁻ t			A	. Fre	eze				
ELEV. (ft) -8.9	SCALE (ft) 0.0	LEGEND	CLASS Depths and ele	SIFICATION OF evations based	[;] MATERIALS I on measured value	es I	REC.	BOX OR SAMPLE			REMARKS		
		••••	Fine qua	artz SAND, few	v fine to coarse								
-9.7	0.8	••••		d, light olive gr	ay (5Y-6/2), (SP).								
	F	•••	Fine quart	tz SAND, trace	inorganic silt in matrix trace fine to	,							
			coarse sand	-sized shell, po	oorly graded, loose.								
-10.9	2.0		subrounde	d, dark gray (5 (5 Y-5/1) (5	5Y 4/1) and, gray	А							
			Fine quart	z SAND, trace	fine sand to fine	-							
10.4		•••••	gravel-siz	ed shell, trace	inorganic silt in								
-12.1	3.2	••••		unded, gray (5	Y-6/1), (SP).	-			Comple #00 5)onth -	0 6'		
-12.6	3.7	•••	Fine quart	tz SAND, trace	e inorganic silt in	, 'H			Sample #C2, L Mean (mm): 0	eptn = 26. Phi	o.v Sortina: 1 17		
	F		graded, loose	, subrounded,	gray (5Y-5/1), (SP	<u>`./ </u>		2	Carbonate: 12.	1%, Fir	ies (#200) - 2.	02 (SP)	
-13.6	4.7		Fine quartz	SAND, little fi	ne sand to coarse	,		0					
	┝	· •	trace coar	rse quartz san	d, poorly graded,	" /							
		\cdot	medium der	nse, subround (סס)	ied, gray (5Y-5/1),								
-14.8	5.9		Fine quartz S	SAND, few inor	rganic sailt in matri:	х́Н							
			and burrows, t	trace fine sand	d to fine gravel-size	ed							
		•••••	content decr	eases with de	pth, color grades to	,							
-16.3	7.4	1919	gray (5Y 5/1	1) from, dark c	vlive gray (5Y-3/2),								
		••••	Fine quartz	SAND, few fi	ne sand to coarse	ЧΠ							
	F	••••	gravel-siz	ed shell, poorl	y graded, loose,								
			Fine quar	rtz SAND, trac	e fine to coarse	-							
	Ļ	••••	sand-size	ed shell, trace	inorganc silt in								
			8.0',8.6',	and 9.0', poorl	ly graded, loose,								
<u>-18.9</u>	10.0	•••••	subrou	unded, gray (5	Y-6/1), (SP).								
	F												
				End of Bor	ing								
	Ļ												
	F												
	F												
		. 1											

Appendix B: Laboratory Analytical Reports – Physical Analyses





		Carb	onate Co	ontent Da	ata		
Project Name: Carteret County Navigation Project							
Project Number:	EQ185047						
Date:	4/11/2018						
	Sample No.	Depth Range, Feet	Tare No.	Beaker No.	Dry Sample Wt.		Percent
Station No.					Before	After	Carbonate
BHC-01-0318-C2	BHC-01	0-7.6	486	5	103.63	96.25	7.1
BHC-02-0318-C2	BHC-02	0-6	470	2	90.76	87.23	3.9
BHC-03-0318-C2	BHC-03	0-6.3	10	12	117.42	112.90	3.8
MC-01-0318-C1	MC-01	0-5	438	10	116.62	103.00	11.7
MC-02-0318-C2	MC-02	0-12.9	219	16	120.08	110.91	7.6
MC-03-0318-C1	MC-03	0-10.1	290	1	119.73	114.13	4.7
MC-04-0318-C2	MC-04	0-8.6	218	13	112.09	98.58	12.1

Tested By:

CRM Sr.

Reviewed By:

TES

Terracon

9655 Florida Mining Boulevard West Jacksonville, Florida 32257 (904) 900-6494 (Tel) • (904) 268-5255 (Fax)

VISUAL SHELL CONTENT

GRAIN SIZE AND VISUAL SHELL CONTENT

Project:	Carteret County	/ Navigation F	Depth: 0-7.6					
Project No.:	EQ185047		Date:	4/13/2018				
Boring No.:	BHC-01-0318-C	2						
Sample No.:	BHC-01							
Description:	SAND, poorly-graded, mostly medium to fine-grained quartz, little							
	coarse to fi	ne sand-sized	l shell fraqme	ents, trace silt	(SP) 5Y 5/1			
T	are Weight, (g):	51.80						
Dry Wt Before Washing (g):		208.76	(with tare)					
Dry Weight After Washing (g):			(with tare)					
, ,	3 (3)		,					
Sieve Size	Sieve Size	Weight		Approx.	Approx Visual			
(Name)	(mm)	Retained (a)	% Passing	Visual Shell	Shell W/t (a)			
(Name)	(1111)	rtetaineu (g)		%				
3/4"	19.000	0.00	100.00	0	0.00			
5/8"	16.000	0.00	100.00	0	0.00			
7/16	11.112	0.00	100.00	0	0.00			
5/16	7.938	0.00	100.00	0	0.00			
#3.5	5.600	0.09	99.94	100	0.09			
#4	4.750	0.20	99.82	100	0.20			
#5	4.000	0.31	99.62	100	0.31			
#7	2.800	0.62	99.22	100	0.62			
#10	2.000	0.81	98.71	100	0.81			
#14	1.400	1.28	97.89	100	1.28			
#18	1.000	1.93	96.66	90	1.74			
#25	0.710	3.79	94.25	70	2.65			
#35	0.500	13.37	85.73	40	5.35			
#45	0.355	34.20	63.94	20	6.84			
#60	0.250	60.18	25.60	5	3.01			
#80	0.180	31.35	5.63	0	0.00			
#120	0.125	5.49	2.13	0	0.00			
#170	0.090	1.04	1.47	0	0.00			
#200	0.075	0.25	1.31	0	0.00			
#230	0.063	0.12	1.23	0	0.00			
Total	Shell Content:	15		%				



ENG FORM 2087

* The USC classification is based on laboratory grain size distribution and visual classification

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VISUAL SHELL CONTENT

GRAIN SIZE AND VISUAL SHELL CONTENT

Project:	Carteret County	/ Navigation F	Depth: 0-6.0				
Project No.:	EQ185047		Date:	4/13/2018			
Boring No.:	BHC-02-0318-C	2					
Sample No.:	BHC-02						
Description:	SAND, poorly-graded with silt, mostly fine-grained quartz, few silt, few						
	medium	to fine sand-s	size shell frac	iments (SP-SI	M) 5Y 5/1		
Ta	are Weight, (g):	51.05					
Dry Wt. Before	e Washing (g):	171.13	(with tare)				
Dry Weight After	Washing (g):	(with tare)					
Sieve Size	Sieve Size	Weight		Approx.	Approx Visual		
(Name)	(mm)	Retained (a)	% Passing	Visual Shell	Shell Wt (a)		
(italito)	()	rtotairioù (g)		%			
3/4"	19.000	0.00	100.00	0	0.00		
5/8"	16.000	0.00	100.00	0	0.00		
7/16	11.112	0.00	100.00	0	0.00		
5/16	7.938	0.00	100.00	0	0.00		
#3.5	5.600	0.00	100.00	0	0.00		
#4	4.750	0.00	100.00	0	0.00		
#5	4.000	0.02	99.98	0	0.00		
#7	2.800	0.02	99.97	0	0.00		
#10	2.000	0.07	99.91	10	0.01		
#14	1.400	0.09	99.83	10	0.01		
#18	1.000	0.13	99.73	20	0.03		
#25	0.710	0.20	99.56	40	0.08		
#35	0.500	0.24	99.36	60	0.14		
#45	0.355	0.43	99.00	80	0.34		
#60	0.250	2.12	97.24	70	1.48		
#80	0.180	15.57	84.27	40	6.23		
#120	0.125	64.73	30.36	0	0.00		
#170	0.090	23.45	10.83	0	0.00		
#200	0.075	4.07	7.45	0	0.00		
#230	0.063	1.17	6.47	0	0.00		
Total	Shell Content:	7		%			



ENG FORM 2087

* The USC classification is based on laboratory grain size distribution and visual classification
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VISUAL SHELL CONTENT

Project:	Carteret County	/ Navigation F	Depth:	0-6.3					
Project No.:	EQ185047			Date:	4/13/2018				
Boring No.:	BHC-03-0318-C2								
Sample No.:	BHC-03								
Description:	SAND, poorly	-graded, mos	tly medium to	o fine-grained	quartz, trace				
	medium to f	ine sand-size	d shell fragm	ents, trace sil	t (SP) 5Y 7/2				
T	are Weight, (g):	51.43							
Drv Wt. Befor	e Washing (g):	195.59	(with tare)						
Drv Weight After	Washing (g):		(with tare)						
	3 (3)		(
Sieve Size	Sieve Size	Weight		Approx.	Approx Visual				
(Name)	(mm)	Potained (a)	% Passing	Visual Shell	Sholl W/t (a)				
(Name)	(11111)	iverained (g)		%	Sheli Wt. (g)				
3/4"	19.000	0.00	100.00	0	0.00				
5/8"	16.000	0.00	100.00	0	0.00				
7/16	11.112	0.00	100.00	0	0.00				
5/16	7.938	0.00	100.00	0	0.00				
#3.5	5.600	0.00	100.00	0	0.00				
#4	4.750	0.00	100.00	0	0.00				
#5	4.000	0.00	100.00	0	0.00				
#7	2.800	0.06	99.96	100	0.06				
#10	2.000	0.07	99.91	90	0.06				
#14	1.400	0.08	99.85	70	0.06				
#18	1.000	0.23	99.69	60	0.14				
#25	0.710	0.38	99.43	50	0.19				
#35	0.500	1.35	98.49	30	0.41				
#45	0.355	4.49	95.38	20	0.90				
#60	0.250	23.17	79.31	15	3.48				
#80	0.180	65.75	33.70	0	0.00				
#120	0.125	42.02	4.55	0	0.00				
#170	0.090	3.83	1.89	0	0.00				
#200	0.075	0.39	1.62	0	0.00				
#230	0.063	0.05	1.59	0	0.00				
Total	Shell Content:	4		%					



9655 Florida Mining Boulevard West Jacksonville, Florida 32257 (904) 900-6494 (Tel) • (904) 268-5255 (Fax)

VISUAL SHELL CONTENT

Project:	Carteret County	/ Navigation F	Depth:	0-5	
Project No.:	EQ185047			Date:	4/13/2018
Boring No.:	MC-01-0318-C1			•	
Sample No.:	MC-01				
Description:	SAND, poorl	y-graded, mo	stly medium f	to fine-graine	d quartz, few
	coarse to fine s	sand-sized sh	ell fragments	<u>s, trace silt, tra</u>	ace fine gravel-
T	are Weight, (g):	51.48			
Dry Wt. Before	e Washing (g):	211.07	(with tare)		
Dry Weight After	Washing (g):		(with tare)		
Sieve Size	Sieve Size	Weight		Approx.	Approx. Visual
(Name)	(mm)	Retained (a)	% Passing	Visual Shell	Shell Wt. (a)
(()	(9)		%	
3/4"	19.000	0.00	100.00	0	0.00
5/8"	16.000	0.00	100.00	0	0.00
7/16	11.112	0.00	100.00	0	0.00
5/16	7.938	0.26	99.84	100	0.26
#3.5	5.600	1.08	99.16	100	1.08
#4	4.750	0.59	98.79	80	0.47
#5	4.000	0.37	98.56	90	0.33
#7	2.800	0.83	98.04	90	0.75
#10	2.000	1.05	97.38	80	0.84
#14	1.400	1.44	96.48	70	1.01
#18	1.000	1.67	95.43	60	1.00
#25	0.710	2.80	93.68	60	1.68
#35	0.500	5.45	90.26	40	2.18
#45	0.355	12.25	82.59	20	2.45
#60	0.250	33.48	61.61	5	1.67
#80	0.180	54.71	27.33	0	0.00
#120	0.125	37.51	3.82	0	0.00
#170	0.090	3.65	1.54	0	0.00
#200	0.075	0.42	1.27	0	0.00
#230	0.063	0.10	1.21	0	0.00
Total	Shell Content:	9		%	



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VISUAL SHELL CONTENT

Project:	Carteret County	Depth:	0-12.9		
Project No.:	EQ185047			Date:	4/13/2018
Boring No.:	MC-02-0318-C2				
Sample No.:	MC-02				
Description:	SAND, poorly	y-graded, mo	stly medium f	to fine-graine	d quartz, few
	coarse to fin	e sand-sized	shell fragme	<u>nts, trace silt,</u>	(SP) 5Y 5/1
T	are Weight, (g):	49.43			
Dry Wt. Before	e Washing (g):	193.43	(with tare)		
Dry Weight After	Washing (g):		(with tare)		
	0 (0)		· · ·		
Sieve Size	Sieve Size	Weight		Approx.	Approx Visual
(Name)	(mm)	Retained (a)	% Passing	Visual Shell	Shell Wt (a)
(Name)	(11111)	rtetaineu (g)		%	
3/4"	19.000	0.00	100.00	0	0.00
5/8"	16.000	0.00	100.00	0	0.00
7/16	11.112	0.00	100.00	0	0.00
5/16	7.938	0.00	100.00	0	0.00
#3.5	5.600	0.00	100.00	0	0.00
#4	4.750	0.11	99.92	100	0.11
#5	4.000	0.27	99.74	100	0.27
#7	2.800	0.46	99.42	100	0.46
#10	2.000	0.48	99.08	80	0.38
#14	1.400	0.70	98.60	60	0.42
#18	1.000	1.02	97.89	45	0.46
#25	0.710	1.64	96.75	40	0.66
#35	0.500	3.59	94.26	30	1.08
#45	0.355	7.95	88.74	30	2.39
#60	0.250	16.56	77.24	15	2.48
#80	0.180	45.17	45.87	1	0.45
#120	0.125	54.04	8.34	0	0.00
#170	0.090	7.62	3.05	0	0.00
#200	0.075	0.76	2.52	0	0.00
#230	0.063	0.18	2.40	0	0.00
Total	Shell Content:	6		%	



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VISUAL SHELL CONTENT

Project:	Carteret County	/ Navigation F	Depth:	0-10.1	
Project No.:	EQ185047			Date:	4/13/2018
Boring No.:	MC-03-0318-C1				
Sample No.:	MC-03				
Description:	SAND, poorly	-graded, mos	tly medium to	o fine-grained	quartz, trace
	medium to fi	<u>ne sand-sized</u>	d shell fragme	ents, trace silt	t (SP) 5Y 6/1
T;	are Weight, (g):	51.27			
Dry Wt. Before	e Washing (g):	213.92	(with tare)		
Dry Weight After	Washing (g):		(with tare)		
, ,	0 (0)		,		
Sieve Size	Sieve Size	Weight		Approx.	Approx Visual
(Name)	(mm)	Retained (a)	% Passing	Visual Shell	Shell Wt (a)
(italiio)	()	(g)		%	
3/4"	19.000	0.00	100.00	0	0.00
5/8"	16.000	0.00	100.00	0	0.00
7/16	11.112	0.00	100.00	0	0.00
5/16	7.938	0.00	100.00	0	0.00
#3.5	5.600	0.00	100.00	0	0.00
#4	4.750	0.02	99.99	100	0.02
#5	4.000	0.00	99.99	0	0.00
#7	2.800	0.04	99.96	100	0.04
#10	2.000	0.19	99.85	90	0.17
#14	1.400	0.23	99.70	70	0.16
#18	1.000	0.27	99.54	60	0.16
#25	0.710	0.66	99.13	50	0.33
#35	0.500	1.90	97.96	40	0.76
#45	0.355	6.33	94.07	20	1.27
#60	0.250	19.43	82.13	5	0.97
#80	0.180	46.03	53.83	0	0.00
#120	0.125	68.27	11.85	0	0.00
#170	0.090	13.30	3.68	0	0.00
#200	0.075	1.46	2.78	0	0.00
#230	0.063	0.37	2.55	0	0.00
Total	Shell Content:	2		%	



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VISUAL SHELL CONTENT

Project:	Carteret County	/ Navigation F	Depth:	0-8.6	
Project No.:	EQ185047			Date:	4/13/2018
Boring No.:	MC-04-0318-C1				
Sample No.:	MC-04				
Description:	SAND, poorly	y-graded, mo	stly medium f	o fine-graine	d quartz, few
	coarse to fine s	sand-sized sh	ell fragments	<u>, trace silt, tra</u>	ace fine gravel-
T	are Weight, (g):	49.81			
Dry Wt. Before	e Washing (g):	198.60	(with tare)		
Dry Weight After	Washing (g):		(with tare)		
Sieve Size	Sieve Size	Weight		Approx.	Approx. Visual
(Name)	(mm)	Retained (a)	% Passing	Visual Shell	Shell Wt. (a)
(((3)		%	(9)
3/4"	19.000	0.00	100.00	0	0.00
5/8"	16.000	0.00	100.00	0	0.00
7/16	11.112	1.29	99.13	100	1.29
5/16	7.938	0.53	98.78	100	0.53
#3.5	5.600	0.82	98.23	100	0.82
#4	4.750	0.46	97.92	100	0.46
#5	4.000	0.48	97.59	100	0.48
#7	2.800	1.31	96.71	80	1.05
#10	2.000	1.24	95.88	80	0.99
#14	1.400	1.35	94.97	60	0.81
#18	1.000	1.47	93.98	50	0.74
#25	0.710	2.38	92.39	40	0.95
#35	0.500	4.72	89.21	25	1.18
#45	0.355	11.50	81.48	10	1.15
#60	0.250	28.87	62.08	1	0.29
#80	0.180	45.53	31.48	0	0.00
#120	0.125	37.41	6.34	0	0.00
#170	0.090	5.65	2.54	0	0.00
#200	0.075	0.77	2.02	0	0.00
#230	0.063	0.18	1.90	0	0.00
Total	Shell Content:	7		%	



MAY 63





GEOTECHNICAL APPENDIX A ENVIRONMENTAL ASSESSMENT BULKHEAD CHANNEL

ATTACHMENT 2 TO GEOTECHNICAL APPENDIX

USACE BORINGS & LAB DATA

BULKHEAD CHANNEL VICINITY

		DIV		INSTALLA	TION		
PROJECT		<u> </u>	SUUTH ATLANTIC	10. SIZE	WILN AND TYPE	OF BIT	4" Dia Vibracore
MOREH	HEAD CI	TY INN	NER HARBOR	11. DATU	M FOR ELI	EVATION S	HOWNTBM or MSL)
NC C	OORD E	2697	" 808.3 N 355633.8 NAD83	12. MANU	FACTURER'	S DESIGNA	TION OF DRILL
DRILLING WILN	agency /INGTON	I DISTF	RICT	VIBRA		OVER-	DISTURBED UNDISTURBED
HOLE NO and file n).(As shown umber)	on drawing	MHC-06-29	BURDE	EN SAMPLE	S TAKEN	
name of ESTER	driller GAUGH	F	CRANE OPERATOR	15. ELEV	ATION GRO	UND WATE	R N/A
	N OF HOLE			16. DATE	HOLE	STAF	COMPLETED COMPLETED /14/06
			NICA (17 4' Water)	17. ELEV	ATION TOP	OF HOLE	0.0' MLLW
DEPTH D	RILLED INT	O ROCK	0.0'	18. TOTA 19. SIGNA	L CORE RE	ECOVERY F	FOR BORING N/A
TOTAL D	EPTH OF H	IOLE	27.4	K. BEI	NTON A	AND K.	KALTENBACH
LEVATION	DEPTH feњet	LEGEND ¢	CLASSIFICATION OF MATERIAL (Description) d	.S	ERY	SAMPLE NO. f	(Drilling time, water loss, depth of weathering, etc., if significant) 9
0.0	0 =		0.0'TO 17.4' WATER				Time begin vibracoring:
							Soils described by Larry
			 RIVER BOTTOM @17 4			17 /	benjamin, CivilEngr. Tech.
-17.4	17.4	• •	SP-Tan, coarse,			17.4	Scale changed @ 18.0'
		•••	poorly-graded sand			1	NOTE TOP OF HOLE IN 4-
	18.0	•••				17.9'	with shell fragments and compensation is made
		•••					for the tide such that top of Hole is 0.0 EL MLLW.
		· . · . ·					
		•••					VIBRACORE BORING
	20.0-					20.0	From 0.0' to 27.4'
	-	•••				20.5	NUH 20.0 Rec+7.0
		••••	21.2'			20.0	Top of vibracore soil sample is loaged as be-
		•••	with shell fragments			22 0	ginning at Ocean Bottom. When Run is greater that
	22.0	••••				3	Recovery, the difference
		•••••				22.5	No Recovery.
		• • • •					
		••••				23.9	
	24.0	•••		24.4'		4	
			No Recovery			24.4	LAB CLASSIFICATION
							Jar
							1 SP
	20.0-						
-27.4	27.4						
			BOTTOM OF HOLE @ -23	7.4'			
			SOILS ARE FIELD VISUAL	LY			
			UCLASSIFIED IN ACCORDAN WITH THE UNIFIED SOIL	ICE			
			CLASSIFICATION SYSTEM				
				PRO	ECT MAC	REHE	AD CITY HOLE NO.



DRILL	ING LO	G Div	SOUTH ATLANTIC		WILN	IINGTON	I DISTRICT OF 1 SHEETS
. project MOREH	HEAD C	ITY INN	NER HARBOR	10. SIZE	AND TYPE		4" Dia. Vibracore
2. LOCATION	N (Coordinate	s or Station		MLLW	Y FOR EL	EVATION 5	HOWN BM OF MSL)
NC CC 3. DRILLING	AGENCY	26979	978.2 N 355250.3 NAD83	12. MANU VIBRA	ACTURER'	S DESIGNA	SNELL
WILN	AINGTON	N DISTE		13. TOTA		OVER-	
and file n	umber)	on and ming	: MHC-06-30	14. TOTA	L NUMBER	CORE BO	κες Ν/Α
ESTER	GAUGH	F	CRANE OPERATOR	15. ELEV	ATION GRO	UND WATE	r N/A
DIRECTION	N OF HOLE	E ICLINED	DEG FROM VERT	16. DATE	HOLE	staf 05	RTED COMPLETED /14/06 05/14/06
THICKNES	SS OF OVE	RBURDEN	N/A (16 7' Water)	17. ELEV	ATION TOP	OF HOLE	0.0' MLLW
. DEPTH D	RILLED INT	O ROCK	0.0'	19. SIGNA	TURE OF	INSPECTOR	CK BOKING N/A
. TOTAL D	EPTH OF I	HOLE		K. BEN	NTON /	AND K.	KALTENBACH
ELEVATION MLLW	DEPTH fevet	LEGEND ¢	CLASSIFICATION OF MATERIAL (Description) d	S	ERY	SAMPLE NO. f	(Drilling time, water loss, depth of weathering, etc., if significant) 9
0.0	0 =		0.0'TO 16.6' WATER				Time begin vibracoring:
							Soils described by Larry
	_						Benjamin, Civil Engr. Tech.
	16.0-						
			RIVER BOTTOM @16.6'			16.6	
-16.6	16.6 - 17.0	•••	SP- Tan, coarse,			1	NOTE: TOP OF HOLE is de- fined as surface of water
	=	•••	poorly-graded sand			17.1	for the tide such that
		•••					itop of Hole is U.U EL MLLW.
		•••				18.6	
						2	From 0.0' to 26.6'
	9.0 _	•••				19.1	Ran 20.0' Rec: 6.4'
	_	•••					Top of vibracore soil
	_	•••				20.6	sample is logged as be-
	210	•••				3	When Run is greater than Recovery the difference
		•••				21.1	is depicted as Assumed
	_						Not Recovered.
	_					22.5	
		•••		23.0'		4	
	-		No Recovery			23.0	
	_						LAB CLASSIFICATION
	_						Jar Number Classification
	25 0						1 SP
	23.0 -						2 SP
<u> </u>							
-26.6	26.6 -		BOTTOM OF HOLE @ -26.6	5'			
			CLASSIFIED IN ACCORDANCE				
			WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM				
	=						
	=						
				PROJ	ECT MC	REHE	AD CITY HOLE NO.

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DRILL	NG LO	G DIV	SOUTH ATLANTIC	INSTALLA			DISTRICT	SHEET 1 OF 1 SHEETS
			NGF B	10. SIZE	AND TYPE	OF BIT	4" Dia. Vib	racore
		s or Station	N E2607038 (NAD 93)	11. DATU ML	M FOR ELE	VATION S	HOWNTBM or MSL)	
	AGENCY	55405	E2097936 (NAD 637	12. MANUI VIBRA	CORE	S DESIGNA	TION OF DRILL	
HOLE NO	NGTON ,(As shown	DISTRI on drawing		13. TOTAL BURDE	NO. OF O	OVER- S TAKEN	DISTURBED	
and file no	DRILLER		· MIL-00-V-02	14. TOTA	. NUMBER	CORE BO	ÆS N/A	0
		<u>HF (</u>	CRANE OPERATOR	15. ELEV/	TION GRO	UND WATE		
		ICLINED	DEG. FROM VERT.	16. DATE		. 97	08708	·9/08/08
THICKNES	IS OF OVE	RBURDEN	N/A (13.7 of Water)	18. TOTAL	CORE RE	COVERY I	FOR BORING N	/A
TOTAL DI	RILLED INT	O ROCK	<u>0.0'</u> 23.7'	19. SIGNA KFLLÉ	TURE OF I	NSPECTOR	СН	
EVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIAL	s	% CORE	BOX OR SAMPLE	Drilling tim	REMARKS ne, water loss, depth of
MLLW	feet	c	(Description) d		ERY •	NO. 1	weathering	g, etc., if significant) 9
			0.0' TO 13.7' WATER				Time begir 1458 hrs.	n vibracoring:
	_						Soils descri Beniamin. C	ibed by Larry CivilEnar, Tech.
								,
	13.0							
-13.7	13.7 -		RIVER BOTTOM @ 13.7			13.7'		
		•••	SP Tan, coarse poorly	inv		1 14 2'	NOTE: TOP fined as sur	OF HOLE is de- face of water
			shell fragments	ury		i . 7.∠	and compen for the tide	sation is made such that
	15.0	•••				15 51	top of Hole	IS U.U EL MLLW
		••••				2		RE BORING
		•••				16.0'	Ran 10.0'	Rec: 9.0'
								racare sail
						17.5'	sample is	logged as be- Ocean Bottom
		• • •	18.01			3	When Run	is greater tha
		••••	Trace of shell fragm	nents		18.0'	is depicte	d as Assumed
	19.0	••••					Not Recov	vered.
		•••••				19.5'	NOTE: Com	mercial soils lab
	_	•••				4	classified s to ASTM D	amples according 2457
		•••				20.0		
	21.0-						LAB CLA	ASSIFICATION
		• • •				<u>21.5'</u> 5	Jar <u>Numbe</u> r	<u>Classification</u>
		••••				22.0'	1 2	SP SP
		•••••		22.7'			3	SP
	23.0-		ASSUME NOT RECOVER	ED				
-23.7	23.7			יר דר				
			SOUS ARE FIELD VISUALLY	23./			NOTE:	
			CLASSIFIED IN ACCORDANCE				HOLE TE	ERMINATED
			CLASSIFICATION SYSTEM				AT PRE	
	1.1						DEPTH A	AT 10.01
	-							
	-							
			l					-





3047-4 St. Johns Bluff Road S. Jacksonville, Florida 32246 (904) 997-1400 (Tel) • (904) 997-9150 (Fax)

VISUAL SHELL CONTENT

GRAIN SIZE AND VISUAL SHELL CONTENT

Project:	Moorehead City DMMP	Depth:	13.7 - 14.2'
Project No.:	WPC6308.00103	Date:	11/23/2008
Boring No.:	MHC-08-V-62		
Sample No.:	1		
Description:	SAND, poorly-graded, mostly medium to	fine-grained qu	artz, some fine
	gravel to medium sand-size shell fragme	ents, trace silt,	grayish brown

Tare Weight, (g): Dry Wt. Before Washing (g): Dry Weight After Washing (g):

49.69	
230.37	(with tare)
229.28	(with tare)

Sieve Size (Name)	Sieve Size (mm)		% Passing	Approx. Visual Shell %	Approx. Visual Shell Wt. (g)
3/4"	19.000	0.00	100.00	0	0.00
3/8"	9.500	0.26	99.86	100	0.26
#4	4.750	1.65	98.94	100	1.65
#7	2.800	3.61	96.94	100	3.61
#10	2.000	3.31	95.11	100	3.31
#14	1.400	6.50	91.52	90	5.85
#18	1.000	9.85	86.06	80	7.88
#25	0.710	17.82	76.20	60	10.69
#35	0.500	43.74	51.99	40	17.50
#45	0.355	49.30	24.71	20	9.86
#60	0.250	20.69	13.26	10	2.07
#80	0.180	17.38	3.64	5	0.87
#120	0.125	4.87	0.94	0	0.00
#170	0.090	0.42	0.71	0	0.00
#200	0.075	0.05	0.68	0	0.00
#230	0.063	0.03	0.66	0	0.00
Tota	I Shell Content:	35		%	





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VISUAL SHELL CONTENT

Project:	Moorehead City I	Depth:	15.5' - 16.0'		
Project No.:	WPC6308.00103			Date:	11/23/2008
Boring No.:	MHC-08-V-62				
Sample No.:	2				
Description:	SAND, poorly-gr	aded, mostly	medium to fi	ne-grained qu	ıartz, some fine∙
	gravel to mediu	<u>m sand-size</u> :	shell fragmen	its, trace silt,	grayish brown
	Tare Maight (g):	50.72			
	rate vvergrit, (g). ro Mosching (g):	20.72	(with toro)		
Dry VVL. Delui	e vvasning (g). : Moching (g):	240.3	(with tare)		
Diy vveigni Aitei	washing (g).	240.10	(with tare)		
				Approx.	
Sieve Size	Sieve Size (mm)		% Passing	Visual Shell	Approx. Visual
(Name)	, í		9	%	Shell VVt. (g)
3/4"	19.000	0.00	100.00	0	0.00
3/8"	9.500	4.39	97.76	100	4.39
#4	4.750	2.52	96.47	100	2.52
#7	2.800	4.92	93.95	100	4.92
#10	2.000	6.19	90.79	100	6.19
#14	1.400	11.07	85.13	90	9.96
#18	1.000	17.04	76.41	80	13.63
#25	0.710	24.29	63.99	60	14.57
#35	0.500	51.99	37.41	40	20.80
#45	0.355	40.44	16.73	20	8.09
#60	0.250	15.78	8.67	10	1.58
#80	0.180	11.63	2.72	5	0.58
#120	0.125	3.75	0.80	0	0.00
#170	0.090	0.17	0.72	0	0.00
#200	0.075	0.17	0.63	0	0.00
#230	0.063	0.02	0.62	0	0.00
Tota	l Shell Content:	45		%	





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VISUAL SHELL CONTENT

Project:	Moorehead City I	DMMP	Depth:	17.5' - 18.0'	
Project No.:	WPC6308.00103			Date:	11/23/2008
Boring No.:	MHC-08-V-62				
Sample No.:	3				
Description:	SAND, poorly-gr	aded, mostly	medium to fi	ne-grained qu	uartz, little fine-
	gravel to medi	ium sand-size	e shell fragmo	ents, trace sili	t, gray 5 Y 5/1
	Tara Maiaht (a):	40.00			
	rare vvergrit, (g). ro Moobing (g):	48.02	(with toro)		
Dry VVL. Belur	e vvasning (g).	224.20	(With tare)		
Dry Weight Alter	vvasning (g).	222.99	(with tare)		
				Approx.	
Sieve Size	Sieve Size (mm)		% Passing	Visual Shell	Approx. Visual
(Name)	(,			%	Shell VVt. (g)
3/4"	19.000	0.00	100.00	0	0.00
3/8"	9.500	0.00	100.00	0	0.00
#4	4.750	0.27	99.85	100	0.27
#7	2.800	0.43	99.60	100	0.43
#10	2.000	0.92	99.08	99	0.91
#14	1.400	1.58	98.17	90	1.42
#18	1.000	2.92	96.51	80	2.34
#25	0.710	5.88	93.15	70	4.12
#35	0.500	16.47	83.75	40	6.59
#45	0.355	50.54	54.91	20	10.11
#60	0.250	53.24	24.53	1	0.53
#80	0.180	34.47	4.86	0	0.00
#120	0.125	6.66	1.06	0	0.00
#170	0.090	0.45	0.80	0	0.00
#200	0.075	0.04	0.78	0	0.00
#230	0.063	0.02	0.76	0	0.00
Tota	l Shell Content:	15		%	

DRILL	NG LO	G Div	ISION SOUTH ATLANTIC	INSTALLA				SHEET 1	
					AND TYPE	OF BIT	4" Dia. Vib	rocore	
	I (Coordinate	s or Statio		11. DATUI ML	IFOR ELE	EVATION S	HOWNTBM or MSL)		
	AGENCY	55650	E2697776 (NAD 83)	12. MANUR		S DESIGNA	TION OF DRILL		
WILMI	NGTON (As shown	DISTR an drawina		13. TOTAL	NO. OF O	OVER-			
and file no	DRILLER		. MHC-08-V-63	14. TOTA	14. TOTAL NUMBER CORE BOXES N/A				
ESTER	CAUG	<u>HF (</u>	CRANE OPERATOR	15. ELEV/	TION GRO	UND WATE			
		ICLINED	DEG. FROM VERT.	16. DATE	HOLE	. 97	<u>08708</u>	9708708	
THICKNES	S OF OVE	RBURDEN	N/A (12.2 of Water)	18. TOTAL	. CORE RE	COVERY	FOR BORING N	/A	
TOTAL D	EPTH OF I	O ROCK	<u>0.0'</u> 22.2'	19. SIGNA KELLI	TURE OF I	NSPECTOR	сн		
EVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIAL (Description)	LS	% CORE RECOV-	BOX OR SAMPLE	(Drilling tim weathering	REMARKS le, water loss, depth of a dc. if stanificant	
MLLW	feet 0_	c			•	1		9 yullar aquariaati	
	=		0.0 10 12.2 WATER				1514 hrs.		
							Solls descri Benjamin, C	bed by Larry ivilEngr. Tech.	
-12.2	12.0 <u>-</u> 12.2 -	•••	RIVER BOTTOM @ 12.2	•		12.2'			
		• •	graded sand			12.7	NOTE: TOP	OF HOLE is de-	
		•••					and compen for the tide	sation is made such that	
		•••					top of Hole	is 0.0 EL MLLW	
	-+.u 	••••				14.5'			
	-	•••				2	From 0.0	D' to 10.0'	
	-	•••				15.0'	Ran 10.0'	Rec: 7.3'	
	16.0	••					Top of vib	racore soil	
	=	••••				16.5'	sample is ginning at	logged as be- Ocean Bottom	
						3	When Run Recovery.	is greater the	
	-	••••				17.0	is depicte	d as Assumed	
	18.0-	••••	18.2'					vered.	
		•••	With shell fragme	nts		18.5'	NOTE: Comr	nercial soils lab	
		• •				4 19.0'	to ASTM D2	amples according 2457	
			ASSUME NOT RECOVER	<u>19.5'</u>				001510 1 71011	
	20.0-			LU			LAB CLA	ASSIFICATION	
	=						Jar <u>Numbe</u> r	<u>Classification</u>	
							1 2	SP	
							3	SP	
-22.2	22.0- 22.2 -								
			BOLLOW OF HOLE AT	22.2'					
							NOTF:		
			SOILS ARE FIELD VISUALLY CLASSIFIED IN ACCORDANCE				HOLE TE	ERMINATED	
			CLASSIFICATION SYSTEM				AT PRE	DETERMINED	
	=						Ι ΔΕΡΤΗ /	ai 10.0'	
	-								
	-								
	-								
	-								





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VISUAL SHELL CONTENT

Project:	Moorehead City	DMMP	Depth:	12.2' - 12.7'							
Project No.:	WPC6308.00103			Date:	11 <i>1</i> 23 <i>1</i> 2008						
Boring No.:	MHC-08-V-63										
Sample No.:	1										
Description:	SAND, poorly-g	SAND, poorly-graded, mostly fine-grained quartz, little coarse to fine									
	sand-size	shell fragmen	its, trace silt,	olive gray 5Y	5/2 (SP)						
	Tare Weight, (g):	50.11									
Dry Wt. Befo	re Washing (g):	241.66	(with tare)								
Dry Weight After	r Washing (g):	239.88	(with tare)								
Sieve Size				Approx.	Annroy Visual						
(Name)	Sieve Size (mm)		% Passing	Visual Shell	Shell Wt (a)						
(Name)				%	Offen 991. (g)						
3/4"	19.000	0.00	100.00	0	0.00						
3/8"	9.500	0.00	100.00	0	0.00						
#4	4.750	0.00	100.00	0	0.00						
#7	2.800	0.02	99.99	100	0.02						
#10	2.000	0.11	99.93	100	0.11						
#14	1.400	0.15	99.85	99	0.15						
#18	1.000	0.29	99.70	95	0.28						
#25	0.710	0.66	99.36	90	0.59						
#35	0.500	2.35	98.13	80	1.88						
#45	0.355	11.32	92.22	40	4.53						
#60	0.250	56.40	62.78	20	11.28						
#80	0.180	98.04	11.59	5	4.90						
#120	0.125	18.63	1.87	0	0.00						
#170	0.090	1.70	0.98	0	0.00						
#200	0.075	0.19	0.88	0	0.00						
#230	0.063	0.06	0.85	0	0.00						
Totz	I Shell Content:	12		%							





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0.250

0.180

0.125

0.090

0.075

0.063

Total Shell Content:

#60

#80

#120

#170

#200

#230

VISUAL SHELL CONTENT

GRAIN SIZE AND VISUAL SHELL CONTENT

Project: Moorehead City DMMP Depth: 14.2' - 15.0' WPC6308.00103 11/23/2008 Project No.: Date: Boring No.: MHC-08-V-63 Sample No.: 2 SAND, poorly-graded, mostly fine-grained quartz, little coarse to fine Description: sand-size shell fragments, trace silt, olive gray 5Y 5/2 (SP) Tare Weight, (g): 50.40 219.59 (with tare) Dry Wt. Before Washing (g): Dry Weight After Washing (g): 218.05 (with tare) Approx. Approx. Visual Sieve Size % Passing Visual Shell Sieve Size (mm) Shell Wt. (g) (Name) % 0.00 3/4" 19.000 100.00 0 0.00 3/8" 9.500 0.00 100.00 Π 0.00 #4 4.750 0.00 100.00 Ο 0.00 #7 2.800 0.00 100.00 0 0.00 Ο #10 2.000 0.00 100.00 0.00 #14 1.400 0.09 99.95 100 0.09 0.23 #18 1.000 0.23 99.81 100 0.70 #25 0.710 99.40 90 0.63 #35 0.500 2.14 98 13 60 1 28 #45 0.355 91.37 40 4.58 11.44

50.02

86.97

14.70

1.32

0.08

0.04

13

61.81

10.40

1.71

0.93

0.89

0.86

%

20

5

0

Π

0

0

10.00

4.35

0.00

0.00

0.00

0.00





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VISUAL SHELL CONTENT

Project:	Moorehead City	DMMP	Depth:	16.5' - 17.0'							
Project No.:	WPC6308.00103			Date:	11 <i>1</i> 23 <i>1</i> 2008						
Boring No.:	MHC-08-V-63										
Sample No.:	3										
Description:	SAND, poorly-g	SAND, poorly-graded, mostly fine-grained quartz, few coarse to fine									
	sand-si:	ze shell fragm	ents, trace s	ilt, gray 5Y 5/	1 (SP)						
	To up Mainlath (u)	40.50									
	Tare vveight, (g):	49.52	(
Dry VVI. Beto	re vvasning (g):	217.24	(with tare)								
Dry Weight Afte	r vvasning (g):	215.75	(with tare)								
				Annrox							
Sieve Size	Sieve Size (mm)		% Passing	Visual Shell	Approx. Visual						
(Name)			g	%	Shell Wt. (g)						
3/4"	19.000	0.00	100.00	0	0.00						
3/8"	9.500	0.00	100.00	0	0.00						
#4	4.750	0.00	100.00	0	0.00						
#7	2.800	0.04	99.98	100	0.04						
#10	2.000	0.06	99.94	100	0.06						
#14	1.400	0.14	99.86	100	0.14						
#18	1.000	0.27	99.70	95	0.26						
#25	0.710	0.64	99.31	95	0.61						
#35	0.500	2.11	98.06	80	1.69						
#45	0.355	7.52	93.57	60	4.51						
#60	0.250	36.33	71.91	20	7.27						
#80	0.180	88.71	19.02	5	4.44						
#120	0.125	27.48	2.64	0	0.00						
#170	0.090	2.35	1.23	0	0.00						
#200	0.075	0.53	0.92	0	0.00						
#230	0.063	0.06	0.88	0	0.00						
Tota	al Shell Content:	11		%							

DRILL	NG LO	G DIV	SOUTH ATLANTIC	INSTALLAT		INGTON		SHEET 1 OF 1 SHEETS
					ND TYPE	OF BIT	4" Dia. Vibr	OCOre
		s or Statio		11. DATUM	FOR ELE	VATION S	HOWNTBM or MSL)	
DRILLING	AGENCY	58025	E2697267 (NAU 83)	12. MANUF VIBRA		S DESIGNA	TION OF DRILL	
WILMI	NGTON ,(As shown	DISTR on drawing		13. TOTAL BURDE	NO. OF ON SAMPLE	VER- S TAKEN	DISTURBED	
and file n	UMber) DRILLER		. MITC-00-V-04	14. TOTAL	. NUMBER	CORE BO	KES N/A	
ESTER DIRECTION	CAUG	<u>HF (</u>	CRANE OPERATOR	15. ELEVA	TION GRO	UND WATE	R N/A	COMPLETED
		CLINED	DEG. FROM VERT.	17. ELEVA		<u>97</u>	0.0'MLLW	<u>·9/08/08</u>
	S OF OVE	RBURDEN	N/A (10.2 of Water)	18. TOTAL	CORE RE	COVERY	FOR BORING N/	'A
TOTAL D	EPTH OF H	10LE	20.2'	19. SIGNA KELLE	TURE OF I	NSPECTOR TENBA	СН	
EVATION	ОЕРТН	LEGEND	CLASSIFICATION OF MATERIAL (Description)	LS	Z CORE RECOV- ERY	BOX OR SAMPLE NO.	i Drilling time weathering	REMARKS », water loss, depth of , etc., if significant)
		¢	0.0' TO 10.2' WATER		•	<u> </u>	Time begin	vibracoring:
							1532 hrs. Soils descri	bed by Larry
							Benjamin, C	ivil Engr. Tech.
-10.2	10.2	•••	RIVER BOTTOM @ 10.2 SP Tan, coarse poorly	•		<u>10.2'</u> 1		
		•••	graded sand			10.7'	NOTE: TOP (fined as sur	OF HOLE is de- face of water
		•••					and compens for the tide	sation is made such that
	12.0	•••				12.0'	top of Hole	IS U.U EL MLLW
	-	· • • •				2	VIBRACO	RE BORING
		•••				12.5	From 0.0	b' to 10.0'
		•••••					Ran 10.0'	Rec: 8.3'
	14.0	•••••				14.0'	Top of yib	racore soil
		••••				3	ginning at	logged as be- Ocean Bottom
		• • • •				14.5	When Run Recovery,	is greater tha the difference
		••••					is depicted	d as Assumed
	16.0	•••••				16.0'		
		•••				4	NOTE: Comm	nercial soils lab
						.0.0	to ASTM D2	457
	18.0	••••				<u>18.0'</u> 5		SSIFICATION
	-	••	ASSUME NOT RECOVER	<u>18.5'</u> FD		18.5'	Number	<u>Classification</u>
				20			1 2	SP
							3 4	SP
-20.2	20.0- 20.2 -			00.0			<u></u>	
			BUITOM OF HOLE AT	20.2'				
							NOTE:	
	-		CLASSIFIED IN ACCORDANCE				HOLE TE	RMINATED
			CLASSIFICATION SYSTEM				AT PREC	
							ULPIH A	
	-							





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VISUAL SHELL CONTENT

Project:	Moorehead City	DMMP		Depth:	10.2' - 10.7'	
Project No.:	WPC6308.00103			Date:	11/23/2008	
Boring No.:	MHC-08-V-64					
Sample No.:	1			-		
Description:	SAND, poorly-g	raded, mostly	y fine-grained	l quartz, little	fine-gravel to	
	fine sand-siz	e shell fragm	ents, trace si	lt, olive gray 5	5Y 5/2 (SP)	
	Tare Weight (g):	/0.70				
Dry Wt Refo	raie Weight, (g). re Washing (g):	71/1 5	(with tare)			
Dry WL. Defor	r Washing (g). Washing (g):	214.0	(with tare)			
Diy Weight Alter	washing (g).	210.11	(with tare)			
				Approx.	a 125 1	
Sieve Size	Sieve Size (mm)		% Passing	Visual Shell	Approx. Visual	
(Name)			Ū	%	Shell VVt. (g)	
3/4"	19.000	0.00	100.00	0	0.00	
3/8"	9.500	0.00	100.00	0	0.00	
#4	4.750	0.70	99.58	100	0.70	
#7	2.800	1.07	98.93	100	1.07	
#10	2.000	0.97	98.34	100	0.97	
#14	1.400	1.44	97.46	95	1.37	
#18	1.000	1.94	96.28	90	1.75	
#25	0.710	2.84	94.56	80	2.27	
#35	0.500	6.76	90.46	60	4.06	
#45	0.355	13.99	81.96	20	2.80	
#60	0.250	40.38	57.45	15	6.06	
#80	0.180	70.05	14.92	5	3.50	
#120	0.125	21.77	1.70	0	0.00	
#170	0.090	0.95	1.12	0	0.00	
#200	0.075	0.28	0.95	0	0.00	
#230	0.063	0.03	0.93	0	0.00	
Tota	Shell Content:	15		%		




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VISUAL SHELL CONTENT

GRAIN SIZE AND VISUAL SHELL CONTENT

Project:	Moorehead City	DMMP	Depth:	12.0' - 12.5'	
Project No.:	WPC6308.00103			Date:	11/23/2008
Boring No.:	MHC-08-V-64				
Sample No.:	2				
Description: SAND, poorly-graded, mostly fine-grained			d quartz, few	coarse to fine	
	sand-size s	shell fragmen	ts, trace silt,	olive gray 5Y	5/2 (SP)
	Tare Weight, (g):	50.02			
Dry Wt. Befor	re Washing (g):	226.59	(with tare)		
Dry Weight After	Washing (g):	224.93	(with tare)		
Sieve Size				Approx.	Annroy Visual
(Name)	Sieve Size (mm)		% Passing	Visual Shell	Shell Wt (a)
(reame)				%	011011 VVI. (g)
3/4"	19.000	0.00	100.00	0	0.00
3/8"	9.500	0.00	100.00	0	0.00
#4	4.750	0.00	100.00	0	0.00
#7	2.800	0.00	100.00	0	0.00
#10	2.000	0.09	99.95	100	0.09
#14	1.400	0.12	99.88	90	0.11
#18	1.000	0.19	99.77	80	0.15
#25	0.710	0.41	99.54	80	0.33
#35	0.500	1.02	98.96	70	0.71
#45	0.355	3.31	97.09	40	1.32
#60	0.250	29.03	80.65	20	5.81
#80	0.180	117.21	14.27	10	11.72
#120	0.125	21.80	1.92	0	0.00
#170	0.090	1.50	1.07	0	0.00
#200	0.075	0.11	1.01	0	0.00
#230	0.063	0.05	0.98	0	0.00
Tota	I Shell Content:	11		%	



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VISUAL SHELL CONTENT

GRAIN SIZE AND VISUAL SHELL CONTENT

Project: Project No.: Boring No.: Sample No.: Description: Moorehead City DMMP

3

WPC6308.00103 MHC-08-V-64

IVITIC-00-V-04

SAND, poorly-graded, mostly fine-grained quartz, few coarse to fine sand-size shell fragments, trace silt, olive gray 5Y 5/2 (SP)

Depth:

Date:

14.0' - 14.5'

11/23/2008

Tare Weight, (g): Dry Wt. Before Washing (g): Dry Weight After Washing (g): 50.36 197.89 (with tare) 196.31 (with tare)

Sieve Size (Name)	Sieve Size (mm)		% Passing	Approx. Visual Shell %	Approx. Visual Shell Wt. (g)
3/4"	19.000	0.00	100.00	0	0.00
3/8"	9.500	0.00	100.00	0	0.00
#4	4.750	0.00	100.00	0	0.00
#7	2.800	0.02	99.99	100	0.02
#10	2.000	0.06	99.95	100	0.06
#14	1.400	0.16	99.84	95	0.15
#18	1.000	0.35	99.60	90	0.32
#25	0.710	0.57	99.21	80	0.46
#35	0.500	1.89	97.93	10	0.19
#45	0.355	6.20	93.73	40	2.48
#60	0.250	21.42	79.21	20	4.28
#80	0.180	85.38	21.34	10	8.54
#120	0.125	27.58	2.64	0	0.00
#170	0.090	2.13	1.20	0	0.00
#200	0.075	0.22	1.05	0	0.00
#230	0.063	0.08	1.00	0	0.00
Tota	I Shell Content:	11		%	



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VISUAL SHELL CONTENT

GRAIN SIZE AND VISUAL SHELL CONTENT

Project:	Moorehead City DMMP
Project No.:	WPC6308.00103
Boring No.:	MHC-08-V-64
Sample No.:	4
Description:	SAND, poorly-graded,

2-08-V-64 4 ND, poorly-graded, mostly fine-grained quartz, few coarse to finesand-size shell fragments, trace silt, olive gray 5Y 5/2 (SP)

Depth:

Date:

16.0' - 16.5'

11/23/2008

Tare Weight, (g): Dry Wt. Before Washing (g): Dry Weight After Washing (g):

49.86	
205.01	(with tare)
203.78	(with tare)

Sieve Size (Name)	Sieve Size (mm)		% Passing	Approx. Visual Shell %	Approx. Visual Shell Wt. (g)
3/4"	19.000	0.00	100.00	0	0.00
3/8"	9.500	0.00	100.00	0	0.00
#4	4.750	0.00	100.00	0	0.00
#7	2.800	0.04	99.97	100	0.04
#10	2.000	0.11	99.90	100	0.11
#14	1.400	0.18	99.79	100	0.18
#18	1.000	0.30	99.59	100	0.30
#25	0.710	0.50	99.27	90	0.45
#35	0.500	1.01	98.62	80	0.81
#45	0.355	3.87	96.13	60	2.32
#60	0.250	35.20	73.44	20	7.04
#80	0.180	90.13	15.35	5	4.51
#120	0.125	20.85	1.91	0	0.00
#170	0.090	1.55	0.91	0	0.00
#200	0.075	0.11	0.84	0	0.00
#230	0.063	0.03	0.82	0	0.00
Tota	Shell Content:	10		%	

DRILL	NG LO	G DIV	SOUTH ATLANTIC	INSTALLAT		INGTON	DISTRICT	SHEET 1 OF 1 SHEETS
			IMP	10. SIZE AND TYPE OF BIT 4" Dia. Vibracore				
LOCATION	Coordinate	s or Station		11. DATUN ML	FOR ELE	EVATION S	HOWNTBM or MSL)	
	AGENCY	0.6	E203/330 (NAU 83)	12. MANUF VIBRA	ACTURER	S DESIGNA	TION OF DRILL	
HOLE NO	NGTON ,(As shown	DISTRI on drawing		13. TOTAL BURDE	NO. OF ON SAMPLE	OVER- S TAKEN	DISTURBED	
and file n	Umber) DRILLER		. MIL-00-0-03	14. TOTAL	. NUMBER	CORE BO	KES N/A	
		HF (CRANE OPERATOR	15. ELEVA	TION GRO	UND WATE		
		Clined	DEG. FROM VERT.	16. DATE		. 97	<u>08708</u>	9/08/08
THICKNES	S OF OVE	RBURDEN	N/A (13.6 of Water)	18. TOTAL	CORE RE	COVERY	FOR BORING N	/A
TOTAL D	RILLED INT	O ROCK	<u>0.0'</u> 23.6'	19. SIGNA KFLLF	TURE OF I	NSPECTOR	сн	
EVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIA	S	% CORE RECOV-	BOX OR SAMPLE	(Drilling tim	REMARKS e, water loss, depth of
MLLW	feet	c	(Description) d		ERY •	NO. 1	weathering	n, etc., if significant) 9
			0.0' TO 13.6' WATER				Time begin 1542 hrs.	vibracoring:
							Soils descri Benjamin. C	bed by Larry ivilEngr. Tech.
	13.0							
-13.6	13.6 -		RIVER BOTTOM @ 13.6			13.6'		
		••••	graded sand with	trace		14.1'	NOTE: TOP fined as su	OF HOLE is de- rface of water
		••••					and comper for the tide	nsation is made such that
	15.0	••••				15 E1	top of Hole	IS U.U EL MLLW
		•.•.•				2	VIBRACO	RE BORING
		••••				16.0'	Ran 10.0'	Rec: 8.2'
	17 0 -						Tap of wh	
	17.0-	•••				17.5'	sample is	logged as be-
	-	••••				3	When Run	is greater that
						18.0'	is depicte	d as Assumed
							Not Recov	vered.
		•.•.•				19.5'	NOTE: Comr	mercial soils lab
		••••				4	to ASTM D	amples according 2457
		••••				20.0		
	21.0	•••				21 7	LAB CLA	SSIFICATION
		••••		21.8'		5	Jar <u>Numbe</u> r	<u>Classification</u>
			ASSUME NOT RECOVER	ED		21.8'	1	SP
								5,
	23.0							
-23.6	23.6							
			BOTTOM OF HOLE AT	23.6'			NOTE:	
			SOILS ARE FIELD VISUALLY CLASSIFIED IN ACCORDANCE				HOLE TE	RMINATED
			WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM				AT PRE	DETERMINED
							DEPTH A	AT 10.0'
	7							





3047-4 St. Johns Bluff Road S. Jacksonville, Florida 32246 (904) 997-1400 (Tel) • (904) 997-9150 (Fax)

VISUAL SHELL CONTENT

GRAIN SIZE AND VISUAL SHELL CONTENT

Project:	Moorehead City	lead City DMMP			13.6' - 14.1'
Project No.:	WPC6308.00103			Date:	11/23/2008
Boring No.:	MHC-08-V-65				
Sample No.:	1				
Description:	SAND, poorly-g	raded, mostl	y fine-grained	d quartz, little	fine-gravel to
	fine sand-siz	e shell fragm	ents, trace si	lt, olive gray 5	5Y 5/2 (SP)
	Tara Maight (g):	40.06			
Dry M/t Refe	raie weight, (g). re Maching (g):	43.30	(with toro)		
Dry VVL. Delu	re vvasning (g). r Machina (a):	200.3	(with tare)		
Diy weight Aite	i washing (g).	203.07	(with tare)		
				Approx.	a 12° 1
Sieve Size	Sieve Size (mm)		% Passing	Visual Shell	Approx. Visual
(Name)			Ū	%	Shell VVt. (g)
3/4"	19.000	0.00	100.00	0	0.00
3/8"	9.500	0.34	99.78	100	0.34
#4	4.750	0.07	99.74	100	0.07
#7	2.800	0.33	99.52	100	0.33
#10	2.000	0.49	99.21	100	0.49
#14	1.400	0.55	98.85	100	0.55
#18	1.000	0.80	98.34	90	0.72
#25	0.710	1.36	97.46	80	1.09
#35	0.500	4.35	94.66	60	2.61
#45	0.355	16.82	83.84	20	3.36
#60	0.250	55.76	47.94	10	5.58
#80	0.180	57.97	10.62	5	2.90
#120	0.125	13.89	1.68	0	0.00
#170	0.090	1.10	0.97	0	0.00
#200	0.075	0.11	0.90	0	0.00
#230	0.063	0.03	0.88	0	0.00
Tota	al Shell Content:	12		%	



ENG FORM 2087



3047-4 St. Johns Bluff Road S Jacksonville Florida 32246 (904) 997-1400 (Teb • (904) 997-9150 (Fax)

VISUAL SHELL CONTENT

GRAIN SIZE AND VISUAL SHELL CONTENT

Project: Project No.: Boring No.: Sample No.: Description: Moorehead City DMMP

WPC6308.00103

MHC-08-V-65

2 SAND, poorly-graded, mostly fine-grained quartz, few fine-gravel to fine sand-size shell fragments, trace silt, olive gray 5Y 5/2 (SP)

Depth:

Date:

15.5' - 16.0'

11/23/2008

Tare Weight, (g): Dry Wt. Before Washing (g): Drv Weight After Washing (g):

48.32 211.12 (with tare) 209.65 (with tare)

Sieve Size (Name)	Sieve Size (mm)		% Passing	Approx. Visual Shell %	Approx. Visual Shell Wt. (g)
3/4"	19.000	0.00	100.00	0	0.00
3/8"	9.500	0.00	100.00	0	0.00
#4	4.750	80.0	99.95	100	0.08
#7	2.800	0.10	99.89	100	0.10
#10	2.000	0.38	99.66	100	0.38
#14	1.400	0.52	99.34	100	0.52
#18	1.000	0.62	98.96	95	0.59
#25	0.710	1.17	98.24	90	1.05
#35	0.500	3.44	96.12	70	2.41
#45	0.355	15.35	86.70	30	4.61
#60	0.250	55.80	52.42	10	5.58
#80	0.180	67.82	10.76	5	3.39
#120	0.125	14.74	1.71	0	0.00
#170	0.090	1.25	0.94	0	0.00
#200	0.075	0.11	0.87	0	0.00
#230	0.063	0.06	0.84	0	0.00
Tota	I Shell Content:	11		%	

