

From: [Chet Myers](#)
To: [Keegan, Michael F NAE](#); [Michalak, Scott C NAE](#); [Bachand, Michael L NAE](#)
Cc: [Gary Davis](#); [Mike Marsh](#); [Sneeringer, Paul J NAE](#); [Jay Borkland](#)
Subject: RE: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)
Date: Tuesday, August 21, 2012 3:17:20 PM
Attachments: [02900 Blasting.doc](#)
[Plan Distances Borings.pdf](#)
[Over Water Boring Logs.pdf](#)

Gentlemen,

As discussed, please find the word version of the blasting specification, the drawing showing the distances from the Hurricane Barrier as well as boring locations, and the boring logs. Please note that elevations are in Mean Lower Low Water (MLLW).

Thanks,

Chet Myers
Apex Companies, LLC
O) 617-728-0070 M) 617-908-5778

-----Original Message-----

From: Sneeringer, Paul J NAE [<mailto:Paul.J.Sneeringer@usace.army.mil>]
Sent: Friday, August 17, 2012 10:48 AM
To: Jay Borkland; Chet Myers
Cc: Gary Davis; Keegan, Michael F NAE; Michalak, Scott C NAE; Bachand, Michael L NAE; Mike Marsh
Subject: RE: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Jay and Chet:

I am following back with Mike Marsh to see when he is able to attend a meeting "late morning" on next Tuesday. Once I have that information, I will finalize an outlook invitation for this meeting. Thanks.

Paul Sneeringer
(978) 318-8491

-----Original Message-----

From: Jay Borkland [<mailto:jborkland@apexcos.com>]
Sent: Friday, August 17, 2012 10:38 AM
To: Sneeringer, Paul J NAE; Chet Myers
Cc: Gary Davis; Keegan, Michael F NAE; Michalak, Scott C NAE; Bachand, Michael L NAE; Mike Marsh
Subject: RE: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Hi Paul. I am responding for Chet as he is in the middle of something. We would like to do it next Tuesday morning (Aug 21) if possible. Apex is available all morning, so to throw out a time, how does 10am look? Thanks. - J

Jay Borkland
Apex Companies, LLC
O) 617-728-0070 M) 617-513-0640

-----Original Message-----

From: Sneeringer, Paul J NAE [<mailto:Paul.J.Sneeringer@usace.army.mil>]

Sent: Friday, August 17, 2012 10:33 AM

To: Chet Myers

Cc: Jay Borkland; Gary Davis; Keegan, Michael F NAE; Michalak, Scott C NAE; Bachand, Michael L NAE; Mike Marsh

Subject: RE: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Chet:

I heard back from Mike Marsh on his availability. He is available next Tuesday in the late morning or afternoon or on Wednesday. Please let me know which time will work best for the Commonwealth and/or the Apex Team. I can reserve a conference room here at the Corps. Thanks.

Paul Sneeringer
(978) 318-8491

-----Original Message-----

From: Chet Myers [<mailto:cmyers@apexcos.com>]

Sent: Friday, August 17, 2012 9:12 AM

To: Sneeringer, Paul J NAE

Subject: RE: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Hi Paul,

Is it possible for you to ask USACE to hold off on submitting a written comment on the blasting issue until we have a chance to discuss the issues with them?

We are trying to coordinate schedules, but it looks like we would be setting up the meeting with them on Tuesday morning.

Chet Myers
Apex Companies, LLC
O) 617-728-0070 M) 617-908-5778

-----Original Message-----

From: Sneeringer, Paul J NAE [<mailto:Paul.J.Sneeringer@usace.army.mil>]

Sent: Thursday, August 16, 2012 4:53 PM

To: Gary Davis

Cc: Jay Borkland; Chet Myers; Ann Williams; Cynthia Catri; Jackie Leclair; Mike Marsh; Keegan, Michael F NAE; Michalak, Scott C NAE; Bachand, Michael L NAE

Subject: RE: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Gary:

Based upon coordination with the Corps Levee Safety Team, the following are the best days for scheduling the South Terminal Blasting Impacts Meeting:

Tuesday August 21st: Any Time
Thursday August 23rd: Morning
Wednesday August 22nd: Late Morning
Monday August 20th: Late Morning

Please let me know if any of these dates will work for you and the Apex team. I will continue to coordinate with Mike Marsh. Once we have a date and time for this meeting, I can arrange for a conference room at Concord Park. Thanks.

Paul Sneeringer
(978) 318-8491

-----Original Message-----

From: Sneeringer, Paul J NAE
Sent: Thursday, August 16, 2012 3:16 PM
To: Bachand, Michael L NAE; Michalak, Scott C NAE; Keegan, Michael F NAE; 'Mike Marsh'
Cc: Gary Davis; Jay Borkland; 'Chet Myers'; 'Ann Williams'; Cynthia Catri; 'Jackie Leclair'
Subject: FW: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Scott and the Mikes:

Gary Davis with the State has asked me to come up with some potential dates for scheduling the meeting on blasting impacts associated with the South Terminal Project so that he can coordinate them with the Apex Team. Please let me know which dates are best for you over the next two weeks. I am ask that this meeting be held at Concord Park. Thanks.

Paul Sneeringer
(978) 318-8491

-----Original Message-----

From: Ann Williams [<mailto:Williams.Ann@epamail.epa.gov>]
Sent: Thursday, August 16, 2012 2:15 PM
To: Keegan, Michael F NAE
Cc: Cynthia Catri; ElaineT Stanley; Gary Davis; Bachand, Michael L NAE; Sneeringer, Paul J NAE; Michalak, Scott C NAE; Jackie Leclair; Mike Marsh; Carl Dierker
Subject: RE: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Dear everyone:

Please include Mike Marsh in any efforts to schedule a meeting about this blasting issue.

Thanks,
Ann

Ann H. Williams
Senior Assistant Regional Counsel
U.S. EPA Region 1
5 Post Office Square – Suite 100
Mail Code ORA18-1
Boston, MA 02109-3912
617-918-1097 (phone)
617-918-0097 (fax)
williams.ann@epa.gov

Inactive hide details for "Keegan, Michael F NAE" ---08/16/2012 12:11:13 PM---Classification:
UNCLASSIFIED Caveats: NONE"Keegan, Michael F NAE" ---08/16/2012 12:11:13 PM---Classification:
UNCLASSIFIED Caveats: NONE

From: "Keegan, Michael F NAE" <Michael.F.Keegan@usace.army.mil>
To: "Sneeringer, Paul J NAE" <Paul.J.Sneeringer@usace.army.mil>, "Michalak, Scott C NAE"
<Scott.C.Michalak@usace.army.mil>
Cc: "Bachand, Michael L NAE" <Michael.L.Bachand@usace.army.mil>, Ann Williams/R1/USEPA/US@EPA,
Cynthia Catri/R1/USEPA/US@EPA, ElaineT Stanley/R1/USEPA/US@EPA, Gary Davis
<gary.davis@state.ma.us>
Date: 08/16/2012 12:11 PM
Subject: RE: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford
Hurricane Barrier (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Paul,

We already had a meeting scheduled with Apex a week or so ago but it was cancelled because EPA wanted to be there and couldn't make the identified date. We need to identify who needs to be at the meeting so that we don't go through the same situation again. Is it the Corps, Commonwealth and Apex or does EPA also need to be there?

Mike

-----Original Message-----

From: Sneeringer, Paul J NAE
Sent: Thursday, August 16, 2012 11:15 AM
To: Michalak, Scott C NAE
Cc: Bachand, Michael L NAE; Keegan, Michael F NAE; Ann Williams; Cynthia Catri; ElaineT Stanley; Gary Davis
Subject: FW: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Scott:

I wanted to let you know that I forwarded your e-mail about potential impacts to the New Bedford Hurricane Barrier from blasting work at the South Terminal site to the South Terminal EPA Team. Carl Dierker forwarded your concerns to Gary Davis with the State. Carl Dierker recommended that the Commonwealth and Apex should schedule a meeting with the Corps team to better flesh out the scope of potential blasting impacts. I will let you know if I hear anything more about the scheduling of this meeting. Thanks.

Paul Sneeringer
(978) 318-8491

-----Original Message-----

From: Davis, Gary (DCR) [<mailto:gary.davis@state.ma.us>]
Sent: Thursday, August 16, 2012 6:53 AM
To: 'Carl Dierker'

Cc: Ann Williams; Cynthia Catri; Sneeringer, Paul J NAE
Subject: RE: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Understood Carl - I will circle back to you. /gd

From: Carl Dierker [<mailto:Dierker.Carl@epamail.epa.gov>]
Sent: Wednesday, August 15, 2012 6:44 PM
To: Davis, Gary (ENV)
Cc: Ann Williams; Cynthia Catri; Sneeringer, Paul J NAE
Subject: Fw: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Gary -- Just received this email chain. We can discuss, but my initial suggestion would be for Apex to sit down with folks at the Corps responsible for the hurricane barrier (and Paul) to go over blasting issues, given their initial reaction below.

Thanks,
Carl

----- Forwarded by Carl Dierker/R1/USEPA/US on 08/15/2012 06:29 PM -----

From: Ann Williams/R1/USEPA/US
To: Carl Dierker/R1/USEPA/US@EPA
Date: 08/15/2012 05:56 PM
Subject: Fw: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

----- Forwarded by Ann Williams/R1/USEPA/US on 08/15/2012 05:56 PM -----

From: "Sneeringer, Paul J NAE" <Paul.J.Sneeringer@usace.army.mil>
To: Ann Williams/R1/USEPA/US@EPA, Cynthia Catri/R1/USEPA/US@EPA
Cc: ElaineT Stanley/R1/USEPA/US@EPA, Kimberly Tisa/R1/USEPA/US@EPA, Mike Marsh/R1/USEPA/US@EPA, Phil Colarusso/R1/USEPA/US@EPA, Ralph Abele/R1/USEPA/US@EPA, Jackie Leclair/R1/USEPA/US@EPA
Date: 08/15/2012 05:47 PM
Subject: FW: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Ann and Cindy:

I contacted the Corps Levee Safety Team to check and see if they had reviewed the potential for blasting impacts associated with the South Terminal Project to impact the adjacent New Bedford Hurricane Barrier. Enclosed is the response that I received from Scott Michalak. It sounds as if blasting

could be a real red flag issue for the Levee Safety Team

I am not sure what level of geological documentation is necessary to complete the blasting assessment. Should I forward this comment directly to Gary and the Apex team so that they can provide the necessary documentation? Thanks.

Paul Sneeringer
(978) 318-8491 (W)
(978) 505-9216 (cell)

-----Original Message-----

From: Michalak, Scott C NAE
Sent: Wednesday, August 15, 2012 3:50 PM
To: Sneeringer, Paul J NAE; Bachand, Michael L NAE; Keegan, Michael F NAE
Cc: Mackos, Anthony T NAE; Margolis, David I NAE; Papadopoulos, Anastasia S NAE
Subject: Re: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

All,

I have severe reservations about blasting within proximity to the Hurricane Barrier. This could cause extreme issues. We would need the design analysis performed by APEX as a start even to begin to assess. This would include a geologic assessment of the area.

I am not familiar enough with the local rock and geologic setting nor the Barrier foundation conditions within this area. This would need to be assessed as well.

This would definitely need to go to HQUSACE for approval under 33USC408. As of present, I would not recommend approval up the chain.

Regards,
Scott C. Michalak, P.E.
Chief, Geotechnical/Water Resources Branch

United States Army Corps of Engineers
New England District
696 Virginia Road
Concord, Massachusetts 01742
Phone: 978.318.8350

Message sent via my BlackBerry Wireless Device

----- Original Message -----

From: Sneeringer, Paul J NAE
Sent: Wednesday, August 15, 2012 02:16 PM
To: Bachand, Michael L NAE; Michalak, Scott C NAE; Keegan, Michael F NAE
Subject: South Terminal Project in New Bedford - Potential Blasting Impacts to the New Bedford Hurricane Barrier (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Mike, Scott, and Mike:

The public comment period for EPA's DRAFT ARARs decision document for the South Terminal Project in New Bedford comes to an end on August 21, 2012. Yesterday afternoon the EPA South Terminal Team

met with the Commonwealth of Massachusetts and Apex to discuss outstanding documentation that needs to be provided to EPA before they can issue their final determination on this project.

The Commonwealth's June 18, 2012 supplemental information package opened the possibility that contractor's may need to do localizing blasting to remove bedrock in and directly adjacent to the main confined disposal facility area. While I am aware that APEX modeled the impacts of proposed dredging on the stability of the New Bedford Hurricane Barrier, I am not sure if they provided an appropriate evaluation of potential blasting impacts on the New Bedford Hurricane Barrier. Do you have any outstanding concerns about how this potential blasting would impact the adjacent New Bedford Hurricane Barrier?

Please let me know if you need any additional information in order to complete your review of this issue. Thanks.

Paul Sneeringer
(978) 318-8491 (W)
(978) 505-9216 (Cell)

Classification: UNCLASSIFIED
Caveats: NONE

NEW BEDFORD MARINE COMMERCE TERMINAL

SECTION 02900

BLASTING

PART 1 GENERAL

1.1 BLASTING REGULATIONS, CONTROLS AND RESPONSIBILITIES

1.1.1 General

When the nature of the material to be dredged requires blasting, the Contractor's blasting progress and methods shall be those necessary to accomplish the excavation shown on the Contract Drawings in accordance with the procedures specified herein. The Contractor shall note that an Operational Blasting Plan shall be submitted for review by the Owner, Owner's Representative, as well as regulatory oversight authorities as noted in Part 3.9 of this Section. The Contractor will be required to make necessary plans, examinations, surveys, and test blasts to determine the quantity of explosives that can be fired without damaging property, and to thereafter control the quantity of explosives fired in any one blast to prevent injuries to persons or damage to structures, homes, utilities, vehicles, vessels moored or underway, or any property. The Contractor's blasting program shall abide by all Federal, State and Local laws and regulations, which include, but are not limited to, the following applicable codes and regulations:

- Title 29 Code of Federal Regulations Part 1926, Safety and Health Regulations for Construction.
- Federal Occupation Safety and Health Act of 1970.
- Army Corps of Engineers EM-385-1-1, Safety and Health Requirements Manual.
- Institute of Makers of Explosives (IME); Safety Publications.
- Board of Fire Prevention Regulations, Code of Massachusetts Regulations, Title 527, Section 13

1.1.2 Liabilities

The Contractor's attention is called to Article 5 of Section 00700 of the General Conditions entitled "Laws to be Observed", which defines the Contractor's responsibilities relative to the references listed in paragraph 1.1.1. The Contractor shall assume all liability and hold and save the Owner, its representatives, officers, agents, and employees harmless for any and all claims for personal injuries, property damages, or other claims arising out of, or in connection with, the transportation, storage, and use of explosives under the contract.

1.1.3 The Contractor shall, in addition, process any and all claims of private citizens arising out of said use of explosives promptly in an acceptable time period set by the Owner's Representative; in particular, all property damage claims shall be acknowledged by the

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Contractor, or his representative, and be submitted immediately as directed by the Owner's Representative providing name of claimant, location, time and description of alleged damage, and estimated value. The claimed damage shall be inspected by the Blasting Vibration Consultant (see paragraph 3.7.3) within 48 hours following initial notification, and processed to a conclusion (honored, denied, or compromised) within 90 days after cessation of all blasting on the contract; but, in no case shall the claims remain unresolved for a period exceeding 6 months (180 calendar days). The Contractor shall submit inspection results and actions taken to the Owner's Representative on a weekly basis.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TRANSPORTATION, STORAGE, AND USE OF EXPLOSIVES

The Contractor will be held responsible to perform the work in compliance with all applicable Federal, State, and local codes and regulations, including, but not limited to, those cited above in paragraph 1.1.1. The Contractor shall have available the documents for inspection at all times, which will pertain to the blasting operation. In case of conflict between codes and regulations, the more stringent will apply.

3.1.1 Daily Summary

The Contractor shall keep a daily record of transactions, to be maintained at each storage magazine. The inventory records shall be updated at close of business each day and furnished to the Owner's Representative on a weekly basis. Records shall show class and quantities received and issued, and total remaining on hand at end of each day. The remaining stock shall be checked each day, and any discrepancies that would indicate a theft or loss of explosive materials shall be reported immediately. The daily summary shall be done in accordance with the applicable regulations cited in paragraph 1.1.1. Copies of the daily inventory records shall be furnished to the Owner's Representative.

3.1.2 Report of Loss

Should a loss or theft of explosives occur, all circumstances and details of the loss/theft will be immediately reported to the nearest office of the Alcohol, Tobacco, Firearms and Explosives (ATF), as well as to the local and State law enforcement authorities and the Owner's Representative.

ATF Boston Field Office
10 Causeway Street, Room 791
Boston, Massachusetts 02222
Telephone: 617-557-1200

The New Bedford Fire Department should be contacted at the following address:

New Bedford Fire Department

NEW BEDFORD MARINE COMMERCE TERMINAL

868 Pleasant Street
New Bedford, Massachusetts 02740
Telephone: 508-991-6105, 508-991-6124.

3.2 RESPONSIBILITY

The Contractor shall be responsible for obtaining all licenses, permits, any and all fees, and the keeping of accounts and records, as well as arranging the transportation and protection of all explosives on the contract, and notifying the relevant local, state and federal authorities of its work. Should the Contractor fail to comply with above requirements, the Owner's Representative may order a suspension of that part of work involved until the deficiencies are corrected. The Contractor's attention is also directed to subparagraph 1.1.2 "Liabilities" for additional specific liability to be assumed by the Contractor. The Contractor must supply to the Owner's Representative all permits, licenses and approvals which are necessary for this contract as required by the regulations cited in paragraph 1.1.1.

3.3 PREBLAST PUBLIC INFORMATION MEETINGS

3.3.1 The Contractor shall schedule, publicize, coordinate, secure adequate facilities for, and conduct two Preblast Public Information Meetings prior to finalizing his Operational Blasting Plan. The meeting shall be held in New Bedford, Massachusetts. As a minimum, the meetings shall be publicized in advertisements in local newspapers, including the Standard Times, not less than two weeks prior to the scheduled meeting for a period of not less than one week. State and local agencies likely to express an interest in the project shall be contacted in writing directly, including law enforcement, fire prevention, and environmental authorities. The Owner's Representative will solicit interest from appropriate Federal agencies. In addition, all property owners whose properties border a portion of the contract limits shall be contacted in writing directly. A post test blast public information meeting shall be conducted at the above location, if requested by the Owner's Representative.

3.3.2 The contents of the advertisements shall be approved by the Owner's Representative prior to advertisement. Copies of all correspondence publicizing the meetings shall be furnished to the Owner's Representative.

3.3.3 The purpose of the meetings is to disseminate basic project information to interested members of the public, to solicit comments from the public and evaluate proposed blasting methods in light of any valid concerns, and to identify key representatives of the Contractor and Owner's Representative who may be contacted for current project information or to report complaints. The Contractor, in conjunction with the Owner's Representative, shall prepare an agenda for each meeting to address these purposes. A public question-and-answer period shall be held at the conclusion of the public presentation if required by the Owner's Representative.

3.3.4 The Owner's Representative will participate in each meeting, and will provide reasonable assistance in planning, scheduling, and coordination with the public.

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3.3.5 The proceedings of each meeting shall be recorded verbatim by the Contractor, and transcripts thereof shall be provided to the Owner's Representative. The Owner's Representative will review the transcripts, as well as any written comments that may be received, with the Contractor, and may require the Contractor to address specific comments in his Operational Blasting Plan prior to submission.

3.4 PROTECTION FOR ADMINISTRATION OF DRILLING AND BLASTING COMPLAINTS

3.5 PREBLAST SURVEY

The Contractor shall provide one person from his organization and his specialist on vibration control (Seismic specialist, see paragraph 3.7.3) to work as a team with a representative of the Owner's Representative in making a preblast structural survey. A preblast survey of the interior and exterior of all structures shall be made within a one thousand five hundred (1500) foot radius from the production blasting areas. The Contractor must notify the property owners near the blasting areas of the preblast survey as defined below. All structures that may be affected by the blasting, as well as those enumerated in paragraph 3.7.3, will be inspected and their condition documented. Any existing outstanding architectural defects such as broken or fallen plaster or broken windows shall be photographically documented by video and with a 35 mm camera with 3:1 zoom capabilities. The Contractor shall provide methodology to be used in conducting the preblast survey and listing of structures, determined from the survey to be sensitive, with reasons for these structures being sensitive, within 1500 feet from the blasting areas. Photographs will be taken of all the surveyed structures. The Contractor will determine the elevation of all piers and record with photographs all floating vessels that are in the vicinity and that are vulnerable to wave propagation.

The Contractor shall certify that the survey was prepared prior to the start of any blasting under this contract. A copy of the Preblast survey shall be submitted for the Owner's Representative's approval in conjunction with the Operational Blasting Plan.

3.5.1 Prior to test blast program and Blasting activities, the following actions regarding property owners located within 1,500 feet of proposed blasting locations are required:

- A. Newspaper Advertisements-Advertisements in the local newspapers informing the public about the location, date and time of the Public Information Meetings.
- B. Public Information Meetings
- C. Door hangers providing information about the blasting and the request for pre-blast property inspection surveys to the property owners residing within 1,500 ft from the blast site.
- D. Requests by first class mail to all property owners for pre-blast property inspections within the 1,500 foot radius of blasting
- E. Where there has been no response to first requests, second requests by certified letter for pre-blast property inspections.

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- F. Where there has been no response to second requests, the Contractor shall inform the property owner by certified mail that he has not responded to both requests for inspections and will provide the date and time that blasting will be commencing .

3.5.2 During blasting activities, the process for addressing citizens complaints will be as follows:

- A. Citizen complaints will be received through the Contractor.
- B. The caller's name, address, phone number, and pertinent information will be recorded in a master complaint log to be maintained by the Contractor.
- C. Contractor shall schedule and perform an inspection of the complainant's property within five calendar days of the date of the complaint.
- D. The Contractor shall issue an acknowledgement letter not later than seven days from the inspection date as a follow up to the inspection and update the complainant as to the status of the final determination of the inspection results.
- E. The Contractor shall provide to the complainant a final determination letter honoring, denying the claim within 90 days after cessation of all blasting on the contract. In no case shall the claims remain unresolved for a period exceeding 180 calendar days.
- F. Inspection results, actions taken and all correspondence regarding the complaints shall be furnished to the Owner's Representative.

3.6 SAFETY

3.6.1 Drill Boat or Barge Safety

- 3.6.1.1 All onboard magazines shall be permanently secured to the deck as required by the Coast Guard.
- 3.6.1.2 No high explosives shall be stored on the boat or barge deck in the open except for the one case that is to be loaded immediately into the bore holes. Any explosives remaining on deck shall be returned to the day magazine prior to the firing of any blast.
- 3.6.1.3 The firing line reel or spool shall be mounted on the rig in a manner that it cannot be lost overboard. An approved blasting machine shall be used for detonation regardless of the number of caps used. An electric blasting system shall not be used.
- 3.6.1.4 The amount of explosives permitted aboard the drill boat at any one time will be subject to the approval of the 'Owner's Representative, but in no case shall such amount exceed the amount permitted by appropriate codes and regulations.
- 3.6.1.5 The Contractor shall make necessary arrangements to prevent damage to any vessel, moored or underway, building or structure and

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preserve the crew or occupants thereon from exposure to injury as a result of the Contractor's operations. The Owner's Representative may require additional arrangements.

- 3.6.1.6 The Contractor shall have a certified marine survey of all floating plant proposed for underwater blasting work on this contract performed prior to starting any work, and shall provide the results to the Owner's Representative.
- 3.6.1.7 Automatic fire extinguishers of an appropriate type shall be installed on air compressors and in all engine compartments aboard vessels (drill boats, barges) where explosives are stored, handled, and used.
- 3.6.1.8 Remote fuel shut-offs and fire signaling devices shall be provided aboard the drill boats.
- 3.6.1.9 Loading of tubes and casings of dissimilar metals shall not be used because of possible transient electric currents from galvanic action of the metals and water.
- 3.6.1.10 Only water resistant blasting caps and detonating cords shall be used for all marine blasting. Loading shall be done through a non-sparking metal loading tube when a tube is necessary.
- 3.6.1.11 No blast shall be fired while any vessel under way is closer than 1,500 feet from the blast area. Those on board vessels or craft moored or anchored within 1,500 feet shall be notified before a blast is fired.
- 3.6.1.12 No blast shall be fired while any swimming or diving operations are in progress in the vicinity of the blasting area. If such operations are in progress, signals and arrangements shall be agreed upon to assure that no blast shall be fired while any person is in the water.
- 3.6.1.13 A red blasting flag, 18 inches by 30 inches with the word "EXPLOSIVES" thereon in white letters, at least six inches in height, shall be readily visible in all directions.
- 3.6.1.14 The storage of explosive material shall be in accordance with 527 CMR 13.05(4).
- 3.6.1.15 When more than one charge is placed in under water, a float device shall be attached to an element of each charge in such a manner that it will be released by firing. Misfires shall be handled in accordance with 527 CMR 13.09(5).

3.6.2 Lightning

The Contractor shall furnish, maintain, and operate lightning-detection equipment during the entire period of blasting operations and during the periods that explosives are stored at the site. The equipment shall be installed where approved by the Owner's Representative. A lightning detector shall be operated at all times to detect lightning within a 50 mile radius. When the lightning-detection device indicates a blasting hazard potential, the Contractor shall perform the following:

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- A. Notify the Coast Guard and the Owner's Representative of the potential hazard.
- B. Clear the buoyed area of all vessels and personnel.
- C. Terminate all loading of holes and return unused explosives to the day storage area/day magazine.
- D. Monitor the blast area to prevent any boat or vessels from inadvertently entering the blasting area during the lightning hazard.
- E. Remove the lightning detector from the drill barge with the last evacuation vessel and continuously monitor the potential hazard until the danger has passed.
- F. After sounding the All Clear Signal, notify the Coast guard and the Owner's Representative that the potential hazard has passed.
- G. Resume operations only after all potential of hazard has passed.

3.6.3 All other applicable safety requirements shall be implemented in addition to that required above.

3.6.4 Navigation Control during Drilling, Loading, and Blasting Operations

3.6.4.1 The Contractor shall buoy the area with warning signs. The warning signs shall be legible from a distance of 200 feet and shall contain the message "DANGER - EXPLOSIVES IN USE" visible on either side of the sign. The Contractor shall operate two or more patrol boats during blasting operations equipped with a visible yellow flashing light, audible horn, and radio with a hailer, whose sole function shall be to monitor and maintain security in the blast area. Patrol boats shall be stationed at the drill barge and remain in the blasting area during all blasting operations. Land oriented access control and visual observation locations should be determined and approved by the Owner's Representative. The Contractor shall inspect and ensure there is no boat traffic within the buoyed work area prior to the firing of the blasting caps and until such time as the Contractor has sounded the "All Clear Signal". The Contractor shall establish and maintain a warning system as required by the Corps of Engineers Safety Manual. The Contractor shall equip and maintain his floating plant with radio equipment capable of communications with the Coast Guard. The Contractor, after each blast, upon inspecting the area, shall immediately notify the Coast Guard and the Owner's Representative if all clear or misfire is noted.

3.6.4.2 Coordination with the U.S. Coast Guard.

The Contractor shall notify the Coast Guard 24 hours prior to a scheduled shot and 2 hours prior to the actual shot. The channel must be kept open to vessel traffic at all times except as permitted by the Coast Guard and the Owner's Representative. Contact should be made with:

US Coast Guard New Bedford Marine Safety Unit
New Bedford, Massachusetts

NEW BEDFORD MARINE COMMERCE TERMINAL

Telephone: 508-999-0072

3.6.5 Contingency Plan in Case of Misfire, Inadvertent Initiator Extraction, or Accidental Loss of Down Lines

All loading of blasting holes shall be done early enough each day to allow time, in case of a misfire, inadvertent initiator extraction, or accidental loss of down lines, to implement a contingency plan for removing or detonating the explosives before dark. The Contractor shall submit a contingency plan to the Coast Guard and Owner's Representative prior to initiation of any blasting and shall notify both parties in the event of a misfire, inadvertent initiator extraction, or accidental loss of down lines. All undetonated explosives due to misfire, inadvertent initiator extraction, or accidental loss of down lines must be detonated. The Contractor shall immediately notify the Coast Guard upon giving the "All Clear Signal" after correcting the misfire, inadvertent initiator extraction, or accidental loss of down lines.

3.6.6 The Contractor shall notify the public at least 24 hours prior to any scheduled blast, and at least 2 hours prior to an actual blast. As a minimum, the following shall be notified:

New Bedford Police Department
871 Rockdale Avenue
New Bedford, Massachusetts 02740
Tel. (508) 991-6300

New Bedford Fire Department
868 Pleasant Street
New Bedford, Massachusetts 02740
Tel. (508) 991-6124

Fairhaven Police Department
1 Bryant Lane
Fairhaven, Massachusetts 02719
Tel. (508) 997-7421

Fairhaven Fire Department
146 Washington Street
Fairhaven, Massachusetts 02719
Tel: (508) 994-1428

3.6.7 Bulk Product Specifications

- A. Bulk blasting agents or explosives delivered to the work area shall be weighed by a certified weigh master at the transfer location nearest the work area to determine the actual quantity of explosives delivered each day.
- B. Bulk storage tanks or vessels on barges shall be permanently attached to the barge and electrically grounded. A containment dike shall be erected to contain the maximum rated capacity of the storage vessel and all associated pumps and hoses for transfer operations. Pumps, hoses and valves containing bulk product after transfer operations shall be stored in a locked magazine.

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- C. All access ports, valves, vents and drains shall be secured to prevent vandalism or theft of the explosive product.

A flow metering device capable of measuring the quantity of explosives to within 0.5% of the actual quantity in pounds shall be utilized for all bulk transfer to or from the bulk storage vessel.

- D. The delivery system to load holes on each drill frame shall be designed to load each hole to within 0.5% of the design quantity required for each drill hole.
- E. Each drill frame shall measure the quantity of explosives loaded in all holes with weigh scales or flow metering devices to within 0.5% of the design quantity for each hole. The total of all loaded holes shall be checked with the total quantity delivered prior to subsequent bulk deliveries. Should the bulk quantity delivered vary from the recorded quantity loaded and detonated, all measuring devices and or meters shall be recalibrated to within the specified accuracy.
- F. Each hole loaded with emulsions or slurry shall be initiated with two separate downlines, caps, boosters and starters. At least one booster shall be secured in the hole with a mechanical lock-in system or spider to prevent extraction of the booster or priming charge.
- G. As a minimum the top elevation of the emulsion or slurry product shall be measured to check for voids and actual quantity loaded.
- H. The blast plan shall include manufacturer's catalog cuts, data sheets and detailed plans and specifications for the bulk storage vessel and transfer system, drill frame delivery system associated loading tubes and reel systems and measuring devices.
- I. All loading tubes or hoses shall be equipped to be retracted from the bottom of the hole to the top of the product as the emulsion or slurry is loaded in the hole. The system shall in effect place the product in each hole in a tremie method.

3.6.8 Surface Blasting

Doby, or Surface Blasting, will not be allowed for the fragmentation of bedrock. Doby blasting is an allowable option for fragmenting boulders or large blast rubble when water depths are at least 30 feet.

3.7 BLASTING CONTROL

3.7.1 General

The blasting program and methods shall be those developed by the test blasting program and procedure to accomplish the excavation shown on the contract drawings in accordance with the procedures specified herein.

3.7.2 Blasting

Blasting shall be confined to daylight hours during the period from 2 hours after sunrise to 1 hour before sunset, but shall not be conducted before 9:00 A.M. or after 4:00 P.M. on the day of blasting. Blasting shall not be conducted when temperature inversions or heavy, low-level cloud cover exists. **Blasting will be prohibited on Saturdays, Sundays and Federal holidays.**

3.7.3 Vibration Control

Where blasting is necessary, the Contractor shall employ a specialist qualified in vibration control methods capable of analyzing results obtained from seismograph readings. A minimum of 30 days prior to commencement of blasting operations, the Contractor shall provide the Owner's Representative such bona fides of the seismic specialist to include, but not limited to, past experience, training, and education, and have working a knowledge of State and local laws and regulations which pertain to blasting. The acceptability of the specialist is subject to the approval of the Owner's Representative. The Contractor's seismic specialist shall place vibration monitors on any identified historic structures and shall determine the placement of at least 8 additional vibration monitoring machines per blast area (minimum 4 per shore) with approval of the Owner's Representative and shall be retained for loss control should contract blasting operations result in claims or complaints. The vibration monitoring plan shall identify the type of anchoring devices to be employed at various monitoring sites. Structures that should have monitoring machines include, at least, bulkheads, hazardous materials storage areas and buried utilities. At least one vibration monitoring machine must be placed between the blast and the nearest structure on a natural ground surface. This may require utilizing underwater locations. The other machines must be secured in the ground near identified sensitive structures. Blasting shall be controlled in such a manner that the maximum vibration level at any vessel or structure which is vulnerable to damage should not exceed the peak particle velocity of the appropriate municipality and geographical jurisdictions, or be subject to an unacceptable vibration frequency. A written and a telephone report on vibration intensity shall be submitted within 24 hours when specifically requested by the Owner's Representative or, without request, when such intensity exceeds a peak particle velocity of 2.0 inches per second for any one of the 3 perpendicular planes of motion. Peak Particle Velocity of 2.0 inches per second should not become the basis of design. Refer to 527 CMR 13.09 chart (a) for assistance. The Contractor will perform a test blast (paragraph 4) which will determine a safe peak particle velocity (PPV) for all structures within the blast area. If historic structures are to be monitored, they shall be evaluated for sensitivity to vibration and monitored during blasting operations. The Contractor shall follow the following vibration limits for the structures listed below:

Historic Structures PPV<0.5 in/sec
Residential Structures in Massachusetts PPV<0.8 in/sec
Other Structures PPV<2.0 in/sec

The Contractor shall submit a copy of the record in tabular form for each blast to the Owner's Representative no later than 24 hours after each blast, with a written report on velocity and vibration effects. This should also include location of blast, size, spacing, number, top and bottom elevations of holes, type of explosives, amount of explosives and stemming per hole and delay, type of delays, sequence and pattern, distance from the

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blast to the vibration monitoring machine, and any other pertinent information.

- 3.7.3.1 The Contractor is advised to evaluate the vibration and airblast factors affecting structures and vessels in the vicinity of the blast area as determined in the preblast survey. It is recommended that the Contractor use a blast design that produces the maximum amount of relief practicable. The amount of explosives to be used will be determined during the test blast operation to meet all proper safety and environmental requirements. The Contractor is responsible that the fragmentation resulting from the blasting operation is of suitable size to allow for easy excavation by the Contractor's equipment. The Contractor shall also check water wave propagation to insure that shoreline structures and moored vessels within the blasting area will not be affected during blasting.
- 3.7.4 All blasting shall be monitored by the Contractor to determine air blast effects using an instrument approved by the Owner's Representative, operated by an experienced person with a minimum of 3 years of related experience with the type of equipment to be used throughout the project construction and all data furnished to the Owner's Representative. The instrumentation will be located at seismic station locations as determined in paragraph 3.7.3 and other locations as directed by the Owner's Representative with at least three (3) monitors located in the area closest to the blast site. Airblast equipment shall record waveform data. Recorded airblast data shall be submitted in conjunction with vibration intensity data as specified in paragraph 3.7.3, within 24 hours of each blast. The maximum allowable airblast shall not exceed 129 decibels.
- 3.7.5 If the Government decides to have a supplemental blasting monitoring program, under no circumstances will this relieve the Contractor of monitoring and controlling the blasting as specified in this Section or any other requirements.

3.8 TEST BLAST PROGRAM

3.8.1 Purpose

The purpose of the test program is to allow the Contractor to establish safe limits of vibration and airblast overpressure, demonstrate the satisfactory performance of the drill boats and develop an operational blasting plan. The type of explosives and firing systems shall adhere to all applicable codes and regulations including, but not limited to, those cited in paragraph 1.1.1.

3.8.2 Test Blast Plan

- 3.8.2.1 The Contractor shall submit fifteen (15) copies of the Test Blast Plan for review. The Owner's Representative shall have 35 days for review after receipt. The Contractor may be required to revise and resubmit the plan. The Owner's Representative shall have 21 days review of the revised plan. Concurrence with the revised plan will not relieve the Contractor of his responsibility to produce safe and satisfactory results as set forth by these specifications. The test plan shall include as a minimum all pertinent information listed in paragraphs 3.8.4 and 3.9.3.

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- 3.8.2.2 Test blast programs shall be conducted by the Contractor for each area of rock such as discontinuity of rock contours and areas and as directed by the Owner's Representative. An optional test blast program for the glacial till shall be planned if determined by the Owner's Representative to be necessary. Each blast program shall involve all drill boats that will be used for any portion of the contract. No drill boat shall be used for the contract that has not participated in a test blast program.
- 3.8.2.3 The Contractor shall notify the Owner's Representative sufficiently in advance of each test blast in order for the Owner's Representative to be present during the test blasts. The Contractor shall also invite representatives of the Fire Departments from New Bedford and Fairhaven to the test blasts. The test blasts shall begin with a small number of charges and extend upward to the maximum yield to be used. The final test event shall simulate as close as practicable the explosives charge type, size, overlying water depth, charge configuration, charge separation, initiation methods, and emplacement conditions anticipated for the operational blasting program. During each blast the Contractor will analyze the effect of wave propagation on structures, vessels, etc., and take the appropriate actions to prevent damages.

3.8.3 Post Blast Evaluation

- 3.8.3.1 After each test blast, the Contractor shall examine the structures of the preblast survey that were inspected and documented, to establish whether damage was caused to the structures. All damage resulting from the test blasting shall be reported in detail to the Owner's Representative, including photographs.
- 3.8.3.2 After each test shot the Contractor will excavate the fractured material to evaluate breakage, toe and top of cut. This information will be documented and provided to the Owner's Representative.

3.8.4 Data Recording and Evaluation

The test blast program shall be conducted and reported in strict accordance with procedures outlined in the sections of these specifications covering vibration control and air blast control. The Contractor shall submit the blasting plans showing the location(s) and extent of the blasted areas. The blasting plans shall include the blasting patterns and the locations of patterns shall be drawn on plan sheet(s)(maps) in scale by providing coordinates of at least four (4) corners of the blasted area. Include information as to the number of holes, bottom and top elevations of holes, coordinates of each hole, amount of explosives and stemming per hole, type of delay in holes, sequence and pattern of delays, maximum peak particle velocity from each instrument, and peak overpressure reading in pounds per square inch and decibels from each airblast sensor. Information provided should also include a written analysis of each blast, including the maximum particle velocity in each plane, associated frequency in each plane and peak true vector sum of particle motion. In addition to the submission of an initial test blast plan, the Contractor is required to submit a documentation of each blast prior to proceeding forward the next blast test. The documentation shall include, but not limited to a written analysis of each blast, all observed test blasting data, examination of

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structures of the preblast surveys that were inspected, and information about excavation of fractured materials. Four copies of the record of each blast performed shall be submitted no later than 24 hours after completion of each test blast until the test blast program is completed. It is expected that the initial test blast will be used to develop knowledge of ground conditions, propagation characteristics, etc. At the conclusion of the test blast program, the Contractor shall examine all reports, surveys, test data, and other pertinent information. Conclusions reached shall be the basis for developing a completely engineered procedure for blasting. Five copies of the Test Blast Plan and results shall be provided to the Owner's Representative. In no event shall the operational blasting proceed until the review of the developed procedure for blasting has been completed and the procedures approved.

3.9 OPERATIONAL BLASTING PLAN

3.9.1 The Contractor shall submit to the Owner's Representative ten (10) copies of the Proposed Operational Blasting Plan for review. The Owner's Representative shall have 35 days for review after receipt. The Contractor may be required to revise and resubmit the plan. The Owner's Representative shall have 21 days review of the revised plan. Concurrence with the revised plan will not relieve the Contractor of his responsibility to produce safe and satisfactory results as set forth by these specifications.

3.9.2 Environmental Impact of Blasting

3.9.2.1 The Contractor shall follow the following guidelines and incorporate the following measures when preparing its Operational Blasting Plan and shall use the following measures to minimize its impact to the aquatic environment to the extent possible. These measures include:

1. Evaluate the need to use explosives. If practical alternatives are available and not excessively expensive to remove rock without blasting, the Contractor shall utilize those methods.
2. Plan the blasting program to minimize the total weight of explosive charges per shot and the number of shots for the project.
3. Use angular stemming material of sufficient length in drill holes to reduce energy dispersal to the aquatic environment.
4. Subdivide the charge, using detonating caps with delays or delay connectors with detonating cord, to reduce total pressure. The Contractor shall not use submerged detonation cord unless the Contractor can show that no other method is practicable.
5. The Contractor shall use decking when possible in lengthy drill holes to reduce total pressure.
6. For seismic exploration use non-explosive sources when possible or use linear charges for open water shots or buried charges.
7. Use shaped charges to focus the blast energy when submerged surface charges are necessary, reducing energy released to the aquatic environment during demolition.
8. Contractor shall enclose blast areas with silt curtains to keep fish species away from the blast area and minimize turbidity generated from blasting.
9. Contractor shall use non-explosive noise techniques to move fish and marine mammals from the immediate blast zone.

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3.9.3 No drilling shall be started before the Owner's Representative reviews and concurs with the final blasting plan or any revisions to that plan.

3.9.3.1 Any changes to the Contractor's blasting or monitoring procedures, equipment, plant, products or personnel must be reflected in a revised Operational Blasting Plan or supplement and must be approved by the Owner's Representative prior to implementation.

3.9.4 The Blasting Plan shall include as minimum requirements the following:

1. Proposed method of transportation, storage, and handling of explosives.
2. Plan showing layout of drill hole pattern, timing and sequence, anticipated burden dimensions and depth of subdrilling.
3. Plan for the fragmentation of large boulders and blast rubble.
4. Type of explosives and method of loading and detonating.
5. Type of blasting machine to be used and when last tested.
6. Specific gravity of explosives and manufacturer's technical literature.
7. Initiation system to be used and explosive loading in pounds of explosive per delay.
8. Indication as to whether decking or boosters will be used and the depths of required stemming.
9. Type and number of drilling rigs, including drill hole diameter, and expected production rates/day.
10. Type of instrumentation to be used, manufacturer, and when last calibrated and certified.
11. Procedure for monitoring the blast operations.
12. List of permits and clearances required, when applied for, and date of approval or anticipated approval.
13. A format for maintaining a record of individual blasts throughout the life of the job designed to record pertinent data before, during, and after the blasting operation. Pertinent information shall include, but not limited to, number of holes, bottom and top elevations of holes, coordinates of each hole, amount of explosives and stemming per hole, type of delay in holes, and sequence and pattern of delays.

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14. Names and qualifications of specialists for vibration control analysis and airblast over- pressure measurements (refer to paragraph 3.7.3 for exacting requirements).
15. Location plan, manufacturer's literature, and parameters to be used in site selection for seismic instrumentation.
16. Plan showing location of warning signs and signals and the Contractor's land and marine spotters.
17. Name and address of Contractor's representative to which any claims for damage due to blasting should be addressed.
18. The plan, signed off by the Contractor's jobsite authorized representative.
19. The location of monitoring equipment, based on information from the preblast survey.
20. Contingency Plan for Lightning Hazard
21. The 527 CMR 13.00 Uniform Blasting Site Detail Check List - (Attached at the end of this Section).
22. Complete Project Team Organization with duties, responsibilities and authorities clearly defined. This organizational outline shall also include a listing of all personnel authorized to sign for, receive and use explosives on this contract.
23. Complete list of floating plant involved in production blasting operations.
24. Provide analysis and control of potential hazard due to possibility of undetonated Pourvex remaining from previous deepening.

The Contractor shall submit the blasting plans showing the location(s) and extent of the blasted areas. The blasting plans shall include the blasting patterns and the locations of patterns shall be drawn on the maps in scale by providing coordinates of at least four (4) corners of blasted areas.

3.9.4 If drilling and blasting is required outside the buoyed areas, the Contractor shall submit a plan to maintain **the previous authorized depth**, as part of the Operational Blast Plan. This plan shall include areas where the buoy cannot be removed.

3.10 DRILL LOG AND BLAST REPORT

The Contractor shall prepare and complete drill logs and report for each blast is completed. Information provided on the logs shall include, at a minimum:

1. Name, signature, and Certificate of Competency Number of the blaster in charge.
2. Blast location, address, city description.

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3. Drill rig type, construction of rig, name of driller in charge, location of borehole in Massachusetts State Plane coordinates.
4. Depth of boring in MLLW. Position within borehole of explosives at time of detonation.
5. Date and time of blast.
6. Type of material blasted.
7. Distance in feet, to the nearest inhabited building or structure, neither owned or leased by holder or holder client of the Explosives User Certificate issued by State Fire Marshall.
8. Scaled distance or alternative option used to determine blast design.
9. Type of matting or cover over blast, if applicable.
10. Weather conditions, including temperature, cloud cover, wind direction.
11. Blast plan and sketch showing blast hole diameter, delay, delay patter, and types of detonators, spacing, depth of blast hole, hole pattern and number of holes.
12. Explosive material type, size, total weights of each explosive by hole.
13. Type of initiation system (Methods of firing and type of circuit).
14. Feet of overburden, depth and type of stemming.
15. Maximum weight of explosives detonated within any eight millisecond period.
16. The seismograph(s) location(s) including distance and direction from the seismograph to the closest borehole and from the seismograph to the closest structure.
17. Seismograph readings including peak particle velocity, frequency and airblast.
18. Type of seismograph, instrument make, model serial number, calibration date and sensitivity settings.
19. Name of person taking the seismograph reading. The name and firm analyzing the seismograph record, if applicable.
20. Complaints or comments following blast.

- End of Section -

527 CMR 13.00 Uniform Blasting Site Detail Check List

Location: _____ Date: ___/___/___
 Blaster's Name: _____ Cert. #: _____
 Company Name: _____ Time of Blast: __:___

Check List	Ref. #	Violations?	YES	NO
Two Way Radio/Warning Signs ("Blasting Zone" "Turn off 2-way Radio")	CMR 13.09(1)(p)		<input type="checkbox"/>	<input type="checkbox"/>
Transport Vehicle(s) (Placards, Fire Marshal Magazine Permit, Attended)	CMR 13.06(2), 13.04(3)		<input type="checkbox"/>	<input type="checkbox"/>
Site Storage (Day Box) (Fire Marshal Magazine Permit, Attended)	CMR 13.04(3)		<input type="checkbox"/>	<input type="checkbox"/>
NO smoking or open flames (within 50ft of explosives)	CMR 13.09(1)(d) 2., 3.		<input type="checkbox"/>	<input type="checkbox"/>
NO unnecessary personnel on the blast site (while boreholes are being loaded or are loaded with explosives)	CMR 13.09(2)(a)		<input type="checkbox"/>	<input type="checkbox"/>
Prior to blasting, excess explosives returned to proper storage	CMR 13.09(2)(f)		<input type="checkbox"/>	<input type="checkbox"/>
Seismograph must be placed between 5&10 ft of nearest inhabited structure	CMR 13.09 (9)(f)		<input type="checkbox"/>	<input type="checkbox"/>
Explosives, persons & equipment must be at a safe distance prior to blast	CMR 13.09(3)(a), (h)		<input type="checkbox"/>	<input type="checkbox"/>
Warning signal (3 long blasts 5 min before blast) Blast Signal (2 blasts 1 min before blast) All Clear Signal (1 prolonged blast)	CMR 13.09(1)(m), (3)(h)(2)		<input type="checkbox"/>	<input type="checkbox"/>
Post Blast Inspection (blaster must inspect site prior to personnel returning)	CMR 13.09(4)		<input type="checkbox"/>	<input type="checkbox"/>
Trash (boxes, bags, non-electric) (shall be picked up and/or destroyed)	CMR 13.09(6)		<input type="checkbox"/>	<input type="checkbox"/>

Seismograph Readings:

PPV: H_____ V_____ R_____ (2.0 in/sec max)
 HZ: H_____ V_____ R_____ Airblast: _____ Db (133max)

Report any incident involving flyrock, whether or not was an injury or damage, to the Office of the State Fire Marshal at 978-567-3375.

FP-55 (Rev. May '10)

NOTES:
CASING WAS LEFT IN PLACE WHILE ADVANCING BORING
A-2011-B5. CONTRACTOR SHALL REMOVE AND DISPOSE OF
CASING OFFSITE.

LEGEND:
A-2011-B5 - BORING LOCATION.



ROCKVILLE, MD
SOUTH WINDSOR, CT - BOSTON, MA -
NEW BEDFORD, MA - HOLYOKE, MA

184 HIGH STREET, SUITE 502
BOSTON, MA 02210

58H CONNECTICUT AVENUE
SOUTH WINDSOR, CT

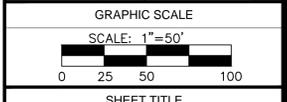
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PROJECT
**NEW BEDFORD
MARINE COMMERCE
TERMINAL**

OWNER
**MASSACHUSETTS CLEAN ENERGY CENTER
55 SUMMER STREET, 9TH FLOOR
BOSTON, MASSACHUSETTS**

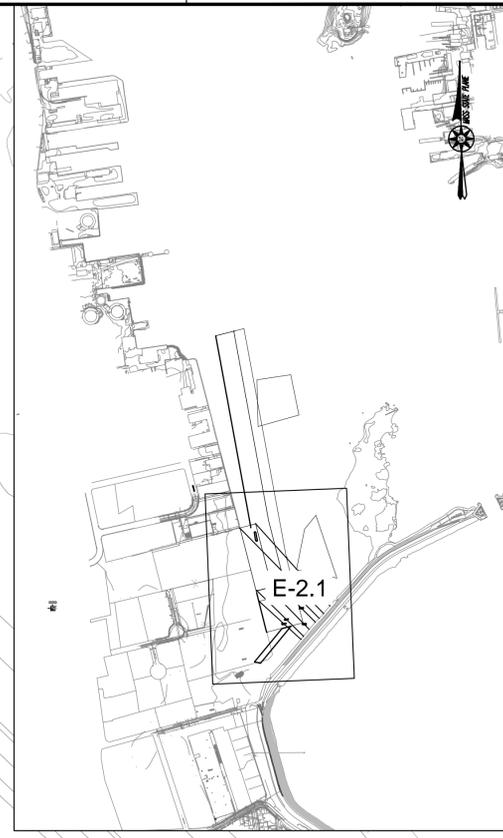
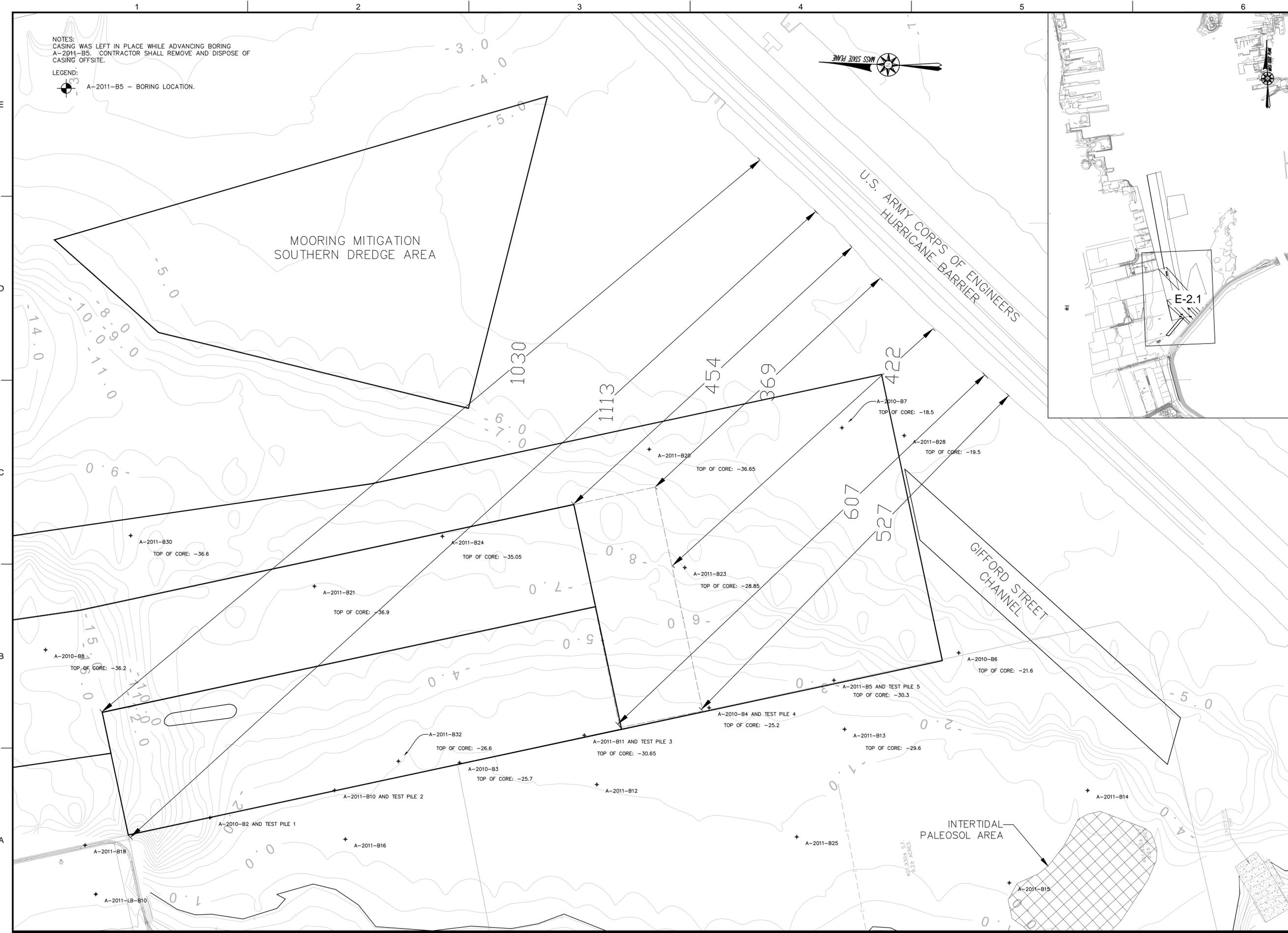
NO.	DATE	DESCRIPTION	BY
3	06/28/12	MOORING MIT. UPDATE	CWM
2	03/05/12	EX. COND. UPDATE	CWM
1	12/23/11	FOR CONSTRUCTION	CHM

PROJECT NO.	6690
CADD FILE	E-1.1-E-2.2_Blasting_Diagram
DESIGNED BY	GCD
DRAWN BY	GCD
CHECKED BY	CMM
DATE	08/04/2011
DRAWING SCALE	1"=50'



SHEET TITLE
**EXISTING
CONDITIONS
DREDGE
FOOTPRINT
SHEET 1**

DRAWING NO.
E-2.1





Date: 9/14/2010
Time: 8:00 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.005	X: 816198.2
Location: South Terminal Expansion		Y: 2688154.5
Elevation at mudline: -23.15'	Datum: MLLW	
Casing Type: Steel	Boring Depth: -38.5' MLLW	Boring No: A-2010-B1
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Todd Pentacost	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 6"	11,2,11,13	Dark Grey, fine to coarse SAND, some silt, some fine to coarse gravel.	-25.15
4		24" 5"	19,33,39,18	Grey SILT and fine to coarse SAND, some fine to coarse gravel - TILL	-27.15
4.75		9" 4"	15, 100/3"	Grey SILT some fine to coarse sand, some fine to coarse gravel. Refusal at -27.9 MLLW.	-27.9
5.35				Cleaned hole for coring run, start core run at -28.5 MLLW.	-28.5
11	50%	5' 4.6'	7,6,6,10,14	Rock Core #1: -28.5 to - 33.5 MLLW - Intensely to moderately fractured grey Granitic Gneiss	-33.5
16	97%	5' 4.85	6,6,6,9,11	Rock Core #2: -33.5 to -38.5 MLLW - Moderately fractured grey Granitic Gneiss	-38.5

Comments: Core run was completed at less revolutions per minute than recommended by core barrel manufacturer, so drill time is not a good indicator of rock competency.

- Notes:
- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 9/15/2010
Time: 11:30 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.005	X: 816277.4
Location: South Terminal Expansion		Y: 2688458.0
Elevation at mudline: -6.3'	Datum: MLLW	
Casing Type: Steel	Boring Depth: -39.4' MLLW	Boring No: A-2010-B2
Casing Diameter: 4"	Drill Rig: CME 45	Sheet: 1 of 1
Drill Co: NH Boring	Method: Drill and Wash	
Driller: Todd Pentacost	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 15"	1,1,1,1	Black to dark grey, Organic SILT, some fine sand, little shell hash, becomes grey in nose of spoon	-8.3
4		24" 15"	2,5,10,14	Dark Grey fine SAND, some organic silt grades to fine SAND, some inorganic silt, trace fine to coarse gravel	-10.3
6		24" 21"	12,14,14,19	-10.3 to -10.8 MLLW Grey fine SAND some fine to coarse gravel, trace coarse -10.8 to -12.0 MLLW Grey fine SAND grading to inorganic SILT and fine SAND -12.0 to -12.3 MLLW Grey Coarse SAND and fine to coarse GRAVEL	-12.3
8		24" 15"	9,17,16,20	Grey, medium to coarse SAND, little fine to coarse gravel	-14.3
10		24" 14"	5,15,15,12	Grey, medium to coarse SAND, little fine to coarse gravel, grades to fine to medium SAND	-16.3
12		24" 21"	3,4,10,12	10 - 11 Grey, fine SAND, trace silt, grades to fine to medium SAND. 11-12 Grey, fine to coarse SAND, trace fine gravel, grading to coarse SAND	-18.3
14		24" 21"	6,7,9,12	Grey, fine to medium SAND, little fine to coarse gravel	-20.3
16		24" 12.5"	14,16,24,24	Grey fine to coarse SAND, some silt, some fine to coarse gravel, mottle at 15.0 to 15.4 red/orange tan.	-22.3
18		24" 11"	8,10,3,3	Grey and Tan mottled, fine to coarse SAND, some silt, some fine to coarse gravel, grades to fine to medium SAND and SILT in nose of spoon	-24.3
19.75		21" 16"	23,32,34, 100/3"	Grey and tan mottled, fine to coarse SAND, and SILT, some fine to coarse gravel. Refusal at -26.2' MLLW.	-26.05
23.6				Drilled with button tooth roller bit through cobbles, drove casing to refusal and began core run at -29.9 MLLW	-29.9
28.1	48%	60" 47"	6,8,8,10, 5min/6"	Rock Core #1: -29.9 to -34.4 MLLW - Moderately to intensely fractured grey Granitic Gneiss, core barrel jammed at 4.5 feet into core run.	-34.4
33.1	50%	60" 44"	7,8,10,10, 10	Rock Core #2: -34.4 to -39.4 MLLW - Moderately to intensely fractured grey Granitic Gneiss	-39.4

Comments: Core run was completed at less revolutions per minute than recommended by core barrel manufacturer, drill time is not a good indicator of rock competency.

- Notes:
- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 9/16/2010
Time: 11:20 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.005	X: 816365.6
Location: South Terminal Expansion		Y: 2688161.5
Elevation at mudline: -1.1'	Datum: MLLW	
Casing Type: Steel	Boring Depth: -35.7' MLLW	Boring No: A-2010-B3
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Todd Pentacost	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6' / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 18"	7,5,5,4	Dark Grey, very fine to fine SAND, little organic silt, trace shell hash, one juvenile clam.	-3.1
7		24" 5"	10,13,20,17	Grey, fine to coarse SAND, trace silt, sharp color change to tan, fine to medium SAND, little silt. Gravel caught in nose of spoon	-8.1
12		24" 6"	16,19,20,23	4" of Grey, fine to coarse GRAVEL and fine to medium SAND, trace silt. 2" of Grey tan, SILT, some fine to coarse SAND, some fine to coarse gravel. TILL.	-13.1
17		24" 4"	17,18,14,14	Grey, SILT and fine SAND, some fine to coarse gravel, little medium to coarse sand, gravel stuck in tip of split spoon.	-18.1
22		24" 5"	80,60,40,61	Tan, fine SAND, some silt, some fine to coarse gravel, trace medium to coarse sand, gravel stuck in top of split spoon.	-23.1
24.6				Refusal while advancing casing to next interval. Cleaned hole with button toothed roller bit, flushed hole and began coring at -25.7' MLLW	-25.7
29.6	25%	5' 3.3'	5,6,19 (Jams)	Rock Core #1: -25.7 to -30.7 MLLW - Very intensely fractured grey Granitic GNEISS, with pegmatic intrusions (pink and grey).	-30.7
34.6	37%	5' 4.6'	(Frequent Jams)	Rock Core #2: -30.7 to -35.7 MLLW - Intensely fractured grey Granitic GNEISS with pegmatic (pink and grey) intrusions.	-35.7

Comments: Core run was completed at less revolutions per minute than recommended by core barrel manufacturer, drill time is not a good indicator of rock competency, drill times were not recorded after the first 3 feet of penetration, due to frequent starts and stops of coring process as barrel jammed and was cleared.

Notes: 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 9/20/2010
Time: 8:05 AM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.005	X: 816439.9
Location	South Terminal Expansion		Y: 2687856.3
Elevation at mudline:	-2.5'	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-43.75' MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Todd Pentacost	Log By:	GCD
			Boring No: A-2010-B4
			Sheet: 1 of 1

Depth below mudline (ft)	ROD	Penetration/Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%					
2		24" 24"	WOH, WOH, WOH, WOH	Black, Organic SILT, little shell hash, little fine to medium sand.	-4.5
4		N/A N/A	N/A	No split spoon this interval.	-6.5
6		24" 3.5"	1,1,1,1	Dark Grey to Black, fine to medium SAND and SILT, little shell hash.	-8.5
8		24" 13"	13,6,8,9	Grey, fine to medium SAND, some Silt, little fine to coarse gravel	-10.5
10		24" 12"	9,17,20,20	Grey, fine GRAVEL, some coarse sand, little coarse gravel. Coarse gravel stuck in nose of spoon.	-12.5
12		24" 11"	10,8,10,12	Grey, fine SAND, some silt, some fine to coarse gravel, trace medium to coarse sand.	-14.5
14		24" 8"	8,14,16,11	Grey, fine SAND, some fine to coarse gravel, trace silt.	-16.5
16		24" 9"	49,9,8,13	Grey SILT, some fine sand, little fine to coarse gravel, little medium to coarse sand. Mottled interval approx 0.25 to 0.5' becomes brown, then back to grey.	-18.5
18		24" 10"	24,20,18,16	SILT, some fine to coarse sand, some fine to coarse gravel, Color changes: 0.0-0.25' grey, 0.25-0.55' light grey, 0.55-0.80' brown .	-20.5
20		24" 10"	13,12,21,14	Tan SILT and GRAVEL, some fine to coarse sand	-22.5
21.66		20" 10"	17,10,15, 100/2"	Tan, SILT, some fine to coarse gravel, some fine to coarse sand. 3" of grey, completely weathered Granitic Gneiss in nose of spoon. Refusal at -24.16 MLLW.	-24.16
22.7				Drilled with button tooth roller bit, cleaned hole, and began core run at -25.2 MLLW.	-25.2
26.7	0%	48" 20"	10,12,19, (Jam)	Rock Core #1: -25.2 to -29.2 MLLW - Shattered greenish Grey Granitic Gneiss (11" in pieces none longer than 3") Potassium Feldspar rich Pegmatic intrusion (9" in pieces none longer than 3"), core barrel jammed at 1.5, water return stopped intermittently through core run, drilling paused each time	-29.2
29.7	0%	36" 25"	6,6,14, (Jam)	Rock Core #2: -29.2 to -32.2 MLLW - Interface of Pegmatite and Granitic Gneiss (2"), highly fractured grey Granitic Gneiss (23") No unfractured pieces greater than 4"	-32.2
31.7	0%	24" 16"	(Frequent Jams)	Rock Core #3: -32.2 to -34.2 MLLW - Highly fractured grey Granitic Gneiss (16") No unfractured pieces greater than 4"	-34.2
36.7	0%	60" 36"	(Frequent Jams)	Rock Core #4: -34.2 to -39.2 MLLW - Highly fractured pink and greenish grey Granitic Gneiss (36") No unfractured pieces greater than 4", shattered between 18" and 25" includes quartz vein 19"-20"	-39.2
41.7	82%	60" 58"	(Frequent Jams)	Rock Core #5: -39.2 to -43.75 MLLW - Highly fractured pink and greenish grey Granitic Gneiss (21") Grades to grey Granitic Gneiss until sharp increase in potassium feldspar content at 56" changes hue back to pink and grey Granitic Gneiss.	-43.75

Comments: Core run was completed at less revolutions per minute than recommended by core barrel manufacturer, drill time is not a good indicator of rock competency. Drill times were not recorded on portions of Rock Cores 1 and 2 as well as Rock Cores 3, 4, and 5, due to frequent starts and stops of coring process as barrel jammed and was cleared.

- Notes:
- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/7/2011
Time: 8:30 AM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.008	X: 816478
Location:	South Terminal Expansion		
Elevation at mudline:	-3.7	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-45.30' MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Norman Stuttard	Log By:	GAD
			Boring No: A-2011-B5
			Sheet: 1 of 1

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%					
3		36" 24"	WOR,WOR, WOR,WOR	Black, organic SILT, trace shell hash.	-6.7
5		24" 24"	WOR,WOR, WOR,WOR	Black, organic SILT, trace shell hash, trace gravel.	-8.7
7		24" 12"	3,1,5,10	Black, organic SILT, trace shell hash, trace fine gravel, grades to greenish-grey, fine to medium SAND, trace fine gravel.	-10.7
9		24" 18"	16,29,26,28	Greenish grey, fine to coarse SAND, some fine to coarse gravel, trace silt	-12.7
11		24" 6"	17,8,7,10	Greenish grey, fine SAND some fine to medium sand, little fine gravel	-14.7
13		24" 6"	37,31,20,30	Greenish grey, fine to medium SAND, some coarse sand, some fine gravel, trace silt	-16.7
15		24" 12"	14,10,12,17	Greenish grey, fine to medium SAND, some coarse sand, some fine gravel, trace silt	-18.7
17		24" 0	25,9,8,11	No Recovery	-20.7
19		24" 2"	20,18,21,17	Greenish grey, fine to medium SAND, some coarse sand, some fine gravel, trace silt	-22.7
21		24" 10"	16,16,19,22	Olive grey, medium to coarse SAND, some fine sand, some fine gravel	-24.7
23		24" 12"	7,9,11,8	Olive grey, medium to coarse SAND, some fine sand, some fine gravel	-26.7
25		24" 12"	23,24,21,15	Olive grey, medium to coarse SAND, some fine sand, some fine gravel, transitions to olive grey, fine to medium SAND, trace silt	-28.7
26.25		15" 7"	17,16, 100/3"	Olive grey, fine to medium SAND, some silt, some gravel. Refusal at 29.95.	-29.95
26.60				Drilled with mill tooth roller bit, cleaned hole, and began core run at -30.30.	-30.3
31.60	48%	5.0' 4.4'	6,6,7,6,6	Rock Core #1 -30.30' to -35.30' MLLW. 0.0-4.0' intensely to moderately fractured grey, GRANITE, 4.0 to 4.4' intensely fractured moderately weathered grey GRANITE	-35.3
36.60	49%	5.0' 4.35'	8-7-8-7-7	Rock Core #2 -35.30' to -40.30' MLLW. 0.0' - 0.6' moderate to heavily weathered, moderately fractured grey, granitic GNEISS, 0.6' - 3.4' fresh, moderately fractured, grey, granitic GNEISS, gneissic banding progressively decreases, 3.4'-4.4' grey GRANITE	-40.3
41.60	74%	5.0' 4.9'	7-8-8-7-7	Rock Core #3 -40.30' to -45.30' MLLW. 0.0-2.2' intensely to moderately fractured grey, granitic GNEISS. 2.2-3.6' gradual transition into and out of intensely to moderately fractured pink and grey granite PEGMATITE, 3.6-4.9' intensely to moderately fractured grey granitic GNEISS	-45.3

Comments: The descriptions of the rock in the cores above are descriptions of the sampled rock in each recovered core length.

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Date: 9/23/2010
Time: 9:30 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.005	X: 816518.5
Location: South Terminal Expansion		Y: 2687561.6
Elevation at mudline: -9.4	Datum: MLLW	Boring No: A-2010-B6
Casing Type: Steel	Boring Depth: -31.6' MLLW	
Casing Diameter: 4"	Drill Rig: CME 45	Sheet: 1 of 1
Drill Co: NH Boring	Method: Drill and Wash	
Driller: Todd Pentacost	Log By: GAD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 6"	WOR,WOR, WOR,WOR	0-1' Black, organic SILT 1'-2' Olive grey, medium to coarse SAND, some fine sand, trace silt	-11.4
6		24" 12"	20,22,41,30	Greenish grey, medium to coarse SAND, some fine gravel	-15.4
10		24" 12"	12,16,22,15	Greenish grey, medium to coarse SAND, some fine gravel.	-19.4
12.2				Drove casing to refusal, cleaned hole, and began core run at -21.6 MLLW	-21.6
17.2	73%	60" 51"	7,7,6,5,7	Rock Core #1: -21.6 to -26.6 MLLW - Intensely to moderately fractured grey granitic Gneiss.	-26.6
22.2	27%	60" 50"	8,12,6,7,6	Rock Core #2: -26.6 to -31.6 MLLW - Intensely fractured grey Granitic Gneiss (0"-36"), intensely fractured pink and grey Granite Pegmatite (36" to 50").	-31.6

Comments: Core run was completed at less revolutions per minute than recommended by core barrel manufacturer, drill time is not a good indicator of rock competency.

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Date: 9/24/2010
Time: 12:15 PM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.005	X: 816781.1
Location: South Terminal Expansion		Y: 2687710.6
Elevation at mudline: -5.5	Datum: MLLW	Boring No: A-2010-B7 Sheet: 1 of 1
Casing Type: Steel	Boring Depth: -28.0' MLLW	
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	
Driller: Todd Pentacost	Log By: GAD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 12"	WOR,6,8,8	0-1' Black, organic SILT 1'-2' Olive Grey, fine to medium SAND, some shell hash, trace silt	-7.5
4		24" 12"	9/11/12/16	Olive Grey, fine to medium SAND, some shell hash, trace silt	-9.5
6		24" 12"	7/5/7/5	4'-4.5' Olive Grey, fine to medium SAND, some shell hash, trace silt 4.5'-6' Greenish grey, fine SAND and SILT	-11.5
8		24" 17"	15/23/100-5"	6'-7' Olive Grey, fine to medium SAND, some shell hash, trace silt 7'-7.4' Olive grey, fine SAND and SILT	-13.5
10		24" 24"	18/14/12/17	8'-8.5' Greenish grey, fine to medium SAND and fine angular GRAVEL 8.5'-9.5' Light grey, fine to medium SAND, some coarse SAND 9.5'-10' Greenish grey, fine SAND and SILT	-15.5
12		24" 24"	15/18/24/58	10'-11.5' Greenish grey, fine SAND and SILT, trace fine angular gravel 11.5'-12' Olive grey, medium to coarse SAND, trace rock fragments at tip.	-17.5
12.5				Drove casing to refusal, cleaned hole, and began core run at -18.0 MLLW	-18
17.5	88%	60" 56"	11/10/12/15/12	Rock Core #1: -18.5to -23.5 MLLW - Highly to moderately fractured grey and pink Granitic Gneiss	-23
22.5	61%	60" 40"	8/8/7/8/9	Rock Core #2: -23.5 to -28.5 MLLW - Highly to moderately fractured grey and pink Granitic Gneiss	-28

Comments: Core run was completed at less revolutions per minute than recommended by core barrel manufacturer, drill time is not a good indicator of rock competency.

- Notes:
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Date: 9/27/2010
Time: 11:50 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.005	X: 816477.0
Location: South Terminal Expansion		Y: 2688656.0
Elevation at mudline: -17.4	Datum: MLLW	
Casing Type: Steel	Boring Depth: -46.2' MLLW	Boring No: A-2010-B8
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Todd Pentacost	Log By: GAD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 0"	WOR,WOR, WOR,WOR	No recovery sample taken	-19.4
4		24" 18"	WOR,WOR, WOR,WOR	Black, organic SILT	-21.4
6		24" 12"	8/13/24/31	4'-5' Black, organic SILT 5'-6' Lt. grey, fine to medium SAND and SILT, trace rock fragments	-23.4
8		24" 12"	26/21/56/48	Lt. grey, fine to medium SAND and SILT, trace rock fragments	-25.4
10		24" 0"	100-0"	No recovery sample taken, drilled with button tooth roller bit through cobbles	-27.4
13				Drilled with button tooth roller bit through cobbles	-30.4
15		24" 12"	46/39/23/24	13'-15' Olive grey, coarse SAND, trace fine sand, trace fine gravel	-32.4
17		24" 12"	13/17/14/21	Olive grey, coarse SAND, some fine sand, trace rock fragments	-34.4
18				Drove casing to refusal, cleaned hole, and began core run at -36.2 MLLW	-34.5
23	53%	60" 54"	14/13/18/11/ 13	Rock Core #1: -36.2 to -41.2 MLLW - Intensely fractured dark grey Basalt(0-9.5"), moderately fractured pink and grey Granitic Gneiss (9.5-27"), dark grey intensely to moderately fractured Basalt (27"- 54").	-39.5
28	50%	60" 50"	12/15/11/12/ 14	Rock Core #2: - -41.2 to -46.2 MLLW - Intensely fractured dark grey Basalt (0-13"), moderately to intensely fractured pink and grey Granitic Gneiss (13"-19"), dark grey intensely to moderately fractured Basalt (19"-50").	-44.5

Comments: Core run was completed at less revolutions per minute than recommended by core barrel manufacturer, drill time is not a good indicator of rock competency.

- Notes:
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 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 9/28/2010
Time: 11:10 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.005	X: 816215.8
Location: South Terminal Expansion		Y: 2689415.8
Elevation at mudline: -21.25	Datum: MLLW	
Casing Type: Steel	Boring Depth: -38.83' MLLW	Boring No: A-2010-B9
Casing Diameter: 4"	Drill Rig: CME 45	Sheet: 1 of 1
Drill Co: NH Boring	Method: Drill and Wash	
Driller: Todd Pentacost	Log By: GAD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 12"	WOR,WOR, WOR,WOR	Black, organic SILT	-23.25
4		24" 12"	10/24/22/19	2'-2.5' Black, organic SILT 2.5'-4' Olive grey, fine to medium SAND, some silt, some angular fine gravel.	-25.25
6		24" 12"	56/33/27/52	Lt. grey, coarse sub rounded SAND, trace rock fragments in tip	-27.25
6.58		7" 7"	53/100-1"	Lt. grey, fine to medium SAND, trace silt, trace rock fragments	-27.83
11.58	35%	60" 37"	6/7/7/6/9	Rock Core #1: -27.83 to -32.83 MLLW - Intensely fractured pink and grey Granitic Gneiss.	-32.83
12.58				Drilled with button tooth roller bit through fractured rock	-33.83
17.58	0%	60" 26"	(Frequent Jams)	Rock Core #2: -33.83 to -38.83 MLLW - Intensely fractured grey Gneiss	-38.83

Comments: Core run was completed at less revolutions per minute than recommended by core barrel manufacturer, drill time is not a good indicator of rock competency. On second run, core barrel was jammed in the boring. Decision was made to move 20' north in order to obtain confirmation cores.

- Notes:
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Date: 2/21/2011
Time: 8:20 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816322
Location: South Terminal Expansion		Y: 2688299
Elevation at mudline: -0.9	Datum: MLLW	
Casing Type: Steel	Boring Depth: -50.79' MLLW	Boring No: A-2011-B10
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 12"	2,4,4,4	Dark grey, very fine SAND, little organic silt, trace shell hash.	-2.9
7		24" 18"	2,1,1,1	Black to dark grey, organic SILT, little inorganic silt, trace fine sand.	-7.9
12		24" 20"	33,33,30,32	4" - Black to dark grey, organic SILT, little inorganic silt, trace fine sand. Grey, fine to coarse SAND, little silt, trace to little fine to coarse gravel.	-12.9
17		24" 14"	17,23,20,20	Grey, fine SAND, little medium to coarse sand, trace fine to coarse gravel, trace silt, TILL	-17.9
19.05				Boulder encountered approx. elev.= -18.75 to -19.95 MLLW.	-19.95
22		24" 12"	16,41,46,35	Grey, fine to coarse SAND, some fine to coarse gravel, little silt, TILL	-22.9
27		24" 8"	98,36,44,57	Grey, becoming tan, fine to coarse SAND, some silt, some fine to coarse gravel, TILL.	-27.9
30.89				Drilled with mill tooth roller bit. Boulder encountered approx. elev. -29.60 to -30.40 MLLW. Cleaned hole and began core run at -31.79 MLLW.	-31.79
35.89	13%	5.0' 2.9'	5-5-5-5-15	Rock Core #1 -31.79 to -36.79 MLLW. Grey, intensely fractured to very intensely fractured Granitic GNEISS, sand filled seams throughout. Return water color changes at 2.3, 2.5, 2.8, 3.5-3.7, 3.9, 4.2. Barrel jamming last foot of run drilling time does not reflect hardness of rock.	-36.79
39.89	22%	5.0' 3.0'	4-3-3-10	Rock Core #2 -36.79 to -40.79 MLLW. Grey, intensely fractured to very intensely fractured Granitic GNEISS, with sand filled seams, Barrel jamming last foot of run drilling time does not reflect hardness of rock.	-40.79
44.89	50%	5.0' 5.0'	3-3-4-4-6	Rock Core #3 -40.79 to -45.79 MLLW. Grey, intensely to moderately fractured Granitic GNEISS,	-45.79
49.89	75%	5.0' 4.9'	5-4-3-3-3	Rock Core #4 -45.79 to -50.79 MLLW. Grey to pink, moderately to slightly fractured, Granite PEMATITE	-50.79

Comments:

- Notes:
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 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 2/22/2011
Time: 12:42 PM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816397
Location: South Terminal Expansion		Y: 2688013
Elevation at mudline: -1.5	Datum: MLLW	
Casing Type: Steel	Boring Depth: -40.65' MLLW	Boring No: A-2011-B11
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 9"	2,3,4,4	Dark grey, fine to medium SAND, little organic silt, little shell hash.	-3.5
7		24"	1,WOH,WOH, 2	3" Black organic SILT, little shell hash.	-8.5
		15'		12" Dark grey to black, fine SAND and organic/inorganic SILT, trace shell hash.	
12		24" 14'	39,36,38,30	Grey, inorganic SILT and fine to medium SAND, trace fine to coarse gravel, Till like	-13.5
16		12" 5"	57, 100/6"	Dark grey to black with brown, micaceous fine SAND and fine to coarse GRAVEL, little silt.	-17.5
17.2				Boulder encountered approx. elev.= -17.5 MLLW to -18.7 MLLW.	-18.7
22		24" 12"	15,16,25,19	Tan grey, fine to medium SAND, little to trace silt, trace coarse sand, trace fine gravel.	-23.5
25.83		10" 4"	55,100/4"	Tan, medium to coarse SAND, some fine to coarse gravel, trace silt. Cobble encountered at approximate elevation -27.33 MLLW.	-27.33
26.75				Drilled with mill tooth roller bit to approx. elevation -28.25 MLLW.	-28.25
29.15				Drove casing to refusal, drilled with mill tooth roller bit into rock and flushed casing before start of core run. Began first core run at -30.65 MLLW.	-30.65
31.75	74%	5.0'	6-4-7-4-5	Rock Core #1 -30.65 to -35.65 MLLW Grey, moderately fractured Granitic GNEISS	-35.65
		4.9'			
36.75	88%	5.0'	4-4-5-5-5	Rock Core #2 -35.65 to -40.65 MLLW Grey, intensely to moderately fractured, Granitic GNEISS	-40.65
		5.0'			

Comments:

- Notes:
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 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 2/23/2011
Time: 10:32 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816344
Location: South Terminal Expansion		Y: 2687989
Elevation at mudline: -1.2	Datum: MLLW	
Casing Type: Steel	Boring Depth: -49.15' MLLW	Boring No: A-2011-B12
Casing Diameter: 4"	Drill Rig: CME 45	Sheet: 1 of 1
Drill Co: NH Boring	Method: Drill and Wash	
Driller: Norman	Log By: GAD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 3"	4,1,WOH,2	Dark grey, very fine SAND, little organic silt, little shell hash.	-3.2
7		24" 6"	1,1,1,30	Greenish dark grey, SILT, little fine to coarse gravel.	-8.2
12		24" 0"	36,22,25,23	No Recovery in Split Spoon	-13.2
17		24" 15"	15,10,12,25	Grey, fine to medium SAND and GRAVEL, trace silt.	-18.2
22		24" 6"	33,37,29,81	Light grey, fine to medium SAND and SILT, some medium gravel.	-23.2
27.35				Drilled with mill tooth roller bit through cobbles with multiple sand seams. Encountered obstruction at approx. elev. -24.35 MLLW. Drilled through 1' boulder. Cleaned hole, and began core run at -26.15 MLLW.	-26.15
27.95	63%	3.0' 2.2'	no drill time available	Rock Core #1A -26.15 to -29.15 MLLW Grey and pink, moderately to intensely fractured, fresh to slightly weathered GRANITE pegmatite	-29.15
30.95	75%	2.0' 1.9'	no drill time available	Rock Core #1B -29.15 to -31.15 MLLW Grey and pink, moderately to intensely fractured fresh to slightly weathered granite PEGMATITE, shattered granite PEGMATITE -31.55 to -32.15 MLLW.	-32.15
34.95	82%	5.0' 5.0'	7-7-7-6-6	Rock Core #2 -31.15 to -36.15 MLLW Grey and pink, moderately to intensely fractured fresh to slightly weathered granite PEGMATITE, shattered granite PEGMATITE -35.65 to -36.15	-36.15
37.95	25%	3.0' 1.7'	4-4-5	Rock Core #3A -36.15 to -39.15 MLLW Grey and pink, intensely fractured, slightly weathered, granite PEGMATITE	-39.15
42.95	78%	5.0' 5.0'	4-3-4-4-4	Rock Core #3B -39.15 to -44.15 MLLW Grey, moderately fractured, fresh to slightly weathered, granitic GNEISS	-44.15
47.95	92%	5.0' 5.0'	4-4-3-5-4	Rock Core #4 -44.15 to -49.15 MLLW Grey, intensely to moderately fractured, fresh to slightly weathered, granitic GNEISS	-49.15

Comments:

Notes:

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- 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 2/24/2011
Time: 12:30 PM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816419
Location: South Terminal Expansion		Y: 2687691
Elevation at mudline: -1.3	Datum: MLLW	
Casing Type: Steel	Boring Depth: -46.6' MLLW	Boring No: A-2011-B13
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GAD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 3"	WOH, WOH, WOH, WOH	Black, organic SILT, little shell hash.	-3.3
7		24" 15"	WOR,1,5,6	Greenish grey, fine SAND and SILT, trace shell hash.	-8.3
12		24" 0"	30,45,53,63	No Recovery in Split Spoon, piece of Granitic GNEISS in nose cone.	-13.3
17		24" 0"	54,58,61,71	No Recovery in Split Spoon, piece of Granitic GNEISS in nose cone. Encountered obstruction at approx. 18.5' below mudline - apparent 1' boulder.	-18.3
22		24" 2"	16,18,17,18	Grey, SILT, some fine to coarse gravel.	-23.3
27		24" 3"	18,21,23,20	Tan, coarse SAND and GRAVEL, trace fine sand, trace silt.	-28.3
28.3				Casing advanced to refusal at -29.6 MLLW. Cleaned hole, and began core run at 29.6 MLLW.	-29.6
35.30	42%	7.0' 5.0'	4-5-6-5-4	Rock Core #1 -29.6' to -30.6' MLLW highly fractured Granitic GNEISS (potential cobble layer or obstruction). At approximate elev. -30.6' MLLW, core barrel penetrated potential cobble layer or obstruction and entered a 2' layer of apparent sediment. Wash changed color from milky white to tan, and contained sand. Continued coring from -32.6 MLLW to -36.6 MLLW - fractured Granitic GNEISS.	-36.6
40.30	79%	5.0' 5.0'	5-4-3-4-5	Rock Core #2 -36.6 to -41.6 MLLW fractured Granitic GNEISS	-41.6
45.30	51%	5.0' 4.8	6-5-7-7-6	Rock Core #3B -41.6 to -46.6 MLLW fractured Granitic GNEISS	-46.6

Comments:

- Notes:**
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 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 2/24/2011
Time: 12:30 PM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.008	X: 816360
Location:	South Terminal Expansion		Y: 2687402
Elevation at mudline:	-1.85	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-31.95' MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Norman Stuttard	Log By:	GAD
			Boring No: A-2011-B14
			Sheet: 1 of 1

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 6"	WOR, WOR, WOR, WOR	Black, organic SILT.	-3.85
7		24" 15"	51,48,49,55	6" of Light grey, fine SAND and SILT. Light grey, fine to medium SAND, trace silt.	-8.85
12		24" 10"	63,58,52,58	8" Lt grey, fine to medium SAND, trace silt, becomes lt. grey, fine to coarse SAND, trace silt, trace gravel, 0.8' boulder encountered -14.2' MLLW	-13.85
17		24" 4"	24,9,10,14	Grey, fine to coarse SAND and fine GRAVEL.	-18.85
20.1				Casing advanced to -20.45 MLLW. Drilled with mill-tooth roller bit to -21.95 MLLW, cleaned hole, seated casing, and began core run.	-21.95
25.10	67%	5.0' 4.9'	6-8-8-7-8	Rock Core #1 -21.95 to -26.95 MLLW 4.5' fractured grey Granitic GNEISS, 0.4' pink Granite PEGMATITE	-26.95
30.10	60%	5.0' 5.1	5-5-5-5-5	Rock Core #2 -26.95 to -31.95 MLLW 0.5' pink Granite PEGMATITE, 0.3' shattered interface, grey fractured Granitic GNEISS	-31.95

Comments:

- Notes:
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Date: 3/2/2011
Time: 7:15 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816254
Location: South Terminal Expansion		Y: 2687498
Elevation at mudline: -0.6	Datum: MLLW	
Casing Type: Steel	Boring Depth: -40.55' MLLW	Boring No: A-2011-B15
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GAD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 18"	WOR, WOR, WOR, WOR	Black, organic SILT	-2.6
7		24" 18"	3,3,3,10	12" Black, organic SILT 6" Black, fine SAND and organic SILT	-7.6
12		24" 6"	33,40,34,56	Light grey, fine to coarse SAND, some fine gravel.	-12.6
17		24" 8"	31,76,40,27	Grey, medium to coarse SAND, trace fine sand, trace silt.	-17.6
19.5		6" 6"	100/6"	Blue grey, fine to coarse SAND, trace rock fragments. Refusal at -20.10' MLLW.	-20.1
19.95				Casing advanced to -20.55 MLLW. Cleaned hole, and began core run at -20.55 MLLW.	-20.55
24.95	44%	5.0' 5.0'	6-5-7-6-5	Rock Core #1 -20.55 to -25.55 MLLW 0.0 -1.0' moderate to intensely fractured dark grey DIABASE, 1.0-4.6 moderately to intensely fractured grey granitic GNEISS, 4.6'-5.0' interface of grey granitic GNEISS and dark grey DIABASE	-25.55
29.95	59%	5.0' 5.0'	5-6-6-5-6	Rock Core #2 -25.55 to -30.55 MLLW 0.0-0.75' intensely to moderately fractured grey granitic GNEISS, 0.75-1.75 intensely to moderately fractured dark grey DIABASE, 1.75'-4.8' moderately fractured grey granitic GNEISS showing reoriented gneissic banding, 4.8'-5.0 DIABASE	-30.55
34.95	68%	5.0' 5.0'	6-5-6-7-6	Rock Core #3 -30.55 to -35.55 MLLW 0.0-0.9' moderately fractured green grey DIABASE, 0.9-5.0 moderately fractured contact metamorphic and igneous mixing zone Gneiss and Diabase Xenoliths in GRANITE PEGMATITE.	-35.55
39.95	38%	5.0' 5.1'	7-6-7-7-8	Rock Core #4 -35.55 to -40.55 MLLW moderately fractured contact metamorphic and igneous mixing zone Gneiss and Diabase Xenoliths in GRANITE PEGMATITE.	-40.55

Comments: DIABASE in this boring is moderately to highly weathered.

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Date: 3/3/2011

Time: 8:20 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816262
Location: South Terminal Expansion		Y: 2688283
Elevation at mudline: -0.4	Datum: MLLW	
Casing Type: Steel	Boring Depth: -50.45' MLLW	Boring No: A-2011-B16
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 14"	11,12,10,2	Grey, fine SAND, little silt, trace shell hash.	-2.4
7		24" 12"	2,2,3,4	Dark grey, organic SILT, trace shell hash, grades to grey, inorganic and organic SILT, and very fine SAND, trace shell hash.	-7.4
12		24" 14"	60,33,29,48	Grey brown fine to coarse SAND and SILT trace fine to coarse gravel, TILL	-12.4
17		24" 9"	13,20,47,25	Grey, fine SAND, some medium to coarse sand, little fine to coarse gravel, little silt.	-17.4
22		24" 14"	50,43,46,29	Grey, SILT, some fine to coarse sand, little fine to coarse gravel, TILL, obstruction encountered -22.65' to approx. -24.05 MLLW (see comments).	-22.4
27		24" 6"	16,23,57,27	Grey and yellow brown, SILT and fine to coarse gravel, little fine to coarse sand, TILL.	-27.4
28.05				Drilled with mill tooth roller bit until obstruction encountered -27.95' MLLW. Cleaned hole, and began core run at -28.45 MLLW.	-28.45
33.05	72%	5.0' 4.9'	5-7-8-22-7	Rock Core #1 -28.45 to -33.45 MLLW 0.0'-1.0' moderate to intensely fractured grey granitic GNEISS	-33.45
38.15	60%	5.0' 5.0'	5-5-7-7-7	Rock Core #2 -33.45 to -38.55 MLLW 0.0'-5.0' intensely to moderately fractured granitic GNEISS, shattered pegmatic intrusion 0.4'-0.9', high angle fractures @ 1.9-2.2' and 4.5-5.0'	-38.55
43.15	30%	5.0' 5.0'	7-16-6-8-7	Rock Core #3 -38.55 to -43.55' MLLW 0.0-1.4' intensely to moderately fractured grey, granitic GNEISS, 1.4-4.3' intensely to moderately fractured grey GRANITE, 4.3-5.0' intensely to moderately fractured grey granitic GNEISS, core jammed in barrel 1.4'	-43.55
48.15	77%	5.0' 4.8'	6-15-7-6-7	Rock Core #4 -43.55 to -48.55 MLLW moderately fractured grey, granitic GNEISS	-48.55
50.05	100%	1.9 1.9	7-15	Rock Core #5 -48.55 to -50.45' MLLW slightly fractured grey, granitic GNEISS	-50.45

Comments: Obstruction encountered at -22.65 MLLW was not penetrated by roller bit, began coring at -23.25 MLLW, core barrel exited boulder at -24.05 MLLW, and soil cuttings in wash suggest till material encountered in interval above.

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Date: 3/8/2011
Time: 8:40 AM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.008	X: 816220
Location:	South Terminal Expansion		Y: 2689671
Elevation at mudline:	-20.8	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-36.4 MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Norman Stuttard	Log By:	GAD

Boring No: A-2011-B17
Sheet: 1 of 1

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 8"	WOR,WOR, WOR,WOR	Black, organic SILT	-22.8
6.25		15" 9"	30,23, 100/3"	Greenish grey, fine to coarse SAND, some fine gravel	-27.05
8.5				Encountered Obstruction -28.9' MLLW, drilled with roller bit to -29.3' MLLW, then attempted core run.	-29.3
9.5	N/A	1.0' 1.0'	7	Rock Core #1 -29.3 to -30.3 MLLW - Penetrated obstruction (boulder). One foot of recovery in core barrel.	-30.3
15.6				Wash water indicates a series of nested boulders or highly fractured rock below obstruction. Unable to advance casing past obstruction. Drilled with roller bit through obstruction until top of competent rock (interpreted from cuttings in wash water). Final elevation at -36.4 MLLW.	-36.4

Comments:

- Notes:
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Date: 3/9/2011
Time: 8:15 AM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.008	X: 816257
Location:	South Terminal Expansion		Y: 2688603
Elevation at mudline:	-20.9	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-48.4' MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Norman Stuttard	Log By:	GCD

Boring No: A-2011-B18
Sheet: 1 of 1

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 3"	WOR, WOR, WOR, WOR	Black, organic SILT, trace shell hash.	-22.9
7		24" 10"	7,9,15,19	First 6" - Gray, medium to coarse SAND and GRAVEL, some shell hash. Last 4" - Light brown, fine to coarse SAND, trace silt.	-27.9
10				Obstruction encountered -28.1' MLLW. Drilled with mill tooth roller bit through obstruction (approximately 8" thick). Collected split spoon from 10-12 feet.	-30.9
11.75		24" 8"	19,27,22,44	Light brown to gray, fine to coarse SAND, trace silt.	-32.65
12.5				Obstruction encountered -32.65' MLLW. Cleaned hole and began core run at -33.4 MLLW.	-33.4
17.5	68%	5.0' 4.75'	10-8-8-9-8	Rock Core #1 -33.4 to -38.4 MLLW 0.0 -2.7' Intensely to moderately fractured moderate to slightly weathered grey granitic GNEISS. 2.7' to 4.75' moderately to slightly weathered dark grey DIABASE.	-38.4
22.5	20%	5.0' 5.0'	8-9-8-8-9	Rock Core #2 -38.4 to -43.4 MLLW 0.0'-5.0' Intensely fractured moderately to slightly weathered dark grey DIABASE, iron stained vertical fractures from 3.4' to 5.0'.	-43.4
27.5	46%	5.0' 5.0'	8-9-8-8-8	Rock Core #3 -43.4 to -48.4' MLLW 0.0-2.6' Intensely fractured moderately fractured dark gray DIABASE. 2.6' - 4.4' moderately fractured granitic GNEISS, 4.4' - 5.0' moderately fractured gray DIABASE.	-48.4

Comments:

- Notes:**
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 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/10/2011
Time: 8:00 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816372
Location: South Terminal Expansion		Y: 2689000
Elevation at mudline: -19.5	Datum: MLLW	
Casing Type: Steel	Boring Depth: -39.85' MLLW	Boring No: A-2011-B19
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 6"	WOR, WOR, 5, 5	Black, organic SILT.	-21.5
5.25		3" 3"	100-3"	Gray, medium to coarse SAND, trace fine sand.	-24.75
7.45				Obstruction encountered at -24.7 MLLW. Drilled with roller bit through obstruction. After penetration of obstruction, tool dropped approximately 0.5 feet. Obstruction encountered at -26.9 MLLW.	-26.9
10.4				Drilled with roller bit through obstruction. After penetration of obstruction, tool dropped approximately 0.3 feet. Roller bit then advanced another 0.6 feet. Cleaned hole and prepared for core run at -29.85 MLLW.	-29.85
15.4	65%	5.0' 5.0'	8-8-8-9-8	Rock Core #1 -29.85 to -34.85 MLLW - 0"-37" Moderately to intensely fractured grey Granitic GNEISS, 37"-60" Moderately to intensely fractured pink grey Granite PEGMATITE.	-34.85
20.4	54%	5.0' 4.42'	8-9-8-8-9	Rock Core #2 -34.85 to -39.85 MLLW - 0"-20" Moderately to intensely fractured pink grey Granite PEGMATITE, 20"-53" Moderately to intensely fractured grey Granitic GNEISS.	-39.85

Comments:

Notes:

- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
- 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/14/2011
Time: 8:50 AM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.008	X: 816746
Location:	South Terminal Expansion		Y: 2687940
Elevation at mudline:	-5.1	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-46.65' MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Norman Stuttard	Log By:	GCD

Boring No: A-2011-B20
Sheet: 1 of 1

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 7"	3,3,3,6	First 5" - Black fine to coarse SAND and organic SILT. Next 2" - Grey fine to coarse SAND, some inorganic silt.	-7.1
7.5		30" 0"	8,2,2,WOH	No Recovery	-12.6
12		24" 13"	25,26,21,28	Grey, fine to coarse SAND, some silt, little fine to coarse gravel.	-17.1
16.1		13" 7"	13,25, 100/1"	Grey fine SAND and SILT, little fine to coarse gravel.	-21.2
17.7				Obstruction encountered at -21.2 MLLW. Penetrated obstruction (8" thick) with roller bit to -22.8 MLLW.	-22.8
19.7		24" 7"	110,67,60, 27	Encountered second obstruction at -22.8 MLLW. Advanced roller bit through second obstruction and encountered coarse sand in drill cuttings. Advanced split spoon from -22.80 to -24.80 MLLW - Dark grey fine to coarse GRAVEL and SILT, little fine to coarse sand (TILL).	-24.8
25.07		2" 0"	110/2"	No recovery. Dark grey granite in light grey silty drill wash.	-30.17
29.9		0" 0"	100/0"	No recovery.	-35
31.55				Roller bit advanced to elevation -36.65 MLLW. Cleaned hole and prepared for core run.	-36.65
36.6	40%	5' 5'	5-5-6-6-6	Rock Core #1 -36.65 to -41.65 MLLW 0.0'-4.0' Intensely to very intensely fractured grey GNEISS, moderately to intensely fractured pink grey Granite PEGMATITE.	-41.65
41.6	40%	5' 4.0'	6-2-6-6-10	Rock Core #2 -41.65 to -46.65 MLLW - 0.0' - 3.1' Intensely to very intensely fractured pink grey Granite PEGMATITE, 3.1-4.0' intensely to very intensely fractured moderately weathered grey Granitic GNEISS. Core barrel penetrated a sediment-filled seam from between 1.3 to 2.0 feet.	-46.65

Comments:

- Notes:
- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/15/2011
Time: 8:00 AM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.008	X: 816566
Location:	South Terminal Expansion		Y: 2688336
Elevation at mudline:	-7	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-47.7' MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Norman Stuttard	Log By:	GCD
			Boring No: A-2011-B21
			Sheet: 1 of 1

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%					
2		24" 18"	WOR, WOR, WOR, WOR	Black, organic SILT and fine SAND.	-9
7		24" 12"	16,16,18,20	Greenish-gray, fine to medium SAND, trace silt.	-14
12		24" 11"	36,27,38,35	Gray, fine to medium SAND, trace silt, trace fine gravel.	-19
12.1				Obstruction encountered at -19.1 MLLW. Penetrated obstruction with roller bit.	-19.1
15.9		11" 2"	36,100/5"	Gray, fine to coarse SAND and SILT, trace fine gravel.	-22.9
22.35		5' 3'	9,7,8,8,8	Encountered second obstruction at -23.95 MLLW. Roller bit advanced to elevation -24.35 MLLW. Cleaned hole and prepared for core run. Core run revealed nested boulders with seams of sediment. 1st Boulder estimated at 1.6 feet in length, 2nd Boulder at 0.3 feet in length, and 3rd boulder at 1.1 feet in length.	-29.35
27.6		24" 6"	25,20,12,10	Light gray, fine to coarse SAND and GRAVEL, trace silt.	-34.6
29.9		0" 0"	100/0"	Roller bit advanced to elevation -36.9 MLLW. Split spoon attempted at this elevation was 100/0". Cleaned hole and prepared for core run.	-36.9
31.9	28%	1.8' 1.33'	7,14	Rock Core #1 -36.9 to -38.7 MLLW 0.0'-1.33' Intensely to moderately fractured pink grey Granite PEGMATITE with xenoliths of granite, diabase and granitic gneiss.	-38.9
35.9	63%	4' 4'	8,7,6,9	Rock Core #2 -38.7 to -42.7 MLLW 0.0'-4.0' Intensely to moderately fractured grey Granite PEGMATITE with xenoliths of granite, gneiss, and diabase.	-42.7
40.9	50%	5' 5'	6,8,9,6,6	Rock Core #3 -42.7 to -47.7 MLLW 0.0'-5.0' Intensely to moderately fractured grey Granite PEGMATITE with xenoliths of granite, gneiss, and diabase.	-47.7

Comments:

- Notes:
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 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/16/2011
Time: 10:00 AM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.008	X: 816496
Location:	South Terminal Expansion		Y: 2689220
Elevation at mudline:	-5.7	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-50' MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Norman Stuttard	Log By:	GCD
			Boring No: A-2011-B22
			Sheet: 1 of 1

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%					
2		24" 3"	WOR, WOR, WOR, WOR	Black, organic SILT and shell hash.	-7.7
7		24" 18"	14,14,16,15	Greenish gray, fine SAND, trace silt, trace shell hash.	-12.7
12		24" 6"	10,10,10,10	Gray, fine to medium SAND, trace coarse sand.	-17.7
16.9		23" 5"	7,7,14, 100/5"	Gray, fine to coarse SAND.	-22.9
19.55		0" 0"	100/0"	No Recovery.	-25.55
24.92		5' 3'	9,7,8,8,8	Encountered obstruction at -25.55 MLLW. Roller bit advanced to bottom of obstruction at -26.3 MLLW. Roller bit advanced to -27.45 MLLW. Telescope set up to advance casing through obstruction to -30.62 MLLW.	-30.62
25.92		11" 0"	35,100/5"	No recovery.	-31.62
29.45		0" 0"	100/0"	Roller bit advanced to elevation -35.15 MLLW. Cleaned hole and began core run at -36.25 MLLW.	-35.15
34.30		1.8' 1.55'	8,5,7	Rock Core #1 -36.25 to -38.05 MLLW - Core run revealed a series of nested boulders and/or fractured rock. Roller bit advanced to -40 MLLW.	-40
39.3	48%	5' 4.3'	5,3,5,6,6	Rock Core #2 -40 to -45 MLLW 0.0'-5.0' Intensely to moderately fractured dark grey granitic GNEISS, Slightly to moderately weathered in fractures 2.5'-4.2' and 1.9'	-45
44.3	44%	5' 4.85'	5,7,6,7,8	Rock Core #3 -45 to -50 MLLW 0.0-1.5' Intensely to moderately fractured dark grey GNEISS, 1.5' - 4.8' Moderately fractured pink grey granite PEGMATITE.	-50

Comments:

- Notes:
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 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/17/2011
Time: 1:00 PM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.008	X: 816606
Location:	South Terminal Expansion		Y: 2687892
Elevation at mudline:	-10.65	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-38.65' MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Norman Stuttard	Log By:	GCD
			Boring No: A-2011-B23
			Sheet: 1 of 1

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%					
2		24" 8"	WOR, WOR, WOR, WOR	Top 4": Black, organic SILT. Last 4": Dark gray, fine to medium SAND and SILT, trace shell hash.	-12.65
7		24" 12"	13,13,17,21	Light gray, fine to coarse SAND.	-17.65
10		0" 0"	100/2"	No recovery.	-20.55
18.25				Obstruction encountered at -23.4 MLLW. Advanced roller bit through a series of obstructions, believed to be either a series of boulders or rock fragments to -28.85 MLLW.	-28.85
18.25		0" 0"	100/0"	No recovery.	-28.85
18.25				Cleaned hole and began core run at -28.85 MLLW.	-28.85
23	65%	4.8' 4.55'	8,9,9,10,11	Rock Core #1: -28.85 to -33.65 MLLW 0.0'-4.8' Intensely to moderately fractured pink grey GRANITE.	-33.65
28	85%	5' 5'	8,8,7,9,9	Rock Core #2: -33.65 to -38.65 MLLW 0.0'-5.0' Moderately fractured pink grey granitic GNEISS.	-38.65

Comments:

- Notes:
- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/21/2011
Time: 8:00 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816632
Location: South Terminal Expansion		Y: 2688166
Elevation at mudline: -6.85	Datum: MLLW	
Casing Type: Steel	Boring Depth: -45.05' MLLW	Boring No: A-2011-B24
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 18"	WOR, WOR, 1, 1	Top 12": Black, organic SILT, trace shell hash. Next 3": Gray, fine SAND and SILT, trace shell hash. Last 3": Light brown fine SAND and SILT, trace shell	-8.85
7		24" 12"	14,10,10,12	Gray, fine to medium SAND, trace coarse sand, trace shell hash.	-13.85
12		24" 10"	21,20,12,10	Light gray, medium to coarse SAND, trace fine sand, trace shell hash.	-18.65
15				Obstruction encountered at -21.3 MLLW. Advanced roller bit through obstruction to -21.85 MLLW for next split-spoon.	-21.85
17		24" 12"	44,54,40,30	Light gray, fine to coarse SAND, some silt, trace fine gravel.	-23.85
22		24" 18"	13,12,23,16	Light gray, fine to coarse SAND, some silt and some fine gravel.	-28.85
25.92		11" 5"	46, 100/5"	Light gray, medium to coarse SAND, trace silt, trace fine gravel.	-32.76
28.2				Advanced casing to -33.25 MLLW. Advanced roller bit to -35.05 MLLW, cleaned hole and began core run.	-35.05
33.2	64%	5' 5'	6,6,6,6,6	Rock Core #1: -35.05 to -40.05 MLLW 0.0'-5.0' Intensely to moderately fractured grey granitic GNEISS.	-40.05
38.2	83%	5' 4.85'	7,6,6,6,6	Rock Core #2: -40.05 to -45.05 MLLW Intensely to moderately fractured grey granitic GNEISS.	-45.05

Comments:

Notes:

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- 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/22/2011
Time: 9:45 AM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816289
Location: South Terminal Expansion		Y: 2687745
Elevation at mudline: -1.2	Datum: MLLW	
Casing Type: Steel	Boring Depth: -34.74' MLLW	Boring No: A-2011-B25
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 0"	WOR, WOR, WOR, WOR	No recovery.	-3.2
7		24" 6"	WOR, WOR, WOR, WOR	Black fine SAND and SILT, some shell hash.	-8.2
10		24" 12"	7,14,30,38	Gray, fine to coarse SAND, trace silt, trace fine gravel.	-11.2
15		24" 5"	29,31,36,43	Light gray fine to coarse SAND, trace silt.	-16.2
20		24" 10"	36,65,31,41	Light gray, fine to coarse SAND, trace silt, trace fine gravel	-21.2
22.54				Obstruction encountered at -22.35 MLLW. Advanced roller bit through obstruction (0.8 feet in length) to -23.15 MLLW. Advanced roller bit to -23.74 MLLW. Cleaned hole and began core run.	-23.74
25.54	31%	3' 2.35'	7,6,7	Rock Core #1: -23.74 to -26.74 MLLW Intensely to very intensely fractured grey granitic GNEISS.	-26.74
28.54	58%	3' 2.7'	6,5,5	Rock Core #2: -26.74 to -29.74 MLLW Intensely to moderately fractured grey granitic GNEISS.	-29.74
33.54	72%	5.0' 5.0'	7,6,7	Rock Core #1: -29.74 to -34.74 MLLW Intensely to moderately fractured pink grey granitic GNEISS.	-34.74

Comments:

Notes:

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- 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/23/2011

Time: 11:15 AM

BORING LOG

Project:	Phase IV Dredging	Project No: 6690.008	X: 816522
Location:	South Terminal Expansion		Y: 2688815
Elevation at mudline:	-16.75	Datum:	MLLW
Casing Type:	Steel	Boring Depth:	-47.65' MLLW
Casing Diameter:	4"	Drill Rig:	CME 45
Drill Co:	NH Boring	Method:	Drill and Wash
Driller:	Norman Stuttard	Log By:	GCD
			Boring No: A-2011-B26
			Sheet: 1 of 1

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 5"	WOR, WOR, WOR, WOR	Black, fine SAND and organic SILT, trace shell hash.	-18.75
7		24" 12"	53,43,41,52	Top 6": Gray, fine to medium SAND. Middle 3": Black, fine to medium SAND, trace fine gravel. Bottom 3": Light gray fine to coarse SAND and fine GRAVEL, some ping stone fragments.	-23.75
10.25				Obstruction encountered at -24.8 MLLW. Advanced roller bit through boulder to elevation -27.0 MLLW.	-27
13.4		24" 6"	64,37,32,49	Light gray, fine to coarse SAND, trace silt, trace fine gravel.	-30.15
14				Obstruction encountered at -30.15 MLLW. Advanced roller bit through obstruction to -30.75 MLLW.	-30.75
18.2		10" 4"	34, 100/4"	Light gray, coarse SAND and fine GRAVEL, trace stone fragments.	-34.98
20.9				Advanced roller bit thru cobbles or fractured bedrock to -37.65 MLLW. Cleaned hole and began core run.	-37.65
25.9	47%	5' 5'	5,5,6,6,6	Rock Core #1: -37.65 to -42.65 MLLW 0.0' - 3.6' Intensely to moderately fractured dark grey DIABASE, 3.6'-5.0' Intensely to very intensely fractured dark grey DIABASE.	-42.65
30.9	26%	5' 4.2'	6,4,5,6,6	Rock Core #2: -42.65 to -47.65 MLLW 0.0'-1.3' Intensely to very Intensely fractured dark grey DIABASE highly weathered at interface, 1.3'-4.0' Intensely to moderately fractured grey granitic GNEISS	-47.65

Comments:

Notes:

- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
- 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/25/2011
Time: 12:30 PM

BORING LOG

Project: Phase IV Dredging	Project No: 6690.008	X: 816356
Location: South Terminal Expansion		Y: 2689759
Elevation at mudline: -13.75	Datum: MLLW	
Casing Type: Steel	Boring Depth: -42.05' MLLW	Boring No: A-2011-B27
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 6"	WOR, WOR, WOR, WOR	Black, fine SAND and SILT, trace shell hash.	-15.75
7		24" 16"	9,9,12,16	Top 3" - Gray, fine SAND, trace silt, trace fine gravel. Next 1/2" - Black, fine SAND, trace silt. Next 3" - Orange-brown, fine to coarse SAND, trace silt. Last 3" - Gray, fine to coarse SAND, trace silt.	-20.75
12		24" 15"	15,20,22,21	Top 10" - Gray, fine SAND and SILT, trace coarse sand and shell hash. Bottom 5" - Orange-brown, fine to coarse SAND and SILT, trace fine gravel.	-25.75
17		24" 4"	12,12,14,14	Gray, fine to coarse SAND and SILT, trace fine gravel, trace shell hash.	-30.75
21		12" 4"	62,80, 100/0"	Gray, fine to coarse SAND, trace silt and fine gravel.	-34.75
25				Obstruction encountered at -35.2 MLLW. Advanced roller bit through obstruction to elevation -38.30 MLLW.	-38.3
26.5		18" 16"	50,125, 172/6"	Tan, coarse to medium SAND, trace silt.	-40.25
28.3				Advanced roller bit to elevation -42.05 MLLW.	-42.05
				End of Boring	

Comments:

- Notes:**
- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



BORING LOG

Date: 3/28/2011
Time: 9:29 AM

Project: Phase IV Dredging	Project No: 6690.008	X: 816775
Location: South Terminal Expansion		Y: 2687636
Elevation at mudline: -5.2	Datum: MLLW	
Casing Type: Steel	Boring Depth: -24.0' MLLW	Boring No: A-2011-B28
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%					
2		24" 14"	WOR, WOR, WOR, WOR	Black, organic SILT, trace fine to coarse sand, trace shell hash.	-7.2
4		24" 16"	10,6,10,12	Grey, fine to medium SAND, little shell hash.	-9.2
6		24" 16"	9,12,11,13	Tan to grey, very fine SAND, trace inorganic silt.	-11.2
8		24" 7"	10,18,17,18	Grey, fine SAND, little inorganic silt, little medium to coarse sand, trace gravel.	-13.2
10		24" 9"	10,20,29,32	Grey fine SAND, little silt, trace coarse gravel.	-15.2
12		24" 12"	20,27,29,43	Grey fine to coarse SAND, little silt, little fine to coarse gravel.	-17.2
13		12" 6"	24,37, 100/0"	Grey, fine to coarse SAND, little silt, little fine to coarse gravel.	-18.2
14.3				Encountered obstruction at -19.5 MLLW. Cleaned hole and began core run.	-19.5
18.8	36%	4.5' 4.5'	5,4,5,5	Rock Core #1: -19.5 to -24.0 MLLW - Intensely to moderately fractured pink grey granitic GNEISS.	-24.0

Comments: Intervals 0-2, 2-4, and 4-6 Sampled using a 3" diameter split spoon sampler, all of the other intervals were sampled using a standard 2" diameter split-spoon.

Notes: 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
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BORING LOG

Date: 3/29/2011
Time: 1:00 PM

Project: Phase IV Dredging	Project No: 6690.008	X: 816617
Location: South Terminal Expansion		Y: 2688559
Elevation at mudline: -7.8	Datum: MLLW	
Casing Type: Steel	Boring Depth: -36.6' MLLW	Boring No: A-2011-B30
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 6"	WOR, 2,2,2	Black, organic SILT and very fine SAND, little shell hash.	-9.8
7		24" 10"	10,12,10,13	Grey fine SAND, little medium to coarse sand. Grades to grey-tan medium SAND, little fine to coarse SAND.	-14.8
12		24" 10"	20,29,25,23	Grey fine to coarse SAND, some silt, little fine to coarse gravel.	-19.8
17		24" 3"	33,25,27,32	Grey fine to coarse SAND, some silt, little fine to coarse gravel (TILL).	-24.8
21.6		24" 5"	57,27,59, 126	Grey, fine to coarse GRAVEL and fine to coarse SAND, little silt (TILL).	-29.4
25.95		24" 2.5"	21,15,67,29	Coarse GRAVEL, some fine to medium sand, some silt (TILL).	-33.75
28.8				Refusal at -33.75 MLLW. Advanced roller bit through obstruction to -35.15 MLLW. Advanced roller bit to -36.60 MLLW. No rock core conducted.	-36.6
				End of Boring	

Comments:

- Notes:**
- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



BORING LOG

Date: 3/30/2011
Time: 10:05 AM

Project: Phase IV Dredging	Project No: 6690.008	X: 816259
Location: South Terminal Expansion		Y: 2689246
Elevation at mudline: -20.85	Datum: MLLW	
Casing Type: Steel	Boring Depth: -57.65' MLLW	Boring No: A-2011-B31
Casing Diameter: 4"	Drill Rig: CME 45	
Drill Co: NH Boring	Method: Drill and Wash	Sheet: 1 of 1
Driller: Norman Stuttard	Log By: GCD	

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
2		24" 3"	WOR, WOR, WOR, WOR	Black, organic SILT trace shell hash.	-22.85
7		24" 4"	16,27,31,40	Gray, medium to coarse SAND and fine GRAVEL, trace silt.	-27.85
8.35				Obstruction encountered at -28.3 MLLW. Advanced roller bit through obstruction until -29.2 MLLW.	-29.2
12		24" 6"	47,22,23,18	Gray, fine to coarse SAND, little fine gravel, trace silt.	-32.85
14.5				Obstruction encountered at -34.4 MLLW. Advanced roller bit through obstruction until -35.35 MLLW.	-35.35
16.8				Advanced roller bit to -37.65 MLLW. Cleaned hole and began core run.	-37.65
21.8	64%	5' 4.8'	5,3,4,5,5	Rock Core #1: -37.65 to -42.65 MLLW - Intensely to moderately fractured grey to dark grey granitic GNEISS.	-42.65
26.8	73%	5' 4.9'	6,5,4,4,4	Rock Core #2: -42.65 to -47.65 MLLW - 0.0-1.25' Intensely to moderately fractured pink grey GRANITE, 1.25-4.9' Intensely to moderately fractured dark grey granitic GNEISS.	-47.65
31.8	58%	5' 4.9'	5,5,5,5,5	Rock Core #3: -47.65 to -52.65 MLLW - Intensely fractured dark grey GNEISS	-52.65
36.8	78%	5' 5'	5,5,5,5,5	Rock Core #4: -52.65 to -57.65 MLLW - Intensely to moderately fractured dark grey GNEISS	-57.65

Comments:

- Notes:**
- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.



Date: 3/31/2011

Time: 11:00 AM

BORING LOG

Project:	Phase IV Dredging	Project No:	6690.008	X:	816364
Location:	South Terminal Expansion			Y:	2688225
Elevation at mudline:	-0.8	Datum:	MLLW		
Casing Type:	Steel	Boring Depth:	-46.6' MLLW	Boring No:	A-2011-B32
Casing Diameter:	4"	Drill Rig:	CME 45		
Drill Co:	NH Boring	Method:	Drill and Wash	Sheet: 1 of 1	
Driller:	Norman Stuttard	Log By:	GCD		

Depth below mudline (ft)	RQD	Penetration/ Recovery	Blows per 6" / Drill Min. per Foot	Description (Color, Texture, Structure)	Elevation (MLLW)
				Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%	
25.8				Encountered first obstruction at -25.7 MLLW. Advanced roller bit to -26.6 MLLW, cleaned hole and began core run.	-26.6
30.8	58%	5' 4.8'	4,4,4,4,4	Rock Core #1: -26.6 to -31.6 MLLW - 0.0'-3.25' Slightly fractured pink grey granitic GNEISS 3.25'-4.8' Intensely fractured highly weathered grey granitic GNEISS grades to unweathered quartz rich GRANITE.	-31.6
35.8	32%	5' 4.3'	6,5,5,5,4	Rock Core #2: -31.6 to -36.6 MLLW - 0.0'-4.2' Intensely fractured pink grey granitic GNEISS becomes very intensely fractured at 1.75'	-36.6
40.8	8%	5' 3.2	5,5,6,5,7	Rock Core #3: -36.6 to -41.6 MLLW - Intensely fractured pink grey granitic GNEISS	-41.6
45.8	47%	5' 5'	no drill time recorded	Rock Core #4: -41.6 to -46.6 MLLW - 0.0'-2.5' Intensely fractured grey granitic GNEISS 2.5'-4.9' moderately fractured grey granitic GNEISS	-46.6

Comments: Partial collapse of hole after withdrawal of Rock Core #4, due to presence of highly fractured rock falling into hole. Elevation of collapse approximately -38.85 MLLW.

- Notes:
- 1). Numbers in "Depth below mudline (ft)" column represent the depth below mudline of the bottom of the respective split-spoon, core run, or drill tool advancement.
 - 2). Numbers in "Elevation (MLLW)" column represent the elevation of the bottom of the respective split-spoon, core run, or drill tool advancement.