US Army Corps
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Jacksonville District

DRAFT
ENVIRONMENTAL ASSESSMENT

REMOVAL OF CONCRETE SILL AND ADVANCE MAINTENANCE DREDGING OF MARINE CORPS SLIPWAY

U.S. MARINE CORPS SUPPORT FACILITY – BLOUNT ISLAND
JACKSONVILLE, DUVAL COUNTY, FLORIDA

February 2009

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CHAPTER 1

PROJECT PURPOSE AND NEED

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1 PROJECT PURPOSE AND NEED

Under the “Interagency and International Services” Program, the United States Army Corps of Engineers (USACE) has been contracted by the United States Marine Corps Support Facility - Blount Island (MCSF-BI) to prepare an environmental assessment and obtain the necessary permits to design and build the MCSF-BI proposed deepening of their slipway at Blount Island.

1.1 PROJECT INTRODUCTION, BACKGROUND AND LOCATION

The project is located in Jacksonville, Duval County, Florida, at the MCSF-BI located on Blount Island along the St. Johns River (Figures 1 and 2). Blount Island was created as a byproduct of USACE post-World War II dredging operations in the St. Johns River. The dredging operations created a new straight line channel (Dames Point-Fulton Cutoff) designed for larger merchant vessels; the dredged material from the operations was deposited on four marsh islands that together formed Blount Island. The MCSF-BI slipway is ten nautical miles west of the St. Johns River outlet, and houses five large vessel berths. The newly deepened slip will continue to be located on the southeast side of Blount Island along the Dames Point-Fulton Cutoff. The estimated dredging area is 2,400,000 square feet with an estimated 775,000 cubic yards of material to be disposed.

Figure 1: Vicinity Map

Figure 2: Plan View of Facility

USACE turned over the property to the Jacksonville Port Authority (JAXPORT) who developed the western portion of the island to meet a limited shipping demand. JAXPORT continues to operate on that property. In 1974, a joint venture between Westinghouse Electric and Tenneco Newport News Shipbuilding purchased the eastern half of the island to construct a facility to build floating nuclear power plants. The construction of this facility included a concrete sill across the slipway to allow for drydock maintenance of the power plants. Due to the size of the plants, the sill had to be substantial to support massive weight, meaning that it was heavily reinforced with rebar. The sill sits perpendicular across the slipway at an elevation in the slip of -37 mean low low water (MLLW) and is 14 feet high, 32 feet wide and 430 feet in length (Figures 3 through 6). The sill sits approximately 900 feet from the end of the slipway (Figure 3).

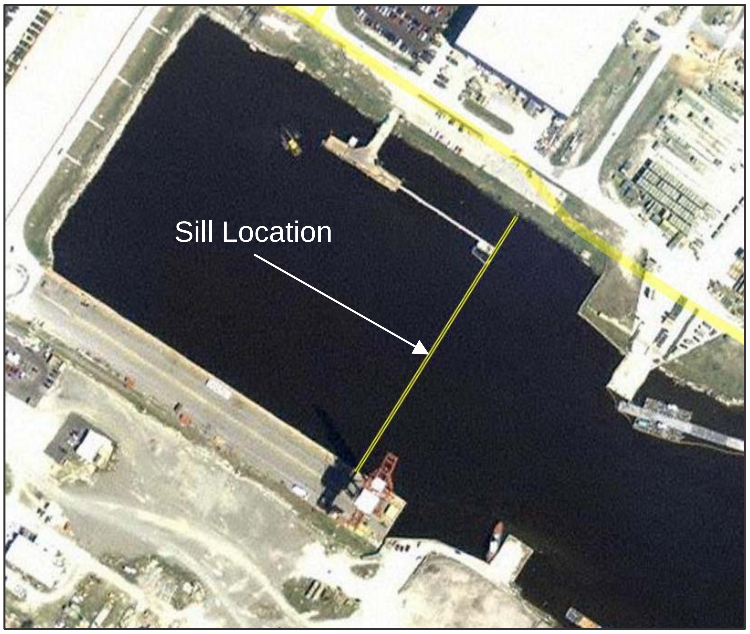


Figure 3: Approximate Sill Location.

Figure 4: Concrete sill under construction – note extensive rebar.

Figure 5: View from top of concrete sill; note extensive rebar.

Figure 6: Rebar reinforcement of – concrete sill.

Due to the lack of economic demand, Tenneco Newport News Shipbuilding opted out of the venture in 1976 and Westinghouse ceased all construction projects in 1979. In January 1986, Gate Maritime Properties, Incorporated purchased the property on the eastern half of the Island and in August of that year leased it to MCSF-BI in support of the Maritime Prepositioning Program. Blount Island Command (BICmd), established in 1989, is the MCSF-BI executive agent for planning, coordinating, and executing the logistics efforts in support of the Maritime Prepositioning Force (MPF) Program and the Marine Corps Prepositioning Program, Norway. In August 2004, MCSF-BI completed acquisition of the eastern half of Blount Island and became responsible for the stewardship of the land, buildings, and environment. The geo-prepositioning and other logistical mission functions continue to be designated as BICmd and remain a subordinate unit under the Marine Corps Logistics Command in Albany, Georgia (U.S. Marine Corps, 2006, U.S. Marine Corps, 2005).

The Maritime Prepositioning Force (MPF) capability consists of 16 civilian operated vessels organized into three squadrons, each of which carries equipment and supplies to sustain approximately 15,000 Marines for approximately 30 days. The download/upload process at MCSF-BI is a structured and orchestrated download, maintenance, and upload of equipment, supply containers, vehicles, and ammunition. Upon completion of the download process (approximately one week after arrival at MCSF-BI), the ship departs MCSF-BI and travels to an assigned drydock for scheduled repairs. The ship then returns to MCSF-BI to be uploaded and prepositioned.

The full download/maintenance/upload process takes approximately 60 days. Every three years, the ships return to Blount Island for maintenance and resupply. All types of vehicles and/or up to 600 containers are stored on each of the MPF ships. MCSF-BI's logistics efforts support MPF ships carrying combat support equipment and supplies for contingency operations worldwide. Resupply items are diverse and may include food rations, pharmaceuticals, landing craft, and ground and air weaponry (U.S. Marine Corps, 2006).

1.2 PROJECT NEED OR OPPORTUNITY

MCSF-BI has requested a permit to remove the concrete sill currently hampering their ability to fully load resupply vessels to their maximum available draft. Additionally, the permit request includes advance maintenance dredging of the slipway to a maximum depth of -47 feet MLLW; this would ensure that operations can be maintained in preparation of the anticipated redeployment of equipment from the Persian Gulf theatre of operations. The advance maintenance dredging may or may not require blasting to remove rock from the slip if it is detected during future geotechnical investigations. The location of the site is in an area prone to extensive silting. Historically, the slip has shallowed quickly, resulting in annual "emergency" maintenance dredging. This shoaling has had, and continues to have an adverse effect on the MCSF-BI mission.

1.3 AGENCY GOAL OR OBJECTIVE

MCSF-BI's goal is to obtain permits that will authorize the removal of the concrete sill, and allow for advance maintenance dredging to a maximum depth of -47 feet below the mean low water, mean low low water (MLW,MLLW) line or -43 feet with up to two feet of required overdepth dredging and two feet of allowable overdepth. If authorized, the proposed action start date is expected to be between November 2009 and January 2011.

1.4 RELATED ENVIRONMENTAL DOCUMENTS

Pursuant to the National Environmental Policy Act (NEPA), this Environmental Assessment (EA) was prepared by USACE for MCSF-BI to address the deepening of their slip, removal of the slip's sill, and continued operations and maintenance (O&M). Related environmental documents include the following:

- USMC, 2008 – Final Environmental Assessment and FONSI for Master Plan. U.S. Marine Corps Support Facility Blount Island, Jacksonville, Florida. FONSI signed September 3, 2008.

- USACE, 1998. Final Environmental Impact Statement. Navigation Channel Improvements. Jacksonville Harbor. Jacksonville, Duval County, Florida.

- USACE 1996. Final Environmental Assessment and FONSI. Maintenance Dredging. Jacksonville Harbor. Duval County, Florida. FONSI signed December 20, 1996.

- Department of the Army Permit #199102068(IP-BAL); issued 17 December 2003 to Gate Maritime Properties, Inc (transferred to MCSF-BI).

- Florida Department of Environmental Protection Permit # 16-183995-003-EI; issued to Gate Maritime Properties, Inc. on Aug 18. 2003. Transfer of this permit to the MCSF-BI Facility took place via 183955-004-EM dated Oct 20, 2004.

1.5 DECISIONS TO BE MADE

This EA evaluates whether to remove the concrete sill in the slipway and conduct advance maintenance dredging to -47 feet MLLW, as well as alternatives to accomplish the MCSF-BI goal.

1.6 SCOPING AND ISSUES

A scoping letter was sent to interested parties on January 30, 2008. Responses to scoping were received from the Miccosukee Tribe of Indians of Florida; Florida Department of Environmental Protection (FDEP); Florida Fish and Wildlife Conservation Commission (FWC); JAXPORT; St. John's River Water Management District (SJRWMD); National Park Service (NPS) and the Florida Department of State (DOS). No comments were received from U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS) or the Environmental Protection Agency (EPA), although requests for scoping comments were sent to those agencies.

The following issues were identified as relevant to the proposed action and appropriate for detailed evaluation: (1) water quality degradation, especially in regards to turbidity and sediment contaminants; (2) impacts to endangered and threatened species occurring within the project area (i.e. manatees and sea turtles); (3) alteration of other wildlife resources; (4) potential damage to Essential Fish Habitat (EFH) that may cause a reduction in standing stocks of certain managed species; (5) impacts to cultural resources; (6) beneficial or adverse effects to navigation; (7) effects on sea turtles, manatees and north Atlantic right whales from pretreatment techniques for sill and rock removal; and (8) impacts to aesthetics.

Copies of the scoping letter and Agency responses can be found in Appendix C.

1.7 PERMITS, LICENSES, AND ENTITLEMENTS

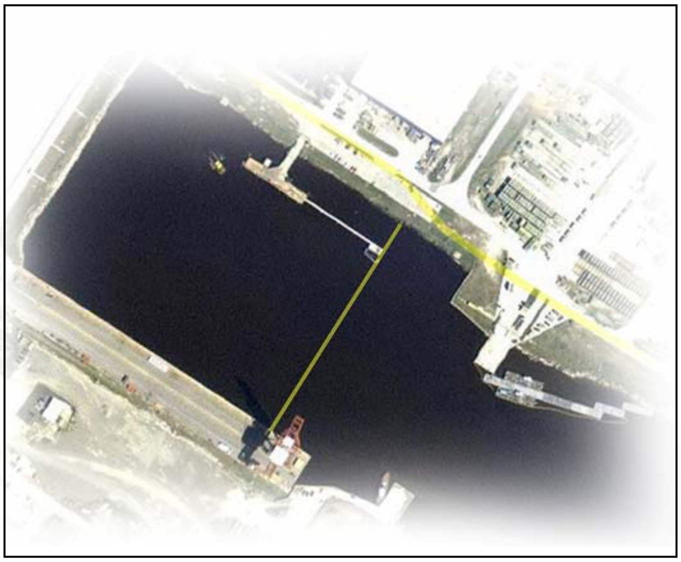
USACE will obtain an Environmental Resource Permit from FDEP for MCSF-BI. In addition, USACE will obtain a Department of Army Permit for the MCSF-BI under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act (CWA). USACE will conduct consultations with NMFS and FWS for effects on species protected under the Endangered Species Act of 1973 (ESA), acting as the lead agency under the ESA. Additionally, USACE will conduct a consultation with NMFS for potential adverse effects on Essential Fish Habitat (EFH), acting as the lead agency under the Magnuson-Stevens Fishery Conservation and Management Act. USACE will obtain an Incidental Harassment Authorization (IHA) from NMFS for potential harassment of marine mammals under their jurisdiction that may be affected by blasting, acting as the lead agency under the Marine Mammal Protection Act (MMPA). USACE has prepared an analysis of all applicable Federal environmental laws and Presidential Executive Orders with which the project will be required to comply. This analysis is located in section 4.35, Compliance with

Environmental Requirements.

1.8 METHODOLOGY

This EA compiles information from a variety of sources including the U.S. Navy Final Environmental Impact Statement (EIS) for the Proposed Homeporting of Additional Surface Ships at Naval Station Mayport; the Final Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for Master Plan U.S. Marine Corps Support Facility Blount Island, Jacksonville, Florida; the Final EIS for Navigation Channel Improvements, Jacksonville Harbor; and the Final EA and FONSI for Maintenance Dredging of Jacksonville Harbor. In addition, previous NEPA documents prepared and permits issued for maintenance dredging of JAXPORT and the MCSF-BI facility were reviewed and are included in section 1.5 of this document.

All of these NEPA documents and permits relied on an interdisciplinary team using a systematic approach to: analyze the affected area; estimate the probable environmental effects; and to prepare the required documents. The teams conducted literature searches, on-site field investigations, and coordination with Federal, State and local resource agencies having expertise in certain areas.



CHAPTER 2

ALTERNATIVES

ENVIRONMENTAL ASSESSMENT

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2 ALTERNATIVES

The Alternatives Section is the heart of an EA. This section describes in detail the no-action alternative, the proposed action, and other reasonable alternatives that were studied in detail. Based on the information and analyses presented in the sections on the affected environment and probable impacts, the Alternatives Section presents the beneficial and adverse environmental effects of all alternatives in comparative form, providing the decision maker and the public a clear basis for choice among the various options.

2.1 DESCRIPTION OF ALTERNATIVES

Without regard to dredging technique, all dredged material will be placed in an existing upland disposal site known as the Dayson Island Dredged Material Management Area (DMMA), located northeast of the Blount Island facility (Figure 7). All placement activities in this site will adhere to the Management Plan as set forth in the “Disposal Area Management Plan – Dayson Dredged Material Management Area.” All concrete and rebar material will be separated from the dredged material, recycled, or disposed of properly, in compliance with Executive Order 13101 and Marine Corps Order 50902A.

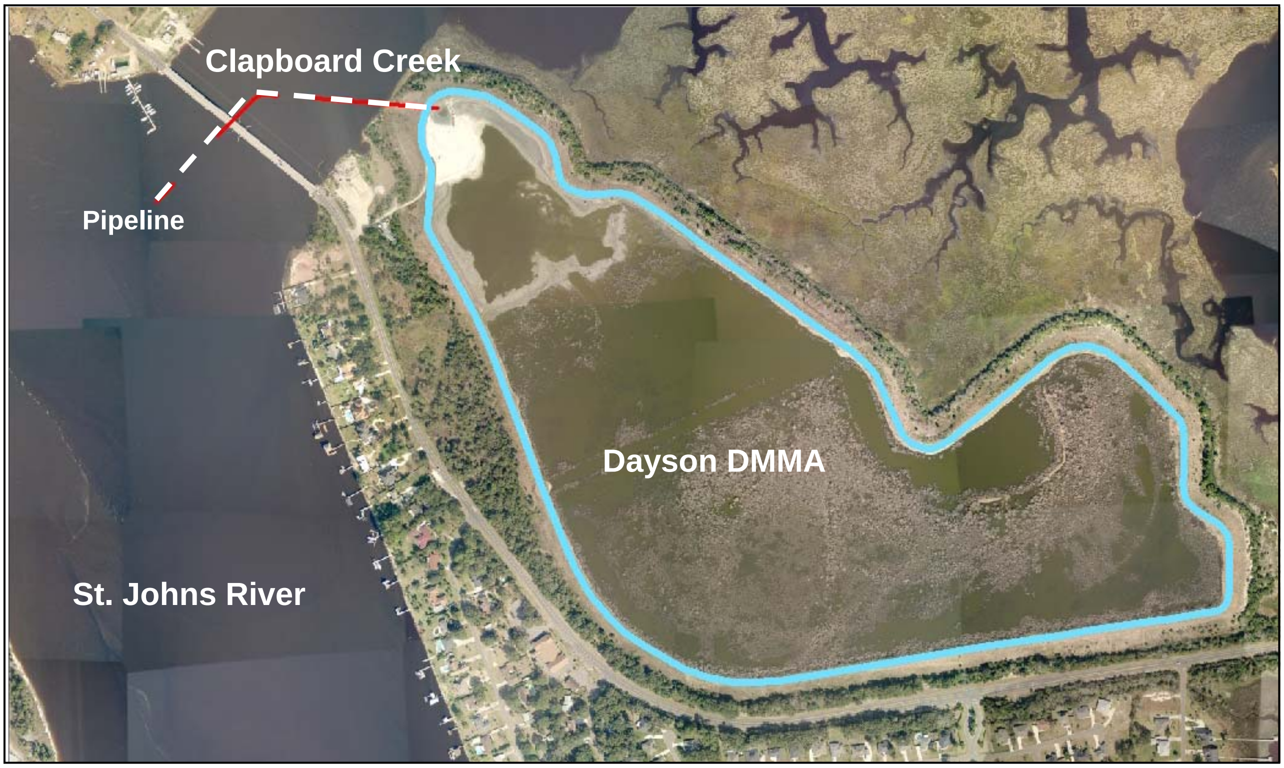

Figure 7: Location of Dayson DMMA and HDPE Pipeline

Dayson Island DMMA is a 149 acre site that is used to place dredged material from MCSF-BI. The dike crest elevation varies between 30 to 33 feet NAVD 88, and the site has an overall remaining capacity of approximately two million cubic yards. Dayson Island DMMA contains two weir structures that are constructed of epoxy-covered carbon steel with tongue-in-groove riser boards. These structures are connected to the dike via a wood and plastic composite lumber crosswalk. The weirs were constructed in 2007 and have an elevation of 30 feet. The weirs are used to return decanted water from the DMMA to surrounding surface waters. .

Each weir connects to the dike with a 30 inch diameter High Density Polyethylene (HDPE) discharge pipe that extends through the dike wall and terminates at the toe of the dike at Clapboard Creek. During dredging operations (when decanting of return water is necessary), extension pipes may be attached to the flanged ends of the discharge pipes to allow for discharge into the Blount Island Channel. The pipe extensions allow return water to be discharged outside of the Nassau River-St. Johns River Marshes Aquatic Preserve.

The dredged material, as well as the sill concrete and rebar, will be removed by clamshell, backhoe or hydraulic dredging equipment. The material removed is placed on barges for transport to a staging area (on MCSF-BI property or at the Dayson Island DMMA) for separation and preparation for disposal and/or recycling. Dredged material that does not include sill material will be placed in the Dayson Island DMMA.

2.1.1 PREFERRED ALTERNATIVE: REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND BLASTING

The concrete sill and any rock identified in the slipway above the final proposed depth of -47 feet would be removed utilizing confined underwater blasting with stemming as the construction technique. Blasting would be temporally limited to between November 1 and March 31, the months when manatees are less likely to be present in the lower St. Johns River. Advance maintenance dredging of the slip to -47 feet MLLW would be completed with either mechanical and/or hydraulic dredges.

2.1.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND PUNCHING/HYDROHAMMER

The concrete sill and any rock identified in the slipway would be removed utilizing a punch barge rig or similar device as the construction technique. Construction with the punch barge rig device would be temporally limited to between November 1 and March 31, the months when manatees are less likely to be present in the lower St. Johns River. Advance maintenance dredging of the slip to -47 ft MLLW would be completed with either mechanical and/or hydraulic dredges.

2.1.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT

The concrete sill and any rock identified in the slipway would be removed utilizing mechanical dredging equipment as the construction technique. Construction would take place at any time during the year. Advance maintenance dredging of the slip to -47 feet MLLW would be completed with either mechanical and/or hydraulic dredges.

2.1.4 NO ACTION ALTERNATIVE (STATUS QUO)

The concrete sill would not be removed from the MCSF-BI Slipway and the project would not be dredged to -47 feet MLLW for advance maintenance.

2.2 CONSTRUCTION TECHNIQUES

2.2.1 DREDGING TECHNIQUES

USACE does not normally specify the type of dredging equipment to be used due to restrictions associated with the Competition in Contracting Act (10 US Code 2304 and 41 US Code 253). The decision regarding equipment used during construction is generally left to the dredging industry contractors, allowing them to offer the most appropriate and competitive equipment available at the time. Never-the-less, certain types of dredging equipment normally are considered more appropriate depending on the type of material, the depth of the channel, the depth of access to the disposal or placement site, the amount of material, the distance to the disposal or placement site, the wave-energy environment, etc. A more detailed description of types of dredging equipment and their characteristics can be found in Engineer Manual, EM 1110-2-5025, "*Engineering and Design - Dredging and Dredged Material Disposal*." This manual is available on the internet at http://www.usace.army.mil/publications/eng-manuals/em1110-2-5025/toc.htm.

Dredging equipment uses either hydraulic or mechanical means to transport material from the substrate to the surface. Hydraulic dredges use water to pump the dredged material as slurry to the surface and mechanical dredges use a bucket-type device to excavate and raise the material from the channel bottom. The most common hydraulic dredges include suction, cutter-suction, and hopper dredges; the most common mechanical dredges include clamshells, backhoes, and marine excavator dredges. Public Law 100-329 requires dredges working on U.S. government projects to have U.S. built hulls, which can limit the options for equipment types if a new type of dredge is developed overseas.

Various project elements influence the selection of the dredge type and size. These factors include the type of material to be dredged (rock, clay, sand, silt, or combination); the water depth; the dredge cut thickness, length, and width; the sea or wave conditions; vessel traffic conditions; environmental restrictions; other operating restrictions; and the required completion time. In addition, all of these factors impact dredge production and, as a result, costs. Multiple dredges of the same or different types may be used to expedite work or to accommodate varying conditions within the dredging areas.

The following discussion of dredges and their associated impacts will be limited to potential dredging equipment suitable for the MCSF-BI advance operation and maintenance (O&M) and sill removal. The key project considerations include the following:

- The sill is composed of rebar reinforced concrete; rock may be found elsewhere in the slip. The concrete will require pretreatment (such as blasting or punching) prior to dredging.
- An overburden of silt, sand, and soft rock exists over some hard rock areas.
- Significant environmental resources, such as manatees and bottlenose dolphins are known to be in the river adjacent to and within the project area.
- The project includes protected water dredging.
- The disposal area is located within the boundaries of the Nassau River-St. Johns River Marshes Aquatic Preserve.

The project scale limits potential equipment to large-scale hydraulic or mechanical dredges. Potential equipment must be able to reach a 45 foot depth and excavate large volumes of material. In some areas the rock will likely require some type of pretreatment prior to dredging such as blasting or fracturing with large cutterhead dredges.

2.2.1.1 MECHANICAL DREDGING

Mechanical dredges are classified by how the bucket is connected to the dredge. The three standard classifications are structurally connected (backhoe), wire rope connected (clamshell), and chain and structurally connected (bucket ladder). The advantage of a mechanical dredging system is that the dredging process adds very little water to the dredged material and the dredging unit is not used to transport the dredged material. This is important when the disposal location is remote from the dredging site. The disadvantage is that a mechanical dredge requires a sufficient dredge cut thickness to fill the bucket to be efficient; greater re-suspended sediment becomes possible when the bucket impacts the bottom and as fine-grained sediment washes from the bucket while it travels through the water column to the surface. Clamshell or backhoe marine excavators may be used to conduct the MCSF-BI sill removal and advance maintenance dredging.

2.2.1.1.1 Mechanical Dredging: Clamshell Dredge

Clamshell dredges are the most common of the mechanical dredges (Figures 8 and 9). Clamshell dredges use a number of different bucket types for mud, gravel, rock, or boulders. The clamshell dredging operation cycle lowers a bucket in the open position to the bottom surface; penetrates the bottom sediments with the weight of the bucket; closes the bucket,and raises the bucket above hopper level, swinging forward to dump the material into the scow; the bucket swings back to repeat the entire process. The dredging depth is limited by the length of the wire used to lower the bucket and production depends upon the bucket size, dredging depth, and type of material. Clamshell dredges are able to work in confined areas, can pick up large particles, and are less sensitive to sea (wave) conditions than other dredges. Their capacity, however, is low and they are unable to dig in firm or consolidated materials, such as rock.

Clamshell dredges could be used to remove the unconsolidated overburden in the MCSF-BI slipway and basin. The dredge requires a tug to move the dredge to and from a location. Clamshell dredging environmental impacts in unconsolidated sediments include re-suspension of sediments when the clamshell drops into on the bottom and as material washes from the bucket while it rises through the water column. Operational controls such as reduction in bucket speed may reduce impacts, as would use of a closed bucket system. Silt curtains may be deployed around the dredge if water quality standards cannot be met using operational controls. An animation of how a clamshell operates is located on the following website - http://el.erdc.usace.army.mil/dots/trip.html.

Figure 8: Mechanical dredging; clamshell dredge with scow.
(Photo: Great Lakes Dredge & Dock Co.)

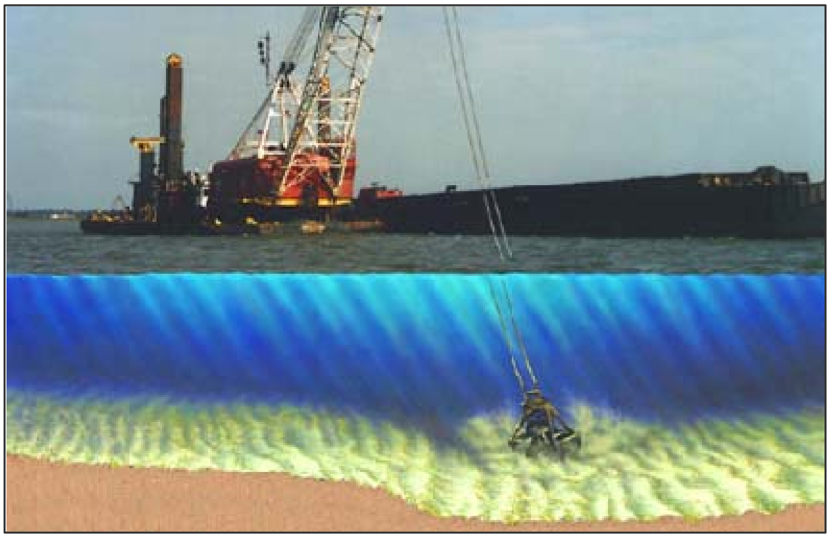

Figure 9: Mechanical dredging; clamshell dredge graphic.
(Photo/drawing: ERDC, 2007)

2.2.1.1.2 Mechanical Dredging: Backhoe Marine Excavator

A backhoe dredge is a back-acting excavating machine that is usually mounted on pontoons or a barge. The backhoe digs toward the machine with a bucket penetrating the surface from the top of the cut face. The operation cycle is similar to the clamshell dredge, as are the factors affecting production. Backhoe marine excavators have accurate positioning ability and are able to excavate firm or consolidated materials. However, they are susceptible to swells and have low to moderate production. Backhoe marine excavators could be used to excavate unconsolidated overburden, fractured rock, and possibly some unfractured rock. The dredge requires a tug to move the dredge to and from a location.

Environmental impacts from backhoe marine excavator dredging in unconsolidated sediment are similar to those of a clamshell dredge, as are the operational controls to reduce that impact. Slowing the movement of the bucket through the water is an example of an operational control. Environmental impacts are significantly less for a backhoe marine excavator dredge removing fractured (blasted) rock as the volume of fine-grained sediment is significantly less in fractured rock than unconsolidated sediment and as a result the potential for sediment re-suspension is reduced. The same operational controls can be applied to fractured rock as to unconsolidated sediment, such as slowing the bucket speed in the water.

2.2.1.1.3 Mechanical Dredging: Transport and Disposal of Dredged Materials

Both types of mechanical dredges require transport barges to move the dredged material from the dredge to the disposal site. The type and size of barge will depend upon the distance to the disposal site and the production rate of the dredge. Barges are less expensive than dredges, therefore the operation is generally designed so that the dredge is always working and does not experience down time waiting for an available barge. Barges or bottom dump scows may be used to transport dredged material to the DMMA for disposal.

Barge-related environmental impacts potentially could occur while the barge is loaded if material is allowed to spill over the sides of the barge (called overflow); during transport if the barge leaks material; and during disposal if the material escapes from the disposal area. Operational controls can eliminate material spills during loading; monitoring the dredge operator to ensure the dredge bucket swings completely over the barge prior to opening the bucket is an example of an operational control. Requiring barges to be in good repair, with new seals, minimizes leaking during transport; and monitoring changes in draft throughout the transport allows leaking scows to be identified for each load of material transported to the disposal site. Hauling rock is often damaging to transport barges, so intermediate inspection and repair may be required during the project to maintain the barge in good working condition. Seals, too, may require replacement.

Proper use of the DMMA minimizes environmental impacts during disposal. Barges will be required to use pump-out equipment to place dredged material within the designated DMMA and inspectors may be required to monitor disposal activity.

2.2.1.2 HYDRAULIC DREDGING

Hydraulic dredges mix dredged material into a sediment-water slurry and pump the mixture from the bottom surface to a temporary location; examples include a barge or re-handling site, or a permanent location such as a confined or unconfined upland or aquatic site. The advantage of hydraulic dredges is that there is less turbidity (re-suspended sediments) at the dredge site than with mechanical dredges. The disadvantage of hydraulic dredges is that a large quantity of water is added to the dredged material and this excess water must be accommodated at the disposal location. Examples of hydraulic dredges that could be used for the MCSF-BI project include hopper dredges and cutterhead dredges.

2.2.1.2.1 Hydraulic Dredging: Cutter-Suction Dredge

Large cutter-suction dredges, or cutterhead dredges, are mounted on barges. The key parts of a cutter suction dredge include the following (see Figures 10 through 12 for additional clarification):

- The cutter suction head, resembling an eggbeater with teeth, breaks up the dredged material as it rotates. Broken material is hydraulically moved into a suction pipe for transport.

- The cutter suction head is located at the end of a ladder structure that raises and lowers it to and from the bottom surface.

- The cutter suction dredge moves by means of a series of anchors, wires, and spuds. The cutter suction head dredges as it moves across the dredge area in an arc while the dredge barge swings on the anchor wires. One corner of the dredge barge is held in place by a spud and the dredge rotates around that spud. The dredge requires workboat or tug assistance to move the anchors and a tug is required to move the dredge to and from a location.

- A discharge pipeline connects the cutter suction dredge to the disposal area. The dredged material is hydraulically pumped from the bottom, through the dredge, then through the discharge pipeline to the disposal location. The disposal site is generally an upland site, although it can be a barge for transport to a remote location or an in-water site.

- Dredge pumps are located on the barge with additional pump(s) often located on the ladder, especially for deep water dredging projects. Booster pumps can be added along the discharge pipeline to move the material greater distances.

Figure 10: Typical large cutterhead
Photo: Terri Jordan

Figure 11: Hydraulic cutterhead dredge vessel. (Photo Terri Jordan)

Figure 12: Cutterhead dredge graphic. (Photo/drawing:ERDC, 2007)

Depending upon their design and the hardness of the material to be removed, cutterhead dredges can be used to remove blasted or unblasted rock and unconsolidated material. A large cutterhead dredge could be used for at least portions of the project. Some pretreatment (cracking of the concrete and rock prior to dredging) will be required for at least the concrete sill portions of the project.

Environmental impacts from cutterhead dredges include localized suspended sediment along the bottom of the dredge area around the cutterhead, and fine-grained sediment turbidity plumes from barge overflow or pipeline leaks. The turbidity plumes can be reduced or eliminated by restricting the amount of overflow time, eliminating barge overflow, and performing regular inspections of the pipeline. Locating barges the furthest possible distance from resources can further reduce environmental impacts. If booster pumps are used, noise impacts may be possible.

Animations illustrating how cutterhead dredges operate are located on the following website - http://el.erdc.usace.army.mil/dots/trip.html.

2.2.1.3 REQUIRED, ALLOWABLE, AND OVER-CUT BEYOND THE PROJECT DEPTH OR WIDTH

Plans and specifications normally require dredging beyond the project depth and/or width. The purpose of the additional dredging “requirement” is to account for shoaling between dredging cycles; thereby reducing the frequency of dredging required to maintain the project depth for navigation. The dredging contractor is allowed to go beyond the required depth to account for the inherent variability and inaccuracy of the dredging equipment (normally ±2 feet). In addition, the dredge operator may practice over-cutting. An “over-cut” along the sides of the channel may be employed in anticipation of movement of material down the sides of the channel. Over-cut throughout the channel bottom may be the result of furrowing or pitting by the dredging equipment (the suction dredge’s cutterhead, the hopper dredge’s drag arms, or the clam-shell dredge’s bucket). In addition, some mixing and churning of material below the channel bottom may occur (especially with a large cutterhead). Generally, the rule of thumb is that the larger the equipment, the greater the potential for over-cut and mixing of material below the “allowable” channel bottom. Some of this material may become mixed-in with the dredged material. If the characteristics of the material in the over-cut and mixing profile differ from that above it, the character of the dredged material may be altered. The quantity and/or quality of material for disposal or placement may be substantially changed depending on the extent of over-depth and over-cut (Tavolaro *et al.*, 2007).

USACE has developed formal guidance concerning the issue of overdepth and overcut with two graphics to help the reader understand the issue (Figures 13 and 14).

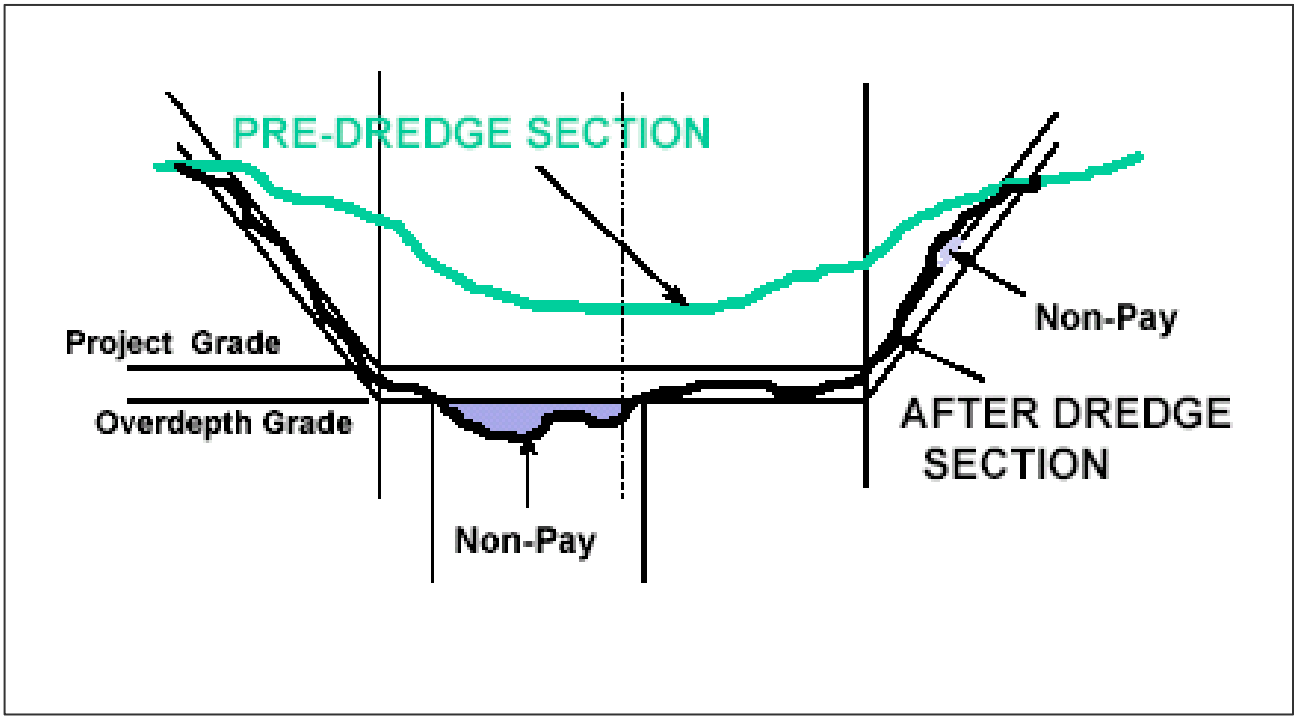

Figure 13: Typical pre/post dredge section.

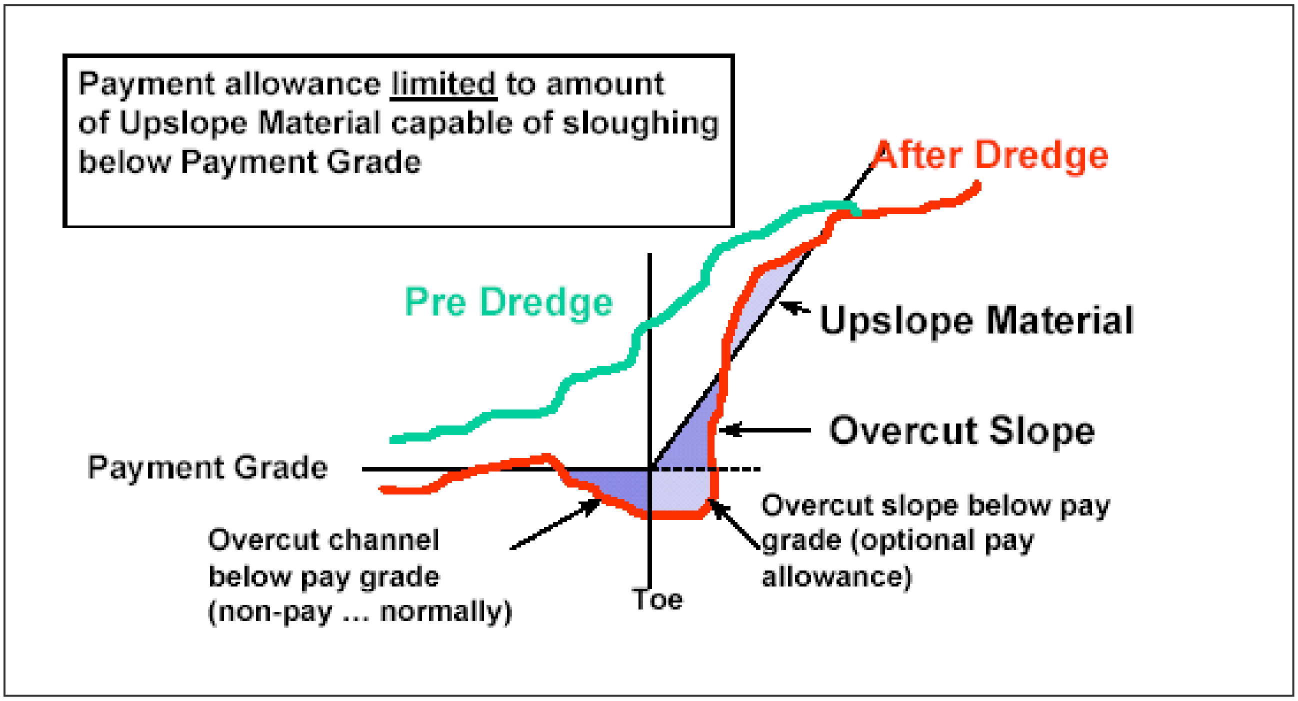

Figure 14: Box cut payment method.

2.2.1.4 USE OF A DRAG BAR (BED-LEVELER) FOR CLEANUP

A “bed-leveler” is considered to be any type of dragged device used to smooth sediment bottom irregularities left by a dredge. It is also referred to as a “mechanical leveling device” or “drag bar.” In various parts of the United States this process is known as “barring” or “knockdown” (Hales *et al.,* 2003). In certain cases, bed-levelers are used to redistribute sediments to maintain navigable depths rather than dredging with conventional methods. Dredge types using bed-levelers include clamshell (excavator), bucket, hydraulic cutterhead, and hopper dredges.

Use of bed-levelers is not a new dredging technique and can be documented as far back as 1565 (Van de Graaf, 1987). Typically, a bed-leveler consists of a large customized plow, I-beam, or old spud that is slowly dragged across sediment to smooth out peaks and trenches during the final cleanup phase of dredging activity (Figures 15 and 16). Another variant involves a hopper dredge digging trenches along the channel below project depth; later, a plow/I-beam bed-leveling device, suspended from a barge, is dragged along the bottom of the channel by a tugboat knocking material from high spots into the newly dug trenches; final project depth is achieved and at an even grade. Use of a bed-leveling device has been documented by NMFS as a preferred cleanup technique (NMFS, 2003).

Figures 15 and 16: Example bed-levelers and associated operating conditions.
Photograph courtesy: Bean Dredging Company and Weeks Marine Incorporated

2.2.2 ROCK PRE-TREATMENT TECHNIQUES

Pre-treatment techniques are used to break-up consolidated massive materials, like rock, prior to removal of this material by a dredge. Such factors as location, rock hardness, cost, and amount of surface requiring treatment are among factors to take into account when determining which method is most suitable and practicable for a given project.

2.2.2.1 SPUDDING/HYDROHAMMER/PUNCHBARGING/RIGGING

USACE investigated the use of a punchbarge/hydrohammer (also called “spudding”) as a method to pre-treat the concrete sill and rock within the slip without blasting (Figure 17). A hydrohammer is a jackhammer mounted on a backhoe. For the rest of this evaluation, the term “punchbarging” will refer to all mechanical rock removal techniques utilizing a spud, hammer or punch. Punchbarging is the process of fracturing rock by dropping an array of chisels or spuds onto the rock, causing a fracture. A dredge (hydraulic or mechanical) excavates the rock after it is fractured. This is a slow process and can be relatively expensive. The punchbarge would work for 12-hour periods, striking the rock approximately once every 30 to 60 seconds. The primary environmental impact of punchbarging is noise and vibration. This constant pounding would serve to disrupt marine mammal behavior in the area, as well as impact other marine species that may be in the area. The impulse spectrum is broadband and can have components well into the kHz range (Laughlin, 2005 and Laughlin, 2007 in Spence *et al.*, 2007). Low frequencies (<200 Hz) typically dominate the overall levels for impact pile driving as seen with punchbarging (Spence *et al*., 2007). Spence *et al.* also noted that underwater sound data published in the literature exhibits a fairly wide variation in levels generated by pile driving type activities (similar to punchbarging). Variations on the order of five to ten decibels (dB) from one hit to another were noted. A punchbarge used to fracture hard material extends the length of the project temporally due to its lowered production relative to blasting; as a result, potential impacts to all fish and wildlife resources in the area are extended temporally, as well.

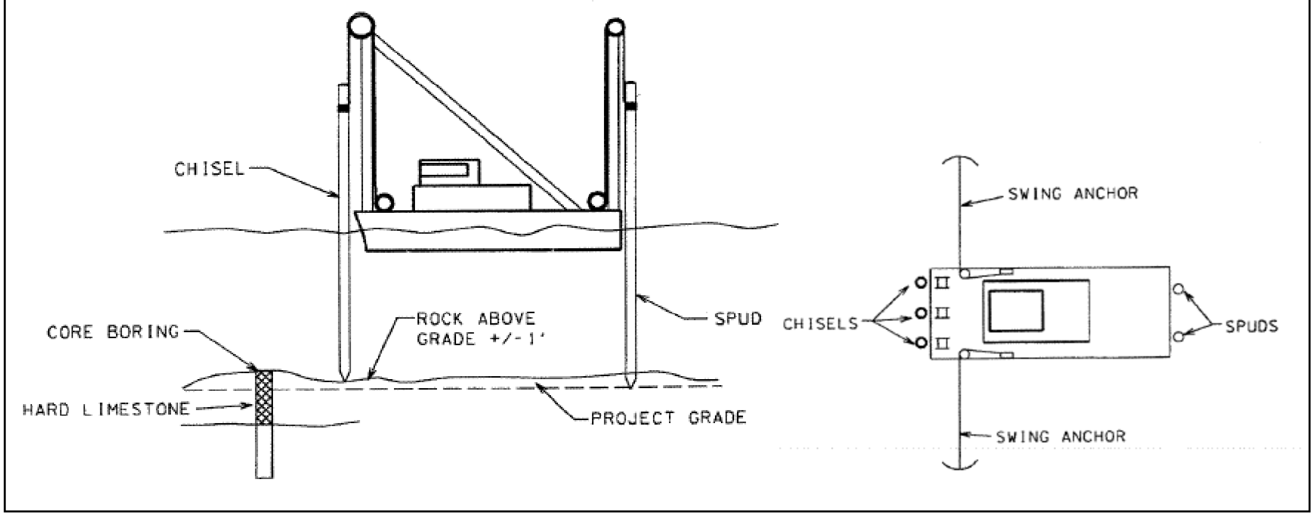

Figure 17: Typical punchbarge set-up.

2.2.2.2 BLASTING

To achieve the removal of the concrete sill and rock in the MCSF-BI slipway, pretreatment will be required. USACE has used two criteria to determine which areas are most likely to need blasting for the MCSF-BI slipway:

1. Areas documented by core borings to contain hard massive rock
2. Concrete sill that is too hard to dredge without pre-treatment.

Based on evaluations of the core boring logs, and as-built information for the sill provided by MCSF-BI, the following is an evaluation of the blasting requirements for the current project. Areas currently identified as having the hardest rock and most likely in need of blasting prior to dredging include the concrete sill and the mouth of the slipway. Additional core borings were collected in October 2008. The results of recent core borings have identified an area of 875,000 square feet of cemented rock within the proposed dredging template in addition to the concrete sill (Figure 18). The cemented rock is highly dense and likely in need of blasting prior to dredging. Based on evaluations of the core boring logs, and as-built information for the sill provided by MCSF-BI, the blasting requirements for the current project will include removal of existing sill and 130,000 CYs cemented sedimentary rock. The pretreatment of the cemented rock will need to occur between Station 22+00 to Station 43+00 of the existing channel baseline. The concrete sill is located approximately at Station 7+00.

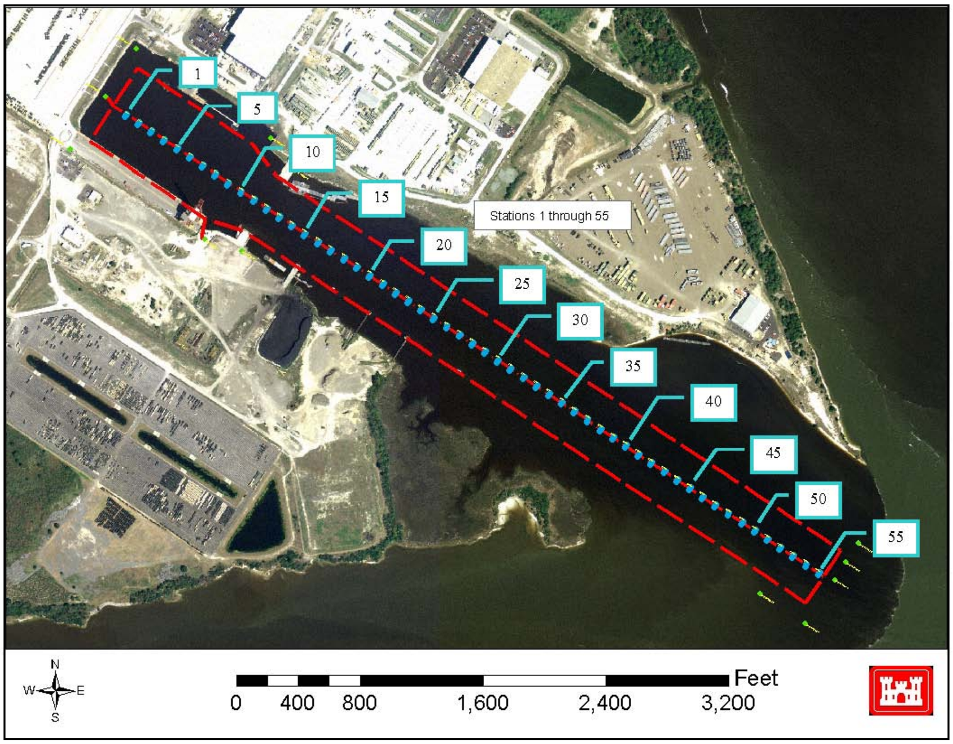

Figure 18: Blount Island Channel Station Markers.

The focus of the proposed blasting work at the Blount Island slipway is to pre-treat the concrete sill and any hard rock prior to removal by a dredge. The pre-treatment would utilize "confined blasting," meaning the shots would be "confined" in the rock (Figure 21). In confined blasting, each charge is placed in a hole drilled in the rock approximately five to ten feet deep, depending on how much rock needs to be broken and the intended project depth. The hole is capped with an inert material, such as crushed rock. This process is referred to as "stemming the hole" (Figures 19 and 20). For the Port of Miami expansion that used confined blasting as a pre-treatment technique, the stemming material was angular crushed rock. The optimum size for stemming material is an average diameter of approximately 0.05 times the diameter of the blast hole. Material must be angular to perform properly (Konya, 2003). For the MCSF-BI project, the geotechnical branch of the USACE Jacksonville District will prepare project specific specifications.

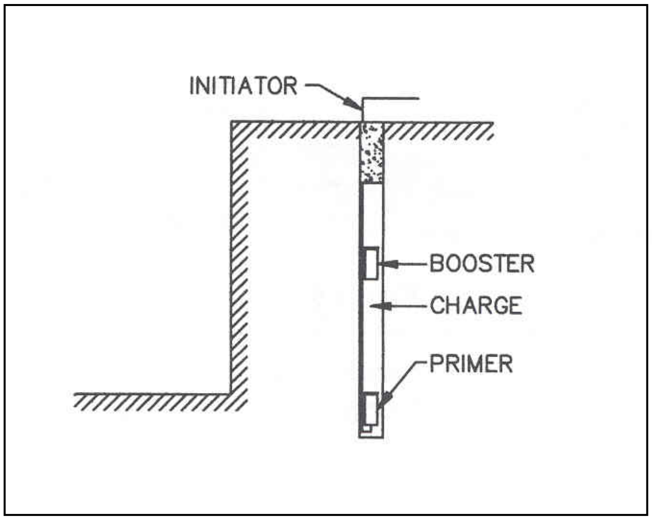

Figure 19: Typical stemmed hole.

Figure 20: Stemming material utilized; bag is approximate volume of material used.

In the recently completed Miami Harbor project, the following requirements were in the specifications regarding stemming material.

1.22.9.20 STEMMING

All blast holes shall be stemmed. The Blaster or Blasting Specialist shall determine the thickness of stemming using blasting industry conventional stemming calculations. The minimum stemming shall be 2 feet thick. Stemming shall be placed in the blast hole in a zone encompassed by competent rock. Measures shall be taken to prevent bridging of explosive materials and stemming within the hole. Stemming shall be clean, angular to subangular, hard stone chips without fines having an approximate diameter of 1/2-inch to

3/8-inch. A barrier shall be placed between the stemming and explosive product, if necessary, to prevent the stemming from settling into the explosive product. Anything contradicting the effectiveness of stemming shall not extend through the stemming.

It is expected that the specifications for any construction utilizing blasting at Blount Island would have similar stemming requirements as those that were used for the Miami Harbor project. The length of stemming material will vary based on the length of the holes drilled, however minimum lengths will be included in the project specific specifications. Studies have shown that stemmed blasts have up to a 60-90% decrease in the strength of the pressure wave released, compared to open water blasts of the same charge weight (Nedwell and Thandavamoorthy, 1992; Hempen *et al*., 2005; Hempen *et al*., 2007). However, unlike open water blasts, very little documentation exists on the effects that confined blasting can have on marine animals near the blast (Keevin *et al*., 1999).

Figure 21: Unconfined blast of seven pounds of explosives.

Figure 22: Confined blast of 3,000 pounds of explosives.

As part of the development of the protected species protection and observation protocols, which will be incorporated into the plans and specifications for the project, USACE and MCSF-BI will work with agencies and non-governmental organizations (NGOs) to address concerns and potential impacts associated with the blasting.

In addition to coordination with the agencies and NGOs, any new scientific studies regarding the effects of blasting (confined or unconfined) on species that may be in the area (marine mammals, sea turtles, and fish (both with a swim bladder and without) will be incorporated into the design of the protection measures that will be employed with confined blasting activities during the project (Figures 21 and 22). Examples of these studies may include:

- Analysis being conducted for the Navy at Woods Hole Oceanographic Center on the effects of unconfined blast pressures on marine mammals (specifically whales, dolphins and seals – manatee carcasses were not made available to the researchers at Woods Hole despite requests from the researchers to FWC) (pers comm. Dr. Ketten, 2005).

- As part of the August 1 and 2, 2006 after action review conducted for the Miami Harbor Phase II dredging project, which included confined blasting as a construction technique, USACE in partnership with FWC, committed to conduct a study ("Caged Fish Study") on the effects of blast pressures on fin fish with air bladders in close proximity to the blast. This study would attempt to answer questions regarding injury and death associated with proximity to a confined blast, not resolved with research conducted during the Wilmington Harbor 1999 blasting (Moser, 1999a and Moser, 1999b).

- Other blasting project monitoring reports (completed prior to development of plans and specifications for the MCSF-BI project) for projects, both from inside and outside of Florida, using confined underwater blasting as a construction technique.

As part of these protective measures, USACE and MCSF-BI will develop three safety radii based on the use of an unconfined blast. The use of an unconfined blast to develop safety radii for a confined blast will increase the protections afforded marine species in the area since it doesn't give any credit of the pressure reduction caused by the confining of the blast. These three zones are referred to as the "Danger zone," which is the inner most zone, located closest to the blast; the "Safety zone," which is the middle zone; and the "watch zone," which is the outer most zone. These zones are described further in subsequent paragraphs and illustrated in Figure 23. Since the slipway is a dead-end canal, the focus of these radii will be the distance animals are up and downstream from the mouth of the slip.

The danger zone radius will be calculated to determine the maximum distance from the blast at which mortality to protected marine species is likely to occur. The danger zone is determined by the amount of explosives used within each delay (which can contain multiple boreholes). An explosive delay is division of a larger charge into a chain of smaller charges with more than eight milliseconds between each of the charges. This break in time breaks up the total pressure of the larger charge into smaller amounts, which makes the rock fracture more efficient and also decreases impacts to aquatic organisms. These calculations are based on impacts to terrestrial animals in water when exposed to a detonation suspended in the water column (unconfined blast) as researched by the U.S. Navy in the 1970s (Yelverton *et al*., 1973; Richmond *et al.,* 1973), as well as observations of sea turtle injury and mortality associated with unconfined blasts for the cutting of oil rig structures in the Gulf of Mexico (Young, 1991; O'Keefe and Young, 1994). The reduction of impact by confining the shots would more than compensate for the presumed higher sensitivity of marine species. The USACE and MCSF-BI believe that the danger zone radius, coupled with a strong protected species observation and protection plan is a conservative, but prudent, approach to the protection of marine wildlife species. Based on a review of the Miami Harbor project, NMFS and FWS found these protective measures sufficient to protect marine mammals under their respective jurisdictions (NMFS, 2005b; FWS, 2002). In addition, monitoring of the Miami blast pressures found these calculations to be extremely conservative and protective (Jordan *et al*., 2007 and Hempen *et al*., 2007).

These zone calculations will be included as part of the specifications package that the contractors will bid on before the project is awarded. The calculations are as follows:

1) Danger Zone (NMFS has referred to this as the Caution Zone in previous authorizations): the radius in feet from the detonation beyond which no mortality or injury from an open water explosion is expected (NMFS 2005). The danger zone (feet) = 260 [79.25 m] X the cube root of weight of explosives in pounds per delay (equivalent weight of TNT).

2) The Safety Zone (sometimes referred to as the Exclusion Zone) is the approximate distance in feet from the detonation beyond which injury (Level A harassment as defined in the MMPA) is unlikely from an open water explosion (NMFS 2005b). The safety zone (feet) = 520 [158.50 m] X cube root of weight of explosives in pounds per delay (equivalent weight of TNT). Ideally, the safety radius should be large enough to offer a wide buffer of protection for marine animals while still remaining small enough that the area can be intensely surveyed.

3) The Watch Zone is three times the radius of the Danger Zone to ensure animals entering or traveling close to the safety zone are spotted and appropriate actions can be implemented before or as they enter any impact areas (i.e., a delay in blasting activities).

To estimate the maximum poundage of explosives that may be utilized for this project, USACE has reviewed two previous blasting projects, one at San Juan Harbor, Puerto Rico in 1994 and the Miami Harbor project in 2005. The heaviest delay used during the San Juan Harbor project was 375 pounds per delay and during the Miami Harbor project, 376 pounds per delay. Based on discussions with USACE geotechnical engineers, the maximum weight of delays for Blount Island is expected to be smaller than the delays in either the San Juan Harbor or Miami Harbor projects since the majority of the material to be removed is concrete and not dense rock. The maximum delay weight for the Blount Island project will be determined during the test blast program.

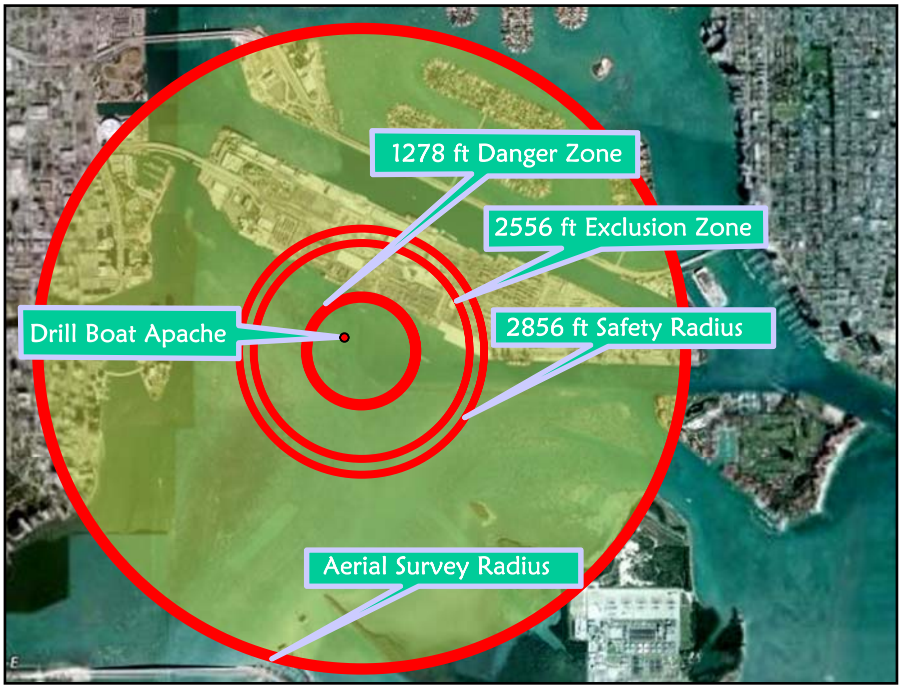

Figure 23: Example of zones utilized at the 2005 Miami Harbor Project.

The weight of explosives to be used in each blast will be limited to the lowest poundage of explosives that can adequately break the rock. The blasting program may consist of the following safety conditions that are based on industry standards in conducting confined underwater blasting, as well as USACE Safety & Health Regulations:

- Drill patterns are restricted to a minimum of an eight foot separation from a loaded hole.
- Hours of blasting are restricted from two hours after sunrise to one hour before sunset to allow for adequate observation of the project area for protected species.
- Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.

- The blast design will consider matching the energy in the “work effort” of the borehole to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.

- Delay timing ensuring at least eight ms between delays to break larger blast weights into smaller blasts increasing blast efficiency while reducing pressure released into the water column.

Because of the potential duration of the blasting and the proximity of the inshore blasting to known manatee use areas, a number of issues will need to be addressed. Due to the likelihood of large numbers of manatees in the area during the summer months, USACE and MSCF-BI have agreed as part of the ESA consultation with FWS to limit blasting activities to November 1 – March 31. In addition, by limiting the blasting activities to the winter months, the project is less likely to impact sea turtles. Sea turtles tend to be present in lower concentrations in the river in the winter months due to the lower water temperatures. Other dredging activities will be taking place inside the slipway and basin during this period of time, but blasting will not be utilized outside of the November 1 – March 31 timeframe.

2.2.2.2.1 Conservation Measures and Monitoring

It is crucial to balance the demands of the blasting operations with the overall safety of the species. A radius that is excessively large can result in a significant number of project suspensions prolonging the blasting, construction, traffic and overall disturbance to the area. A radius that is too small puts the animals at too great of a risk should one go undetected by the observers and move into the blast area. As a result of these factors, the goal is to establish the smallest radius possible without compromising animal safety, and to provide adequate observer coverage for the agreed upon radius.

A watch plan will be formulated based on the required safety zones and optimal observation locations. The watch plan will be consistent with the program that was utilized successfully at Miami Harbor in 2005 and will consist of six observers including at least one aerial observer, two boat-based observers, and two observers stationed on the drill barge. The sixth observer will be placed in the most optimal observation location (boat, barge or aircraft) on a day by day basis depending on the location of the blast and the placement of dredging equipment. This process will ensure complete coverage of the three zones. The watch will begin at least one hour prior to each blast and continue for one-half hour after each blast (Jordan *et al*., 2007).

Figures 24 through 27 depict monitoring activity during blasting activity at Miami Harbor.

Figure 24: Observer on the drill barge.

Figure 25: Aerial observer.

Figure 26: Typical altitude of aerial operations.

Figure 27: Vessel-based observer.

The MCSF-BI and USACE (as joint consulters) will be required to obtain incidental harassment authorization from the NMFS Office of Protected Resources and FWS under the Marine Mammal Protection Act (MMPA). USACE has initiated these actions for MCSF-BI with NMFS, as well as with the FWS while working on the ESA Section 7 Consultation.

In addition to monitoring for protected marine mammals and sea turtles during blasting operations, USACE will work with the resource agencies to develop a monitoring plan for fish kills associated with each blasting event. This effort may be similar to the effort that was developed by FWC in association with the Miami Harbor project. The fish monitoring plan will include collection, enumeration and identification of dead and injured fish floating on the surface after each blast. In addition, blast data will be collected from daily blasting reports provided by the blasting contractor (recorded after each shot), as well as environmental data such as tidal currents (in-going or out-going). Due to health and safety restrictions, all collections of fish will be made from the surface only; no diving to recover fish carcasses will be authorized.

2.2.2.2.2 Test Blast Program

Prior to implementing a construction blasting program a test blast program will be completed. The test blast program will have all the same protection measures in place for protected species monitoring and protection as blasting for construction purposes. The purpose of the test blast program is to demonstrate and/or confirm the following:

- Drill boat capabilities and production rates
- Ideal drill pattern for typical boreholes
- Acceptable rock breakage for excavation
- Tolerable vibration level emitted
- Directional vibration
- Calibration for the environment (water temp, salinity, etc)

The test blast program begins with a single range of individually delayed holes and progresses up to the maximum production blast intended for use. The test blast program will take place in the project area and will count toward the pre-treatment of material, since the blasts of the test blast program will be cracking rock. Each test blast is designed to establish limits of vibration and air blast overpressure, with acceptable rock breakage for excavation. The final test event simulates the maximum explosive detonation as to size, overlying water depth, charge configuration, charge separation, initiation methods, and loading conditions anticipated for the typical production blast.

The results of the test blast program will be formatted in a regression analysis with other pertinent information and conclusions reached. This will be the basis for developing a completely engineered procedure for the construction blasting plan. During testing, the following data will be used to develop a regression analysis:

- Distance
- Pounds per delay
- Peak particle velocities (TVL)
- Frequencies of TVL
- Peak vector sum
- Air blast, overpressure.

2.2.2.2.3 Vibration Monitoring

Protection of structures must be considered in an urban environment such as the Blount Island facility. Commercial properties, utilities, and an active port surround MCSF-BI. For projects with blasting activity, once areas requiring blasting have been identified, critical structures within the blast zones are identified. Where vibration damage may occur, energy ratios and peak particle velocities are limited in accordance with state or county requirements, whichever is more stringent. Furthermore, vibration-monitoring devices are installed to ensure that established vibration limits are not exceeded. If energy ratio or peak particle velocity limits are exceeded, blasting is stopped until the probable cause is determined and corrective measures taken. Critical monitoring locations may include structures such as bulkheads, hazardous materials storage areas, and buried utilities.

Industry standard vibration limitations, as well as the USACE Safety and Health Requirements Manual (EM 385-1-1 3, Sept/96) 29.E.06 limit –“air blast pressure exerted on structures resulting from blasting shall not exceed 133 dB (0.013 psi)" – are incorporated into the design process. A conservative regression analysis of similar projects may be used to develop the design and then continually updated with calibration of the environment. The contractor will also be required to abide by state and local blasting requirements in addition to the USACE Safety Manual previously referenced in this paragraph.

2.3 COMPARISON OF ALTERNATIVES

Table 1 outlines the alternatives considered and summarizes the major features and consequences of the proposed action and alternatives. See Section 4.0 Environmental Effects for a more detailed discussion of impacts of alternatives.

Table 1: Summary of Direct and Indirect Impacts

ALTERNATIVE/ ENVIRONMENTAL FACTOR	Remove sill w/blasting and conduct advance O&M **(PROPOSED ACTION)**	Remove sill w/punching and conduct advance O&M	Remove sill w/mechanical equipment and conduct advance O&M	No Action Status Quo
ENDANGERED AND THREATENED SPECIES	Not likely to adversely affect due to project timing, protective measures and marine species monitoring program	Not likely to adversely affect due to project timing, protective measures and marine species monitoring program	Not likely to adversely affect due to project timing, protective measures and marine species monitoring program	No impact
FISH AND WILDLIFE RESOURCES	Not likely to adversely affect due to project timing, protective measures and marine species monitoring program	Not likely to adversely affect due to project timing, protective measures and marine species monitoring program	Not likely to adversely affect due to project timing, protective measures and marine species monitoring program	No impact
WATER QUALITY	Temporary increase in turbidity within the slipway and basin	Temporary increase in turbidity within the slipway and basin	Temporary increase in turbidity within the slipway and basin	No impact
HISTORIC PROPERTIES	No impact	No impact	No impact	No impact
RECREATION	No impact	No impact	No impact	No impact
MILITARY NAVIGATION	Military navigation can continue to achieve the mission of the MCSF-BI	Military navigation can continue to achieve the mission of the MCSF-BI	Military navigation can continue to achieve the mission of the MCSF-BI	Military navigation would be severely hindered *
ESSENTIAL FISH HABITAT	Not likely to adversely affect due to project timing, protective measures and marine species monitoring program	Not likely to adversely affect due to project timing, protective measures and marine species monitoring program	Not likely to adversely affect due to project timing, protective measures and marine species monitoring program	No impact

* Navigation in the “No Action” alternative may be forced to cease when siltation elevations do not allow for safe vessel navigation.

CHAPTER 3
AFFECTED ENVIRONMENT

ENVIRONMENTAL ASSESSMENT

REMOVAL OF CONCRETE SILL
AND ADVANCE MAINTENANCE DREDGING
OF MARINE CORPS SLIPWAY
U.S. MARINE CORPS SUPPORT FACILITY – BLOUNT ISLAND

ENVIRONMENTAL ASSESSMENT
REMOVAL OF CONCRETE SILL AND ADVANCE MAINTENANCE DREDGING OF MARINE CORPS SLIPWAY
U.S. MARINE CORPS SUPPORT FACILITY – BLOUNT ISLAND
JACKSONVILLE, DUVAL COUNTY, FLORIDA

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3 AFFECTED ENVIRONMENT

The Affected Environment section describes the existing environmental resources of the areas that would be affected if any of the alternatives were implemented. The proposed action and alternatives have been described in Section 2. This section describes only those environmental resources that are relevant to the decision to be made. It does not describe the entire existing environment, only those environmental resources that would affect or that would be affected by the alternatives if they were implemented. This section of the EA, in conjunction with the description of the "no-action" alternative, forms the base line conditions for determining the environmental impacts of the proposed action and reasonable alternatives.

Information presented in this section represents the environmental baseline to which the proposed action is compared in Section 4. In accordance with NEPA and the White House Council on Environmental Quality (CEQ) guidelines, this chapter discusses the existing condition of the human and natural environment that could potentially be affected, beneficially or adversely by the alternatives.

3.1 GENERAL ENVIRONMENTAL SETTING

3.1.1 AREAS TO BE DREDGED

The Blount Island slipway and basin is located in the Port of Jacksonville, a major seaport located on the northeast coast of Florida, along the shores of the St. Johns River in Jacksonville, Duval County. The entrance of the Port is approximately 115 nautical miles south of Savannah, Georgia and 320 miles north of Miami, Florida.

3.1.2 HISTORICAL MAINTENANCE DREDGING IN THE BLOUNT ISLAND SLIPWAY AND BASIN

USACE has maintained the Blount Island slipway and basin for the MCSF-BI. The property was purchased from Gate Maritime Systems in 2005. Since the transfer, two emergency maintenance-dredging events have been required (Table 2). All of the material dredged from the Blount Island facility has been placed in the Dayson Island DMMA.

Table 2: Dredging Events Completed at the Blount Island Facility

Dredging Dates	Type (scheduled/emergency)	Volumes
August 1 - 24, 2005	Emergency	263,415 cubic yards
May 25 - June 7, 2006	Emergency	39,637 cubic yards
May 11 – June 12, 2007	Scheduled	197,366 cubic yards

3.2 THREATENED AND ENDANGERED SPECIES

3.2.1 SEA TURTLES

Duval County is within the normal nesting range of three species of sea turtles: the loggerhead turtle (*Caretta caretta*), the green turtle (*Chelonia mydas*), and the leatherback turtle (*Dermochelys coriacea*). The green turtle and the leatherback turtle are both listed under the ESA, 1973 as endangered species and the loggerhead turtle is listed as a threatened species (Table 3).

Table 3: Sea Turtle Nesting in Duval County: Number of Nests by Year and Species

Year	Green	Loggerhead	Leatherback
2007	0	36	2
2006	4	103	0
2005	3	67	0
2004	1	41	0
2003	0	88	2
2002	0	55	0
2001	0	87	1
2000	1	80	0
1999	0	119	2
1998	2	72	1
1997	0	63	0
1996	0	69	0
1995	0	54	0
1994	0	78	0

FWRI 2007, Duval County

The majority of sea turtle nesting activity in Duval County occurs during the summer months of June, July and August, with nesting activity occurring as early as March and as late as September (Burney and Margolis, 1999). The waters and habitats offshore of Duval County are also used for foraging and shelter for the three species listed above and possibly the Kemp's ridley turtle (*Lepidochelys kempii*).

Between 1991 - 2006, 518 stranded threatened and endangered sea turtles have been reported within the boundaries of Duval County (Table 4). Data is not available to USACE to determine proximity to the project area and not yet available on the FWC website for 2006 and 2007, (Dr. Allen Foley, FWRI, pers. Comm. 2007).

Table 4: Stranded Sea Turtles in Duval County Broken Down Annually by Species

Year	Loggerhead	Green	Kemp's Ridley	Leatherback	Unknown Species
2006	44	4	1	0	0
2005	24	2	2	1	1
2004	14	2	1	1	0
2003	28	3	2	1	0
2002	30	4	4	5	0
2001	13	8	7	0	0
2000	9	9	2	0	0
1999	24	4	5	2	1
1998	21	2	3	0	2
1997	26	1	2	0	1
1996	27	6	1	0	2
1995	23	4	7	0	1
1994	27	3	4	1	2
1993	7	0	2	2	0
1992	26	1	1	4	1
1991	37	6	0	3	4

FWRI 2008, Duval County

Additionally, USACE has noted that in two dredging projects (one in 2003 and one in 1995), the dredge used to complete the projects has lethally interacted with loggerhead and green sea turtles within the boundaries of the Jacksonville Harbor project (USACE, 2008).

USACE requested initiation consultation under the ESA with NMFS regarding the potential effect of the proposed project on threatened and endangered sea turtles in November 2008 with a finding of "may affect, not likely to adversely affect", found in Appendix C.

3.2.2 RIGHT WHALE

The North Atlantic right whale (*Eubalaena glacialis*) (NAWR) is a federally listed endangered species and is also listed as a depleted stock under the MMPA. NARW are highly migratory, summering in feeding and nursery grounds in New England waters and northward to the Bay of Fundy and the Scotian Shelf (NMFS, 2001). They migrate southward in the winter to the northeastern coast of Florida. The breeding and calving grounds for the right whale occur off of the coast of southern Georgia and north Florida; this area has been designated as critical habitat under the ESA in 1994 (59 FR 28793). During these winter months, right whales are routinely seen close to shore in the critical habitat area.

The NMFS March 2007 Stock Assessment reported the current minimum estimated population of the western Atlantic stock of the northern right whale (also called the NARW) to be approximately 306 animals (known alive in 2001 based on the New England Aquarium sighting catalog). No estimate of abundance with an associated coefficient of variability is available. There is disagreement in the literature as to if the population is growing, stagnant or in decline. Potential Biological Removal (PBR) for the western Atlantic right whale is calculated to be zero whales. A review of the “Large Whale Ship Strike Database” (Jensen and Silber, 2003) found five recorded ship strikes of NARWs offshore of Florida, all between Fernandina and Jacksonville from 1975 through 2002. There have been at least two additional ship strikes (one in 2003 and one in 2006) in that same area since 2002. The minimum estimated population within the north Atlantic region is 179 animals (North Atlantic Right Whale Consortium - NARC, 2007). This estimate is based solely on the whales cataloged as alive in 2005 in the New England Aquarium’s right whale identification catalog. The conservative middle-range population estimate is 296 individual whales. This is based on 2005 survey data which is the sum of the 330 cataloged whales presumed alive in 2005, the 40 “inter-match” whales that were likely to be added to the catalog, and 26 calves from 2004 to 2005 that were also likely to be added to the catalog. The high estimate of the current population of north Atlantic right whales is 591 individuals. This is a calculation, based on 2005 survey data, of the 451 cataloged whales minus known dead individuals, plus 98 active inter-match animals without calves and 42 calves (2004 and 2005 calves) minus the known dead. These numbers are based on a completed analysis of 2005 survey data as of October 10, 2006 and were presented by Dr. Michael Moore of Woods Hole at the annual NARC meeting held in New Bedford, Massachusetts during November 2006 (NARC, 2007). In 2006 a total of 19 calves were documented, resulting in an average calving interval for the 2006 calving mothers of 3.2 years. There were also five new mothers. As of December 29, 2008, the data for the 2007 season is not yet available from the NARC.

A complete assessment of NARW recovery efforts and activities is reviewed in the “Recovery Plan for the North Atlantic Right Whale (*Eubalaena glacialis*)” (NMFS, 2005) http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_right_northatlantic.pdf.

The USACE determined that no consultation for Right whales is needed based on discussion in section 4.1.2.1.The likelihood of encountering a Right whale at the project site is discountable as there is no component of this project which occur in open waters offshore of Jacksonville, where Right whales are known to inhabit.

3.2.3 SHORTNOSE STURGEON

The shortnose sturgeon is an anadromous species restricted to the east coast of North America. Throughout its range, shortnose sturgeon occur in rivers, estuaries, and the sea; however, it is principally a riverine species and is known to use three distinct portions of river systems: (1) non-tidal freshwater areas for spawning and occasional overwintering; (2) tidal areas in the vicinity of the fresh/saltwater mixing zone, year-round as juveniles, and during the summer months as adults; and (3) high salinity estuarine areas (15 parts per thousand salinity or greater) as adults during the winter. The majority of the populations are in greatest abundance, and throughout most of the year, in the lower portions of the estuary; the populations are considered to be more abundant now than previously thought.

The shortnose sturgeon is a suctorial feeder and its preferred prey includes small gastropods. The sturgeon forage by slowly swimming along the bottom, lightly dragging their barbels until they feel something that may resemble food, at which time they suck it up in their protrusible mouths, and expel non-food items through their gills. Juveniles may be even more indiscriminate, and just vacuum their way across the bottom. Soft sediments with abundant prey items such as macroinvertebrates are thought to be preferred by shortnose sturgeon for foraging, so established benthic communities are likely important. They are thought to forage for small epifaunal and infaunal organisms over gravel and mud by sucking up food. A few prey studies have been conducted and prey include small crustaceans, polychaetes, insects, and mollusks (Moser and Ross 1995; NMFS, 1998) but they have also been observed feeding off plant surfaces and on fish bait (Dadswell *et al.*, 1984).

The species' general pattern of seasonal movement appears to involve an upstream migration from late January through March when water temperatures range from 9º C to 12º C. Post-spawning fish begin moving back downstream in March and leave the freshwater reaches of the river in May. Throughout the year, both juvenile and adult sturgeon use the area located one to three miles from the freshwater/saltwater interface as a feeding ground. During the summer and winter, adult shortnose sturgeon occur in freshwater reaches of rivers or river reaches that are influenced by tides; as a result, they often occupy only a few short reaches of a river’s entire length (Buckley and Kynard, 1985). During the summer, this species tends to use deep holes at or just above the freshwater/saltwater boundary (Flournoy *et al*., 1992; Rogers and Weber; 1994, Hall *et al.*, 1991). Juvenile shortnose sturgeon generally move upstream for the spring and summer seasons and downstream for fall and winter; however, these movements usually occur above the salt and freshwater interface of the rivers they inhabit (Dadswell *et al.,* 1984, Hall *et al.,* 1991). Adult shortnose sturgeons prefer deep, downstream areas with soft substrate and vegetated bottoms, if present. As the species rarely leave their natal rivers, Kieffer and Kynard (1993) considered shortnose sturgeon to be freshwater amphidromous (*i.e. adults* spawn in freshwater but regularly enter saltwater habitats during their life).

Several authors have concluded that shortnose sturgeon populations in the southern end of the species’ geographic range are extinct. Rogers and Weber (1994), Kahnle *et al.* (1998), and Collins *et al.* (2000) concluded that shortnose sturgeon are extinct from the St. Johns River in Florida and the St. Marys River along the Florida and Georgia border. Rogers and Weber (1995) also concluded that shortnose sturgeon have become extinct in Georgia’s

Satilla River. Historical distribution has been in major rivers along the Atlantic seaboard from the St. John River in Canada to the St. Johns River in Florida, and is rarely seen in the offshore marine environment. Currently, the shortnose sturgeon is more prominent in northern river systems and severely depleted in southern river systems. A recovery plan was completed for shortnose sturgeon with little to no population data available for the St. Johns River in Florida (NMFS, 1998). Beginning in the spring of 2001, the Florida Fish and Wildlife Research Institute (FWRI) and USFWS began research on the population status and distribution of the species in the St. Johns River. After approximately 4,500 hours of gill-net sampling from January through August of 2002 and 2003, only one shortnose sturgeon was captured in 2002. In addition, after 21,381 hours of gill-net sampling for other species from 1980 through 1993, there were no incidental captures of sturgeon (FWRI, 2007).

Because the St. Johns River is heavily industrialized and the system is dammed in the headwaters, shortnose sturgeon populations may have suffered due to habitat degradation and blocked access to historic spawning grounds. Spawning habitat is rocky or gravel substrate or limestone outcroppings, which is very rare in the St. Johns River and associated tributaries. There is no documented reproduction in the St. Johns River and no large adults have been positively identified. Shortnose sturgeon are known to use warm-water springs in other southern rivers, but none have been observed in the numerous warm water springs found in the St. Johns River system (FWRI 2007). Therefore, the occurrence of shortnose sturgeons within the Blount Island slipway and basin is considered very unlikely.

USACE requested initiation consultation under the ESA with NMFS regarding potential effect of the proposed project on endangered shortnose sturgeon in a January 2009 Biological Assessment with a finding of “may affect, not likely to adversely affect” found in Appendix C.

3.2.4 SMALLTOOTH SAWFISH

The smalltooth sawfish (*Pristis pectinata*) has a circumtropical distribution and has been reported to be in shallow coastal and estuarine habitats. In U.S. waters, *P. pectinata* historically occurred from North Carolina south through the Gulf of Mexico, where it was sympatric with the largetooth sawfish *P. perotteti* (west and south of Port Arthur, TX) (Adams and Wilson, 1995). Individuals historically have been reported to migrate northward along the Atlantic seaboard in the warmer months, and as occasional visitors to waters as far north as New York.

Smalltooth sawfish, *P. pectinata,* were once common in Florida as detailed by the draft Smalltooth sawfish recovery plan (NMFS, 2006) and are very rarely reported outside of southwest Florida. Their core range extends along the Everglades coast from the Ten

Thousand Islands to Florida Bay, with moderate occurrence in the Florida Keys and at the mouth of the Caloosahatchee River. Outside of these areas, sawfish are rarely encountered and appear to be relatively rare (Simpfendorfer, 2006). It does not appear to be a coincidence that the core range of smalltooth sawfish corresponds to the section of Florida with the smallest amount of modification to coastal habitat.

NMFS released a draft recovery plan for the smalltooth sawfish in August 2006 (NMFS, 2006), and to date has not released a draft designation of critical habitat for the species, although NMFS has notified USACE that a draft critical habitat designation is expected in December 2008 (A. Livergood, pers.comm, 2008).

Smalltooth sawfish inhabit coastal and estuarine shallow waters close to shore with muddy and sandy bottoms, particularly at river mouths. As noted in the Draft Recovery Plan for this species, historic range of smalltooth sawfish was from Florida to Cape Hatteras. The loss of habitat for juveniles and high incidence of bycatch for adults is suspected cause of decline in the population. Current distribution is reduced by as much as 90 percent, with regular occurrence of the species secluded to the southern tip of Florida from the Caloosahatchee River down to the Florida Keys (NMFS 2006). Therefore, it is considered very unlikely that smallmouth sawfish would occur within the St. John's River or in the Blount Island slipway or basin.

USACE initiated consultation under the ESA with NMFS regarding the potential effect of the proposed project on endangered smalltooth sawfish a January 2009 Biological Assessment with a finding of "may affect, not likely to adversely affect" found in Appendix C.

3.2.5 FLORIDA MANATEE

The West Indian manatee (*Trichechus manatus*) has been listed as a protected mammal in Florida since 1893. The manatee is federally protected under the MMPA as a depleted species and was listed as an endangered species throughout its range in 1967 (32 FR 4061) and received federal protection with the passage of the ESA. Although critical habitat was designated in 1976 for the Florida subspecies (*Trichechus manatus latirostris*) (50 CFR 19.95(a)), there is no federally designated critical habitat in the project area. Florida provided further protection in 1978 by passing the Florida Marine Sanctuary Act designating the state as a manatee sanctuary and providing signage and speed zones in Florida's waterways.

There are four populations of manatees: Northwest, Upper St. Johns River, Atlantic Coast, and Southwest. The Upper St. Johns River population encompasses the area upstream of Palatka extending to the headwaters of the St. Johns River and is the population most likely to occur within the project area. Habitat in this area consists of eelgrass beds, lakes, and spring fed tributaries. Important springs for manatees include Blue, Silver Glen, DeLeon, Salt, and Ocklawaha River (USFWS, 2001 and 2007).

In general, manatees feed primarily on freshwater plants, submerged sea grasses, and plants along shorelines. In northeastern Florida, manatees feed in salt marshes on smooth cordgrass. Springs and freshwater runoff sites are used for drinking water (USFWS, 2001 and 2007). Manatees use secluded canals, creeks, embayments, and lagoons for resting, cavorting, mating, calving and nurturing their young; open waterways and channels are used as travel corridors. Manatees occupy different habitats during various times of the year, with a focus on warm-water sites during winter. They venture from the St. Johns River to the springs in November and reside there until March (USFWS, 2001 and 2007).

Boat traffic and development are the main causes for decline in the population. The Lower St. Johns River Manatee Refuge includes Duval, Clay and St. Johns counties and has established federal protection for this area against watercraft-related takings. Other causes of injury or death include ingestion of debris, entanglement in fishing gear, cold stress, red tide, and entrapment or crushing in water control structures and navigational locks. Even though manatees are vulnerable in their current environment, recent surveys have shown increases in three of the four population stocks. A five-year review prepared by USFWS concluded that the West Indian manatee no longer fits the ESA definition of endangered and made a recommendation to reclassify it as threatened (USFWS, 2001, 2007).

Critical habitat was designated for the Florida manatee in 1976 (50 CFR Part 17.95(a)). Designated critical habitat in the vicinity of the Blount Island facility encompasses the entire St. Johns River from its headwater to the mouth of the Atlantic Ocean. Two groups of manatees reside in the Jacksonville area. One group remains in the area all winter while the other group moves south during the winter (DoN, 2007b). On occasion, individual manatees have been observed in the Blount Island slipway by facility staff (S. Kennedy, pers comm. 2008).

USACE requested initiation consultation under the ESA with USFWS regarding the potential effect of the proposed project on endangered manatees in January 2009 with a finding of “may affect, not likely to adversely affect.” found in Appendix C.

3.3 FISH AND WILDLIFE RESOURCES

3.3.1 BOTTLENOSE DOLPHINS

Bottlenose dolphins are very sociable and are typically found in groups of two to 15 individuals, although groups of 100 have been reported. They are opportunistic feeders, taking a wide variety of fish, cephalopods, and shrimp. There are two forms of bottlenose dolphins: a nearshore (coastal) and an offshore form. Only the coastal form would occur within the project area (NMFS, 2008).

Dr. Martha Jane Caldwell (2001) completed research on the coastal and inshore bottlenose dolphin populations of the St. Johns River in the vicinity of Blount Island. She determined there are two resident inshore populations of bottlenose dolphins in the St. Johns River – the Intracostal south/St. Johns River population (also referred to as the Southern community) and the Intracoastal north population (also referred to as the Northern community). The Southern community dolphins inhabit the waters east (seaward) of the MCSF-BI facility, based on Dr. Caldwell’s assessment (Figure 28).

In discussions with Dr. Quinton White of Jacksonville University, dolphins are commonly seen in the vicinity of the Dames Point Bridge west and upriver of Blount Island (pers comm. Q. White, 2008).

The USACE requested that the NMFS-SEFSC Marine Mammal Stranding Program at the Southeast Fisheries Science Center (SEFSC) in Miami, Florida provide us with data for the last 15 years (1992-2007) for any stranded marine mammals in Duval County recorded by the program (this would exclude manatees as they are not covered by this program). To date, the data request has not been fulfilled.

Figure 28: Southern community dolphins.

Currently, there is not a stock assessment available from NMFS concerning the status of bottlenose dolphins in the inshore and nearshore waters off of Florida (Lance Garrison, pers.com 2008). The stocks of bottlenose dolphins that reside closest to the project area that have a completed stock assessment report available for review are the western North Atlantic coastal stock and offshore stock of bottlenose dolphins. The assessments for these groups were completed in 2006 and 2005, respectively (NMFS, 2008).

3.4 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH). This EA is prepared consistent with guidance provided by the NMFS Southeast Regional Office to USACE, Jacksonville District regarding coordinating EFH consultation requirements with NEPA (NMFS, 1999a). EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, or growth to maturity” (SAFMC, 1998). The South Atlantic Fishery Management Council (SAFMC) currently manages nine fisheries: coastal migratory pelagics, coral and live bottom habitat, dolphin and wahoo, golden crab, red drum, shrimp, snapper, grouper, spiny lobster, and *Sargassum*.

The SAFMC has designated EFH and Habitat Areas of Particular Concern (HAPCs) for the following species that occur in the project area and vicinity: red drum, snapper-grouper, coastal migratory pelagics, and shrimp (SAFMC, 1998).

The two designated EFH species/complexes in the project area that may be affected are the Red Drum and Snapper-Grouper Complex.

***Red Drum*.**

Red drum are distributed along the Atlantic coast in a variety of habitats between the Chesapeake Bay area through Florida. They spawn in the ocean along beaches, near inlets, and in high salinity estuaries. Juveniles are highly abundant during the high salinity months of June through August in the St. Johns River. Adults spend a majority of their time in the ocean upon maturation in estuaries and are fished both recreationally and commercially (SAFMC, 1998).

EFH includes all the following habitats to a distance of 50 meters offshore: tidal freshwater, estuarine emergent vegetated wetlands (flooded saltmarshes, brackish marsh, and tidal creeks), estuarine scrub/shrub (mangrove fringe), submerged rooted vascular plants (sea grasses), oyster reefs and shell banks, unconsolidated bottom (soft sediments), ocean high salinity surf zones, and artificial reefs. The area covered includes Virginia through the

Florida Keys. Red drum EFH within the project area only occurs within the high salinity estuary and unconsolidated bottom (SAFMC, 1998; NMFS, 1999b).

***Snapper-Grouper Complex*.**

The Snapper-Grouper complex contains 73 species from 10 families. Specific life history information for these species can be found in their fisheries management plans under jurisdiction of the SAFMC. In general, snapper-grouper species reside in both pelagic and benthic habitats. Larval stages are typically found in the water column while juvenile and adult stages occur closer to the sea floor. In addition, juvenile species of red grouper, yellowfin grouper, gray snapper, and mutton snapper are likely to occur in inshore seagrass beds, mangrove estuaries, lagoons, and bay systems and may be present in the St. Johns River during this early life stage. The commercial fishery for Snapper-Grouper typically occurs offshore in live bottom (-54.1 to -88.6 ft) and shelf-edge habitats (-360.9 to -590.5 ft). Offshore, man-made artificial reefs are also greatly utilized by snapper-grouper species. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for larval survival and growth up to and including settlement. The Gulf Stream is included as EFH due to its dispersal mechanism of Snapper-Grouper larvae. For specific life stages of estuarine dependent and nearshore Snapper-Grouper species, EFH includes areas inshore of the -100-ft contour, for macroalgae attachment; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom on and around the shelf break zone from shore to at least 600 ft (but to at least 2,000 ft for wreckfish).

3.5 WATER QUALITY

Section 404 of the CWA regulates the discharging of dredged or fill material into waters of the United States. USEPA and USACE jointly administer the Section 404 permit program. The USACE authorizes and issues the individual and general permits and has the responsibility of ensuring compliance with the permits. In addition, USACE makes the determination if a particular plot of land is actually a wetland or water of the United States. USEPA jurisdiction lies with issuing guidelines and policies pertaining to Section 404 and determines if a portion of the program should be turned over to a state, territory, or tribe (USEPA, 2003).

The CWA requires that the surface waters of each state be classified according to designated uses. Florida has five surface water classifications (62-302.400 FAC) with specific criteria applicable to each class of water: Class I - Potable Water Supplies; Class II - Shellfish Propagation or Harvesting; Class III - Recreation, Propagation, and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife; Class IV - Agricultural Water

Supplies; and Class V - Navigation, Utility, and Industrial Use (currently, there are not any designated Class V bodies of water within the State of Florida) (FDEP, 2007b). Under 62-302-400(10) FAC, a water body may be designated as an Outstanding Florida Water (OFW) in addition to being classified as Class I, Class II, or Class III.

An OFW is water designated worthy of special protection because of its natural attributes. This special designation is applied to certain waters, including State Aquatic Preserves, and is intended to protect existing good water quality (FDEP, 2007b). OFWs are listed at 62-302.700 FAC.

State waters within the proposed dredging area of the Blount Island slipway and basin have been designated by the State of Florida as Class III Waters, suitable for recreation as well as propagation and maintenance of a healthy and well-balanced population of fish and wildlife. This dredging area is located to the south of the Nassau River-St. Johns River Marshes Aquatic Preserve. However, the Dayson Island DMMA is located just north of the Aquatic Preserve boundary at Heckscher Drive on the east side of Clapboard Creek. Discharges from the Dayson Island DMMA into waters of the state within the Aquatic Preserve are subject to the state water quality anti-degradation policy set forth at 62-302.300 and 62-4.242 FAC

Section 303(d) of the CWA addresses impaired waters, which are those waters that are not meeting their designated uses (e.g., drinking, fishing, swimming, shellfish harvesting, etc.). Based on Section 303(d) of the CWA and the Florida Watershed Restoration Act, Total Maximum Daily Loads (TMDLs) must be developed for all impaired waters. One water body may have several TMDLs, one for each pollutant that exceeds the water body's capacity to absorb it safely. Florida classifies the Lower St. Johns River as a Class III water body, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. The Lower St. Johns River was included on the 1998-303(d) list as impaired for nutrients. "This portion of the" river was verified as impaired by nutrients based on "its" elevated chlorophyll-a levels (i.e., algal organic matter) in both the fresh and marine portions of the river. To meet its water quality criteria for nutrients and dissolved oxygen, TDMLS have been established for both total nitrogen and total phosphorus in the fresh and marine potions of the Lower St. Johns River. (FDEP, 2006).

3.6 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

Hazardous materials and waste are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Occupational Safety and Health Administration (OSHA); the Resource Conservation and Recovery Act (RCRA); the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); and the Emergency Planning and Community Right-to-Know Act (EPCRA). The CWA also addresses hazardous materials and waste through Spill Prevention Control and Countermeasures (SPCC) and National Pollution Discharge Elimination System (NPDES) permit requirements. Hazardous materials have been defined to include any substance with special characteristics that could harm people, plants, or animals when released. Hazardous waste is defined in the RCRA as any "solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that could or do pose a substantial hazard to human health or the environment." Waste may be classified as hazardous because of its toxicity, reactivity, ignitibility, or corrosiveness. In addition, certain types of waste are "listed" or identified as hazardous in 40 CFR 263.

The slipway and basin have a history as a former commercial site for construction of free-floating nuclear power plants (although the plants were never constructed), and was owned by Gate Maritime Operations. Materials removed from the site will be placed in a confined upland disposal site. The current operations at MCSF-BI generate hazardous waste (USMC, 2008) however, those operations are contained and do not discharge into the spillway of basin.

3.7 SEDIMENT ANALYSIS

Historically, shoal material encountered in the slipway is mostly fines consisting of silts and clays with some sand. Four vibracores were recently collected in the slipway; the analysis of the sediment has not been completed. When completed, the analytical results will be provided as part of the permit application process and as an appendix to the Final EA. Fifteen additional core borings are planned to be collected in October 2008.

In 2005, prior to the last dredging event, 10 surface samples were taken for the maintenance dredging. The samples showed that the inner parts of the channel were mostly made up of silt in association with some fine grained sand and clay; in the outer channel and in proximity to the main river there were mostly poorly graded sands which were associated with silt and clay.

In 2008, four vibracores were taken by the USACE along the length of the channel. The materials encountered are similar to the materials found in the surface samples from 2005, being primarily silt, clay, and sand. Vibracore borings VB-BIMC08-1 and VB-BIMC08-2 in the inner channel (north end) encountered very soft fat clays. Borings VB-BIMC08-3 (Figure 29) and VB-BIMC08-4 encountered primarily sand with varying amounts of silt and clay and soft rock at elevation -39.7 feet and -38.1 feet MLLW, respectively. The rock broke down into sand with some gravel upon retrieval. It is believed the rock continues and becomes firmer with depth. Additional borings are being taken to verify the unconsolidated materials and the distribution and character of the rock. The detailed analysis of these vibracores can be found in Appendix D.

Figure 29: Location of Vibracore Test Borings.

Two out of last three O&M dredging contracts were considered emergency operations due to sudden changes in shoaling rates. These changes are assumed to be tied to increased flows and depositions resulting from the 2004 and 2005 hurricane seasons, as well as drought conditions in the St. Johns River. The slipway lies at the confluence of the Dames point – Fulton Cutoff Range and the St. Johns Bluff reach of the river. Sediment laden water entering the river on a flood tide empties directly into the slipway, over the sill and water velocities drop, allowing fine sediment to drop from suspension and accumulate hindering vessel operations.

3.8 AIR QUALITY

The area of influence for air quality is defined by the administrative/regulatory boundary of Duval County. Duval County is within the Jacksonville (Florida)-Brunswick (Georgia) Interstate Air Quality Control Region. The air quality affected environment for MCSF-BI is Duval County, including the city of Jacksonville. Duval County is currently in attainment with all criteria pollutant standards. The Florida Department of Air Resource Management publishes the requisite Duval County Air Quality Maintenance Plan, the most recent of which was published in December 2002 and covers 2005-2015. This plan is currently under revision to update the new 8-hour ozone standard. This plan revision is expected to be submitted to USEPA Region 4 for review and approval (USN, 2008). If approved, the revised plan will fall under Section 110 of the Clean Air Act Amendments and will not entail any conformity obligations.

3.9 NOISE

The assessment of noise for this section of the EA is limited to daily operations and dredging operations at MCSF-BI and does not include an assessment of the noise associated with either blasting or punch barging activities. An analysis of that noise is located in Section 2.2.2 of this EA and is not repeated here.

Noise is often defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, diminishes the quality of the environment, or is otherwise annoying. Response to noise varies by the type and characteristics of the noise source; distance from the source; receptor sensitivity, and time of day. Noise can be intermittent or continuous, steady or impulsive, and it may be generated by stationary or mobile sources. Noise is described by a weighted sound intensity (or level), which represents sound heard by the human ear and is measured in units called decibels (dBA).

3.9.1 DAILY OPERATIONS AT MCSF-BI

The ambient (or surrounding) noise level of an area like MCSF-BI includes sounds from both natural (wind, waves, birds, etc.) and artificial (vehicle and ship engines, maintenance activities, etc.) sources. The strength/extent (or magnitude) and frequency of sound levels vary over the course of the day, throughout the week, and can be affected by weather conditions.

At MCSF-BI, noise levels are limited and there are no complaints on record from nearby businesses and homes. Most of the MCSF-BI operations occur during the day around normal work hours when noise is rarely an issue. The nearest sensitivity receptors are 0.5 to 1.0 mile, or farther, from the noisiest areas of the Installation (USMC, 2008).

In addition to noise in the air, pile driving and other construction and/or upgrade activities can produce underwater noise. For underwater environments, ambient noise includes tides, currents, waves, as well as noise produced by marine mammals and by humans. Human-caused noise can be generated from the operation of vessels, aircraft, dredging equipment, and other activities.

3.9.2 NOISE ASSOCIATED WITH DREDGING OPERATIONS

Noise generated by dredges is low frequency in nature. This low frequency noise tends to carry long distances in the water, but is attenuated the further away you are from the source. Currently, periodic maintenance dredging occurs in the dredging project area, as often as every two years for the NAVSTA Mayport entrance channel and turning basin. Deepening of the Jacksonville Harbor has involved some blasting upriver from the Jacksonville Harbor Bar Cut 3 federal navigation channel. Underwater noise as it relates to marine mammals is discussed in Sections 3.6 and 4.6. Sound exposure levels measured for equipment similar to clamshell equipment used in the past to dredge the NAVSTA Mayport turning basin range between 75 and 88 dBA at 50 foot distance from the dredging equipment (NMFS, 2007).

3.10 RECREATION RESOURCES

The estuarine waters of the St. Johns River in Duval County are used for a variety of recreational activities including swimming, fishing, water skiing, and sail and power boating. Recreational boaters use the St. Johns River for accessing offshore fishing and diving areas in the Atlantic near Jacksonville, as well as for fishing in the river itself. In addition to commercial port facilities, there are several large marinas to the north and south of the Port where pleasure craft of various types and sizes are moored.

Currently, outdoor recreation at the MCSF-BI facility on Blount Island is limited to a few recreational facilities for military use, many of which are associated with military physical training requirements. Numerous open and waterfront areas provide opportunity for passive recreation such as bird watching, pedestrian activities and picnicking. The public has no access to the on-site slip for fishing or waterborne activities.

3.11 MILITARY NAVIGATION

Blount Island Command's primary mission is to support worldwide military operations. The Command plans, coordinates and executes the logistics efforts of the Maritime Prepositioning Force (MPF) programs, including loading and offloading munitions, materials and combat equipment from 16 ships assigned to MCSF-BI. In fulfilling this mission, MCSF-BI has to allow for the entry and exit of ships in both the basin area and the slipway channel. As a result of hurricane-related shoaling of the slipway channel and basin, frequent and unscheduled dredging has been required to maintain vessel movement.

MCSF-BI has also taken on logistics command (LOGCOM) forward requirements, receiving ships with Marine Corps equipment returning from conflict areas. It is critical that the slipway and basin areas are deep enough to safely accommodate these ships and meet mission requirements.

3.12 HISTORIC PROPERTIES

An archival and literature search, in addition to coordination with the State Historic Preservation Officer (SHPO), was conducted for the Blount Island advance maintenance and sill removal. There are no known cultural or archeological resources located within the project area (SHPO coordination letter, dated April 17, 2008 located in Appendix C).

CHAPTER 4

ENVIRONMENTAL EFFECTS

ENVIRONMENTAL ASSESSMENT

REMOVAL OF CONCRETE SILL
AND ADVANCE MAINTENANCE DREDGING
OF MARINE CORPS SLIPWAY
U.S. MARINE CORPS SUPPORT FACILITY – BLOUNT ISLAND

ENVIRONMENTAL ASSESSMENT

REMOVAL OF CONCRETE SILL AND ADVANCE MAINTENANCE DREDGING OF MARINE CORPS SLIPWAY
U.S. MARINE CORPS SUPPORT FACILITY – BLOUNT ISLAND
JACKSONVILLE, DUVAL COUNTY, FLORIDA

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4 ENVIRONMENTAL EFFECTS

This section describes how the implementation of each alternative would affect the environmental resources listed in Section 3.0. A summary of these impacts can be found in Table 1 of Section 2.0. The following discussion pertaining to anticipated changes to the existing environment includes direct, indirect, and cumulative effects.

4.1 THREATENED AND ENDANGERED SPECIES

4.1.1 SEA TURTLES

4.1.1.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND BLASTING

4.1.1.1.1 Direct Effects of Dredging

The impacts of dredging operations on sea turtles have been assessed by NMFS (NMFS, 1991; NMFS, 1995; NMFS, 1997a; NMFS, 1997b; NMFS, 2003) in the various versions of the South Atlantic Regional Biological Opinion (SARBO) and the 2003 (revised in 2005 and 2007) Gulf Regional Biological Opinion (GRBO). The life history of the four sea turtle species commonly found in north Florida, and the four most likely to be affected by in-water construction activities is found in the GRBO; in addition, the species' individual recovery plans are incorporated by reference (NMFS, 2003; NMFS and FWS, 1991; NMFS and FWS, 1991a; NMFS and FWS, 1991b; NMFS and FWS, 1992; NMFS and FWS, 1993; NMFS and FWS, 1995). Removal of the sill after pre-treatment, and removal of dredged material during advance maintenance will be done by mechanical dredge like a clamshell (also known as a bucket) dredge or a cutterhead dredge. The 1991 SARBO states "clamshell dredges are the least likely to adversely affect sea turtles because they are stationary and impact very small areas at a given time. Any sea turtle injured or killed by a clamshell dredge would have to be directly beneath the bucket. The chances of such an occurrence are extremely low…" (NMFS, 1991). NMFS also determined that "of the three major dredge types, only the hopper dredge has been implicated in the mortality of endangered and threatened sea turtles." NMFS repeated the 1991 determination in the 1995 and 1997 SARBOs (NMFS, 1995 and 1997a and b). Based on these determinations, USACE believes that the use of a mechanical and/or cutterhead dredge for removal of the concrete sill and for advance maintenance dredging, may affect, but is not likely to adversely affect listed sea turtles.

As part of the standard plans and specifications for the project, USACE and MCSF-BI have agreed to implement the NMFS "Sea Turtle and Smalltooth Sawfish Construction Conditions:"

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-foot radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

4.1.1.1.2 Direct Effects of Blasting

The highest potential impact to sea turtles may result from the use of explosives to remove areas of rock within the project area. Due to the presence of safety zones and measures associated with all proposed blasting activities, it is highly unlikely that blasting will have an adverse effect as classified by the Endangered Species Act on listed sea turtles. However, it is extremely likely that both the pressure and noise associated with blasting would physically damage sensory mechanisms and other physiological functions of individual sea turtles. Impacts associated with blasting can be broken into two categories: direct impacts and indirect impacts.

To date, there has not been a single comprehensive study to determine the effects of underwater explosions on reptiles that defines the relationship between distance/pressure and mortality or damage (Keevin and Hempen, 1997). However, there have been studies that demonstrate that sea turtles are killed and injured by underwater explosions (Keevin and Hempen, 1997). Sea turtles with untreated internal injuries would have increased vulnerability to predators and disease. Nervous system damage was cited as a possible impact to sea turtles caused by blasting (U.S. Department of Navy 1998 as cited in USACE, 2000). Damage of the nervous system could kill sea turtles through disorientation and subsequent drowning. The Navy's review of previous studies suggests that rigid masses such as bone (or carapace and plastron) could protect tissues beneath them; however, there are no observations available to determine whether turtle shells would indeed afford such protection.

Christian and Gaspin's (1974) estimates of safety zones for swimmers found that beyond a cavitation area, waves reflected off a surface have reduced pressure pulses; therefore, an animal at shallow depths would be exposed to a reduced impulse. Studies conducted by Klima *et al*., (1988) evaluated unconfined blasts of approximately 42 pounds (a low number) on sea turtles placed in surface cages at varying distances from the explosion (four ridley and four loggerhead sea turtles). The findings of the Christian and Gaspin 1974 study, which only considered very small unconfined explosive weights, imply that the turtles in the Klima *et al*. (1988) study would be under reduced effects of the shock wave. Despite this possible lowered level of impact, five of eight turtles were rendered unconscious at distances of 229 to 915 meters from the detonation site. Unconscious sea turtles that are not detected, removed and rehabilitated likely have low survival rates. Such results would not have resulted given blast operations confined within rock substrates rather than unconfined blasts.

The proposed action will use confined blasts, which will significantly reduce the pressure wave strength and the area around the discharge where injury or death could occur (Hempen *et al*., 2007). USACE assumes that tolerance of turtles to blast overpressures is approximately equal to that of marine mammals (Department of the Navy 1998 in USACE, 2000), that is death would not occur to individuals farther than 400 feet from a confined blast (Konya, 2003).

For assessing impacts of blasting operations on sea turtles, USACE relied on the previous analyses conducted by NMFS-Protected Resources Division as part of their ESA consultations on the Miami Harbor GRR (NMFS Consult #F/SER/2002/01094 – Feb 26, 2003) (NMFS, 2003a) and the Miami Harbor Phase II project (NMFS, Consult #I/SER/2002/00178 dated Sept 23, 2002) (NMFS, 2002). The results from 38 days of blasting conducted in Miami indicated that 16 sea turtles were recorded in the action area, without a single stranding of an injured or dead turtle reported (Trish Adams, FWS pers.com, 2005; and Wendy Teas, NMFS, pers.com 2005). In the ESA consultations for the two projects in Miami, with regard to impacts on sea turtles, NMFS found that “NOAA Fisheries believes that the use of the mitigative measures above in addition with capping the hole the explosives are placed in (which will greatly reduce the explosive energy released into the water column) will reduce the chances of a sea turtle being adversely affected by explosives to discountable levels”, (NMFS, 2003a).

Pressure data collected during the Miami Harbor Phase II project by USACE geophysicists and biologists indicated that using the three zones previously described, the pressures associated with the blasts return to background levels (one to two psi) at the margin of the danger zone. This means that any animal located inside the safety zone, but outside the danger zone, would not be exposed to any additional pressure effects from a confined blast (Hempen *et al*., 2007).

***Protection*.**
Based on the protective measures proposed for this project, in concert with the reduction in pressure from the blast due to the confinement of the pressure in the substrate, the impacts to sea turtles associated with blasting should be minimal. USACE has concluded that blasting is the *least* environmentally impactful method for removing the concrete sill and rock in the slipway. Each blast will last no longer than 15 seconds in duration, and may even be as short as two seconds. Additionally, the blasts are confined in rock substrate with stemming. Because the blasts are confined within the rock structure, the distance of the blast effects are reduced significantly as compared to an unconfined blast (Nedwell and Thandavamoorthy, 1992; Hempen *et al*., 2005; Hempen *et al*., 2007).

4.1.1.1.3 Indirect Effects of Blasting

Indirect impacts on sea turtles due to dredging/blasting and construction activities in the project area include alteration of behavior and autecology. For example, daily movements of sea turtles may be impeded or altered. These effects would be temporary, only lasting as long as the dredging and sill removal activities.

Biological Assessment.
More detailed information concerning the impacts associated with the project is available in the Biological Assessment submitted to NMFS that is included in Appendix C. It is the determination of USACE that while the project may affect sea turtles under NMFS' jurisdiction, the project is not likely to adversely affect them since the construction techniques do not use a hopper dredge; USACE has requested that NMFS concur with that determination.

4.1.1.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

4.1.1.2.1 Direct Effects of Punching

Use of a punchbarge in the slipway to pre-treat the concrete sill prior to removal by a dredge would require the punchbarge to work for 12-hour periods, seven days a week. During this period, the punchbarge would strike the concrete sill approximately once every 30-seconds. The constant pounding would disrupt sea turtle behavior in the area by harassment. Using the punchbarge would likely extend the length of the project temporally, thus increasing any potential impacts to all fish and wildlife resources in the area.

Low frequencies (<200 Hz) typically dominate the overall levels for impact pile driving as seen with punchbarges (Spence *et al*., 2007). Spence *et al.,* also noted that underwater sound data published in the literature typically shows a fairly wide variation in the levels generated by pile driving type activities (which punchbarging or hydrohammer is similar to). They found variations on the order of five to ten decibels from one hit to another. Using the punchbarge will also extend the length of the project temporally due to its lower production with harder materials, thus temporally increasing any potential impacts to all fish and wildlife resources in the area.

4.1.1.2.2 Direct Effects of Dredging

Analysis of the effects of dredging was completed in Section 4.1.1.1.1 of the EA and is hereby incorporated by reference.

4.1.1.2.3 Indirect Effects of Dredging

Indirect impacts on sea turtles due to dredging/punching and construction activities in the project area include alteration of behavior and autecology. For example, daily movements of sea turtles may be impeded or altered. These effects would be temporary, only lasting as long as the dredging and sill removal activities.

4.1.1.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT

4.1.1.3.1 Direct Effects of Dredging

Analysis of the effects of dredging was completed in Section 4.1.1.1.1 of the EA and is hereby incorporated by reference.

4.1.1.3.2 Indirect Effects of Dredging

Analysis of the indirect effects associated with the project was completed in Sections 4.1.1.1.3 and 4.1.1.2.3 of the EA and is hereby incorporated by reference.

4.1.1.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impact to endangered and threatened sea turtles if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.1.2 RIGHT WHALES

4.1.2.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND BLASTING

The proposed activities take place in an estuarine environment, in a dead-end slip seven miles upstream from the Atlantic Ocean. No activities are taking place in the offshore environment where right whales are expected to be found. Should a right whale swim seven miles upstream while the construction activities are taking place, USACE, MCSF-BI and their contractors will be notified by NMFS as part of the Right Whale Early Warning Network and appropriate mechanisms can be put in place to ensure that the animal is protected at all time, to include ceasing work until the whale leaves the vicinity of the project area.

Biological Assessment

It is the determination of USACE that the project shall have no effect on the Atlantic Right whale as the likelihood of an effect is so small as to be discountable since no activities take place in the open waters offshore of Jacksonville where whales are known to be found.

4.1.2.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND PUNCHEBARGE/HYDROHAMMER

The proposed activities take place in an estuarine environment, in a dead-end slip seven miles upstream from the Atlantic Ocean. No activities are taking place in the offshore environment where right whales are expected to be found. Should a north Atlantic right whale swim seven miles upstream while the construction activities are taking place, USACE, MCSF-BI and our contractors will be notified by NMFS as part of the Right Whale Early Warning System and appropriate mechanisms implemented to ensure that the animal is protected at all times, to include ceasing work until the whale leaves the vicinity of the project area, if necessary.

4.1.2.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT

The proposed activities take place in an estuarine environment, in a dead-end slip seven miles upstream from the Atlantic Ocean. No activities are taking place in the offshore environment where right whales are expected to be found. Should a right whale swim seven miles upstream while the construction activities are taking place, USACE, MCSF-BI and their contractors will be notified by NMFS as part of the Right Whale early warning network and appropriate mechanisms can be put in place to ensure that the animal is protected at all times, to include ceasing work until the whale leaves the vicinity of the project area.

4.1.2.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impact to endangered right whales if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.1.3 SHORTNOSE STURGEON

4.1.3.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND BLASTING

4.1.3.1.1 Effects of blasting

In reviewing the effects of blasting on fish in a previous port deepening project, USACE has determined that, as with marine mammals and reptiles, the confinement of the blast in the rock greatly reduces the impacts from the blasting and pressure waves, and as a result, greatly reduces the impacts to fish in the project area.

At the Port of Miami Phase II project conducted in 2005, blasting consisted of 40 blast events over a 38 day time frame. Of the 40 blast events, 23 were monitored (57.5%) by the FWC and had injured and dead fishes collected after the “all clear” signal was given. The “all-clear” is normally at least two to three minutes after the shot is fired; this gap was important since seagulls and frigate birds quickly learned to approach the blast site and swoop in to eat some of the stunned, injured and dead fish floating on the surface. FWC staff and volunteers collected the carcasses of floating fish (it should be noted that not all dead fish float after a blast; due to safety concerns, no plans exist for sub-surface diving in the blast zone to collect non-floating carcasses). The fish were described to the lowest taxonomic level possible (usually species) and the injury types were categorized. The data forms are available from FWC and USACE on request.

A summary of the data shows that 24 different genera were collected during the Miami Harbor blasting. The species with the highest abundance were white grunts (*Haemulon plumieri*) (N=51); scrawled cowfish (*Lactophrys quadricornis*) (N=43) and Pygmy filefish (*Monocanthus setifer*) (N=30). Total fish collected during the 23 blasts was N=288 or an average of 12.5 fish per blast (range of three to 38). Table 5 presents a review of the three blasts with the greatest number of fish killed and the maximum charge weight per delay for the Miami Harbor project.

Table 5 : Miami Harbor Blasting Fish Survey (Maximum Charge Weight per Delay)

Date	Max Charge Wt/delay (lbs)	Fish killed
7/26/2005	85	38
7/25/2005	112	35
8/10/2005	17	28

There appears to be no direct correlation between charge weight and fish killed that can be determined from such a small sample; a review of the entire 23 blasts does not indicate a discernible pattern. Factors that affect fish mortality include, but are not limited to: fish size, body shape (fusiform, etc.), and proximity of the blast to a vertical structure like a bulkhead (in the August 10, 2005 blast as an example, a much smaller charge weight resulted in a higher fish kill due to the closeness of a bulkhead).

If we use the 12.5 fish/blast kill estimate based solely on the Miami Harbor blasting, and multiply it by the 40 shots, we reach a total estimate of floating fish killed in Miami of 500 fish. As stated previously, not all carcasses float to the surface and there is no way to estimate how many carcasses will not float. However, we can say that at Miami, the minimum estimated fish kill based on field data (collected fish) was 500. It should be noted that no tarpon or snook (species of concern for the state) were observed or collected.

This system of estimating impacts is limited physically by the ability to collect the fish carcass. As previously stated, due to human health and safety concerns, collection of carcass from the bottom of the blast zone will not be conducted. In addition, this method of estimating impacts does not address eggs or larval fish that may be in the water column near the blast. To address mortality, instead of estimating the number of fish, eggs and larvae killed or injured (injured are considered killed for the purposes of this analysis), a model would need to be developed based on site geology to estimate potential charge weights per hole and blast pattern, and what the injury/mortality radius would be for a maximum blast at Blount Island. While this proposed model would not quantify fish, eggs and larvae injured or killed, it would define distance and charge parameters (i.e., a fish, egg or larvae within “X” feet of “X” charge would be injured or killed).

Using the Danger zone equation previously discussed in section 2.2.2.2 (MR_{ow} (feet) = 260 $w_{ow}^{1/3}$ equation), suggests that the kill radius of a one pound open water booster test was 260 feet at Miami Harbor. The kill radius would have been only 56 feet as a conservative assessment for a one pound charge that was confined by stemming within rock at Miami Harbor. The same charge may have a kill radius of only 22 feet when confined within competent rock and well stemmed. The kill radii for the shots recorded at Miami Harbor of 17, 32, 67, and 134 pounds per delay may have been 140, 180, 230 and 290 feet, respectively. Radiation of the wave energy into rock reduced the available energy reaching the water column. The pressures entering the water column were well below those pressures that typically propagate away from open-water charges relative to charge weight per delay (solid media, like rock, can mitigate wave energy).

There are a number of physical attributes of the pressure waveform from the confined shots that suggest mortality would be lower than indicated by the peak-pressure measurements. The rapid oscillation from a high, brief overpressure and a moderate, but longer underpressure associated with detonation of high explosives in the water column is most probably responsible for organ damage and mortality in fish. This oscillation in waveform is responsible for the rapid contraction and overextension of the swimbladder resulting in internal damage and mortality (Wiley *et al*., 1981). It has also been suggested that the negative phase (relative to ambient) of the pressure wave is responsible for organ damage (particularly the swimbladder) and mortality (Anonymous 1948; Hubbs and Rechnitzer 1952 and Wiley *et al*., 1981). When reviewing the data from Miami Harbor, it was determined that the high-frequency compressing pressures, usually associated with the detonation of high explosives, were reduced in amplitude and negative pressures were small relative to the background noise.

Hubbs and Rechnitzer (1952) determined that the lethal threshold peak pressure for a variety of marine fish species exposed to dynamite blasts varied from 40 psi to 70 psi. The more conservative pressure of 40 psi from Hubbs and Rechnitzer (1952) was used to develop the safety radii equations used at Miami, and is proposed for Blount Island, even though the range defined by Hubbs and Rechnitzer extends much further than for 70 psi. Keevin (1995) found no mortality or internal organ damage to bluegill exposed to a high explosive at pressures at or below 60 psi (420 kPa). The 40 psi value is also conservative because the waveform of the mortality value was established from an open-water testing program and not from similar confined shots that did not have clear extension (negative pressure) phases for measurable impulse and energy measures.

The blasting at Miami Harbor and subsequent analysis clearly demonstrates that explosives shot in open water will produce both higher amplitude and more rapidly oscillating shock waves than rock removal shots. Thus, blasting in rock/concrete will result in lower aquatic organism mortality than the same explosive weight detonated in open water, when stemming of the blast is used to control the blasting agent’s release of pressure into the water column. This conclusion is important because the majority of aquatic organism mortality models were developed using open-water shot data that will overestimate rock-removal shot mortality. Safety zones calculated using open-water mortality models are used to establish watch plans and optimal observer locations to protect aquatic organisms (Jordan *et al*., 2007). If the observation area becomes too large, based on the use of open-water shot pressures, it is possible that the level of intended species protection may be diminished. It is much easier to monitor a small area than a very large area. As the dimensions of a watch zone unnecessarily increase, there is undoubtedly a safety radius that would preclude blasting because of the high cost of monitoring, long blasting delays due to aquatic organisms wandering into the enlarged blast zone, and the reduced efficiency of being able to protect the organisms of concern.

Biological Assessment.
Given the unlikely presence of shortnose sturgeon in the slipway during construction activities (based on FWC survey work – FWRI, 2007), it is the determination of USACE that while the project may affect shortnose sturgeon under NMFS' jurisdiction, the project is not likely to adversely affect them, and the likelihood of an effect is so small as to be discountable (based on the census information from the St. Johns River population of shortnose sturgeon). USACE and MCSF-BI have requested that NMFS concur with this determination. More detailed information concerning the impacts associated with the project is available in the Biological Assessment submitted to the NMFS that is included in Appendix C.

4.1.3.1.1 Effects of dredging

Few studies exist that specifically evaluate the impacts of dredging impacts on sturgeon. However, based on known incidental take history from both Endangered Species Observer (ESO) and non-ESO reporting, maintenance dredging of federal navigation channels using hydraulic (cutterhead and hopper) and mechanical (clamshell) dredge types may adversely affect shortnose and Atlantic sturgeon populations. From 1990-2007, a total of 24 sturgeon takes (eleven Atlantic, eleven shortnose, and two Gulf) have been documented for hopper (n=16), cutterhead (n=5), and clamshell (n=3) dredging activities along the Atlantic (North and South) and Gulf coasts. Of the documented incidental takes, 15 were lethal, 8 were non-lethal, and 1 was unknown. All 11 shortnose sturgeon takes occurred in the USACE North Atlantic Division (NAD) (Delaware River – five; Kennebec River – six) and occurred during cutterhead dredging operations (n=5; all lethal), hopper (n=5), and clamshell (n=1) (Figure 32). Although incidental takes of sturgeon have been documented for hydraulic and mechanical dredging, only hydraulic hopper dredge operations are capable of effectively screening for an incidental take and have included ESOs to monitor and report incidental takes since 1995. The proportion of hydraulic cutterhead and clamshell dredging operations being observed (using ESOs or other observing method) are unknown, but probably relatively small due to the limited concern regarding potential for lethal or injurous take by these types of dredging equipment. Therefore, take data does not consider observer coverage equal for all dredging operations. However, based on the current understanding of different dredging operations relative to sturgeon behavior, clamshell and hydraulic cutterhead dredges are still considered by the NMFS as alternative dredge types to reduce potential entrainment (where the fish is sucked into the cutterhead by the suction used to dredge the rock) impacts to sturgeon (NMFS, 1998).

Given the unlikely presence of shortnose sturgeon in the slipway during construction activities (FWC survey work, FWRI, 2007), it is the determination of USACE that while the project may affect shortnose sturgeon under NMFS' jurisdiction, the project is not likely to adversely affect them. Based on census information from the St. Johns River population of shortnose sturgeon, the likelihood of an affect is small, if not discountable.

4.1.3.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

The effects of punching on shortnose sturgeon are similar to those of blasting since use of a punchbarge results in pressure waves under water as the punch hits rock or concrete. The blasting analysis found in section 4.1.3.1.1 is incorporated to demonstrate the worst-case effects of use of a punchbarge on shortnose sturgeon.

4.1.3.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT

Analysis of the effects of dredging was completed in Section 4.1.3.1.1 of the EA and is hereby incorporated by reference.

4.1.3.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impact to endangered shortnose sturgeon if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.1.4 SMALLTOOTH SAWFISH

4.1.4.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND BLASTING

4.1.4.1.1 Effects of Dredging

The likelihood of a smalltooth sawfish being in the project area is extremely slim since the area lacks the habitat preferred by the species. However, the USACE is including the fish in the analysis as a matter of conservatism.

The logic set forth regarding cutterhead (pipeline) and mechanical (clamshell) dredges in the 1991, 1995 and 1997 SARBOs and 2003 (as amended) GRBO (NMFS, 1991; NMFS, 1995; NMFS 1997, 1997a and b; and NMFS, 2003) for sea turtles holds true for sawfish, as well. The 1991 SARBO states, “Pipeline dredges are relatively stationary and only influence small areas at any given time. For a turtle to be taken with a pipeline dredge, it would have to approach the cutterhead and be caught in the suction. This type of behavior would appear unlikely, but may be possible. Presently, NMFS has determined that pipeline dredges are unlikely to adversely affect sea turtles." The 2003 GRBO states, "In contrast to hopper dredges, pipeline dredges are relatively stationary, and therefore act on only small areas at any given time." In the 1980s, NOAA Fisheries required observer coverage at pipeline outflows during several dredging projects deploying pipeline dredges along the Atlantic coast. No turtles or turtle parts were observed in the outflow areas. Additionally, the USACE South Atlantic Division (SAD) office in Atlanta, Georgia, charged with overseeing the work of the individual USACE Districts along the Eastern Seaboard from North Carolina through Florida, provided documentation of hundreds of hours of informal observation by USACE inspectors during which no takes of listed species were observed. Additional monitoring by other agency personnel, conservation organizations, and the general public has never resulted in reports of turtle takes by pipeline dredges." USACE believes that if this statement holds true for a species that is relatively abundant in south Florida such as sea turtles, it should also hold true for a very rare species like sawfish.

In the 2003 GRBO, NMFS made the determination that "After consultation with individuals with many years in the business of providing qualified observers to the hopper dredge industry to monitor incoming dredged material for endangered species remains (C. Slay, Coastwise Consulting, personal communication18 August 2003) and a review of the available scientific literature, NOAA Fisheries has determined that there has never been a reported take of a smalltooth sawfish by a hopper dredge, and such take is unlikely to occur because of smalltooth sawfishes affinity for shallow, estuarine systems."

The probability of a sawfish being taken by a cutterhead or mechanical dredge is so unlikely as to be discountable. To help minimize the potential for a sawfish take, should an animal be in the area during dredging operations, USACE will incorporate the NMFS sawfish protection construction protocols into the plans and specifications. The protocols include:

- The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

- The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

- Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the NMFS's Protected Resources Division, St. Petersburg, Florida.

- All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

- If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50 foot radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

- Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the NMFS's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

- Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

4.1.4.1.2 Effects of Blasting

Review of ichthyologic information and test blast data indicates that fish with swim bladders are more susceptible to damage from blasts, and some less-tolerant individuals may be killed within 140 feet of a confined blast (USACE, 2000). Sawfish, as chondrichthyans, do not have air bladders; therefore, they would be more tolerant of blast overpressures closer to the discharge, possibly even within 70 feet of a blast.

4.1.4.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

The effects of punching on smalltooth sawfish are similar to those of blasting since use of a punchbarge results in pressure waves under water as the punch hits rock or concrete. The blasting analysis found in section 4.1.3.1.1 is incorporated to demonstrate the worst-case effects on a smalltooth sawfish from use of a punchbarge.

4.1.4.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT

Analysis of the effects of dredging on smalltooth sawfish was completed in Section 4.1.1.1.1 of the EA and is hereby incorporated by reference.

4.1.4.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impacts on endangered smalltooth sawfish if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.1.5 FLORIDA MANATEE

4.1.5.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND BLASTING

4.1.5.1.1 Effects of Dredging

The project is not likely to adversely affect the manatee because the following USFWS standard “Manatee Protection Measures” will be incorporated into the standard plans and specifications for the project:

(1) The contractor will instruct all personnel associated with the construction of the project about the presence of manatees in the area and the need to avoid collisions with manatees. All construction personnel shall be responsible for observing water-related activities for the presence of manatees and shall implement appropriate precautions to ensure the protection of manatees.

(2) All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing or killing manatees, which are protected under the Marine Mammals Protection Act of 1972, the Endangered Species Act of 1973, and the Florida Sanctuary Act. The contractor shall be held responsible for any manatee harmed, harassed, or killed as a result of the construction of the project.

(3) Prior to the commencement of construction, the construction contractor shall construct and install at least two temporary signs concerning manatees. These signs shall read "Caution: Manatee Habitat. Idle Speed is required if operating a Vessel in the Construction Area." and "Caution: Manatee Habitat. Equipment must be Shutdown Immediately if a Manatee Comes within 50 Feet of Operation."

(4) All vessels associated with the project will be required to operate at "no wake" speeds at all times while in waters where the draft of the vessel provides less than four feet of clearance from the bottom. All vessels shall follow routes of deep water whenever possible.

(5) If a manatee is sighted within a hundred yards of the construction area, appropriate safeguards will be taken, including suspension of construction activities, if necessary, to avoid injury to manatees. These precautions shall include the operation of all moving equipment no closer than 50 feet of a manatee.

(6) The contractor shall maintain a log detailing sightings, collisions, or injuries to manatees should they occur during the contract. Any collision with and/or injury to a manatee shall be reported immediately to the Florida Marine Patrol at 1-800-DIAL-FMP (1-800-342-5367) and USFWS in Vero Beach.

4.1.5.1.2 Effects of Blasting

Utilization of blasting as a technique to remove the concrete sill and rock from the slipway and basin at Blount Island may have an effect on manatees in the area of any blasts fired. There have been sightings of manatees in the vicinity of the project area and it is likely that any effect on manatees outside of the proposed safety radius will be in the form of a Temporary Threshold Shift (TTS). Both the pressure and noise associated with blasting can injure marine mammals.

Direct impacts on marine mammals due to blasting activities in the project area include alteration of behavior and autecology. For example, daily movements and/or seasonal migrations of dolphins may be impeded or altered. In addition, manatees may alter their behavior or sustain minor physical injury from detonation of blasts outside the danger zone. Although an incidental take would not result from sound/noise at this distance, disturbances of this nature (alteration of behavior/movements) may be considered harassment under MMPA and ESA. These are special concerns related to resident populations of manatees.

Utilizing data from rock-contained blasts such as those at Miami Harbor in 2005, USACE has been able to estimate potential effects on protected species. This data can be correlated to the data from the Environmental Protection Agency (EPA) concerning blasting impacts to marine mammals. The EPA data indicates that impacts from explosives can produce lethal and non-lethal injury as well as incidental harassment. The pressure wave from the blast is the most causative factor in injuries because it affects the air cavities in the lungs and intestines. The extent of lethal effects are proportional to the animal's mass, *i.e.*, the smaller the animal, the more lethal the effects; therefore all data is based on the lowest possible weight for an affected mammal (infant dolphin). Non-lethal injuries include tympanic membrane ruptures; however, given that manatee behavior relies heavily on sound, the non-lethal nature of such an injury is questionable in the long-term. For that reason, it is important to employ limits so no non-lethal tympanic membrane damage is expected to occur. Based on the EPA test data, the level of pressure impulse when no lethal and no non-lethal injuries occur is reported to be five pounds per square inch pressure during an exposure lasting one millisecond.

More recently, studies by Finneran *et al*. (2000) demonstrated both temporary and permanent auditory threshold shifts in marine mammals as impacts from explosions. Due to the fact that marine mammals (particularly dolphins and manatees, (Reynolds, 2003)) are highly acoustic, such effects on behavior should be taken into account when assessing harmful impacts. While many of these impacts are not lethal and this study has shown that the impacts tend not to be cumulative, significant changes in behavior could constitute a "take" under the MMPA and the ESA.

By utilizing the confined blasting technique used and studied at Miami Harbor in 2005, the Blount Island maximum shot pressures from confined blasting will be significantly lower than open-water shot pressures at the same charge weight. Radiation of the wave energy into rock reduces the available energy to reach the water column (Hempen *et al.*, 2007). The pressures entering the water column during confined blasting are well below those pressures that typically propagate away from open-water shot pressures relative to charge weight per delay.

As a result of the reduction in pressure waves by confining blasts in rock, the placement of a protective zone around the blast array, and monitoring for the presence of protected species, including the Florida manatee, USACE does not believe that any manatee will be killed or injured. However, because the proposed action may harass manatees by causing a TTS, USACE will consult with USFWS under the ESA and MMPA for potential effects on the species. As part of the consultation, USACE and MCSF-BI will agree to limit blasting operations to the timeframe when manatees are least likely to be in the project vicinity (November 1 through March 31).

4.1.5.1.3 Indirect Effects

Indirect impacts on manatees due to dredging/blasting and construction activities in the project area include alteration of behavior and autecology. For example, daily movements of manatees in and out of the slip should they be in the area during construction, may be impeded or altered. These effects would be temporary, only lasting as long as the occurrence of dredging and sill removal activities.

Biological Assessment.
More detailed information concerning the impacts associated with the project is available in the Biological Assessment submitted to the FWS that is included in Appendix C. It is the determination of USACE that while the project may affect manatees under FWS' jurisdiction, the project is not likely to adversely affect them; USACE and MCSF-BI have requested that FWS concur with this determination.

4.1.5.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

4.1.5.2.1 Direct Effects of Punching

Use of a punchbarge or hydrohammer in the slipway to pre-treat the concrete sill prior to removal by a dredge would require the punchbarge to work for 12-hour periods, 7 days a week. During this period, the punchbarge would strike the concrete sill approximately once every 30 seconds. The constant pounding would serve to disrupt manatee behavior in the area by harassment. Using the punchbarge would likely extend the length of the project temporally, thereby increasing any potential impacts to all fish and wildlife resources in the area.

Low frequencies (<200 Hz) typically dominate the overall noise levels during impact pile driving as seen with a hydrohammer or punchbarg (Spence *et al*., 2007). Spence *et al.,* also noted that underwater sound data published in the literature typically shows a fairly wide variation in the levels generated by pile driving type activities (using a punchbarge or hydrohammer is similar). Variations on the order of five to 10 decibels from one hit to another were noted. The use of a punchbarge will extend the length of the project temporally due to its lower production with harder materials, and as a result, temporally increase any potential impacts to all fish and wildlife resources, including manatees, in the area.

4.1.5.2.2 Direct Effects of Dredging

An analysis of the effects of dredging was included in Section 4.1.5.1.1 of the EA and is hereby incorporated by reference.

4.1.5.2.3 Indirect Effects

Indirect impacts on manatees due to dredging/punching and construction activities in the project area include alteration of behavior and autecology. For example, daily movements of manatees in and out of the slip should they be in the area during construction, may be impeded or altered. These effects would be temporary, only lasting as long as the dredging and sill removal activities.

4.1.5.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT

4.1.5.3.1 Direct Effects of Dredging

An analysis of the effects of dredging was included in Section 4.1.5.1.1 of the EA and is hereby incorporated by reference.

4.1.5.3.2 Indirect Effects of Dredging

An analysis of the indirect effects associated with the project was included in Sections 4.1.5.1.2 and is hereby incorporated by reference.

4.1.5.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impacts to the endangered Florida manatee if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.2 FISH AND WILDLIFE RESOURCES

4.2.1 BOTTLENOSE DOLPHINS

4.2.1.1 PREFERED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND BLASTING

4.2.1.1.1 Effects of Dredging on Bottlenose Dolphins

Although bottlenose dolphins are common in the St. Johns River system (Caldwell, 2001), USACE has never documented a direct effect on bottlenose dolphins from dredging activities during its numerous dredging projects throughout the St. Johns River, Florida, and the United States. In the April 25, 2005 notice in the Federal Register for the issuance of an Incidental Harassment Authorization for blasting at the Port of Miami, NMFS states:

> “According to the Corps, bottlenose dolphins and other marine mammals have not been documented as being directly affected by dredging activities and, therefore, the Corps does not anticipate any incidental harassment of bottlenose dolphins. NMFS concurs.” (NMFS, 2005b)”

4.2.1.1.2 Effects of Blasting on Bottlenose Dolphins

All of the alternatives that remove the sill and deepen the slipway utilizing blasting as a construction technique may have an effect on bottlenose dolphins in the area of any blasts fired to break rock or concrete during the project. Although there have been very few sightings of dolphins in the boundaries of the slipway, it is likely that an effect on dolphins outside of the proposed safety radius will be in the form of a Temporary Threshold Shift (TTS). Both the pressure and noise associated with blasting can injure marine mammals.

Direct impacts on marine mammals due to blasting activities in the project area include alteration of behavior and autecology. For example, daily movements and/or seasonal migrations of dolphins may be impeded or altered. In addition, dolphins may alter their behavior or sustain minor physical injury from detonation of blasts inside the danger zone. Although a lethal or injurious incidental take would not result from sound/noise at the edge of the danger zone, disturbances of this nature (alteration of behavior/movements) may be considered harassment under MMPA.

Utilizing data from confined (rock-contained) blasts such as those at the Atlantic Dry Dock in North Carolina and the Port of Miami in 2005, USACE has been able to estimate potential effects on protected species. This data can be correlated to the data from the EPA concerning blasting impacts to marine mammals. The EPA data indicates that impacts from explosives can produce lethal and non-lethal injury as well as incidental harassment. The pressure wave from the blast is the most causative factor in injuries because it affects the air cavities in the lungs and intestines. The extent of lethal effects are proportional to the animal's mass, *i.e.*, the smaller the animal, the more lethal the effects; therefore all data is based on the lowest possible weight of the affected mammal (infant dolphin). Non-lethal injuries include tympanic membrane ruptures; however, given that dolphin behavior relies heavily on sound, the non-lethal nature of such an injury is questionable in the long-term. For that reason, it is important to employ limits so no non-lethal tympanic membrane damage is expected to occur. Based on the EPA test data, the level of pressure impulse when no lethal and no non-lethal injuries occur is reported to be five pounds per square inch pressure during an exposure lasting one millisecond.

More recently, studies by Finneran *et al*. (2000) demonstrated both temporary and permanent auditory threshold shifts in marine mammals as impacts from explosions. Due to the fact that marine mammals are highly acoustic, such effects on behavior should be taken into account when assessing harmful impacts. While many of these impacts are not lethal and this study has shown that the impacts tend not to be cumulative, significant changes in behavior could constitute a "take" under the MMPA.

By utilizing the confined blasting technique used and studied at Miami Harbor in 2005, the Blount Island maximum shot pressures from confined blasting will be significantly lower than open-water shot pressures at the same charge weight. Radiation of the wave energy into rock reduces the available energy to reach the water column (Hempen *et al.*, 2007). The pressures entering the water column are well below those pressures that typically propagate away from open-water shot pressures relative to charge weight per delay.

As a result of the reduction in pressure waves by confining blasts in rock, the placement of a protective zone around the blast array, and monitoring for the presence of protected species, including bottlenose dolphins, USACE does not believe that any dolphins will be killed or injured. However, because the proposed action may harass bottlenose dolphins by causing a TTS, USACE will submit a request for an "incidental harassment authorization" from the NMFS. Section 101 (a)(5) of the MMPA allows the incidental (but not intentional) taking of marine mammals upon request if the taking will (1) have a negligible impact on the species or stock(s); and (2) not have an immitigable adverse impact on the availability of the species or stock(s) for subsistence uses.

4.2.1.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

4.2.1.2.1 Effects of Dredging on Bottlenose Dolphins

An analysis of the effects of dredging was included in Section 4.2.1.1.1 of the EA and is hereby incorporated by reference.

4.2.1.2.2 Effects of Punchbarging on Bottlenose Dolphins

Use of a punchbarge or hydrohammer in the slipway to pre-treat the concrete sill prior to removal by a dredge would require the punchbarge to work for 12-hour periods, 7 days a week. During this period, the punchbarge would strike the concrete sill approximately once every 30 seconds. This constant pounding would serve to disrupt manatee behavior in the area by harassment. Using the punchbarge would likely extend the length of the project temporally, thereby increasing any potential impacts to all fish and wildlife resources in the area.

Low frequencies (<200 Hz) typically dominate the overall levels for impact pile driving as seen with use of a hydrohammer or punchbarge (Spence *et al*., 2007). Spence *et al.,* also noted that underwater sound data published in the literature typically shows a fairly wide variation in the levels generated by pile driving type activities (a punchbarge or hydrohammer is similar). Variations on the order of five to ten decibels from one hit to another were noted. Using the punchbarge will extend the length of the project temporally due to its lower production with harder materials, and as a result, temporally increase any potential impacts to all fish and wildlife resources, including dolphins, in the area.

4.2.1.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 ft MLLW WITH DREDGING EQUIPMENT

4.2.1.3.1 Effects of Dredging on Bottlenose Dolphins

An analysis of the effects of dredging was included in Section 4.2.1.1.1 of the EA and is hereby incorporated by reference.

4.2.1.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impacts to bottlenose dolphins if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.3 ESSENTIAL FISH HABITAT ASSESSMENT

The project description is in Section 2.3. The mitigation of impacts is in section 2.7. Whereas Section 3.6 describes the “existing conditions” of the Essential Fish Habitat (EFH), Federally managed fisheries, and associate species such as major prey species, including affected life history stages, this section describes the individual and cumulative impacts of the proposed action (s) and alternatives.

4.3.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND BLASTING

4.3.1.1 BLASTING IMPACTS ON FISH/ESSENTIAL FISH HABITAT (EFH)

An analysis of the effects of blasting on fish was included in Section 4.1.3.1.1 of the EA and is hereby incorporated by reference. The Blount Island slip is a man-made, dead end slip with little to no habitat value for species designated by the South Atlantic Fisheries Management Council (SAFMC) as having EFH. As a result of this determination, and a review of the effects of blasting on fish previously included in this EA, USACE and MCSF-BI have concluded that blasting is the *least* environmentally impacting method for removing the concrete sill and rock in the slipway. Each blast will last no longer than 15 seconds in duration, and may even be as short as two seconds. Additionally, the blasts are confined in the rock substrate with stemming; because the blasts are confined within the rock structure, the distance of the blast effects are reduced significantly as compared to an unconfined blast (Nedwell and Thandavamoorthy, 1992; Hempen *et al*., 2005; Hempen *et al*., 2007).

4.3.1.2 DREDGING IMPACTS ON FISH/ESSENTIAL FISH HABITAT (EFH)

Dredging with hydraulic dredges usually results in little to no effect on adult fish due to their size and ability to avoid either the drag head or cutterhead. The same cannot be said of larval fish, which lack the ability to avoid the suction near the drag head or cutterhead. Larval distribution and concentrations in a channel are highly variable on a range of scales (spatially and temporally). It is important to recognize that not all larvae in an inlet like the

Blount Island slipway (although this is a dead-end slip) would be vulnerable to entrainment. Larvae are not equally distributed in the inlet as the tidal flows, both in and out of the inlet, can show asymmetry. In addition, many larvae exhibit a vertical migration strategy that facilitates tidal stream transport; larvae are in the upper portion of the water column during flood tide and near the bottom during ebb tide (Settle, 2003).

The National Oceanographic and Atmospheric Administration's National Ocean Service (NOAA/NOS) National Centers for Coastal Ocean Science prepared a report entitled "Assessment of Potential Larval Entrainment Mortality Due to Hydraulic Dredging of Beaufort Inlet" (Settle, 2003)." In this assessment, NOAA found that the use of a 30 inch hydraulic dredge, dredging 24 hours a day, in Beaufort Inlet, North Carolina, would result in entrainment mortality of the local fish population "even under the worst case scenario" of 0.1%/day^{-1}. NOAA also found, and USACE agrees that any larvae entrained in the dredge are likely to be killed; however, it is likely that the impact at the population level would be insignificant (Settle, 2003). While Beaufort, North Carolina is not near the St. Johns River or the Blount Island slip, the analysis completed by Settle in the 2003 assessment (regarding pipe diameter, volume of water taken in by a dredge, and larvae densities) allows USACE to draw similar conclusions relative to the Blount Island slip project. The assumption is that if an inlet such as Beaufort with high densities of larval fishes (up to 5 larvae m $^{-3)}$ can be dredged for 24 hours a day without significant population level impacts to larval fish densities, the same can hold true at Blount Island where a significant portion of the larval development habitat is in the river estuary.

4.3.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

4.3.2.1 DREDGING IMPACTS ON FISH/ESSENTIAL FISH HABITAT (EFH)

An analysis of the effects of dredging was included in Section 4.3.1.2 of the EA and is hereby incorporated by reference.

4.3.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT

4.3.3.1 DREDGING IMPACTS ON FISH

An analysis of the effects of dredging was included in Section 4.3.1.2 of the EA and is hereby incorporated by reference.

4.3.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impacts to essential fish habitat if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.4 WATER QUALITY

4.4.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND BLASTING

There will be a temporary elevation of turbidity within the permitted mixing zone; state water quality standards will not be exceeded outside of the permitted mixing zone. All dredging activities and discharge activities will be actively monitored for turbidity compliance. Removal of the sill is expected to improve water quality at the dead-end portion of the slip by allowing a greater mixing of waters in the slip with water entering and exiting via tide.

4.4.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

There will be a temporary elevation of turbidity within the permitted mixing zone; state water quality standards will not be exceeded outside of the permitted mixing zone. All dredging activities and discharge activities will be actively monitored for turbidity compliance. Removal of the sill is expected to improve water quality at the dead-end portion of the slip by allowing greater mixing of waters in the slip with water entering and exiting via tide.

4.4.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT

There will be a temporary elevation of turbidity within the permitted mixing zone; state water quality standards will not be exceeded outside of the permitted mixing zone. All dredging activities and discharge activities will be actively monitored for turbidity compliance. Removal of the sill is expected to improve water quality at the dead-end portion of the slip by allowing greater mixing of waters in the slip with water entering and exiting via tide.

4.4.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impact to water quality if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.5 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW)

4.5.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND BLASTING

Based on the previous dredging history of the slipway, no HTRW is expected to be found during this advance maintenance event. No changes to current MCSF-BI HTRW programs are expected to occur as a result of the dredging and sill removal.

4.5.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

Based on the previous dredging history of the slipway, no HTRW is expected to be found during this advance maintenance event. No changes to current MCSF-BI HTRW programs are expected to occur as a result of the dredging and sill removal.

4.5.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT

Based on the previous dredging history of the slipway, no HTRW is expected to be found during this advance maintenance event. No changes to current MCSF-BI HTRW programs are expected to occur as a result of the dredging and sill removal.

4.5.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impacts related to HTRW if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.6 AIR QUALITY

4.6.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND BLASTING

The short-term effects from dredge emissions and other construction equipment associated with sill removal and advance maintenance dredging would not significantly impact air quality. No air quality permits would be required to complete this dredging and sill removal. Duval County is designated as an attainment area for Federal air quality standards under the Clean Air Act (CAA). As the proposed dredging and sill removal is within an attainment area, EPA's General Conformity Rule to implement Section 176(c) of the CAA does not apply and a conformity determination is not required.

4.6.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

The short-term effects from dredge emissions and other construction equipment associated with sill removal and advance maintenance dredging would not significantly impact air quality. No air quality permits would be required to complete this dredging and sill removal. Duval County is designated as an attainment area for Federal air quality standards under the Clean Air Act. As the proposed dredging and sill removal is within an attainment area, EPA's General Conformity Rule to implement Section 176(c) of the CAA does not apply and a conformity determination is not required.

4.6.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT

The short-term effects from dredge emissions and other construction equipment associated with sill removal and advance maintenance dredging would not significantly impact air quality. No air quality permits would be required to complete this dredging and sill removal. Duval County is designated as an attainment area for Federal air quality standards under the Clean Air Act. As the proposed dredging and sill removal is within an attainment area, EPA's General Conformity Rule to implement Section 176(c) of the CAA does not apply and a conformity determination is not required.

4.6.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impacts to air quality if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.7 NOISE

4.7.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND BLASTING

The MCSF-BI facility is located within an active industrial port. Due to its location, the noise associated with the sill removal and dredging will be a minimal, if discernible, temporary increase over background noise associated with daily operations at MCSF-BI and the Port of Jacksonville. With the exception of the alarms 15 and five minutes before a blast is set off, and when the all clear is signaled, there is minimal noise associated with blasting. Based on the observations of previous confined underwater blasting events, above water noise associated with the actual detonation is not expected to occur.

4.7.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND PUNCHBARGE

The MCSF-BI facility is located within an active industrial port. Due to its location, the noise associated with the sill removal and dredging will be a minimal, if discernible, temporary increase over background noise associated with daily operations at MCSF-BI and the Port of Jacksonville. Punching is a noisy construction technique with the punch hitting the sill/rock approximately once a minute during operations. The area surrounding the slip is an industrial area comprised of MCSF-BI and JAXPORT facilities. Although the noise associated with punching will be minimized by adjacent buildings, there may be an increase in noise in the areas surrounding the slip.

4.7.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT

The MCSF-BI facility is located within an active industrial port. Due to its location, the noise associated with the sill removal and dredging will be a minimal, if discernible, temporary increase over background noise associated with daily operations at MCSF-BI and Port of Jacksonville.

4.7.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impacts related to noise if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.8 RECREATIONAL RESOURCES

4.8.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND BLASTING

Removal of the sill with blasting and conducting advance maintenance dredging to -47 ft MLLW with dredging equipment and blasting will have no effect on current recreational opportunities and activities at MCSF-BI.

4.8.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND PUNCHING

Removal of the sill with punchbarging and conducting advance maintenance dredging to -47 ft MLLW with dredging equipment and blasting will have no effect on current recreational opportunities and activities at MCSF-BI.

4.8.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT

Removal of the sill with mechanical equipment and conducting advance maintenance dredging to -47 ft MLLW with dredging equipment and blasting will have no effect on current recreational opportunities and activities at MCSF-BI.

4.8.4 NO ACTION ALTERNATIVE (STATUS QUO)

There will be no impacts related to recreational resources if USACE does not remove the sill from the slipway and conduct advance O&M operations in the slipway and basin.

4.9 MILITARY NAVIGATION

4.9.1 PREFERRED ALTERNATIVE - REMOVE SILL WITH BLASTING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND BLASTING

Removal of the sill and advance maintenance dredging will allow operations at the Blount Island facility to continue safely. It would allow the accomplishment of MCSF-BI’s primary mission that includes entry and exit of ships in support of MPF programs. Removal of the sill and advance maintenance dredging will allow the ships to be fully loaded to capacity; in addition, it will allow MCSF-BI to complete its primary mission.

4.9.2 REMOVE SILL WITH PUNCHING AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT AND PUNCHING

Removal of the sill and advance maintenance dredging will allow operations at the Blount Island facility to continue safely. It would allow the accomplishment of MCSF-BI’s primary mission that includes entry and exit of ships in support of MPF programs. Removal of the sill and advance maintenance dredging will allow the ships to be fully loaded to capacity; in addition, it will allow MCFS-BI to complete its primary mission.

4.9.3 REMOVE SILL WITH MECHANICAL EQUIPMENT AND CONDUCT ADVANCE MAINTENANCE DREDGING TO -47 FT MLLW WITH DREDGING EQUIPMENT

Removal of the sill and advance maintenance dredging will allow operations at the Blount Island facility to continue safely. It would directly allow the accomplishment of MCSF-BI’s primary mission that includes entry and exit of ships in support of MPF programs. Removal of the sill and advance maintenance dredging will allow the ships to be fully loaded to capacity and also allow MCFS-BI to complete its primary mission.

4.9.4 NO ACTION ALTERNATIVE (STATUS QUO)

If removal of the sill and advance maintenance dredging is not conducted, the slipway and basin will continue to silt in and will shallow from the necessary 40 feet. Additional shoaling above the -40 foot MLLW level would hinder ships from entering and leaving the Blount Island facility safely. In turn, this would prevent the accomplishment of MCSF-BI's primary mission which includes entry and exit of ships in support of MPF programs.

Without removal of the sill at -37 feet, the ships will continue to require to be light loaded (not to their full capacity) which also will hinder MCSF-BI's ability to complete its primary mission.

4.10 CUMULATIVE IMPACTS

Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." (40 CFR 1508.7)

***Past Actions in the area of Blount Island*.**

The Port of Jacksonville was authorized as a Federal Navigation Project in 1920. JAXPORT has deepened the St. Johns River shipping channel, which extends from the inlet to the Talleyrand Marine Terminal, to a maintained depth of -40 ft MLLW. Dredged material is currently disposed of at the West Bartram Island upland disposal site; East Bartram Island upland disposal site; Buck Island upland disposal site, where material is recycled for beneficial use along the shoreline for beach nourishment (starting at the jetties and working south); or in the Jacksonville ODMDS. USACE Jacksonville District, in cooperation with JAXPORT, is studying the feasibility of further deepening the port. A Supplemental EIS for the Jacksonville Harbor Navigation Study, General Re-Evaluation Report (GRR) is being prepared to supplement the Jacksonville Harbor Navigation Improvements EIS completed in July 1996.

Ongoing projects in the St. Johns River and the Port of Jacksonville include construction to complete deepening of the harbor to -40 ft MLLW throughout the port; a feasibility study on ebb-tide restrictions and shoreline erosion at Milepoint; and an EIS evaluating the homeporting of Naval vessels at Naval Station Mayport. The Navy has completed the extensive Cumulative Impacts Analysis in the Final EIS for Homeporting (USN, 2008); with regard to the impacts of that proposal, that analysis is hereby incorporated by reference.

4.11 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.11.1 IRREVERSIBLE

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. The only irreversible commitment of resources associated with the proposed project would be the expenditure of federal funds to complete the work.

4.11.2 IRRETRIEVABLE

An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. Placement of dredged material at any of the placement sites would temporarily disrupt the normal use of these areas.

4.12 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

There may be short-term degradation of water quality due to turbidity caused by dredging and dredged material placement operations. The potential exists for the incidental harassment of bottlenose dolphins during dredging operations. However, the implementation of standard protective measures should minimize and mitigate for this potential impact to resident dolphins in the St. Johns River.

4.13 UNCERTAIN, UNIQUE, OR UNKNOWN RISKS

There are no expected uncertain, unique or unknown risks associated with the proposed sill removal and advance maintenance dredging project.

4.14 PRECEDENT AND PRINCIPLE FOR FUTURE ACTIONS

Removal of this sill and advance maintenance of the MSCF-BI slip sets no precedent for future actions.

4.15 ENVIRONMENTAL COMMITMENTS

USACE, MSCF-BI and their contractors commit to avoid, minimize or mitigate for adverse effects during construction activities by including the following commitments in the contract specifications:

- USACE will comply with all requirements of any consultation documents provided under the Endangered Species Act from either FWS or NMFS associated with this project.

- USACE will implement the Standard Manatee Construction Protection Specifications to ensure manatee protection.

- USACE will implement the terms and conditions of the latest State of Florida Water Quality Certification for this project.

4.16 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

4.16.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Environmental information on the project has been compiled and this EA has been prepared under the requirements of the National Environmental Policy Act, thus ensuring compliance with the Act.

4.16.2 ENDANGERED SPECIES ACT OF 1973

Consultation was initiated with the FWS and NMFS via the scoping letter dated January 30, 2008. Additionally, Biological Assessments (BAs) for species under both agencies' jurisdictions have been prepared and will be submitted to each agency to initiate consultation under the Act. Based on the findings of NMFS and FWS at the completion of the consultations, USACE and MCSF-BI will finalize the EA. This project was fully coordinated under the ESA and is in full compliance with the Act.

4.16.3 FISH AND WILDLIFE COORDINATION ACT OF 1958

This project has been coordinated with the FWS. A Coordination Act Report was not required for this project.

4.16.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

Archival research, channel surveys, and consultation with the Florida State Historic Preservation Officer (SHPO) have been conducted for the sill removal and advance O&M dredging project. All of these activities have been completed in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act, as amended; and Executive Order 11593. The project is in full compliance with the NHPA as well as the AHPA and EO 11593. USACE received a letter from the Florida SHPO dated April 22, 2008 stating that no historic properties will be affected by the proposed sill removal and advance maintenance operations.

4.16.5 CLEAN WATER ACT OF 1972

A Section 401 water quality certification will be required from the Florida Department of Environmental Protection (FDEP) and a permit will be issued from USACE to MCSF-BI under Section 404 of the Act. All state water quality standards would be met. A Section 404(b) evaluation is included in this report as Appendix A. Public notices (Department of the Army and FDEP) either have been or will be issued in a manner that satisfy the requirements of Section 404 of the CWA and will be available for review at the Jacksonville District upon request.

4.16.6 CLEAN AIR ACT OF 1972

No air quality permits would be required for this project. The project is in compliance with this Act.

4.16.7 COASTAL ZONE MANAGEMENT ACT OF 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix B. USACE and MCSF-BI have determined that no unacceptable impacts would occur as a result of the project and it would be consistent with the Florida Coastal Management Plan. In accordance with the Memorandum of Understanding (1979) and the Addendum to the Memorandum (1983) concerning acquisition of Water Quality

Certifications and other state authorizations, the preliminary EA and Section 404 (b)(1) Evaluation have been submitted to the state in lieu of a summary of environmental impacts to show consistency with the Florida Coastal Zone Management Plan. In a letter dated March 17, 2008, the Florida Department of Environmental Protection (DEP) found the proposed project to be consistent with the Florida Coastal Management Plan (Appendix B).

4.16.8 FARMLAND PROTECTION POLICY ACT OF 1981

No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

4.16.9 WILD AND SCENIC RIVER ACT OF 1968

No designated Wild and Scenic River reaches would be affected by project related activities. This act is not applicable.

4.16.10 MARINE MAMMAL PROTECTION ACT OF 1972

Due to the potential use of explosives to pre-treat the concrete sill in the slipway and any hard rock located during the advance O&M operations, Incidental Harassment Authorization (IHA) must be obtained from NMFS and FWS for species under their jurisdictional authority protected by the MMPA. NMFS has codified regulations for obtaining an IHA for species under their jurisdiction, while FWS has not. USACE and MCSF-BI have prepared an application to NMFS for an IHA associated with this project, and have prepared a BA under the ESA for Florida manatees for FWS, since the species are covered by both laws. FWS often uses the ESA Biological Opinion mechanism to communicate and coordinate for Florida manatees. The results of these coordination and consultation efforts will be incorporated into the Final EA.

4.16.11 ESTUARY PROTECTION ACT OF 1968

No designated estuary would be affected by project activities. This act is not applicable.

4.16.12 FEDERAL WATER PROJECT RECREATION ACT

The principles of the Federal Water Project Recreation Act, (Public Law 89-72) as amended, have been fulfilled by complying with the recreation cost sharing criteria as outlined in Section 2 (a), paragraph (2). The renourishment project also hinges on compliance with the public beach access requirement (Section 1, (b)).

4.16.13 FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

Coordination with NMFS has been accomplished via this environmental assessment. The project will be in compliance with this Act.

4.16.14 SUBMERGED LANDS ACT OF 1953

The project would occur on submerged lands of the State of Florida. The project has been coordinated with the state and is in compliance with the act.

4.16.15 COASTAL BARRIER RESOURCES ACT AND COASTAL BARRIER IMPROVEMENT ACT OF 1990

There are no designated coastal barrier resources in the project area that would be affected by this project. These acts are not applicable.

4.16.16 RIVERS AND HARBORS ACT OF 1899

The proposed work would not obstruct navigable waters of the United States. The proposed action has been subject to the public notice, public hearing, and other evaluations normally conducted for activities subject to the act. The project is in full compliance.

4.16.17 ANADROMOUS FISH CONSERVATION ACT

Anadromous fish species would not be affected. Coordination with NMFS has been accomplished during review of the EA. The project will be in compliance with this Act.

4.16.18 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

No migratory birds would be affected by project activities. The project is in compliance with these acts.

4.16.19 MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

The term "dumping" as defined in the Act (3[33 U.S.C. 1402](f)) does not apply to the disposal of material for beach nourishment or to the placement of material for a purpose other than disposal (i.e. placement of rock material as an artificial reef or the construction of artificial reefs as mitigation). Therefore, the Marine Protection, Research and Sanctuaries Act does not apply to this project. The disposal activities addressed in this EA have been evaluated under Section 404 of the Clean Water Act (CWA).

4.16.20 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

This act requires preparation of an Essential Fish Habitat (EFH) Assessment and coordination with NMFS. Pursuant to the Magnuson-Stevens Act, EFH consultation with NMFS for the removal of the sill and advance maintenance dredging of the slipway is undergoing consultation and this EA will serve as the EFH Assessment. Details of this consultation can be found in Appendix C. The project is in full compliance with this act.

4.16.21 E.O. 11990, PROTECTION OF WETLANDS

No wetlands would be affected by project activities. This project is in compliance with the goals of this Executive Order.

4.16.22 E.O. 11988, FLOOD PLAIN MANAGEMENT

The project is in the base flood plain (100-year flood) and is being evaluated in accordance with this Executive Order. The project will be in compliance with this Act.

4.16.23 E.O. 12898, ENVIRONMENTAL JUSTICE

The proposed action would not result in adverse health or environmental effects. Any impacts of this action would not be disproportionate toward any minority. The activity does not (a) exclude persons from participation in, (b) deny persons the benefits of, or (c) subject persons to discrimination because of their race, color, or national origin. The activity would not impact “subsistence consumption of fish and wildlife.”

5 LIST OF PREPARERS

5.1 PREPARERS

- Terri Jordan – Biologist, U.S. Army Corps of Engineers, Jacksonville District. Primary Author

- Michael Hollingsworth – Biologist, U.S. Army Corps of Engineers, Jacksonville District.

5.2 REVIEWERS

- Steven Ross – Project Manager, U.S. Army Corps of Engineers, Jacksonville District
- Kenneth Dugger – Supervisory Biologist, U.S. Army Corps of Engineers, Jacksonville District
- Patrice Morey – U.S. Army Corps of Engineers, Jacksonville District
- Shari Kennedy – U.S Marine Corps
- Kim Wiesenberger – U.S Marine Corps

6 PUBLIC INVOLVEMENT

6.1 SCOPING AND DRAFT EA

A scoping letter dated January 30, 2008 was issued for this action. The draft EA and Finding of No Significant Impact (FONSI) will be made available to the public by letter and publication on the USACE – SAJ Environmental documents website; (http://planning.saj.usace.army.mil/envdocs/envdocsb.htm).
When the EA is made final and the FONSI is finalized, both will be posted to the website and the FONSI mailed to all individuals that received the scoping letter and draft EA.

6.2 AGENCY COORDINATION

USACE initiated coordination with the agencies via the scoping for the Draft EA. Additional coordination will occur with USFWS and NMFS for ESA and MMPA issues and NMFS for EFH issues under separate letters. Letters to and from Federal and state agencies for natural resource coordination are located in Appendix C.

6.3 LIST OF RECIPIENTS

Copies of the scoping letter and draft EA were mailed to the list of individuals and organizations found in Appendix C.

6.4 COMMENTS RECEIVED AND RESPONSE

Any comments received on the draft EA will be compiled here in the final EA.

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APPENDIX A - SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

Removal of Concrete Sill and Advance Maintenance Dredging of Marine Corps Slipway
Blount Island Terminal Facility
US Marine Corps
Jacksonville, Duval County, Florida

I. Project Description

a. Location. The project is located in Jacksonville, Duval County, Florida (see figure 1, vicinity map and plan view of the EA). The MCSF-BI slipway is seven nautical miles from the St. Johns River outlet, and houses five large vessel berths.

b. General Description. The proposed plan calls for the removal of a concrete sill that is currently hampering the Marine Corps' ability to full load the resupply vessels to the maximum available draft of the ships. Additionally, the permit request will be to conduct advance maintenance dredging of the slipway to a maximum depth of -47 feet MLLW to ensure that operations can be maintained in preparation of the anticipated redeployment of equipment from the Persian Gulf theatre of operations.

c. Authority and Purpose. See section 1.8 of the associated project Environmental Assessment (EA).

d. General Description of Dredged or Material

(1) General Characteristics of Material: The sill is composed of reinforced concrete with rebar. The remainder of the slipway is comprised of sand, gravel and soft rock covering hard rock.

(2) Quantity of Material: It is estimated that 1.025 Million cubic yards of material will be removed and placed in the disposal site.

(3) Source of Material: Deepening of the Blount Island slip covering approximately 2,230,520 square feet. Project proposes deepening slipway to a maximum depth of -47 feet MLLW.

e. Description of the Proposed Discharge Site(s)

(1) Location. The Dayson Island Dredged Material Management Area (DMMA), located northeast of the Blount Island facility (Figure 4 of EA).

(2) Size. The Dayson Island DMMA is a 120 acre upland site. The dike crest elevation varies between 30 to 33 feet NAVD 88, and the site has an overall remaining capacity of approximately 2-million cubic yards.

(3) Type of Site. The Dayson Island DMMA is a confined upland site.

(4) Type(s) of Habitat. Bermed area within DMMA is grubbed and leveled, resulting in flat open ground with no woody vegetation.

(5) Timing and Duration of Discharge. The exact timing of dredging operations is not known, although dredging activities are expected to occur in the first quarter of 2009.

f. Description of Disposal Method. Disposal could be either from a pipeline via hydraulic dredging or clamshell dredge and transport barge.

II. Factual Determinations

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope: Disposal location within Upland Site is at 16-18 ft elevation, with dike elevations of 30 ft.

(2) Sediment Type. The sediment from the project slipway ranges from silt, fine to coarse sand, soft rock and gravel.

(3) Dredged/Fill Material Movement: Material will settle and remain within boundaries of upland site.

(4) Physical Effects on Benthos: Upland site disposal will not affect benthic community other than turbidity at the dredging site.

(5) Other Effects: NA

(6) Actions Taken to Minimize Impacts: Placement of materials in approved upland site to minimize impacts to benthos and water quality.

b. Water Circulation. Fluctuation and Salinity Determinations

(1) Water: Returned water from outfall pipes will have little difference from surrounding waters from settling of particulates after disposal into upland site. Upland site is in same location as dredging activities, therefore no significant water quality differences are expected.

(2) Current Patterns and Circulation: Returned water from outfall pipes should have no impact on current and circulation patterns.

e. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site: Returned water from outfall pipes should have little to no impact on suspended particulates as settling of particulates is expected in the upland site. State water quality standards for turbidity would not be exceeded.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column: No significant changes are expected in chemical or physical properties of the water column due to long settling times of disposed material in the upland site.

(a) Light Penetration. No impact is expected on light penetration from returned water.

(b) Dissolved Oxygen: No impact is expected on dissolved oxygen from returned water.

(c) Toxic Metals and Organics: No toxic metals or organics are expected to be released by this project.

(d) Pathogens: No pathogens are expected to be released by this project.

(e) Aesthetics: Some temporary affects to aesthetics are expected in the disposal area as material is pumped into the upland site. This would be a short-term and localized condition.

(3) Effects on Biota (consider environmental values in sections 230.21, as appropriate)

(a) Primary Production, Photosynthesis: No impact on primary producers is expected from upland disposal.

(b) Suspension/Filter Feeders: No impacts on filter feeders is expected by this project.

(c) Sight Feeders: Upland disposal would not impact sight feeders.

d. Contaminant Determinations: No contamination is expected from this project.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton: No impact as the disposal site is an upland site.

(2) Effects on Benthos: No impact as the disposal site is an upland site.

(3) Effects on Nekton: No impact as the disposal site is an upland site.

(4) Effects on Aquatic Food Web: No impact as the disposal site is an upland site.

(5) Effects on Special Aquatic Sites: The area surrounding the disposal site is classified as estuarine marsh and will not be disturbed by proposed action. The interior of the DMMA has been recently cleared and grubbed with only small pooling of water occurring after rainfalls.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination No mixing shall occur as dredged material will be confined within the Dayson upland site. Water quality will be monitored at locations 150 m upstream and downstream from the dredge and disposal discharge locations.

(2) Determination of Compliance with Applicable Water Quality Standards The return water from discharge pipes will be within Class III waters as defined by the state of Florida. There is no expected violation of water quality standards for this project.

(3) Potential Effects on Human Use Characteristic

(a) Municipal and Private Water Supply: There will be no impact to water supply as a result of this project.

(b) Recreational and Commercial Fisheries: Short term recreational fishing impacts may be observed from the dredging activity. This will cease once the project is completed.

(c) Water Related Recreation: Access to the marsh surrounding the disposal site may be impacted during dredging operations, but impacts will be short term.

(d) Aesthetics: No impacts to aesthetics is expected outside of the dredging operations.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves: While the upland site it located within the boundaries of the Timucuan Ecological and Historical Preserve, The National Park Service (NPS) does not own the Dayson Island upland site, there no impacts are expected with this project.

g. Determination of Cumulative Effects on the Aquatic Ecosystem (consider requirements in section 230.11 (g): There are no expected cumulative effects on the aquatic ecosystem associated with this project.

h. Determination of Secondary Effects on the Aquatic Ecosystem: There are no expected secondary effects on the aquatic ecosystem associated with this project.

III. Findings of Compliance or Non-Compliance With the Restrictions on Discharge

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practical alternative exists which meets the study objectives that does not involve upland disposal of dredged materials. Further, no less environmentally damaging practical alternatives to the proposed actions exist.

c. After consideration of disposal site dilution and dispersion, the discharge of dredge materials would not cause or contribute to, violations of any applicable State water quality standards for Class III waters

d. The discharge operations would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

e. The removal of the concrete sill and advance maintenance dredging of the Blount Island slipway would not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species act of 1973.

f. The actions associated with this activity do not fall under the Marine Protection. Research, and Sanctuaries Act of 1972. No impacts are expected from this activity.

g. The placement of dredged materials into the upland site will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values would not occur.

h. On the Basis of the Guidelines. The proposed disposal site for the discharge of dredged material is specified as complying with the requirements of these guidelines.

APPENDIX B - COASTAL ZONE MANAGEMENT CONSISTENCY

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM
FEDERAL CONSISTENCY EVALUATION PROCEDURES

Removal of Concrete Sill and Advance Maintenance Dredging of Marine Corps Slipway
Blount Island Terminal Facility
US Marine Corps
Jacksonville, Duval County, Florida

1. Chapter 161, Beach and Shore Preservation. The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: The proposed plans and information will be submitted to the state in compliance with this chapter.

2. Chapters 163(part II), 186, and 187, County, Municipal, State and Regional Planning. These chapters establish the Local Comprehensive Plans, the Strategic Regional Policy Plans, and the State Comprehensive Plan (SCP). The SCP sets goals that articulate a strategic vision of the State's future. Its purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.

Response: The proposed project has been coordinated with various Federal, State and local agencies via the NEPA and regulatory processes. The project meets the primary goal of the State Comprehensive Plan through preservation and protection of the shorefront development and infrastructure.

3. Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: This project would be consistent with the efforts of Division of Emergency Management.

4. Chapter 253, State Lands. This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: This project is located on privately owned submerged lands and therefore no proprietary authorizations are required.

5. Chapters 253, 259, 260, and 375, Land Acquisition. This chapter authorizes the state to acquire land to protect environmentally sensitive areas.

Response: Since the affected property already is in public ownership, this chapter does not apply.

6. Chapter 258, State Parks and Aquatic Preserves. This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: The dredging and sill removal portions of the proposed project area does not contain any state parks or aquatic preserves. The Dayson Island DMMA lies within the Nassau River-St. Johns River Marshes State Aquatic Preserve.   Project operational controls would prevent a direct or indirect impact to the Preserve. The project is consistent with this chapter.

7. Chapter 267, Historic Preservation. This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: This project has been coordinated with the State Historic Preservation Officer (SHPO). Historic Property investigations were conducted in the project area. An archival and literature search, in addition to a magnetometer survey of the proposed borrow area were conducted. The SHPO concurred with the Corps determination that the proposed project will not adversely affect any significant cultural or historic resources. The project will be consistent with the goals of this chapter.

8. Chapter 288, Economic Development and Tourism. This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: The proposed sill removal and advance operations and maintenance dredging has no effect on public recreation activities, since the facility is not open to the public. This would be compatible with tourism for this area and therefore, is consistent with the goals of this chapter.

9. Chapters 334 and 339, Transportation. This chapter authorizes the planning and development of a safe balanced and efficient transportation system.

Response: No public transportation systems would be impacted by this project.

10. Chapter 370, Saltwater Living Resources. This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.

Response: Based on the overall impacts of the project, the project is consistent with the goals of this chapter.

11. Chapter 372, Living Land and Freshwater Resources. This chapter establishes the Game and Freshwater Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions which provide sustained ecological, recreational, scientific, educational, aesthetic, and economic benefits.

Response: The project will have no effect on freshwater aquatic life or wild animal life.

12. Chapter 373, Water Resources. This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: This project does not involve water resources as described by this chapter.

13. Chapter 376, Pollutant Spill Prevention and Control. This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: The contract specifications will prohibit the contractor from dumping oil, fuel, or hazardous wastes in the work area and will require that the contractor adopt safe and sanitary measures for the disposal of solid wastes. A spill prevention plan will be required.

14. Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This project does not involve the exploration; drilling or production of gas, oil or petroleum product and therefore, this chapter does not apply.

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development. This chapter

also deals with the Area of Critical State Concern program and the Coastal Infrastructure Policy.

Response: The proposed dredging project will not have any regional impact on resources in the area. Therefore, the project is consistent with the goals of this chapter.

16. Chapters 381 (selected subsections on on-site sewage treatment and disposal systems) and 388 (Mosquito/Arthropod Control). Chapter 388 provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The project will not further the propagation of mosquitoes or other pest arthropods.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Regulation (now a part of the Florida Department of Environmental Protection).

Response: A Final Environmental Assessment addressing project impacts has been prepared and will be reviewed by the appropriate resource agencies including the Florida Department of Environmental Protection. Environmental protection measures will be implemented to ensure that no lasting adverse effects on water quality, air quality, or other environmental resources will occur. Water Quality Certification will be sought from the State prior to construction. The project complies with the intent of this chapter.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

Response: The proposed project is not located near or on agricultural lands; therefore, this chapter does not apply.

APPENDIX C - PERTINENT CORRESPONDENCE

RECEIVED
22 Apr 08

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

April 17, 2008

Ms. Marie G. Burns
Acting Chief, Planning Division
Jacksonville District Corps of Engineers
Planning Division
Post Office Box 4970
Jacksonville, Florida 32232-0019

Re: SHPO/DHR Project File Nos.: 2008-933 and 2008-2277
Received: February 6th and 8th, 2008
SAI#: FL200802053983C
Environmental Assessment – U.S. Marine Corps Support Facility Blount Island
Corps Support for Others Program
Maintenance dredging of slipway channel and basin areas and removal of a concrete sill
Jacksonville, Duval County

Dear Ms. Burns:

This agency received a copy of your January 30, 2008 letter regarding the preparation of an environmental assessment for the U.S. Marine Corps Support Facility Blount Island, Corps Support for Others program for maintenance dredging of slipway channel and basin areas and removal of a concrete sill as well as copy submitted to the Florida State Clearinghouse. However, we did not respond to the Clearinghouse within their timeframe, but reviewed the referenced project in accordance with Section 106 of the National Historic Preservation Act as amended, and the National Environmental Policy Act as amended. It is the responsibility of this office to advise and assist, as appropriate, the U.S. Army Corps of Engineers in carrying out historic preservation responsibilities. We cooperate with your agency to ensure that historic properties are taken into consideration at all levels of planning and development. This office consults with the your office on undertakings that may affect historic properties, and provides guidance to ensure the content and sufficiency of environmental documentation and project plans identify and protect, minimize or mitigate harm to such properties.

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245-6300 • FAX: 245-6436
☐ Archaeological Research (850) 245-6444 • FAX: 245-6452
✓ Historic Preservation (850) 245-6333 • FAX: 245-6437
☐ Historical Museums (850) 245-6400 • FAX: 245-6433
☐ South Regional Office (561) 416-2115 • FAX: 416-2149
☐ North Regional Office (850) 245-6445 • FAX: 245-6435
☐ Central Regional Office (813) 272-3843 • FAX: 272-2340

Based on a review of the Florida Master Site File data and the information provided in the submittal, it is the opinion of this office that no such historic properties will be affected by this proposed project.

If you have any questions concerning the brochure, or need any assistance, please contact Laura Kammerer, Deputy State Historic Preservation Officer for Review and Compliance, at 850-245-6333 or lkammerer@dos.state.fl.us.

Sincerely,

Frederick P. Gaske, Director, and
State Historic Preservation Officer

Xc: Lauren Milligan, Florida State Clearinghouse

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

MAR 17 2009

Mr. David Bernhart
NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
Saint Petersburg, Florida 33701

Dear Mr. Bernhart:

Pursuant to Section 7(a) of the Endangered Species Act, please find enclosed the Biological Assessment (BA) for the Blount Island removal of concrete sill and advanced maintenance dredging of the Marine Corps slipway, addressing the concerns of the threatened and endangered species under the purview of the National Marine Fisheries Service (NMFS). Listed species which may occur in the vicinity of the proposed work and are under the jurisdiction of the NMFS are: loggerhead sea turtle (*Caretta caretta*, T), green sea turtle (*Chelonia mydas*, E), hawksbill sea turtle (*Eretmochelys imbricata*, E), shortnose sturgeon (*Acipenser brevirostrum*). Based on the enclosed BA, the U.S. Army Corps of Engineers (Corps) has determined that the proposed action may affect, but is not likely to adversely affect the species identified in the BA. Since the proposed action does not include offshore operation and is located 7 miles inland of the mouth of the St. Johns River, there are no expected impacts to the North Atlantic Right whale *(Eubalaena glacialis)*. The Corps requests your written concurrence on this determination.

If you have any questions or need further information, please contact Ms. Terri Jordan at 904-232-1701 or by email: Terri.L.Jordan@usace.army.mil.

Sincerely,

Eric P. Summa
Chief, Environmental Brach

Enclosure

Biological Assessment to
The National Marine Fisheries Service for
Removal of Concrete Sill and Advance Maintenance Dredging
Of the Marine Corps Slipway
US Marine Corps Support Facility - Blount Island
Jacksonville, Duval County, Florida

Description of the Proposed Action – Under the "Interagency and International Services" Program, the U.S. Army Corps of Engineers (USACE) has been contracted by the United States Marine Corps Support Facility - Blount Island (MCSF-BI) to prepare an environmental assessment and obtain the necessary permits to design and build the MCSF-BI proposed deepening of their slipway at Blount Island.

MCSF-BI has requested a permit to remove the concrete sill currently hampering their ability to fully load resupply vessels to their maximum available draft. Additionally, the permit request includes advance maintenance dredging of the slipway to a maximum depth of -47 feet MLLW; this would ensure that operations can be maintained in preparation of the anticipated redeployment of equipment from the Persian Gulf theatre of operations. The advance maintenance dredging may or may not require blasting to remove rock from the slip if it is detected during future geotechnical investigations. The location of the site is in an area prone to extensive silting. Historically, the slip has shallowed quickly, resulting in annual "emergency" maintenance dredging. This shoaling has had, and continues to have an adverse effect on the MCSF-BI mission

Action Area

The project is located in Jacksonville, Duval County, Florida, at the MCSF-BI located on Blount Island along the St. Johns River (Figures 1 and 2). Blount Island was created as a byproduct of USACE post-World War II dredging operations in the St. Johns River. The dredging operations created a new straight line channel (Dames Point-Fulton Cutoff) designed for larger merchant vessels; the dredged material from the operations was deposited on four marsh islands that together formed Blount Island. The MCSF-BI slipway is ten nautical miles west of the St. Johns River outlet, and houses five large vessel berths. The newly deepened slip will continue to be located on the southeast side of Blount Island along the Dames Point-Fulton Cutoff.

Figure 1: St. Johns River Overview photo

Figure 2: MSCF-BI facility overview

Protected Species Included in this Assessment

Of the listed and protected species under NMFS jurisdiction occurring in the action area, the Corps believes that the green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*), Kemp's ridley turtle (*Lepidochelys kempii*), and shortnose sturgeon (*Acipenser brevirostrum*), may be affected by the implementation of the proposed action.

The endangered Florida manatee (*Trichecus manatus*) also occurs with the action area and the Corps has initiated consultation with the U.S. Fish and Wildlife Service concerning the effects of the proposed action on these species.

The endangered North Atlantic Right whale *(Eubalaena glacialis)* is discussed in the Environmental Assessment (Section 3.2.2 and 4.1.2) and determined by the USACE that the proposed action will have no effect on this species. The proposed action does not include offshore operations and is located 7 miles inland of the mouth of the St. Johns River, outside the known habitat boundaries of the Right whale.

Species and Suitable Habitat Descriptions

Green Turtle (*Chelonia mydas*)

Federal listing of the green sea turtle occurred on July 28, 1978, with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are endangered. The nesting range of the green sea turtles in the southeastern United States includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina, the U.S. Virgin Islands (USVI) and Puerto Rico (NMFS and USFWS, 1991b). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard through Broward counties (Ehrhart and Witherington, 1992). Green sea turtle nesting also occurs regularly on St. Croix, USVI, and on Vieques, Culebra, Mona, and the main island of Puerto Rico (Mackay and Rebholz, 1996).

Life History and Distribution

The estimated age at sexual maturity for green sea turtles is between 20-50 years (Balazs, 1982; Frazer and Ehrhart, 1985). Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12-14 day intervals. Mean clutch size is highly variable among populations, but averages 110-115 eggs/nest. Females usually have 2-4 or more years between breeding seasons, whereas males may mate every year (Balazs, 1983). After hatching, green sea turtles go through a post-hatchling pelagic stage where they are associated with drift lines of algae and other debris. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas (Bjorndal, 1997).

Green sea turtles are primarily herbivorous, feeding on algae and sea grasses, but also occasionally consume jellyfish and sponges. The post-hatchling, pelagic-stage individuals are assumed to be omnivorous, but little data are available.

Green sea turtle foraging areas in the southeastern United States include any coastal shallow waters having macroalgae or sea grasses. This includes areas near mainland coastlines, islands, reefs, or shelves, and any open-ocean surface waters, especially where advection from wind and currents concentrates pelagic organisms (Hirth, 1997; NMFS and USFWS, 1991b). Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty, 1984; Hildebrand, 1982; Shaver, 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr, 1957; Carr, 1984), Florida Bay and the Florida Keys (Schroeder and Foley, 1995), the Indian River Lagoon System, Florida (Ehrhart, 1983), and the Atlantic Ocean off Florida from Brevard through Broward counties (Wershoven and Wershoven, 1992; Guseman and Ehrhart, 1992). Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs.

Population Dynamics and Status

The vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Meylan *et al.* 1995; Johnson and Ehrhart 1994). Green sea turtle nesting in Florida has been increasing since 1989 (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute Index Nesting Beach Survey Database). Current nesting levels in Florida are reduced compared to historical levels, reported by Dodd (1981). However, total nest counts and trends at index beach sites during the past 17 years suggest the numbers of green sea turtles that nest within the southeastern United States are increasing.

Although nesting activity is obviously important in determining population distributions, the remaining portion of the green turtle’s life is spent on the foraging and developmental grounds. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatán Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth, 1997). The summer developmental habitat for green turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus, 1997).

There are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas (where they come to forage) of the southeastern United States. However, information on incidental captures of immature green sea turtles at the St. Lucie Power Plant (they have averaged 215 green sea turtle captures per year since 1977) in St. Lucie County, Florida (on the Atlantic coast of Florida) show that the annual number of immature green sea turtles captured has increased significantly in the past 26 years

(FPL, 2002).

It is likely that immature green sea turtles foraging in the southeastern United States come from multiple genetic stocks; therefore, the status of immature green sea turtles in the southeastern United States might also be assessed from trends at all of the main regional nesting beaches, principally Florida, Yucatán, and Tortuguero. Trends at Florida beaches were previously discussed. Trends in nesting at Yucatán beaches cannot be assessed because of a lack of consistent beach surveys over time. Trends at Tortuguero (ca. 20,000-50,000 nests/year) showed a significant increase in nesting during the period 1971-1996 (Bjorndal *et al.* 1999), and more recent information continues to show increasing nest counts (Troëng and Rankin, 2004). Therefore, it seems reasonable that there is an increase in immature green sea turtles inhabiting coastal areas of the southeastern United States; however, the magnitude of this increase is unknown.

Green Sea Turtles in the Action Area

Although green sea turtles are known to nest in substantial numbers in the southeast U.S., in Florida they typically nest along the beaches from Brevard County south to Broward County, south of the action area (Navy, 2002). However, they do nest in very low numbers along the beaches of Duval County. From 1990 through 2006, only 11 nests were recorded in Duval County (Table 1) (FWRI 2007f). South of North Carolina, green sea turtles are expected to occur year-round in waters between the shoreline and the 50-m isobath. The preferred habitats of this species are seagrass beds and worm-rock reefs, which are located primarily in shallow water environments along the Atlantic coast. Two green sea turtle takes occurred during emergency hopper dredging operations downstream from MSCF-BI at NAVSTA Mayport in 2002, and a total of eight takes were recorded during hopper dredging operations at Kings Bay, Georgia north of the action area from 1980 through 2007 (USACE, 2008c).

Table 1. Sea Turtle Nesting Data for Duval County, Florida (1990-2006)

	Species	
Year	*Loggerhead*	*Green*
1990	43	0
1991	40	0
1992	29	0
1993	30	0
1994	78	0
1995	54	0
1996	69	0
1997	63	0
1998	72	2
1999	119	0
2000	80	1
2001	87	0

2002	55	0
2003	88	0
2004	41	1
2005	67	3
2006	103	4
	1,118	**11**

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the over-exploitation of green sea turtles for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. However, there are still significant and ongoing threats to green sea turtles from human-related causes in the United States. These threats include beach armoring, erosion control, artificial lighting, beach disturbance (e.g., driving on the beach), pollution, foraging habitat loss as a result of direct destruction by dredging, siltation, boat damage, other human activities, and interactions with fishing gear. Sea sampling coverage in the pelagic driftnet, pelagic longline, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. There is also the increasing threat from green sea turtle fibropapillomatosis disease. Presently, this disease is cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst, 1994; Jacobson, 1990; Jacobson *et al*., 1991).

Summary of Status for Atlantic Green Sea Turtles

Green turtles range in the western Atlantic from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare in benthic areas north of Cape Hatteras (Wynne and Schwartz, 1999). Green turtles face many of the same natural and anthropogenic threats as for loggerhead sea turtles described above. In addition, green turtles are also susceptible to fibropapillomatosis, which can result in death. In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart, 1979). Recent population estimates for the western Atlantic area are not available. Between 1989 and 2006, the annual number of green turtle nests at core index beaches ranged from 267 to 7,158 (Florida Marine Research Institute Statewide Nesting Database). While the pattern of green turtle nesting shows biennial peaks in abundance, there is a generally positive trend since establishment of index beaches in Florida in 1989.

Critical Habitat

On 2 September 1998, the NMFS published the final rule for critical habitat designation for the green sea turtle and hawksbill sea turtle (Federal Register / Vol. 63, No. 170 / Wednesday, September 2, 1998) (http://www.nmfs.noaa.gov/pr/pdfs/fr/fr63-46693.pdf) .

The geographic limits of critical habitat, designated by the NMFS as habitat necessary for the continued survival and recovery of green turtles in the region, includes the waters surrounding Culebra, Mona, and Monito Islands, Puerto Rico extending seaward 3 nm (5.6 km) from the mean high water line of Culebra Island, Puerto Rico. The proposed action does not encompass critical habitat.

Loggerhead Turtle (*Caretta caretta*)

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. It was listed because of direct take, incidental capture in various fisheries, and the alteration and destruction of its habitat. Loggerhead sea turtles inhabit the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. In the Atlantic, developmental habitat for small juveniles is the pelagic waters of the North Atlantic and the Mediterranean Sea (NMFS and USFWS, 1991a). Within the continental United States, loggerhead sea turtles nest from Texas to New Jersey. Major nesting areas include coastal islands of Georgia, South Carolina, and North Carolina, and the Atlantic and Gulf of Mexico coasts of Florida, with the bulk of the nesting occurring on the Atlantic coast of Florida.

On 16 November 2007, the NMFS received a petition from Ocean and the Center for Biological Diversity requesting that loggerhead turtles in the western North Atlantic Ocean be reclassified as a Distinct Population Segment (DPS) with endangered status and that critical habitat be designated. On 05 March 2008, the NMFS position finding was published in the Federal Register indicating that a re-classification of the loggerhead in the western North Atlantic Ocean as a DPS and listing of the DPS as endangered may be warranted (Federal Register/Vol. 73, No. 44/Wednesday, March 5, 2008/Proposed Rules). An affirmative 90-day finding requires that the NMFS commence a status review on the loggerhead turtle. Upon completion of this review, the NMFS will make a finding on whether reclassification of the loggerhead in the western North Atlantic Ocean as endangered is warranted, warranted but precluded by higher priority listing actions, or not warranted.

Atlantic Ocean

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. There are at least five western Atlantic subpopulations, divided geographically as follows: (1) A northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29ºN; (2) a south Florida nesting subpopulation, occurring from 29ºN on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez, 1990; TEWG, 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS 2001a). Additionally, there is evidence of at least several other genetically distinct stocks, including a Cay Sal Bank, Western Bahamas stock; a Quintana Roo, Mexico stock, including all loggerhead rookeries on Mexico's Yucatan Peninsula; a Brazilian stock; and a Cape Verde stock (SWOT Report, Volume II, The State of the World's Sea Turtles, 2007). The fidelity of nesting females to their nesting beach is the reason these subpopulations can be differentiated from one another. Fidelity for nesting beaches makes recolonization of nesting beaches with sea turtles from other subpopulations unlikely.

Life History and Distribution

Past literature gave an estimated age at maturity of 21-35 years (Frazer and Ehrhart, 1985; Frazer *et al*., 1994), with the benthic immature stage lasting at least 10-25 years. NMFS estimates ages of maturity ranging from 20-38 years with the benthic immature stage lasting from 14-32 years based on data from tag returns, strandings, and nesting surveys (NMFS 2001a).

Mating takes place in late March through early June, and eggs are laid throughout the summer, with a mean clutch size of 100-126 eggs in the southeastern United States. Individual females nest multiple times during a nesting season, with a mean of 4.1 nests/individual (Murphy and Hopkins, 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2-3 years, but can vary from 1-7 years (Dodd, 1988). Generally, loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years or more. Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico, although some loggerheads may move back and forth between the pelagic and benthic environment (Witzell, 2002). Benthic immature loggerheads (sea turtles that have come back to inshore and nearshore waters), the life stage following the pelagic immature stage, have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in Northeastern Mexico.

Tagging studies have shown loggerheads that have entered the benthic environment undertake routine migrations along the coast that are limited by seasonal water temperatures. Loggerhead sea turtles occur year round in offshore waters off North Carolina where water temperature is influenced by the Gulf Stream. As coastal water temperatures warm in the spring, loggerheads begin to immigrate to North Carolina inshore waters (e.g., Pamlico and Core Sounds) and also move up the coast (Epperly *et al*., 1995a; Epperly *et al.,* 1995b; Epperly *et al*., 1995c), occurring in Virginia foraging areas as early as April and on the most northern foraging grounds in the Gulf of Maine in June. The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine by mid-September but some may remain in mid-Atlantic and Northeast areas until late fall. By December loggerheads have emigrated from inshore North Carolina waters and coastal waters to the north to waters offshore North Carolina, particularly off Cape Hatteras, and waters further south where the influence of the Gulf Stream provides temperatures favorable to sea turtles (≥ 11ºC) (Epperly *et al*., 1995a;

Epperly *et al*., 1995b; Epperly *et al.,* 1995c). Loggerhead sea turtles are year-round residents of central and south Florida.

Pelagic and benthic juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd, 1988). Sub-adult and adult loggerheads are primarily coastal dwelling and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

Population Dynamics and Status

A number of stock assessments (TEWG, 1998; TEWG, 2000; NMFS 2001a; Heppell *et al*. 2003) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. Based on nesting data of the five western Atlantic subpopulations, the south Florida-nesting and the northern-nesting subpopulations are the most abundant (TEWG 2000; NMFS 2001a). Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182 annually with a mean of 73,751 (TEWG 2000). On average, 90.7 percent of these nests were of the south Florida subpopulation and 8.5 percent were from the northern subpopulation (TEWG 2000). The TEWG (2000) assessment of the status of these two better-studied populations concluded that the south Florida subpopulation was increasing at that time, while no trend was evident (may be stable but possibly declining) for the northern subpopulation. A more recent analysis of nesting data from 1989-2005 by the Florida Wildlife Research Institute indicates there is a declining trend in nesting at beaches utilized by the south Florida nesting subpopulation (McRae letter to NMFS, October 25, 2006). Nesting data obtained for the 2006 nesting season are also consistent with the decline in loggerhead nests (Meylan pers. comm. 2006). It is unclear at this time whether the nesting decline reflects a decline in population, or is indicative of a failure to nest by the reproductively mature females as a result of other factors (resource depletion, nesting beach problems, oceanographic conditions, etc.).

For the northern subpopulations, recent estimates of loggerhead nesting trends in Georgia from standardized daily beach surveys showed significant declines ranging from 1.5 to 1.9 percent annually (Mark Dodd, Georgia Department of Natural Resources, pers. comm., 2006). Nest totals from aerial surveys conducted by the South Carolina Department of Natural Resources showed a 3.3 percent annual decline in nesting since 1980. Another consideration that may add to the importance and vulnerability of the northern subpopulation is the sex ratios of this subpopulation. NMFS scientists have estimated that the northern subpopulation produces 65 percent males (NMFS 2001a). However, new research conducted over a limited time frame has found opposing sex ratios (Wyneken *et al*. 2004) so further information is needed to clarify the issue. Since nesting female loggerhead sea turtles exhibit nest fidelity, the continued existence of the northern subpopulation is related to the number of female hatchlings that are produced. Producing fewer females will limit the number of subsequent offspring produced by the subpopulation.

The remaining three subpopulations – Dry Tortugas, Florida Panhandle, and Yucatán – are much smaller, but also relevant to the continued existence of the species. Nesting surveys for the Dry Tortugas subpopulation are conducted as part of Florida's statewide survey program. Survey effort has been relatively stable during the 9-year period from 1995-2003 (although the 2002 year was missed). Nest counts ranged from 168-270 but with no detectable trend during this period (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Statewide Nesting Beach Survey Data). Nest counts for the Florida Panhandle subpopulation are focused on index beaches rather than all beaches where nesting occurs. Currently, there is not enough information to detect a trend for the subpopulation (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Index Nesting Beach Survey Database). Similarly, nesting survey effort has been inconsistent among the Yucatán nesting beaches and no trend can be determined for this subpopulation. However, there is some optimistic news. Zurita *et al.* (2003) found a statistically significant increase in the number of nests on seven of the beaches on Quintana Roo, Mexico, from 1987-2001 where survey effort was consistent during the period.

Loggerhead Sea Turtle within the Action Area

Approximately 90% of all loggerhead nesting in the continental U.S. takes place in Florida. At the conclusion of the 2007 nesting season, it was determined that loggerhead nesting had dropped by 50% since 1998 (FWRI, 2007d). However, loggerhead nesting on Duval County beaches has not shown a decline but has increased from 72 nests in 1998 to 103 nests in 2006, with a high of 119 nests in 1999 and a low of 41 nests in 2004 (Table 1) (FWRI, 2007e).

Loggerheads have nested and continue to nest on Duval county beaches. Although there is an overall decline in nesting of loggerheads in Florida, nesting in Duval County has increased.

The beaches east of the action area are suitable habitat for loggerhead nesting, and the nearshore areas are sufficient for pelagic juvenile habitat and adult feeding activities. Loggerheads are the most commonly sighted sea turtles off the Atlantic coast of north Florida and are expected to occur throughout the year (Navy, 2002). One loggerhead take was recorded during maintenance dredging operations at NAVSTA Mayport in 2002 and one in 2006. In addition, 70 loggerheads were taken during dredging operations from 1986-2007 in the entrance channel to King's Bay, Georgia to the north of the action area (USACE, 2008a).

Threats

The diversity of a sea turtle's life history leaves them susceptible to many natural and human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. Hurricanes are particularly destructive to sea turtle nests. Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. For example, in 1992, all of the eggs over a

90-mile length of coastal Florida were destroyed by storm surges on beaches that were closest to the eye of Hurricane Andrew (Milton *et al*. 1994). Also, many nests were destroyed during the 2004 hurricane season. Other sources of natural mortality include cold stunning and biotoxin exposure.

Anthropogenic factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, beach armoring, and nourishment, artificial lighting, beach cleaning, increased human presence, recreational beach equipment, beach driving, coastal construction and fishing piers, exotic dune and beach vegetation, and poaching. An increase in human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs and an increased presence of native species (e.g., raccoons, armadillos, and opossums) which raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (e.g., Merritt Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection. Sea turtle nesting and hatching success on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation, marine pollution, underwater explosions, hopper dredging, offshore artificial lighting, power plant entrainment and/or impingement, entanglement in debris, ingestion of marine debris, marina and dock construction and operation, boat collisions, poaching, and fishery interactions. Loggerheads in the pelagic environment are exposed to a series of longline fisheries, which include the Atlantic highly migratory species (HMS) pelagic longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various longline fleets in the Mediterranean Sea (Aguilar *et al*. 1995; Bolten *et al.* 1996). Loggerheads in the benthic environment in waters off the coastal United States are exposed to a suite of fisheries in federal and state waters including trawl, purse seine, hook and line, gill net, pound net, longline, and trap fisheries.

Summary of Status for Loggerhead Sea Turtles

In the Atlantic Ocean, absolute population size is not known, but based on extrapolation of nesting information, loggerheads are likely much more numerous than in the Pacific Ocean. NMFS recognizes five subpopulations of loggerhead sea turtles in the western north Atlantic based on genetic studies. Cohorts from all of these are known to occur within the action area of this consultation. The South Florida subpopulation may be critical to the survival of the species in the Atlantic Ocean because of its size (over 90 percent of all U.S. loggerhead nests are from this subpopulation). In the past, this nesting aggregation was considered second in size only to the nesting aggregation on islands in the Arabian Sea off Oman (Ross, 1979; Ehrhart, 1989; NMFS and USFWS, 1991a). However, the status of the Oman colony has not been evaluated recently and it is located in an area of the world where it is highly vulnerable to disruptive events such as political upheavals, wars, catastrophic oil spills, and lack of strong protections for sea turtles (Meylan *et al*., 1995). Given the lack of updated information on this population, the status of loggerheads in the Indian Ocean basin overall is essentially unknown.

All loggerhead subpopulations are faced with a multitude of natural and anthropogenic effects that negatively influence the status of the species. Many anthropogenic effects occur as a result of activities outside of U.S. jurisdiction (i.e., fisheries in international waters).

Critical Habitat

No critical habitat has been designated by the NMFS for loggerhead sea turtles.

Kemp's Ridley Turtle (*Lepidochelys kempii*)

The Kemp's ridley was listed as endangered on December 2, 1970. Internationally, the Kemp's ridley has been considered the most endangered sea turtle (Zwinenberg, 1977; Groombridge, 1982; TEWG 2000). Kemp's ridleys nest primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State. This species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Occasional individuals reach European waters (Brongersma, 1972). Adults of this species are usually confined to the Gulf of Mexico, although adult-sized individuals sometimes are found on the east coast of the United States.

Life History and Distribution

The TEWG (1998) estimates age at maturity from 7-15 years. Females return to their nesting beach about every 2 years (TEWG 1998). Nesting occurs from April into July and is essentially limited to the beaches of the western Gulf of Mexico, near Rancho Nuevo in southern Tamaulipas, Mexico. Nesting also occurs in Veracruz, Mexico, and Texas, U.S., but on a much smaller scale. The mean clutch size for Kemp's ridleys is 100 eggs/nest, with an average of 2.5 nests/female/season.

Little is known of the movements of the post-hatchling stage (pelagic stage) within the Gulf of Mexico. Studies have shown the post-hatchling pelagic stage varies from 1-4 or more years, and the benthic immature stage lasts 7-9 years (Schmid and Witzell, 1997). Benthic immature Kemp's ridleys have been found along the eastern seaboard of the United States and in the Gulf of Mexico. Atlantic benthic immature sea turtles travel northward as the water warms to feed in the productive, coastal waters off Georgia through New England, returning southward with the onset of winter (Lutcavage and Musick, 1985; Henwood and Ogren, 1987; Ogren, 1989). Studies suggest that benthic immature Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud, 1995).

Stomach contents of Kemp's ridleys along the lower Texas coast consisted of nearshore crabs and mollusks, as well as fish, shrimp, and other foods considered to be shrimp fishery discards (Shaver, 1991). Pelagic stage Kemp's ridleys presumably feed on the available *Sargassum* and associated infauna or other epipelagic species found in the Gulf of Mexico.

Population Dynamics and Status

Of the seven extant species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the Rancho Nuevo beaches (Pritchard, 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand, 1963). By the mid-1980s nest numbers were below 1,000 (with a low of 702 nests in 1985). However, observations of increased nesting with 6,277 nests recorded in 2000, 10,000 nests in 2005, and 12,143 nests recorded during the 2006 nesting season (Gladys Porter Zoo nesting database) show the decline in the ridley population has stopped and the population is now increasing.

A period of steady increase in benthic immature ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature sea turtles beginning in 1990. The increased survivorship of immature sea turtles is attributable, in part, to the introduction of turtle excluder devices (TEDs) in the United States and Mexican shrimping fleets and Mexican beach protection efforts. As demonstrated by nesting increases at the main nesting sites in Mexico, adult ridley numbers have increased over the last decade. The population model used by TEWG (2000) projected that Kemp's ridleys could reach the Recovery Plan's intermediate recovery goal of 10,000 nesters by the year 2015.

Next to loggerheads, Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath *et al*., 1987; Musick and Limpus, 1997). The juvenile population of Kemp's ridley sea turtles in Chesapeake Bay is estimated to be 211 to 1,083 turtles (Musick and Limpus, 1997). These juveniles frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus, 1997). Kemp's ridleys consume a variety of crab species, including *Callinectes spp*., *Ovalipes spp*., *Libinia sp*., and *Cancer spp*. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal, 1997). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus, 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds, as well as smaller juveniles from New York and New England, to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Musick and Limpus, 1997; Epperly *et al*., 1995a; Epperly *et al*., 1995b).

Kemp's Ridley Sea Turtle within the Action Area

From 1979 through 2006 there have been no records of Kemp's ridley nesting in Duval County (FWRI, 2007c). Part of the post-juvenile distribution does include the Atlantic coast through Florida, and occurrence is mainly seasonal for feeding. The shallow waters of the southeast U.S. are suitable habitat for all life stages of this species throughout much of the year and Kemp's ridley sea turtles are expected to occur year-round in waters between the shoreline and the 50-meter (m) isobath. The waters off the Atlantic coast of north Florida are most suitable for Kemp's ridley sea turtles from May through October (Navy, 2002). Maintenance hopper dredging operations at Kings Bay, Georgia north of the project area, led to a total of nine Kemp's ridley takes from 1988 to 2006 (USACE, 2008b).

Threats

Kemp's ridleys face many of the same natural threats as loggerheads, including destruction of nesting habitat from storm events, natural predators at sea, and oceanic events such as cold stunning. Although cold stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. For example, in the winter of 1999-2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and 5 green turtles were found on Cape Cod beaches (R. Prescott, pers. comm., 2001). Annual cold-stunning events do not always occur at this magnitude; the extent of episodic major cold-stunning events may be associated with numbers of turtles utilizing Northeast waters in a given year, oceanographic conditions, and the occurrence of storm events in the late fall. Many cold-stunned turtles can survive if found early enough, but cold-stunning events can still represent a significant cause of natural mortality.

Although changes in the use of shrimp trawls and other trawl gear have helped to reduce mortality of Kemp's ridleys, this species is also affected by other sources of anthropogenic impacts similar to those discussed above. For example, in the spring of 2000, five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 275 loggerhead carcasses were found. Cause of death for most of the turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gill net fishery operating offshore in the preceding weeks. The five ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction because it is unlikely that all of the carcasses washed ashore.

Summary of Kemp's Ridley Status

The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr, 1963). The number of nests observed at Rancho Nuevo and nearby beaches increased at a mean rate of 11.3 percent per year from 1985 to 1999. Current totals are 12,059 nests in Mexico in 2006 (August 8, 2006, e-mail from Luis Jaime Peña - Conservation Biologist, Gladys Porter Zoo). Kemp's ridleys mature at an earlier age (7-15 years) than other chelonids, thus "lag effects" as a result of unknown impacts to the non-breeding life stages would likely have been seen in the increasing nest trend beginning in 1985 (NMFS and USFWS, 1992).

The largest contributors to the decline of Kemp’s ridleys in the past were commercial and local exploitation, especially poaching of nests at the Rancho Nuevo site, as well as the Gulf of Mexico trawl fisheries. The advent of TED regulations for trawlers and protections for the nesting beaches has allowed the species to begin to rebound. Many threats to the future of the species remain, including interactions with fishery gear, marine pollution, foraging habitat destruction, illegal poaching of nests and potential threats to the nesting beaches from such sources as global climate change, development, and tourism pressures.

Critical Habitat

No critical habitat has been designated by the NMFS for Kemp’s ridley sea turtles.

Shortnose Sturgeon

Life History and Distribution

The shortnose sturgeon is an anadromous species restricted to the east coast of North America. Throughout its range, shortnose sturgeon occur in rivers, estuaries, and the sea; however, it is principally a riverine species and is known to use three distinct portions of river systems: (1) non-tidal freshwater areas for spawning and occasional overwintering; (2) tidal areas in the vicinity of the fresh/saltwater mixing zone, year-round as juveniles and during the summer months as adults; and (3) high salinity estuarine areas (15 parts per thousand (ppt.) salinity or greater) as adults during the winter. The majority of populations have their greatest abundance and are found throughout most of the year in the lower portions of the estuary and are considered to be more abundant now than previously thought (NMFS, 1998).

The shortnose sturgeon is a suctorial feeder and its preferred prey is small gastropods. Sturgeon forage by slowly swimming along the bottom, lightly dragging their barbels until they feel something that may resemble food at which time they suck it up in their protrusible mouths. The non-food items are expelled through their gills. Juveniles may be even more indiscriminate, and just vacuum their way across the bottom. Soft sediments with abundant prey items such as macroinvertebrates are thought to be preferred by shortnose sturgeon for foraging, so established benthic communities are likely important. They are thought to forage for small epifaunal and infaunal organisms over gravel and mud by sucking up food. A few prey studies have been conducted and prey include small crustaceans, polychaetes, insects, and mollusks (Moser and Ross 1995; NMFS, 1998) but they have also been observed feeding off plant surfaces and on fish bait (Dadswell *et al.* 1984).

The species' general pattern of seasonal movement appears to involve an upstream migration from late January through March when water temperatures range from 9º C to 12º C. Post-spawning fish begin moving back downstream in March and leave the freshwater reaches of the river in May. Juvenile and adult sturgeon use the area located 1 to 3 miles from the freshwater/saltwater interface throughout the year as a feeding ground. During the summer and winter, adult shortnose sturgeon occur in freshwater reaches of rivers or river reaches that are influenced by tides; as a result, they often occupy only a few short reaches of a river's entire length (Buckley and Kynard, 1985). During the summer, this species tends to use deep holes at or just above the freshwater/saltwater boundary (Flournoy *et al*., 1992; Rogers and Weber; 1994, Hall *et al.*, 1991). Juvenile shortnose sturgeon generally move upstream for the spring and summer seasons and downstream for fall and winter; however, these movements usually occur above the salt- and freshwater interface of the rivers they inhabit (Dadswell *et al.* 1984, Hall *et al.* 1991). Adult shortnose sturgeon prefer deep, downstream areas with soft substrate and vegetated bottoms, if present. Because they rarely leave their natal rivers, Kieffer and Kynard (1993) considered shortnose sturgeon to be freshwater amphidromous (*i.e.* adults spawn in freshwater but regularly enter saltwater habitats during their life).

Shortnose sturgeons in the northern portion of the species' range live longer than individuals in the southern portion of the species' range (Gilbert, 1989). The maximum age reported for a shortnose sturgeon in the St. John River in New Brunswick is 67 years (for a female), 40 years for the Kennebec River, 37 years for the Hudson River, 34 years in the Connecticut River, 20 years in the Pee Dee River, and 10 years in the Altamaha River (Gilbert 1989 using data presented in Dadswell *et al.* 1984). Male shortnose sturgeon appear to have shorter life spans than females (Gilbert, 1989).

Spawning Life Stage.

As with most fish, southern populations of shortnose sturgeon mature earlier than northern ones: females reach sexual maturity at approximately 6 years, and males reach it at 3 years. In early February to late March, shortnose sturgeon spawn far upstream in freshwater. In most population segments, sturgeon spawn at the uppermost river reaches that are accessible in channels and curves in gravel, sand, and log substrate; however, many spawning grounds are blocked by dams (Hall *et al*. 1991). Other suitable substrates include riffles near limestone bluffs with gravel to boulder-sized substrate (Rogers and Weber 1995). Spawning lasts for about 3 weeks, beginning when water temperatures are at about 8 to 9° C, and ending when it reaches approximately 12 to 15° C. The spent fish migrate downriver from March to May, and spend the summer from June to December in the lower river (Hall *et al*. 1991). Females likely do not spawn every year, while males may do so. The demersal, adhesive eggs hatch in freshwater, and develop into larvae within 9 to 12 days. Larvae start swimming and initiate their slow downstream migrations at about 20 mm in length (Richmond and Kynard, 1995).

Adult Life Stage.

Adult shortnose sturgeons migrate extensively throughout an individual river system and may also migrate between different river basins (Wrona *et al*., 2007; Cooke and Leach, 2004). In 1999 and 2000, Collins *et al.* (2001) tracked adult and juvenile sturgeon in the Savannah River and identified distinct summer and winter habitats in terms of location and water quality (Table 2). Observations indicate that they seek relatively deep, cool holes upriver for sanctuary from warm temperatures (and possibly to escape low dissolved oxygen coupled with salinity stress), and in the winter, they migrate downstream to the estuary, perhaps to feed or escape extreme cold. When temperatures are below 22° C, it appears that both adult and juvenile sturgeon stay in the lower river and during warmer periods when temperatures exceed 22° C, telemetry observations and gill net surveys indicate that sturgeon use the upper estuary. While they are known to occur in 4 to 33° C, sturgeon show signs of stress at temperatures above 28°, and this stress may be exacerbated by low dissolved oxygen conditions during summer critical months. Sturgeon may seek thermal refuges during these periods, deep cool waters where salinity conditions are appropriate and food is available with minimal foraging movements. For example, Flournoy *et al*. (1992) found that sturgeon may use spring-fed areas for summer habitat in the Altamaha River system. The synergistic effects of high temperatures and low dissolved oxygen should be considered in any impact analysis. Based on work done in the Chesapeake Bay, sturgeon may suffer an "oxygen squeeze" in the summer when they seek deep cool areas that also have low dissolved oxygen (Secor and Niklitschek, 2001).

Table 2. Mean water temperature, salinity, and dissolved oxygen (D.O.) by season at locations where adult shortnose sturgeon were found. Reproduced from Collins *et al*. 2001.

Season	**°C**	**Salinity (ppt)**	**D.O. (mg/L)**
Spring	19.9	1.4	7.84
Summer	27.3	2.0	6.36
Fall	21.1	3.3	7.06
Winter	12.3	5.4	8.36

Juvenile Life Stage.

Juvenile shortnose sturgeon mature at approximately 3 to 6 years of age, and they live in the salt/fresh interface in most rivers. After spending their first year in the upper freshwater reaches, they adopt the adult migratory lifestyle and go upriver in the summer and down in the winter. Like adults, they need sand or mud substrate for foraging (Hall *et al.* 1991). They are less tolerant of low dissolved oxygen and high salinity than the adults and appear to migrate accordingly within the river system. According to Collins *et al.* (2001), when temperatures exceeded 22° C in the Savannah River, juveniles spent the summer in deep (5 to 7 m) holes with 0 to 1 ppt salinity levels (Table 3). During the winter, they use the warmer estuarine-influenced lower river. For example, they move into more saline areas (0 to 16 ppt) when temperatures dropped below 16° C in the Ogeechee River. Warm summer temperatures over 26° limit movement of juveniles who may not be able to forage extensively during summers. Tolerance to both dissolved oxygen and salinity is thought to increase with age; very young sturgeon are known to be extremely sensitive to both (Jenkins *et al*., 1993). Jenkins *et al* (1993) reported that in a 6-hour test, fish 64 days old exhibited 86% mortality when exposed to dissolved oxygen concentrations of 2.5 mg/L. However, sturgeon >100 days old were able to tolerate concentrations of 2.5 mg/L with<20%

mortality. Jenkins also reported that dissolved oxygen at less than 3 mg/L causes changes in sturgeon behavior: Fish hold still and pump water over their gills, an apparent adaptation to survive low dissolved oxygen conditions. If fish spawn in the spring, it is believed that late age individuals encounter these low dissolved oxygen conditions in the lower estuary. Environmental Protection Agency (Chesapeake Bay Program Office) recently revised its D.O. criteria for living resources in Chesapeake Bay tributaries from 2.0 mg/L to 3.5 mg/L to be protective of sturgeons (Secor and Gunderson, 1998; Niklitschek and Secor, 2000). It is possible that 3.5 mg/L may be acceptable, but 4.0 mg/L would be safer for the higher temperatures in this southern river. As with adults, temperatures above 28° reduce tolerance to low dissolved oxygen (Flournoy *et al*. 1992).

Table 3. Mean water temperature, salinity, and dissolved oxygen by season at locations where juvenile shortnose sturgeon were found. Reproduced from Collins *et al*. 2001.

Season	**°C**	**Salinity**	**D.O.**
Spring	20.4	2.4	7.58
Summer	28.5	0.3	6.8
Fall	21.7	4.7	6.45
Winter	12.5	8.6	8.63

Species' Description, Distribution, and Population Structure

Shortnose sturgeon occur within most major river systems along the Atlantic Coast of North America, from the St. John River in Canada to the St. Johns River in Florida. In the southern portion of the range, they are found in the St. Johns River in Florida; the Altamaha, Ogeechee, and Savannah Rivers in Georgia; and, in South Carolina, the river systems that empty into Winyah Bay and the Santee/Cooper River complex that forms Lake Marion. Data are limited for the rivers of North Carolina. In the northern portion of the range, shortnose sturgeon are found in the Chesapeake Bay system, Delaware River from Philadelphia, Pennsylvania to Trenton, New Jersey; the Hudson River in New York; the Connecticut River; the lower Merrimack River in Massachusetts and the Piscataqua River in New Hampshire; the Kennebec River in Maine; and the St. John River in New Brunswick, Canada (http://www.nmfs.noaa.gov/pr/species/fish/shortnosesturgeon.htm#distribution). The Shortnose sturgeon recovery plan describes 20 shortnose sturgeon population segments that exist in the wild. Two additional, geographically distinct populations occur behind dams in the Connecticut River (above the Holyoke Dam) and in Lake Marion on the Santee-Cooper River system in South Carolina (above the Wilson and Pinopolis Dams). Although these populations are geographically isolated, genetic analyses suggest that individual shortnose sturgeon move between some of these populations each generation (Quattro *et al.* 2002, Wirgin *et al.* 2005).

At the northern end of the species' distribution, the highest rate of gene flow (which suggests migration) occurs between the Kennebec and Androscoggin Rivers. At the southern end of the species' distribution, populations south of the Pee Dee River appear to exchange between 1 and 10 individuals per generation, with the highest rates of exchange between the Ogeechee and Altamaha Rivers (Wirgin *et al.* 2005). Wirgin *et al.* (2005) concluded that rivers separated by more than 400 km were connected by very little migration while rivers separated by no more than 20 km (such as the rivers flowing into coastal South Carolina) would experience high migration rates. Coincidentally, at the geographic center of the shortnose sturgeon range, there is a 400 km stretch of river with no known populations occurring from the Delaware River, New Jersey to Cape Fear River, North Carolina (Kynard, 1997). However, shortnose sturgeon are known to occur in the Chesapeake Bay, and may be transients from the Delaware River via the Chesapeake and Delaware Canal (Skjeveland *et al.* 2000, Welsh *et al.* 2002) or remnants of a population in the Potomac River.

Several authors have concluded that shortnose sturgeon populations in the southern end of the species geographic range are extinct. Rogers and Weber (1994), Kahnle *et al.* (1998), and Collins *et al.* (2000) concluded that shortnose sturgeon are extinct from the St. Johns River in Florida and the St. Marys River along the Florida and Georgia border. Rogers and Weber (1995) also concluded that shortnose sturgeon have become extinct in Georgia’s Satilla River. Historical distribution has been in major rivers along the Atlantic seaboard from the St. John River in Canada, south to the St. Johns River in Florida and rarely in the off-shore marine environment. Currently, shortnose sturgeon are more prominent in northern river systems and severely depleted in southern river systems. A recovery plan was completed for shortnose sturgeon with little to no population data available for the St. Johns River in Florida (NMFS, 1998). Beginning in spring of 2001, the Florida Fish and Wildlife Research Institute (FWRI) and USFWS began research on the population status and distribution of the species in St. Johns River. After approximately 4,500 hours of gill-net sampling from January through August of 2002 and 2003, only one shortnose sturgeon was captured in 2002. In addition, after 21,381 hours of gill-net sampling for other species from 1980 through 1993, there were no incidental captures of sturgeon (FWRI, 2007)

Population Dynamics and Status

Shortnose sturgeon were listed as endangered on March 11, 1967 (32 FR 4001) pursuant to the Endangered Species Preservation Act of 1966. Shortnose sturgeon remained on the list as endangered with the enactment of the ESA in 1973. Shortnose sturgeon were first listed on the International Union for Conservation of Nature and Natural Resources Red List in 1986 where it is still listed as vulnerable and facing a high risk of extinction based in part on: an estimated range reduction of greater than 30% over the past three generations, irreversible habitat losses, effects of habitat alteration and degradation, degraded water quality and extreme fluctuations in the number of mature individuals between rivers. As of 30 November 2007, the NMFS initiated a status review of the shortnose sturgeon under the ESA; however, no report had been published by the time this assessment was developed. .

Despite the longevity of adult sturgeon, the viability of sturgeon populations are highly sensitive to juvenile mortality that result in reductions in the number of sub-adults that recruit into the adult, breeding population (Anders *et al.,* 2002; Gross *et al.,* 2002; Secor *et al.,* 2002). Sturgeon populations can be grouped into two demographic categories: populations that have reliable (albeit periodic) natural recruitment and those that do not. The shortnose sturgeon populations without reliable natural recruitment are at the greatest risk (Secor *et al.,* 2002).

Several authors have also demonstrated that sturgeon populations generally, and shortnose sturgeon populations in particular, are much more sensitive to adult mortality than other species of fish (Boreman, 1997; Gross *et al.,* 2002; Secor *et al.,* 2002). These authors concluded that sturgeon populations cannot survive fishing related mortalities that exceed five percent of an adult spawning run and they are vulnerable to declines and local extinction if juveniles die from fishing related mortalities.

Shortnose Sturgeon within the Action Area

Beginning in spring of 2001, the Florida Fish and Wildlife Research Institute (FWRI) and USFWS began research on the population status and distribution of the species in the St. Johns River. After approximately 4,492 hours of gill-net sampling from January through August of 2002 and 2003 in the upper river and estuarine area, only one shortnose sturgeon was captured. In addition, after 21,381 hours of gill-net sampling for other species from 1980 through 1993, there were no incidental captures of sturgeon. Shortnose sturgeon are known to use warm-water springs in other southern rivers, but only eight individual fish have been observed in the numerous warmwater springs found upstream in the St. Johns River system, and these sightings occurred in the 1970s and early 1980s. The FWRI concluded that with the lack of current sightings in surveys, the patchy and extremely infrequent catch of small individuals, and the historic low numbers, it is highly unlikely that a significant population of shortnose sturgeon currently resides within the St. Johns River (FWRI, 2007).

Because the St. Johns River is heavily industrialized and has been for many years, shortnose sturgeon populations may have suffered due to habitat degradation and blocked access to historic spawning grounds in the upstream reaches of the river. Spawning habitat for this species is rock or gravel substrate near limestone outcroppings, which is very rare in the St. Johns River and associated tributaries. Reproduction of shortnose sturgeon has not been documented in the St. Johns River, and in fact, no large adults (> 10 pounds) have been sighted in this area (FWRI, 2007). Due to the limited catch of shortnose sturgeon in the vicinity of the St. Johns River, the occurrence of shortnose sturgeons within the MSCF-BI slipway is considered very unlikely.

Threats

The construction of dams throughout the shortnose sturgeon's range probably reduced their reproductive success. Dredging activities have been known to take individual sturgeon and have the potential to alter the quality of their feeding, rearing, and overwintering habitat. More recently, larval and juvenile shortnose sturgeon in the different populations along the Atlantic have been killed after being impinged on the intake screens or entrained in the intake structures of power plants on the Delaware, Hudson, Connecticut, Savannah and Santee rivers (Dadswell *et al.,* 1984). Sturgeon populations have also been reduced further by habitat fragmentation and loss, siltation, water pollution, decreased water quality (low DO, salinity alterations), bridge construction, and incidental capture in coastal fisheries (Dadswell *et al.,* 1984; Collins *et al.,* 1996; NMFS, 1998a; Secor and Gunderson, 1998; Collins *et al.,* 2000; Newcomb and Fuller, 2001).

Construction of dams and pollution of many large northeastern river systems during the period of industrial growth in the late 1800's and early 1900's may have resulted in substantial loss of suitable habitat. In addition, habitat alterations from discharges, dredging or disposal of material into rivers, or related development activities involving estuarine/riverine mudflats and marshes, remain constant threats. Commercial exploitation of shortnose sturgeon occurred throughout its range starting in colonial times and continued periodically into the 1950's.

Critical Habitat

No critical habitat has been designated for the shortnose sturgeon.

<u>Protective Measures Taken in the Project Area Separate from Conservation Measures the Corps will Undertake as Part of the Proposed Action</u>

Other consultations of Federal actions in the area to date

The Corps has been working with the citizens of Duval County since 1907 on expanding and maintaining Jacksonville Harbor. None of the projects authorized by Congress prior to 1973 were required to consult under the Endangered Species Act of 1973 (ESA). There are currently a variety of federally authorized studies for various projects within Jacksonville Harbor. Detailed information regarding these studies can be found in the “Jacksonville Harbor Navigation Study and Environmental Assessment” found on the Corps’ environmental documents website at the following link - http://www.saj.usace.army.mil/Divisions/Planning/Branches/Environmental/DOCS/OnLine/Duval/JAXHarborNavigationStudy.pdf. The applicable discussion begins on page 7, paragraph 11 and continues through page 12 and paragraph 28.

In addition, the US Navy recently completed a Final EIS for the homeporting of additional vessels at NAVSTA Mayport and signed a Record of Decision for that action on 14 January 2009. The FEIS and ROD can be reviewed at http://www.mayporthomeportingeis.com/EISDocuments.aspx.

<u>Protective Measures Taken in the Project Area as Part of the Proposed Action</u>

Consideration of Plans and Methods to Minimize/Avoid Environmental Impacts. Conservation measures were a major focus during the plan formulation phase for the proposed project. Avoiding and minimizing some potential impact areas significantly decreased the risk of indirect effects on managed and protected species, and a great deal of consideration was given to the utilization of rock/concrete removal methods to decrease the likelihood of incidental take, injury, and behavioral modification of protected species. It was determined that rock/concrete removal options not involving blasting were possibly more detrimental to populations and individuals of protected species. One alternative option was the use of a punchbarge/piledriver to break rock. However, it was determined that the punchbarge, which would work for 12-hour periods, strikes the rock approximately once every 60-seconds.   This constant pounding would serve to disrupt animal behavior in the area, and result in adverse effects on the mission of MSCF-BI since the sill removal would not be completed in the required six week timeframe. Using the punchbarge would also extend the length of the project, thus increasing any potential impacts to all fish and wildlife resources in the area. The Corps believes that blasting is actually the least environmentally impactful method for removing the rock in the slipway. Each blast will last no longer than five (5) seconds in duration, and may even be as short as 2 seconds each. Additionally, the blasts are confined in the rock/concrete substrate. Boreholes are drilled into the rock below, the blasting charge is set, and then the chain of explosives is detonated. Because the blasts are confined within the rock structure, the distance of the blast effects is reduced as compared to an unconfined blast (see discussion below).

Development of Protective Measures. The proposed project includes measures to conserve sea turtles and shortnose sturgeon. Foremost among the measures are protective actions to ensure that sea turtles and shortnose sturgeon are not killed if in fact such methods are required as a part of the overall dredging operation. Development of the measures involved consideration of past practices and operations, anecdotal observations, and the most current scientific data. The discussion below summarizes the development of the conservation measures, which, although developed for marine mammals, will also be utilized to protect such species as sea turtles and shortnose sturgeon.

<u>Blasting</u>

To achieve the deepening of the MSCF-BI slipway from the existing depth of -38 feet to a maximum project depth of -47 feet MLLW, pretreatment of the rock/concrete sill areas may be required. Blasting is anticipated to be required for some or all of the deepening and extension of the channel, where standard construction methods are unsuccessful. The total volume to be removed in these areas is up to 130,000 cubic yards of rock and 875,000 sq feet of reinforced concrete. USACE has used two criteria to determine which areas are most likely to need blasting for the MCSF-BI slipway:

1. Areas documented by core borings to contain hard massive rock
2. Concrete sill that is too hard to dredge without pre-treatment.

Based on evaluations of the core boring logs, and as-built information for the sill provided by MCSF-BI, the following is an evaluation of the blasting requirements for the current project. Areas currently identified as having the hardest rock and most likely in need of blasting prior to dredging include the concrete sill and the mouth of the slipway. Additional core borings were collected in October 2008. The results of recent core borings have identified an area of 875,000 square feet of cemented rock within the proposed dredging template in addition to the concrete sill. The cemented rock is highly dense and likely in need of blasting prior to dredging. Based on evaluations of the core boring logs, and as-built information for the sill provided by MCSF-BI, the blasting requirements for the current project will include removal of existing sill and 130,000 CYs cemented sedimentary rock. The pretreatment of the cemented rock will need to occur between Station 22+00 to Station 43+00 of the existing channel baseline. The concrete sill is located approximately at Station 7+00 (Figure 3).

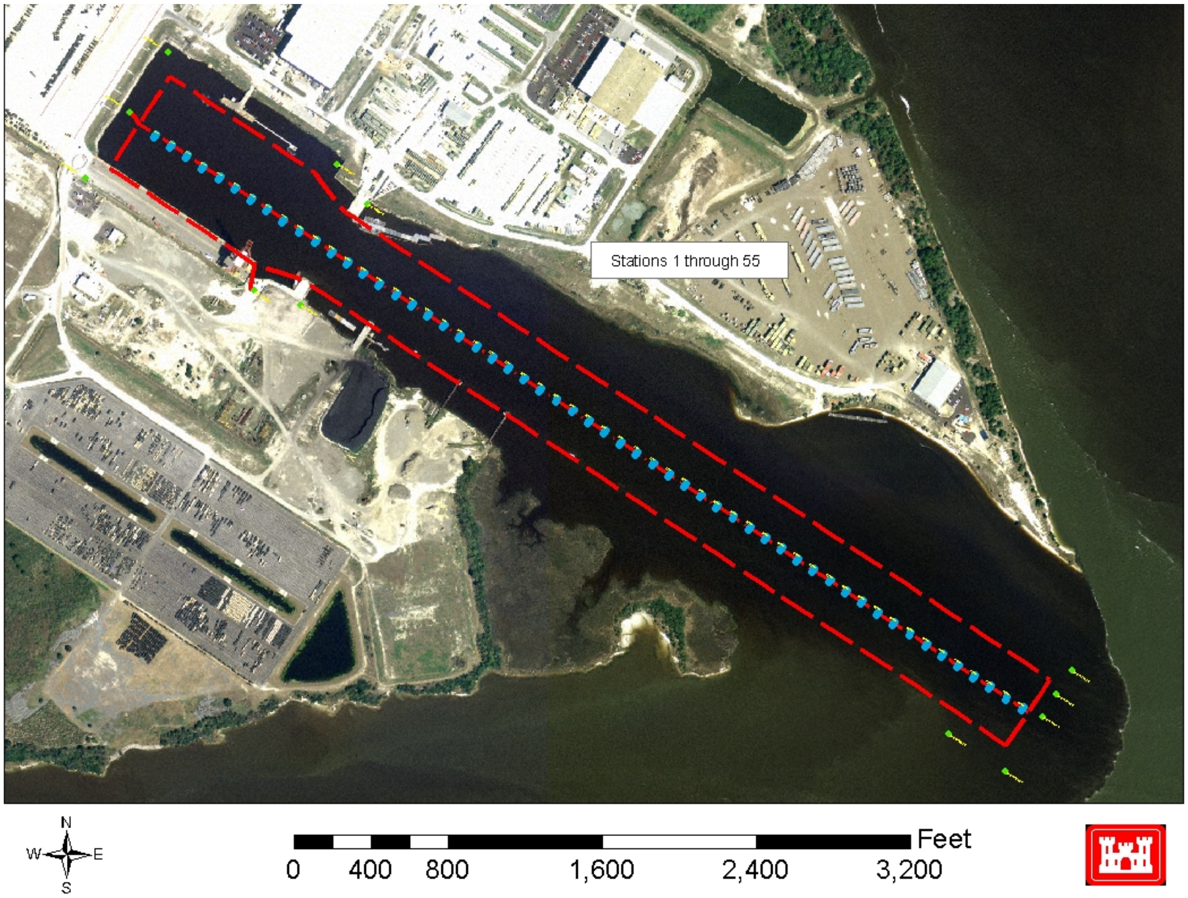

Figure 3: Blount Island slipway station markers

The focus of the proposed blasting work at the Blount Island slipway is to pre-treat the concrete sill and any hard rock prior to removal by a dredge. The pre-treatment would utilize “confined blasting,” meaning the shots would be “confined” in the rock. In confined blasting, each charge is placed in a hole drilled in the rock approximately five to ten feet deep, depending on how much rock needs to be broken and the intended project depth. The hole is capped with an inert material, such as crushed rock. This process is referred to as “stemming the hole” (Figure 3). For the Port of Miami expansion that used confined blasting as a pre-treatment technique, the stemming material was angular crushed rock. The optimum size for stemming material is an average diameter of approximately 0.05 times the diameter of the blast hole. Material must be angular to perform properly (Konya, 2003). For the MCSF-BI project, the geotechnical branch of the USACE Jacksonville District will prepare project specific specifications.

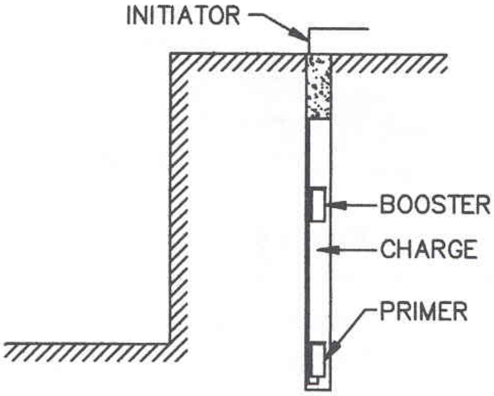

Figure 4: Typically stemmed hole

Figure 5: Stemming material utilized; bag is approximate volume of material used

In the recently completed Miami Harbor project, the following requirements were in the specifications regarding stemming material:

> 1.22.9.20 Stemming
> All blast holes shall be stemmed. The Blaster or Blasting Specialist shall determine the thickness of stemming using blasting industry conventional stemming calculations. The minimum stemming shall be 2 feet thick. Stemming shall be placed in the blast hole in a zone encompassed by competent rock. Measures shall be taken to prevent bridging of explosive materials and stemming within the hole. Stemming shall be clean, angular to subangular, hard stone chips without fines having an approximate diameter of 1/2-inch to 3/8-inch. A barrier shall be placed between the stemming and explosive product, if necessary, to prevent the stemming from settling into the explosive product. Anything contradicting the effectiveness of stemming shall not extend through the

stemming.

It is expected that the specifications for any construction utilizing blasting at Blount Island would have similar stemming requirements as those that were used for the Miami Harbor project. The length of stemming material will vary based on the length of the holes drilled, however minimum lengths will be included in the project specific specifications. Studies have shown that stemmed blasts have up to a 60-90% decrease in the strength of the pressure wave released, compared to open water blasts of the same charge weight (Nedwell and Thandavamoorthy, 1992; Hempen *et al*., 2005; Hempen *et al*., 2007). However, unlike open water blasts, very little documentation exists on the effects that confined blasting can have on marine animals near the blast (Keevin *et al*., 1999).

Figure 6 - Unconfined blast of seven pounds of explosives

Figure 7 - Confined blast of 3,000 pounds

The work may be completed in the following manner:

- Contour dredging with either bucket, hydraulic or excavator dredges to remove material that can be dredged conventionally and determine what areas require blasting.

- Pre-treating (blasting) the remaining above grade rock, drilling and blasting the "Site Specific" areas where rock could not be conventionally removed by the dredges.

- Excavating with bucket, hydraulic or excavator dredges to remove the pre-treated rock areas to grade.

- All drilling and blasting will be conducted in strict accordance with local, state and federal safety procedures. Marine Wildlife Protection, Protection of Existing Structures, and Blasting Programs coordinated with federal and state agencies*.*

- Based upon industry standards and USACE, Safety & Health Regulations, the blasting program may consist of the following:

> The weight of explosives to be used in each delay will be limited to the lowest poundage of explosives that can adequately break the rock/concrete. The blasting would consist of up to two blasts per day.

The following safety conditions are standard in conducting underwater blasting:

- Drill patterns are restricted to a minimum of 8 ft separation from a loaded hole.
- Hours of blasting are restricted from 2 hours after sunrise to 1 hour before sunset to allow for adequate observation of the project area for protected species.
- Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.
- The blast design will consider matching the energy in the “work effort” of the borehole to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.

As part of the development of the protected species protection and observation protocols, which will be incorporated into the plans and specifications for the project, USACE and MCSF-BI will work with agencies and non-governmental organizations (NGOs) to address concerns and potential impacts associated with the blasting.
In addition to coordination with the agencies and NGOs, any new scientific studies regarding the effects of blasting (confined or unconfined) on species that may be in the area (marine mammals, sea turtles, and fish (both with a swim bladder and without) will be incorporated into the design of the protection measures that will be employed with confined blasting activities during the project. Examples of these studies may include:

Analysis being conducted for the Navy at Woods Hole Oceanographic Center on the effects of unconfined blast pressures on marine mammals (specifically whales, dolphins and seals; manatee carcasses were not made available to the researchers at Woods Hole despite requests from the researchers to FWC) (pers comm. Dr. Ketten, 2005).

As part of the August 1 and 2, 2006 after action review conducted for the Miami Harbor Phase II dredging project, which included confined blasting as a construction technique, USACE in partnership with FWC, committed to conduct a study (“Caged Fish Study”) on the effects of blast pressures on fin fish with air bladders in close proximity to the blast. This study would attempt to answer questions regarding injury and death associated with proximity to a confined blast, not resolved with research conducted during the Wilmington Harbor 1999 blasting (Moser, 1999a and Moser, 1999b).

Other blasting project monitoring reports (completed prior to development of plans and specifications for the MCSF-BI project) for projects, both from inside and outside of Florida, using confined underwater blasting as a construction technique.

As part of these protective measures, USACE and MCSF-BI will develop three safety radii based on the use of an unconfined blast. The use of an unconfined blast to develop safety radii for a confined blast will increase the protections afforded marine species in the area since it doesn’t give any credit of the pressure reduction caused by the confining of the blast. These three zones are referred to as the “Danger zone,” which is the inner most zone, located closest to the blast; the “Safety zone,” which is the middle zone; and the “watch zone,” which is the outer most zone. These zones are described further in subsequent paragraphs and illustrated in Figure 8. Since the slipway is a dead-end canal, the focus of these radii will be the distance animals are up and downstream from the mouth of the slip.

The danger zone radius will be calculated to determine the maximum distance from the blast at which mortality to protected marine species is likely to occur. The danger zone is determined by the amount of explosives used within each delay (which can contain multiple boreholes). An explosive delay is division of a larger charge into a chain of smaller charges with more than eight milliseconds between each of the charges. This break in time breaks up the total pressure of the larger charge into smaller amounts, which makes the rock fracture more efficient and also decreases impacts to aquatic organisms. These calculations are based on impacts to terrestrial animals in water when exposed to a detonation suspended in the water column (unconfined blast) as researched by the U.S. Navy in the 1970s (Yelverton *et al*., 1973; Richmond *et al.,* 1973), as well as observations of sea turtle injury and mortality associated with unconfined blasts for the cutting of oil rig structures in the Gulf of Mexico (Young, 1991; O’Keefe and Young, 1994). The reduction of impact by confining the shots would more than compensate for the presumed higher sensitivity of marine species. The USACE and MCSF-BI believe that the danger zone radius, coupled with a strong protected species observation and protection plan is a conservative, but prudent, approach to the protection of marine wildlife species. Based on a review of the Miami Harbor project, NMFS and FWS found these protective measures sufficient to protect marine mammals under their respective jurisdictions (NMFS, 2005b; FWS, 2002). In addition, monitoring of the Miami blast pressures found these calculations to be extremely conservative and protective (Jordan *et al*., 2007 and Hempen *et al*., 2007).

These zone calculations will be included as part of the specifications package that the contractors will bid on before the project is awarded. The calculations are as follows:

> 1) Danger Zone (NMFS has referred to this as the Caution Zone in previous authorizations): the radius in feet from the detonation beyond which no mortality or injury from an open water explosion is expected (NMFS 2005). The danger zone (feet) = 260 [79.25 m] X the cube root of weight of explosives in pounds per delay (equivalent weight of TNT).
>
> 2) The Safety Zone (sometimes referred to as the Exclusion Zone) is the approximate distance in feet from the detonation beyond which injury (Level A harassment as defined in the MMPA) is unlikely from an open water explosion (NMFS 2005b). The safety zone (feet) = 520 [158.50 m] X cube root of weight of explosives in pounds per delay (equivalent weight of TNT). Ideally, the safety radius should be large enough to offer a wide buffer of protection for marine animals while still remaining small enough that the area can be intensely surveyed.
>
> 3) The Watch Zone is three times the radius of the Danger Zone to ensure animals entering or traveling close to the safety zone are spotted and appropriate actions can be implemented before or as they enter any impact areas (i.e., a delay in blasting activities).

To estimate the maximum poundage of explosives that may be utilized for this project, USACE has reviewed two previous blasting projects, one at San Juan Harbor, Puerto Rico in 1994 and the Miami Harbor project in 2005. The heaviest delay used during the San Juan Harbor project was 375 pounds per delay and during the Miami Harbor project, 376 pounds per delay. Based on discussions with USACE geotechnical engineers, the maximum weight of delays for Blount Island is expected to be smaller than the delays in either the San Juan Harbor or Miami Harbor projects since the majority of the material to be removed is concrete and not dense rock. The maximum delay weight for the Blount Island project will be determined during the test blast program.

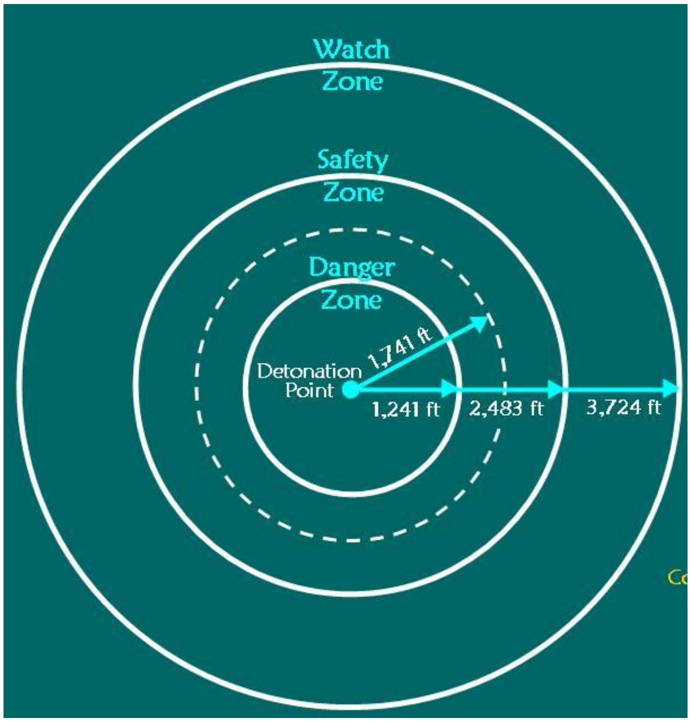

Figure 8: Example safety radii from Miami Harbor

The weight of explosives to be used in each blast will be limited to the lowest poundage of explosives that can adequately break the rock. The blasting program may consist of the following safety conditions that are based on industry standards in conducting confined underwater blasting, as well as USACE Safety & Health Regulations:

- Drill patterns are restricted to a minimum of an eight-foot separation from a loaded hole.
- Hours of blasting are restricted from two hours after sunrise to one hour before sunset to allow for adequate observation of the project area for protected species.
- Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.
- The blast design will consider matching the energy in the “work effort” of the borehole to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.
- Delay timing ensuring at least eight ms between delays to break larger blast weights into smaller blasts increasing blast efficiency while reducing pressure released into

the water column.

Because of the potential duration of the blasting and the proximity of the inshore blasting to known manatee use areas, a number of issues will need to be addressed. Due to the likelihood of large numbers of manatees in the area during the summer months, USACE and MSCF-BI have agreed as part of the ESA consultation with FWS to limit blasting activities to November 1 – March 31. In addition, by limiting the blasting activities to the winter months, the project is less likely to impact sea turtles. Sea turtles tend to be present in lower concentrations in the river in the winter months due to the lower water temperatures. Other dredging activities will be taking place inside the slipway and basin during this period of time, but blasting will not be utilized outside of the November 1 – March 31 timeframe.

Conservation Measures

It is crucial to balance the demands of the blasting operations with the overall safety of the species. A radius that is excessively large can result in a significant number of project suspensions prolonging the blasting, construction, traffic and overall disturbance to the area. A radius that is too small puts the animals at too great of a risk should one go undetected by the observers and move into the blast area. As a result of these factors, the goal is to establish the smallest radius possible without compromising animal safety, and to provide adequate observer coverage for the agreed upon radius.

A watch plan will be formulated based on the required safety zones and optimal observation locations. The watch plan will be consistent with the program that was utilized successfully at Miami Harbor in 2005 and will consist of six observers including at least one aerial observer (Figures 9 and 11), two boat-based observers (Figure 12), and two observers stationed on the drill barge (Figure 10). The sixth observer will be placed in the most optimal observation location (boat, barge or aircraft) on a day-by-day basis depending on the location of the blast and the placement of dredging equipment. This process will ensure complete coverage of the three zones. The watch will begin at least one hour prior to each blast and continue for one-half hour after each blast (Jordan *et al*., 2007).

Figure 9: Typical height of aerial observation

Figure 10: Observer on the drill barge

Figure 11: Aerial observer

Figure 12: Vessel-based observer

In addition to monitoring for protected marine mammals and sea turtles during blasting operations, USACE will work with the resource agencies to develop a monitoring plan for fish kills associated with each blasting event. This effort may be similar to the effort that was developed by FWC in association with the Miami Harbor project. The fish-monitoring plan will include collection, enumeration and identification of dead and injured fish floating on the surface after each blast. In addition, blast data will be collected from daily blasting reports provided by the blasting contractor (recorded after each shot), as well as environmental data such as tidal currents (in-going or out-going). Due to health and safety restrictions, all collections of fish will be made from the surface only; no diving to recover fish carcasses will be authorized.

Test Blast Program

Prior to implementing a blasting program a Test Blast Program will be completed. The purpose of the Test Blast Program is to demonstrate and/or confirm the following:

- Drill boat capabilities and production rates
- Ideal drill pattern for typical boreholes
- Acceptable rock breakage for excavation
- Tolerable vibration level emitted
- Directional vibration
- Calibration of the blasts to the surrounding environment

The Test Blast Program begins with a single range of individually delayed holes and progresses up to the maximum production blast intended for use. Each Test Blast is designed to establish limits of vibration and airblast overpressure, with acceptable rock breakage for excavation. The final test event simulates the maximum explosive detonation as to size, overlying water depth, charge configuration, charge separation, initiation methods, and loading conditions anticipated for the typical production blast.

The results of the Test Blast Program will be formatted in a regression analysis with other pertinent information and conclusions reached. This will be the basis for developing a completely engineered procedure for Blasting Plan. During the testing the following data will be used to develop a regression analysis:

- Distance
- Pounds per delay
- Peak Particle Velocities (TVL)
- Frequencies (TVL)
- Peak vector sum
- Air blast, overpressure

The Corps believes that blasting is actually the least environmentally impactful method for removing the rock in the MSCF-BI slipway. Each blast will last no longer than 5-seconds in duration, and may even be as short as 2 seconds, occurring no more than three times per day. As stated previously, the blasts are confined in the rock/concrete substrate. Boreholes are drilled into the substrate below, the blasting charge is set and then the chain of explosives is detonated. Because the blasts are confined within the concrete/rock structure, the distance of the blast effects are reduced as compared to an unconfined blast.

Effects of the Action on Protected Species

Sea Turtles

Direct Effects of Dredging

The impacts of dredging operations on sea turtles have been assessed by NMFS (NMFS, 1991; NMFS, 1995; NMFS, 1997a; NMFS, 1997b; NMFS, 2003) in the various versions of the South Atlantic Regional Biological Opinion (SARBO) and the 2003 (revised in 2005 and 2007) Gulf Regional Biological Opinion (GRBO). The life history of the four sea turtle species commonly found in north Florida, and the four most likely to be affected by in-water construction activities is found in the GRBO; in addition, the species' individual recovery plans are incorporated by reference (NMFS, 2003; NMFS and FWS, 1991; NMFS and FWS, 1991a; NMFS and FWS, 1991b; NMFS and FWS, 1992; NMFS and FWS, 1993; NMFS and FWS, 1995). Removal of the sill after pre-treatment, and removal of dredged material during advance maintenance will be done by mechanical dredge like a clamshell dredge or a cutterhead dredge. The 1991 SARBO states "clamshell dredges are the least likely to adversely affect sea turtles because they are stationary and impact very small areas at a given time. Any sea turtle injured or killed by a clamshell dredge would have to be directly beneath the bucket. The chances of such an occurrence are extremely low…" (NMFS, 1991). NMFS also determined that "of the three major dredge types, only the hopper dredge has been implicated in the mortality of endangered and threatened sea turtles." NMFS repeated the 1991 determination in the 1995 and 1997 SARBOs (NMFS, 1995 and 1997a and b). Based on these determinations, USACE believes that the use of a mechanical and/or cutterhead dredge for removal of the concrete sill and for advance maintenance dredging, may affect, but is not likely to adversely affect listed sea turtles.

As part of the standard plans and specifications for the project, USACE and MCSF-BI have agreed to implement the NMFS "Sea Turtle and Smalltooth Sawfish Construction Conditions:"

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-foot radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Direct Effects of Blasting

The highest potential impact to sea turtles may result from the use of explosives to remove areas of rock within the project area. Due to the presence of safety zones and measures associated with all proposed blasting activities, it is highly unlikely that blasting will have an adverse effect on listed sea turtles. However, it is extremely likely that both the pressure and noise associated with blasting would physically damage sensory mechanisms and other physiological functions of individual sea turtles. Impacts associated with blasting can be broken into two categories: direct impacts and indirect impacts.

To date, there has not been a single comprehensive study to determine the effects of underwater explosions on reptiles that defines the relationship between distance/pressure and mortality or damage (Keevin and Hempen, 1997). However, there have been studies that demonstrate that sea turtles are killed and injured by underwater explosions (Keevin and Hempen, 1997). Sea turtles with untreated internal injuries would have increased vulnerability to predators and disease. Nervous system damage was cited as a possible impact to sea turtles caused by blasting (U.S. Department of Navy 1998 as cited in USACE, 2000). Damage of the nervous system could kill sea turtles through disorientation and subsequent drowning. The Navy's review of previous studies suggests that rigid masses such as bone (or carapace and plastron) could protect tissues beneath them; however, there are no observations available to determine whether turtle shells would indeed afford such protection.

Christian and Gaspin's (1974) estimates of safety zones for swimmers found that beyond a cavitation area, waves reflected off a surface have reduced pressure pulses;

therefore, an animal at shallow depths would be exposed to a reduced impulse. Studies conducted by Klima *et al*., (1988) evaluated unconfined blasts of approximately 42 pounds (a low number) on sea turtles placed in surface cages at varying distances from the explosion (four ridley and four loggerhead sea turtles). The findings of the Christian and Gaspin 1974 study, which only considered very small unconfined explosive weights, imply that the turtles in the Klima *et al*. (1988) study would be under reduced effects of the shock wave. Despite this possible lowered level of impact, five of eight turtles were rendered unconscious at distances of 229 to 915 meters from the detonation site. Unconscious sea turtles that are not detected, removed and rehabilitated likely have low survival rates. Such results would not have resulted given blast operations confined within rock substrates rather than unconfined blasts.

The proposed action will use confined blasts, which will significantly reduce the pressure wave strength and the area around the discharge where injury or death could occur (Hempen *et al*., 2007). USACE assumes that tolerance of turtles to blast overpressures is approximately equal to that of marine mammals (Department of the Navy 1998 in USACE, 2000), that is death would not occur to individuals farther than 400 feet from a confined blast (Konya, 2003).

For assessing impacts of blasting operations on sea turtles, USACE relied on the previous analyses conducted by NMFS-Protected Resources Division as part of their ESA consultations on the Miami Harbor GRR (NMFS Consult #F/SER/2002/01094 – Feb 26, 2003) (NMFS, 2003a) and the Miami Harbor Phase II project (NMFS, Consult #I/SER/2002/00178 dated Sept 23, 2002) (NMFS, 2002). The results from 38 days of blasting conducted in Miami indicated that 16 sea turtles were recorded in the action area, without a single stranding of an injured or dead turtle reported (Trish Adams, FWS pers.com, 2005; and Wendy Teas, NMFS, pers.com 2005). In the ESA consultations for the two projects in Miami, with regard to impacts on sea turtles, NMFS found that “NOAA Fisheries believes that the use of the mitigative measures above in addition with capping the hole the explosives are placed in (which will greatly reduce the explosive energy released into the water column) will reduce the chances of a sea turtle being adversely affected by explosives to discountable levels.” (NMFS, 2003a).

Pressure data collected during the Miami Harbor Phase II project by USACE geophysicists and biologists indicated that using the three zones previously described, the pressures associated with the blasts return to background levels (one to two psi) at the margin of the danger zone. This means that any animal located inside the safety zone, but outside the danger zone, would not be exposed to any additional pressure effects from a confined blast (Hempen *et al*., 2007).

Protection. Based on the protective measures proposed for this project, in concert with the reduction in pressure from the blast due to the confinement of the pressure in the substrate, the impacts to sea turtles associated with blasting should be minimal. USACE has concluded that blasting is the *least* environmentally impactful method for removing the concrete sill and rock in the slipway. Each blast will last no longer than 15 seconds in duration, and may even be as short as two seconds. Additionally, the blasts are confined in rock substrate with stemming. Because the blasts are confined within the rock structure, the distance of the blast effects are reduced significantly as compared to an unconfined blast (Nedwell and Thandavamoorthy, 1992; Hempen *et al*., 2005; Hempen *et al*., 2007).

Indirect Effects

Indirect impacts on sea turtles due to dredging/blasting and construction activities in the project area include alteration of behavior and autecology. For example, daily movements of sea turtles may be impeded or altered. These effects would be temporary, only lasting as long as the dredging and sill removal activities.

The Corps believes that turtles that may be near the project area may be harassed acoustically as a result of the blast detonations. The harassment is expected to be in the form of a temporary threshold shift.

Interrelated and Interdependent Effects

The regulations for interservice consultation found at 50 CFR 402 define interrelated actions as “those that are part of a larger action and depend on the larger action for their justification” and interdependent actions as “those that have no independent utility apart from the action under consideration.”

The Corps does not believe that there are any interrelated actions for this proposed project.

Cumulative Effects

The regulations for interservice consultation found at 50 CFR 402 define cumulative effects as “those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consideration.” The Corps is not aware of any future state or provate activites, not involving Federal activities that are reasonably certain to occur within the action area.

Take Analysis

Due to the restrictions and special conditions placed in the construction specifications for the proposed project, the Corps does not anticipate any injurious or lethal take of endangered/threatened sea turtles, or endangered shortnose sturgeon. The Corps does expect take through harassment in the form of TTS for sea turtles that may be near the action area.

Determination

The Corps has determined that the removal of the concrete sill and advance maintenance dredging of the MCSF-BI slipway is likely to affect, but not likely to adversely affect listed species within the action area. The Corps believes that the restrictions placed on the blasting previously discussed in this assessment will diminish/eliminate the effect of the project on protected species within the action area.

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DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

MAR 1 0 2009

Mr. David Hankla
U.S. Fish and Wildlife Service
7915 Baymeadows Way, Suite 200
Jacksonville, Florida 32256-7517

Dear Mr. Hankla:

Pursuant to Section 7(a) of the Endangered Species Act, please find enclosed the Biological Assessment (BA) for the Blount Island removal of concrete sill and advanced maintenance dredging of the Marine Corps slipway, addressing the concerns of the threatened and endangered species under the purview of the U.S. Fish and Wildlife Service (FWS). Listed species which may occur in the vicinity of the proposed work and are under the jurisdiction of the FWS include the West Indian manatee (*Trichechus manatus*, E). Based on the enclosed BA, the U.S. Army of Corps of Engineers (Corps) has determined that the proposed action may affect, but is not likely to adversely affect the species identified in the BA. The Corps requests your written concurrence on this determination.

If you have any questions or need further information, please contact Ms. Terri Jordan at 904-232-1701 or by email: Terri.L.Jordan@usace.army.mil.

Sincerely,

Eric P. Summa
Chief, Environmental Branch

Enclosure

Biological Assessment to
U.S. Fish and Wildlife Service for
Removal of Concrete Sill and Advance Maintenance Dredging
Of the Marine Corps Slipway
US Marine Corps Support Facility - Blount Island
Jacksonville, Duval County, Florida

Description of the Proposed Action – Under the "Interagency and International Services" Program, the U.S. Army Corps of Engineers (USACE) has been contracted by the United States Marine Corps Support Facility - Blount Island (MCSF-BI) to prepare an environmental assessment and obtain the necessary permits to design and build the MCSF-BI proposed deepening of their slipway at Blount Island.

MCSF-BI has requested a permit to remove the concrete sill currently hampering their ability to fully load resupply vessels to their maximum available draft. Additionally, the permit request includes advance maintenance dredging of the slipway to a maximum depth of -47 feet MLLW; this would ensure that operations can be maintained in preparation of the anticipated redeployment of equipment from the Persian Gulf theatre of operations. The advance maintenance dredging may or may not require blasting to remove rock from the slip if it is detected during future geotechnical investigations. The location of the site is in an area prone to extensive silting. Historically, the slip has shallowed quickly, resulting in annual "emergency" maintenance dredging. This shoaling has had, and continues to have an adverse effect on the MCSF-BI mission.

Dredging will be completed utilizing mechanical and/or hydraulic dredges, as well as pre-treatment techniques like blasting and cleanup activities like bed-leveling. Section 2.2.1 of the Draft Environmental Assessment prepared for the project discusses all dredging techniques in detail and is hereby incorporated by reference.

To achieve the deepening of the MSCF-BI slipway to a maximum proposed depth of -47 feet, pretreatment of the rock areas may be required. Blasting is anticipated to be required for some of the slipway where the rebar reinforced concrete sill is located or geotechnical investigations completed in October 2008 has demonstrated that the rock is too hard for standard construction methods. The total volume to be pre-treated is 130,000 CYs of cemented sedimentary rock and the concrete sill.

All dredged material will be placed in an existing upland disposal site known as the Dayson Island Dredged Material Management Area (DMMA), located northeast of the Blount Island facility All concrete and rebar material will be separated from the dredged material, recycled, or disposed of properly, in compliance with Executive Order 13101 and Marine Corps Order 50902A.

Action Area

The project is located in Jacksonville, Duval County, Florida, at the MCSF-BI located on Blount Island along the St. Johns River (Figures 1 and 2). Blount Island was created as a byproduct of USACE post-World War II dredging operations in the St. Johns River. The dredging operations created a new straight-line channel (Dames Point-Fulton Cutoff) designed for larger merchant vessels; the dredged material from the operations was deposited on four marsh islands that together formed Blount Island. The MCSF-BI slipway is ten nautical miles west (upstream) of the St. Johns River outlet, and houses five large vessel berths. The newly deepened slip will continue to be located on the southeast side of Blount Island along the Dames Point-Fulton Cutoff.

Figure 1: St. Johns River Overview photo

Figure 2: MSCF-BI facility overview

Protected Species Included in this Assessment

Of the listed and protected species under U.S. Fish and Wildlife Service (FWS) jurisdiction occurring in the action area, the Corps believes that the Florida manatee (*Trichecus manatus*) may be affected by the implementation of the navigation project and are the subject of this document.

The Federal government has recognized the threats to the continued existence of the Florida manatee, a subspecies of the West Indian manatee, for more than 30 years. The West Indian manatee was first listed as an endangered species in 1967 under the Endangered Species Preservation Act of 1966 (16 U.S.C. 668aa(c)) (32 FR 48:4001). The Endangered Species Conservation Act of 1969 (16 U.S.C. 668aa(c)) continued to recognize the West Indian manatee as an endangered species (35 FR 16047), and the West Indian manatee was also among the original species listed as endangered pursuant to the Endangered Species Act of 1973. Critical habitat was designated for the manatee in 1976, and includes the project area (50 CFR 17.95). The justification for listing as endangered included impacts to the population from harvesting for flesh, oil, and skins as well as for sport, loss of coastal feeding grounds from siltation, and the volume of injuries and deaths resulting from collisions with the keels and propellers of powerboats. Manatees are also protected under the provisions of the Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361 *et seq*.) and have been protected by Florida law since 1892. Florida provided further protection in 1978 by passing the Florida Marine Sanctuary Act designating the state as a manatee sanctuary and providing signage and speed zones in Florida’s waterways.

Species and Suitable Habitat Descriptions

Florida Manatee *(Trichecus manatus)*

All manatees belong to the order Sirenia. The living sirenians consist of one species of dugong and three species of manatee. A fifth species, the Steller's sea cow, was hunted to extinction by 1768. All living sirenians are found in warm tropical and subtropical waters. The West Indian manatee was once abundant throughout the tropical and subtropical western North and South Atlantic and Caribbean waters. The Florida manatee occurs throughout the southeastern United States. However, the only year-round populations of manatees occur throughout the coastal and inland waterways of peninsular Florida and Georgia (Hartman, 1974). During the summer months, manatees may range as far north along the East Coast of the U.S. as Rhode Island, west to Texas, and, rarely, east to the Bahamas (FWS, 1996, Lefebvre et al., 1989). There are reports of occasional manatee sightings from Louisiana, southeastern Texas, and the Rio Grande River mouth (Gunter, 1941, Lowery,1974).

There are four regional subpopulations of manatees in Florida: Northwest, Upper St. Johns River, Atlantic Coast, and Southwest. Manatee habitat within the St. Johns River consists of eelgrass beds, lakes, and spring fed tributaries. High use areas are located further up the St. Johns River from the mouth. Important springs include Blue, Silver Glen, DeLeon, Salt, and Ocklawaha River (USFWS, 2001, 2007).

Preferred Habitats

Manatees occur in fresh, brackish, and salt water and move freely between environments of salinity extremes. They inhabit rivers, bays, canals, estuaries, and coastal areas that provide seagrasses and macroalgae. Freshwater sources, either natural or human-influenced/created, are especially important for manatees that spend time in estuarine and brackish waters (FWS, 1996). Because they prefer water above 70 ºF (21 ºC), they depend on areas with access to natural springs or water effluents warmed by human activities, particularly in areas outside their native range.

Manatees often seek out quiet areas in canals, lagoons or rivers. These areas provide habitat not only for feeding, but also for resting, cavorting, mating, and calving. Manatees may be found in any waterway over 3.3 ft. (1 m) deep and connected to the coast. Deeper inshore channels and nearshore zones are often used as migratory routes (Kinnaird, 1983). Although there are reports of manatees in locations as far offshore as the Dry Tortugas Islands, approximately 50 mi. (81 km) west of Key West, Florida, manatees rarely venture into deep ocean waters.

Habits

Manatees use secluded canals, creeks, embayments, and lagoons for resting, cavorting, mating, calving and nurturing their young; and open waterways and channels as travel corridors. Within marine, estuarine, and freshwater habitats they are found in turbid and clear water in depths of at least 3 ft. In coastal areas, they tend to travel in water up to 20 ft deep. Manatees occupy different habitats during various times of the year, with a focus on warm-water sites during winter. They venture from the St. Johns River to warmwater springs in November and reside there until March (USFWS, 2001 and 2007).

Florida manatees are herbivores that feed opportunistically on a wide variety of submerged, floating and emergent vegetation. Shallow grass beds with ready access to deep channels are the preferred feeding areas in coastal and riverine habitats. Bengtson (1983) estimated that the annual mean consumption rate for manatees feeding in the upper St. John's River at 4% to 9% of their body weight per day depending on season. A complete review of manatee biology is included in the manatee section of the South Florida Multi-species Recovery Plan (FWS, 1999).

In general, manatees feed primarily on freshwater plants, submerged sea grasses, and plants along shorelines. In northeastern Florida, manatees feed in salt marshes on smooth cordgrass. Springs and freshwater runoff sites are used for drinking water (USFWS, 2001 and 2007).

Migration Patterns

The overall geographic distribution of manatees within Florida has changed since the 1950s and 60s (Lefebvre et al., 1989), and prominent shifts in seasonal distribution are also evident. Specifically, the introduction of power plants and paper mills in Texas, Louisiana, southern Georgia, and northern Florida has given manatees the opportunity to expand their winter range to areas not previously frequented (Hartman, 1979). Florida manatees move into warmer waters when the water temperature drops below about 68 ºF (20 ºC). Before warm effluents from power plants became available in the early 1950s, the winter range of the manatee in Florida was most likely limited on its northern bounds by the Sebastian River on the east coast and Charlotte Harbor on the west coast (Moore, 1951). Since that time, manatees altered their normal migration patterns, and appreciable numbers of manatees began aggregating at new sites. As new power plants became operational, more and more manatees began taking advantage of the sites even though it required traveling great distances. Among the most important of the warm-water discharges are the Florida Power and Light Company's power plants at Cape Canaveral, Fort Lauderdale, Port Everglades, Riviera Beach, and Fort Myers, and the Tampa Electric Company's Apollo Beach power plant in Tampa Bay. During cold weather, more than 200 manatees have been reported at some power plants. These anthropogenically heated aquatic habitats have allowed manatees to remain north of their historic wintering grounds. Although seemingly conducive for survival, warm-water industrial discharges alone cannot furnish suitable habitats for manatees, as they may not be associated with forage that is typically found near natural warm-water refugia of natural springs.

Population Trends

Determining exact population estimates or trends is difficult for this species. The best indicator of population trends is derived from mortality data and aerial surveys (Ackerman et al., 1992, Ackerman et al., 1995, Lefebvre et al., 1995). Increases in the number of recovered dead manatees have been interpreted as evidence of increasing mortality rates (Ackerman et al., 1992, Ackerman et al., 1995). Because manatees have low reproductive rates, these increases in mortality may lead to a decline in the population (O’Shea et al., 1992 and Beeler and O’Shea, 1988). Aerial surveys, which represent the minimum number of manatees in Florida waters (not the total population size), have been conducted for more than 20 years, and may indicate population growth. However, because survey methods were inconsistent, conclusions are tentative. O’Shea (1988) found no firm evidence of a decrease or increase between the 1970s and 1980s, even though aerial survey counts increased. Over the last decade, aerial counts have varied from 1,267 (in 1991) to 3,807 (in 2009) (FMRI, 2009). The mean number observed during all counts (January, February, and/or March of all years since 1991 except 2008) is 2,332 (std dev = 672).

Boat traffic and development are the main causes for decline in the population. The Lower St. Johns River Manatee Refuge, which includes Duval, Clay, and St. Johns counties, has established federal protection for this area against watercraft-related takes. Other causes of injury or death include ingestion of debris, entanglement in fishing gear, cold stress, red tide, and entrapment or crushing in water control structures and navigational locks (USFWS, 2001). Even though manatees are vulnerable in their current environment, recent surveys have shown increases in three of the four population stocks. A 5-year review prepared by USFWS concluded that the manatee no longer fits the ESA definition of endangered and made a recommendation to reclassify it as threatened (USFWS, 2007).

Mortality

Human activities have likely affected manatees by eliminating or modifying suitable habitat; causing alteration of, or limiting access to historic migratory routes; and killing or injuring individuals through incidental or negligent activities. To understand manatee mortality trends in Florida, Ackerman et al. (1995) evaluated the number of recovered carcasses between 1974 and 1992 and categorized the causes of death. The number of manatees killed in collisions with watercraft increased each year by 9.3%. The number of manatees killed in collisions with watercraft each year correlated with the total number of pleasure and commercial watercraft registered in Florida (Ackerman et al., 1995). Other deaths or injuries were incurred due to flood-control structures and navigational locks, entanglement in fishing line, entrapment in culverts, and poaching, which together accounted for 162 known mortalities between 1974 and 1993 (FMRI, 2002a).

Table 1: Manatee deaths in Florida (statewide) from 1974 through 2008 (source: FMRI)

Year	Water-craft	Flood Gate/ Canal Lock	Other Human	Perinatal	Cold Stress	Natural	Undetermined	Unrecovered	Total
1974	3	0	2	0	0	0	2	0	7
1975	6	1	1	7	0	1	10	3	29
1976	10	4	0	14	0	2	22	10	62
1977	13	6	5	9	0	1	64	16	114
1978	21	9	1	10	0	3	34	6	84
1979	24	8	9	9	0	4	18	5	77
1980	16	8	2	13	0	5	15	4	63
1981	24	2	4	13	0	9	62	2	116
1982	20	3	1	14	0	41	29	6	114
1983	15	7	5	18	0	6	28	2	81
1984	34	3	1	25	0	24	40	1	128
1985	33	3	3	23	0	19	32	6	119
1986	33	3	1	27	12	1	39	6	122
1987	39	5	2	30	6	10	22	0	114
1988	43	7	4	30	9	15	23	2	133
1989	50	3	5	38	14	18	39	1	168
1990	47	3	4	44	46	21	40	1	206
1991	53	9	6	53	1	13	39	0	174
1992	38	5	6	48	0	20	45	1	163
1993	35	5	6	39	2	22	34	2	145
1994	49	16	5	46	4	33	37	3	193
1995	42	8	5	56	0	35	53	2	201
1996	60	10	0	61	17	101	154	12	415
1997	54	8	8	61	4	42	61	4	242
1998	66	9	6	53	9	12	72	4	231
1999	82	15	8	53	5	37	69	0	269
2000	78	8	8	58	14	37	62	8	273
2001	81	1	7	61	32	33	108	2	325
2002	95	5	9	53	17	59	65	2	305
2003	73	3	7	71	47	102	67	10	380
2004	69	3	4	72	50	24	51	3	276
2005	79	6	8	89	31	89	90	4	396
2006	92	3	6	70	22	81	116	27	417
2007	73	2	5	59	18	82	66	12	317
2008	90	3	6	101	25	33	72	7	337

Of interest is the increase in the number of perinatal deaths. The frequency of perinatal deaths (stillborn and newborn calves) has been consistently high over the past 5 years. The cause of the increase in perinatal deaths is uncertain, but may result from a combination of factors that includes pollution, disease, or environmental change (Marine Mammal Commission, 1992). It may also result from the increase in collisions between manatees and watercraft because some newborn calves may die when their mothers are killed or seriously injured by boat collisions, when they become separated from their mothers while dodging boat traffic, or when stress from vessel noise or traffic induces premature births (Marine Mammal Commission, 1992).

The greatest present threat to manatees is the high rate of manatee mortalities caused by watercraft collisions. Between 1974 and 1997, there were 3,270 known manatee mortalities in Florida. Of these, 749 were watercraft-related. Since 1974, an average of 31 manatees have died from watercraft-related injuries each year. Between 1983 and 1993, manatee mortalities resulting from collisions with watercraft reached record levels (DEP, 1994). Between 1986 and 1992, watercraft collisions accounted for 37.3% of all manatee deaths where the cause of death could be determined (Ackerman *et al.,* 1995).

The significance of manatee mortalities related to watercraft appears to be the result of dramatic increases in vessel traffic (O'Shea *et al*., 1985). Ackerman *et al.* (1995) showed a strong correlation between the increase in recorded manatee mortality and increasing boat registrations. In 1960, there were approximately 100,000 registered boats in Florida; by 1990, there were more than 700,000 registered vessels in Florida (Marine Mammal Commission, 1992, Wright *et al.*, 1995). Approximately 97 percent of these boats are registered for recreational use. The most abundant number of registered boats is in the 16-foot to 26-foot size class. Watercraft-related mortalities were most significant in the southwest and northeast regions of Florida; deaths from watercraft increased from 11 to 25 percent in southwestern Florida. In all of the counties that had high watercraft-related manatee deaths, high numbers of watercraft were combined with high seasonal abundance of manatees (Ackerman *et al.*, 1995).

Approximately twice as many manatees died from impacts suffered during collisions with watercraft than from propeller cuts; this has been a consistent trend over the last several years. Medium or large-sized boats cause most lethal propeller wounds, while impact injuries are caused by fast, small to medium-sized boats (Wright *et al.*, 1992). The Florida Marine Research Institute (FMIR) conducts carcass recovery and necropsy activities throughout the state to attempt to assess the cause of death for each carcass recovered.

Designated Critical Habitat for Species Included in this Assessment

Florida Manatee *(Trichecus manatus)*

Critical habitat is defined under the ESA as specific areas within and/or outside a geographical area that are occupied by a species at the time of listing, that contain physical or biological features essential to the conservation of the species and therefore require special management considerations or protection for the benefit of the species. Critical habitat was designated for the manatee in 1976 (50 Code of Federal Regulations [CFR] Part 17.95(a)). It encompasses the St. Johns River and includes a portion of the action area (i.e., the entrance channel and federal navigation channel). Although no specific primary constituent elements (PCEs) were included in the initial critical habitat designation, requirements of the habitat to sustain essential life history functions of manatees can be derived from current literature (USFWS, 2007) which likely include the following:

1. shallow, secluded water areas for resting, mating, and calving (i.e., canals, creeks, lagoons);
2. submerged, emergent, and floating vegetation for foraging;
3. freshwater source for drinking (natural or artificial sources); and
4. unobstructed transiting corridors to warm-water refugia due to manatees' sensitivity to low water temperatures.

None of the requirements are found in the MSCF-BI slipway, although they may be present up and downstream from the slipway in the St. Johns River. Resting, mating, and calving are less likely to occur within the deeper federal navigation channel outside of the slipway than secluded shallower tributaries located further up and down the St. Johns River. They are more likely to use the shallow edges of the navigation channel as a travel corridor to a freshwater drinking source. There are currently no obstructions within the federal navigation channel, allowing unobstructed transit for the manatees to warm water refuges they more commonly frequent further up into the St. Johns River.

<u>Project Area Specific Information for Species Included in this Assessment</u>

Florida Manatee *(Trichecus manatus)*

Local Distribution and Status

All but a few manatees that reside in the Jacksonville area during the summer migrate south to warmer waters from mid-fall until early spring (USFWS 2008a). Individual manatees have been observed during the summer on average six times per year near the water treatment plant outfall along the south side of the entrance channel of NAVSTA Mayport (US Navy, 2008) located downstream (east) of the MSCF-BI slipway. Single manatees have also been observed in the MSCF-BI slipway on occasions (S. Kennedy, pers. Comm. 2008).

Local Mortality

The causes for manatee deaths in Duval County are varied (Table 2). Watercraft interactions result in the highest level of documented mortality and continue to be a concern throughout the county. Manatee mortality data in a GIS format specific to the project area are not available via FWRI's website. As with the statewide mortailities, perinatal mortaility in Duval County is also a concern and is the second highest category of mortality in the county.

Table 2: Manatee deaths in Duval County from 1974 through Oct 31, 2008 (source: FMRI)

Year	Water-craft	Gate/Lock	Human, Other	Perinatal	Cold stress	Natural	Undetermined	Total
1976	2	0	0	0	0	0	4	6
1977	1	0	0	1	0	0	9	11
1978	5	0	0	0	0	0	6	11
1979	6	0	1	1	0	0	3	11
1980	0	0	0	1	0	0	2	3
1981	1	0	0	0	0	1	5	7
1982	1	0	0	1	0	0	1	3
1983	2	0	0	0	0	0	6	8
1984	7	0	0	0	0	6	2	15
1985	4	0	0	0	0	2	3	9
1986	2	0	0	0	2	0	9	13
1987	5	0	0	2	3	1	1	12
1988	4	0	0	0	2	2	1	9
1989	6	0	1	3	4	2	4	20
1990	3	0	3	0	4	0	3	13
1991	9	0	2	4	0	1	3	19
1992	2	0	0	1	0	3	2	8
1993	2	0	0	2	0	0	1	5
1994	2	0	1	1	1	1	0	6
1995	3	0	0	0	0	1	3	7
1996	3	0	0	0	1	2	4	10
1997	2	0	0	3	1	0	4	10
1998	3	0	0	3	2	0	5	13
1999	2	0	0	1	1	1	4	9
2000	4	0	0	2	2	0	3	11
2001	1	0	0	1	2	0	3	7
2002	10	0	0	1	0	0	3	14
2003	4	0	0	4	3	2	6	19
2004	5	0	0	4	1	0	5	15
2005	4	0	0	2	2	0	6	14
2006	8	0	0	1	1	1	2	13
2007	2	0	0	0	3	0	3	8
2008	11	0	0	0	2	0	1	14
Totals	126	0	8	39	37	26	117	353

Protective Measures Taken in the Project Area Separate from Conservation Measures the Corps will Undertake as Part of the Proposed Action

Other consultations of Federal actions in the area to date

The Corps has been working with the citizens of Duval County since 1907 on expanding and maintaining Jacksonville Harbor. None of the projects authorized by Congress prior to 1973 were required to consult under the Endangered Species Act of 1973 (ESA). There are currently a variety of federally authorized studies for various projects within Jacksonville Harbor. Detailed information regarding these studies can be found in the "Jacksonville Harbor Navigation Study and Environmental Assessment" found on the Corps' environmental documents website at the following link - http://www.saj.usace.army.mil/Divisions/Planning/Branches/Environmental/DOCS/OnLine/Duval/JAXHarborNavigationStudy.pdf. The applicable discussion begins on page 7, paragraph 11 and continues through page 12 and paragraph 28.

In addition, the US Navy recently completed a Final EIS for the homeporting of additional vessels at NAVSTA Mayport (US Navy, 2008) and signed a Record of Decision for that action on 14 January 2009. The FEIS and ROD can be reviewed at http://www.mayporthomeportingeis.com/EISDocuments.aspx.

Protective Measures Taken in the Project Area as Part of the Proposed Action

Consideration of Plans and Methods to Minimize/Avoid Environmental Impacts. Conservation measures were a major focus during the plan formulation phase for the proposed project. Avoiding and minimizing some potential impact areas significantly decreased the risk of indirect effects on managed and protected species, and a great deal of consideration was given to the utilization of rock/concrete removal methods to decrease the likelihood of incidental take, injury, and behavioral modification of protected species. It was determined that rock/concrete removal options not involving blasting were possibly more detrimental to populations and individuals of protected species. One alternative option was the use of a punchbarge/piledriver to break rock. However, it was determined that the punchbarge, which would work for 12-hour periods, strikes the rock approximately once every 60-seconds. This constant pounding would serve to disrupt animal behavior in the area, and result in adverse effects on the mission of MSCF-BI since the sill removal would not be completed in the required six-week timeframe. Using the punchbarge would also extend the length of the project, thus increasing any potential impacts to all fish and wildlife resources in the area. The Corps believes that blasting is actually the least environmentally impactful method for removing the rock in the slipway. Each blast will last no longer than five (5) seconds in duration, and may even be as short as 2 seconds each. Additionally, the blasts are confined in the rock/concrete substrate. Boreholes are drilled into the rock below, the blasting charge is set, and then the chain of explosives is detonated. Because the blasts are confined within the rock structure, the distance of the blast effects is reduced as compared to an unconfined blast (see discussion below).

Development of Protective Measures. The proposed project includes measures to conserve and protect Florida manatees. Foremost among the measures are protective actions to ensure that manatees are not killed if in fact such methods are required as a part of the overall dredging operation. Development of the measures involved consideration of past practices and operations, anecdotal observations, and the most current scientific data. The discussion below summarizes the development of the conservation measures.

Blasting

To achieve the deepening of the MSCF-BI slipway from the existing depth of -38 feet to a maximum project depth of -47 feet MLLW, pretreatment of the rock/concrete sill areas may be required. Blasting is anticipated to be required for some or all of the deepening and extension of the channel, where standard construction methods are unsuccessful. The total volume to be removed in these areas is up to 130,000 cubic yards of rock and 875,000 sq feet of reinforced concrete. USACE has used two criteria to determine which areas are most likely to need blasting for the MCSF-BI slipway:

1. Areas documented by core borings to contain hard massive rock
2. Concrete sill that is too hard to dredge without pre-treatment.

Based on evaluations of the core boring logs, and as-built information for the sill provided by MCSF-BI, the following is an evaluation of the blasting requirements for the current project. Areas currently identified as having the hardest rock and most likely in need of blasting prior to dredging include the concrete sill and the mouth of the slipway. Additional core borings were collected in October 2008. The results of recent core borings have identified an area of 875,000 square feet of cemented rock within the proposed dredging template in addition to the concrete sill. The cemented rock is highly dense and likely in need of blasting prior to dredging. Based on evaluations of the core boring logs, and as-built information for the sill provided by MCSF-BI, the blasting requirements for the current project will include removal of existing sill and 130,000 CYs cemented sedimentary rock. The pretreatment of the cemented rock will need to occur between Station 22+00 to Station 43+00 of the existing channel baseline. The concrete sill is located approximately at Station 7+00 (Figure 3).

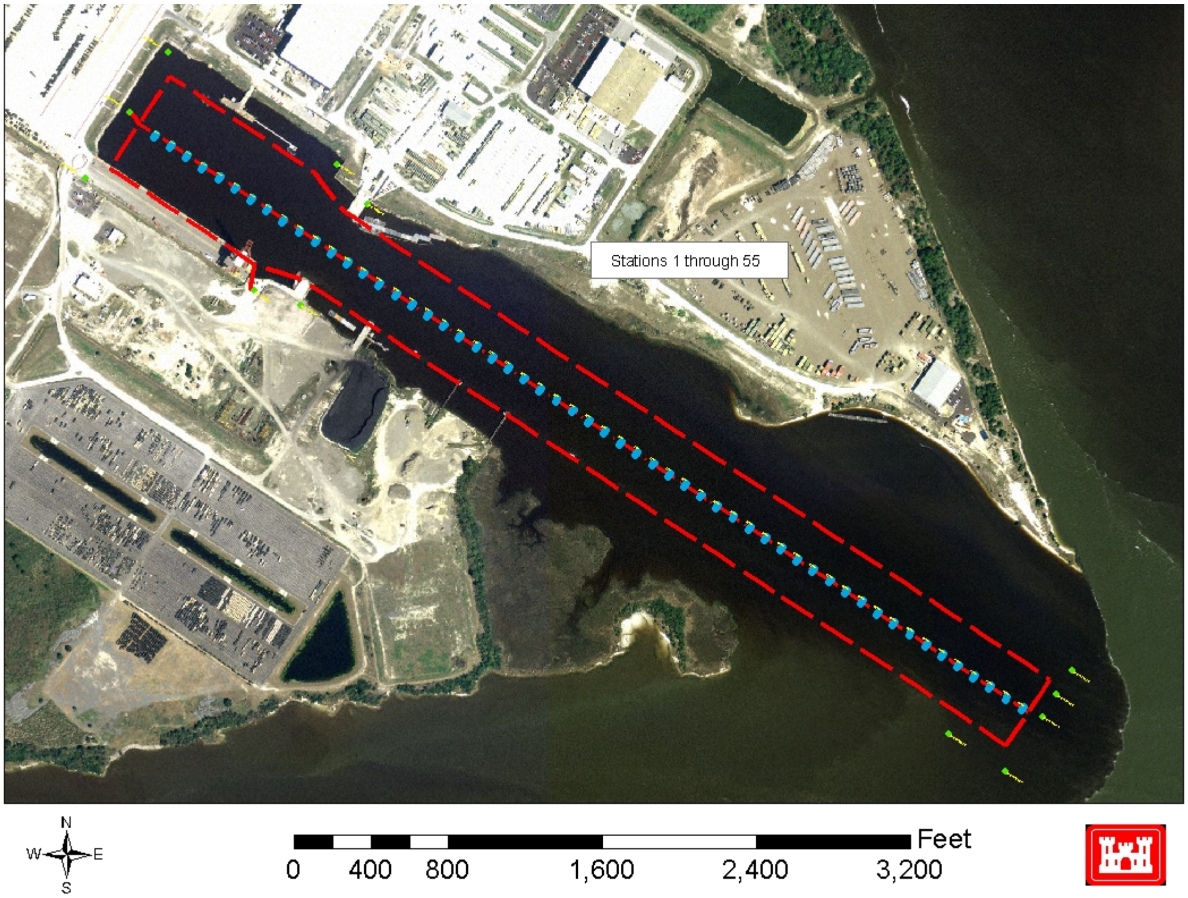

Figure 3: Blount Island slipway station markers

The focus of the proposed blasting work at the Blount Island slipway is to pre-treat the concrete sill and any hard rock prior to removal by a dredge. The pre-treatment would utilize “confined blasting,” meaning the shots would be “confined” in the rock. In confined blasting, each charge is placed in a hole drilled in the rock approximately five to ten feet deep, depending on how much rock needs to be broken and the intended project depth. The hole is capped with an inert material, such as crushed rock. This process is referred to as “stemming the hole” (Figure 4). For the Port of Miami expansion, completed in 2005, that used confined blasting as a pre-treatment technique, the stemming material was angular crushed rock. The optimum size for stemming material is an average diameter of approximately 0.05 times the diameter of the blast hole. Material must be angular to perform properly (Konya, 2003). For the MCSF-BI project, the geotechnical branch of the USACE Jacksonville District will prepare project specific specifications.

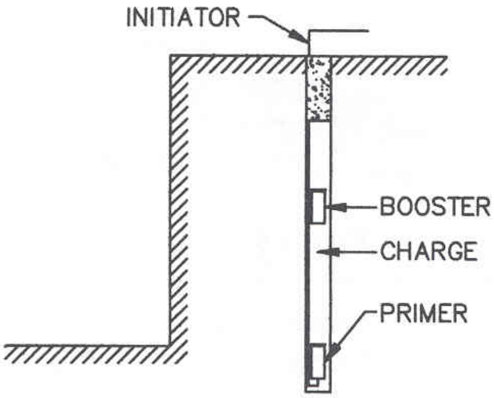

Figure 4: Typically stemmed hole

Figure 5: Stemming material utilized; bag is approximate volume of material used

In the Miami Harbor project, the following requirements were in the specifications regarding stemming material:

> 1.22.9.20 Stemming
> All blast holes shall be stemmed. The Blaster or Blasting Specialist shall determine the thickness of stemming using blasting industry conventional stemming calculations. The minimum stemming shall be 2 feet thick. Stemming shall be placed in the blast hole in a zone encompassed by competent rock. Measures shall be taken to prevent bridging of explosive materials and stemming within the hole. Stemming shall be clean, angular to subangular, hard stone chips without fines having an approximate diameter of 1/2-inch to 3/8-inch. A barrier shall be placed between the stemming and explosive product, if necessary, to prevent the stemming from settling into the explosive product. Anything contradicting the effectiveness of stemming shall not extend through the stemming.

It is expected that the specifications for any construction utilizing blasting at Blount Island would have similar stemming requirements as those that were used for the Miami Harbor project. The length of stemming material will vary based on the length of the holes drilled, however minimum lengths will be included in the project specific specifications. Studies have shown that stemmed blasts have up to a 60-90% decrease in the strength of the pressure wave released, compared to open water blasts of the same charge weight (Nedwell and Thandavamoorthy, 1992; Hempen *et al*., 2005; Hempen *et al*., 2007). However, unlike open water blasts, very little documentation exists on the effects that confined blasting can have on marine animals near the blast

(Keevin *et al*., 1999).

Figure 6 - Unconfined blast of seven pounds of explosives

Figure 7 - Confined blast of 3,000 pounds

The work may be completed in the following manner:

- Contour dredging with either bucket, hydraulic or excavator dredges to remove material that can be dredged conventionally and determine what areas require blasting.

- Pre-treating (blasting) the remaining above grade rock, drilling and blasting the "Site Specific" areas where rock could not be conventionally removed by the dredges.

- Excavating with bucket, hydraulic or excavator dredges to remove the pre-treated rock areas to grade.

- All drilling and blasting will be conducted in strict accordance with local, state and federal safety procedures. Marine Wildlife Protection, Protection of Existing Structures, and Blasting Programs coordinated with federal and state agencies.

- Based upon industry standards and USACE, Safety & Health Regulations, the blasting program may consist of the following:

The weight of explosives to be used in each delay will be limited to the lowest poundage of explosives that can adequately break the rock/concrete. The blasting would consist of up to two blasts per day.

The following safety conditions are standard in conducting underwater blasting:

- Drill patterns are restricted to a minimum of 8 ft separation from a loaded hole.
- Hours of blasting are restricted from 2 hours after sunrise to 1 hour before sunset to allow for adequate observation of the project area for protected species.
- Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.
- The blast design will consider matching the energy in the “work effort” of the borehole to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.

As part of the development of the protected species protection and observation protocols, which will be incorporated into the plans and specifications for the project, USACE and MCSF-BI will work with agencies and non-governmental organizations (NGOs) to address concerns and potential impacts associated with the blasting.
In addition to coordination with the agencies and NGOs, any new scientific studies regarding the effects of blasting (confined or unconfined) on species that may be in the area (marine mammals, sea turtles, and fish (both with a swim bladder and without) will be incorporated into the design of the protection measures that will be employed with confined blasting activities during the project. Examples of these studies may include:

Analysis being conducted for the Navy at Woods Hole Oceanographic Center on the effects of unconfined blast pressures on marine mammals (specifically whales, dolphins and seals; manatee carcasses were not made available to the researchers at Woods Hole despite requests from the researchers to FWC) (pers comm. Dr. Ketten, 2005).

Other blasting project monitoring reports (completed prior to development of plans and specifications for the MCSF-BI project) for projects, both from inside and outside of Florida, using confined underwater blasting as a construction technique.

As part of these protective measures, USACE and MCSF-BI will develop three safety radii based on the use of an unconfined blast. The use of an unconfined blast to develop safety radii for a confined blast will increase the protections afforded marine species in the area since it doesn’t give any credit of the pressure reduction caused by the confining of the blast. These three zones are referred to as the “Danger zone,” which is the inner most zone, located closest to the blast; the “Safety zone,” which is the middle zone; and the “watch zone,” which is the outer most zone. These zones are described further in subsequent paragraphs and illustrated in Figure 8. Since the slipway is a dead-end canal, the focus of these radii will be the distance animals are up and downstream from the mouth of the slip.

The danger zone radius will be calculated to determine the maximum distance from the blast at which mortality to protected marine species is likely to occur. The danger zone is determined by the amount of explosives used within each delay (which can contain multiple boreholes). An explosive delay is division of a larger charge into a chain of smaller charges with more than eight milliseconds between each of the charges. This break in time breaks up the total pressure of the larger charge into smaller amounts, which makes the rock fracture more efficient and also decreases impacts to aquatic organisms. These calculations are based on impacts to terrestrial animals in water when exposed to a detonation suspended in the water column (unconfined blast) as researched by the U.S. Navy in the 1970s (Yelverton *et al*., 1973; Richmond *et al.,* 1973), as well as observations of sea turtle injury and mortality associated with unconfined blasts for the cutting of oil rig structures in the Gulf of Mexico (Young, 1991; O'Keefe and Young, 1994). The reduction of impact by confining the shots would more than compensate for the presumed higher sensitivity of marine species. The USACE and MCSF-BI believe that the danger zone radius, coupled with a strong protected species observation and protection plan is a conservative, but prudent, approach to the protection of marine wildlife species. Based on a review of the Miami Harbor project, NMFS and FWS found these protective measures sufficient to protect marine mammals under their respective jurisdictions (NMFS, 2005; FWS, 2002). In addition, monitoring of the Miami blast pressures found these calculations to be extremely conservative and protective (Jordan *et al*., 2007; Hempen *et al*., 2007).

These zone calculations will be included as part of the specifications package that the contractors will bid on before the project is awarded. The calculations are as follows:

1) Danger Zone (NMFS has referred to this as the Caution Zone in previous authorizations): the radius in feet from the detonation beyond which no mortality or injury from an open water explosion is expected (NMFS, 2005). The danger zone (feet) = 260 [79.25 m] X the cube root of weight of explosives in pounds per delay (equivalent weight of TNT).

2) The Safety Zone (sometimes referred to as the Exclusion Zone) is the approximate distance in feet from the detonation beyond which injury (Level A harassment as defined in the MMPA) is unlikely from an open water explosion (NMFS, 2005). The safety zone (feet) = 520 [158.50 m] X cube root of weight of explosives in pounds per delay (equivalent weight of TNT). Ideally, the safety radius should be large enough to offer a wide buffer of protection for marine animals while still remaining small enough that the area can be intensely surveyed.

3) The Watch Zone is three times the radius of the Danger Zone to ensure animals entering or traveling close to the safety zone are spotted and appropriate actions can be implemented before or as they enter any impact areas (i.e., a delay in blasting activities).

To estimate the maximum poundage of explosives that may be utilized for this project, USACE has reviewed two previous blasting projects, one at San Juan Harbor, Puerto Rico in 1994 and the Miami Harbor project in 2005. The heaviest delay used during the San Juan

Harbor project was 375 pounds per delay and during the Miami Harbor project, 376 pounds per delay. Based on discussions with USACE geotechnical engineers, the maximum weight of delays for Blount Island is expected to be smaller than the delays in either the San Juan Harbor or Miami Harbor projects since the majority of the material to be removed is concrete and not dense rock. The maximum delay weight for the Blount Island project will be determined during the test blast program.

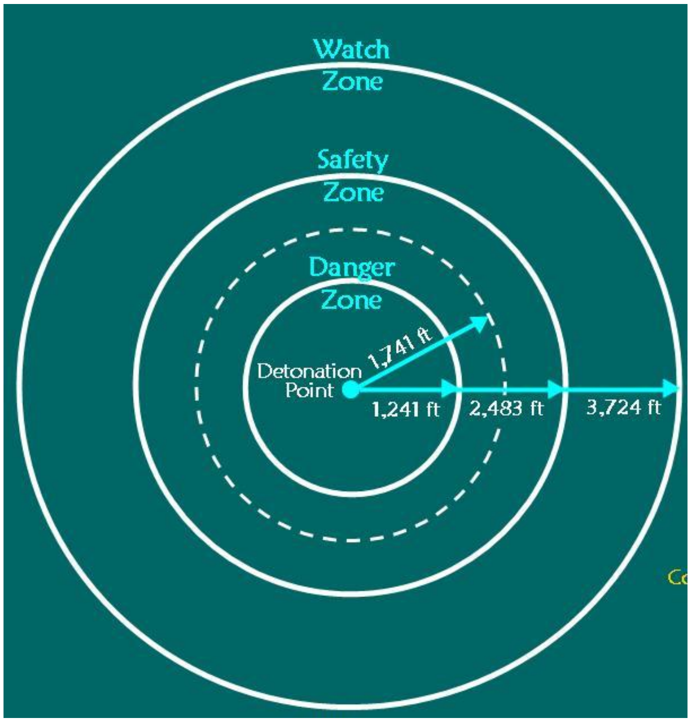

Figure 8: Example safety radii from Miami Harbor

The weight of explosives to be used in each blast will be limited to the lowest poundage of explosives that can adequately break the rock. The blasting program may consist of the following safety conditions that are based on industry standards in conducting confined underwater blasting, as well as USACE Safety & Health Regulations:

- Drill patterns are restricted to a minimum of an eight-foot separation from a loaded hole.
- Hours of blasting are restricted from two hours after sunrise to one hour before sunset to allow for adequate observation of the project area for protected species.
- Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.
- The blast design will consider matching the energy in the “work effort” of the borehole

to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.

- Delay timing ensuring at least eight ms between delays to break larger blast weights into smaller blasts increasing blast efficiency while reducing pressure released into the water column.

Because of the potential duration of the blasting and the proximity of the inshore blasting to known manatee use areas, a number of issues will need to be addressed. Due to the likelihood of large numbers of manatees in the area during the summer months, USACE and MSCF-BI agree to limit blasting activities to November 1 – March 31. Other dredging activities will be taking place inside the slipway and basin during this period of time, but blasting will not be utilized outside of the November 1 – March 31 timeframe.

Conservation Measures

It is crucial to balance the demands of the blasting operations with the overall safety of the species. A radius that is excessively large can result in a significant number of project suspensions prolonging the blasting, construction, traffic and overall disturbance to the area. A radius that is too small puts the animals at too great of a risk should one go undetected by the observers and move into the blast area. As a result of these factors, the goal is to establish the smallest radius possible without compromising animal safety, and to provide adequate observer coverage for the agreed upon radius.

A watch plan will be formulated based on the required safety zones and optimal observation locations. The watch plan will be consistent with the program that was utilized successfully at Miami Harbor in 2005 and will consist of six observers including at least one aerial observer (Figures 9 and 11), two boat-based observers (Figure 12), and two observers stationed on the drill barge (Figure 10). The sixth observer will be placed in the most optimal observation location (boat, barge or aircraft) on a day-by-day basis depending on the location of the blast and the placement of dredging equipment. This process will ensure complete coverage of the three zones. The watch will begin at least one hour prior to each blast and continue for one-half hour after each blast (Jordan *et al*., 2007).

Figure 9: Typical height of aerial observation

Figure 10: Observer on the drill barge

Figure 11: Aerial observer

Figure 12: Vessel-based observer

Test Blast Program

Prior to implementing a blasting program a Test Blast Program will be completed. The purpose of the Test Blast Program is to demonstrate and/or confirm the following:

- Drill boat capabilities and production rates
- Ideal drill pattern for typical boreholes
- Acceptable rock breakage for excavation
- Tolerable vibration level emitted
- Directional vibration
- Calibration of the blasts to the surrounding environment

The Test Blast Program begins with a single range of individually delayed holes and progresses up to the maximum production blast intended for use. Each Test Blast is designed to establish limits of vibration and airblast overpressure, with acceptable rock breakage for excavation. The final test event simulates the maximum explosive detonation as to size, overlying water depth, charge configuration, charge separation, initiation methods, and loading conditions anticipated for the typical production blast.

The results of the Test Blast Program will be formatted in a regression analysis with other pertinent information and conclusions reached. This will be the basis for developing a completely engineered procedure for Blasting Plan*.* During the testing the following data will be used to develop a regression analysis:

- Distance
- Pounds per delay
- Peak Particle Velocities (TVL)
- Frequencies (TVL)
- Peak vector sum
- Air blast, overpressure

The Corps believes that blasting is actually the least environmentally impactful method for removing the rock in the MSCF-BI slipway. Each blast will last no longer than 5-seconds in duration, and may even be as short as 2 seconds, occurring no more than three times per day. As stated previously, the blasts are confined in the rock/concrete substrate. Boreholes are drilled into the substrate below, the blasting charge is set and then the chain of explosives is detonated. Because the blasts are confined within the concrete/rock structure, the distance of the blast effects are reduced as compared to an unconfined blast.

Effects of the Proposed Action

Direct Effects

The highest potential impact to manatees may result from the use of explosives to remove areas of rock within the project area. Due to the presence of safety zones and measures associated with all proposed blasting activities, it is highly unlikely that blasting will have an adverse effect on manatees. However, the effects of noise and pressure associated with blasting, has not been documented for manatees. After discussions with Dr. Darlene Ketten of the Woods-Hole Oceanographic Institute and an expert in the effects of blast, the Corps has determined that manatees will be impacts in a manner similar to dolphins, for which published data do exist. Impacts associated with blasting can be broken into two categories: direct impacts and indirect impacts.

The proposed action will use confined blasts, which will significantly reduce the pressure wave strength and the area around the discharge where injury or death could occur (Hempen *et al*., 2007). USACE assumes that tolerance of manatees to blast overpressures is approximately equal to that of other marine mammals (Department of the Navy,1998 in USACE, 2000), that is death would not occur to individuals farther than 400 feet from a confined blast (Konya, 2003).

For assessing impacts of blasting operations on manatees, USACE relied on the previous analyses conducted by FWS-Vero Beach Field Office as part of their ESA consultations on the Miami Harbor GRR (FWS Service Log No: 4-1-03-I-786; Dated June 17, 2003) (FWS, 2003) and the Miami Harbor Phase II project (FWS Service Log No:4-1-02-F-4334, Dated: June 19,2002) (FWS, 2002) as well as pressure data collected, synthesized and reported for the Miami Harbor project. The results from 38 days of blasting conducted in Miami indicated that 58 manatees were recorded in the action area, without a single stranding of an injured or dead manatee reported (Trish Adams, FWS pers.com, 2005). In the ESA consultations for the two projects in Miami, with regard to impacts on manatees, FWS found that “Since the Corps has agreed to incorporate the *Standard Manatee Protection Construction Conditions* and implement a comprehensive blasting plan to minimize possible adverse effects to listed marine species using the standard “Navy diver” protocol, the Service concurs with the Corps’ determination for the two species, which fall under the jurisdiction of the Service, the West Indian manatee and the American crocodile.” (FWS, 2003).

Pressure data collected during the Miami Harbor Phase II project by USACE geophysicists and biologists indicated that using the three zones previously described, the pressures associated with the blasts return to background levels (one to two psi) at the margin of the danger zone. This means that any animal located inside the safety zone, but outside the danger zone, would not be exposed to any additional pressure effects from a confined blast (Hempen *et al*., 2007).

Protection. Based on the protective measures proposed for this project, in concert with the reduction in pressure from the blast due to the confinement of the pressure in the substrate, the impacts to manatees associated with blasting should be minimal. USACE has concluded that blasting is the *least* environmentally impactful method for removing the concrete sill and rock in the slipway. Each blast will last no longer than five seconds in duration, and may even be as short as two seconds. Additionally, the blasts are confined in rock substrate with stemming. Because the blasts are confined within the rock structure, the distance of the blast effects are reduced significantly as compared to an unconfined blast (Nedwell and Thandavamoorthy, 1992; Hempen *et al*., 2005; Hempen *et al*., 2007).

Indirect Effects

Indirect impacts on manatees due to dredging/blasting and construction activities in the project area include alteration of behavior and autecology. For example, daily movements of manatees may be impeded or altered. These effects would be temporary, only lasting as long as the dredging and sill removal activities.

Interrelated and Interdependent Effects

The regulations for interservice consultation found at 50 CFR 402 define interrelated actions as “those that are part of a larger action and depend on the larger action for their justification” and interdependent actions as “those that have no independent utility apart from the action under consideration.”

The Corps does not believe that there are any interrelated actions for this proposed project.

Cumulative Effects

The regulations for interservice consultation found at 50 CFR 402 define cumulative effects as “those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consideration.” The Corps is not aware of any future state or provate activites, not involving Federal activities that are reasonably certain to occur within the action area.

Take Analysis

Due to the restrictions and special conditions placed in the construction specifications for the proposed project, the Corps does not anticipate any injurious or lethal take of endangered Florida manatee.

Determination

The Corps has determined that the removal of the concrete sill and advance maintenance dredging of the MCSF-BI slipway is likely to affect, but not likely to adversely affect endangered manatee within the action area. The Corps believes that the restrictions placed on the blasting previously discussed in this assessment will diminish/eliminate the effect of the project on endangered manatee within the action area.

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DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
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REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

MAR 28 2009

Mr. Pace Wilbur
Acting Assistant Regional Administrator
National Marine Fisheries Service
Southeast Regional Office
Habitat Conservation Division
219 Fort Johnson Road
Charleston, South Carolina 29412-9110

Dear Mr. Wilbur:

Pursuant to the National Environmental Policy Act (NEPA), enclosed for your review and comment is a copy of the draft Environmental Assessment (EA) for the Removal of a Concrete Sill and Advance Maintenance Dredging of the Marine Corps Slipway at Blount Island, Duval County, Florida.

Included throughout the EA is information which constitutes the Essential Fish Habitat (EFH) Assessment as required by the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). Sections 2.1; 2.2; 2.3; 3.4 and 4.3 of the enclosed NEPA document constitute our Essential Fish Habitat Assessment in accordance with procedures between our agencies as stated in the May 3, 1999 Statement of Findings. Based on analysis discussed in the EA, the U.S. Army Corps of Engineers has determined that the removal of the concrete sill and advance maintenance dredging would not adversely affect the essential habitat of species managed under this Act.

We request your comments pursuant to NEPA and the MSFCMA within 30 days of receipt of this letter. If you have any questions or need further information, please contact Ms. Terri Jordan at 904-232-1701 or by email: Terri.L.Jordan@usace.army.mil.

Sincerely,

Eric P. Summa
Chief, Environmental Branch

Enclosure

Copy Furnished (w/encl):

Mr. George Getsinger, National Marine Fisheries Service, C/O GTM NERR; 9741
Ocean Shore Blvd.; St. Augustine, Florida 32080-8618

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

JAN 30 2008

To Whom It May Concern:

The Jacksonville District, U.S. Army Corps of Engineers (Corps), is gathering information to define issues and concerns that will be addressed in an Environmental Assessment (EA) being prepared under the National Environmental Policy Act for the U.S. Marine Corps Support Facility Blount Island (MCSF-BI) under the Corps' Support for Others program. MCSF-BI is proposing to conduct advance maintenance dredging of the slipway channel and basin areas which include removal of a concrete sill located at elevation -37 feet MLLW to improve safety and efficiency at the Blount Island Facility and ensure worldwide military operations are unaffected. The project area is located on Blount Island, on the St. John's River, in Duval County, Florida (see enclosed aerial photographs of the area).

The MCSF-BI's missions include logistic support to worldwide military operations in support of the Maritime Prepositioning Force (MPF) program, as well as, receiving equipment returning from conflict areas.

The rebar re-enforced concrete sill 14 feet thick, 32 feet wide; 430 feet long was built in the 1970's when the slip was part of a facility designed to build floating nuclear power plants by a private entity. The sill currently limits the MCSF-BI's ability to fully load military supply transport vessels operated by the U.S. Military Sealift Command in support of the war on terror.

Due to the location of the MCSF-BI's facility along the river, it has a chronic problem of rapid silting, which has forced logistics efforts to cease with very little warning and significantly impacted their mission. The MCSF-BI and Corps would like to deepen the slip to -45 feet as part of an advance maintenance dredging project to ensure safe operations of the vessels and remove the concrete sill to improve efficiency of the berth and the ability to fully load the Marine Corps Prepositioning vessels which currently is limited by the sill thus decreasing efficiency.

Alternatives being considered include no action and advance maintenance dredging of the slipway channel and basin areas including removal of the sill by blasting. Material dredged from the slipway channel and basin will be placed in a previously approved upland disposal area. This EA will review those two alternatives.

We welcome your views, comments and information about environmental and cultural resources, study objectives, and important features within the described study area, as well as any suggested improvements. Letters of comment or inquiry should be addressed to the letterhead address to the attention of the Planning Division, Environmental Section and received by this office within thirty (30) days of the date of this letter.

Sincerely,

James McAdams for

Marie G. Burns
Acting Chief, Planning Division

Enclosure

RECEIVED
7 Feb 2008

Miccosukee Tribe of Indians
of Florida

Business Council Members
Billy Cypress, Chairman

Jasper Nelson, Ass't. Chairman
Max Billie, Treasurer

Andrew Bert Sr., Secretary
William M. Osceola, Lawmaker

February 4, 2008

Department of the Army
Jacksonville District Corps of Engineer
P.O. Box 4970
Jacksonville, FL 32232-0019
ATTN: Planning Division, Environmental Branch

Dear Sirs:

The Miccosukee Tribe of Indians of Florida received your letter dated January 30 concerning the U.S. Marine Corps Support Facility Blount Island advance maintenance dredging of the slipway channel. The Miccosukee Tribe has no objections to this proposal provided that no archaeological sites will be disturbed by the dredging activity and no dredge material will be placed on an archaeological site.

Thank you for consulting with the Miccosukee Tribe. Please contact me at the below number, Ext. 2243, or via e-mail at Stevet@miccosukeetribe.com if you require additional information.

Sincerely,

Steve Terry
NAGPRA & Section 106 Representative

P.O. Box 440021, Tamiami Station, Miami, Florida 33144, (305) 223-8380, fax (305) 223-1011
Constitution Approved by the Secretary of the Interior, January 11, 1962

PD-SC Dugger

RECEIVED
MAR 07 2008

JAXPORT
JACKSONVILLE PORT AUTHORITY

904-357-3001

February 26, 2008

US Army Corps of Engineers
Jacksonville District
Attn: Planning Division, Environmental Section
PO Box 4970
Jacksonville, FL 32232-0019

RE: MCSF-BI Advance Maintenance Dredging

Gentlemen:

The Jacksonville Port Authority strongly supports the subject project. This work is a key element in the continued growth and operation of the strategic military presence in the Jacksonville Harbor.

Jaxport stands ready to assist in any way possible to assure the successful completion of this project.

Sincerely,

Randy B. Murray
Senior Project Manager

P.O. Box 3005
2831 Talleyrand Avenue
Jacksonville, FL 32206-0005
Phone: (904) 630-3000
www.jaxport.com

Blount Island Marine Terminal
Talleyrand Marine Terminal
Dames Point Marine Terminal
JAXPORT Cruise Terminal

McAbbees Jill
Dugger.

St. Johns River
Water Management District
Kirby B. Green III, Executive Director • David W. Fisk, Assistant Executive Director

4049 Reid Street • P.O. Box 1429 • Palatka, FL 32178-1429 • (386) 329-4500
On the Internet at *www.sjrwmd.com.*

February 28, 2008

Ms. Marie Burns, Acting Chief
Attention: Planning Division – Environmental Section
Department of the Army
Jacksonville District Corps of Engineers
PO Box 4970
Jacksonville, FL 32232-0019

Subject: **Environmental Assessment**
U.S. Marine Corps Support Facility Blount Island (MCSF-BI)

Dear Ms. Burns:

In response to your letter of January 30, 2008, the St. Johns River Water Management District's department of water resources has no advisory comment at this time.

We believe that the assessments of this project's impacts are important. If we can provide assistance or data for your study, contact me. Please keep me on the notification roster for this study and addition review actions.

If you have any questions, please I may be reached at (386) 329-4374 or kmclane@sjrwmd.com.

Sincerely,

B. Kraig McLane, AICP
Program Manager
Lower St. Johns River Basin
Department of Water Resources

c: Geoff Sample, Jacksonville
Steven Fitzgibbons, Palatka

Florida Department of
Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

RECEIVED
20 mar 2008

March 17, 2008

Ms. Marie G. Burns, Acting Chief
Planning Division, Jacksonville District
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: Department of the Army, Jacksonville District Corps of Engineers - Scoping Notice - Conduct Advance Maintenance Dredging of the Slipway Channel and Basin Areas at the U.S. Marine Corps Support Facility Blount Island (MCSF-BI) - Jacksonville, Duval County, Florida. SAI # FL200802053983C

Dear Ms. Burns:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has coordinated a review of the referenced scoping notice.

The Florida Fish and Wildlife Conservation Commission (FWC) has provided a number of comments regarding the potential effects of dredging and concrete sill demolition on Florida manatees, marine turtles and Atlantic right whales. If blasting is proposed as a method of demolition and material removal, please be advised that protective measures will be required to offset any impacts to protected marine species. These measures will likely include performing the blasting event during a specific time of year and having appropriate watch protocols in place. Unless the potential impacts of blasting can be adequately offset, the FWC encourages the Corps of Engineers to consider the no-action alternative. Further coordination is requested to determine site-specific measures for this project. Please contact Ms. Mary Duncan of the FWC's Imperiled Species Management Section at (850) 922-4330 or Mary.Duncan@MyFWC.com for further information and assistance.

"More Protection, Less Process"

Based on the information contained in the scoping notice and the enclosed state agency comments, the state has determined that, at this stage, the proposed federal action is consistent with the Florida Coastal Management Program (FCMP). The federal agencies must, however, address the concerns identified by our reviewing agencies prior to project implementation. The state's continued concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and subsequent reviews. The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting stage.

Thank you for the opportunity to review the proposal. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

cc: Mary Ann Poole, FWC

MyFlorida.com

Florida
Department of Environmental Protection

"More Protection, Less Process"

Categories

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Project Information

Project:	FL200802053983C
Comments Due:	03/08/2008
Letter Due:	03/17/2008
Description:	DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - SCOPING NOTICE - CONDUCT ADVANCE MAINTENANCE DREDGING OF THE SLIPWAY CHANNEL AND BASIN AREAS AT THE U.S. MARINE CORPS SUPPORT FACILITY BLOUNT ISLAND (MCSF-BI) - JACKSONVILLE, DUVAL COUNTY, FLORIDA.
Keywords:	ACOE - DREDGE AT U.S. MARINE CORPS SUPPORT FACILITY BLOUNT ISLAND - DUVAL CO.
CFDA #:	12.107

Agency Comments:

NE FLORIDA RPC - NORTHEAST FLORIDA REGIONAL PLANNING **COUNCIL**

No Comments

COMMUNITY AFFAIRS - FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS

DCA has no comment.

FISH and WILDLIFE COMMISSION - FLORIDA FISH AND **WILDLIFE** CONSERVATION COMMISSION

The FWC has provided a number of comments regarding the potential effects of dredging and concrete sill demolition on Florida manatees, marine turtles and Atlantic right whales. If blasting is proposed as a method of demolition and material removal, please be advised that protective measures will be required to offset any impacts to protected marine species. These measures will likely include performing the blasting event during a specific time of year and having appropriate watch protocols in place. Unless the potential impacts of blasting can be adequately offset, the FWC encourages the Corps of Engineers to consider the no-action alternative. Further coordination is requested to determine site-specific measures for this project. Please contact Ms. Mary Duncan of the FWC's Imperiled Species Management Section at (850) 922-4330 or Mary.Duncan@MyFWC.com for further information and assistance.

STATE - FLORIDA DEPARTMENT OF STATE

No Comments Received

ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRON**MENTAL PROT**ECTION

Please coordinate with the Department's Bureau of Beaches and Coastal Systems regarding issuance of the required Environmental Resource Permit (ERP). As noted by the FWC, protected species concerns will be need to be addressed in the ERP application.

ST. JOHNS RIVER WMD - ST. JOHNS RIVER WATER **MANAGEMENT** DISTRICT

Released Without Comment

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

Visit the Clearinghouse Home Page to query other projects.

Florida Fish
and Wildlife
Conservation
Commission

Office of Policy and Stakeholder Coordination
Mary Ann Poole
Director
(850) 410-5272
(850) 922-5679 FAX

Managing fish and wildlife resources for their long-term well-being and the benefit of people.

620 South Meridian Street
Tallahassee, Florida
32399-1600
Voice: (850) 488-4676
Hearing/speech impaired:
(800) 955-8771 (T)
(800) 955-8770 (V)
MyFWC.com

March 5, 2008

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MAR 07 2008
OIP / OLGA

Ms. Lauren Milligan, Clearinghouse Coordinator
Florida State Clearinghouse
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, Mail Station 47
Tallahassee, FL 32399-3000

Re: SAI #FL200802053983C, Department of the Army, Jacksonville District Corps of Engineers - Scoping Notice - Conduct Advance Maintenance Dredging of the Slipway Channel and Basin Areas at the U.S. Marine Corps Support Facility Blount Island (MCSF-BI) - Jacksonville, Duval County

Dear Ms. Milligan:

The Florida Fish and Wildlife Conservation Commission's (FWC) Imperiled Species Management Section has coordinated a preliminary agency review of the proposed advance maintenance dredging of the slipway channel and basin areas, which includes removal of a concrete sill, at the U.S. Marine Corps Support Facility Blount Island (MCSF-BI). This letter outlines the anticipated concerns and provides comments to consider in developing a draft Environmental Assessment under the National Environmental Policy Act.

Background

The MCSF-BI's missions include logistic support to worldwide military operations in support of the Maritime Prepositioning Force (MPF) program, as well as receiving equipment returning from conflict areas. The MCSF-BI facility is located on Blount Island along the St. Johns River in Duval County, Florida, and according to the scoping notice, it has a chronic problem of rapid silting, which has forced logistics efforts to cease with very little warning and significantly impacted their mission. The MCSF-BI and the U.S. Army Corps of Engineers (Corps) are proposing to conduct advance maintenance dredging of the slipway channel and basin areas to ensure safe operations of vessels, and remove an existing concrete sill to improve efficiency of the berth and the ability to fully load the Marine Corps Prepositioning vessels.

Project Description

Two alternatives being considered at the project site include: 1) no action and 2) advance maintenance dredging of the slipway channel and basin areas, including removal of an existing 14-foot thick, 32-foot wide, and 430-foot long rebar re-enforced concrete sill. The advanced maintenance dredging alternative proposes deepening the slipway channel and basin areas to a depth of -45 feet. In addition, the concrete sill, which is located at a depth of -37 feet MLLW, will be removed by blasting. Material dredged from the slipway channel and basins will be placed in a previously approved upland disposal area.

Potentially Affected Resources

Manatees: The Florida manatee (*Trichechus manatus latirostris*) use of this area is documented by aerial survey, mortality, and satellite telemetry data. An average of approximately 2.0 manatees per aerial survey flight has been observed within a five-mile radius of the project location, and telemetry data shows 16 tagged animals have been observed in the same radius. Between January 1974 and November 2007, 339 manatees have died in Duval County waters, of which 114 were a result of watercraft-related injuries. Seventy-six manatees have died within a five-mile radius of the project location, 31 of which were a result of watercraft-related causes.

The project area serves as an important migratory corridor for manatees traveling along Florida's eastern coast. Manatees use this area primarily during the warmer months of the year; however, it is important to note that several manatees were observed at Jacksonville Electric Authority outfalls in the St. Johns River during the 2006/2007 winter.

Marine Turtles: The coastal beaches and waterways of Duval County provide nesting and foraging habitat for the loggerhead (*Caretta caretta* - threatened), leatherback (*Dermochelys coriacea* - endangered), Kemp's ridley (*Lepidochelys kempi* - endangered), and the green sea turtle (*Chelonia mydas* - endangered). Both loggerhead and leatherback sea turtle nests have been documented along the Atlantic beaches directly north and south of the St. Johns River jetties. Between 1986 and 2004 there have been 29 total sea turtle strandings within a five-mile radius of the project location.

Right whales: The proposed project may also pose some minor risks to the North Atlantic right whale (*Eubalaena glacialis*) one of the most endangered large whales in the world with an estimated population of approximately 350 individuals. North Atlantic right whales migrate south from their feeding grounds in the northeastern United States to their calving grounds in northeastern Florida. The waters from Brunswick, Georgia to Jacksonville, Florida, contain the highest density of adult and juvenile right whales in the southeastern United States (Kraus et al. 1993), and were formally designated as critical habitat for right whales on June 3, 1994, by the National Marine Fisheries Service.

Mainly adult females and calves, along with some juveniles and adult males, migrate to the southeastern calving grounds each winter and may remain in the area for four to five months. Migration from the northeastern feeding grounds typically begins in October. Most right whales have left the calving grounds by March/April for the return trip to the northern feeding and nursing areas. While whales generally do not enter into the St. Johns River channel, in 2004 a right whale was documented as far as the entrance to Sister Creek and further incursions are possible.

Concerns and Recommendations

The FWC has had previous experience with blasting projects in this part of the St. Johns River (i.e., demolition of bridges and some dredging projects). If blasting is to be considered as a method of demolition and material removal, please be aware that in this project area protective measures will need to be in place to offset impacts to protected marine species. These measures will likely include performing the blasting event during a specific time of year and having appropriate watch protocols in place. Unless the potential impacts from blasting can be adequately offset, the FWC encourages the Corps to consider the no-action alternative.

Since no information was provided regarding dredge methodology, or the seasonality, length, and duration of work, it would be premature for us to recommend specific avoidance and minimization measures for manatees, sea turtles, and right whales at this time. Further coordination with our agency will be necessary in order to determine site-specific measures for this project.

In addition, the federal system of channels from the mouth of the St. Johns River extending upstream past the MCSF-BI facility to river mile 20 has an existing depth of -40 feet. While the Jacksonville Port Authority has requested that the Corps study the feasibility of further deepening the channel system to a depth of -45 feet, this proposal is still in the scoping process and it seems premature to consider dredging the MCSF-BI slipway and basin areas to a depth below -40 feet prior to further deepening of the ingress/egress pathway.

We appreciate the opportunity to provide input during the scoping process for the proposed advance maintenance dredging project. Please continue to notify Mary Duncan of the FWC's Division of Habitat and Species Conservation, Imperiled Species Management Section, in Tallahassee of all future meetings, information exchanges, and requests for comments regarding this potential project. Should you require additional assistance regarding our comments, please contact her at (850) 922-4330 or by email at Mary.Duncan@MyFWC.com.

Sincerely,

Mary Ann Poole

Mary Ann Poole, Director
Office of Policy and Stakeholder Coordination

map/jan
Blount Island_1280
ENV 1-3-2
cc: Dave Hankla, USFWS, Jacksonville
Rolando Garcia, FWC, Lake City
Leslie Ward, FWC, St. Petersburg

Literature Cited:

Kraus, S.D., R.D. Kenney, A.R. Knowlton, and J.N. Ciano. 1993. Endangered right whales of the southwestern North Atlantic. Report to Minerals Management Service

under Contract No. 14-35-0001-30486. Atlantic Outer Continental Shelf Region of the Minerals Management Service, U.S. Department of the Interior, Herndon, VA.

NATIONAL PARK SERVICE
FORT CAROLINE NATIONAL MEMORIAL
12713 FORT CAROLINE ROAD
JACKSONVILLE FL 32225

COMMANDER
SEVENTH COAST GUARD DISTRICT
909 SE 1ST AVENUE
MIAMI FL 33131-3050

HOUSING AND URBAN DEVELOPMENT
REGIONAL ENVIRONMENTAL OFFICER
75 SRING STREET SW ROOM 600-C
ATLANTA GA 30303-3309

MR PACE WILBUR
NATIONAL MARINE FISHERIES SERVICE
219 FORT JOHNSON ROAD
CHARLESTON SC 29412-9110

REGIONAL DIRECTOR
NATIONAL MARINE FISHERIES SERVICE
9721 EXECUTIVE CENTER DR NORTH
ST PETERSBURG FL 33702

REGIONAL DIRECTOR
US FISH AND WILDLIFE SERVICE
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ATLANTA GA 30345

FIELD SUPERVISOR
US FISH AND WILDLIFE SERVICE
6620 SOUTHPOINT DRIVE SOUTH SUITE 310
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MS DONNA WIETING
US DEPARTMENT OF COMMERCE
HCHB SP ROOM 6117
14TH & CONSTITUTION AV NW
WASHINGTON DC 20230

REGIONAL ADMINISTRATOR
US ENVIR PROTECTION AGENCY
ENVIRONMENTAL POLICY SECTION
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ATLANTA GA 30303-3104

MR GEORGE GETSINGER
NATIONAL MARINE FISHERIES SERVICE
C/O GTM NERR
9741 OCEAN SHORE BLVD.
ST. AUGUSTINE, FL 32080-8618

NATIONAL MARINE FISHERIES SERVICE
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ST. PETERSBURG FL 33701

REGIONAL DIRECTOR
FEMA INSURANCE & MITIGATION DIV
3003 CHAMBLEE-TUCKER ROAD
ATLANTA GA 30341

SOUTHERN REGION FORESTER
US FOREST SERVICE - USDA
1720 PEACHTREE ROAD NW
ATLANTA GA 30309-2405

US DEPARTMENT OF AGRICULTURE
NATURAL RES CONSER SERVICE
PO BOX 141510
GAINESVILLE FL 32614-1510

DIVISION OF STATE LANDS
BUREAU OF SURVEY & MAPPING
3900 COMMONWEALTH BLVD MS 105
TALLAHASSEE FL 32399-3000

REGIONAL ADMINISTRATOR
NAT MARINE FISHERIES SERV, HABITAT CONS
263 13TH AVE. S.
ST. PETERSBURG FL 33701

CAPTAIN GARY KLINE
FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
2510 SECOND AVENUE N
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MR BRADLEY J HARTMAN
FL FISH & WILDLIFE CONSERV COMM
DIRECTOR OFFICE OF ENV SERVICES
620 SOUTH MERIDIAN STREET
TALLAHASSEE FL 32399-1600

MR TONY ORSINI
JACKSONVILLE PORT AUTHORITY
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2831 TALLYRAND AVENUE
JACKSONVILLE FL 32206-0005

MR RANDY MURRAY
JACKSONVILLE PORT AUTHORITY
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2831 TALLYRAND AVENUE
JACKSONVILLE FL 32206-0005

FLORIDA DEPT OF ENV PROTECTION
BUREAU OF SURVEY & MAPPING, DIV OF ST LANDS
MAIL STATION 105
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DR JANET S MATTHEWS
DIVISION OF HISTORICAL RES - SHPO
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ST JOHNS RIVER WATER MGMT DIST
P O BOX 1429
PALATKA FL 32178-1428

FLORIDA STATE CLEARINGHOUSE
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
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NE FLORIDA REGIONAL PLANNING COUNCIL
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HONORABLE STEVE WISE
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HONORABLE MEL MARTINEZ
UNITED STATES SENATOR
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HONORABLE JOHN PEYTON
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SAVE THE MANATEE CLUB
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DREDGING CONTRACTORS OF AMERICA
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MR WILLIAM STEELE
SEMINOLE TRIBE OF FLORIDA
AH THA THI KI MUSEUM
HC 61, BOX 31A
CLEWISTION FLORIDA 33440

MR NEAL ARMINGEON
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2029 3RD STREET NORTH
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2122 YORK ROAD
OAK BROOK IL 60523

MR FRED DAYHOFF
MICCOSUKEE TRIBE OF FLORIDA
ATTENTION STEVE TERRY,
POST OFFICE BOX 440021
TAMIAMI STATION
MIAMI FLORIDA 33144

CAPTAIN DON LEWIS
JMTX
PO BOX 350162
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MR CHRISTOPHER J MCARTHUR
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INTERIM DIRECTOR OF PLANNING AND
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32225-8145

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US HOUSE OF REPRESENTATIVES
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MR ED HALL
DEPUTY DIRECTOR OF PUBLIC WORKS
CITY OF JACKSONVILLE
OFFICE OF PUBLIC WORKS
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MS LYNETTE SELF
CHAIR, WATERWAYS COMMISSION
CITY COUNCIL DISTRICT 2
CITY HALL
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APPENDIX D - VIBRACORE DATA

** FINAL REPORT **

CHALLENGE
ENGINEERING & TESTING, INC.

TEST AND BE SURE

A-E SERVICES FOR VIBRACORING AND LABORATORY TESTING

OF

MCSF BLOUNT ISLAND MIL DREDGE
MARINE CORPS TERMINAL CHANNEL
JACKSONVILLE HARBOR, FLORIDA

SEPTEMBER 2008

CONTRACT NO.: W912EP-05-D-0010-00017

SPECIALIZING IN SOILS
EXPLORATION, PHYSICAL
TESTING, ENGINEERING AND
NDT EXAMINATION SERVICES

CHALLENGE
ENGINEERING & TESTING, INC.

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FINAL REPORT
VIBRACORE SAMPLING AND LABORATORY TESTING

MCSF BLOUNT ISLAND MIL PROJECT

SEPTEMBER 2008
Contract # W912EP-05-D-0010
Delivery Order # 0017
Challenge Engineering & Testing, Inc.

Prepared For:

U.S. Army Corps of Engineers – Jacksonville District
Geotechnical Branch
701 San Marco Boulevard
Jacksonville, Florida 32207

Submitted By:

Challenge Engineering & Testing, Inc.
4234 Halls Mill Road
Mobile, Alabama 36691

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PURPOSE OF PROJECT

The U.S. Army Corps of Engineers is proposing to deepen the United States Marine Corps (USMC) Basin on the north side of the St. John's River near Mayport, Florida.

The area within USMC Blount Island Slipway Dredging includes dredging of the Marine Corps Terminal Channel from an existing -38 foot MLLW to a maximum depth to a maximum of -45' MLLW which may also require removal of a submerged concrete sill.

Work was requested to be performed following completion of the NAVSTA Mayport Project in June as time was of the essence for project completion.

Challenge Engineering & Testing, Inc. of Mobile, Alabama was requested to assist the Jacksonville District of The U.S. Army Corps of Engineers on this contract.

SCOPE OF WORK

The scope of work in this assignment consisted of performing in the marine environment four (4) vibracore soils test borings to target termination depths of 10 ft. below the seafloor.

Security clearance was granted for the vessel prior to entry of the USMC Basin.

The water depths encountered on this project ranged from -37.2 ft. to -39.6 ft. MLLW.

Laboratory testing was preformed on designated samples selected and tested in accordance with Corps of Engineers standards for the following analyses:

1. Sieve Analyses (Gradation)
2. Visual Percent Shell
3. Sedimentation Test

Authorization to proceed with the requested tasks was issued on June 13, 2008, Contract #W912EP-05-D-0010 – Delivery Order # 0017 by the U.S. Army Corps of Engineers – Jacksonville District.

The purpose of this core boring project is to characterize the materials to be dredged in preparation of permitting for disposal.

PROCEDURES AND PROJECT SPECIFICATIONS

This report presents the procedures as followed for the borehole location, vibracore sampling, laboratory analyses and the classification of each respective soil sample in conjunction with special notes as recorded regarding conditions encountered in the field.

U.S. Army Corps of Engineer Standard Boring Log Forms 1836 are completed for each core boring performed in the designated location as generated with the Geotechnical Integrator “gINT” Software Program and script/library files as furnished by the Jacksonville District.

FIELD WORK PERFORMED

PHASE I: MARINE VIBRACORE PROGRAM

ALPINE OCEAN SEISMIC SURVEY, INC. – Norwood, New Jersey

The core boring phase of work on this project consisted of performing four (4) test borings in the USMC Terminal Channel.

Challenge Engineering & Testing, Inc. subcontracted to **Alpine Ocean Seismic Survey, Inc.** of Norwood, New Jersey to perform the offshore vibracore survey and sampling operations as specified on this project.

The scientific research vessel “R/V Atlantic Twin“ a 90 ft. steel catamaran with a seven (7) foot draft was used as a platform for the vibracoring operations.

The vessel has a laboratory and deck space, an anchoring system, hydraulic crane, deck winches and an “A-frame” capability for vibracoring.

The navigational equipment and echosounder, with associated computers, printer and display units were mounted in the pilothouse. The crew stayed on board during the project survey period as the vessel returned to port each evening.

A representative of Challenge Engineering was on board during all field sampling operations to verify compliance with Corps of Engineering project specifications and to take custody of all sediment tube samples.

The vibracore drilling/sampling was conducted during daylight hours commencing on Friday, June 13th and was concluded Saturday, June 14, 2008.

Survey was accomplished through the use of a Trimble NT300D Differential Global Positioning 12 Channel Satellite Receiver System and Hypak Survey Software using core boring location coordinates as furnished by the Jacksonville District.

A layout drawing indicating general boring locations and a table of test coordinate positions was furnished for field positioning by the Jacksonville District prior to commencement of the field sampling by Alpine Ocean Seismic.

Coordination was performed with the U.S.M.C. and the St. John's Bar Pilot's in an attempt to remain clear of traffic and minimize downtime.

A summary of the computed horizontal coordinates for each of the vibracore borings to Florida East – NAD 83 State Plane Coordinates and vertical elevations to Mean Lower Low Water (MLLW) is reported as follows:

MARINE VIBRACORE TEST CORE BORING LOCATIONS

NAD 83 FLORIDA EAST

Boring Number	Northing	Easting	Water Depth (MLLW)	Penetration Depth (Ft.)
VB-BIMC08-1	2205909	490885	-38.1	7.80
VB-BIMC08-2	2205158	491990	-39.6	7.00
VB-BIMC08-3	2204189	493323	-37.2	6.60
VB-BIMC08-4	2203378	494685	-37.8	8.50

Water depths were recorded with an Innerspace 448 Digital Echosounder with a 200 KHz 8 transducer. The Echosounder was calibrated daily on site using a bar-check method.

Raw water depths were corrected to Mean Lower Low Water (MLLW) based on the Tidal Station located at the Entrance to Mayport Harbor at the Bar Pilots Dock on the South side of the St. John's River.

A model 271 B Alpine Pneumatic Vibracore configured to take cores up to 20 feet in length was used on this project. The 271 B is a self-contained, free standing pneumatic vibracore unit consisting of an air driven vibratory hammer, an aluminum H-beam which serves as the vertical guide for the vibrator, a set of four steel support pads and legs which hold the beam upright on the sea bottom, a steel coring pipe, a cutting edge, a core retainer, a 4" clear polycarbonate core liner, and penetrometer which records time and depth of penetration of the core pipe into the sea bottom.

An air hose array provides passage of compressed air from the Ingersoll Rand 500 cfm compressor on the deck to drive the piston vibrator and return vent air to the surface.

When refusal was encountered resulting in less that acceptable penetration or recovery was less than 85% of penetration, the sampled portion was removed from the pipe, labeled “Run # 1”, a new liner inserted, and a jet pump hose was attached just below the vibracore head. The rig was lowered to the sea bottom and jetted to the refusal depth. The jet was then turned off and vibrator turned on in an attempt to recover the remaining portion of the core.

Immediately upon removal of the plastic liner form the core pipe, the sediment liners were measured, marked, cut into 5 ft. sections, capped & stored. Shipboard field visual descriptions were made as this time and pertinent survey information entered on field logs.

Penetration graphs are included for each core boring to indicate comparative in-situ density of the sediments encountered for each foot of depth.

Fair weather conditions existed during the field work phase on this project with no currents or sea conditions and light winds.

A report as issued by Alpine Ocean Seismic, Inc., dated July 27, 2008 is attached as part of this submittal.

The vibracore sample tubes were capped and sealed in the field and delivered to the laboratory/offices of Challenge Engineering & Testing, Inc. in Mobile, Alabama on Saturday, June 14, 2008.

PHASE II: CLASSIFICATION/LABORATORY TESTING

The sample tubes were retained in the laboratory of Challenge Engineering until authorization was granted from Mrs. Karen Pitchford of the Geotechnical Branch to split the tubes and assign laboratory tests.

A sample handling table was constructed to hold the vibracore clear polycarbonate tubes in place while each was split longitudinally. After splitting the plastic tubing, a sharp knife was used to cut the sample in half, exposing the sediments. The core was then positioned with a reference level to indicate depth in feet below the top of ocean bottom.

Each 5 ft. sample interval and total core composite was digitally photographed. One half was then separated, wrapped in clear plastic wrap, labeled, then placed in wooden core boxes for delivery to the Corps of Engineer Warehouse.

The remaining half was air dried, classified in accordance with the Unified Soils Classification system, Munsell colored, & sampled for laboratory analyses then placed in our warehouse for future examination.

The visual classification & Munsell color determinations were performed by Mr. Bob Momberger, Registered Florida Geologist of the vibracore samples after they were split open and allowed to air dry at the offices of Challenge Engineering & Testing, Inc.

Mrs. Karen Pitchford, Registered Project Geologist & Mr. Mark Whitson from the Jacksonville District performed a site visit on June 27, 2008 to review the core samples and make initial grain size laboratory assignments.

The final laboratory test assignment to include Atterberg Limits, sedimentation, carbonate & specific gravity, and sub-samples was received on August 1, 2008.

The following samples were taken from the tubes for laboratory analyses:

Grain Size Tests - 8 Each
Visual Percent Shell – 8 Each
Sedimentation Rate Tests - 8 Each

The following sieve sizes were used as specified for this project: ¾”, 3/8”, # 4, #10, #20, #40, #60, #100 & #200.

As per project specifications, an inventory of core boxes as prepared in the gINT format was submitted to Mrs. Karen Pitchford on August 11, 2008. The Corps of Engineer samples were sealed in clear plastic wrap and placed in labeled wooden core boxes and delivered to the Corps of Engineer Warehouse on Talleyrand Avenue in Jacksonville, Florida on August 18, 2008.

REPORT SUBMITTALS

The field boring logs, visual classifications and laboratory test results were all entered into the Geotechnical Integrator (gINT) software format as designed by the Jacksonville District which is presented as part of this report.

Alpine Ocean Seismic, Inc. core penetrometer graphs are included for each core performed on this project and are included as part of this report.

Digital photographs were taken of the samples after each tube was split in the laboratory. A marker board was prepared to photograph the vibracore tube samples while split in the tube. The reference photographs are included in this report after each respective core boring log.

The laboratory results for grain size analyses, visual percent shell & sedimentation tests are reported on the gINT boring logs.

FIELD EXPLORATION SUMMARY CONCLUSION

The field work was performed during a period of time in June in which the weather allowed sampling operations to be conducted with no threat of tropical storms other than normal summertime weather patterns.

Refusal was encountered on each of the borings prior to reaching project termination depth.

The colors of the materials were noted to change significantly from dark to lighter as the split vibracore tubes were left open to air dry.

REPORT INVESTIGATION LIMITATIONS

The vibracore borings, analyses and recommendations submitted in this conceptual report are based on the data obtained from the field explorations performed at the locations depicted on the site plan.

These locations were chosen by the U.S. Army Corps of Engineers, Jacksonville District. The area explored is limited to the depth and diameter of the core borings.

This report does not reflect any variations which may occur adjacent to or between the core borings. The nature and extent of the variations between the borings may not become evident until during construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations presented in this report after performing additional explorations and noting the characteristics of the variations.

This report is based on relatively shallow explorations and a scope of work determined solely by the Corps of Engineers. This report does not include an evaluation of the environmental (ecological or hazardous/toxic material related) condition of the site and subsurface.

This report has been prepared for the exclusive use of the U.S. Army Corps of Engineers in accordance with generally accepted soil and foundation engineering practices.

It has been our pleasure for Challenge Engineering & Testing, Inc. to provide the U.S. Army Corps of Engineers – Jacksonville District our geotechnical engineering testing services on this project in the Jacksonville Harbor, Florida.

I trust that you will find this submittal to be in general conformance with the project guidelines and specifications.

In the event any questions arise concerning the information contained herein, please advise.

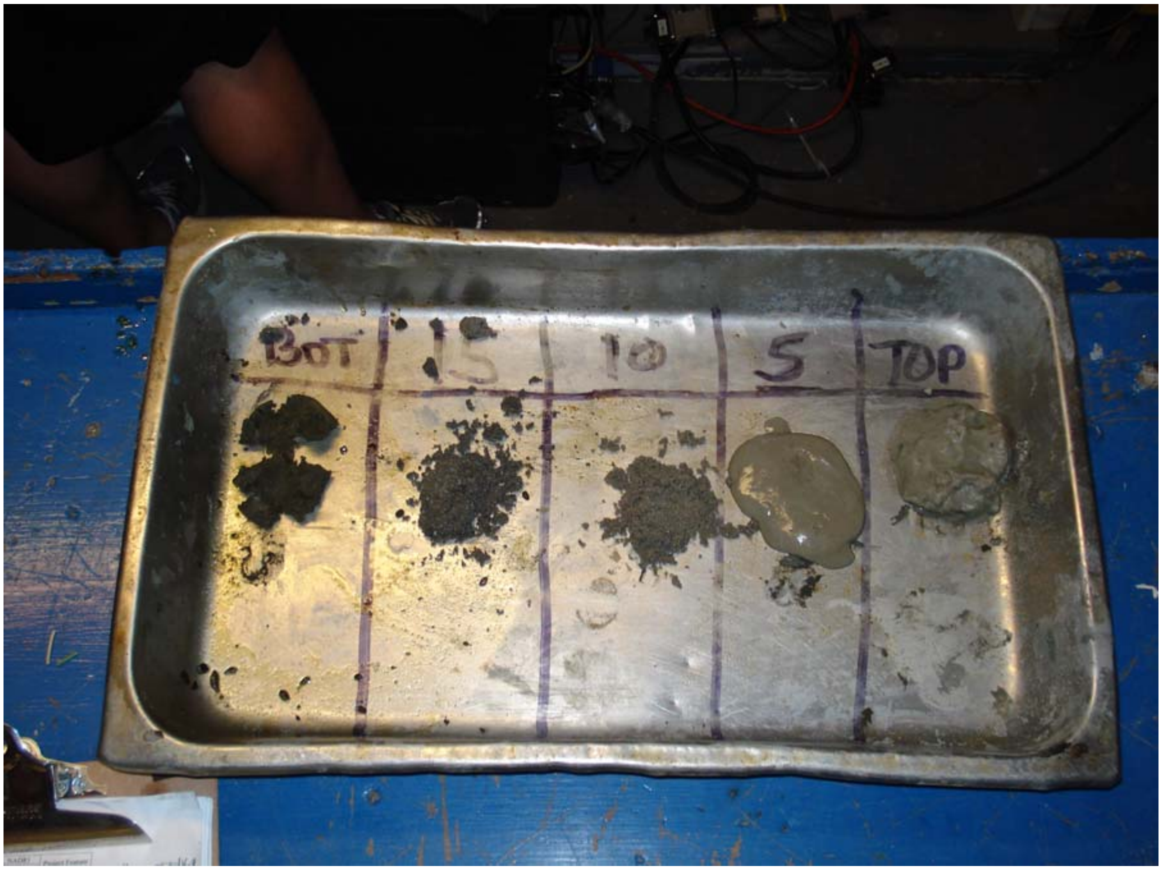
Respectfully Submitted,
Challenge Engineering & Testing, Inc.

V. J. Thompson III, P.E.
Florida Registration # 37610

REFERENCE PROJECT PHOTOGRAPHS

The Research Vessel "Atlantic Twin",a 90 Ft. Steel Hulled Catamaran Was Utilized to Sample the Test Locations Within the Entrance To The St. John's River & Mayport Harbor.

The Alpine 271 Pnuematically Powered Vibracore Unit Was Set Up To Sample 20 Ft. Cores With 3 7/8" Clear Lexan Liners.



The Cores Were Cut Into 5 Ft. Lengths On The Vessel After Sampling. A General Visual Classification Was Performed, Then Capped & Stored For Delivery To The Laboratory.

Cores Samples Were Labled & Secured On Vessel Prior To Offloading.

ALPINE OCEAN SIESMIC SURVEY REPORT

FINAL REPORT

VIBRACORE SAMPLING
MCSF BLOUNT ISLAND MIL DREDGE
JACKSONVILLE HARBOR, FLORIDA

Prepared for:

Challenge Engineering and Testing, Inc.
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Submitted by:

Alpine Ocean Seismic Survey, Inc.
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July 27, 2008

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1.0 Introduction

Alpine Ocean Seismic Survey, Inc. (Alpine), under contract to Challenge Engineering & Testing, Inc., has conducted a Vibracore survey of the USMC Basin on the north side of the St. John’s River near Mayport, Florida. The work was conducted using an Alpine model 271 pneumatic Vibracore, as deployed from the R/V Atlantic Twin.

The purpose of the project was to collect sediment core samples for use in characterization of the work area for dredging and potential disposal for beach renourishment. Samples were collected at four (4) locations within the work area. At the end of the project, Challenge Engineering transported the cores to their facility in Mobile, AL for analysis.

2.0 Equipment and Personnel

2.1 Survey Vessel

The R/V Atlantic Twin, a 90-foot steel catamaran hull research vessel with a 7-foot draft, was used as the platform for vibracoring operation. It has ample laboratory and deck space, an anchoring system, hydraulic crane, deck winches and an A-frame for vibracoring. The navigational equipment and echosounder, with associated computers, printer and display units are mounted in the pilothouse. The vessel has sleeping facilities to accommodate crew and survey staff during the survey period.

2.2 Positioning System

A CSI Differential GPS Navigation System was used throughout this operation. The DGPS system consists of a 12-channel satellite receiver and a built-in dual-channel radio beacon receiver, which obtains differential correction signals from the United States Coast Guard GPS transmitter in Jacksonville, Florida. The antenna has dual sensors and generates vessel heading internally.

2.3 Navigation Data Acquisition and Logging System

The WGS-84 Geographic positions obtained by the GPS navigation system were converted into Florida East State Plane (NAD 83) grid coordinate positions, using a computer and Hypack Max navigation software, version 6.2. The system consists of the following components:

1) Dell computer.
2) Color video monitor (helmsman’s display).
3) Hypak Max software.

2.4 Digital Echosounder

An Innerspace 448 Digital Echosounder with a 200 KHz 8° transducer was used to collect water depths at the time of vibracoring. In order to calibrate the echo sounder, the speed of sound in the water was determined by bar check every morning during the survey and entered into the echosounder.

2.5 Vibracore

A model 271 B Alpine Pneumatic Vibracore configured to take cores 20 feet in length was used on this project. The model 271 B is a self-contained freestanding pneumatic Vibracore unit. It consists of: an air-driven vibratory hammer assembly; an aluminum H-beam which acts as the vertical guide for the vibrator; a set of four steel support pads and legs which hold the beam upright on the sea bottom; a steel coring pipe; a cutting edge; a core retainer; a clear lexan core liner; and a penetrometer which records time and depth of penetration of the core pipe into the sea bottom. An air hose array provides passage of compressed air from the compressor on deck to drive the Vibracore. Whenever refusal occurred with initial penetration of less than acceptable, or recovery was less than 80% of penetration, the sampled portion was removed from the pipe, a new liner inserted, and jet pump hose was attached just below the Vibracore head. The rig was lowered to the bottom and jetted to refusal depth of the prior run, the jet turned off and vibrator turned on, taking the additional part of the core.

2.6 Key Personnel

Captain, R/V Atlantic Twin	Ron Hanauer
Field Supervisors	Shane Dunn/Brian Larkin
Navigator/Geologists	Shane Dunn/Brian Larkin

2.7 Field Methods

The proposed location of each core was entered into the Hypack program, which displays the location of the survey vessel relative to each selected core. The vessel was anchored within 50 feet of a given core location and the water depth recorded with the echo sounder. Once the vessel was determined to be in a stable position, the Vibracore was placed on the sea floor and the core conducted.

In most cases, the Vibracore was able to penetrate to the desired depth on the first attempt. In those cases where refusal was encountered, the jetting technique was used to complete the core.

Once the Vibracore reached the desired core depth, the air power was turned off and the Vibracore secured to the side of the survey boat, where the sample was removed and placed on deck.

3.0 Vibracore Data Presentation

Immediately upon removal of the plastic liner from the core pipe, the sediment filled liners were measured, marked, cut into sections and sealed. Shipboard descriptions were made and the heading data was entered onto the shipboard log sheet. This data included date, time, location, water depth, penetration and recovery information. Table 1 presents a summary of the final core locations for all the samples.

The penetration graphs for each of the cores conducted are presented this report. The graph headers contain the core number, the location in state grid and latitude – longitude, the length of penetration and recovery, along with the raw and corrected water depths, and time of each core. The changes in rate of penetration with depth at each core are useful to the geologist in describing the core.

VIBRACORE TEST LOCATION PLAN

LOCATION OF VIBRACORE TEST BORINGS
MCSF BLOUNT ISLAND MIL PROJECT
JACKSONVILLE, FLORIDA

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© 2008 Europa Technologies

VIBRACORE TEST BORING
MCSF Blount Island Mil Dredge
“VB-BIMC08-01”

gInt Boring Log
Penetration Resistance Graph
Sample Photographs
Laboratory Test Results

Boring Designation VB-BIMC08-1

DRILLING LOG

DIVISION South Atlantic

INSTALLATION Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT MCSF Blount Island Mil Dredge Marine Corps Terminal Channel
2. BORING DESIGNATION VB-BIMC08-1 LOCATION COORDINATES X = 490,885 Y = 2,205,909
3. DRILLING AGENCY Challenge Engineering & Testing, Inc. CONTRACTOR FILE NO. 2007D16B
4. NAME OF DRILLER Alpine Ocean Seismic, Inc.
5. DIRECTION OF BORING ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL BEARING
6. THICKNESS OF OVERBURDEN N/A
7. DEPTH DRILLED INTO ROCK N/A
8. TOTAL DEPTH OF BORING 7.8 Ft.
9. SIZE AND TYPE OF BIT See Remarks
10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.) HORIZONTAL NAD83 VERTICAL MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL Alpine Vibracore Unit ☐ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES DISTURBED 2 UNDISTURBED (UD) 0
13. TOTAL NUMBER CORE BOXES 1
14. ELEVATION GROUND WATER Tidal
15. DATE BORING STARTED 06-13-08 COMPLETED 06-13-08
16. ELEVATION TOP OF BORING -38.1 Ft.
17. TOTAL RECOVERY FOR BORING 100 %
18. SIGNATURE AND TITLE OF INSPECTOR Bob Momberger, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
-38.1	0.0						-38.1		
		▨	CLAY, fat, high plasticity, very soft, wet, 5Y 2.5/1 black (CH)	100			Vibracore -40.1		
				100	1		-40.6 Vibracore		
-41.1	3.0	⁘	SAND, poorly-graded, mostly fine to coarse-grained sand-sized quartz, trace angular sand to gravel-sized shell up to 3/4", wet, 5Y 7/2 light gray (SP)	100			Vibracore -44.1		
				100	2		-44.6 Vibracore		
				100			Vibracore		
-45.6	7.5								
-45.9	7.8	I	LIMESTONE, fossiliferous, moderately hard, highly weathered, very fine grained, solid, 5Y 7/2 light gray				-45.9		

BORING TERMINATED IN REFUSAL

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Vibracore Borings Were Sampled With An Alpine 271 Pneumatic Powered Unit Using A 3 7/8" Clear Lexan Liner To Termination Depth Specified.

4. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	2.0/2.5	CH*

0

5

10

15

SAJ FORM 1836
JUN 02

(Continued)

Boring Designation VB-BIMC08-1

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT MCSF Blount Island Mil Dredge	COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)	HORIZONTAL NAD83	VERTICAL MLLW	
LOCATION COORDINATES X = 490,885 Y = 2,205,909	ELEVATION TOP OF BORING -38.1 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			2 6.0/6.5 SP* *Lab visual classification based on gradation curve. No Atterberg limits.						

15
20
25
30
35

SAJ FORM 1836-A
JUN 02

Penetration Graph for Core No. VB-BIMC08-01, Run 1

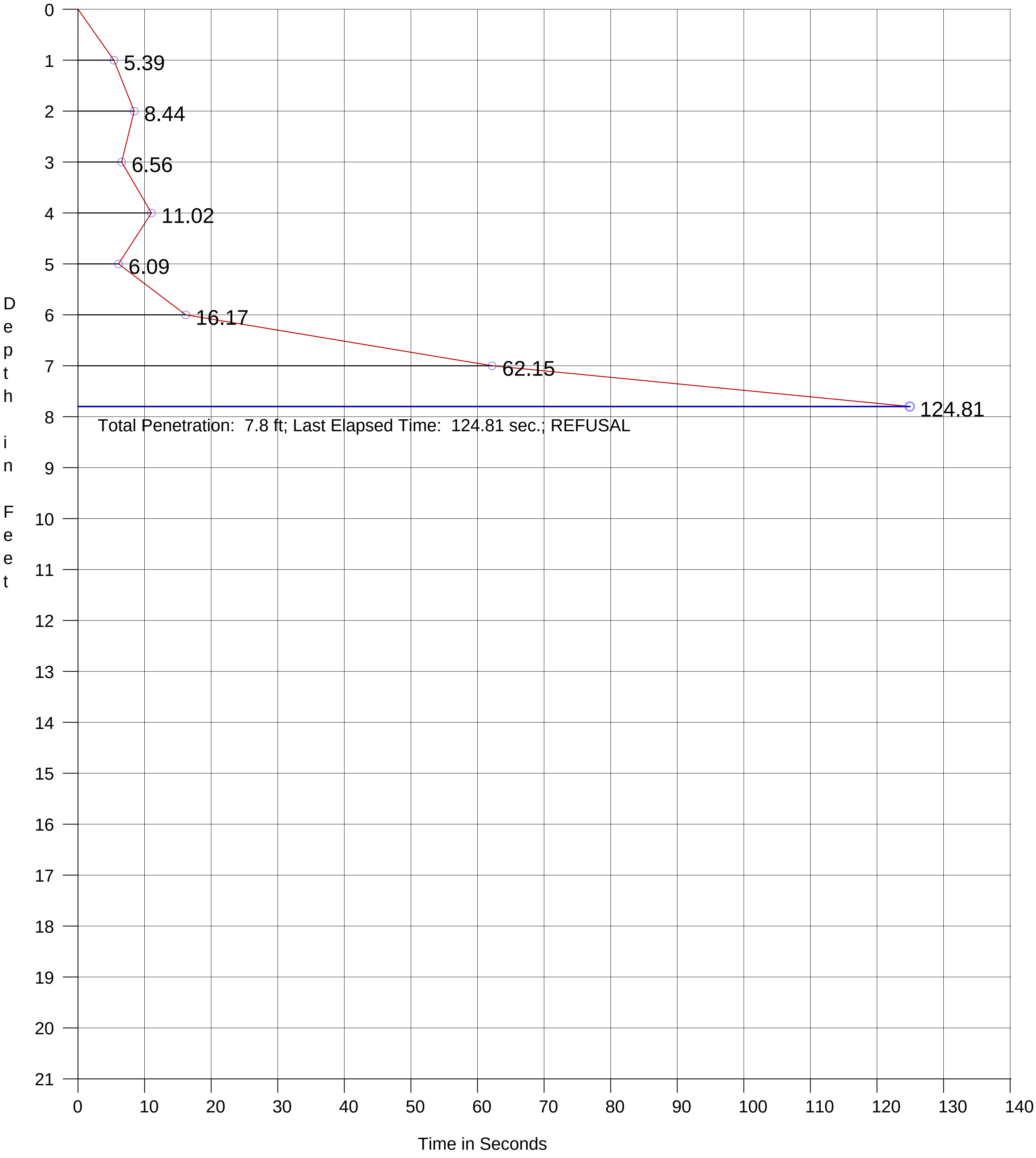
Date: 6/13/2008
Start Time: 2:13:14 PM
End Time: 2:16:30 PM

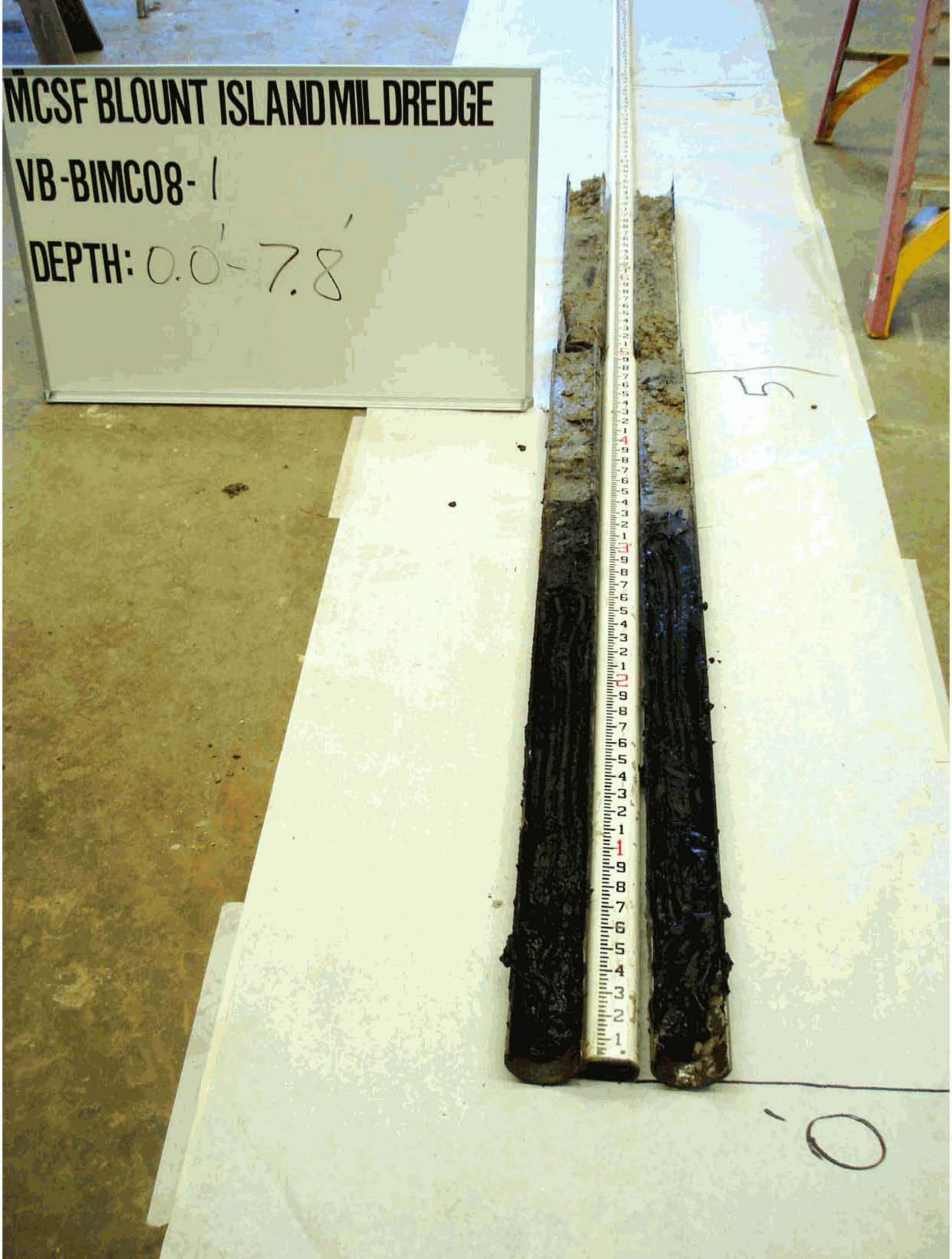
Penetration: 7.80 ft
Recovery: 7.80 ft
W. D. Corrected: -38.10 ft
W. D. Raw: -39.00 ft

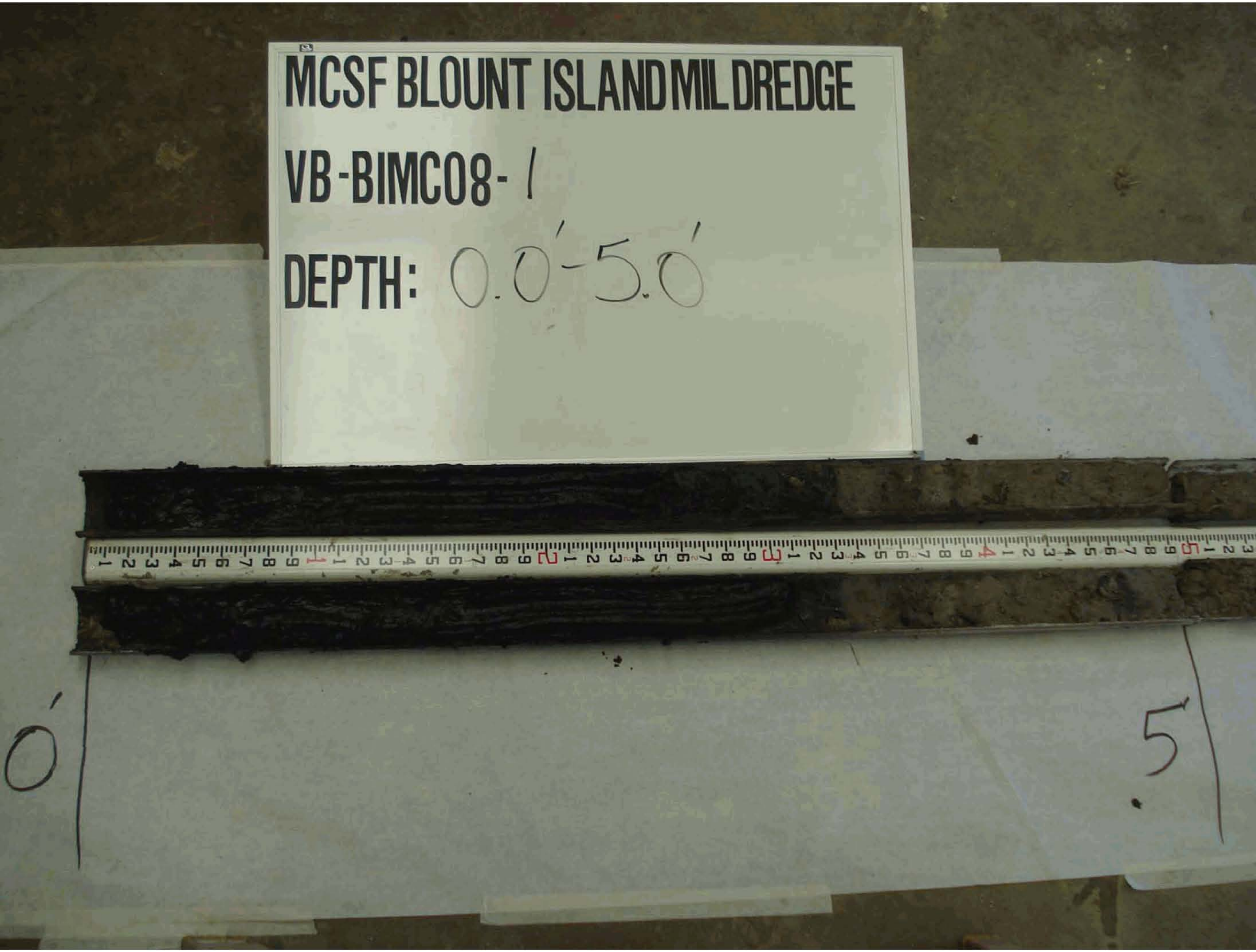
Easting: 490885.45
Northing: 2205909.31
Coord. System: Florida East

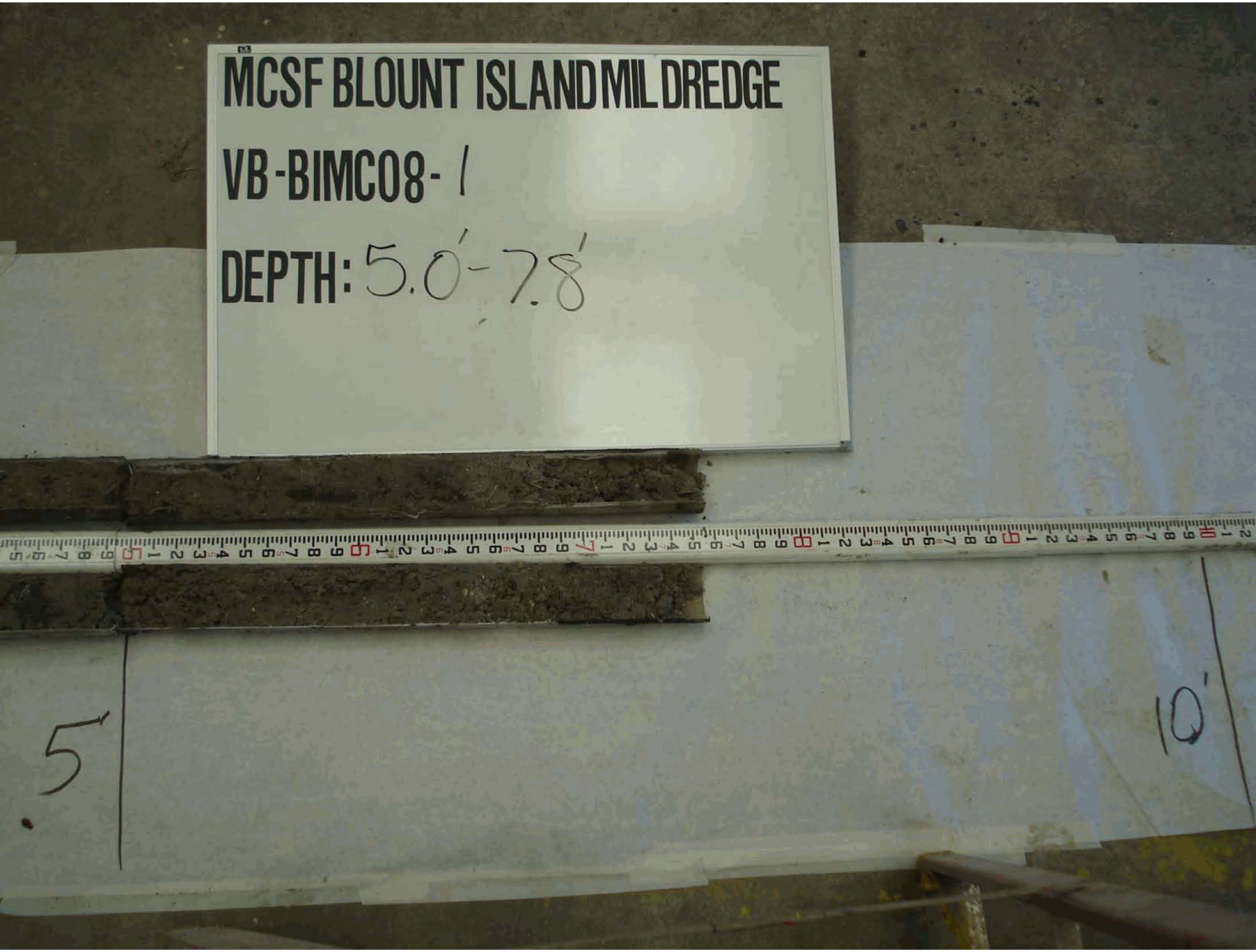
Lat: 30°24.02090' N
Long: 081°31.45610' W
Datum: MLLW

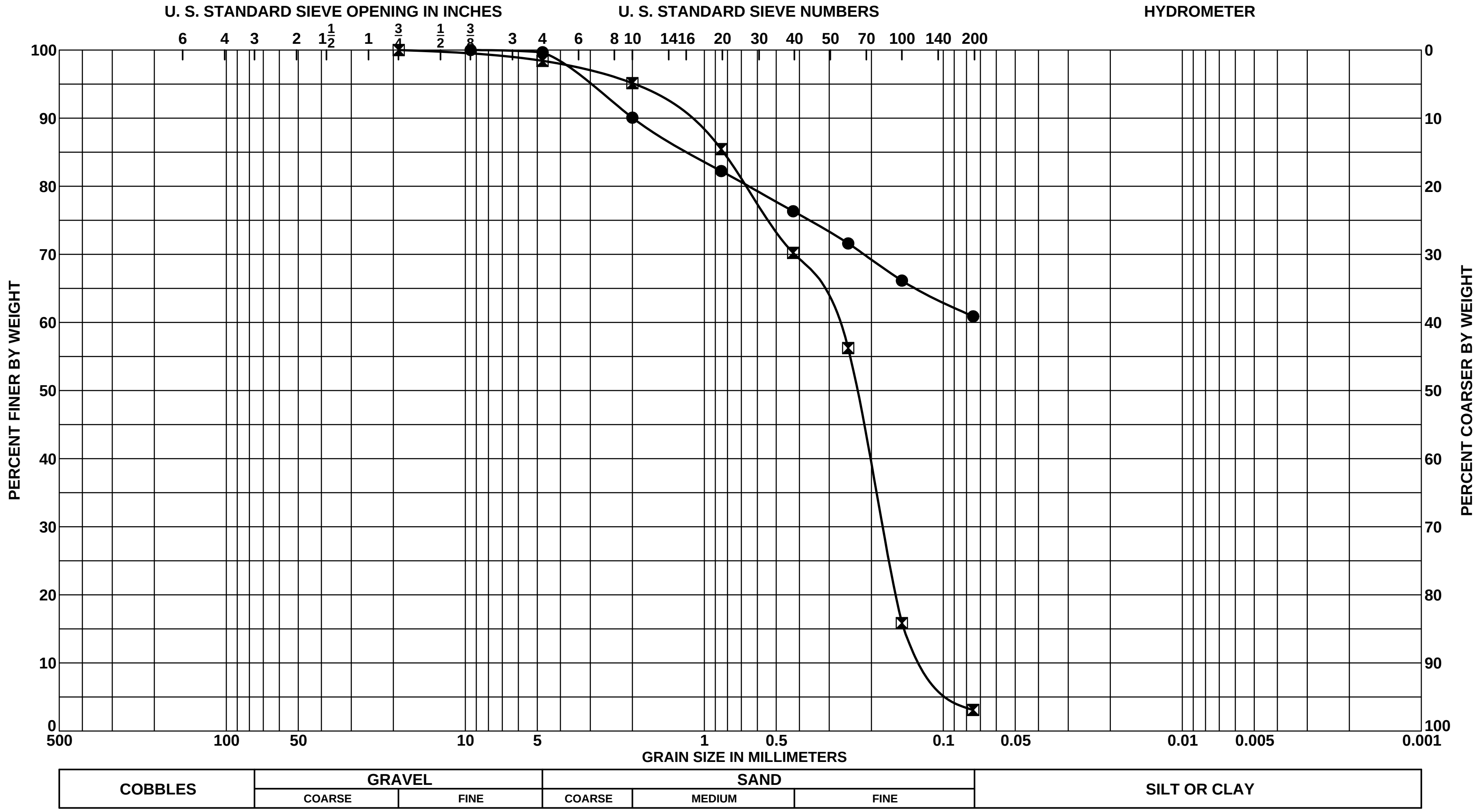
Comment:




MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08-1
DEPTH: 0.0'-7.8'
5
0


MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08-1
DEPTH: 0.0'-5.0'
0'
5'


MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08- 1
DEPTH: 5.0'-7.8'
5'
10'



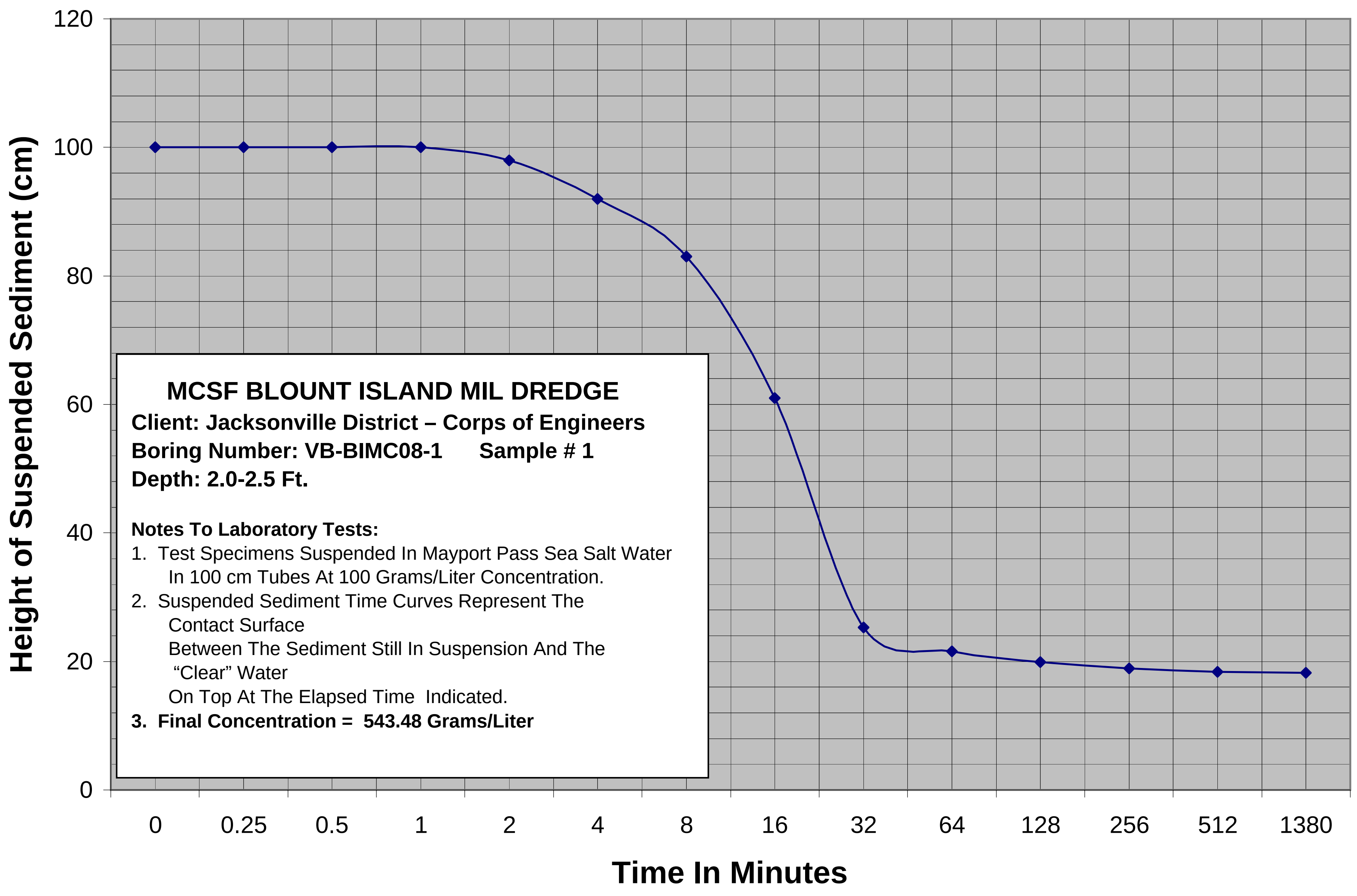
Sample No.	Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
● 1	2.0 to 2.5 Ft.	(CH)								
☒ 2	6.0 to 6.5 Ft.	(SP)								

PROJECT MCSF Blount Island Mil Dredge
Marine Corps Terminal Channel
BORING NO. VB-BIMC08-1
BORING ELEV. -38.1 Ft., MLLW
DATE 08/12/2008

GRADATION CURVES

SAJ FORM 2087
JUN 02

SUSPENDED SEDIMENTATION TIME CURVES



MCSF BLOUNT ISLAND MIL DREDGE

Client: Jacksonville District – Corps of Engineers

Boring Number: VB-BIMC08-1   Sample # 1

Depth: 2.0-2.5 Ft.

Notes To Laboratory Tests:

1. Test Specimens Suspended In Mayport Pass Sea Salt Water In 100 cm Tubes At 100 Grams/Liter Concentration.
2. Suspended Sediment Time Curves Represent The Contact Surface Between The Sediment Still In Suspension And The "Clear" Water On Top At The Elapsed Time Indicated.
3. **Final Concentration = 543.48 Grams/Liter**

VIBRACORE TEST BORING
MCSF Blount Island Mil Dredge
“VB-BIMC08-02”

gInt Boring Log
Penetration Resistance Graph
Sample Photographs
Laboratory Test Results

Boring Designation VB-BIMC08-2

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT: MCSF Blount Island Mil Dredge
Marine Corps Terminal Channel

2. BORING DESIGNATION: VB-BIMC08-2 | LOCATION COORDINATES: X = 491,990 Y = 2,205,158

3. DRILLING AGENCY: Challenge Engineering & Testing, Inc. | CONTRACTOR FILE NO.: 2007D16B

4. NAME OF DRILLER: Alpine Ocean Seismic, Inc.

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED | DEG. FROM VERTICAL: | BEARING:

6. THICKNESS OF OVERBURDEN: N/A

7. DEPTH DRILLED INTO ROCK: N/A

8. TOTAL DEPTH OF BORING: 7.0 Ft.

9. SIZE AND TYPE OF BIT: See Remarks

10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.) | HORIZONTAL: NAD83 | VERTICAL: MLLW

11. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Vibracore Unit ☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES: DISTURBED 2 | UNDISTURBED (UD) 0

13. TOTAL NUMBER CORE BOXES: 1

14. ELEVATION GROUND WATER: Tidal

15. DATE BORING: STARTED 06-13-08 | COMPLETED 06-13-08

16. ELEVATION TOP OF BORING: -39.6 Ft.

17. TOTAL RECOVERY FOR BORING: 100 %

18. SIGNATURE AND TITLE OF INSPECTOR: Bob Momberger, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
-39.6	0.0						-39.6		
		▨	CLAY, fat, high plasticity, very soft, wet, 5Y 2.5/1 black (CH)	100			Vibracore -42.1		
				100	1		-42.6 Vibracore		
-43.6	4.0			100			Vibracore -44.6		
		⁞	SAND, silty, mostly fine-grained sand-sized quartz, little silt, wet, 5Y 5/3 olive (SM)	100	2		-45.1 Vibracore		
-46.1	6.5			100			Vibracore		
-46.6	7.0	HW	LIMESTONE, fossiliferous, moderately hard, highly weathered, very fine grained, solid, 5Y 5/3 olive				-46.6		

BORING TERMINATED IN REFUSAL

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Vibracore Borings Were Sampled With An Alpine 271 Pneumatic Powered Unit Using A 3 7/8" Clear Lexan Liner To Termination Depth Specified.

4. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	2.5/3.0	CH*
2	5.0/5.5	SM*

*Lab visual classification based on gradation

(Continued)

Boring Designation VB-BIMC08-2

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS
PROJECT MCSF Blount Island Mil Dredge	COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)	HORIZONTAL NAD83	VERTICAL MLLW	
LOCATION COORDINATES X = 491,990 Y = 2,205,158	ELEVATION TOP OF BORING -39.6 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			curve. No Atterberg limits.						

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SAJ FORM 1836-A
JUN 02

Penetration Graph for Core No. VB-BIMC08-02, Run 1

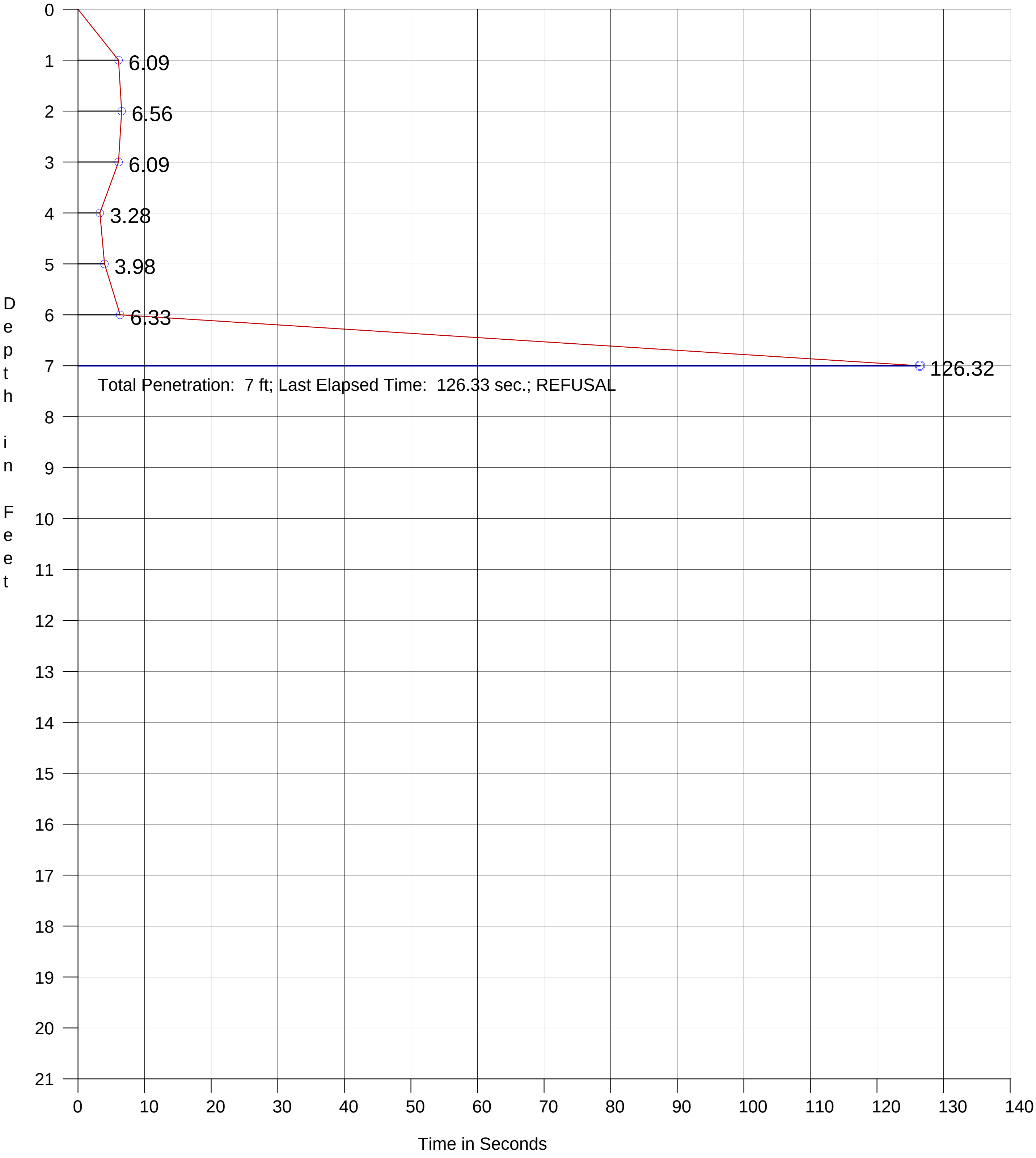
Date: 6/13/2008
Start Time: 2:35:03 PM
End Time: 2:37:42 PM

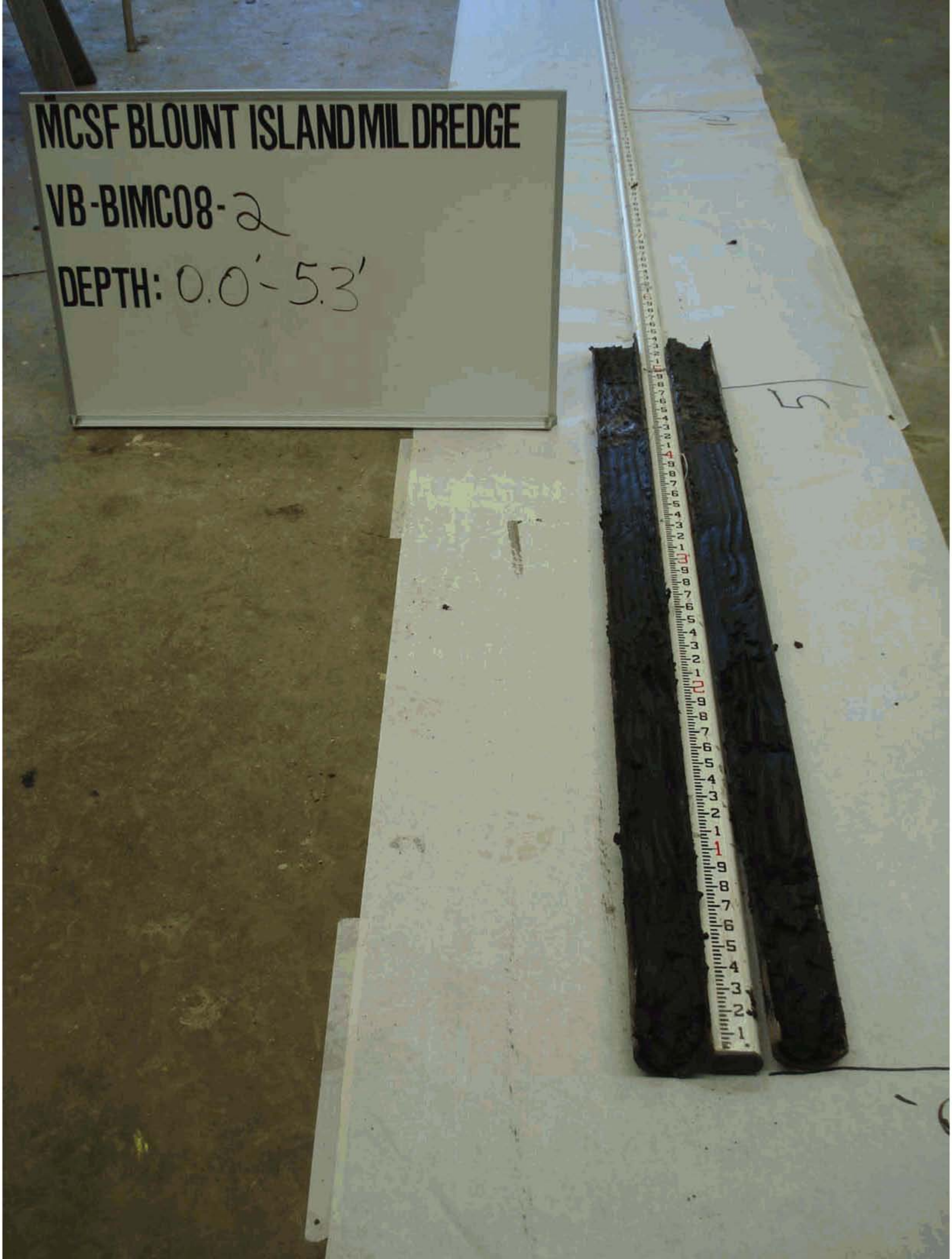
Penetration: 7.00 ft
Recovery: 7.00 ft
W. D. Corrected: -39.60 ft
W. D. Raw: -42.00 ft

Easting: 491989.70
Northing: 2205158.08
Coord. System: Florida East

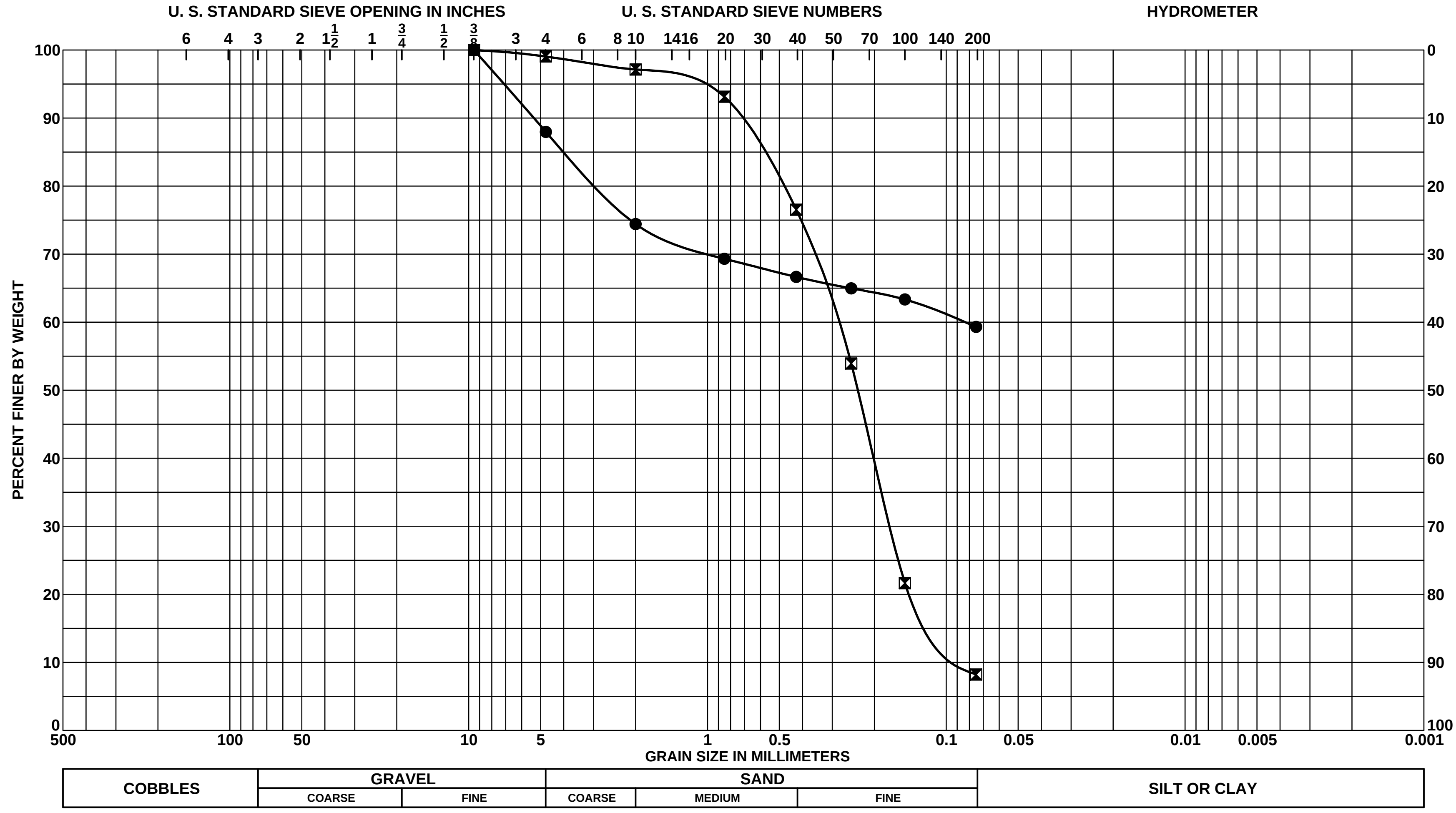
Lat: 30°23.89780' N
Long: 081°31.24530' W
Datum: MLLW

Comment:




MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08-2
DEPTH: 0.0'-5.3'
5


MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08-2
DEPTH: 0.0'-5.3'
0'
5'



Sample No.	Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
● 1	2.5 to 3.0 Ft.	(CH)								
☒ 2	5.0 to 5.5 Ft.	(SM)								

GRADATION CURVES

PROJECT MCSF Blount Island Mil Dredge
Marine Corps Terminal Channel

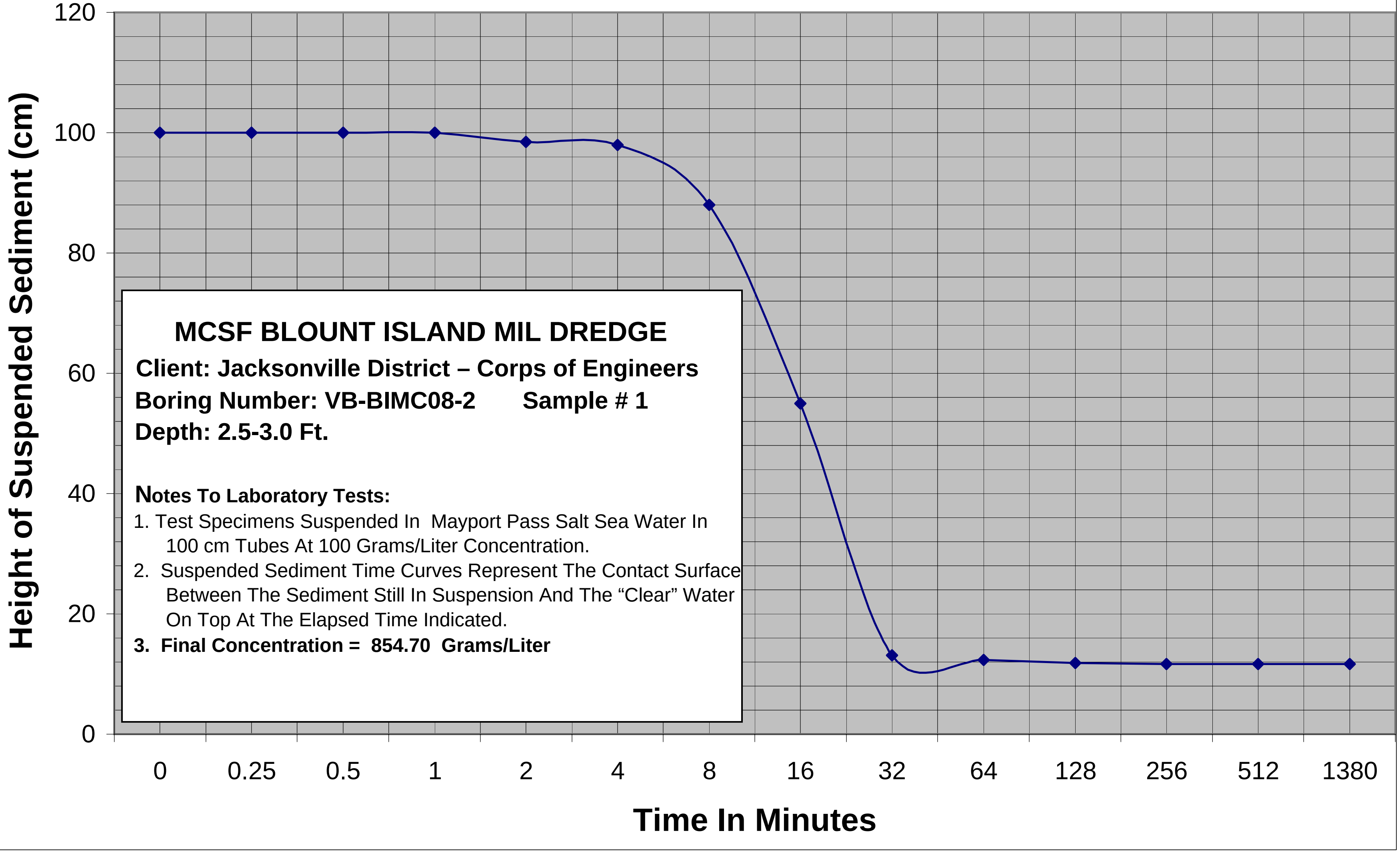
BORING NO. VB-BIMC08-2

BORING ELEV. -39.6 Ft., MLLW

DATE 08/12/2008

SAJ FORM 2087
JUN 02

SUSPENDED SEDIMENTATION TIME CURVES



MCSF BLOUNT ISLAND MIL DREDGE

Client: Jacksonville District – Corps of Engineers

Boring Number: VB-BIMC08-2 Sample # 1

Depth: 2.5-3.0 Ft.

Notes To Laboratory Tests:

1. Test Specimens Suspended In Mayport Pass Salt Sea Water In 100 cm Tubes At 100 Grams/Liter Concentration.
2. Suspended Sediment Time Curves Represent The Contact Surface Between The Sediment Still In Suspension And The “Clear” Water On Top At The Elapsed Time Indicated.
3. **Final Concentration = 854.70 Grams/Liter**

VIBRACORE TEST BORING
MCSF Blount Island Mil Dredge
“VB-BIMC08-03”

gInt Boring Log
Penetration Resistance Graph
Sample Photographs
Laboratory Test Results

Boring Designation VB-BIMC08-3

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT
MCSF Blount Island Mil Dredge
Marine Corps Terminal Channel

2. BORING DESIGNATION VB-BIMC08-3 | LOCATION COORDINATES X = 493,323 Y = 2,204,189

3. DRILLING AGENCY Challenge Engineering & Testing, Inc. | CONTRACTOR FILE NO. 2007D16B

4. NAME OF DRILLER Alpine Ocean Seismic, Inc.

5. DIRECTION OF BORING ☒ VERTICAL ☐ INCLINED | DEG. FROM VERTICAL | BEARING

6. THICKNESS OF OVERBURDEN N/A

7. DEPTH DRILLED INTO ROCK N/A

8. TOTAL DEPTH OF BORING 6.6 Ft.

9. SIZE AND TYPE OF BIT See Remarks

10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.) | HORIZONTAL NAD83 | VERTICAL MLLW

11. MANUFACTURER'S DESIGNATION OF DRILL Alpine Vibracore Unit ☐ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES | DISTURBED 2 | UNDISTURBED (UD) 0

13. TOTAL NUMBER CORE BOXES 1

14. ELEVATION GROUND WATER Tidal

15. DATE BORING | STARTED 06-13-08 | COMPLETED 06-13-08

16. ELEVATION TOP OF BORING -37.2 Ft.

17. TOTAL RECOVERY FOR BORING 100 %

18. SIGNATURE AND TITLE OF INSPECTOR Bob Momberger, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
-37.2	0.0						-37.2		
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace angular shell up to 3/8", wet, 5Y 4/3 olive (SM)	100			Vibracore		
-39.7	2.5						-39.7		
		Moderately Weathered	SANDSTONE, sparsely fossiliferous, very soft, moderately weathered, fine-grained, solid, 5Y 6/4 pale olive	100	1		Vibracore -40.2		
				100			Vibracore		
-42.2	5.0								
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace angular shell up to 1/8", wet, weak cementation, 5Y 4/1 dark gray (SM)				-42.7		
				100	2		Vibracore -43.2		
				100			Vibracore -43.8		
-43.7 -43.8	6.5 6.6		LIMESTONE, fossiliferous, moderately hard, highly weathered, very fine grained, solid, 5Y 4/1 dark gray						

BORING TERMINATED IN REFUSAL

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Vibracore Borings Were Sampled With An Alpine 271 Pneumatic Powered Unit Using A 3 7/8" Clear Lexan Liner To Termination Depth Specified.

4. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	2.5/3.0	SM*
2	5.5/6.0	SM*

*Lab visual classification based on gradation

SAJ FORM 1836
JUN 02

(Continued)

Boring Designation VB-BIMC08-3

DRILLING LOG (Cont. Sheet)	*INSTALLATION* Jacksonville District	*SHEET* 2 *OF* 2 *SHEETS*

PROJECT MCSF Blount Island Mil Dredge	*COORDINATE SYSTEM/DATUM* State Plane, FLE (U.S. Ft.)	*HORIZONTAL* NAD83	*VERTICAL* MLLW
LOCATION COORDINATES X = 493,323 Y = 2,204,189	*ELEVATION TOP OF BORING* -37.2 Ft.		

ELEV.	*DEPTH*	*LEGEND*	*CLASSIFICATION OF MATERIALS*	*% REC.*	*BOX OR SAMPLE*	*RQD OR UD*	*REMARKS*	*BLOWS/ 1 FT.*	*N-VALUE*
			curve. No Atterberg limits.						

15

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35

SAJ FORM 1836-A
JUN 02

Penetration Graph for Core No. VB-BIMC08-03, Run 1

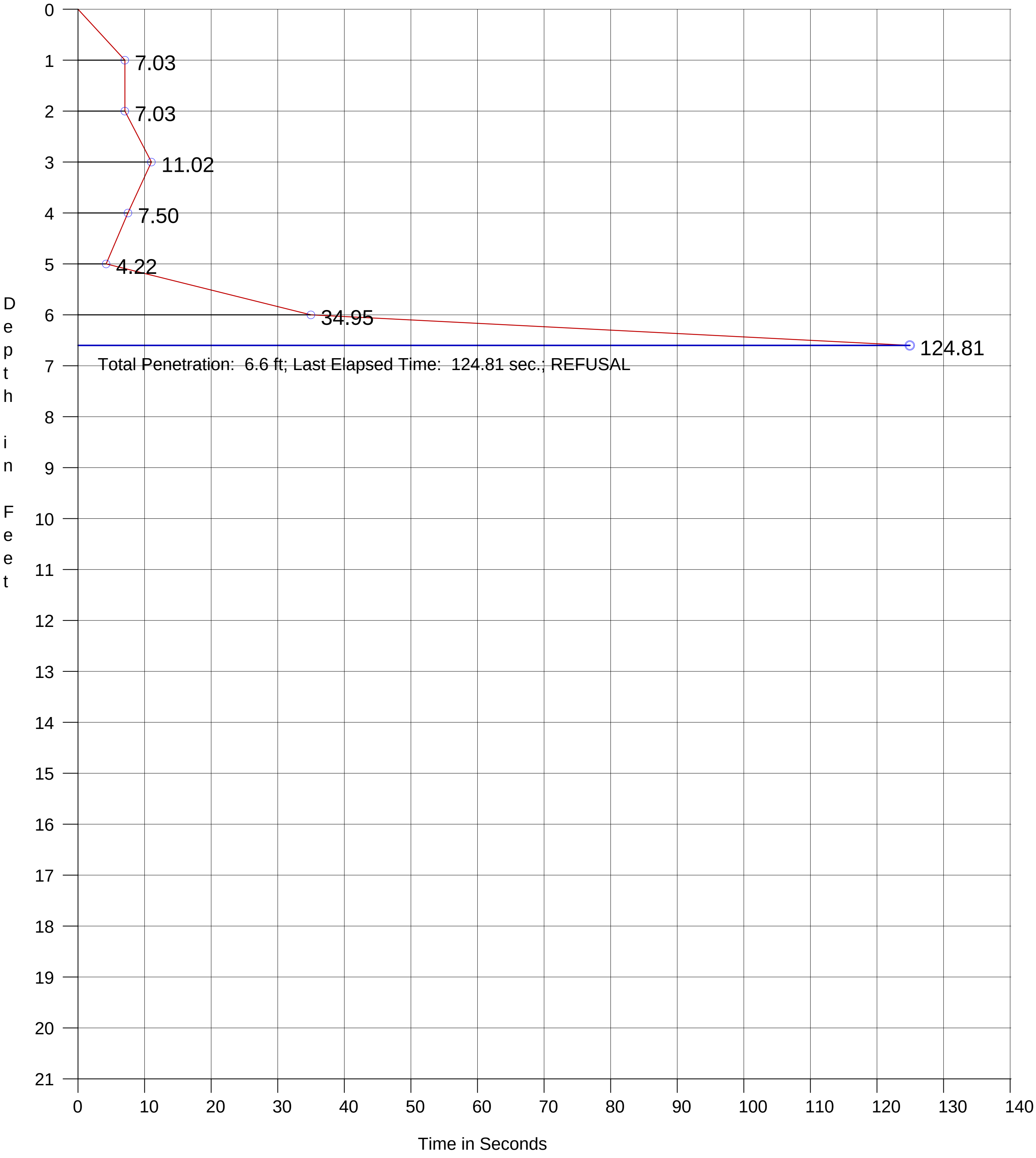
Date: 6/13/2008
Start Time: 2:56:08 PM
End Time: 3:01:28 PM

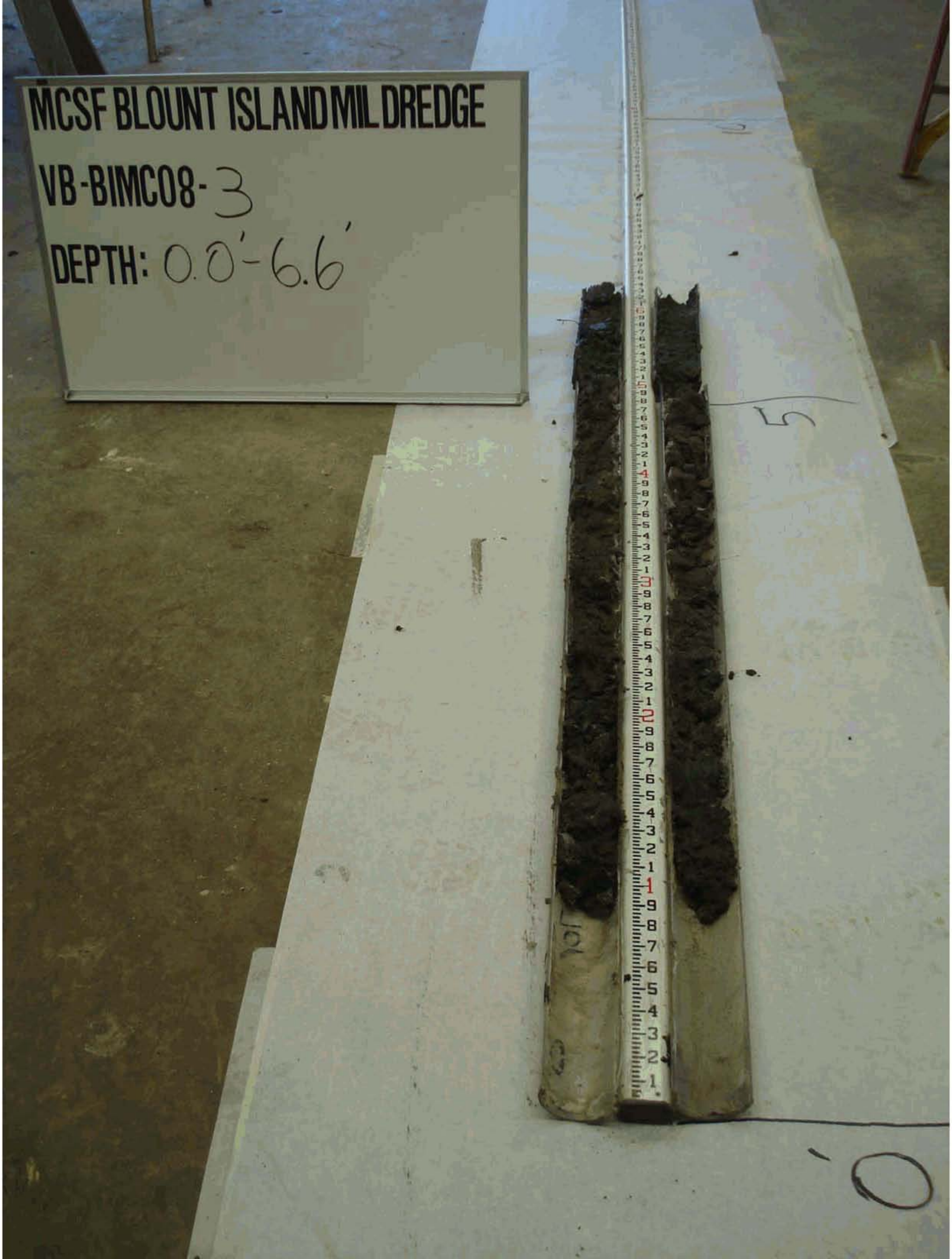
Penetration: 6.60 ft
Recovery: 6.60 ft
W. D. Corrected: -37.20 ft
W. D. Raw: -40.00 ft

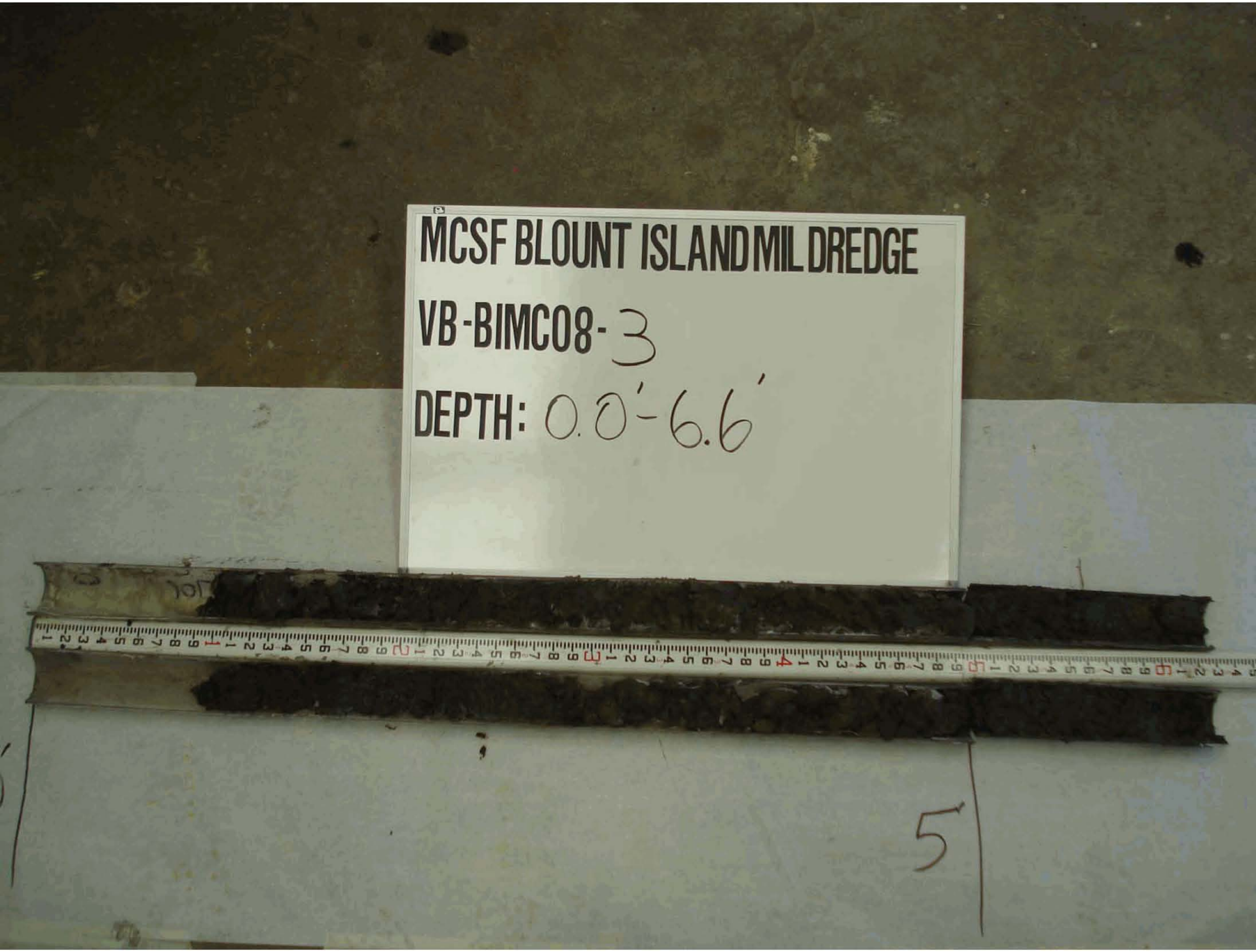
Easting: 493322.90
Northing: 2204189.43
Coord. System: Florida East

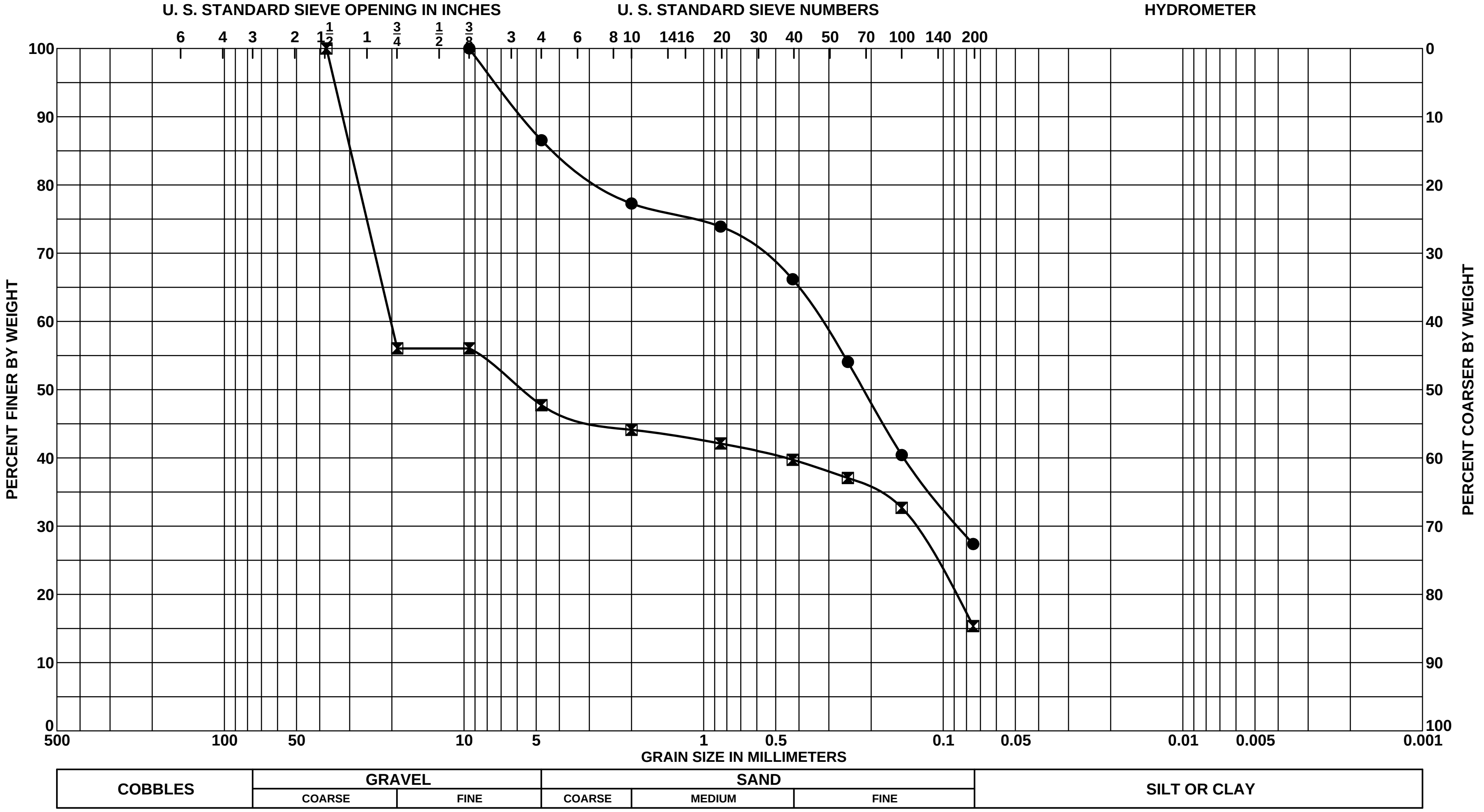
Lat: 30°23.73900' N
Long: 081°30.99070' W
Datum: MLLW

Comment:




MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08-3
DEPTH: 0.0'-6.6'
5
0


MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08-3
DEPTH: 0.0'-6.6'
5



Sample No.		Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	1	2.5 to 3.0 Ft.	(SM)								
⧗	2	5.5 to 6.0 Ft.	(SM)								

GRADATION CURVES

PROJECT	MCSF Blount Island Mil Dredge
	Marine Corps Terminal Channel
BORING NO.	VB-BIMC08-3
BORING ELEV.	-37.2 Ft., MLLW
DATE	08/12/2008

SAJ FORM 2087
JUN 02

VIBRACORE TEST BORING
MCSF Blount Island Mil Dredge
“VB-BIMC08-04”

gInt Boring Log
Penetration Resistance Graph
Sample Photographs
Laboratory Test Results

Boring Designation VB-BIMC08-4

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT
MCSF Blount Island Mil Dredge
Marine Corps Terminal Channel

2. BORING DESIGNATION: VB-BIMC08-4
LOCATION COORDINATES: X = 494,685 Y = 2,203,378

3. DRILLING AGENCY: Challenge Engineering & Testing, Inc.
CONTRACTOR FILE NO.: 2007D16B

4. NAME OF DRILLER: Alpine Ocean Seismic, Inc.

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN N/A

7. DEPTH DRILLED INTO ROCK N/A

8. TOTAL DEPTH OF BORING 8.5 Ft.

9. SIZE AND TYPE OF BIT See Remarks

10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.)
HORIZONTAL: NAD83
VERTICAL: MLLW

11. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Vibracore Unit
☐ AUTO HAMMER
☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED: 2
UNDISTURBED (UD): 0

13. TOTAL NUMBER CORE BOXES 1

14. ELEVATION GROUND WATER Tidal

15. DATE BORING
STARTED: 06-13-08
COMPLETED: 06-13-08

16. ELEVATION TOP OF BORING -37.8 Ft.

17. TOTAL RECOVERY FOR BORING 100 %

18. SIGNATURE AND TITLE OF INSPECTOR
Bob Momberger, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
-37.8	0.0						-37.8		
-38.1	0.3		SAND, silty, mostly fine-grained sand-sized quartz, some silt, wet, 2.5Y 4/3 olive brown (SM)	100			-38.0 Vibracore		
				100	1		Vibracore -38.5		
		Moderately Weathered	LIMESTONE, fossiliferous, very soft, moderately weathered, aphanitic, pitted, clay filled pits, 2.5Y 8/2 pale yellow	100			Vibracore -41.8		
				100	2		-42.3 Vibracore		
				100			Vibracore		
-46.3	8.5						-46.3		

BORING TERMINATED IN REFUSAL

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Vibracore Borings Were Sampled With An Alpine 271 Pneumatic Powered Unit Using A 3 7/8" Clear Lexan Liner To Termination Depth Specified.

4. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION

(Continued)

Boring Designation VB-BIMC08-4

DRILLING LOG (Cont. Sheet)	*INSTALLATION* Jacksonville District	*SHEET* 2 *OF* 2 *SHEETS*

PROJECT MCSF Blount Island Mil Dredge	*COORDINATE SYSTEM/DATUM* State Plane, FLE (U.S. Ft.)	*HORIZONTAL* NAD83	*VERTICAL* MLLW
LOCATION COORDINATES X = 494,685 Y = 2,203,378	*ELEVATION TOP OF BORING* -37.8 Ft.		

ELEV.	*DEPTH*	*LEGEND*	*CLASSIFICATION OF MATERIALS*	*% REC.*	*BOX OR SAMPLE*	*RQD OR UD*	*REMARKS*	*BLOWS/ 1 FT.*	*N-VALUE*
			1 0.2/0.7 SM* 2 4.0/4.5 SM* *Lab visual classification based on gradation curve. No Atterberg limits.						

15

20

25

30

35

Penetration Graph for Core No. VB-BIMC08-04, Run 1

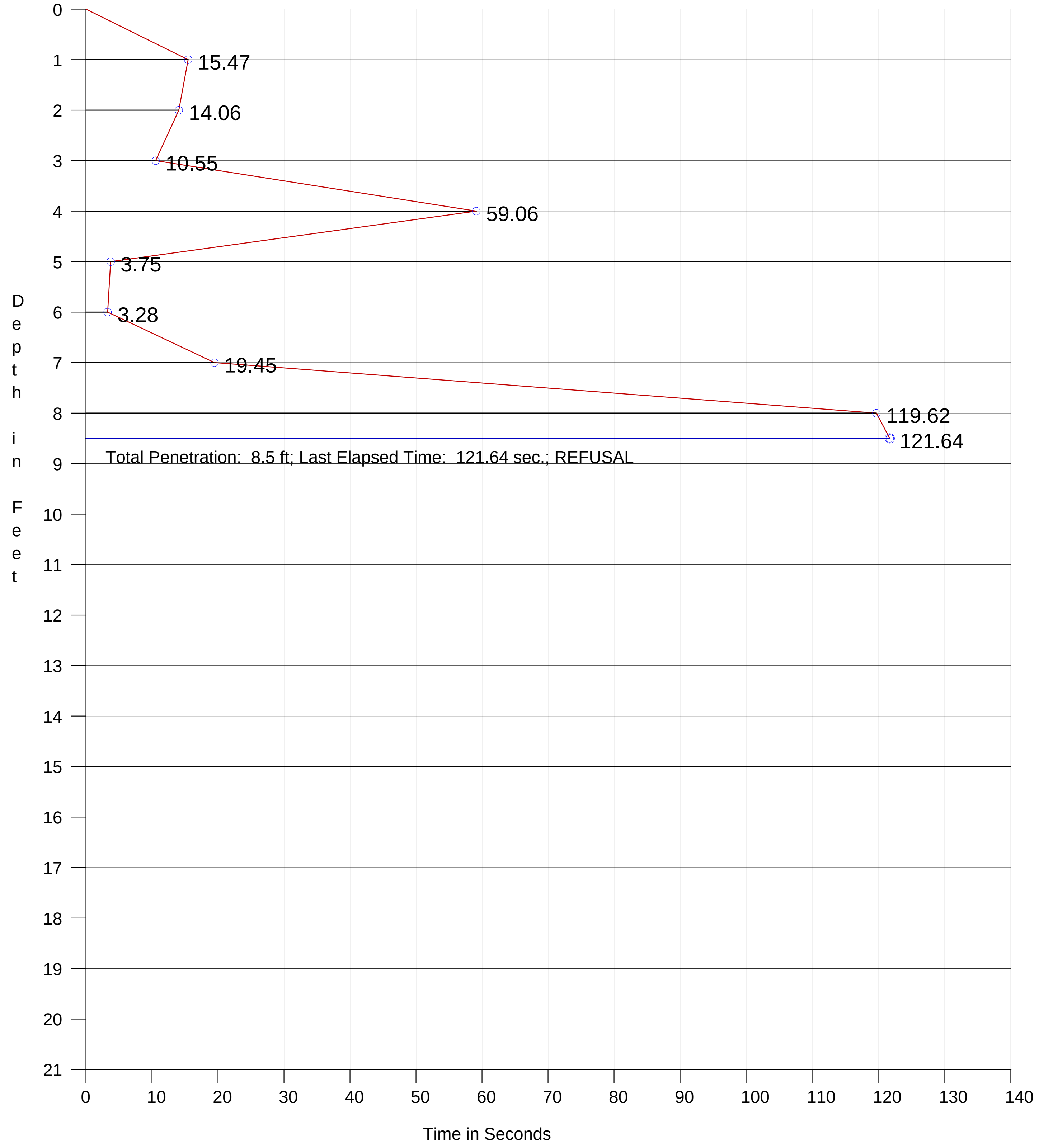
Date: 6/13/2008
Start Time: 3:18:05 PM
End Time: 3:24:48 PM

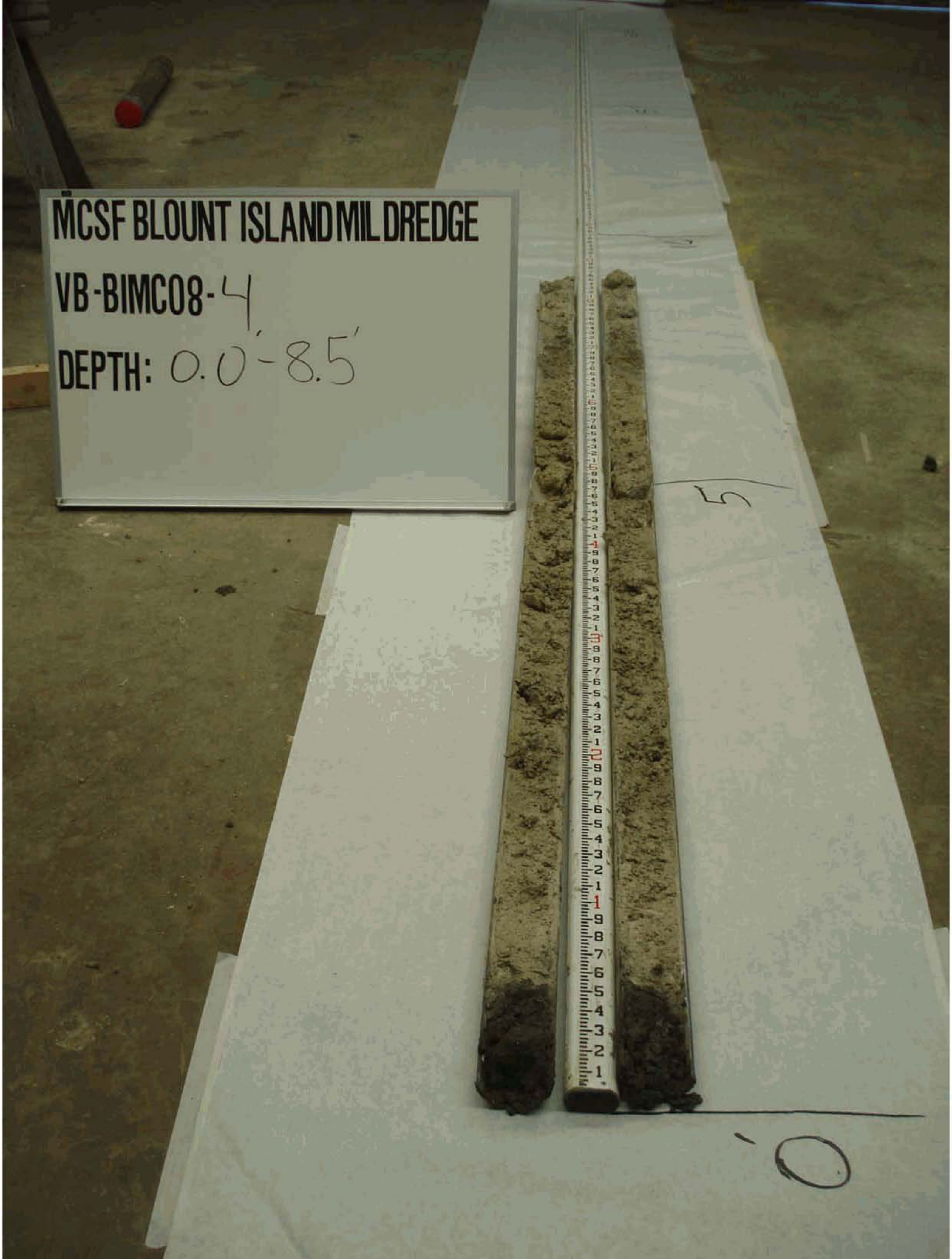
Penetration: 8.50 ft
Recovery: 8.50 ft
W. D. Corrected: -37.80 ft
W. D. Raw: -45.00 ft

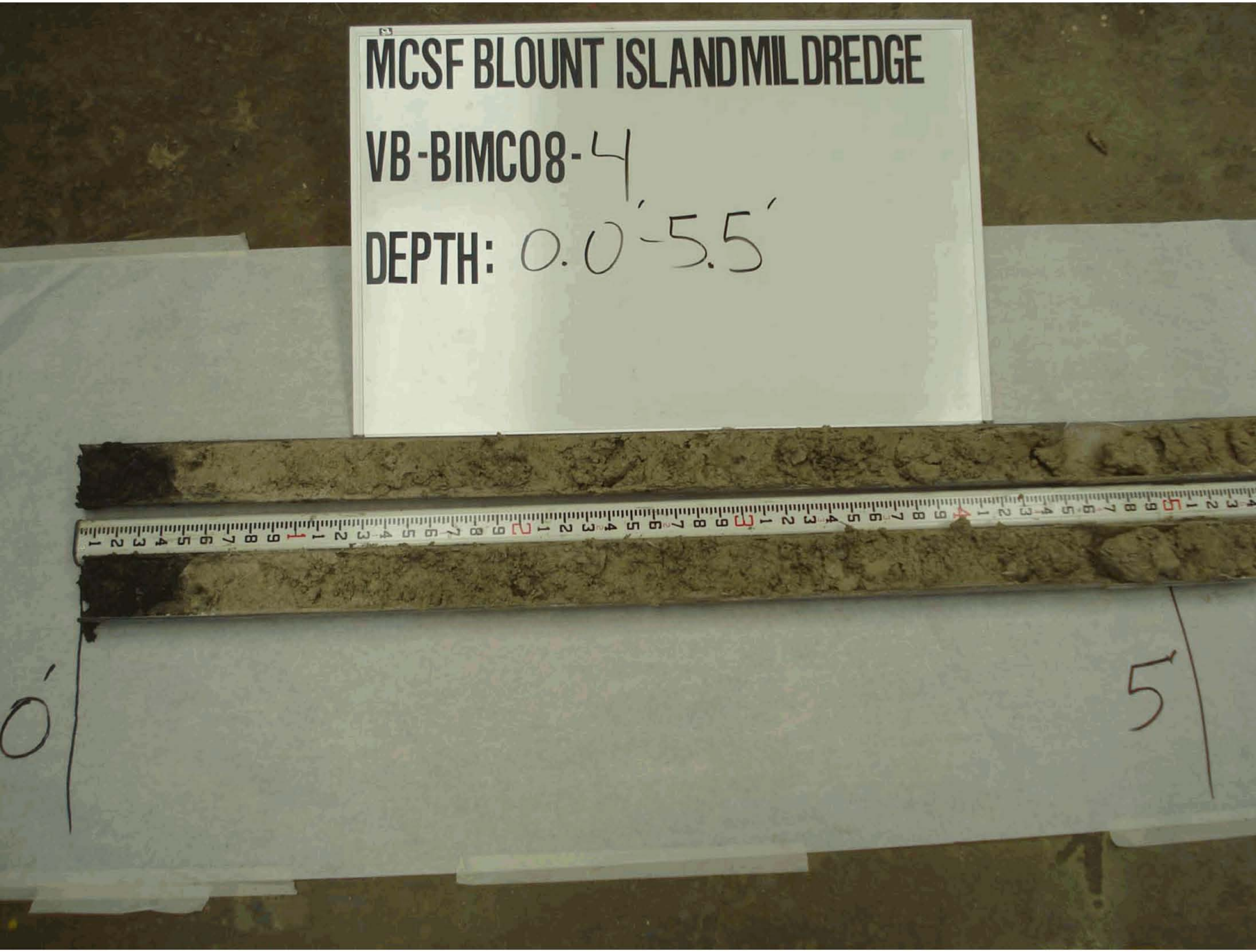
Easting: 494684.95
Northing: 2203378.07
Coord. System: Florida East

Lat: 30°23.60620' N
Long: 081°30.73080' W
Datum: MLLW

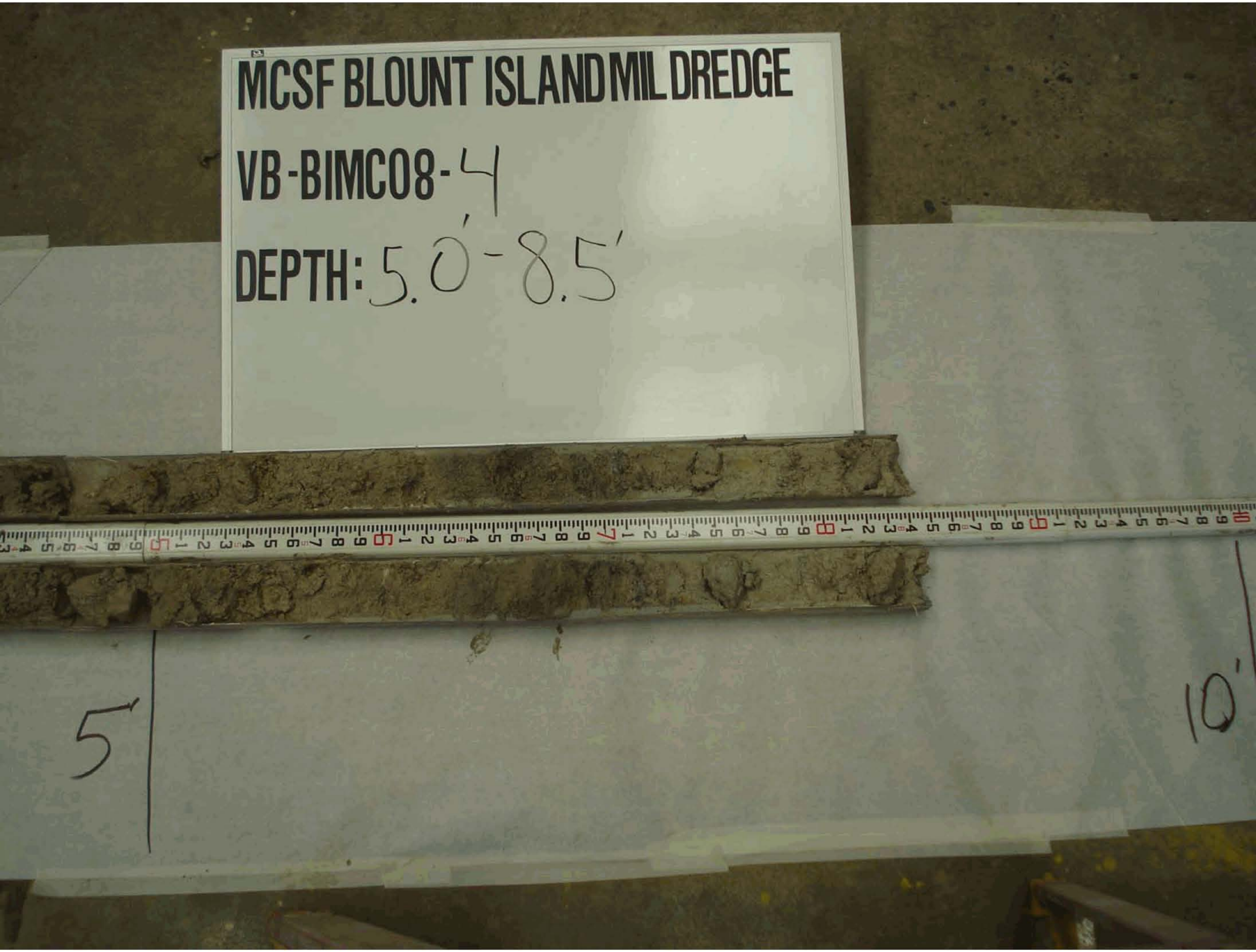
Comment:

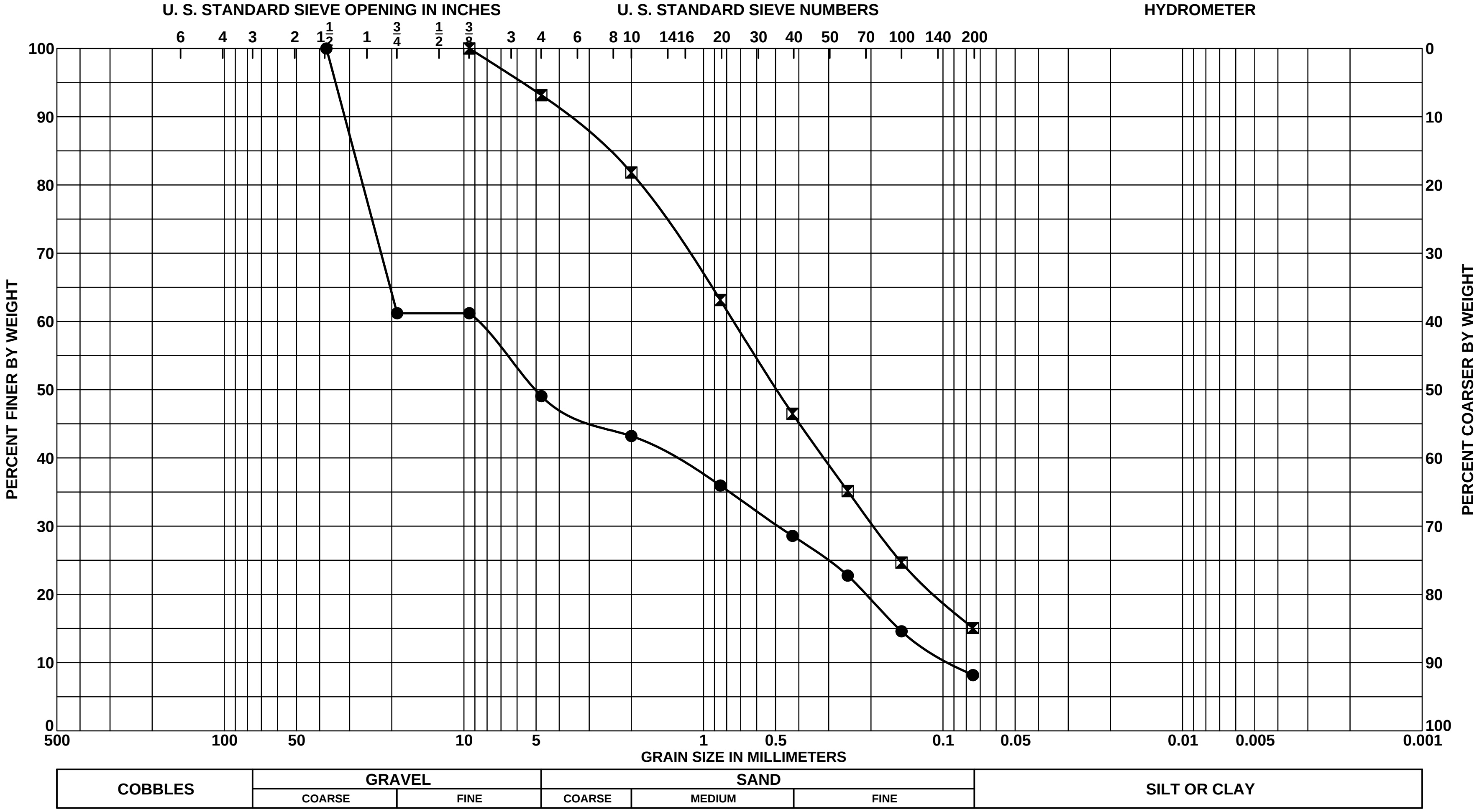



MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08-4
DEPTH: 0.0'-8.5'
5
0



MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08-4
DEPTH: 0.0'-5.5'
0'
5


MCSF BLOUNT ISLAND MIL DREDGE
VB-BIMC08-4
DEPTH: 5.0'-8.5'
5'
10'



Sample No.		Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	1	0.2 to 0.7 Ft.	(SM)								
⧗	2	4.0 to 4.5 Ft.	(SM)								

GRADATION CURVES

PROJECT	MCSF Blount Island Mil Dredge
	Marine Corps Terminal Channel
BORING NO.	VB-BIMC08-4
BORING ELEV.	-37.8 Ft., MLLW
DATE	08/12/2008

SAJ FORM 2087
JUN 02

LABORATORY TEST SUMMARIZATION

SUMMARY OF LABORATORY SOILS TESTS

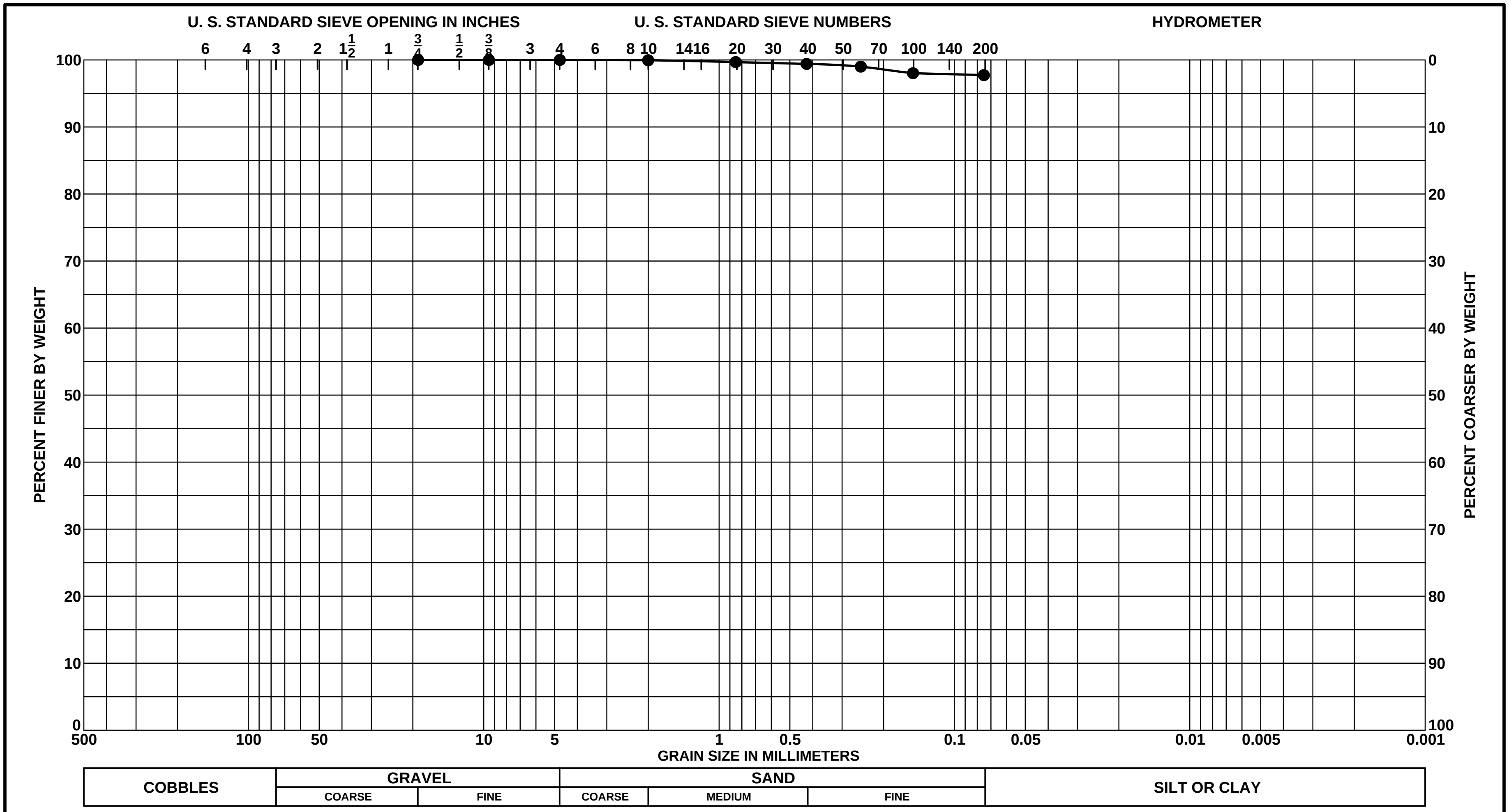
MCSF BLOUNT ISLAND MIL DREDGE PROJECT

U.S. ARMY CORPS OF ENGINEERS - JACKSONVILLE DISTRICT

Core Boring #	Sample Number	Depth (Ft)	Elevation Bottom (Ft)	Elevation Sample (Ft)	Visual % Shell	U.S.C.S Classification
VB-BIMC08-1	1	2	-38.1	-40.1	0	CH
VB-BIMC08-1	2	4	-38.1	-42.1	5	SP
VB-BIMC08-2	1	2.5	-39.6	-42.1	0	CH
VB-BIMC08-2	2	5	-39.6	-44.6	0	SM
VB-BIMC08-3	1	2.5	-37.2	-39.7	5	SM
VB-BIMC08-3	2	5.5	-37.2	-42.7	5	SM
VB-BIMC08-4	1	0.2	-37.8	-38	0	SM
VB-BIMC08-4	2	4	-37.8	-41.8	5	SM

CORE BOX INVENTORY REPORT

```
ENVB-BIMC08-1         MCSF Blount Is~BOX 1 OF 1 BOX; BORING 1 OF 1 BORING; DEPTH 0.0 TO 7.8; BOX ID: 84a   Loca~ 1BX  PITCHFORDKARENEN-GG3295
ENVB-BIMC08-2         MCSF Blount Is~BOX 1 OF 1 BOX; BORING 1 OF 1 BORING; DEPTH 0.0 TO 7.0; BOX ID: 85a   Loca~ 1BX  PITCHFORDKARENEN-GG3295
ENVB-BIMC08-3         MCSF Blount Is~BOX 1 OF 1 BOX; BORING 1 OF 1 BORING; DEPTH 0.0 TO 6.6; BOX ID: 86a   Loca~ 1BX  PITCHFORDKARENEN-GG3295
ENVB-BIMC08-4         MCSF Blount Is~BOX 1 OF 1 BOX; BORING 1 OF 1 BORING; DEPTH 0.0 TO 8.5; BOX ID: 87a   Loca~ 1BX  PITCHFORDKARENEN-GG3295
```



Sample No.	*Depth*	*Classification*	*Munsell*	*CO_3 %*	*G_S*	*Org %*	*w_n*	*LL*	*PL*	*PI*
● 1	0.0 to 8.1 Ft.	CLAY, organic-H, trace fine-grained quartz sand, very dark greenish gray (OH)	10Y 3/1			15	271.2	228	60	168

PROJECT US Marine Corps Support Facility - Blount Island
Deepening & Sill Removal

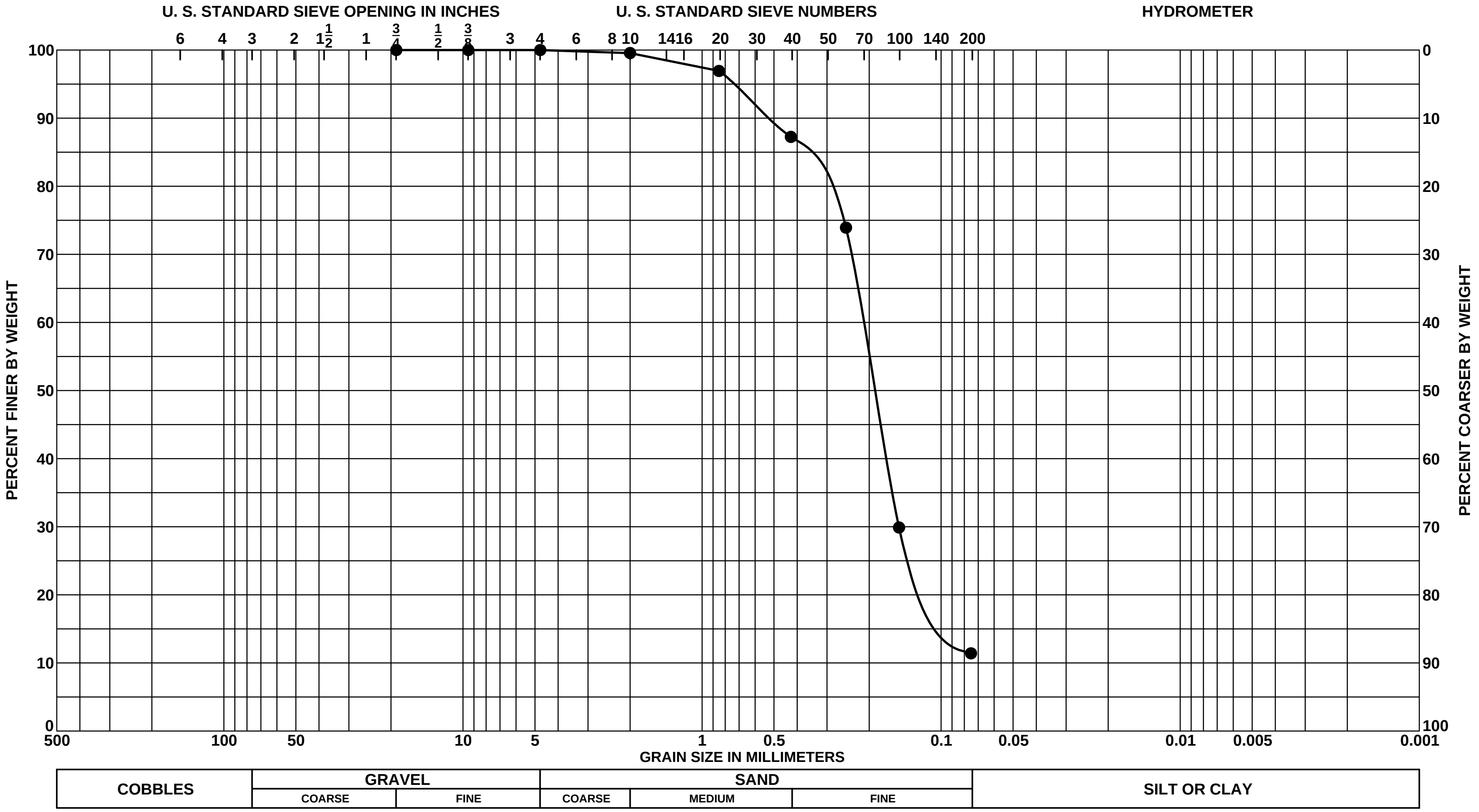
BORING NO. CB-BIMC08-1

BORING ELEV. -35.8 Ft., MLLW

DATE 11/26/2008

GRADATION CURVES

SAJ FORM 2087
JUN 02

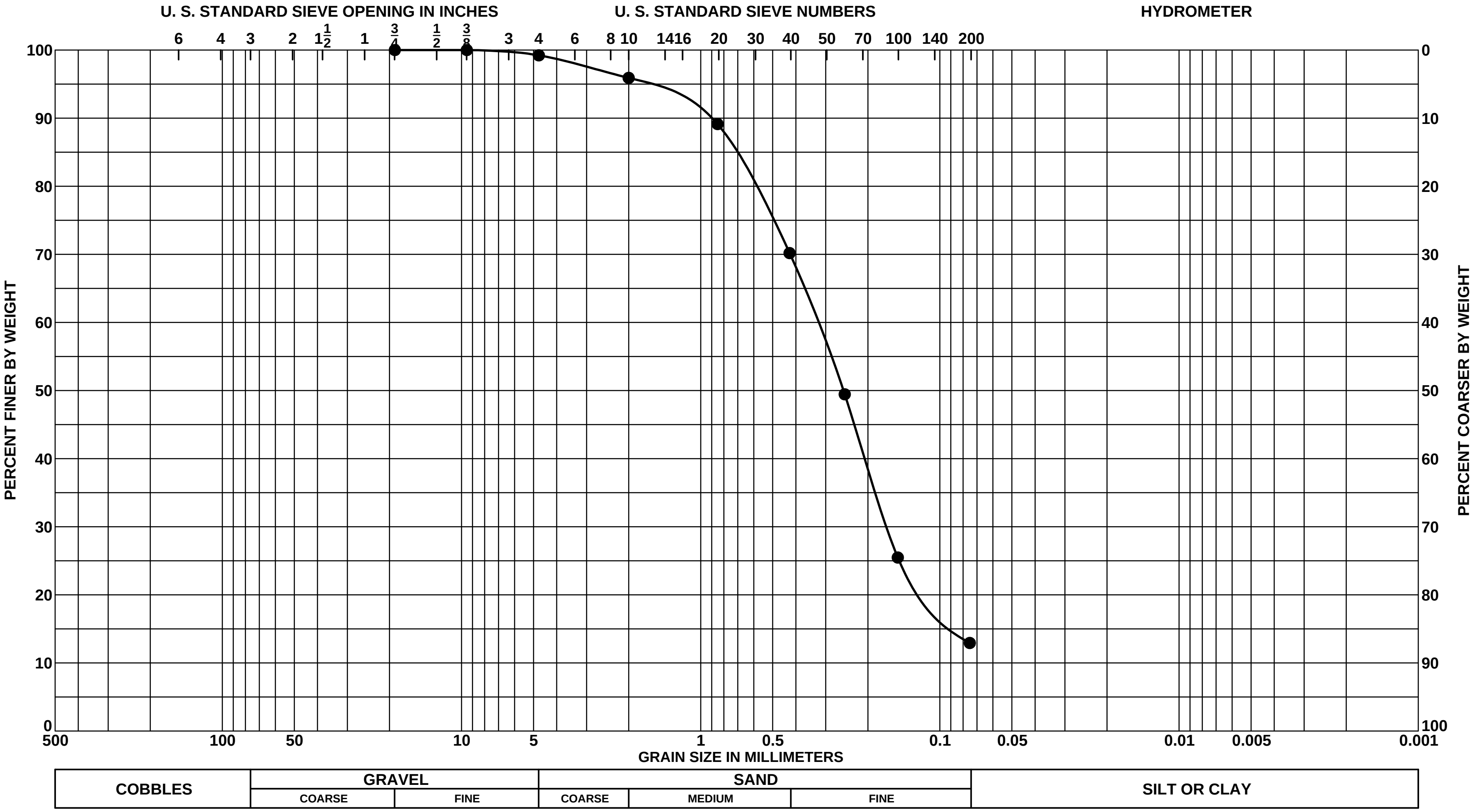


Sample No.	Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
● 2	8.1 to 10.2 Ft.	SAND, poorly-graded with silt, mostly medium to fine-grained quartz, few silt, light yellowish brown (SP-SM)	2.5Y 6/3		2.63					

GRADATION CURVES

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-1
BORING ELEV.	-35.8 Ft., MLLW
DATE	11/26/2008

SAJ FORM 2087
JUN 02



Sample No.		Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
●	4	11.2 to 11.7 Ft.	SAND, silty, mostly medium to fine-grained quartz, little silt, few fine-gravel to medium sand-size limerock fragments, light olive brown (SM)	2.5Y 5/3							

GRADATION CURVES

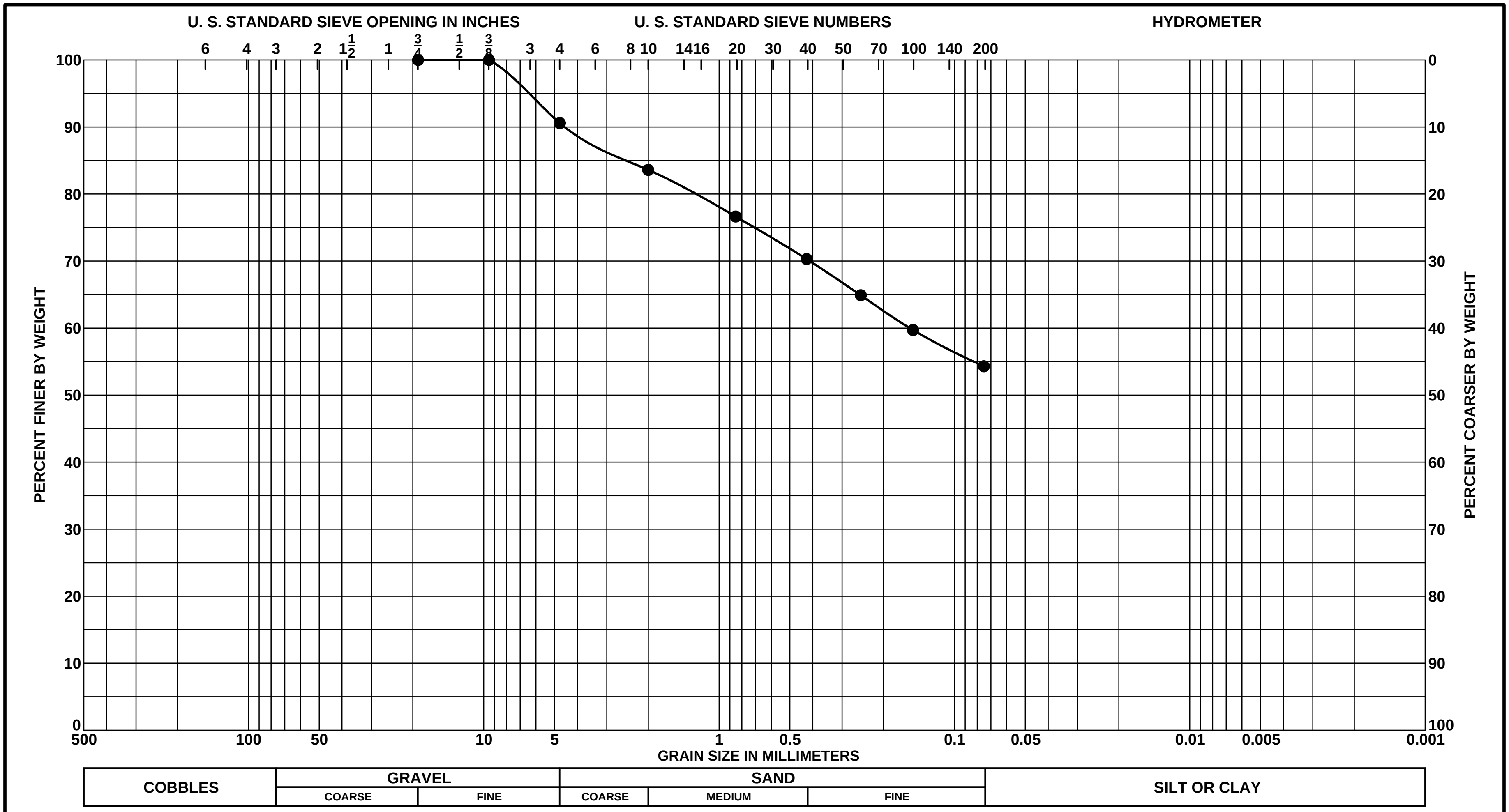
PROJECT US Marine Corps Support Facility - Blount Island Deepening & Sill Removal

BORING NO. CB-BIMC08-1

BORING ELEV. -35.8 Ft., MLLW

DATE 11/26/2008

SAJ FORM 2087
JUN 02

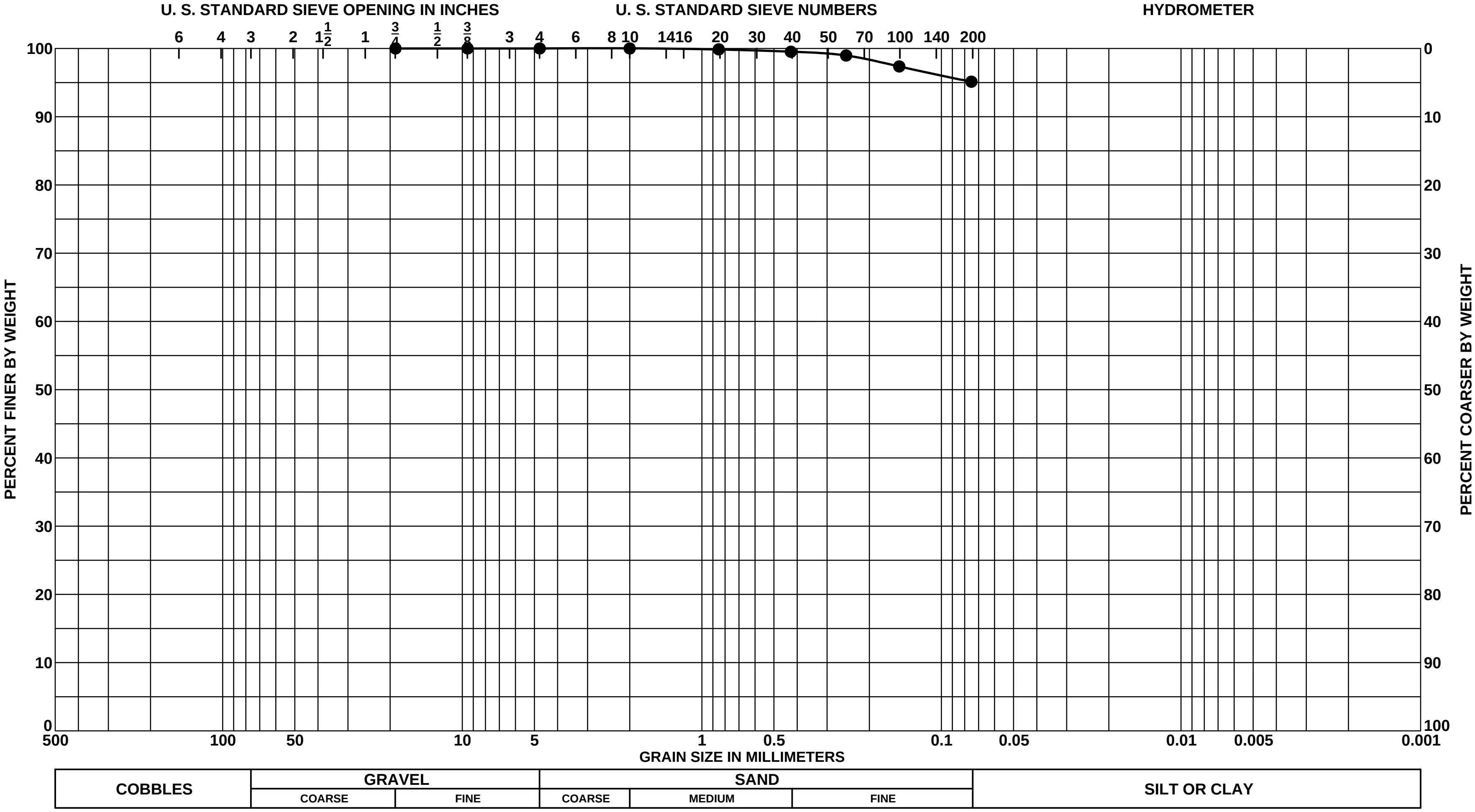


Sample No.		Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	6	14.5 to 16.0 Ft.	SILT, inorganic-H, little fine-gravel to medium sand-size limerock fragments, little fine-grained quartz, light olive brown (MH)	2.5Y 5/6							

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-1
BORING ELEV.	-35.8 Ft., MLLW
DATE	11/26/2008

GRADATION CURVES

SAJ FORM 2087
JUN 02

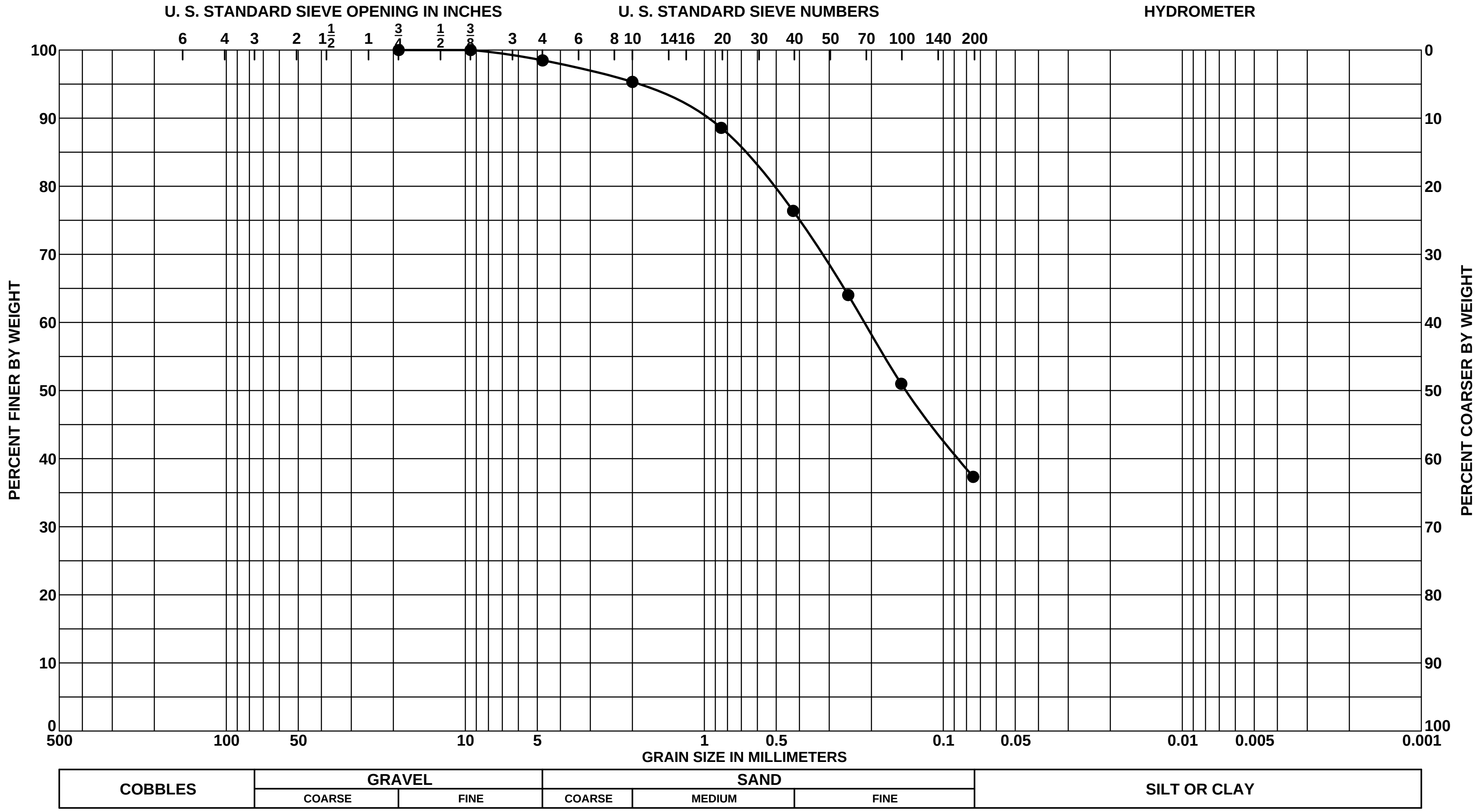


Sample No.	Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
● 1	0.0 to 8.4 Ft.	CLAY, organic-H, trace fine-grained	N 3/		2.62			228	65	163
		quartz sand, very dark gray (OH)								

PROJECT	US Marine Corps Support Facility - Blount Island
	Deepening & Sill Removal
BORING NO.	CB-BIMC08-2
BORING ELEV.	-35.0 Ft., MLLW
DATE	11/26/2008

GRADATION CURVES

SAJ FORM 2087
JUN 02



Sample No.		Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	4	13.4 to 14.9 Ft.	SAND, silty, some silt, some	10YR 7/4							
			fine-gravel to medium sand-size								
			limerock fragments, little medium to								
			fine-grained quartz, very pale brown								
			(SM)								

GRADATION CURVES

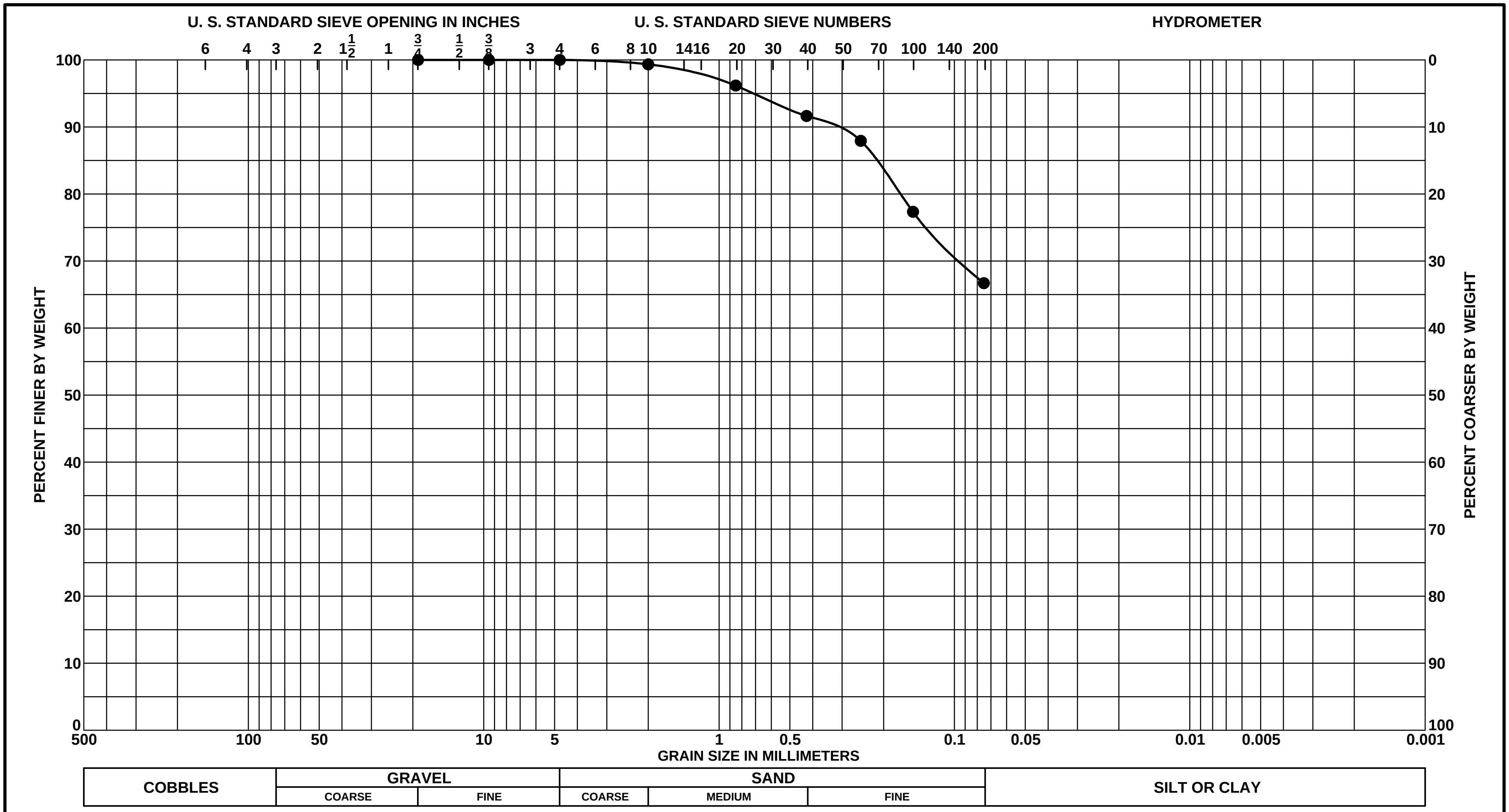
PROJECT US Marine Corps Support Facility - Blount Island
Deepening & Sill Removal

BORING NO. CB-BIMC08-2

BORING ELEV. -35.0 Ft., MLLW

DATE 11/26/2008

SAJ FORM 2087
JUN 02

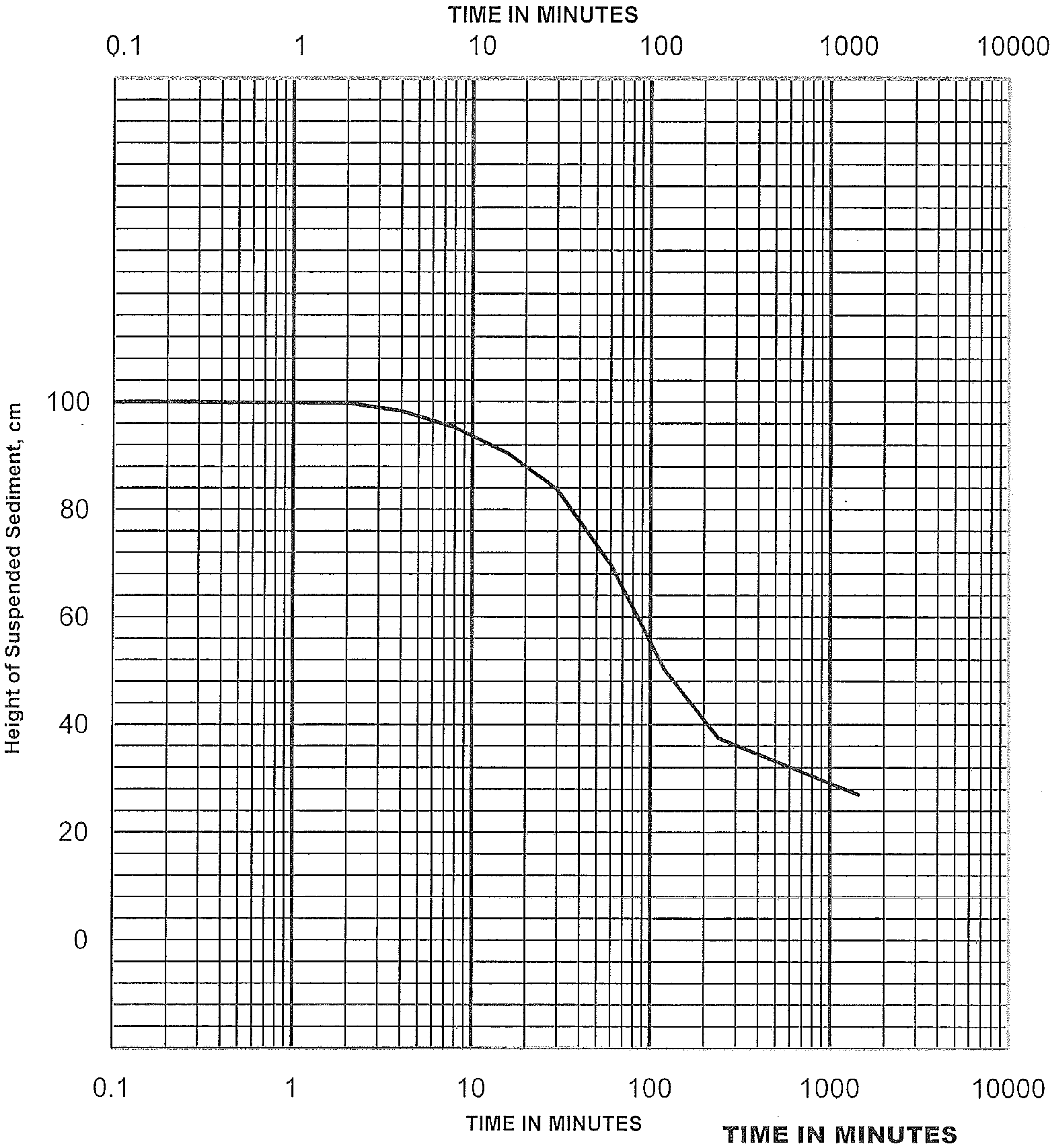


Sample No.		Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
●	1	0.0 to 4.7 Ft.	CLAY, organic-H, trace fine-grained	N 3/					202	59	143
			quartz sand, very dark gray (OH)								

GRADATION CURVES

PROJECT US Marine Corps Support Facility - Blount Island
Deepening & Sill Removal
BORING NO. CB-BIMC08-3
BORING ELEV. -38.8 Ft., MLLW
DATE 11/26/2008

SAJ FORM 2087
JUN 02



FINAL CONCENTRATION: 370 grams per liter

PROJECT Task #96 USMC Support Facility

AREA

BORING NO. CB-BIMC08-3	SAMPLE NO. 1	ELEV., FT.	TO	DATE 24-Nov-08

SUSPENDED SEDIMENT - TIME CURVES

SAD FORM 3023

SEDIMENTATION RATE TEST DATA

Project Name:	Task #96 USMC Support Facility		
Area:			
Boring No:	CB-BIMC08-3		
Sample No.:	1	Date:	24-Nov-08
Sample Elev. Range, Feet:		To	
Wolf/WPC Project No.:	WPC6308.00115		

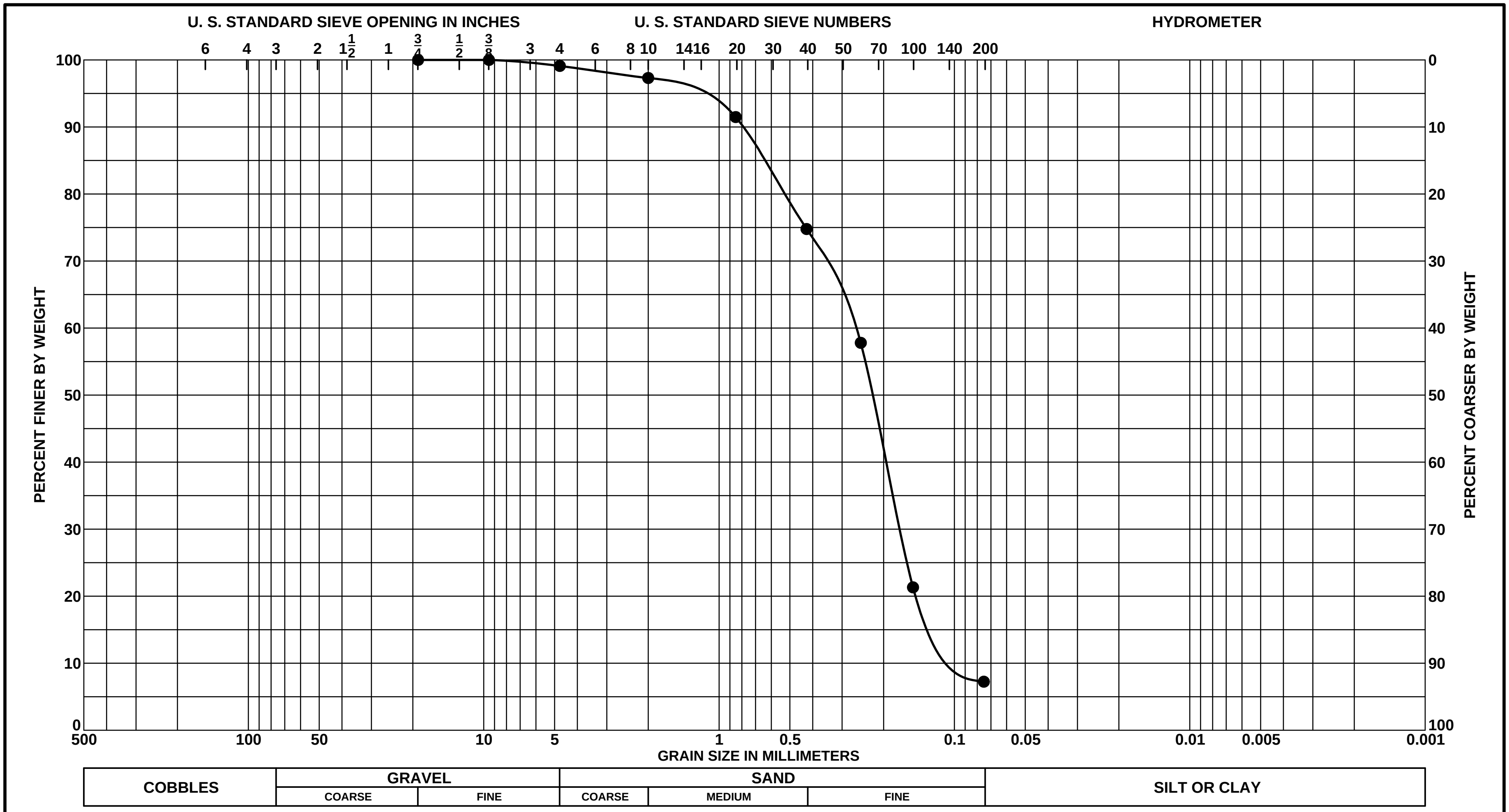
Starting Time: 6:28

Time	Elapsed Time, Minutes	Height of Suspended Solids, cm
6:28:06	0.1	100
6:28:15	0.25	100
6:28:30	0.5	99.9
6:29:00	1	99.9
6:30:00	2	99.8
6:32:00	4	98.3
6:36:00	8	95.3
6:44:00	16	90.4
6:58:00	30	83.7
7:28:00	60	69.7
8:28:00	120	50.2
10:28:00	240	37.5
6:28:00	1440	27

FINAL CONCENTRATION: 370 **grams per liter**

Testing By:____ CRM **Date Completed:**

Checked By:____________________ **Date:**____________________



Sample No.		Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
●	3	8.2 to 9.7 Ft.	SAND, poorly-graded with silt, mostly medium to fine-grained quartz, few fine-gravel to medium sand-size shell, light brownish gray (SP-SM)	10YR 6/2	4/5 (est)						

GRADATION CURVES

PROJECT US Marine Corps Support Facility - Blount Island Deepening & Sill Removal

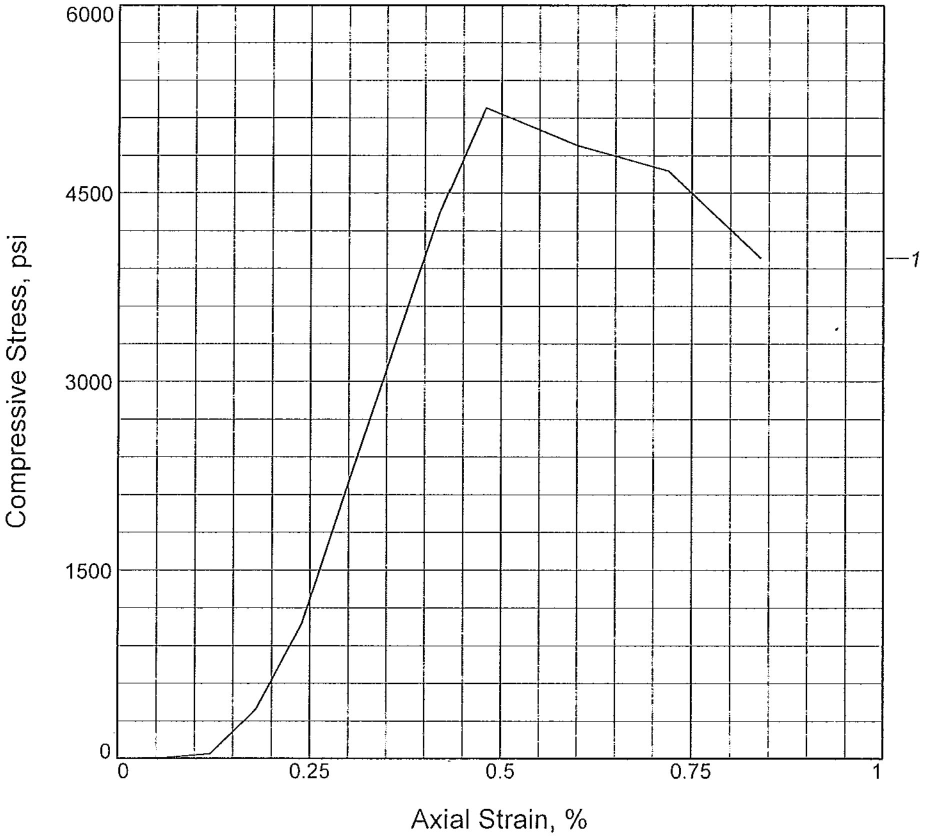
BORING NO. CB-BIMC08-3

BORING ELEV. -38.8 Ft., MLLW

DATE 11/26/2008

SAJ FORM 2087
JUN 02

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	5180.61			
Undrained shear strength, psi	2590.30			
Failure strain, %	0.5			
Strain rate, in./min.	0.20			
Water content, %	4.2			
Wet density, pcf	135.6			
Dry density, pcf	130.1			
Saturation, %	41.1			
Void ratio	0.2713			
Specimen diameter, in.	3.95			
Specimen height, in.	8.34			
Height/diameter ratio	2.11			

Description: Rock Core

LL =	**PL =**	**PI =**	**GS=** 2.65	**Type:** Core

Project No.: 6308.00115
Date Sampled:
Remarks:

Figure _______

Client: USACE

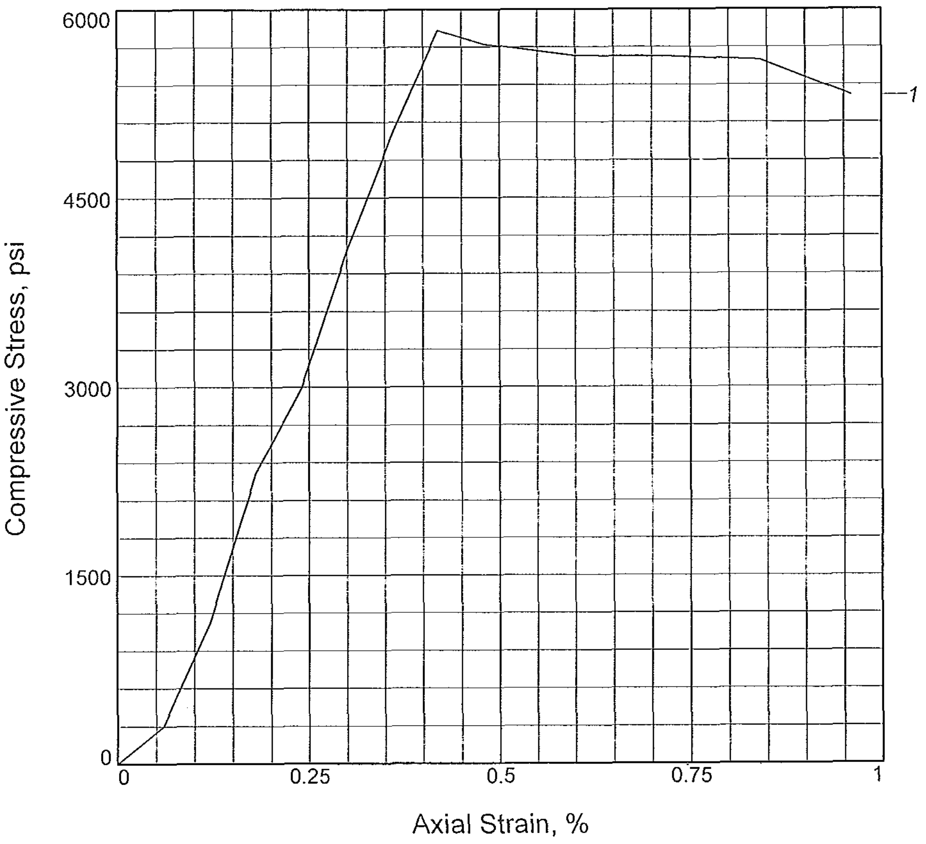
Project: USMC Support Facility

Location: CB-BIMC08-4
Depth: 2.6'- 3.65'

UNCONFINED COMPRESSION TEST
WPC

Tested By: C. Martin

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	5832.28			
Undrained shear strength, psi	2916.14			
Failure strain, %	0.4			
Strain rate, in./min.	0.20			
Water content, %	4.2			
Wet density, pcf	139.4			
Dry density, pcf	133.8			
Saturation, %	47.1			
Void ratio	0.2363			
Specimen diameter, in.	3.97			
Specimen height, in.	8.33			
Height/diameter ratio	2.10			

Description: Rock Core

LL = **PL =** **PI =** **GS=** 2.65 **Type:** core

Project No.: 6308.00115
Date Sampled:
Remarks:

Figure _______

Client: USACE

Project: USMC Support Facility

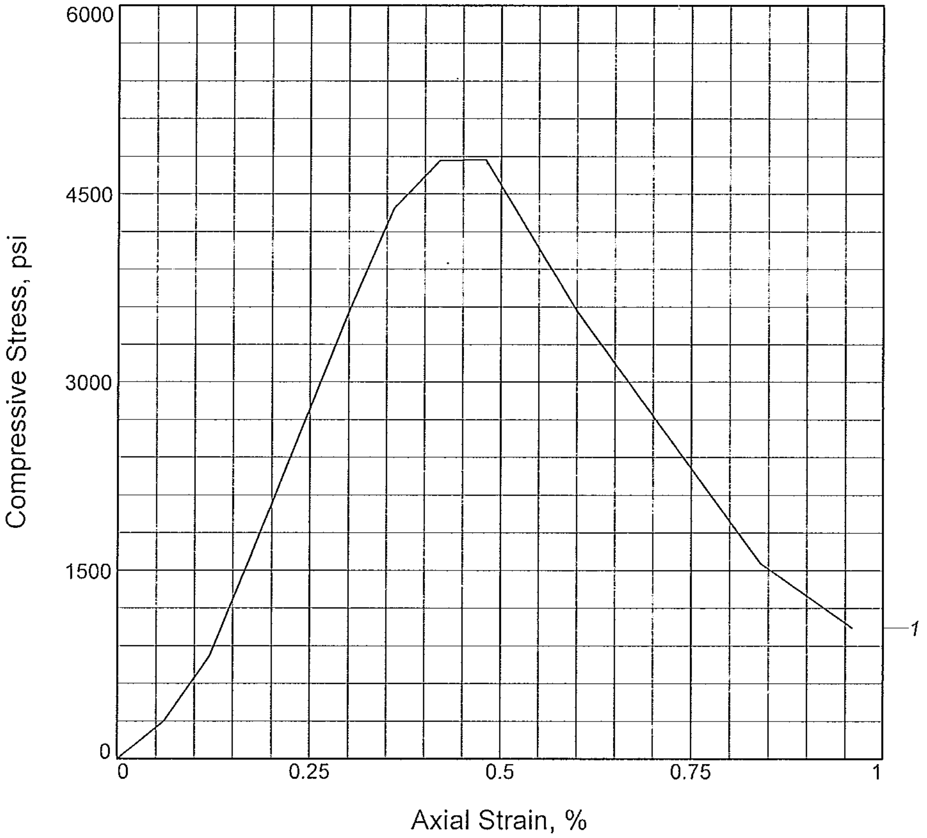
Location: CB-BIMC08-4
Depth: 10.4'- 11.6'

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	4773.73			
Undrained shear strength, psi	2386.86			
Failure strain, %	0.5			
Strain rate, in./min.	0.05			
Water content, %	4.6			
Wet density, pcf	136.8			
Dry density, pcf	130.7			
Saturation, %	46.2			
Void ratio	0.2657			
Specimen diameter, in.	3.95			
Specimen height, in.	8.34			
Height/diameter ratio	2.11			

Description: Rock Core

LL =	**PL =**	**PI =**	**GS=** 2.65	**Type:**

Project No.: 6308.00115
Date Sampled:
Remarks:

Figure ________

Client: USACE

Project: USMC Support Facility

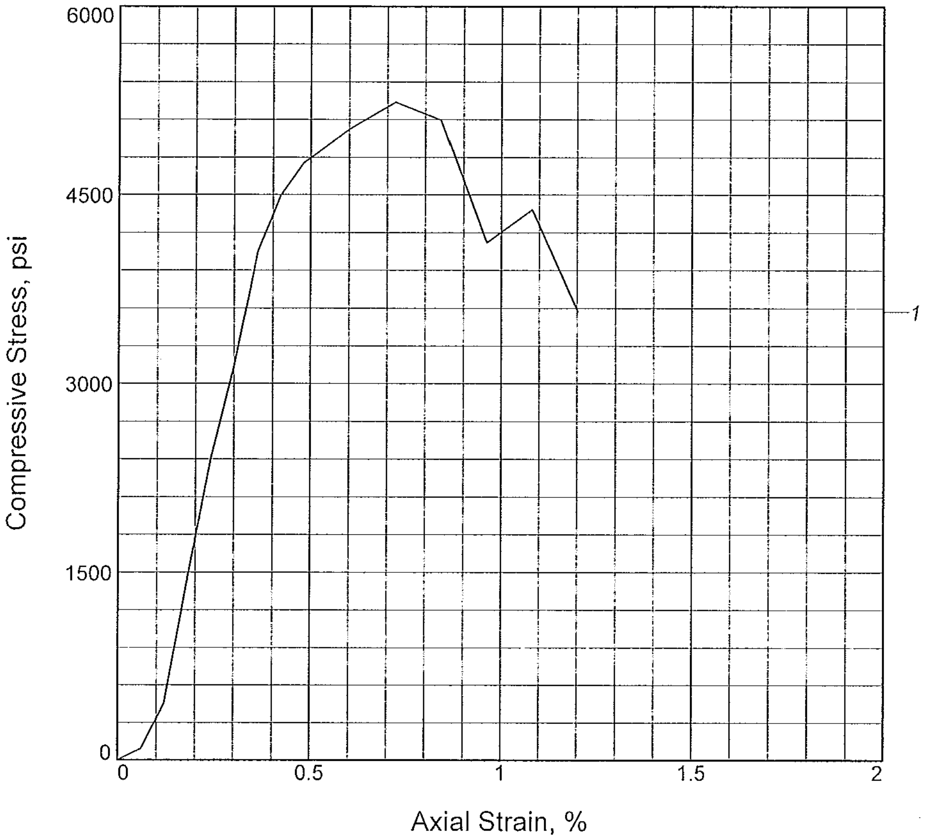
Location: CB-BIMC08-5
Depth: 1.7'- 2.6'

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	5239.50			
Undrained shear strength, psi	2619.75			
Failure strain, %	0.7			
Strain rate, in./min.	0.08			
Water content, %	4.9			
Wet density, pcf	133.8			
Dry density, pcf	127.6			
Saturation, %	43.4			
Void ratio	0.2961			
Specimen diameter, in.	3.96			
Specimen height, in.	8.32			
Height/diameter ratio	2.10			

Description: Rock Core

LL =	**PL =**	**PI =**	**GS=** 2.65	**Type:** Core

Project No.: 6308.00115

Date Sampled:

Remarks:

Figure ________

Client: USACE

Project: USMC Support Facility

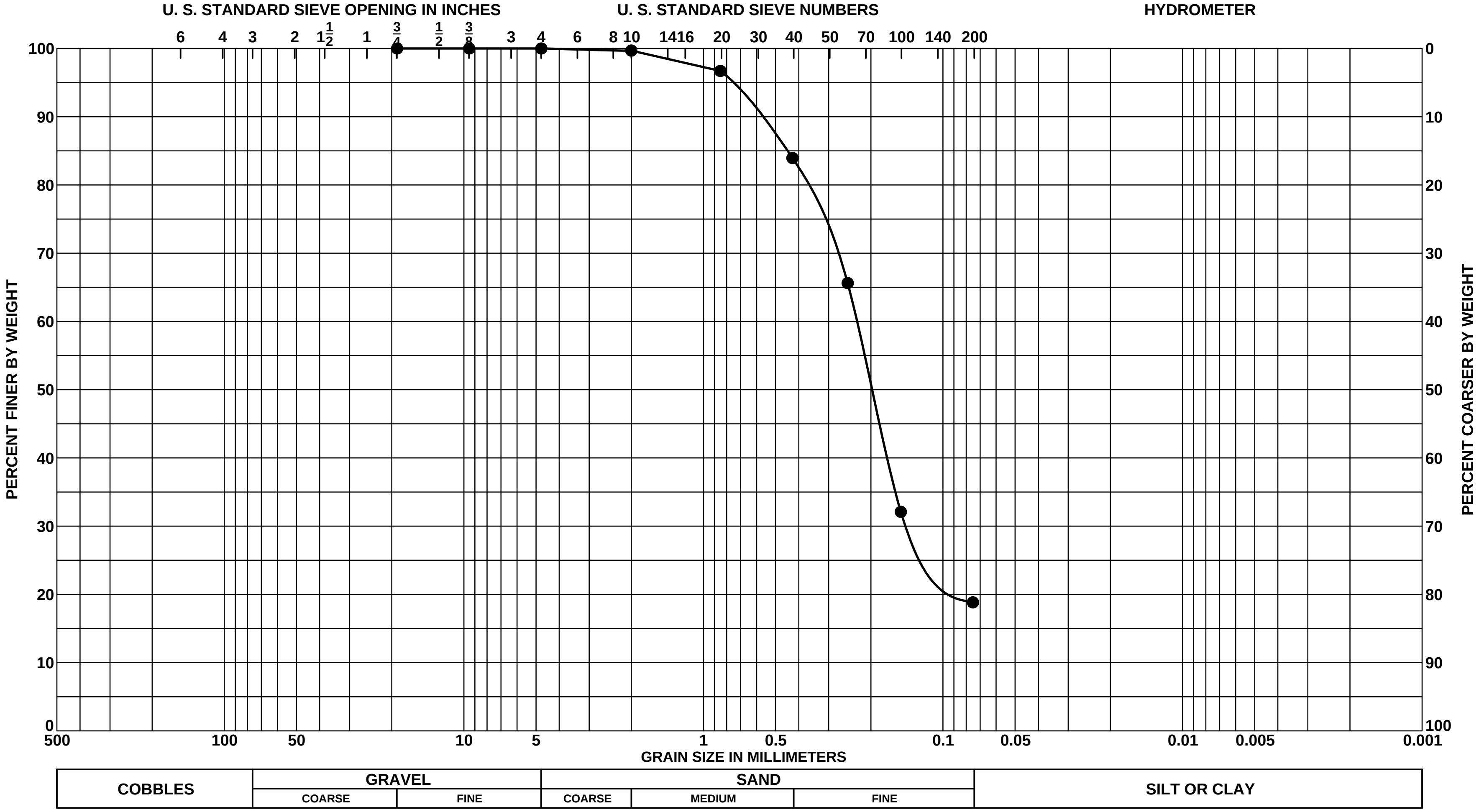
Location: CB-BIMC08-5

Depth: 12.9'- 13.95

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin

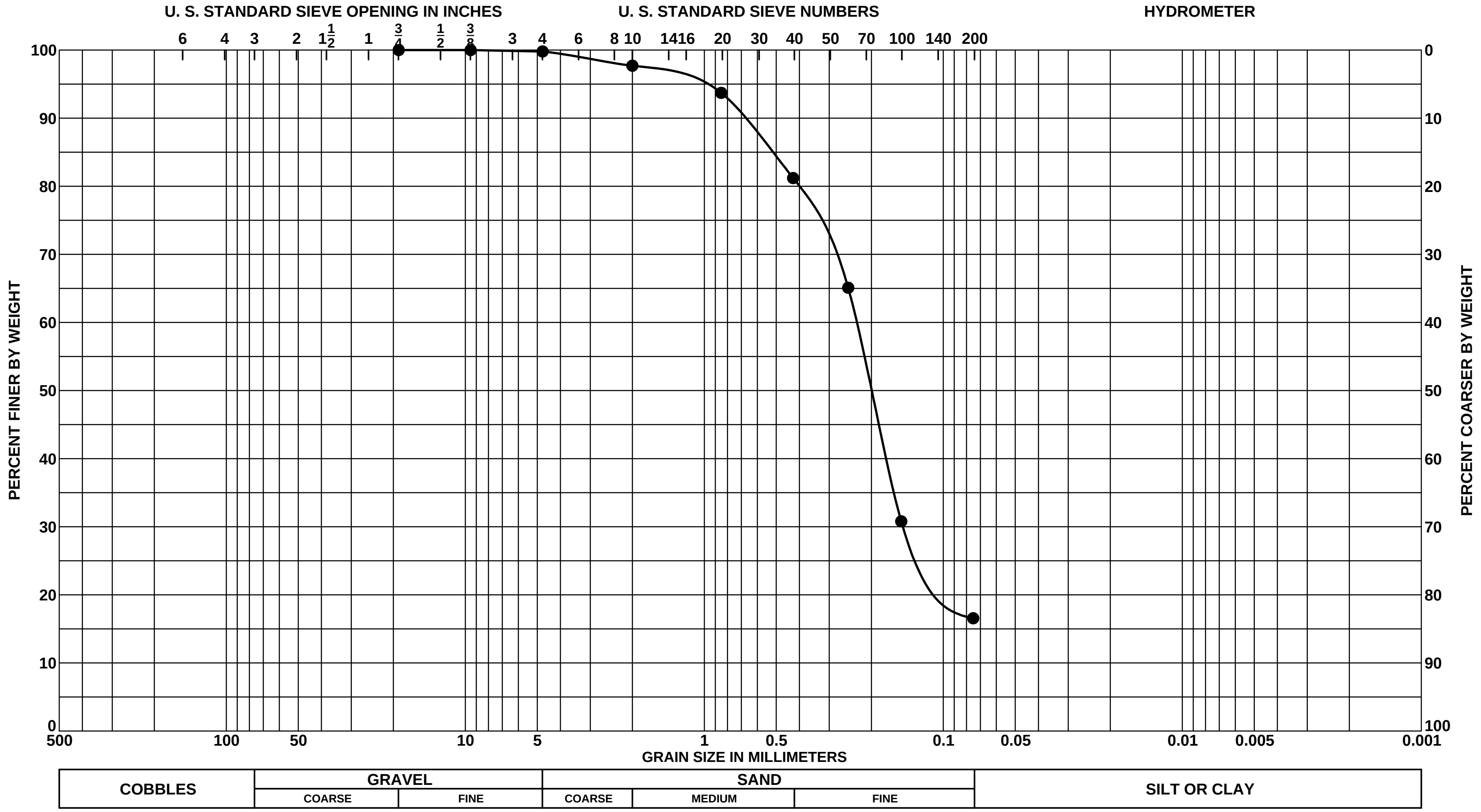


Sample No.		Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
●	2	5.1 to 6.6 Ft.	SAND, silty, mostly fine-grained quartz, little silt, little coarse to medium sand-size shell fragments, dark gray (SM)	5Y 4/1					0	0	NP

GRADATION CURVES

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-6
BORING ELEV.	-38.3 Ft., MLLW
DATE	11/26/2008

SAJ FORM 2087
JUN 02

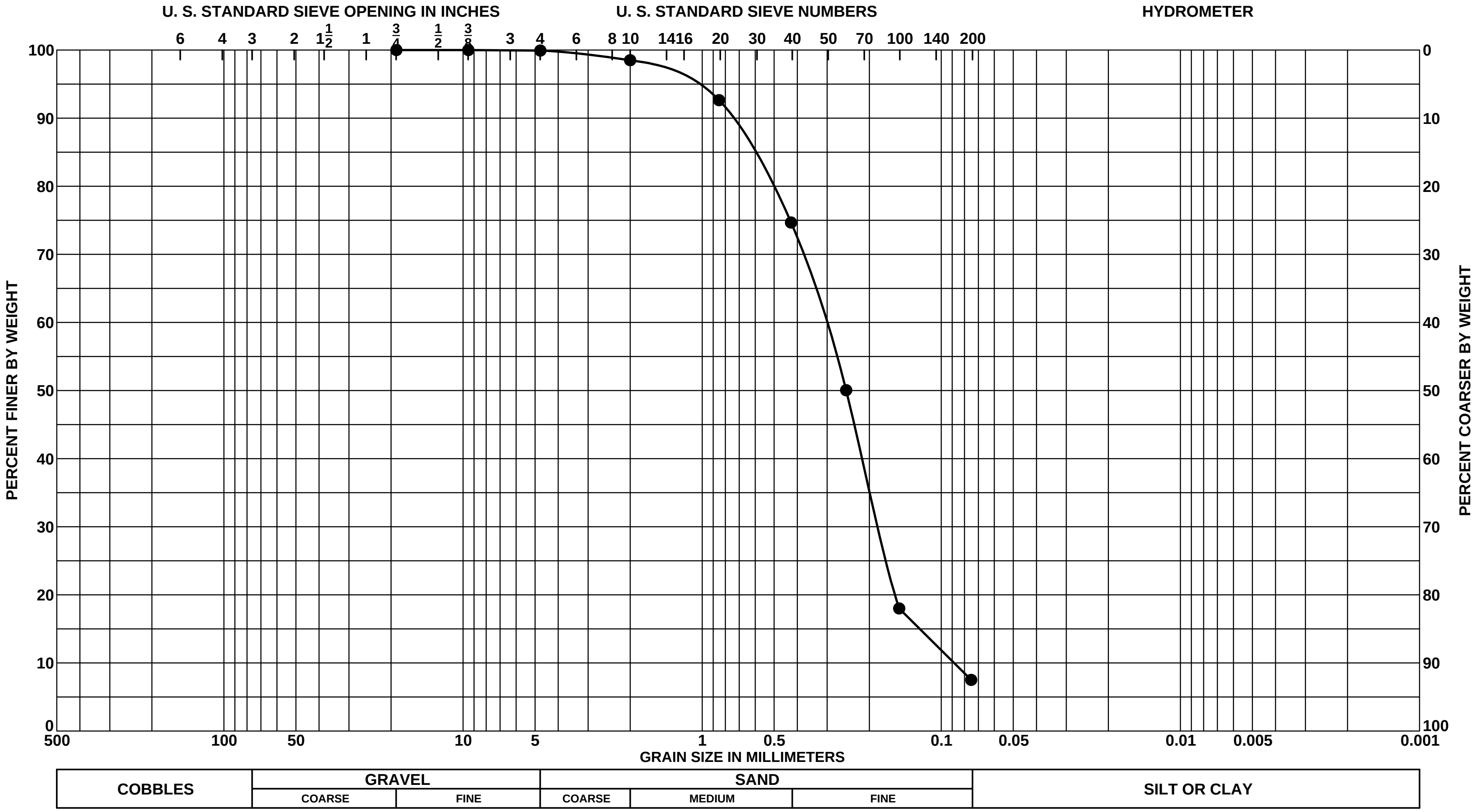


Sample No.	*Depth*	*Classification*	*Munsell*	*CO_3 %*	*G_s*	*Org %*	*w_n*	*LL*	*PL*	*PI*
● 3	6.6 to 8.1 Ft.	SAND, silty, mostly fine-grained quartz, little fine-gravel to medium sand-size shell fragments, little silt, dark gray (SM)	5Y 4/1							

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-6
BORING ELEV.	-38.3 Ft., MLLW
DATE	11/26/2008

GRADATION CURVES

SAJ FORM 2087
JUN 02

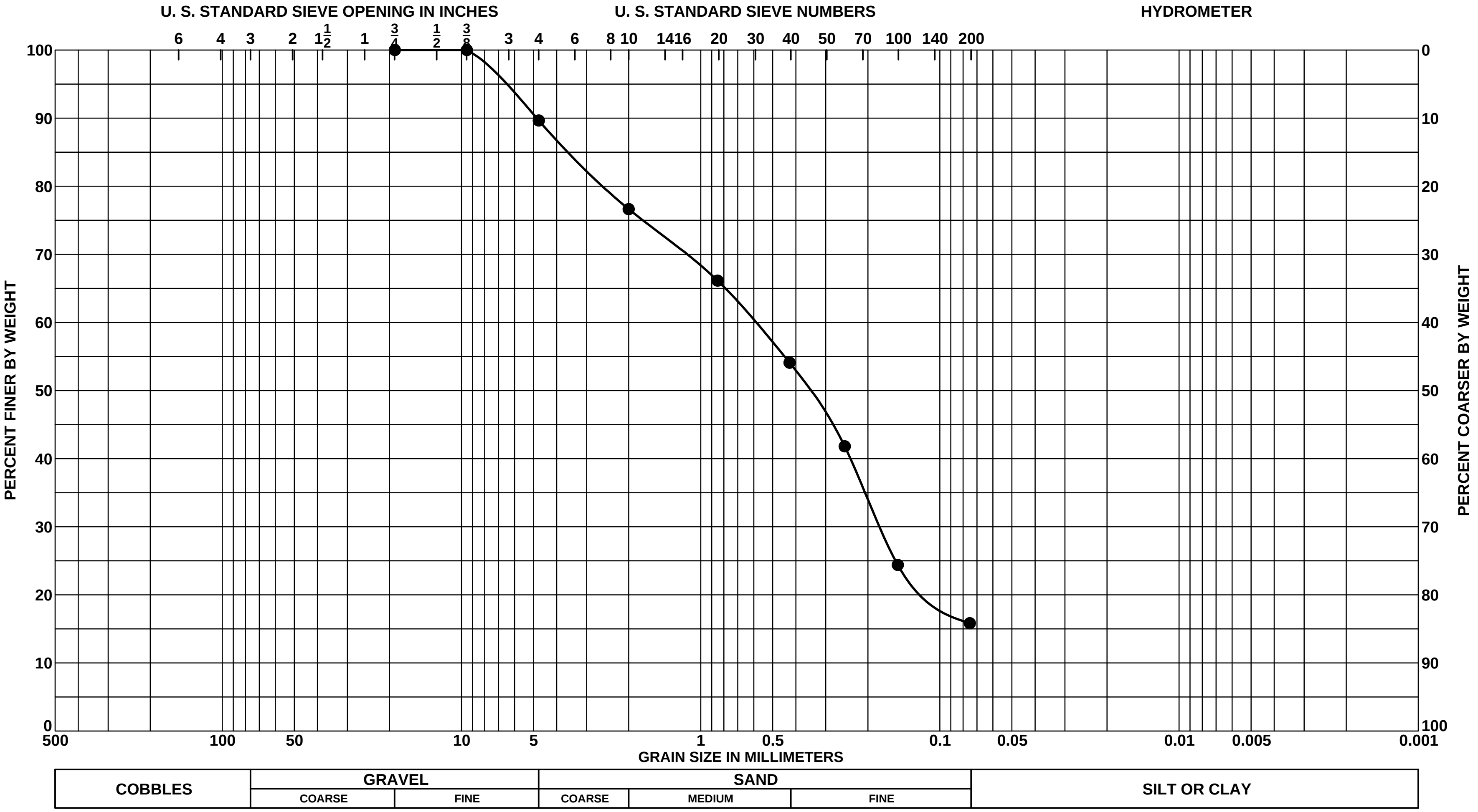


Sample No.	Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
● 5	10.7 to 12.2 Ft.	SAND, poorly-graded with silt, mostly medium to fine-grained quartz, few silt, trace limerock fragments, olive gray (SP-SM)	5Y 4/2							

GRADATION CURVES

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-6
BORING ELEV.	-38.3 Ft., MLLW
DATE	11/26/2008

SAJ FORM 2087
JUN 02

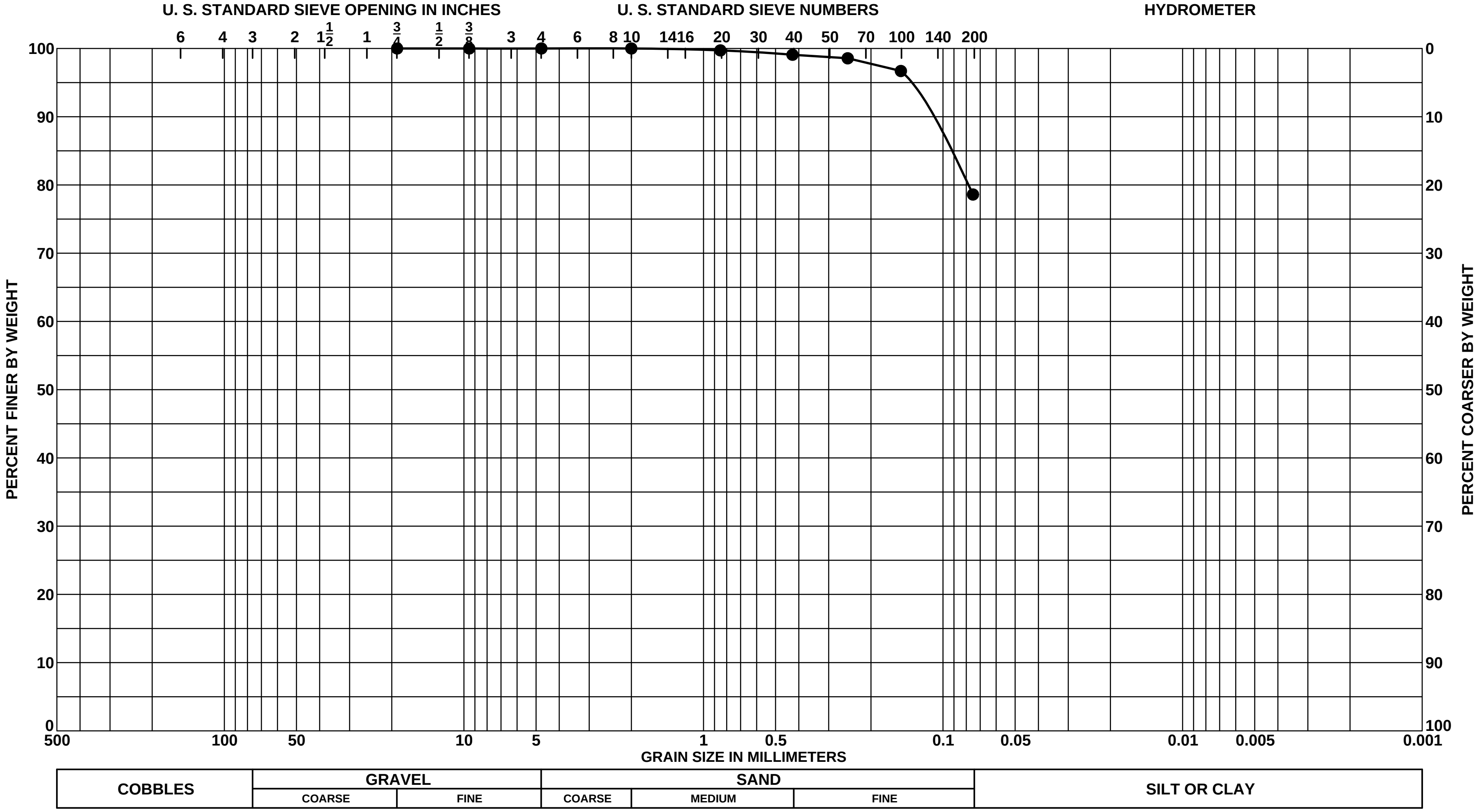


Sample No.	Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
● 3	7.3 to 8.8 Ft.	SAND, silty, some fine-gravel to medium sand-size limerock fragments, little fine-grained quartz, little silt, olive gray (SM)	5Y 4/2							

GRADATION CURVES

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-7
BORING ELEV.	-38.3 Ft., MLLW
DATE	11/26/2008

SAJ FORM 2087
JUN 02



Sample No.	Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
● 1	0.0 to 6.4 Ft.	CLAY, organic-H, trace fine-grained quartz sand, very dark gray (OH)	N 3/					172	50	122

PROJECT US Marine Corps Support Facility - Blount Island Deepening & Sill Removal

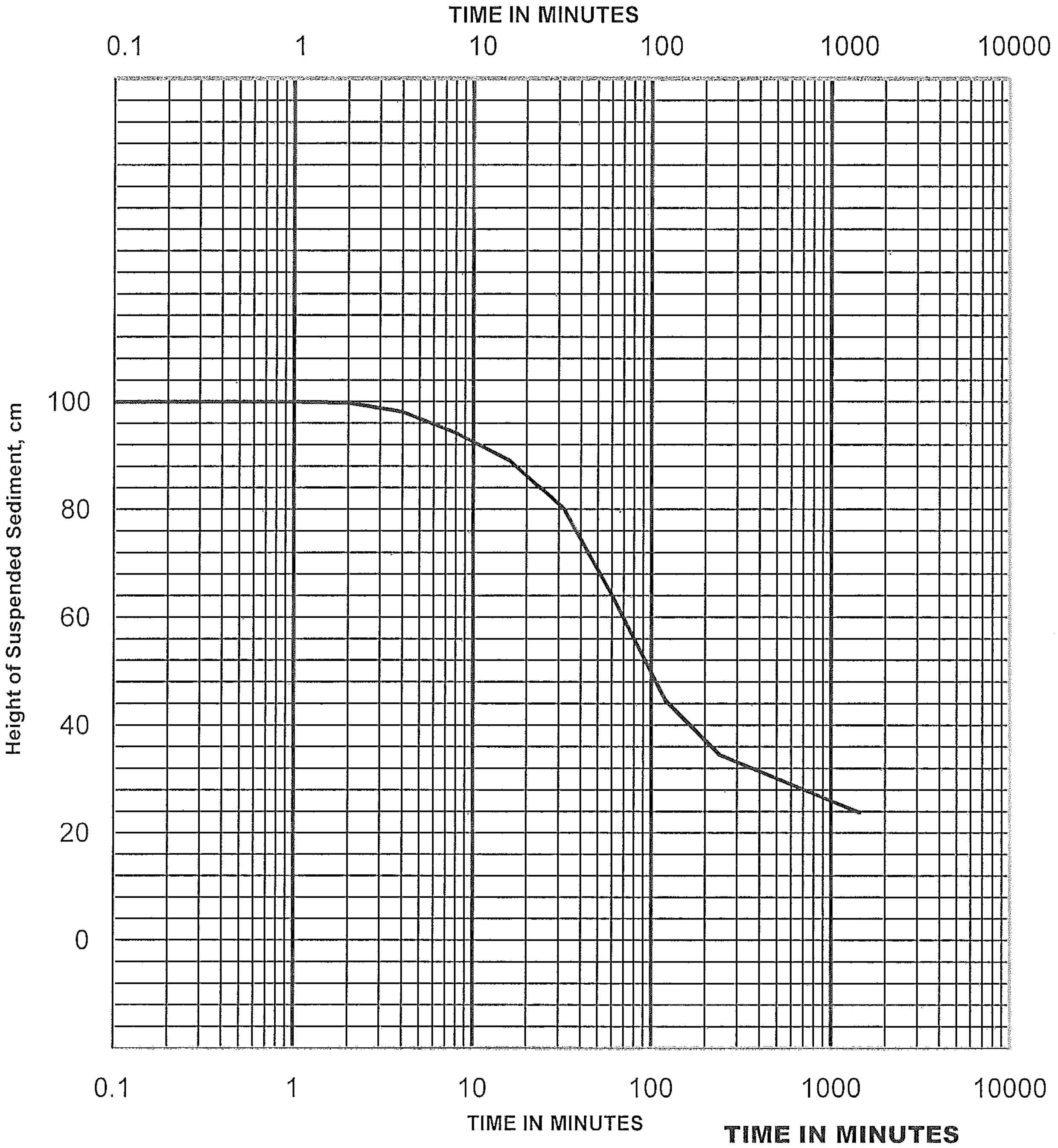
BORING NO. CB-BIMC08-8

BORING ELEV. -41.5 Ft., MLLW

DATE 11/26/2008

GRADATION CURVES

SAJ FORM 2087
JUN 02



FINAL CONCENTRATION: 420 grams per liter

PROJECT **Task #96 USMC Support Facility**

AREA

BORING NO. CB-BIMC08-8 | SAMPLE NO. 1 | ELEV., FT. TO | DATE 24-Nov-08

SUSPENDED SEDIMENT - TIME CURVES

SAD FORM 3023

SEDIMENTATION RATE TEST DATA

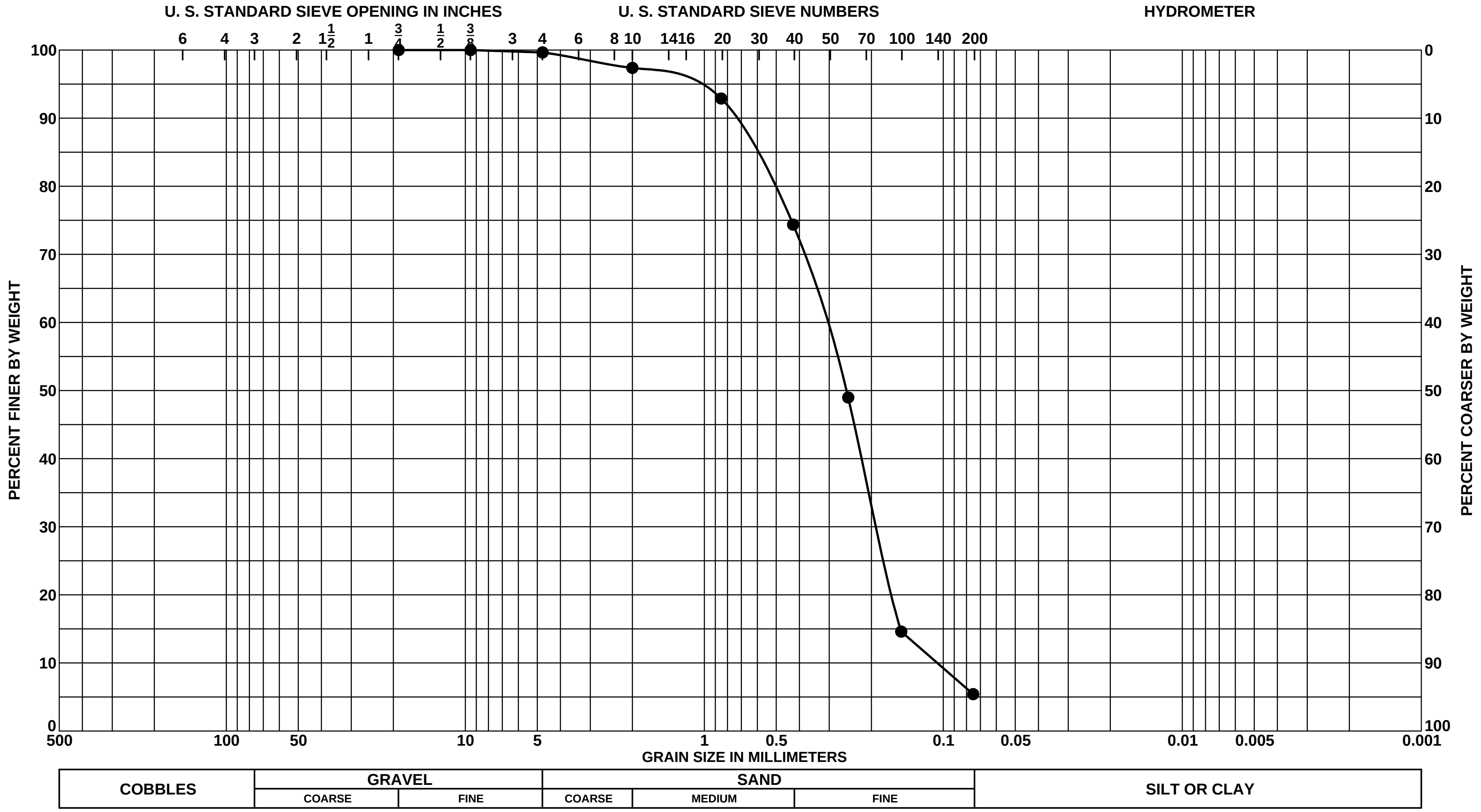
Project Name:	Task #96 USMC Support Facility			
Area:				
Boring No:	CB-BIMC08-8			
Sample No.:	1		Date:	24-Nov-08
Sample Elev. Range, Feet:			To	
Wolf/WPC Project No.:	WPC6308.00115			

Starting Time: 6:25

Time	Elapsed Time, Minutes	Height of Suspended Solids, cm
6:25:06	0.1	100
6:25:15	0.25	100
6:25:30	0.5	100
6:26:00	1	100
6:27:00	2	99.8
6:29:00	4	98.1
6:33:00	8	94.2
6:41:00	16	89.1
6:57:00	32	80.2
7:25:00	60	64.1
8:25:00	120	44.6
10:25:00	240	34.5
6:25:00	1440	23.8

FINAL CONCENTRATION: 420 **grams per liter**

Testing By:____ **CRM** **Date Completed:**
Checked By:__________________ **Date:**____________________



Sample No.	Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
● 4	8.4 to 9.9 Ft.	SAND, poorly-graded with silt,	5Y 4/2	3/0 (est)	2.64					
		mostly medium to fine-grained								
		quartz, few silt, trace shell								
		fragments, trace limerock								
		fragments, olive gray (SP-SM)								

GRADATION CURVES

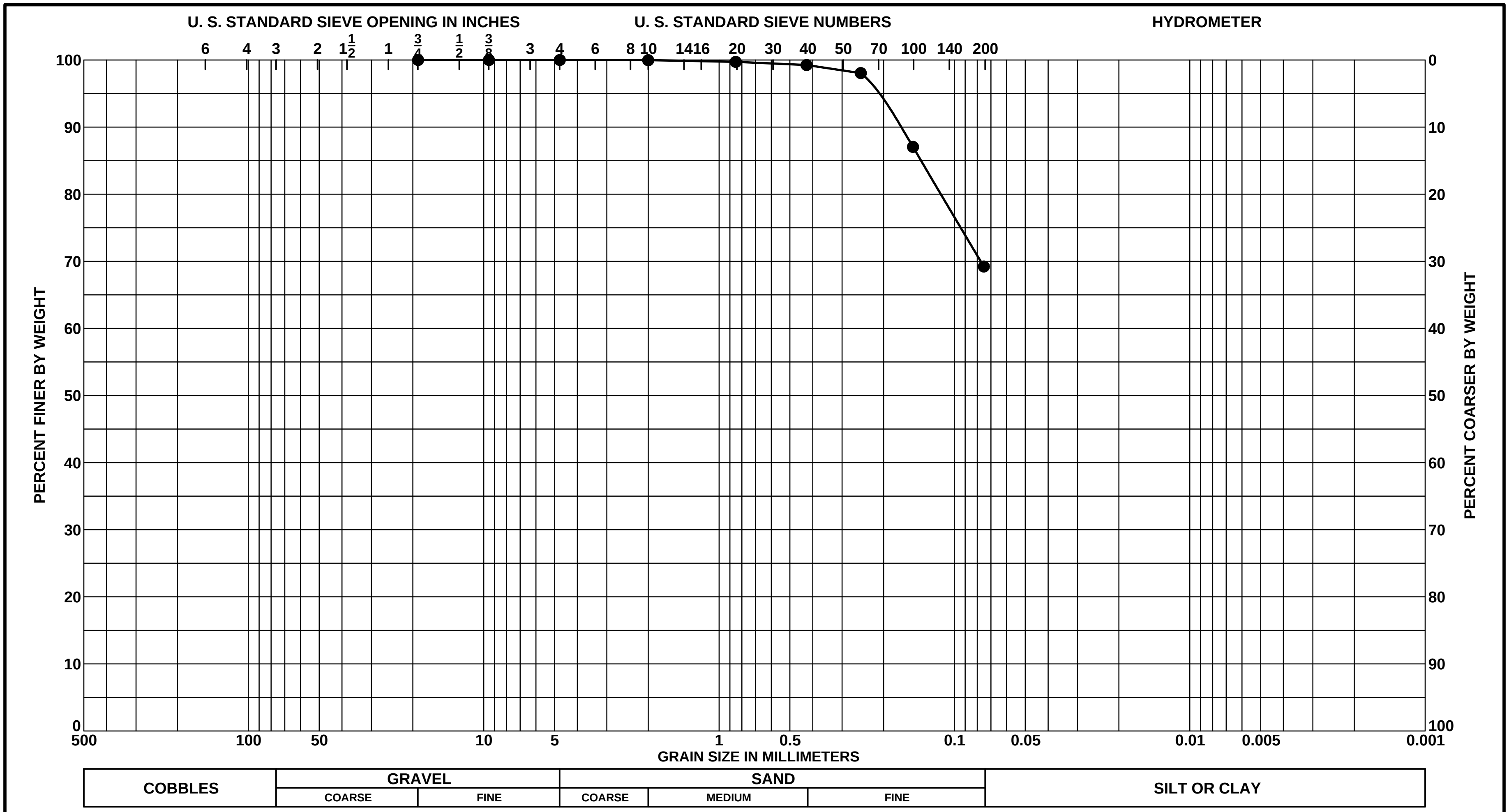
PROJECT US Marine Corps Support Facility - Blount Island Deepening & Sill Removal

BORING NO. CB-BIMC08-8

BORING ELEV. -41.5 Ft., MLLW

DATE 11/26/2008

SAJ FORM 2087
JUN 02



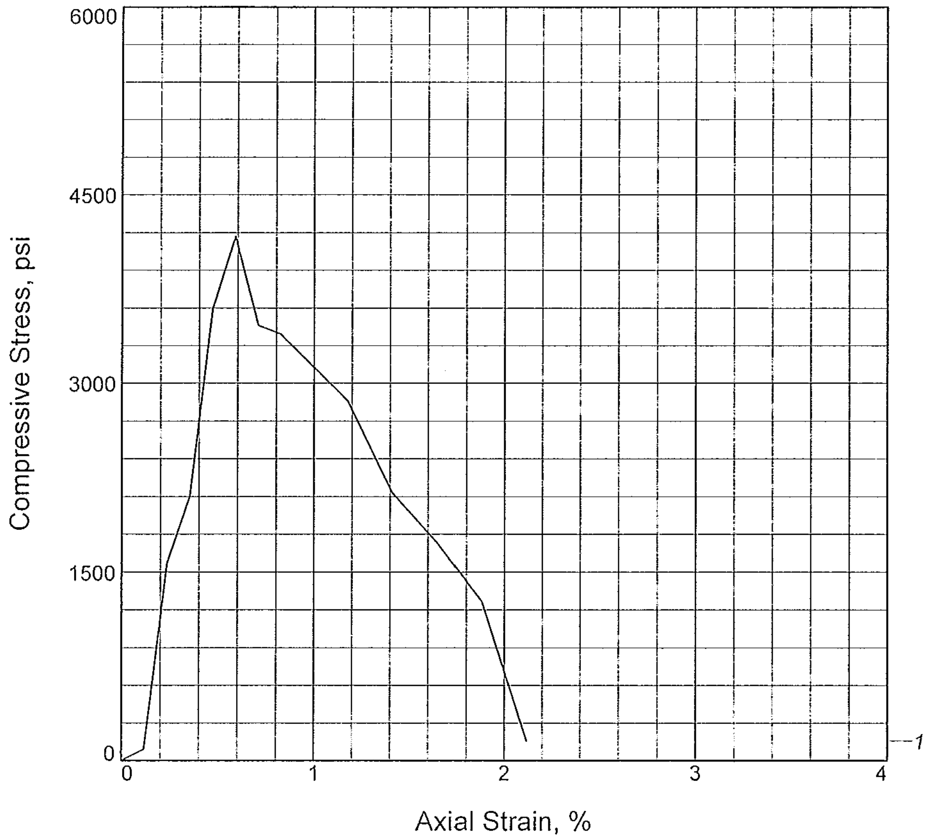
Sample No.	Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
● 1	0.0 to 7.8 Ft.	CLAY, organic-H, trace fine-grained	N 3/		2.59	10	197.8	152	55	97
		quartz sand, very dark gray (OH)								

PROJECT	US Marine Corps Support Facility - Blount Island
	Deepening & Sill Removal
BORING NO.	CB-BIMC08-9
BORING ELEV.	-35.3 Ft., MLLW
DATE	11/26/2008

GRADATION CURVES

SAJ FORM 2087
JUN 02

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	4167.38			
Undrained shear strength, psi	2083.69			
Failure strain, %	0.6			
Strain rate, in./min.	0.08			
Water content, %	1.1			
Wet density, pcf	134.4			
Dry density, pcf	132.9			
Saturation, %	12.3			
Void ratio	0.2452			
Specimen diameter, in.	3.95			
Specimen height, in.	4.25			
Height/diameter ratio	1.08			

Description: Rock Core

LL =	PL =	PI =	GS= 2.65	Type: Core

Project No.: 6308.00115

Date Sampled:

Remarks:

Figure ________

Client: USACE

Project: USMC Support Facility

Location: CB-BIMC08-9

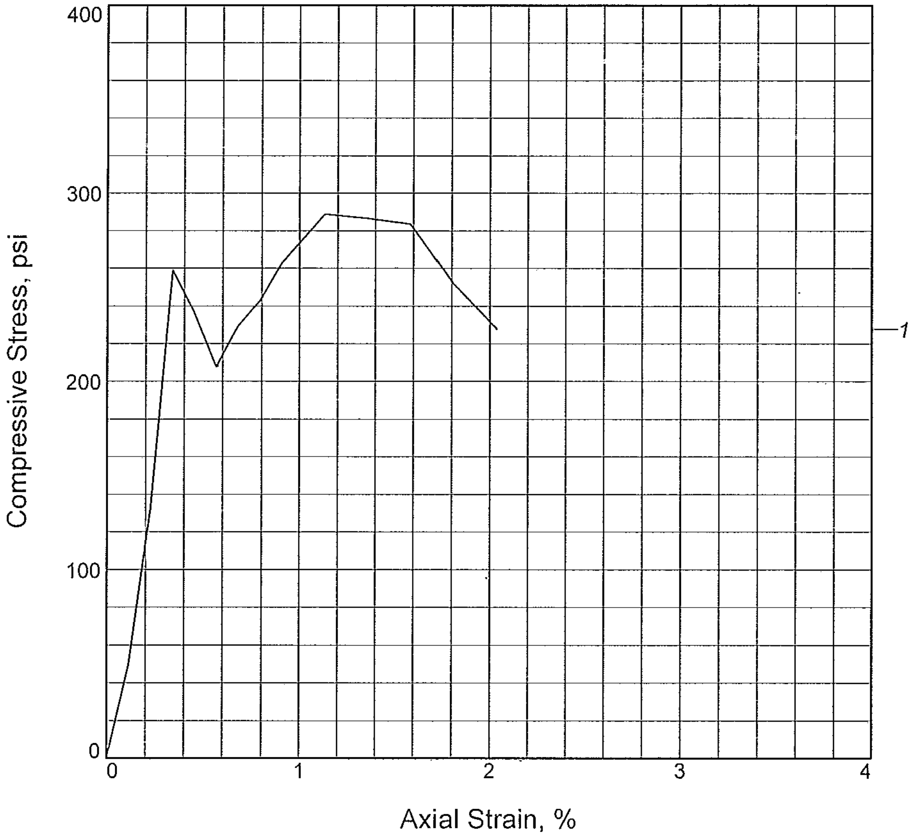
Depth: 9.6'- 10.1'

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	288.84			
Undrained shear strength, psi	144.42			
Failure strain, %	1.1			
Strain rate, in./min.	0.18			
Water content, %	7.5			
Wet density, pcf	93.1			
Dry density, pcf	86.5			
Saturation, %	21.9			
Void ratio	0.9120			
Specimen diameter, in.	3.95			
Specimen height, in.	4.42			
Height/diameter ratio	1.12			

Description: Rock Core

LL =	**PL =**	**PI =**	**GS=** 2.65	**Type:** Core

Project No.: 6308.00115
Date Sampled:
Remarks:

Figure _______

Client: USACE

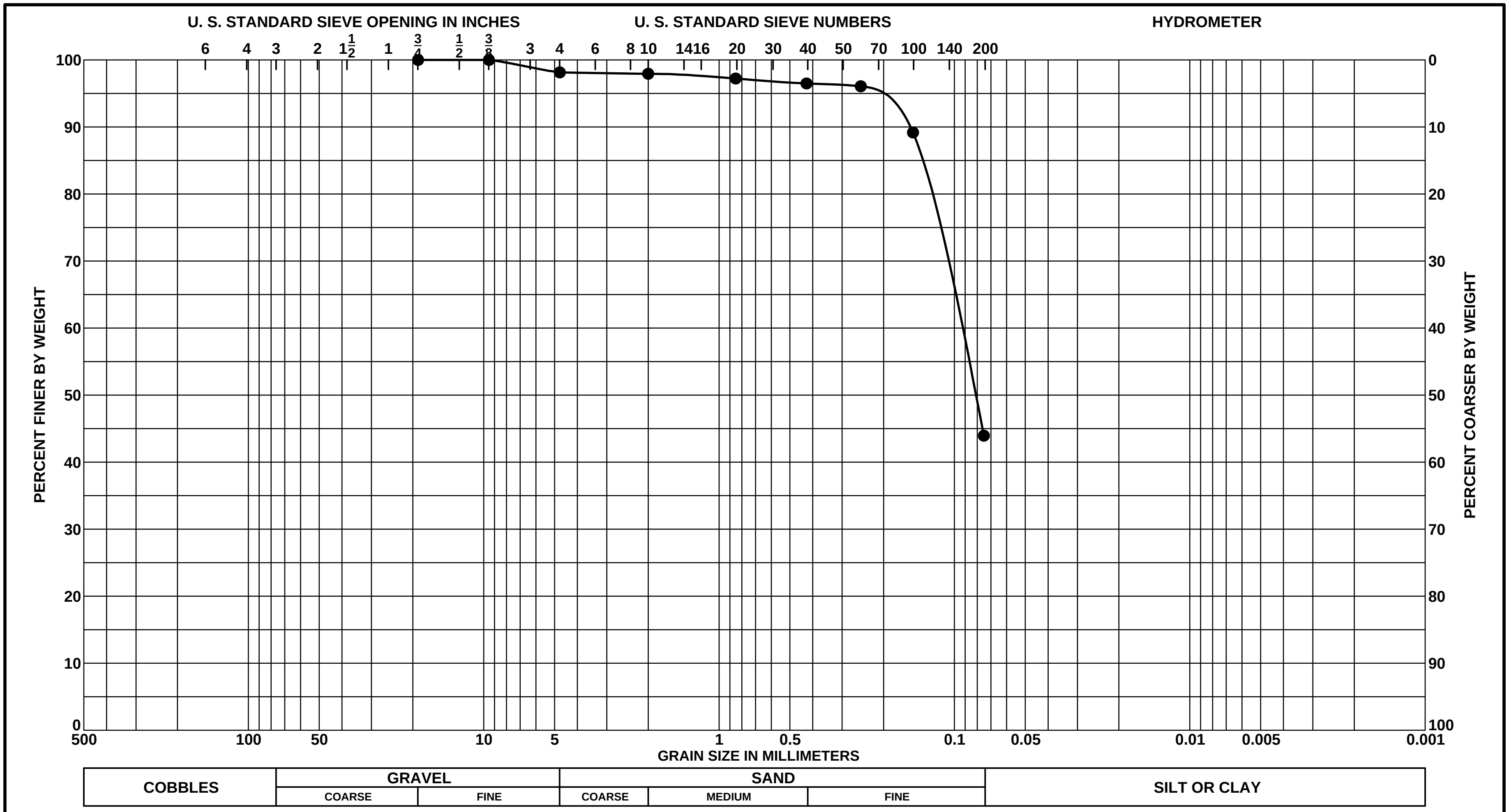
Project: USMC Support Facility

Location: CB-BIMC08-9
Depth: 10.95'- 11.5'

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin



Sample No.	Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
● 1	0.0 to 0.6 Ft.	SAND, silty, mostly fine-grained	5Y 4/1							
		quartz, some silt, trace rock								
		fragments, dark gray (SM)								

PROJECT US Marine Corps Support Facility - Blount Island
Deepening & Sill Removal

BORING NO. CB-BIMC08-10

BORING ELEV. -39.9 Ft., MLLW

DATE 11/26/2008

GRADATION CURVES

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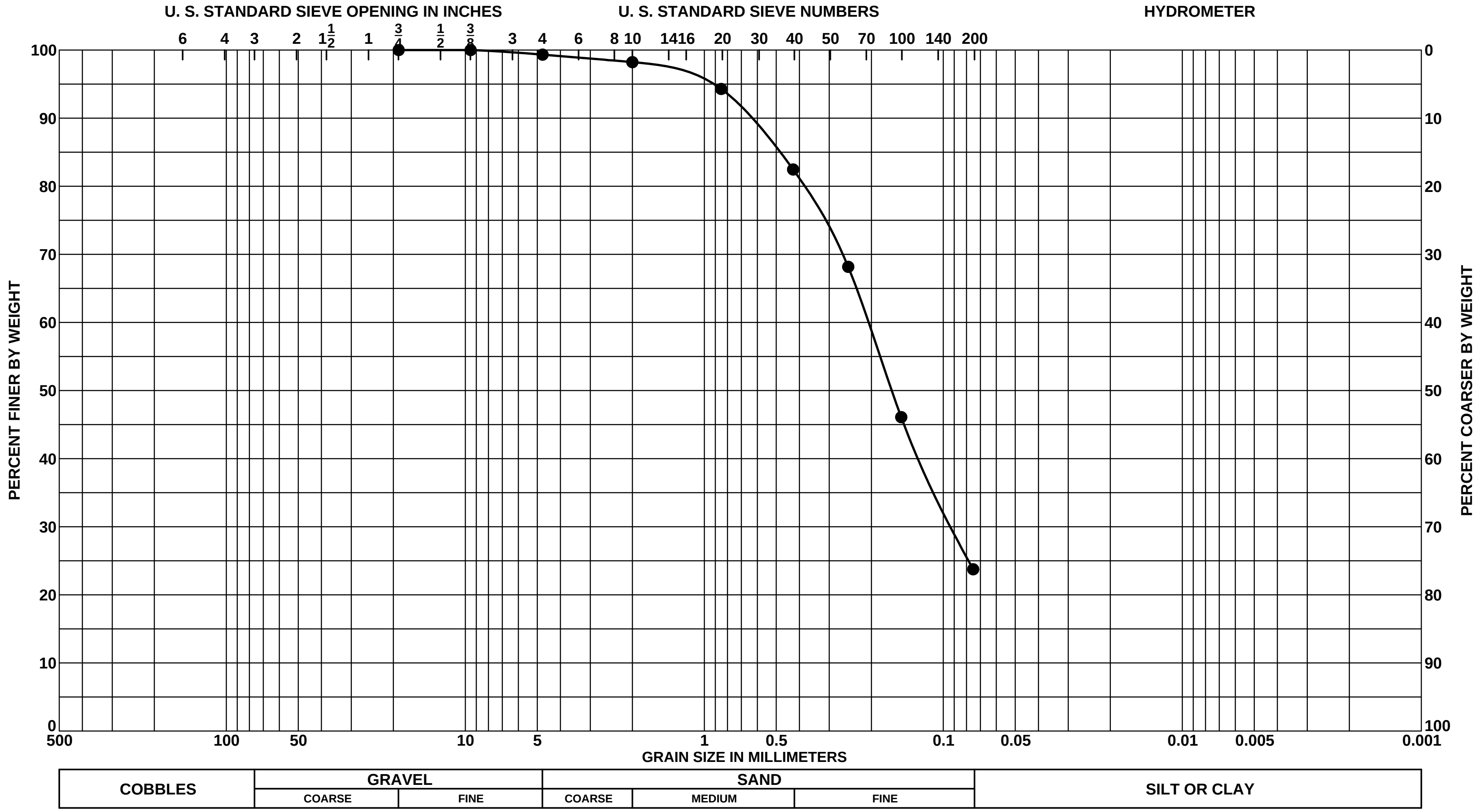
JUN 02



Sample No.		*Depth*	*Classification*	*Munsell*	*CO_3 %*	*G_S*	*Org %*	*w_n*	*LL*	*PL*	*PI*
●	2	0.6 to 2.0 Ft.	SAND, silty, mostly medium to	5Y 3/1							
			fine-grained quartz, little silt, few								
			fine-gravel to fine sand-size shell								
			fragments, very dark gray (SM)								

PROJECT	US Marine Corps Support Facility - Blount Island
	Deepening & Sill Removal
BORING NO.	CB-BIMC08-10
BORING ELEV.	-39.9 Ft., MLLW
DATE	11/26/2008

GRADATION CURVES

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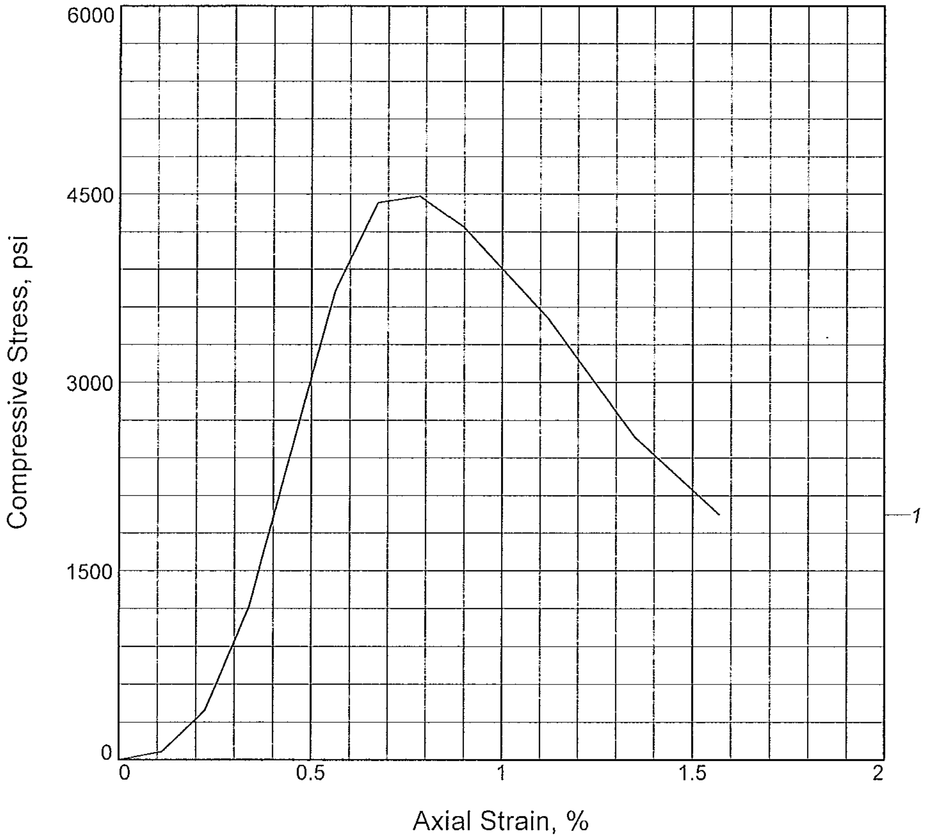
JUN 02

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	4483.81			
Undrained shear strength, psi	2241.91			
Failure strain, %	0.8			
Strain rate, in./min.	0.14			
Water content, %	1.5			
Wet density, pcf	147.3			
Dry density, pcf	145.1			
Saturation, %	28.9			
Void ratio	0.1404			
Specimen diameter, in.	3.95			
Specimen height, in.	4.46			
Height/diameter ratio	1.13			

Description: Rock Core

LL =	PL =	PI =	GS= 2.65	**Type:** Core

Project No.: 6308.00115
Date Sampled:
Remarks:

Figure _______

Client: USACE

Project: USMC Support Facility

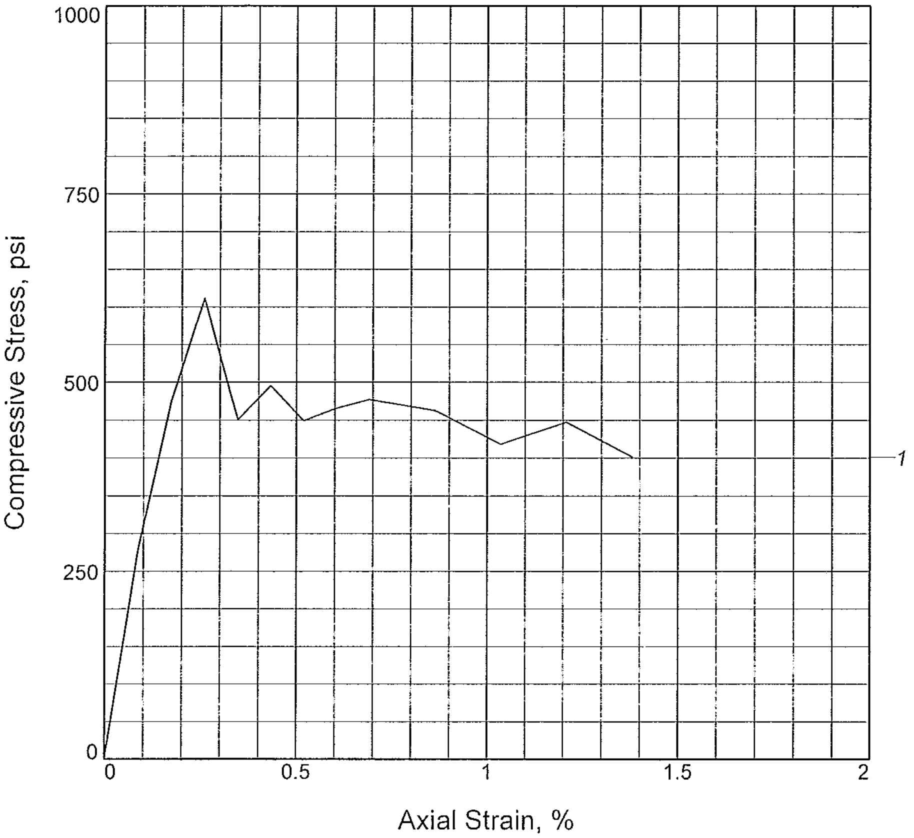
Location: CB-BIMC08-10
Depth: 4.05'- 4.6'

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	611.26			
Undrained shear strength, psi	305.63			
Failure strain, %	0.3			
Strain rate, in./min.	0.30			
Water content, %	3.7			
Wet density, pcf	125.6			
Dry density, pcf	121.2			
Saturation, %	26.8			
Void ratio	0.3653			
Specimen diameter, in.	3.95			
Specimen height, in.	5.79			
Height/diameter ratio	1.47			

Description: Rock Core

LL =	**PL =**	**PI =**	**GS=** 2.65	**Type:** Core

Project No.: 6308.00115
Date Sampled:
Remarks:

Figure ________

Client: USACE

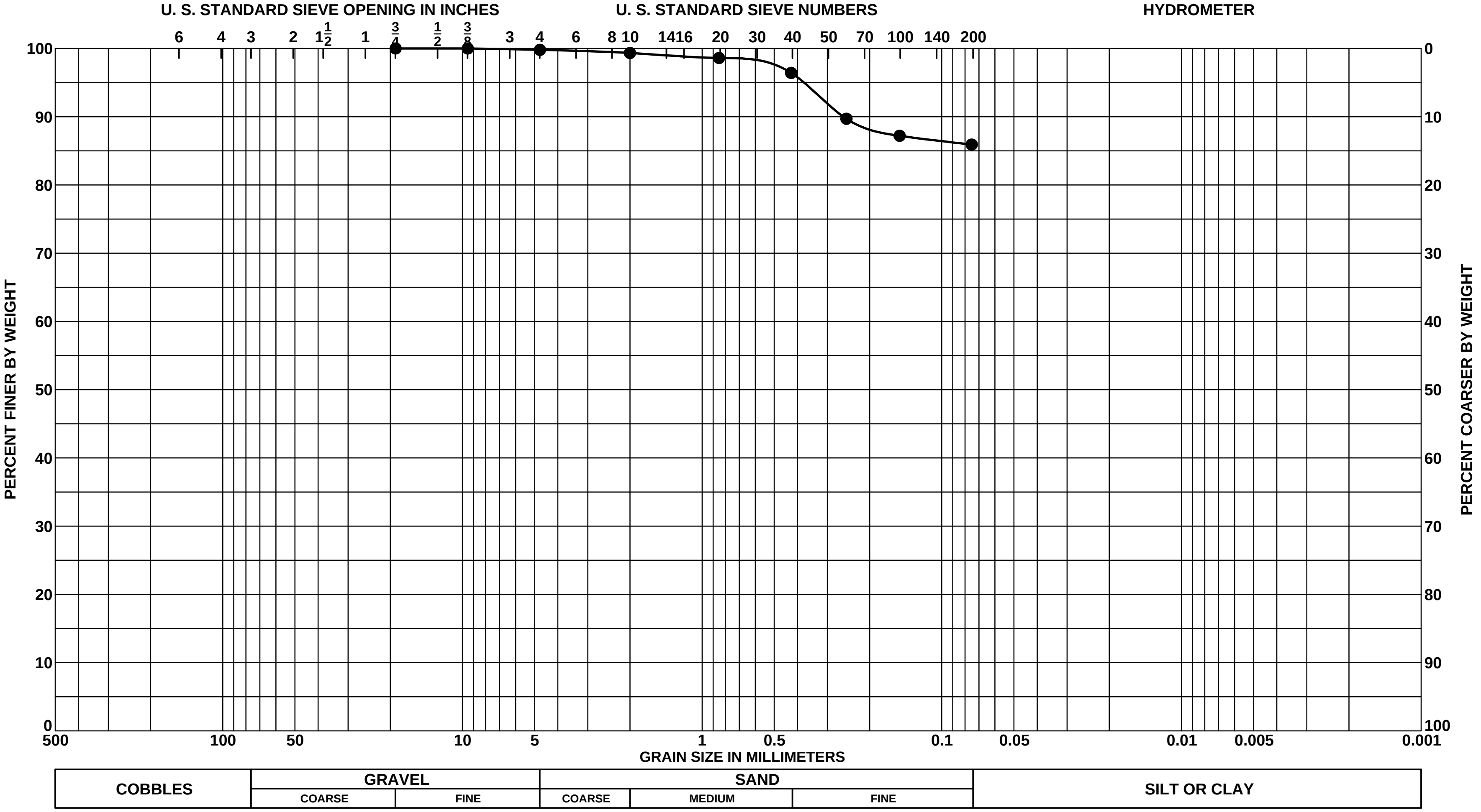
Project: USMC Support Facility

Location: CB-BIMC08-10
Depth: 5.4'- 5.9'

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin



Sample No.	Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
● 4	11.3 to 12.8 Ft.	CLAY, inorganic-H, trace fine-grained quartz sand, greenish gray (CH)	10Y 6/1					77	26	51

GRADATION CURVES

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-10
BORING ELEV.	-39.9 Ft., MLLW
DATE	11/26/2008

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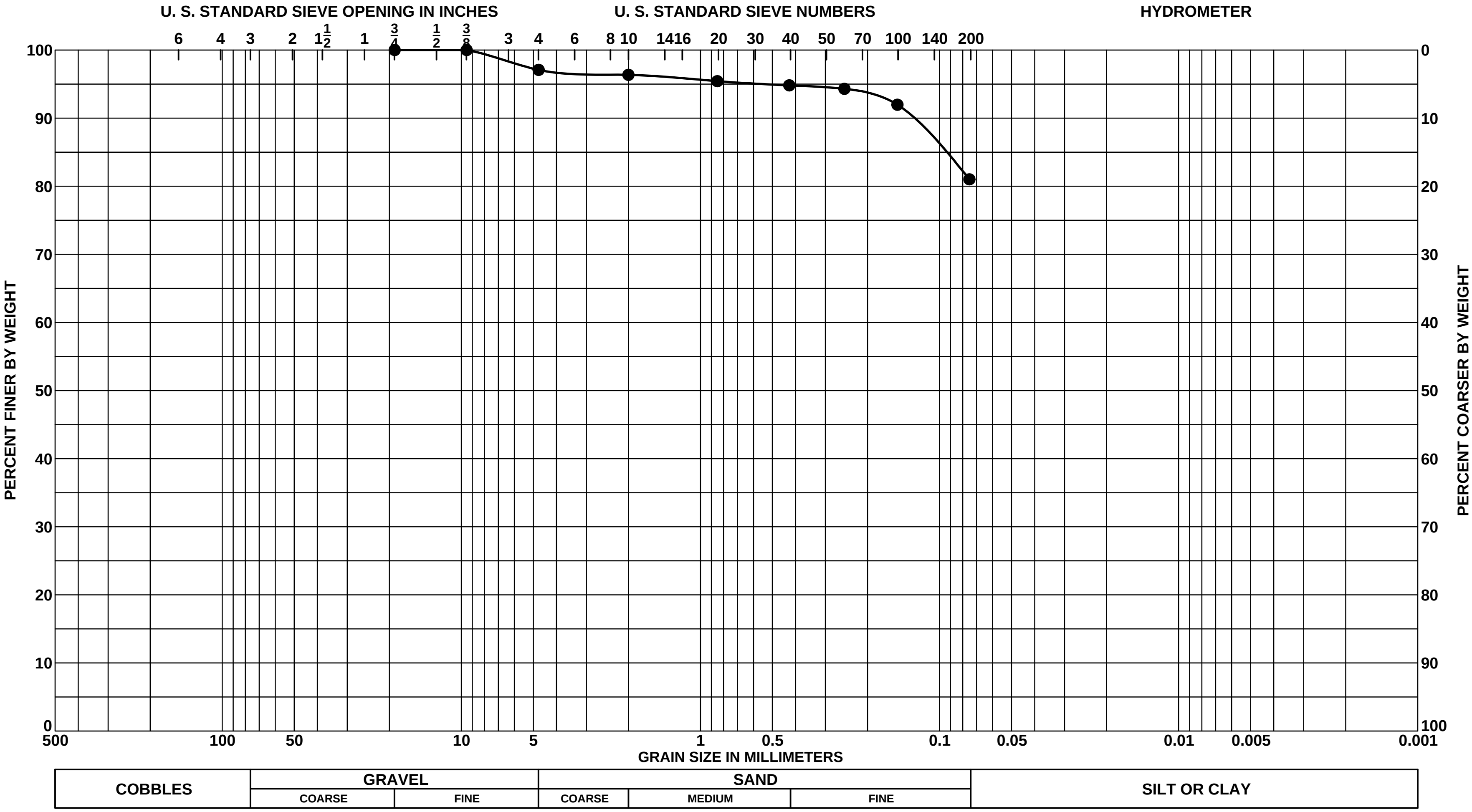
JUN 02



Sample No.		Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
●	1	0.0 to 3.4 Ft.	CLAY, organic-H, trace fine-grained	N 3/				159.9	135	49	86
			quartz sand, very dark gray (OH)								

PROJECT	US Marine Corps Support Facility - Blount Island
	Deepening & Sill Removal
BORING NO.	CB-BIMC08-11
BORING ELEV.	-38.1 Ft., MLLW
DATE	11/26/2008

GRADATION CURVES

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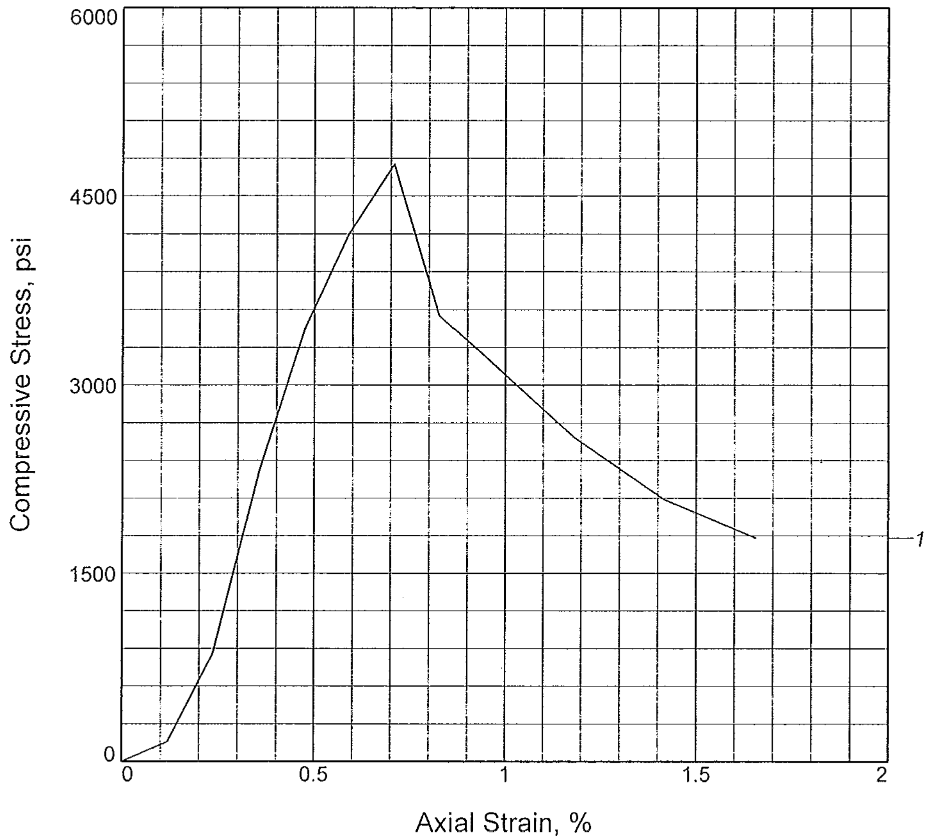
UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	4753.80			
Undrained shear strength, psi	2376.90			
Failure strain, %	0.7			
Strain rate, in./min.	0.06			
Water content, %	4.6			
Wet density, pcf	125.1			
Dry density, pcf	119.6			
Saturation, %	31.8			
Void ratio	0.3834			
Specimen diameter, in.	3.95			
Specimen height, in.	4.23			
Height/diameter ratio	1.07			

Description: Rock Core

LL =	PL =	PI =	GS= 2.65	Type: Core

Project No.: 6308.00115

Date Sampled:

Remarks:

Figure ________

Client: USACE

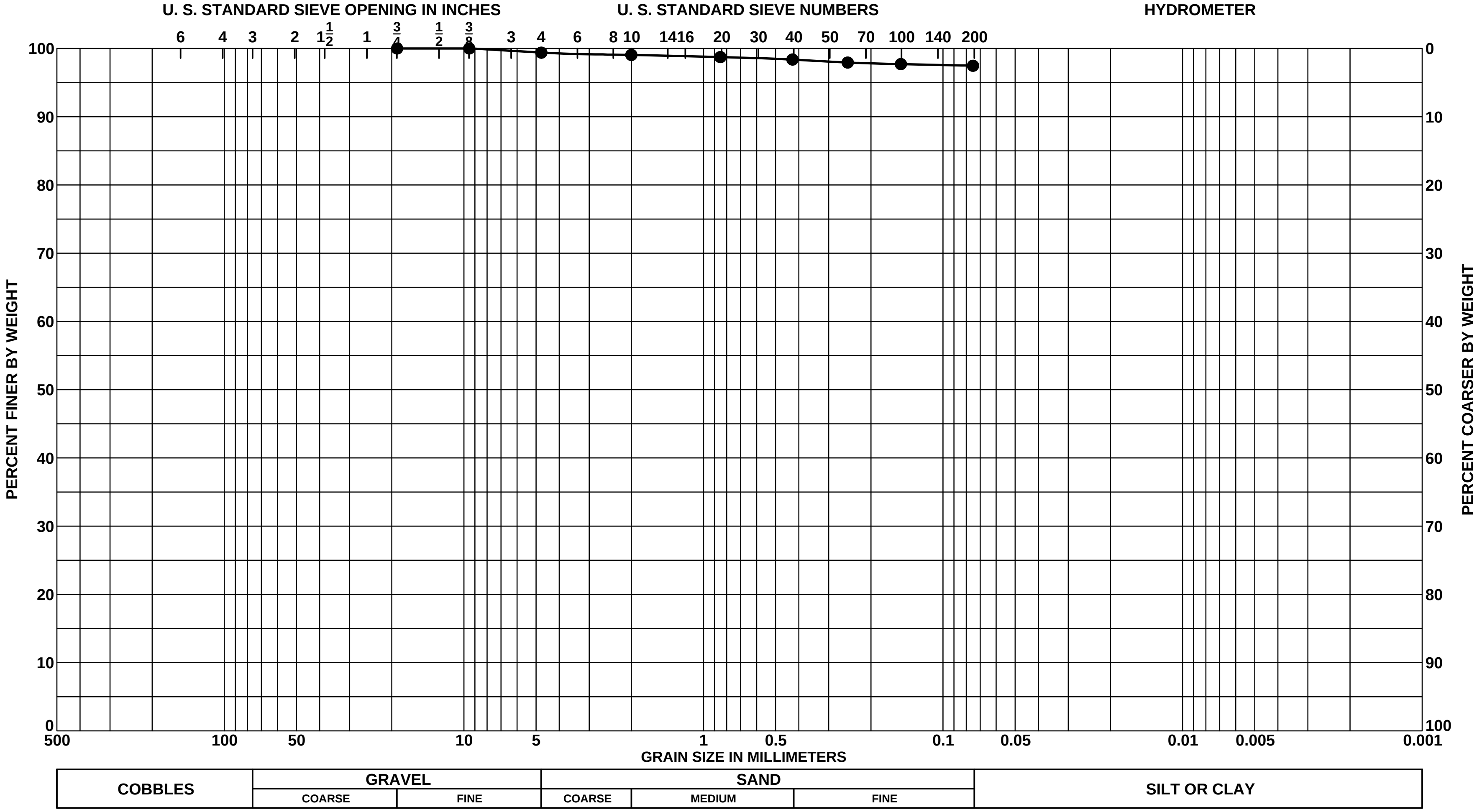
Project: USMC Support Facility

Location: CB-BIMC08-11
Depth: 7.65'- 8.45'

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin



Sample No.		Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
●	3	9.4 to 10.9 Ft.	CLAY, inorganic-L, trace	5GY 6/1		2.78			45	21	24
			fine-grained quartz sand, greenish								
			gray (CL)								

PROJECT US Marine Corps Support Facility - Blount Island Deepening & Sill Removal

BORING NO. CB-BIMC08-11

BORING ELEV. -38.1 Ft., MLLW

DATE 11/26/2008

GRADATION CURVES

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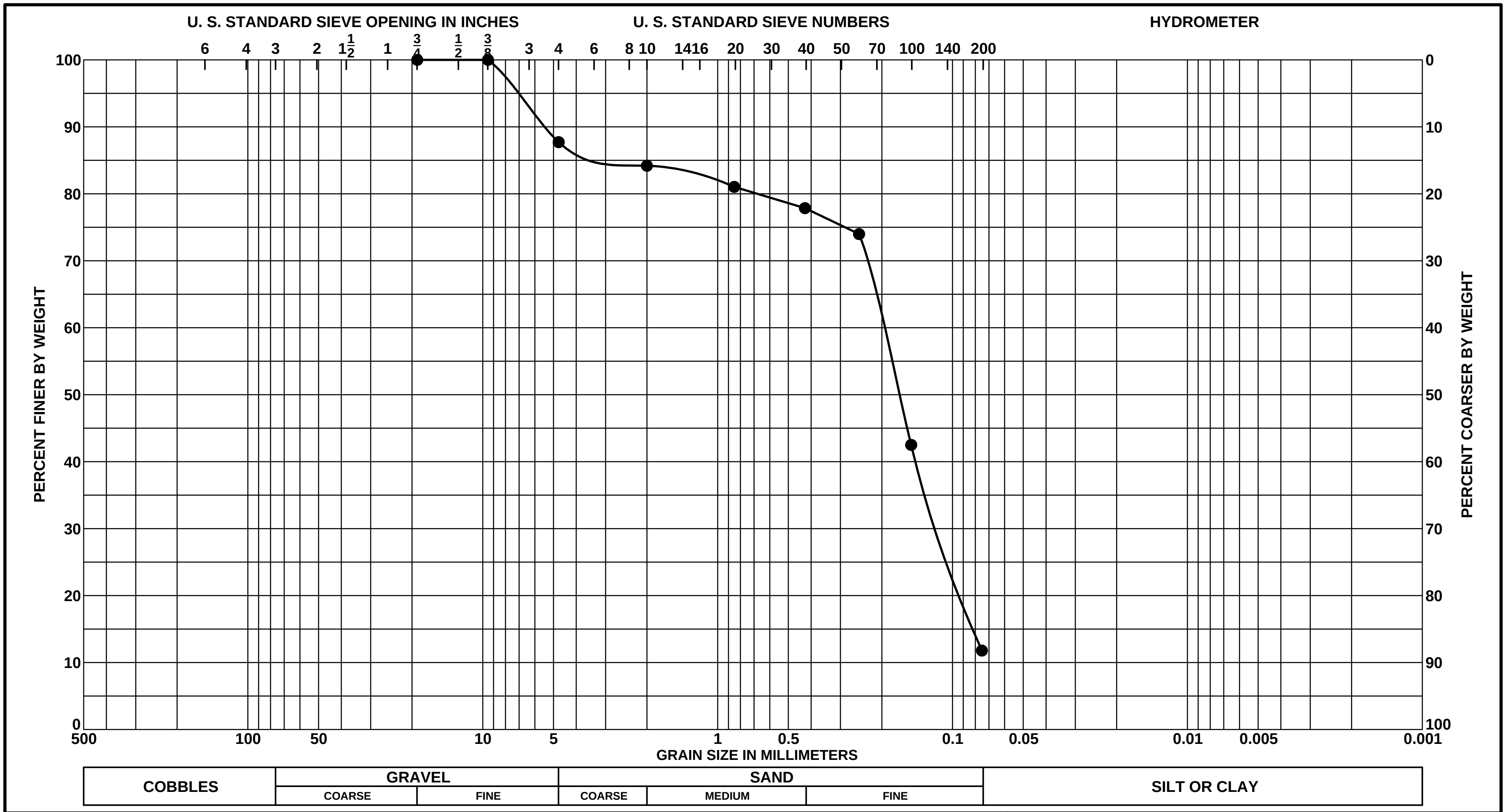

Sample No.	Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
● 1	0.0 to 1.2 Ft.	SAND, poorly-graded with silt,	10Y 3/1					30	23	7
		mostly fine-grained quartz, little								
		fine-gravel to medium sand-size								
		limerock fragments, few silt, very								
		dark greenish gray (SP-SM)								

PROJECT	US Marine Corps Support Facility - Blount Island
	Deepening & Sill Removal
BORING NO.	CB-BIMC08-12
BORING ELEV.	-38.9 Ft., MLLW
DATE	11/26/2008

GRADATION CURVES

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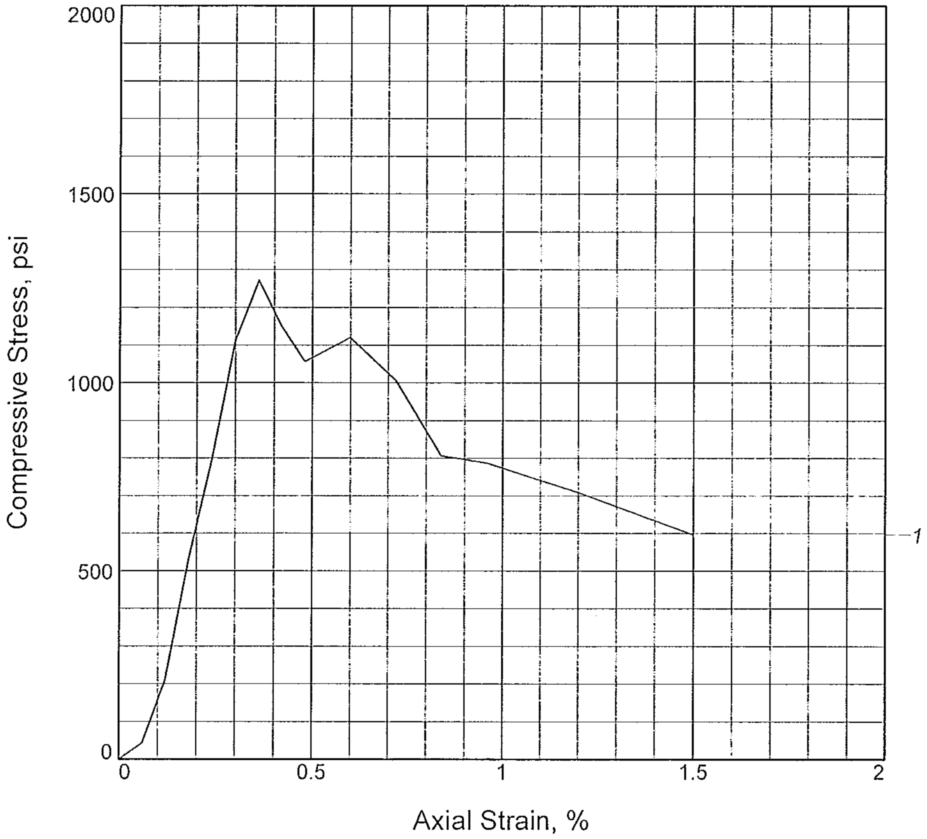
UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	1270.96			
Undrained shear strength, psi	635.48			
Failure strain, %	0.4			
Strain rate, in./min.	0.05			
Water content, %	1.1			
Wet density, pcf	111.8			
Dry density, pcf	110.6			
Saturation, %	5.9			
Void ratio	0.4958			
Specimen diameter, in.	3.96			
Specimen height, in.	8.34			
Height/diameter ratio	2.11			

Description: Rock Core

LL = **PL =** **PI =** **GS=** 2.65 **Type:** Core

Project No.: 6308.00115
Date Sampled:
Remarks:

Figure ________

Client: USACE

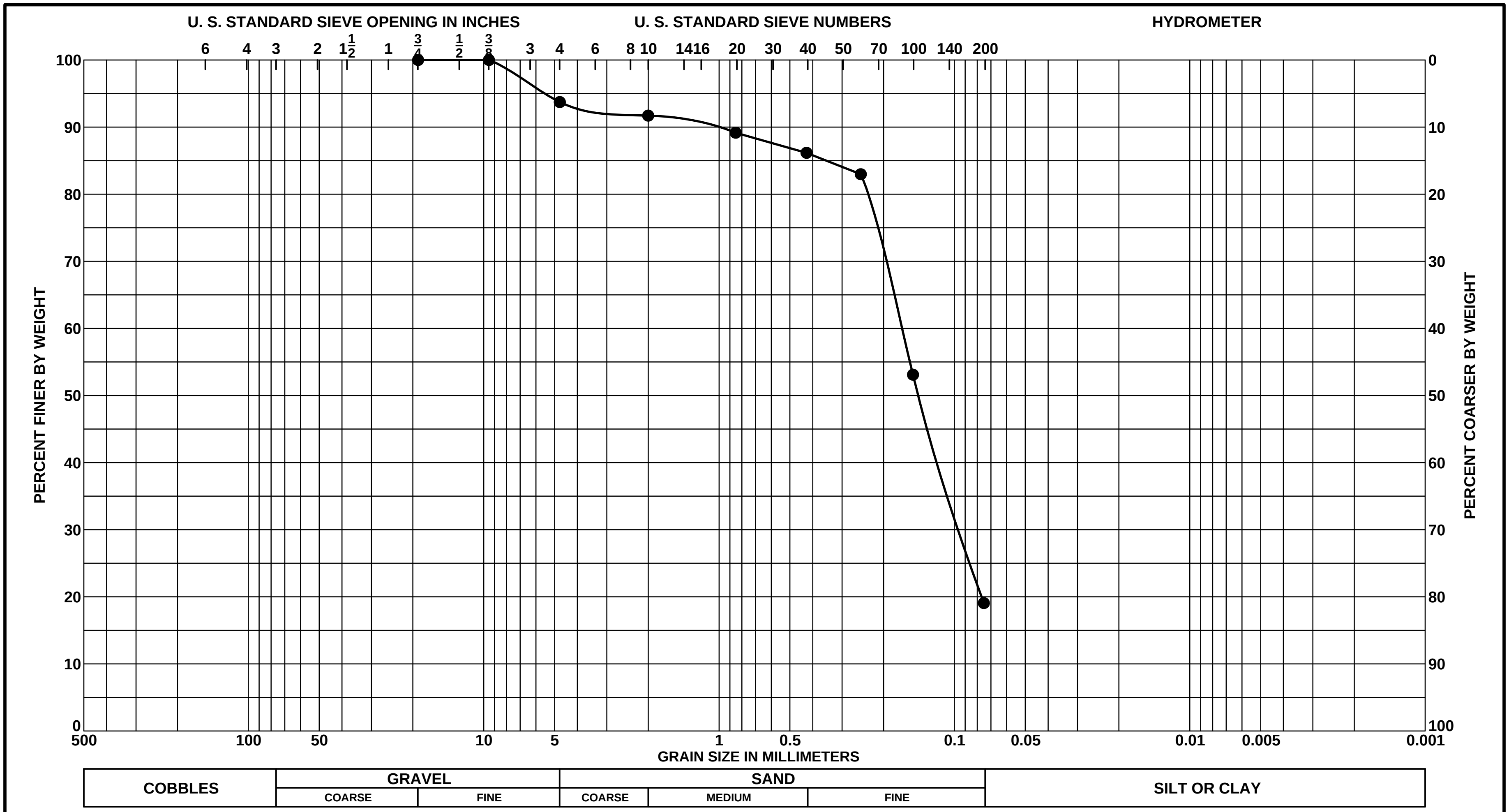
Project: USMC Support Facility

Location: CB-BIMC08-12
Depth: 8.0'- 9.5'

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin

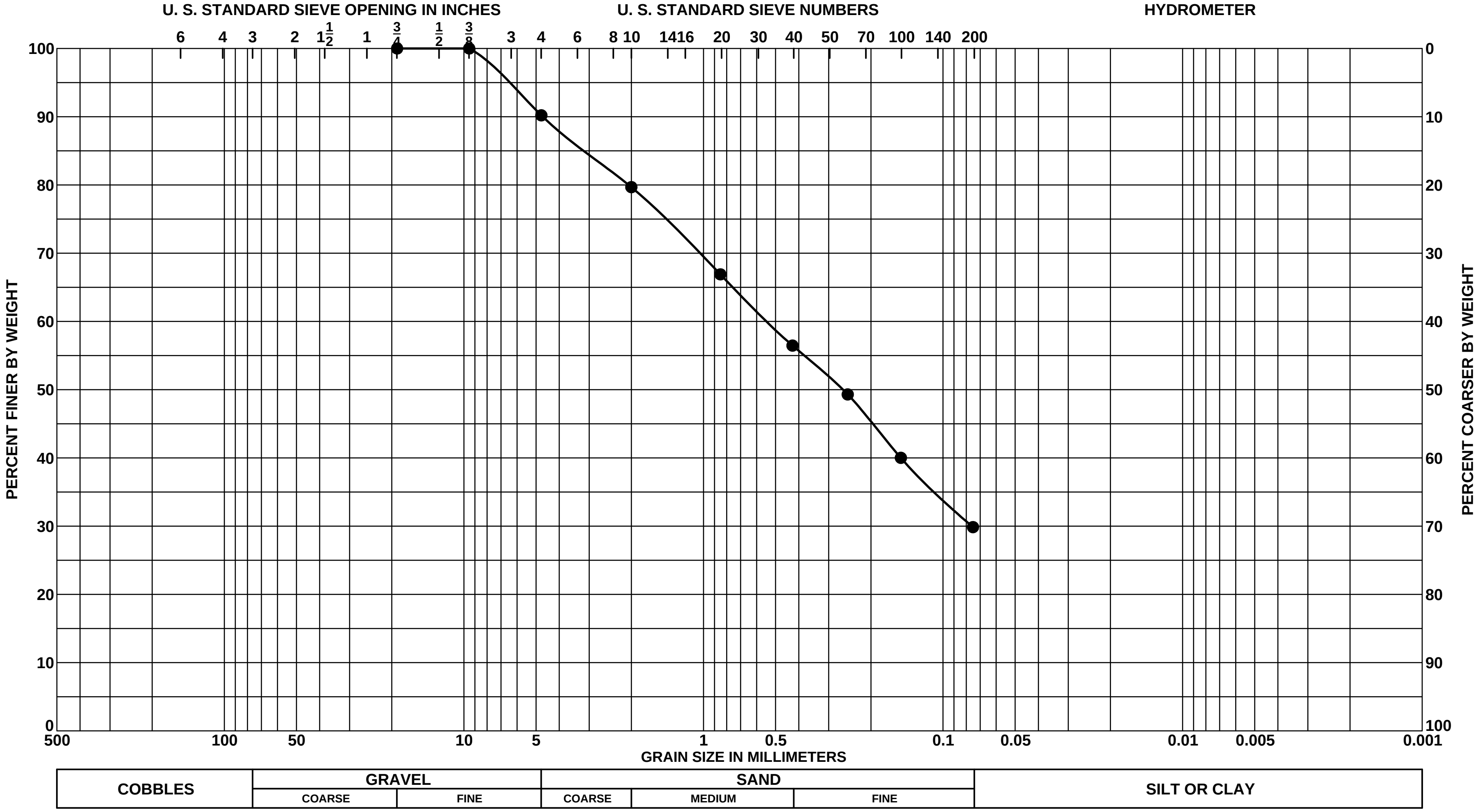


Sample No.		Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	1	0.0 to 2.3 Ft.	SAND, clayey, mostly fine-grained quartz, little fine-gravel to medium sand-size limerock fragments, little clay, olive (SC)	5Y 4/3					29	22	7

GRADATION CURVES

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-13
BORING ELEV.	-39.7 Ft., MLLW
DATE	11/26/2008

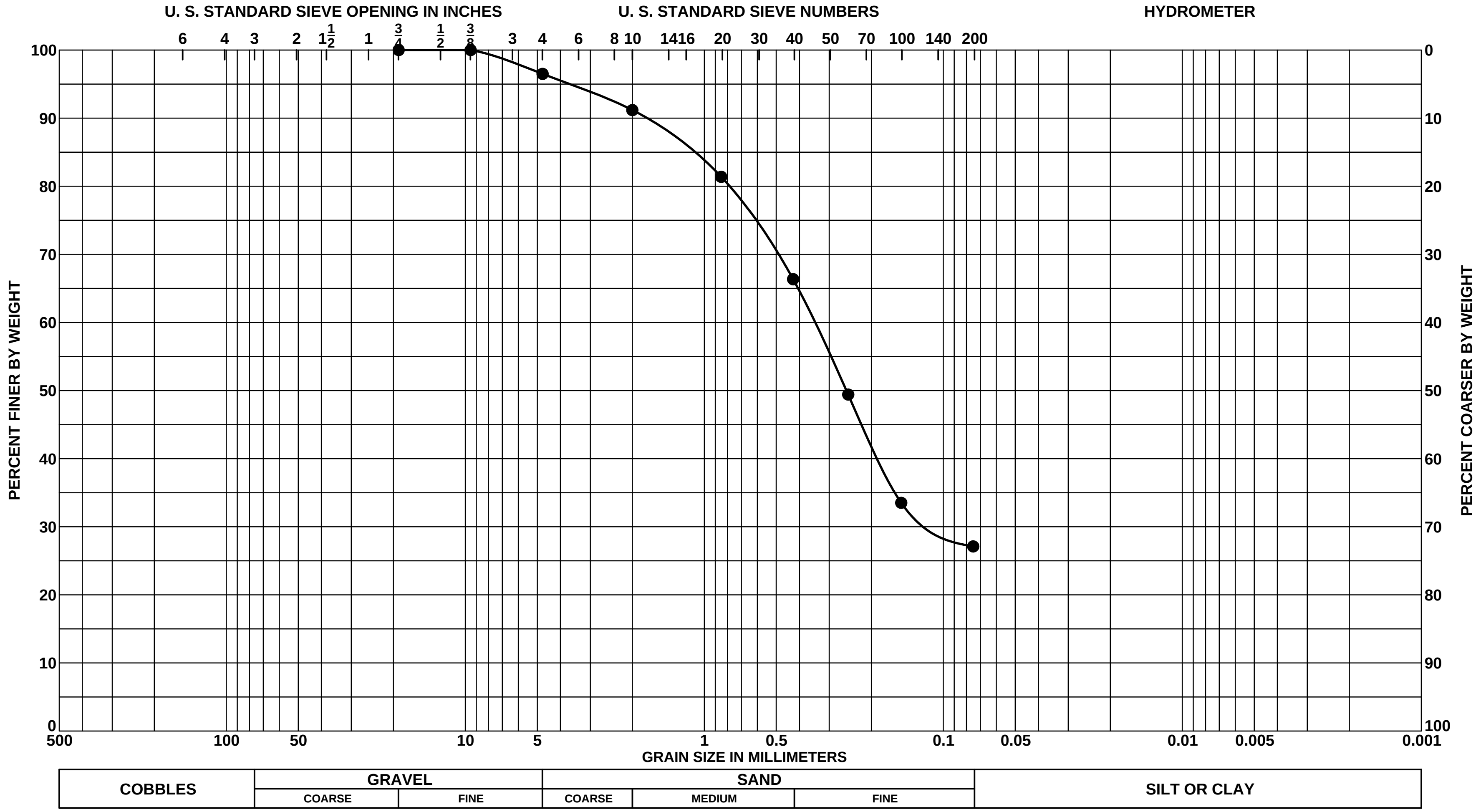
SAJ FORM 2087
JUN 02



Sample No.	Depth	Classification	Munsell	CO_3 %	G_S	Org %	w_n	LL	PL	PI
● 3	3.8 to 5.3 Ft.	SAND, silty, some fine-gravel to medium sand-size limerock fragments, little silt, little fine-grained quartz, light yellowish brown (SM)	2.5Y 6/4		2.69					

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-13
BORING ELEV.	-39.7 Ft., MLLW
DATE	11/26/2008

GRADATION CURVES



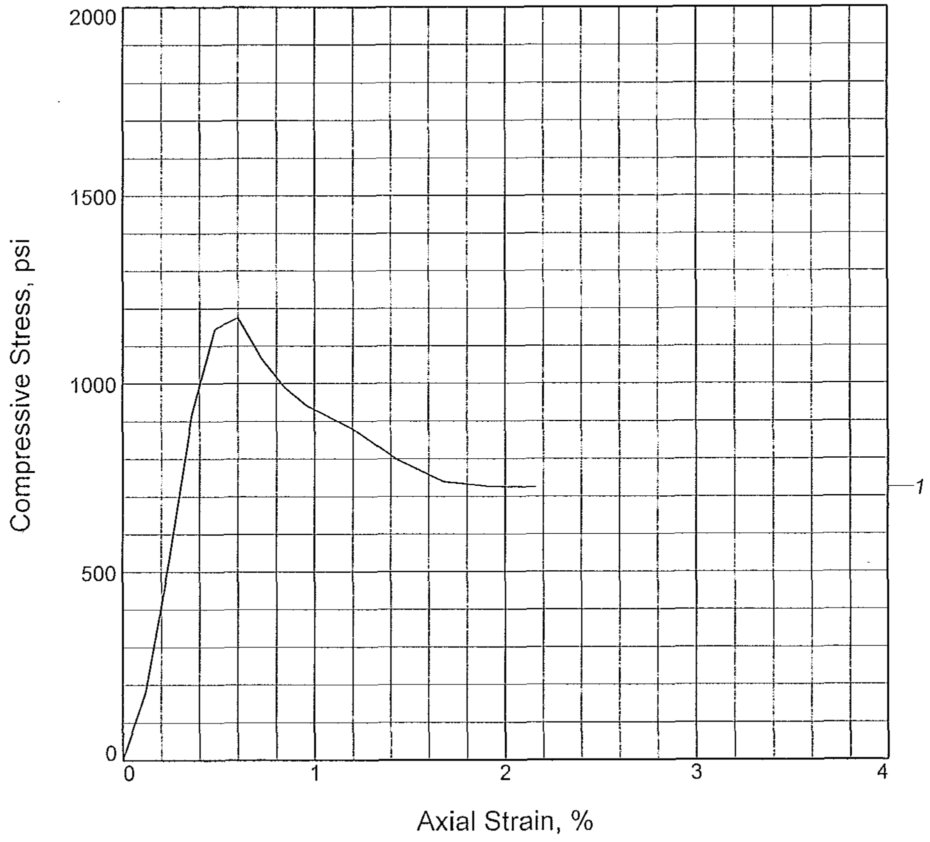
Sample No.		Depth	Classification	Munsell	CO_3 %	G_s	Org %	w_n	LL	PL	PI
●	6	6.8 to 9.4 Ft.	SAND, clayey, mostly fine-grained quartz, some fine-gravel to medium sand-size limerock fragments, little clay, trace shell fragments, pale yellow (SC)	2.5Y 7/3							

GRADATION CURVES

PROJECT	US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
BORING NO.	CB-BIMC08-13
BORING ELEV.	-39.7 Ft., MLLW
DATE	11/26/2008

SAJ FORM 2087
JUN 02

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	1174.55			
Undrained shear strength, psi	587.28			
Failure strain, %	0.6			
Strain rate, in./min.	0.06			
Water content, %	2.7			
Wet density, pcf	127.6			
Dry density, pcf	124.2			
Saturation, %	21.8			
Void ratio	0.3325			
Specimen diameter, in.	3.95			
Specimen height, in.	4.17			
Height/diameter ratio	1.06			

Description: Rock Core

LL =	**PL =**	**PI =**	**GS=** 2.65	**Type:** Core

Project No.: 6308.00115

Date Sampled:

Remarks:

Figure ________

Client: USACE

Project: USMC Support Facility

Location: CB-BIMC08-14

Depth: 5.45'- 6.4'

UNCONFINED COMPRESSION TEST

WPC

Tested By: C. Martin

Boring Designation CB-BIMC08-1

DRILLING LOG

DIVISION: South Atlantic
INSTALLATION: Jacksonville District
SHEET 1 OF 2 SHEETS

1. PROJECT: US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
2. BORING DESIGNATION: CB-BIMC08-1
LOCATION COORDINATES: X = 490,515 Y = 2,205,814
3. DRILLING AGENCY: Corps of Engineers - CESAM
CONTRACTOR FILE NO.:
4. NAME OF DRILLER: Charlie Brown
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:
6. THICKNESS OF OVERBURDEN: N/A
7. DEPTH DRILLED INTO ROCK: N/A
8. TOTAL DEPTH OF BORING: 19.0 Ft.
9. SIZE AND TYPE OF BIT: See Remarks
10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.) HORIZONTAL: NAD83 VERTICAL: MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (barge-mounted) ☒ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES: DISTURBED: 9 UNDISTURBED (UD): 0
13. TOTAL NUMBER CORE BOXES: 2
14. ELEVATION GROUND WATER: N/A
15. DATE BORING: STARTED: 10-13-08 COMPLETED: 10-13-08
16. ELEVATION TOP OF BORING: -35.8 Ft.
17. TOTAL RECOVERY FOR BORING: 45 %
18. SIGNATURE AND TITLE OF INSPECTOR: Marianne Gruber, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-35.8	0.0						-35.8		
			CLAY, fat, high plasticity, very soft, few fine-grained sand-sized quartz, wet, N 2.5/ black (CH)	27	1		Free Fall of Sampler		
-43.9	8.1						-43.9		
			SAND, silty, mostly fine to medium-grained sand-sized quartz, some silt, 5Y 6/2 light olive gray (SM)	95	2		SPT Sampler	1 1 1	2
			At El. -45.8 Ft., trace medium-grained sand-sized shell				-46.0		
				100	3		SPT Sampler	1 2	8
-47.0	11.2		SAND, poorly-graded with silt, mostly fine to coarse-grained sand-sized quartz, few silt, 2.5Y 7/2 light gray (SP-SM)		4		-47.5	6	
-48.0	12.2			100	5		-48.0 SPT Sampler	11	
		Unweathered	SANDSTONE, non-fossiliferous, moderately hard, unweathered, fine grained, intact, solid, 2.5Y 6/2 light brownish gray	100	BOX 2	RQD 37	4 x 5-1/2" Diamond Impregnated Bit DT = 13 mins HP = 300 psi DFR = 95 %		
-49.5	13.7		SANDSTONE, hard, 2.5Y 6/1 gray						
-50.3	14.5		At El. -50.0 Ft., broken due to drill action				-50.3		
			SAND, clayey, 10YR 6/1 gray (SC)	NR	6		SPT Sampler	12	

0
5
10
15

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(Continued)

Boring Designation CB-BIMC08-1

DRILLING LOG (Cont. Sheet)

INSTALLATION: Jacksonville District
SHEET 2 OF 2 SHEETS
PROJECT: US Marine Corps Support Facility - Blount Island
COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.)
HORIZONTAL: NAD83
VERTICAL: MLLW
LOCATION COORDINATES: X = 490,515 Y = 2,205,814
ELEVATION TOP OF BORING: -35.8 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-51.8	16.0		At El. -51.3 Ft., layer of clay At El. -51.7 Ft., 10YR 8/1 white	NR	6		SPT Sampler -51.8	27 10	37
			SANDSTONE, silicious, sparsely fossiliferous, moderately hard, fine grained, broken due to drill action, 10YR 7/2 light gray	NR	7		SPT Sampler -53.3	31 24 17	41
-54.4	18.6	Highly Weath.	At El. -53.3 Ft., highly weathered	NR	8		SPT Sampler	8 8 25	33
-54.8	19.0		SILTSTONE, very fine grained, thin bedding, flat bedding orientation, 2.5Y 7/1 light gray		9		-54.8		

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	0.0/8.1	OH
2	8.1/10.2	SP-SM*
4	11.2/11.7	SM*
6	14.5/16.0	MH*

*Lab visual classification based on gradation curve. No Atterberg limits.

4. Additional Laboratory Testing

1 Moisture Content
2 Specific Gravity

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
NR = Not Recorded.
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

Boring Designation CB-BIMC08-2

DRILLING LOG

DIVISION South Atlantic

INSTALLATION Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
2. BORING DESIGNATION CB-BIMC08-2
   LOCATION COORDINATES X = 490,630 Y = 2,206,137
3. DRILLING AGENCY Corps of Engineers - CESAM
   CONTRACTOR FILE NO.
4. NAME OF DRILLER Charlie Brown
5. DIRECTION OF BORING ☒ VERTICAL ☐ INCLINED
   DEG. FROM VERTICAL
   BEARING
6. THICKNESS OF OVERBURDEN N/A
7. DEPTH DRILLED INTO ROCK N/A
8. TOTAL DEPTH OF BORING 20.5 Ft.
9. SIZE AND TYPE OF BIT See Remarks
10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)
    HORIZONTAL NAD83
    VERTICAL MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL CME-55 (barge-mounted) ☒ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES DISTURBED 5 UNDISTURBED (UD) 0
13. TOTAL NUMBER CORE BOXES 1
14. ELEVATION GROUND WATER N/A
15. DATE BORING STARTED 10-14-08 COMPLETED 10-14-08
16. ELEVATION TOP OF BORING -35.0 Ft.
17. TOTAL RECOVERY FOR BORING 48 %
18. SIGNATURE AND TITLE OF INSPECTOR Mariane Gruber, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-35.0	0.0						-35.0		
			CLAY, fat, high plasticity, very soft, trace fine-grained sand-sized quartz, wet, N 2.5/ black (CH)	26	1		Free Fall of Sampler		
							-43.4		
							Overwashed		
-45.4	10.4						-45.4		
			SAND, poorly-graded with silt, mostly fine to coarse-grained sand-sized quartz, trace clay, 2.5Y 6/1 gray (SP-SM)	87	2		SPT Sampler	1 1 1	2
-46.6	11.6						-46.9		
			SAND, silty, mostly fine to medium-grained sand-sized quartz, 5Y 6/3 pale olive (SM) From El. -47.2 to -47.3 Ft., layer of sandstone, 5Y 7/2 light gray						
-47.5	12.5	HW	SILTSTONE, highly weathered, broken due to drill action, 5Y 6/2 light olive gray	80	3		SPT Sampler	5 12 15	27
-48.4	13.4						-48.4		
			SAND, poorly-graded with silt, mostly fine to coarse-grained sand-sized quartz, 5Y 8/1 white (SP-SM) From El. -49.6 to -49.7 Ft., layer of	NR	4		SPT Sampler	3 5 12	17
-49.9	14.9						-49.9		

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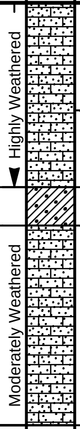
(Continued)

Boring Designation CB-BIMC08-2

DRILLING LOG (Cont. Sheet)	*INSTALLATION* Jacksonville District	*SHEET* 2 *OF* 2 *SHEETS*

PROJECT US Marine Corps Support Facility - Blount Island	*COORDINATE SYSTEM/DATUM* State Plane, FLE (U.S. Ft.)	*HORIZONTAL* NAD83	*VERTICAL* MLLW
LOCATION COORDINATES X = 490,630 Y = 2,206,137	*ELEVATION TOP OF BORING* -35.0 Ft.		



ELEV.	*DEPTH*	*CLASSIFICATION OF MATERIALS*	*% REC.*	*BOX OR SAMPLE*	*RQD OR UD*	*REMARKS*	*BLOWS/ 0.5 FT.*	*N-VALUE*
		sandstone SANDSTONE, silicious, highly weathered, 5Y 7/1 light gray	87	5		SPT Sampler -51.4	8 12 16	28
		At El. -51.4 Ft., coarse grained, 5Y 7/2 light gray	95	BOX 1	RQD 39	4 x 5-1/2" Diamond Impregnated Bit DT = 8 mins HP = 300 psi DFR = 0 %		
-52.4	17.4	SAND, clayey, some fine to coarse gravel-sized sandstone, 5Y 5/1 gray (SC)						
-52.9	17.9	SANDSTONE, silicious, sparsely fossiliferous, hard, moderately weathered, fine grained, porous, 2.5Y 8/1 white						
-55.5	20.5					-55.5		

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NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	0.0/8.4	OH
4	13.4/14.9	SM*

*Lab visual classification based on gradation curve. No Atterberg limits.

4. Additional Laboratory Testing

1 Specific Gravity

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
NR = Not Recorded.
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

Boring Designation CB-BIMC08-3

DRILLING LOG

DIVISION South Atlantic

INSTALLATION Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT
US Marine Corps Support Facility - Blount Island
Deepening & Sill Removal

2. BORING DESIGNATION CB-BIMC08-3
LOCATION COORDINATES X = 491,101 Y = 2,205,619

3. DRILLING AGENCY Corps of Engineers - CESAM
CONTRACTOR FILE NO.

4. NAME OF DRILLER Ricky Brown

5. DIRECTION OF BORING
☒ VERTICAL
☐ INCLINED
DEG. FROM VERTICAL
BEARING

6. THICKNESS OF OVERBURDEN N/A

7. DEPTH DRILLED INTO ROCK N/A

8. TOTAL DEPTH OF BORING 16.2 Ft.

9. SIZE AND TYPE OF BIT See Remarks

10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)
HORIZONTAL NAD83
VERTICAL MLLW

11. MANUFACTURER'S DESIGNATION OF DRILL CME-55 (barge-mounted)
☒ AUTO HAMMER
☐ MANUAL HAMMER

12. TOTAL SAMPLES
DISTURBED 6
UNDISTURBED (UD) 0

13. TOTAL NUMBER CORE BOXES 1

14. ELEVATION GROUND WATER N/A

15. DATE BORING
STARTED 10-21-08
COMPLETED 10-21-08

16. ELEVATION TOP OF BORING -38.8 Ft.

17. TOTAL RECOVERY FOR BORING 60 %

18. SIGNATURE AND TITLE OF INSPECTOR
Jase Ousley, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-38.8	0.0						-38.8		
			CLAY, fat, high plasticity, very soft, wet, N 2.5/ black (CH)	36	1		Free Fall of Sampler -43.5		
				0			Free Fall of Sampler -45.5		
-45.9	7.1		SAND, poorly-graded, mostly medium-grained sand-sized quartz, few angular fine gravel-sized shell, dry, 5Y 6/1 gray (SP) From El. -46.6 to -46.7 Ft., strong cementation	73	2		SPT Sampler -47.0	7 16 16	32
				100	3		SPT Sampler -48.5	15 17 22	39
				67	4		SPT Sampler -50.0	3 4 8	12
			At El. -51.1 Ft., 5Y 3/1 very dark gray At El. -51.4 Ft., layer of sandstone	93	5		SPT Sampler -51.5	2 11 21	32
-51.7	12.9		CLAY, lean, low plasticity, firm, dry, 5Y 5/1 gray (CL)	100	6		SPT Sampler -52.0	50	
-52.2	13.4	Sl. Weathered	SANDSTONE, silicious, fossiliferous, moderately hard, slightly weathered, fine grained, intact, vuggy, 2.5Y 6/3 light yellowish brown	83	BOX 1	RQD 72	4 x 5-1/2" Diamond Impregnated Bit DT = 5 mins HP = 125 psi DFR = 50 %		

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(Continued)

Boring Designation CB-BIMC08-3

DRILLING LOG (Cont. Sheet)

INSTALLATION Jacksonville District		SHEET 2 OF 2 SHEETS
PROJECT US Marine Corps Support Facility - Blount Island	COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)	HORIZONTAL NAD83
		VERTICAL MLLW
LOCATION COORDINATES X = 491,101 Y = 2,205,619	ELEVATION TOP OF BORING -38.8 Ft.	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-55.0	16.2	▨		83	BOX 1	RQD 72	4 x 5-1/2" Diamond Impregnated Bit DT = 5 mins HP = 125 psi -55.0 DFR = 50 %		

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	0.0/4.7	OH
3	8.2/9.7	SP-SM*

*Lab visual classification based on gradation curve. No Atterberg limits.

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

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Boring Designation CB-BIMC08-4

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT: US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
2. BORING DESIGNATION: CB-BIMC08-4
LOCATION COORDINATES: X = 491,180 Y = 2,205,690
3. DRILLING AGENCY: Corps of Engineers - CESAM
CONTRACTOR FILE NO.:
4. NAME OF DRILLER: Charlie Brown
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:
6. THICKNESS OF OVERBURDEN: N/A
7. DEPTH DRILLED INTO ROCK: N/A
8. TOTAL DEPTH OF BORING: 17.9 Ft.
9. SIZE AND TYPE OF BIT: See Remarks
10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.)
HORIZONTAL: NAD83
VERTICAL: MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (barge-mounted) ☒ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES: DISTURBED 0 UNDISTURBED (UD) 0
13. TOTAL NUMBER CORE BOXES: 3
14. ELEVATION GROUND WATER: N/A
15. DATE BORING: STARTED 10-11-08 COMPLETED 10-11-08
16. ELEVATION TOP OF BORING: -37.5 Ft.
17. TOTAL RECOVERY FOR BORING: 97 %
18. SIGNATURE AND TITLE OF INSPECTOR: Jase Ousley, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
-37.5	0.0						-37.5		
			CONCRETE	100	BOX 1		4 x 5-1/2" Diamond Impregnated Bit DT = 14 mins HP = 250 psi DFR = 10 % -40.1		
				100			4 x 5-1/2" Diamond Impregnated Bit DT = 25 mins HP = 250 psi DFR = 70 % -44.8		
			At El. -45.1 Ft., pour lift	100	BOX 2		4 x 5-1/2" Diamond Impregnated Bit DT = 33 mins HP = 250 psi DFR = 75 % -49.7		
				90			4 x 5-1/2" Diamond Impregnated Bit DT = 17 mins HP = 200 psi DFR = 75 %		
-52.3	14.8								

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(Continued)

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Boring Designation CB-BIMC08-4

DRILLING LOG (Cont. Sheet)	*INSTALLATION* Jacksonville District	*SHEET* 2 *OF* 2 *SHEETS*

PROJECT US Marine Corps Support Facility - Blount Island	*COORDINATE SYSTEM/DATUM* State Plane, FLE (U.S. Ft.)	*HORIZONTAL* NAD83	*VERTICAL* MLLW
LOCATION COORDINATES X = 491,180 Y = 2,205,690	*ELEVATION TOP OF BORING* -37.5 Ft.		

ELEV.	*DEPTH*	*LEGEND*	*CLASSIFICATION OF MATERIALS*	*% REC.*	*BOX OR SAMPLE*	*RQD OR UD*	*REMARKS*	*BLOWS/ 1 FT.*	*N-VALUE*
		Moderately Weathered	SANDSTONE, silicious, fossiliferous, moderately hard, moderately weathered, very fine grained, pitted, 2.5Y 5/2 grayish brown	90	BOX 2		-52.8		
							4 x 5-1/2" Diamond Impregnated Bit DT = 2 mins HP = 150 psi DFR = 80 %		
			From El. -54.7 to -54.8 Ft., layer of sand	90	BOX 3				
-55.3	17.9		At El. -55.2 Ft., 5Y 5/1 gray				-55.3		
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System.				Abbreviations: DT = Drill Time. HP = Hydraulic Pressure. DFR = Drill Fluid Return.		

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SAJ FORM 1836-A
JUN 02

Boring Designation CB-BIMC08-5

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT
US Marine Corps Support Facility - Blount Island
Deepening & Sill Removal

2. BORING DESIGNATION CB-BIMC08-5 | LOCATION COORDINATES X = 491,065 Y = 2,205,488

3. DRILLING AGENCY Corps of Engineers - CESAM | CONTRACTOR FILE NO.

4. NAME OF DRILLER Charlie Brown

5. DIRECTION OF BORING ☒ VERTICAL ☐ INCLINED | DEG. FROM VERTICAL | BEARING

6. THICKNESS OF OVERBURDEN N/A

7. DEPTH DRILLED INTO ROCK N/A

8. TOTAL DEPTH OF BORING 22.9 Ft.

9. SIZE AND TYPE OF BIT See Remarks

10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.) | HORIZONTAL NAD83 | VERTICAL MLLW

11. MANUFACTURER'S DESIGNATION OF DRILL CME-55 (barge-mounted) | ☒ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES | DISTURBED 0 | UNDISTURBED (UD) 0

13. TOTAL NUMBER CORE BOXES 3

14. ELEVATION GROUND WATER N/A

15. DATE BORING | STARTED 10-12-08 | COMPLETED 10-12-08

16. ELEVATION TOP OF BORING -35.3 Ft.

17. TOTAL RECOVERY FOR BORING 93 %

18. SIGNATURE AND TITLE OF INSPECTOR Karen Pitchford, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
-35.3	0.0		CONCRETE At El. -35.9 Ft., 1" rebar	100	BOX 1		-35.3 4 x 5-1/2" Diamond Impregnated Bit DT = 21 mins HP = 250 psi DFR = 75 %		
			At El. -40.3 Ft., 1" rebar angled 30% from horizontal	99			-38.7 4 x 5-1/2" Diamond Impregnated Bit DT = 45 mins HP = 250 psi DFR = 75 %		
				95	BOX 2		-43.2 4 x 5-1/2" Diamond Impregnated Bit DT = 42 mins HP = 200 psi DFR = 75 %		
			At El. -49.6 Ft., 1.5" rebar	100			-48.2 4 x 5-1/2" Diamond Impregnated Bit DT = 34 mins HP = 250 psi DFR = 75 %		

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(Continued)

Boring Designation CB-BIMC08-5

DRILLING LOG (Cont. Sheet)

INSTALLATION Jacksonville District

SHEET 2 *OF* 2 *SHEETS*

PROJECT US Marine Corps Support Facility - Blount Island

COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)

HORIZONTAL NAD83

VERTICAL MLLW

LOCATION COORDINATES X = 491,065 Y = 2,205,488

ELEVATION TOP OF BORING -35.3 Ft.

ELEV.	*DEPTH*	*LEGEND*	*CLASSIFICATION OF MATERIALS*	*% REC.*	*BOX OR SAMPLE*	*RQD OR UD*	*REMARKS*	*BLOWS/ 1 FT.*	*N-VALUE*
				100	BOX 2		4 x 5-1/2" Diamond Impregnated Bit DT = 34 mins HP = 250 psi DFR = 75 % -52.7		
-53.3	18.0	Sl. Wea.	SANDSTONE, hard, slightly weathered, very fine grained, pitted, 10Y 6/1 greenish gray						
-54.0	18.7	Sl. M S Moderately Weathered	LIMESTONE, silicious, fossiliferous, hard, slightly weathered, very fine grained, pitted, 2.5Y 7/3 pale yellow At El. -54.2 Ft., moderately weathered At El. -54.6 Ft., slightly weathered At El. -54.8 Ft., moderately weathered At El. -56.5 Ft., broken due to drill action, 10Y 6/1 greenish gray	78	BOX 3		4 x 5-1/2" Diamond Impregnated Bit DT = 4 mins HP = 250 psi DFR = 75 % -58.2		
-58.2	22.9								

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

Abbreviations:
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

Boring Designation CB-BIMC08-6

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT
US Marine Corps Support Facility - Blount Island
Deepening & Sill Removal

2. BORING DESIGNATION: CB-BIMC08-6
LOCATION COORDINATES: X = 491,397 Y = 2,205,305

3. DRILLING AGENCY: Corps of Engineers - CESAM
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Charlie Brown

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN N/A

7. DEPTH DRILLED INTO ROCK N/A

8. TOTAL DEPTH OF BORING 17.7 Ft.

9. SIZE AND TYPE OF BIT See Remarks

10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.)
HORIZONTAL: NAD83
VERTICAL: MLLW

11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (barge-mounted) ☒ AUTO HAMMER ☐ MANUAL HAMMER

12. TOTAL SAMPLES: DISTURBED 6 UNDISTURBED (UD) 0

13. TOTAL NUMBER CORE BOXES 1

14. ELEVATION GROUND WATER N/A

15. DATE BORING: STARTED 10-14-08 COMPLETED 10-15-08

16. ELEVATION TOP OF BORING -38.3 Ft.

17. TOTAL RECOVERY FOR BORING 54 %

18. SIGNATURE AND TITLE OF INSPECTOR
Mariane Gruber, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE	
-38.3	0.0						-38.3			0
			CLAY, fat, high plasticity, very soft, wet, N 2.5/ black (CH)	31	1		Free Fall of Sampler -43.4			
-42.8	4.5									
			SAND, clayey, mostly fine to medium-grained sand-sized quartz, moist, 2.5Y 3/2 very dark grayish brown (SC)	87	2		SPT Sampler -44.9	1 2 5	7	5
-44.9	6.6									
			SAND, silty, mostly fine to medium-grained sand-sized quartz, 5Y 2.5/2 black (SM)	100	3		SPT Sampler -46.4	4 6 7	13	
				100	4		SPT Sampler -47.9	1 5 7	12	
							Overwashed -49.0			10
-49.0	10.7									
			SAND, poorly-graded with silt, mostly fine to medium-grained sand-sized quartz, 5Y 4/1 dark gray (SP-SM)	80	5		SPT Sampler -50.5	4 8 18	26	
-50.8	12.5									
		Highly Weath.	SANDSTONE, silicious, sparsely fossiliferous, hard, broken due to drill action, 5Y 5/1 gray At El. -51.8 Ft., highly weathered	NR	6		SPT Sampler -52.0	29 22 18	40	
				60	BOX 1	RQD 0	4 x 5-1/2" Diamond Impregnated Bit DT = 6 mins HP = 300 psi			15

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(Continued)

Boring Designation CB-BIMC08-6

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District	SHEET 2 OF 2 SHEETS

PROJECT US Marine Corps Support Facility - Blount Island	COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)	HORIZONTAL NAD83	VERTICAL MLLW
LOCATION COORDINATES X = 491,397 Y = 2,205,305	ELEVATION TOP OF BORING -38.3 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-54.5	16.2			60	BOX 1	RQD 0	4 x 5-1/2" Diamond Impregnated Bit DT = 6 mins HP = 300 psi		
-55.4	17.1	Unweathered	SILTSTONE, non-fossiliferous, hard, unweathered, very fine grained, solid, broken due to drill action, 2.5Y 2.5/1 black						
-56.0	17.7		SANDSTONE, silicious, non-fossiliferous, hard, porous, broken due to drill action, 5Y 6/2 light olive gray				-56.0		

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
2	5.1/6.6	SM
3	6.6/8.1	SM*
5	10.7/12.2	SP-SM*

*Lab visual classification based on gradation curve. No Atterberg limits.

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
NR = Not Recorded.
DT = Drill Time.
HP = Hydraulic Pressure.

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SAJ FORM 1836-A
JUN 02

Boring Designation CB-BIMC08-7

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT
US Marine Corps Support Facility - Blount Island
Deepening & Sill Removal

2. BORING DESIGNATION CB-BIMC08-7
LOCATION COORDINATES X = 491,879 Y = 2,205,343

3. DRILLING AGENCY Corps of Engineers - CESAM
CONTRACTOR FILE NO.

4. NAME OF DRILLER Charlie Brown

5. DIRECTION OF BORING
☒ VERTICAL
☐ INCLINED
DEG. FROM VERTICAL
BEARING

6. THICKNESS OF OVERBURDEN N/A

7. DEPTH DRILLED INTO ROCK N/A

8. TOTAL DEPTH OF BORING 15.7 Ft.

9. SIZE AND TYPE OF BIT See Remarks

10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)
HORIZONTAL NAD83
VERTICAL MLLW

11. MANUFACTURER'S DESIGNATION OF DRILL CME-55 (barge-mounted)
☒ AUTO HAMMER
☐ MANUAL HAMMER

12. TOTAL SAMPLES DISTURBED 3 UNDISTURBED (UD) 0

13. TOTAL NUMBER CORE BOXES 2

14. ELEVATION GROUND WATER N/A

15. DATE BORING STARTED 10-15-08 COMPLETED 10-15-08

16. ELEVATION TOP OF BORING -38.3 Ft.

17. TOTAL RECOVERY FOR BORING 55 %

18. SIGNATURE AND TITLE OF INSPECTOR
Mariane Gruber, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-38.3	0.0						-38.3		
			CLAY, fat, high plasticity, very soft, few fine-grained sand-sized quartz, N 2.5/ black (CH)	26	1		Free Fall of Sampler		
-43.1	4.8		SAND, poorly-graded with silt, mostly fine to medium-grained sand-sized quartz, 5Y 3/1 very dark gray (SP-SM)				-44.1		
-44.6	6.3			33	2		SPT Sampler	1 1 2	3
-45.1	6.8		SAND, silty, mostly fine to medium-grained sand-sized quartz, little silt, trace clay, 5Y 3/1 very dark gray (SM)				-45.6		
			SAND, poorly-graded with silt, mostly fine to medium-grained sand-sized quartz, 5Y 3/1 very dark gray (SP-SM)	NR	3		SPT Sampler	2 15 34	49
-47.1	8.8		SANDSTONE, silicious, moderately hard, very fine grained, broken due to drill action, 5Y 5/1 gray				-47.1		
-48.3	10.0	Unweathered	SANDSTONE, sparsely fossiliferous, hard, unweathered, fine grained, 2.5Y 7/2 light gray	89	BOX 1	RQD 15	4 x 5-1/2" Diamond Impregnated Bit DT = 3 mins HP = 200 psi -49.8		
			At El. -51.4 Ft., 5Y 6/1 gray	100		RQD 21	4 x 5-1/2" Diamond Impregnated Bit DT = 12 mins HP = 300 psi -51.7		
-52.2	13.9		CLAY, lean, low plasticity, very hard, little fine-grained sand-sized quartz, no reaction with HCl, dry, moderate cementation,	100	BOX 2	RQD 48	4 x 5-1/2" Diamond Impregnated Bit DT = 14 mins HP = 300 psi		

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(Continued)

Boring Designation CB-BIMC08-7

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District	SHEET 2 OF 2 SHEETS

PROJECT US Marine Corps Support Facility - Blount Island	COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)	HORIZONTAL NAD83	VERTICAL MLLW
LOCATION COORDINATES X = 491,879 Y = 2,205,343	ELEVATION TOP OF BORING -38.3 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-54.0	15.7	▨	5Y 5/1 gray (CL)	100	BOX 2	RQD 48	-54.0		

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
3	7.3/8.8	SM*

*Lab visual classification based on gradation curve. No Atterberg limits.

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
NR = Not Recorded.
DT = Drill Time.
HP = Hydraulic Pressure.

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SAJ FORM 1836-A
JUN 02

Boring Designation CB-BIMC08-8

DRILLING LOG

DIVISION: South Atlantic
INSTALLATION: Jacksonville District
SHEET 1 OF 2 SHEETS

1. PROJECT: US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
2. BORING DESIGNATION: CB-BIMC08-8 | LOCATION COORDINATES: X = 492,139 Y = 2,204,806
3. DRILLING AGENCY: Corps of Engineers - CESAM | CONTRACTOR FILE NO.:
4. NAME OF DRILLER: Charlie Brown
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED | DEG. FROM VERTICAL: | BEARING:
6. THICKNESS OF OVERBURDEN: N/A
7. DEPTH DRILLED INTO ROCK: N/A
8. TOTAL DEPTH OF BORING: 14.5 Ft.
9. SIZE AND TYPE OF BIT: See Remarks
10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.) | HORIZONTAL: NAD83 | VERTICAL: MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (barge-mounted) ☒ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES: DISTURBED 7 | UNDISTURBED (UD) 0
13. TOTAL NUMBER CORE BOXES: 1
14. ELEVATION GROUND WATER: N/A
15. DATE BORING: STARTED 10-16-08 | COMPLETED 10-16-08
16. ELEVATION TOP OF BORING: -41.5 Ft.
17. TOTAL RECOVERY FOR BORING: 64 %
18. SIGNATURE AND TITLE OF INSPECTOR: Jase Ousley, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-41.5	0.0						-41.5		
-48.2	6.7	▨	CLAY, fat, high plasticity, very soft, wet, N 2.5/ black (CH) At El. -47.9 Ft., soft, dry, 10Y 2.5/1 greenish black	32	1 2		Free Fall of Sampler -48.4		
			SAND, poorly-graded with silt, mostly medium-grained sand-sized quartz, trace phosphate, 2.5Y 3/1 very dark gray (SP-SM) At El. -49.1 Ft., trace fine gravel-sized quartz	93	3		SPT Sampler -49.9	2 2 6	8
				100	4		SPT Sampler -51.4	4 6 9	15
-52.5	11.0	⁙		100	5 6		SPT Sampler -52.9	5 9 10	19
-53.7	12.2	Highly Wea.	SANDSTONE, non-fossiliferous, moderately hard, highly weathered, 10Y 3/1 very dark greenish gray	88	6		SPT Sampler -53.7	13 50/0.3'	
-56.0	14.5	Unweathered	SANDSTONE, silicious, fossiliferous, hard, unweathered, fine grained, massive bedding, flat bedding orientation, intact, vuggy, 10Y 6/1 greenish gray	87	BOX 1		4 x 5-1/2" Diamond Impregnated Bit DT = 4 mins HP = 250 psi DFR = 60 % -56.0		
							140# hammer w/30" drop used with		

(Continued)

SAJ FORM 1836
JUN 02

Boring Designation CB-BIMC08-8

DRILLING LOG (Cont. Sheet)

INSTALLATION
Jacksonville District

SHEET 2
OF 2 SHEETS

PROJECT
US Marine Corps Support Facility - Blount Island

COORDINATE SYSTEM/DATUM
State Plane, FLE (U.S. Ft.)

HORIZONTAL
NAD83

VERTICAL
MLLW

LOCATION COORDINATES
X = 492,139 Y = 2,204,806

ELEVATION TOP OF BORING
-41.5 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	0.0/6.4	OH
4	8.4/9.9	SP-SM*

*Lab visual classification based on gradation curve. No Atterberg limits.

4. Additional Laboratory Testing

4 Specific Gravity

2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

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SAJ FORM 1836-A
JUN 02

Boring Designation CB-BIMC08-9

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT: US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
2. BORING DESIGNATION: CB-BIMC08-9
   LOCATION COORDINATES: X = 492,796 Y = 2,204,793
3. DRILLING AGENCY: Corps of Engineers - CESAM
   CONTRACTOR FILE NO.:
4. NAME OF DRILLER: Charlie Brown
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
   DEG. FROM VERTICAL:
   BEARING:
6. THICKNESS OF OVERBURDEN: N/A
7. DEPTH DRILLED INTO ROCK: N/A
8. TOTAL DEPTH OF BORING: 20.7 Ft.
9. SIZE AND TYPE OF BIT: See Remarks
10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.)
    HORIZONTAL: NAD83
    VERTICAL: MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (barge-mounted)
    ☒ AUTO HAMMER
    ☐ MANUAL HAMMER
12. TOTAL SAMPLES: DISTURBED 6 UNDISTURBED (UD) 0
13. TOTAL NUMBER CORE BOXES: 2
14. ELEVATION GROUND WATER: N/A
15. DATE BORING: STARTED 10-16-08 COMPLETED 10-16-08
16. ELEVATION TOP OF BORING: -35.3 Ft.
17. TOTAL RECOVERY FOR BORING: 62 %
18. SIGNATURE AND TITLE OF INSPECTOR: Jase Ousley, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-35.3	0.0						-35.3		
		▨	CLAY, fat, medium plasticity, very soft, some fine-grained sand-sized quartz, wet, 10Y 2.5/1 greenish black (CH) From El. -37.1 to -37.2 Ft., layer of sand	19	1		Free Fall of Sampler		
-43.1	7.8						-43.1		
		⁘	SAND, poorly-graded, mostly medium-grained sand-sized quartz, trace coarse-grained sand-sized shell, 5Y 6/1 gray (SP)	87	2		SPT Sampler	2	7
-43.7	8.4				3			2	
-43.9	8.6	▨	SAND, clayey, mostly fine-grained sand-sized quartz, 5Y 6/2 light olive gray (SC)		4		-44.6	5	
-44.9	9.6			100			-44.9 SPT Sampler	50/0.3'	
		⁘	CLAY, lean, low plasticity, firm, few angular fine gravel-sized quartz, dry, 10Y 7/1 light greenish gray (CL)	44			4 x 5-1/2" Diamond Impregnated Bit 15 mins, 250 psi, 85 %		
			SANDSTONE, non-fossiliferous, moderately hard, unweathered, very fine grained, intact, porous, 2.5Y 6/3 light yellowish brown Unweathered		BOX 1		-45.8 4 x 5-1/2" Diamond Impregnated Bit DT = 8 mins HP = 250 psi DFR = 80 %		
-48.1	12.8			87					
		▨	CLAY, lean, low plasticity, hard, dry, 10G 5/1 greenish gray (CL) From El. -48.7 to -48.8 Ft., layer of sandstone						

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JUN 02

(Continued)

Boring Designation CB-BIMC08-9

DRILLING LOG (Cont. Sheet)	*INSTALLATION* Jacksonville District	*SHEET* 2 *OF* 2 *SHEETS*
PROJECT US Marine Corps Support Facility - Blount Island	*COORDINATE SYSTEM/DATUM* State Plane, FLE (U.S. Ft.)	*HORIZONTAL* NAD83 *VERTICAL* MLLW
LOCATION COORDINATES X = 492,796 Y = 2,204,793	*ELEVATION TOP OF BORING* -35.3 Ft.	

ELEV.	*DEPTH*	*LEGEND*	*CLASSIFICATION OF MATERIALS*	*% REC.*	*BOX OR SAMPLE*	*RQD OR UD*	*REMARKS*	*BLOWS/ 0.5 FT.*	*N-VALUE*
-51.5	16.2	▨		87	BOX 1		-51.3		
		HW	SANDSTONE, moderately hard, highly weathered, fine grained, 5Y 6/1 gray	100	5 6		SPT Sampler -52.2	16 50/0.4'	
-56.0	20.7	Slightly Weathered	At El. -52.2 Ft., slightly weathered, banded, flat banding orientation, intact, porous, 5Y 7/2 light gray	97	BOX 2	RQD 68	4 x 5-1/2" Diamond Impregnated Bit DT = 9 mins -56.0		

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	0.0/7.8	OH

4. Additional Laboratory Testing

1	Moisture Content
1	Specific Gravity

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

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Boring Designation CB-BIMC08-10

DRILLING LOG

DIVISION South Atlantic

INSTALLATION Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
2. BORING DESIGNATION CB-BIMC08-10
   LOCATION COORDINATES X = 493,065 Y = 2,204,206
3. DRILLING AGENCY Corps of Engineers - CESAM
   CONTRACTOR FILE NO.
4. NAME OF DRILLER Charlie Brown
5. DIRECTION OF BORING ☒ VERTICAL ☐ INCLINED
   DEG. FROM VERTICAL
   BEARING
6. THICKNESS OF OVERBURDEN N/A
7. DEPTH DRILLED INTO ROCK N/A
8. TOTAL DEPTH OF BORING 16.3 Ft.
9. SIZE AND TYPE OF BIT See Remarks
10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)
    HORIZONTAL NAD83
    VERTICAL MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL CME-55 (barge-mounted) ☒ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES DISTURBED 6 UNDISTURBED (UD) 0
13. TOTAL NUMBER CORE BOXES 2
14. ELEVATION GROUND WATER N/A
15. DATE BORING STARTED 10-17-08 COMPLETED 10-17-08
16. ELEVATION TOP OF BORING -39.9 Ft.
17. TOTAL RECOVERY FOR BORING 93 %
18. SIGNATURE AND TITLE OF INSPECTOR Jase Ousley, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-39.9	0.0						-39.9		
-40.5	0.6		SILT, inorganic-H, medium plasticity, very soft, little fine-grained sand-sized quartz, wet, 10Y 2.5/1 greenish black (MH)	60	1		Free Fall of Sampler		
-42.0	2.1		SAND, silty, mostly fine-grained sand-sized quartz, some silt, wet, 10Y 2.5/1 greenish black (SM)		2		-41.9		
		HW	SANDSTONE, silicious, hard, highly weathered, fine grained, banded, flat banding orientation, 10Y 4/1 dark greenish gray	100	3		SPT Sampler -43.0	23 48 50/0.1'	98+
		Unweathered H	At El. -43.0 Ft., unweathered, vuggy, 5Y 5/1 gray At El. -44.6 Ft., porous At El. -45.0 Ft., highly weathered	91	BOX 1	RQD 26	4 x 5-1/2" Diamond Impregnated Bit DT = 8 mins HP = 250 psi DFR = 0 % -46.4		
-50.2	10.3	Unweathered HW	At El. -45.4 Ft., unweathered, 2.5Y 6/4 light yellowish brown At El. -46.4 Ft., vuggy At El. -49.2 Ft., 10Y 6/1 greenish gray At El. -49.7 Ft., highly weathered	100		RQD 76	4 x 5-1/2" Diamond Impregnated Bit DT = 10 mins HP = 250 psi DFR = 0 % -51.2		
			CLAY, lean, low plasticity, hard, dry, 10GY 5/1 greenish gray (CL)	100	4		SPT Sampler -52.7	7 8 6	14
-53.9	14.0		At El. -52.7 Ft., few sand	100	5		SPT Sampler	7 12 41	53
		Unweath.	SANDSTONE, silicious, fossiliferous, hard, unweathered, fine grained, banded, flat banding orientation, vuggy, 5Y 7/3 pale		6		-54.2		
				95	BOX 2	RQD 95			

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JUN 02

(Continued)

Boring Designation CB-BIMC08-10

DRILLING LOG (Cont. Sheet)

INSTALLATION: Jacksonville District

SHEET 2 OF 2 SHEETS

PROJECT: US Marine Corps Support Facility - Blount Island

COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.)

HORIZONTAL: NAD83

VERTICAL: MLLW

LOCATION COORDINATES: X = 493,065 Y = 2,204,206

ELEVATION TOP OF BORING: -39.9 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-56.2	16.3	Unweath. ▨	yellow	95	BOX 2	RQD 95	4 x 5-1/2" Diamond Impregnated Bit DT = 3 mins HP = 250 psi DFR = 0 % -56.2		

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	0.0/0.6	SM*
2	0.6/2.0	SM*
4	11.3/12.8	CH

*Lab visual classification based on gradation curve. No Atterberg limits.

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

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Boring Designation CB-BIMC08-11

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT: US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
2. BORING DESIGNATION: CB-BIMC08-11
   LOCATION COORDINATES: X = 493,547 Y = 2,204,244
3. DRILLING AGENCY: Corps of Engineers - CESAM
   CONTRACTOR FILE NO.:
4. NAME OF DRILLER: Charlie Brown
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
   DEG. FROM VERTICAL:
   BEARING:
6. THICKNESS OF OVERBURDEN: N/A
7. DEPTH DRILLED INTO ROCK: N/A
8. TOTAL DEPTH OF BORING: 17.0 Ft.
9. SIZE AND TYPE OF BIT: See Remarks
10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.) HORIZONTAL: NAD83 VERTICAL: MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (barge-mounted) ☒ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES: DISTURBED 6 UNDISTURBED (UD) 0
13. TOTAL NUMBER CORE BOXES: 2
14. ELEVATION GROUND WATER: N/A
15. DATE BORING: STARTED 10-17-08 COMPLETED 10-17-08
16. ELEVATION TOP OF BORING: -38.1 Ft.
17. TOTAL RECOVERY FOR BORING: 81 %
18. SIGNATURE AND TITLE OF INSPECTOR: Jase Ousley, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-38.1	0.0						-38.1		
		▨	CLAY, fat, high plasticity, very soft, little fine-grained sand-sized quartz, moist, 10Y 2.5/1 greenish black (CH)	32	1		Free Fall of Sampler		
-41.5	3.4		At El. -41.3 Ft., layer of sandstone				-41.5		
		Highly Wea.	SANDSTONE, highly weathered, broken due to drill action, 2.5Y 5/3 light olive brown	55	2		SPT Sampler	3 21 50/0.1'	71+
-42.7	4.6						-42.6		
		Unweathered	SANDSTONE, silicious, fossiliferous, hard, unweathered, fine grained, banded, flat banding orientation, porous, 5Y 7/3 pale yellow At El. -43.8 Ft., vuggy At El. -44.5 Ft., 10Y 6/1 greenish gray	96	BOX 1	RQD 55	4 x 5-1/2" Diamond Impregnated Bit DT = 5 mins HP = 150 psi DFR = 0 %		
-46.6	8.5	▨	CLAY, lean, low plasticity, hard, dry, 10GY 5/1 greenish gray (CL)						
							-47.5		
				100	3		SPT Sampler	5 6 6	12
							-49.0		
			At El. -49.3 Ft., layer of sandstone	100	4		SPT Sampler	8 12 10	22
							-50.5		
-51.1	13.0			93	5 6		SPT Sampler	4 14 25	39
		Unweathered	SANDSTONE, silicious, fossiliferous, hard, unweathered, fine grained, massive bedding, flat bedding orientation, intact, vuggy, 2.5Y 7/3 pale yellow				-52.0		
			From El. -52.8 to -53.5 Ft., banded, flat	100	BOX 2	RQD 100	4 x 5-1/2" Diamond Impregnated Bit DT = 2 mins HP = 200 psi		

(Continued)

Boring Designation CB-BIMC08-11

DRILLING LOG (Cont. Sheet)

INSTALLATION: Jacksonville District

SHEET 2 OF 2 SHEETS

PROJECT: US Marine Corps Support Facility - Blount Island

COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.)

HORIZONTAL: NAD83

VERTICAL: MLLW

LOCATION COORDINATES: X = 493,547 Y = 2,204,244

ELEVATION TOP OF BORING: -38.1 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
			banding orientation	100			-53.4 DFR = 0 %		
-54.7	16.6	Unweathered		88	BOX 2	RQD 47	4 x 5-1/2" Diamond Impregnated Bit DT = 3 mins HP = 200 psi DFR = 0 % -55.1		
-54.9	16.8		SAND, poorly-graded, mostly fine to coarse-grained sand-sized carbonate, trace silt, wet, 2.5Y 6/2 light brownish gray (SP)						
-55.1	17.0	U	LIMESTONE, sparsely fossiliferous, moderately hard, unweathered, fine grained, vuggy, 10Y 7/1 light greenish gray						

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	0.0/3.4	OH
3	9.4/10.9	CL

4. Additional Laboratory Testing

1 Moisture Content
3 Specific Gravity

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

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SAJ FORM 1836-A
JUN 02

Boring Designation CB-BIMC08-12

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT
US Marine Corps Support Facility - Blount Island
Deepening & Sill Removal

2. BORING DESIGNATION: CB-BIMC08-12
LOCATION COORDINATES: X = 493,825 Y = 2,203,728

3. DRILLING AGENCY: Corps of Engineers - CESAM
CONTRACTOR FILE NO.:

4. NAME OF DRILLER: Charlie Brown

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

6. THICKNESS OF OVERBURDEN: N/A

7. DEPTH DRILLED INTO ROCK: N/A

8. TOTAL DEPTH OF BORING: 16.3 Ft.

9. SIZE AND TYPE OF BIT: See Remarks

10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.)
HORIZONTAL: NAD83
VERTICAL: MLLW

11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (barge-mounted)
☒ AUTO HAMMER
☐ MANUAL HAMMER

12. TOTAL SAMPLES: DISTURBED 5, UNDISTURBED (UD) 0

13. TOTAL NUMBER CORE BOXES: 2

14. ELEVATION GROUND WATER: N/A

15. DATE BORING: STARTED 10-18-08, COMPLETED 10-18-08

16. ELEVATION TOP OF BORING: -38.9 Ft.

17. TOTAL RECOVERY FOR BORING: 78 %

18. SIGNATURE AND TITLE OF INSPECTOR: Jase Ousley, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-38.9	0.0						-38.9		
-40.4	1.5		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, wet, 5GY 2.5/1 greenish black (SC)	17	1		Free Fall of Sampler -40.1		
-41.9	3.0	Unweathered	SANDSTONE, silicious, fossiliferous, moderately hard, unweathered, fine grained, vuggy, 10Y 7/1 light greenish gray	100	2		SPT Sampler -41.0	4 60/0.4'	
-46.5	7.6		CLAY, lean, low plasticity, hard, dry, 10GY 5/1 greenish gray (CL) At El. -46.2 Ft., strong reaction with HCl, 5Y 8/1 white	83	BOX 1	RQD 42	4 x 5-1/2" Diamond Impregnated Bit DT = 8 mins HP = 250 psi DFR = 0 % -46.3		
-48.8	9.9	Unweathered H	SANDSTONE, silicious, fossiliferous, moderately hard, unweathered, fine grained, porous, 10Y 7/1 light greenish gray At El. -48.4 Ft., highly weathered, vuggy	100	3		SPT Sampler -47.2	10 40/0.4'	
-51.8	12.9		SAND, poorly-graded with clay, mostly sand to gravel-sized carbonate, some shell up to 2", few clay, 5Y 7/2 light gray (SP-SC)	78	BOX 1	RQD 38	4 x 5-1/2" Diamond Impregnated Bit DT = 4 mins HP = 200 psi DFR = 0 % -52.2		
			CLAY, lean, medium plasticity, firm, some angular fine gravel-sized shell, strong reaction with HCl, 5Y 7/2 light gray (CL) At El. -52.7 Ft., oyster shell At El. -53.3 Ft., oyster shell	100	BOX 2 5		SPT Sampler -53.7	9 6 6	12

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(Continued)

Boring Designation CB-BIMC08-12

DRILLING LOG (Cont. Sheet)	*INSTALLATION* Jacksonville District	*SHEET* 2 *OF* 2 *SHEETS*

PROJECT US Marine Corps Support Facility - Blount Island	*COORDINATE SYSTEM/DATUM* State Plane, FLE (U.S. Ft.)	*HORIZONTAL* NAD83	*VERTICAL* MLLW
LOCATION COORDINATES X = 493,825 Y = 2,203,728	*ELEVATION TOP OF BORING* -38.9 Ft.		

ELEV.	*DEPTH*	*LEGEND*	*CLASSIFICATION OF MATERIALS*	*% REC.*	*BOX OR SAMPLE*	*RQD OR UD*	*REMARKS*	*BLOWS/ 0.5 FT.*	*N-VALUE*
-55.2	16.3	▨		60	6		SPT Sampler -55.2	7 18 18	36

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	0.0/1.2	SP-SM

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

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Boring Designation CB-BIMC08-13

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT: US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
2. BORING DESIGNATION: CB-BIMC08-13
   LOCATION COORDINATES: X = 494,429 Y = 2,203,695
3. DRILLING AGENCY: Corps of Engineers - CESAM
   CONTRACTOR FILE NO.:
4. NAME OF DRILLER: Charlie Brown
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
   DEG. FROM VERTICAL:
   BEARING:
6. THICKNESS OF OVERBURDEN: N/A
7. DEPTH DRILLED INTO ROCK: N/A
8. TOTAL DEPTH OF BORING: 15.4 Ft.
9. SIZE AND TYPE OF BIT: See Remarks
10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.) HORIZONTAL: NAD83 VERTICAL: MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (barge-mounted) ☒ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES: DISTURBED: 7 UNDISTURBED (UD): 0
13. TOTAL NUMBER CORE BOXES: 1
14. ELEVATION GROUND WATER: N/A
15. DATE BORING: STARTED: 10-18-08 COMPLETED: 10-18-08
16. ELEVATION TOP OF BORING: -39.7 Ft.
17. TOTAL RECOVERY FOR BORING: 71 %
18. SIGNATURE AND TITLE OF INSPECTOR: Jase Ousley, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-39.7	0.0						-39.7		
		▨	SAND, clayey, mostly fine-grained sand-sized quartz, some clay, few fine gravel-sized limestone, few shell, wet, 10Y 4/1 dark greenish gray (SC) From El. -40.1 to -40.2 Ft., layer of limestone At El. -41.3 Ft., oyster shell	87	1		Free Fall of Sampler -42.0		
-42.1	2.4								
		∴▨	SAND, poorly-graded with clay, mostly fine-grained sand-sized quartz, few clay, few shell, no reaction with HCl, 5Y 8/2 pale yellow (SP-SC) At El. -42.4 Ft., oyster shell At El. -42.9 Ft., oyster shell At El. -43.5 Ft., oyster shell	100	2		SPT Sampler -43.5	10 13 27	40
			At El. -44.7 Ft., oyster shell	93	3		SPT Sampler -45.0	9 16 21	37
-45.0	5.3								
		∴	SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace angular shell, 5Y 5/1 gray (SP)	100	4		SPT Sampler	12 18	40
-46.0	6.3								
		∴▨	SAND, poorly-graded with clay, mostly fine-grained sand-sized quartz, little clay, little angular fine gravel-sized shell, 2.5Y 8/2 pale yellow (SP-SC)		5		-46.5	22	
				58	6		SPT Sampler -49.1	3 2 2	4
-49.8	10.1								
		Unweath. Highly Weathered	SANDSTONE, silicious, fossiliferous, moderately hard, unweathered, fine grained, massive bedding, flat bedding orientation, 2.5Y 7/2 light gray From El. -51.1 to -51.3 Ft., highly weathered	44	BOX 1	RQD 22	4 x 5-1/2" Diamond Impregnated Bit DT = 4 mins HP = 250 psi DFR = 80 % -53.6		
-54.1	14.4								
		∴	SAND, poorly-graded, mostly medium-grained sand-sized quartz, trace	67	7		SPT Sampler	3 3	

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(Continued)

Boring Designation CB-BIMC08-13

DRILLING LOG (Cont. Sheet)	*INSTALLATION* Jacksonville District	*SHEET* 2 *OF* 2 *SHEETS*

PROJECT US Marine Corps Support Facility - Blount Island	*COORDINATE SYSTEM/DATUM* State Plane, FLE (U.S. Ft.)	*HORIZONTAL* NAD83	*VERTICAL* MLLW
LOCATION COORDINATES X = 494,429 Y = 2,203,695	*ELEVATION TOP OF BORING* -39.7 Ft.		

ELEV.	*DEPTH*	*LEGEND*	*CLASSIFICATION OF MATERIALS*	*% REC.*	*BOX OR SAMPLE*	*RQD OR UD*	*REMARKS*	*BLOWS/ 0.5 FT.*	*N-VALUE*
-55.1	15.4	∴	coarse-grained sand-sized shell, 5Y 7/2 light gray (SP)	67	7		-55.1 SPT Sampler	10	13

NOTES:

1. USACE Jacksonville is the custodian for these original files.

2. Soils are field visually classified in accordance with the Unified Soils Classification System.

3. Laboratory Testing Results

SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION
1	0.0/2.3	SC
3	3.8/5.3	SM*
6	6.8/9.4	SC*

*Lab visual classification based on gradation curve. No Atterberg limits.

4. Additional Laboratory Testing

3 Specific Gravity

140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).

Abbreviations:
DT = Drill Time.
HP = Hydraulic Pressure.
DFR = Drill Fluid Return.

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Boring Designation CB-BIMC08-14

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT: US Marine Corps Support Facility - Blount Island Deepening & Sill Removal
2. BORING DESIGNATION: CB-BIMC08-14
   LOCATION COORDINATES: X = 493,903 Y = 2,203,566
3. DRILLING AGENCY: Corps of Engineers - CESAM
   CONTRACTOR FILE NO.:
4. NAME OF DRILLER: Charlie Brown
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
   DEG. FROM VERTICAL:
   BEARING:
6. THICKNESS OF OVERBURDEN: N/A
7. DEPTH DRILLED INTO ROCK: N/A
8. TOTAL DEPTH OF BORING: 18.7 Ft.
9. SIZE AND TYPE OF BIT: See Remarks
10. COORDINATE SYSTEM/DATUM: State Plane, FLE (U.S. Ft.)
    HORIZONTAL: NAD83
    VERTICAL: MLLW
11. MANUFACTURER'S DESIGNATION OF DRILL: CME-55 (barge-mounted) ☒ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES: DISTURBED 7 UNDISTURBED (UD) 0
13. TOTAL NUMBER CORE BOXES: 2
14. ELEVATION GROUND WATER: N/A
15. DATE BORING: STARTED 10-20-08 COMPLETED 10-20-08
16. ELEVATION TOP OF BORING: -36.1 Ft.
17. TOTAL RECOVERY FOR BORING: 63 %
18. SIGNATURE AND TITLE OF INSPECTOR: Mariane Gruber, Geologist

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-36.1	0.0						-36.1		
-38.3	2.2		CLAY, fat, high plasticity, very soft, some fine to medium-grained sand-sized quartz, trace shell, 5Y 3/1 very dark gray (CH)	18	1		Free Fall of Sampler -37.8		
-38.9	2.8	SW	SILTSTONE, moderately hard, slightly weathered, very fine grained, 5Y 4/1 dark gray	80	2		SPT Sampler -39.3	24 4 12	16
-39.8	3.7	HW	SANDSTONE, highly weathered, 2.5Y 5/4 light olive brown	93	3		SPT Sampler -40.8	15 17 39	56
-40.2	4.1		SANDSTONE, silicious, sparsely fossiliferous, moderately weathered, 2.5Y 5/3 light olive brown	60	4		-41.3 4 x 5-1/2" Diamond Impregnated Bit 2 mins, 0 %		
-44.3	8.2	Moderately Weathered	SANDSTONE, hard, 2.5Y 7/1 light gray At El. -40.8 Ft., 2.5Y 7/2 light gray At El. -42.8 Ft., pitted, 10Y 5/1 greenish gray	70	BOX 1	RQD 55	4 x 5-1/2" Diamond Impregnated Bit DT = 8 mins HP = 250 psi DFR = 0 %		
-46.1	10.0		CLAY, lean, hard, some fine-grained sand-sized quartz, dry, 5BG 4/1 dark greenish gray (CL)		BOX 2		-46.3		
-47.8	11.7		SANDSTONE, silicious, non-fossiliferous, moderately hard, fine grained, broken due to drill action, 2.5Y 8/1 white	100	5		SPT Sampler -47.8	2 20 30	50
		UW	SANDSTONE, hard, very fine grained, broken due to drill action At El. -48.3 Ft., fine grained, broken due to drill action At El. -49.6 Ft., unweathered, porous At El. -50.3 Ft., fossiliferous, highly weathered, broken due to drill action,	88	BOX 2	RQD 18	4 x 5-1/2" Diamond Impregnated Bit DT = 7 mins HP = 250 psi		

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(Continued)

Boring Designation CB-BIMC08-14

DRILLING LOG (Cont. Sheet)	*INSTALLATION* Jacksonville District	*SHEET* 2 *OF* 2 *SHEETS*

PROJECT US Marine Corps Support Facility - Blount Island	*COORDINATE SYSTEM/DATUM* State Plane, FLE (U.S. Ft.)	*HORIZONTAL* NAD83	*VERTICAL* MLLW
LOCATION COORDINATES X = 493,903 Y = 2,203,566	*ELEVATION TOP OF BORING* -36.1 Ft.		

ELEV.	*DEPTH*	*LEGEND*	*CLASSIFICATION OF MATERIALS*	*% REC.*	*BOX OR SAMPLE*	*RQD OR UD*	*REMARKS*	*BLOWS/ 0.5 FT.*	*N-VALUE*
		Highly Weathered ▦	2.5Y 6/1 gray	88	BOX 2	RQD 18	-51.8		
				NR	6		SPT Sampler -53.3	14 20 25	45
-53.8	17.7								
-54.8	18.7	▨	SAND, clayey, little shell, 2.5Y 7/1 light gray (SC)	NR	7		SPT Sampler -54.8	20 32 37	69
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System.				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.). Abbreviations: NR = Not Recorded. DT = Drill Time. HP = Hydraulic Pressure. DFR = Drill Fluid Return.		

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