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REMEDICATION WORK PLAN FOR THE PIPE SLIP LINING AT ALPHA-DELTA PIERS NS  
MAYPORT FL  
12/1/1994  
BECHTEL ENVIRONMENTAL

# REMEDICATION WORK PLAN FOR THE PIPE SLIP-LINING, ALPHA DELTA PIERS MAYPORT, FLORIDA

Prepared for

DEPARTMENT OF THE NAVY  
SOUTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND

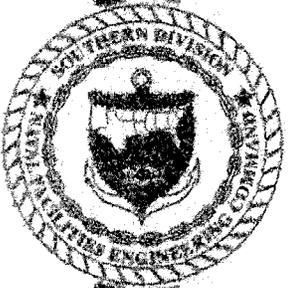
Under Contract No. N62467-93-D-0836

Prepared by



BECHTEL ENVIRONMENTAL, INC.  
OAK RIDGE, TENNESSEE

Bechtel Job No. 22567



REMEDIATION WORK PLAN  
FOR PIPE SLIP-LINING  
AT THE ALPHA DELTA PIERS  
FOR  
U.S. NAVAL STATION  
MAYPORT, FLORIDA

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DECEMBER 1994

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## DISCLAIMER

This Remediation Work Plan was prepared using background information, design basis, and other data furnished to BEI by the Naval Facilities Engineering Command, the Navy's CLEAN Contractors, and/or third parties. BEI has relied on this information as furnished and is not responsible for and has not confirmed the accuracy of this information. Certain key assumptions made by BEI may substantially affect the conclusions and/or recommendations which are conditioned upon these assumptions. These assumptions, although thought to be reasonable and appropriate, may not prove true in the future.

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## FOREWORD

This Remediation Work Plan (RWP) has been prepared to document the scoping and planning process performed by the U.S. Navy to support the storm water pipe rehabilitation at the Alpha Delta Piers, U.S. Naval Station in Mayport, Florida.

NAVSTA Mayport is conducting remediation activities by working through the Southern Division, Naval Facilities Engineering Command. The US EPA and the Florida Department of Environmental Protection oversee the Navy environmental program at NAVSTA Mayport. All aspects of the program are conducted in compliance with local, state, and federal regulations.

The storm water pipe rehabilitation does not involve the remediation of contaminated materials; however, it precludes the spread of contamination into the environment.

## 1.0 INTRODUCTION

The U.S. Department of Navy, Southern Division, Naval Facilities Engineering Command intends to conduct remedial actions at the U.S. Naval Station in Mayport, Florida. The Work Plan will address the Alpha Delta Piers identified for storm water pipe rehabilitation. Bechtel Environmental, Inc. (Bechtel), the Environmental Response Action Contractor, will perform the remedial action.

This work plan is intended to document the scope of the remediation effort and the procedures to be used.

The activities described in this Plan are based on the following:

- Facsimile from Blake Svendsen at ABB-ES to Gerald G. Pearson, RPE of UST/Petroleum Division at Southern Division Naval Facilities Engineering Command, dated July 20, 1994, Subject: *Storm Water Pipe Rehabilitation at the U.S. Naval Station Mayport, Alpha Delta Piers.*

In implementing this Plan, Bechtel will supply qualified personnel and equipment to the project; coordinate, manage, and supervise construction activities on site; assure compliance with contract and regulatory requirements; and lastly, provide documentation to the Navy supporting the remedial action for the Alpha Delta Piers. Bechtel's approach to complete the task is presented in the following sections of this Plan.

The remainder of Section 1.0 provides general site information and the justification and objectives for the proposed remediation.

Section 2.0 presents the Bechtel organization and responsibilities for completing the work. Section 3.0 provides a site history and a detailed description of the Alpha Delta Piers identified by the State of Florida as requiring remediation.

Section 4.0 provides the Scope of Work, outlining the approach Bechtel will take to achieve the remedial objectives, and a description of the remedial action components and field activities.

Section 5.0 presents Bechtel's Sampling and Analysis Plan.

Sections 6.0, 7.0, and 8.0 address the Waste Management Plan, Safety and Health Plan, and Quality Control Plan, respectively.

### 1.1 GENERAL SITE INFORMATION

U.S. Naval Station Mayport is located about 15 miles east-northeast of downtown Jacksonville, Florida (see Figure 1-1). The turning basin, where ships are docked and serviced, is located in the northern part of the station. The Alpha Delta Piers site, is located on the south side of the turning basin (see Figures 1-2 and 1-3) and is actually two contiguous piers, Alpha Pier and Delta 1 Pier.

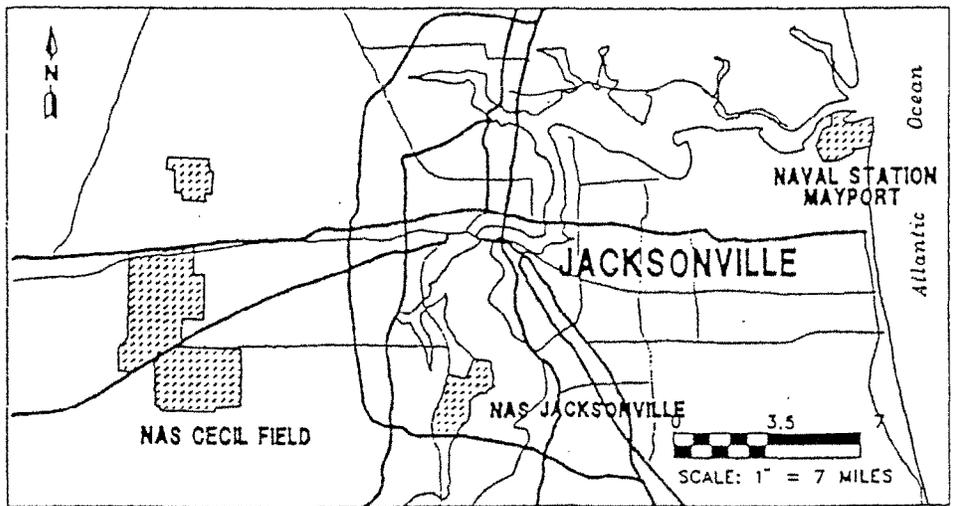
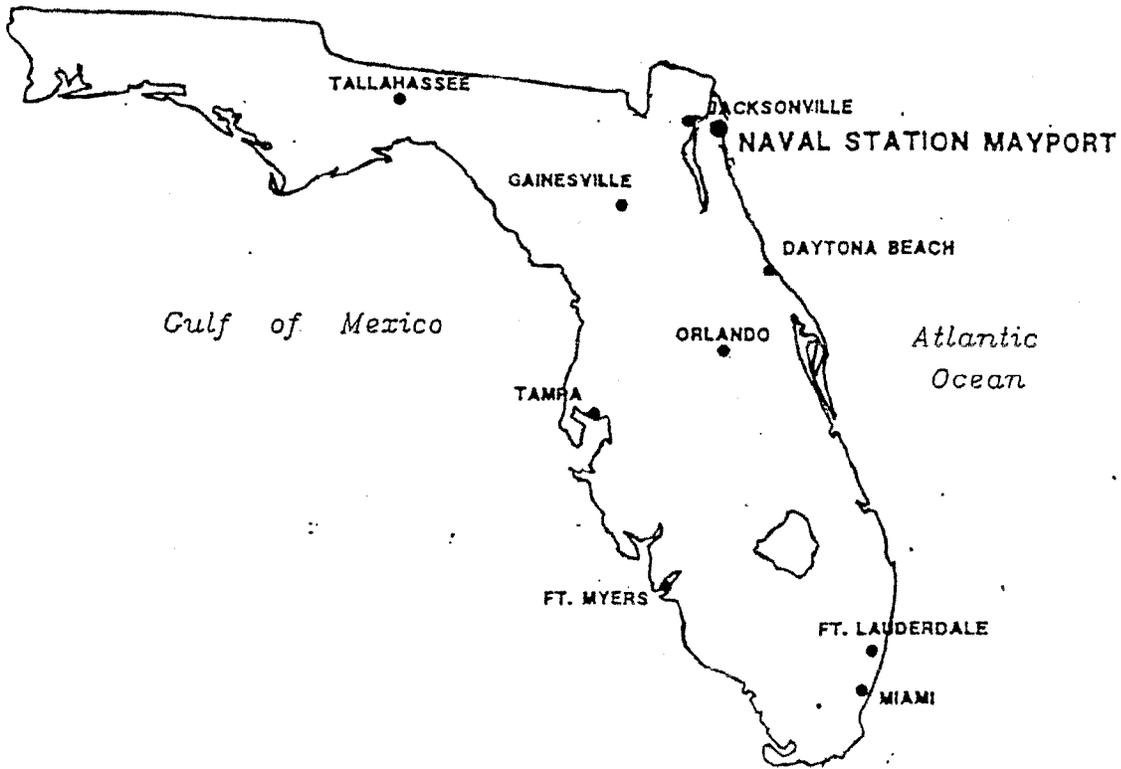


FIGURE 1-1  
FACILITY LOCATION MAP



U.S. Naval Station  
Mayport, Florida

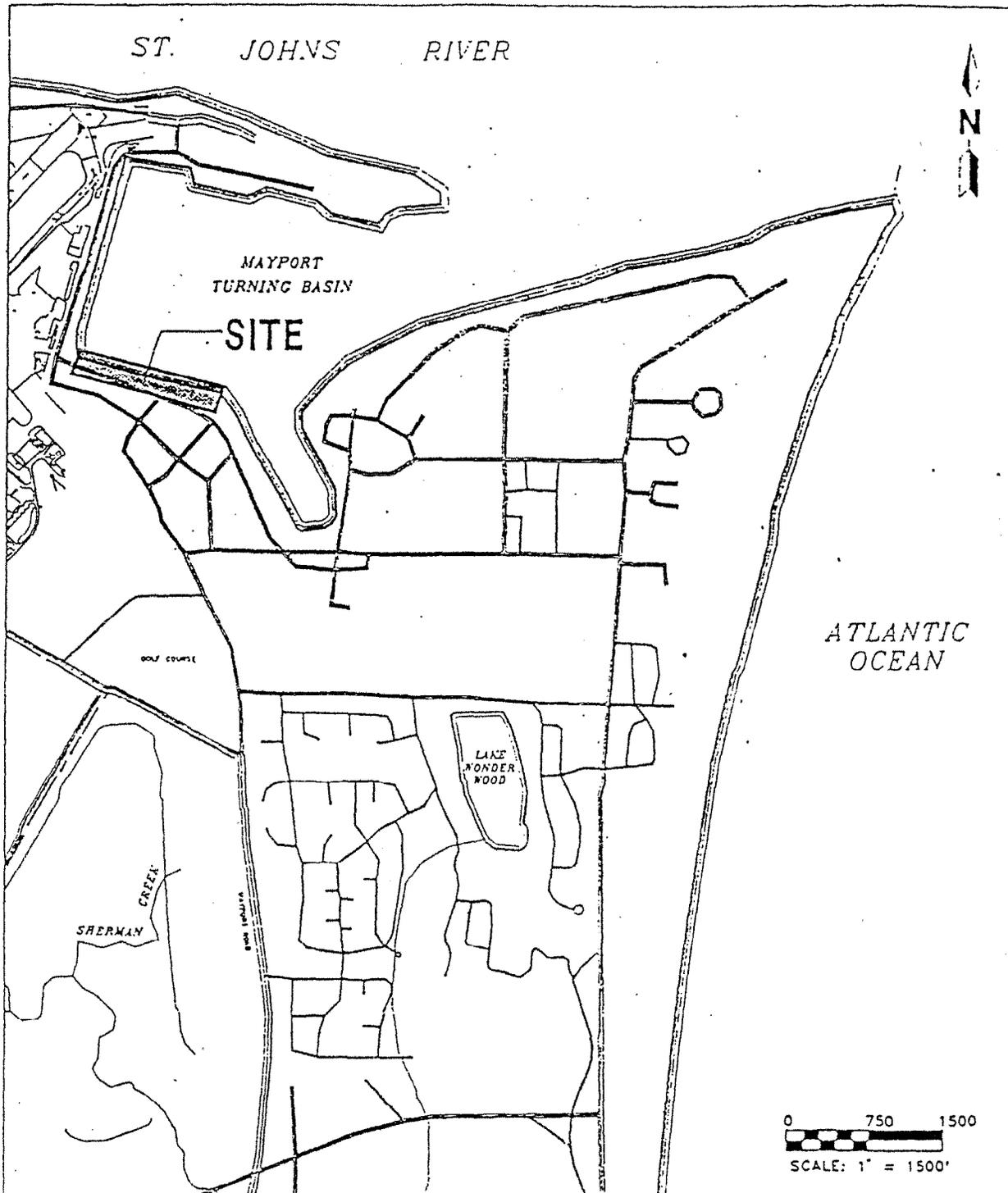


FIGURE 1-2  
SITE LOCATION MAP



U.S. Naval Station  
Mayport, Florida

NAVY DISTRICT ENGINEERING CENTER

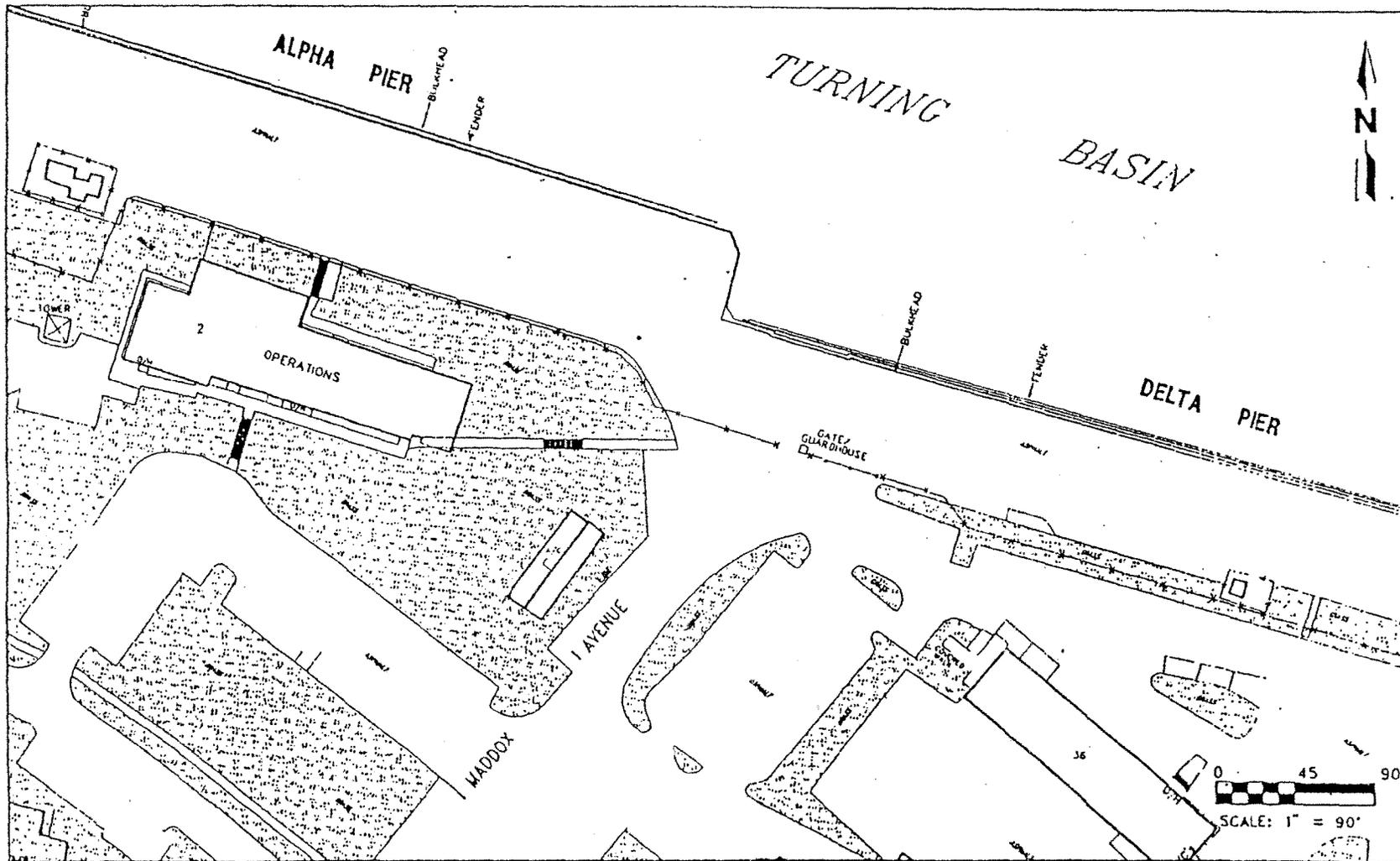


FIGURE 1-3  
SITE MAP



Alpha Delta Piers  
U.S. Naval Station  
Mayport, Florida

## **1.2 JUSTIFICATION AND OBJECTIVES FOR THE PROPOSED ACTION**

The primary threat to human health and the environment associated with the Alpha Delta Piers is the potential for uncontrolled releases of contaminants from infiltration and percolation of contaminants into the existing storm sewer system. Even though the contamination at the Alpha Delta Pier site does not pose an immediate threat to human health, the rehabilitation is necessary for the long-term protection of human health and the environment.

## **2.0 ORGANIZATION AND RESPONSIBILITIES**

### **2.1 PROJECT ORGANIZATION**

Bechtel is the Environmental Response Action Contractor for the Navy, Southern Division Naval Facilities Engineering Command. A project organization chart is provided in Figure 2-1.

### **2.2 COORDINATION AND RESPONSIBILITIES FOR FIELD WORK**

As the Environmental Response Action Contractor for the Navy, Bechtel manages U.S. Naval Station Mayport remedial action field activities, which includes all activities necessary to implement field work delineated in work plans. Typically, these activities include development and procurement of subcontract services; development, implementation, and overview of plans; collection and review of data, including sampling results, quality assurance/quality control submittals, and sample tracking and custody; technical guidance to onsite personnel; report preparation; cost management; and schedule control.

The Bechtel program manager is responsible to the Navy for the completion of all aspects of the work. The program manager is supported by a project manager and representatives from engineering, construction, environmental safety and health, contract administration, quality control, project administration, and project controls. A brief description of the responsibilities of the project manager and each group are described below.

#### **2.1.1 Project Manager**

- Implements overall guidance provided by the Bechtel program manager on a site specific basis
- Manages a team of professionals from each of the disciplines described below to accomplish the goals of the Naval Facilities Engineering Command project managers and the Bechtel program manager
- Interfaces directly with Navy project managers to implement directions on a site-specific basis

#### **2.2.2 Engineering**

- Develops bid packages and technical specifications needed to subcontract any remedial action work
- Provides site interface/coordination with regulatory agencies



- Modifies technical specifications and drawings, as required
- Provides geotechnical field support to remedial action efforts
- Provides onsite waste management and identification
- Participates in technology selection
- Develops work plans for remedial action
- Manages and evaluates chemical data obtained during remedial action activities

### **2.2.3 Construction**

- Reviews all site plans for constructability
- Provides field engineering services to monitor onsite work
- Administers subcontracts to complete work plans (i.e., cost, completion)
- Obtains manual craft
- Directs craft to implement work plans
- The project superintendent is responsible to the Bechtel project manager for day-to-day operations at the site.

### **2.2.4 Environmental Safety and Health**

- Develops plans, objectives, evaluations, and documentation for all environmental compliance, safety, and health matters
- Ensures all applicable federal, state, and local regulatory requirements are met
- Supports onsite waste management
- Provides site-specific safety and health training
- Provides a site safety and health representative (SSHHR)
- Performs audits of site activities to ensure implementation of the Safety and Health Plan and to assess the effectiveness of the program.

### **2.2.5 Contract Administration**

- Identifies bidders for subcontract work
- Coordinates bid and subcontract bid and award process

- Manages revisions to subcontracts
- Ensures compliance with Prime Contract

#### **2.2.6 Quality Control**

- Prepares site-specific quality control (QC) plan
- Implements the QC plan
- Audits quality assurance system and performance
- Conducts periodic reviews of program plans

#### **2.2.7 Project Controls**

- Provides cost and schedule support, including budgeting and monitoring
- Provides site automation services

#### **2.2.8 Project Administration**

- Provides administrative services such as document control, reproduction, archival, and mail distribution
- Provides document editing services

### **3.0 SITE BACKGROUND AND SETTING**

#### **3.1 SITE HISTORY**

This facility was established in 1942 and is primarily involved in the maintenance and repair of equipment, ships, aircraft, and other support units assigned to that part of the Second Fleet, which is stationed at the facility.

There are existing underground utility lines throughout the pier area. These utility lines include fuel and oily waste steel pipelines, electrical, stormwater, wastewater, sanitary sewer, potable water, and steam. In 1985, a broken Diesel Fuel Marine (DFM) valve was discovered and repaired. Since that time a sheen has been evident at the discharge point of the storm sewer which is downgradient from the original valve break.

### **4.0 SCOPE OF WORK**

The remedial action objective at the U.S. Naval Station Mayport for the Alpha Delta Piers is to slip-line approximately 565 linear ft of storm sewer lines that drain into the Turning Basin. To accomplish this objective, the following services will be performed:

- mobilization
- asphalt demolition
- soil excavation
- soil stockpile construction
- cleaning of storm sewer lines
- video inspection of sewer lines
- liner installation
- backfill
- site restoration
- demobilization

An estimated schedule of the work is included as Figure 4-1.

#### **4.1 MOBILIZATION**

Mobilization includes: delivering to the jobsite and work areas all construction equipment, tools, materials, supplies, and miscellaneous articles; establishing a work force sufficient to commence and sustain construction activities, designating laydown and material storage areas, maintaining traffic control during construction as required; and securing all necessary permits and registrations.

#### **4.2 ASPHALT DEMOLITION**

Asphalt will be demolished within the limits shown on Figure 4-2 in accordance with Section 5.7 of Technical Specification 001-SP000-005, "Contaminated Earthwork and Miscellaneous Demolition," Appendix B-1.

#### **4.3 SOIL EXCAVATION**

##### **4.3.1 Excavation Interferences**

Prior to excavation, the designated areas will be checked for potential interferences. The area will be visually inspected to verify locations of manholes, hydrants, valves, open cuts, overhead obstructions, curbs, buildings, etc. BEI will review all relevant as-built drawings to further delineate all underground utilities. BEI will either perform or supervise the performance of utility location surveys completed using standard field utility detection equipment. No excavation will be initiated until the subgrade interference survey is complete.

##### **4.3.2 Limits of Excavation**

Soil excavation consists of excavating soil at the two locations shown in Figure 4-2 and at locations necessary to facilitate the work. These excavation areas will be approximately 15 ft by 30 ft. The excavated soil will be temporarily stockpiled and used for backfilling after the pipe has been lined and activities are complete.

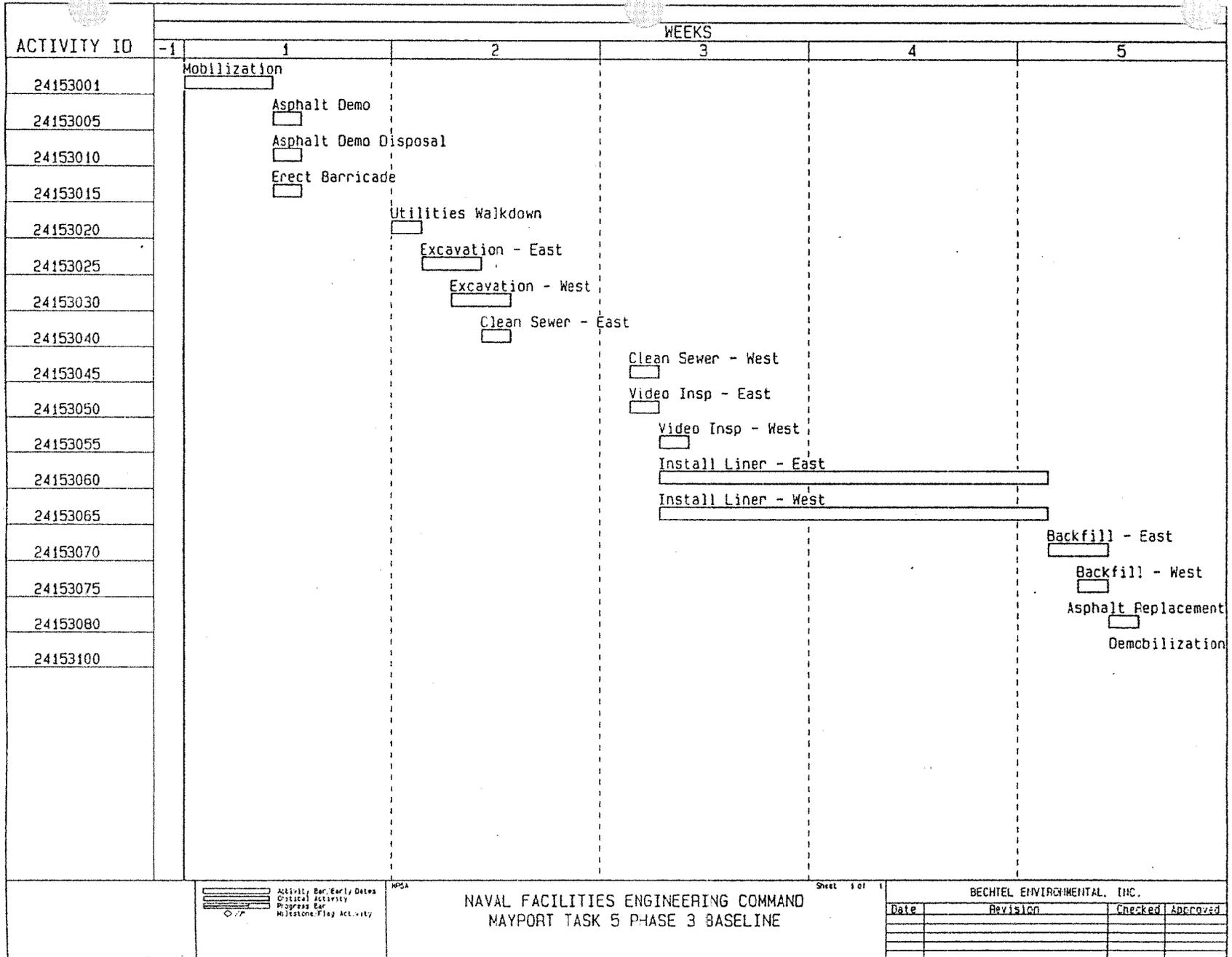
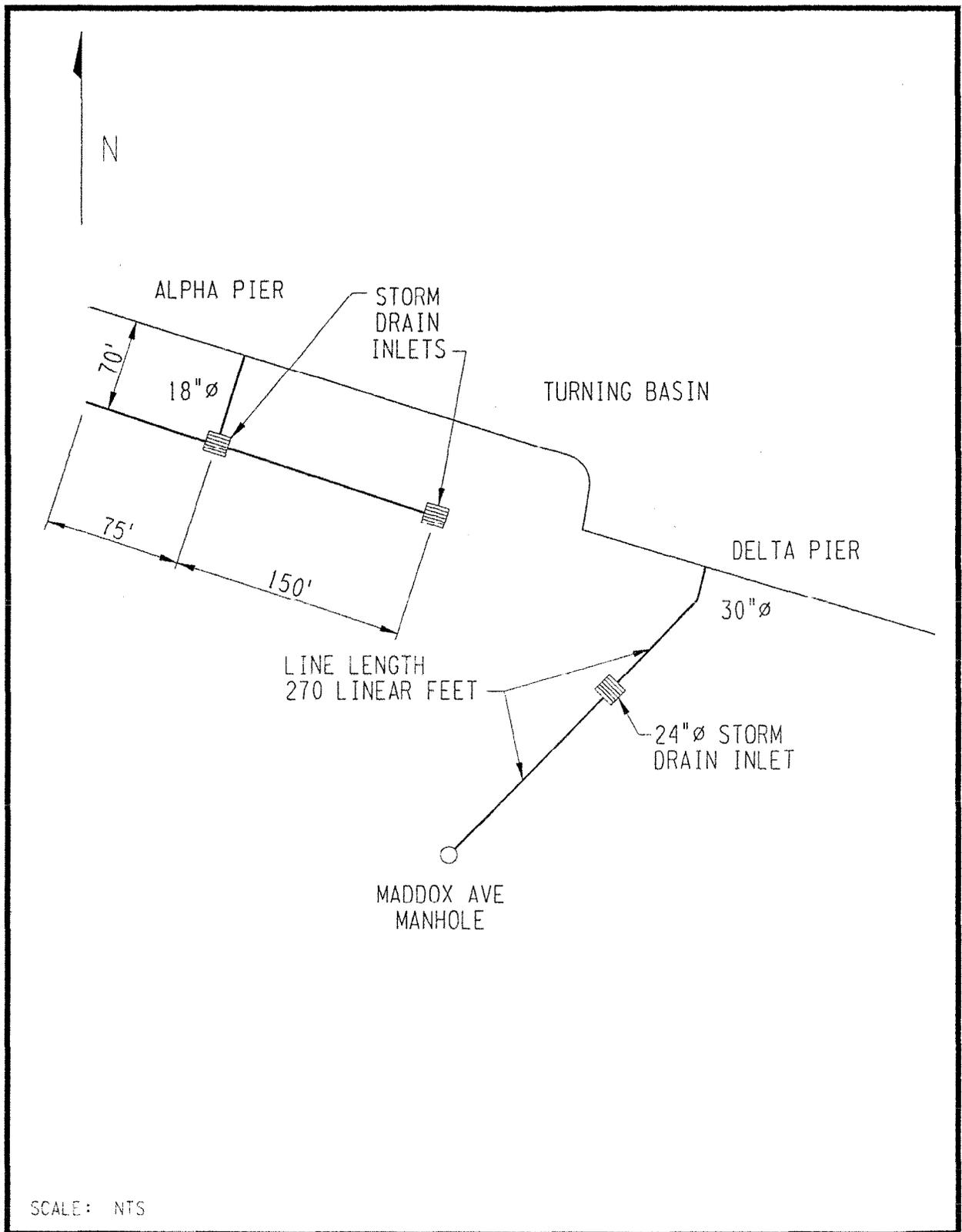


FIGURE 4-1 APPROXIMATE PROJECT SCHEDULE



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Figure 4-2  
ALPHA DELTA PIER  
PIPE SLIP LINING

#### **4.3.3 Method of Excavation**

Excavation shall be performed in accordance with Technical Specification 001-SP000-006, "Uncontaminated Earthwork," Appendix A-1. All excavation will be by backhoe and/or excavator where practical. In areas where interferences are present and preclude use of mechanized equipment, excavation will be by hand.

#### **4.4 CLEANING OF STORM SEWER LINES**

Cleaning of storm sewer lines consists of removing sediment, rocks, and debris. Cleaning is necessary to facilitate liner installation. Material removed from the storm sewer lines is not hazardous based on available information and will be disposed of at a licensed solid waste landfill.

#### **4.5 SOIL STOCKPILE CONSTRUCTION**

Excavated soil will be temporarily stockpiled near the excavation areas. Field screening sampling, as described in Section 5.0, will be implemented to segregate soils excessively contaminated with petroleum hydrocarbons. Once segregated, contaminated soils will be properly disposed of in accordance with Section 6.0. The stockpiles will be covered to protect the material from the elements until backfilling or disposal is complete.

#### **4.6 VIDEO INSPECTION OF SEWER LINES**

Video inspection of the sewer lines to be lined includes: identifying obstructions to be removed and verifying the layout of the pipes (bends, diameter, changes, etc.) prior to liner installation; and checking that the liner has been properly installed after liner installation.

#### **4.7 LINER INSTALLATION**

Liner installation includes: verifying that the liner is resistant to petroleum hydrocarbons; determining the sewer liner sizes; installing the liner according to manufacturer's instructions; and, if the liner involves segments, grouting the space between the pipe and liner and at each entrance and exit to prevent short circuiting and protect the structural integrity of the liner. Approximate locations of the storm water pipes to be lined are shown on Figure 4-2.

#### **4.8 BACKFILL**

Backfill will consist of the excavated soil. Backfill will be performed in accordance with the Technical Specification 001-SP000-006, "Uncontaminated Earthwork," Appendix A-1. Soils determined to be excessively contaminated as described in Section 5.0 will not be used for backfill.

#### **4.9 SITE RESTORATION**

After all excavation areas have been successfully backfilled, the site will be restored to the condition existing prior to commencement of work. Asphalt restoration will be performed by BEI.

## 4.10 DEMOBILIZATION

Demobilization includes: decontaminating equipment; cleaning up work areas upon completion of work; and removing equipment from the work site.

## 5.0 SAMPLING AND ANALYSIS PLAN

This section describes the sampling and analysis for field screening of potentially contaminated soils encountered during the rehabilitation of the storm water pipe. Sampling methodology and procedures described in this Sampling and Analysis Plan (SAP) are based on FDEP requirements as found in the Florida Department of Environmental Protection *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities* (DERQA-001/92) and *Quality Assurance Standard Operating Procedures for Petroleum Storage System Closure Assessments*.

As outlined in FDEP's *Quality Assurance Standard Operating Procedures for Petroleum Storage System Closure Assessments*, field screening techniques (EPA DQP Level I) using OVA will be used to delineate the area where potential soil remediation is required.

### 5.1 SAMPLING PROTOCOL

#### 5.1.1 Decontamination

Sampling equipment will be decontaminated prior to collection of each sample. Decontamination will be completed in accordance with section 4.1, "Decontamination," of FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*. Used decontamination fluids will be containerized, stored and disposed of in accordance with the Navy Public Works Department.

#### 5.1.2 Collection

Field screening will be performed in accordance with Section IV, "Field Measurements," of FDEP's *Quality Assurance Standard Operating Procedures for Petroleum Storage System Closure Assessments*.

#### 5.1.3 Sample Identification

Sample identification will be in accordance with NAVRAC Project Procedure 6003, "Sample Identification and Data Encoding."

#### 5.1.4 Logbooks

Field logbooks will be used for recording all field activities. Entries will include sufficient detail to reconstruct all significant activities. Logbook entries will be completed in accordance with the minimum requirements for recordkeeping including in Section 5.0, "Sample Custody and Documentation," of the FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*. This procedure includes the minimum requirements for recordkeeping.

### 5.1.5 Chain-of-Custody Records

In order to maintain sample traceability, each sample collected for offsite analysis will be properly documented on a chain-of-custody record. Chain-of-custody documentation will be completed in accordance with Section 5.3, "Custody Documentation Requirements for Field Operations," of the FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*.

### 5.1.6 Packaging and Holding Times

Sample volume requirements, frequencies, preservation techniques, minimum holding times, and container material requirements for samples are given in Table 5-1 (Unsaturated Soil). The Field Engineer is responsible for ensuring that a sufficient volume of each sample is collected and placed in the appropriate container with proper preservation.

The preparation of all sampling containers and the container types, preservatives, and holding times are specified in Table 5-1 and in accordance with Section 4.4, "Sample Handling," of the FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*.

## 5.2 FIELD SAMPLING AND ANALYSIS

Samples identified in this section will be collected in accordance with FDEP's standard operating procedures as outlined in Section 4.3.4, "Soil Sampling Procedures." Analysis of these samples will be in accordance with Florida Department of Regulation *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*, Sections 5.0 through 10.0. Table 5-1 provides a summary of data requirements and analytical parameters for samples to be collected.

### 5.2.1 Field Screening Sampling

Field screening of samples for the VOC component of TRPH's will be used to guide remediation activities. Soil samples will be collected and analyzed using a Flame Ionization Detector (FID) in accordance with Section IV, "Field Measurements," of FDEP's SOPs.

Each sample will be obtained in the vadose zone and screened with and without a carbon filter so a determination can be made whether naturally occurring organic (methane) vapors are having an effect on the FID levels detected. A Photoionization Detector (PID) may be used after determination is made of that instrument's equivalent response to a FID.

During mobilization and prior to excavation activities, soil samples as specified in Table 5-1 will be collected and screened onsite using an FID detector as well as sent offsite for laboratory TPH analyses. The offsite analysis (EPA level II) will have a two day turnaround. Laboratory and field screening results will be compared to determine an equivalence factor to the 50 ppm clean-up level, prior to actual field screening activities.

Field screening will be performed as specified in Section 4 to aid in excavation of soil that may exhibit levels over 50 ppm for TRPH's. Soil will be excavated in the areas identified as

**Table 5-1**  
**Data Requirements for**  
**Field Screening Sampling**

Analysis	Analytical Method	DQO Level	Sample Frequency	Sample Volume	Sample Container	Preservative	Holding Time	QC Samples Required <sup>1</sup>
TVOC <sup>2</sup>	Head Space	1	As required during excavation	fill jar 1/2 full	16 oz. canning jar	None	Analyze immediately following temperature equilibration	DUP: 1/10
TPH <sup>3</sup>	California LUFT Manual	3	1	300 g	8 oz. clear widemouth	None	14 days	DUP: 1/10

<sup>1</sup>DUP: Duplicates

<sup>2</sup>TVOC: Total Volatile Organic Compounds

<sup>3</sup>TPH: Total Petroleum Hydrocarbons, offsite analysis required for determining equivalence factor.

contaminated with over 50 ppm as discussed in Section 4, after which field screening will be used to guide additional excavation activities.

## **6.0 WASTE MANAGEMENT**

Waste management will be performed as directed by the Navy. Waste management practices, as defined in the Program Hazardous Waste Management Plan, will be used as guidance and appropriately followed for this work.

To minimize the amount of materials that must eventually be disposed, waste minimization practices will be implemented during operations. These practices will include, but not be limited to:

- (1) No extraneous materials taken into contamination control areas;
- (2) Decontamination and free release of equipment used to support onsite activities, to the extent practicable;
- (3) Use of consumables that can be compacted or otherwise volume reduced, to the extent practicable.

Personal protective equipment (PPE) that is not visibly soiled will be disposed of as conventional waste. Contaminated portions of PPE will be disposed of at a licensed treatment/disposal facility or licensed solid waste landfill.

Stormwater runoff and runoff controls will be implemented to prevent offsite migration of sediment or contaminated stormwater during site activities.

Any contaminated soil (i.e., OVA reading greater than 50 ppm) that is generated will be properly containerized for transportation offsite to a licensed treatment/disposal facility. The waste soil will be sampled in accordance with the treatment/disposal facility's waste acceptance criteria and all necessary paperwork for disposal will be completed by BEI.

## **7.0 SAFETY AND HEALTH**

A Program Safety and Health Plan (PSHP) defines policies for work on the NAVYRAC Project. A Site Safety and Health Plan (SSHP) has been prepared for the NAVSTA Mayport site.

## **8.0 QUALITY CONTROL PLAN**

The Quality Control Plan (QCP) - Quality Control Plan Addendum (QCPA) has been prepared for Remediation Tasks at NAVSTA Mayport. These documents will be used to provide site-specific QC requirements for remedial activities at NAVSTA Mayport.

## REFERENCES

Department of the Navy. *Remedial Action Plan for Alpha Delta Piers, Naval Station Mayport, Mayport Florida*, Unit Identification Code (UIC) No. N65928 Clean - District 1, Contract No. N62467-89-D-0317, Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina 29419-9010, December 1993.

Facsimile from Blake Svendsen at ABB-ES to Gerald G. Pearson, RPE of UST/Petroleum Division at Southern Division Naval Facilities Engineering Command, dated July 20, 1994, Subject: *Storm Water Pipe Rehabilitation at Naval Station Mayport, Alpha Delta Piers*.

**APPENDIX A**

**TECHNICAL SPECIFICATION FOR  
UNCONTAMINATED EARTHWORK**

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

UNCONTAMINATED EARTHWORK

0	7/21/94	Issued for Use	SK	RT	AF	UBB
NO.	DATE	REASON FOR REVISION	BY	CHECK	SUPV	PE
ORIGIN		Uncontaminated Earthwork :	JOB NO. 22567			
			TECHNICAL SPECIFICATION			REV
			001-SP000-006			0
			SHEET 1 OF 20			

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**TECHNICAL SPECIFICATION  
FOR  
UNCONTAMINATED EARTHWORK**

**1.0 GENERAL**

This specification defines the technical requirements for uncontaminated earthwork. Not all operations defined herein are necessarily required for this Subcontract; reference is directed to the contract Scope of Work for specific services required.

This specification includes requirements for

- a) Filling and backfilling for general site work
- b) Building perimeter and site structure backfilling
- c) Consolidation and compaction
- d) Miscellaneous earthwork
- e) Trenching and backfilling for utilities

This specification does not provide requirements for construction of low-permeability clay liners and closure caps, roadway and railroad earthwork, and contaminated earthwork, except as referenced by specifications for those activities.

**2.0 QUALITY STANDARDS**

Publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The latest edition at the time of bid, including addendums, shall be effected as a part of this specification.

**AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

ASTM D 1556 (1990) Density of Soil in Place by the Sand-Cone Method

ASTM D 1557 (1991) Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop

ASTM D 2167 (1984) Density and Unit Weight of Soils in Place by the Rubber Balloon Method

ASTM D 2216 (1992) Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures

ASTM D 2487 (1992) Classification of Soils for Engineering Purposes

- ASTM D 2922 (1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- ASTM D 3017 (1988) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- ASTM D 4253 (1988) Minimum Index Density of Soils Using A Vibratory Table
- ASTM D 4254 (1983) Minimum Index Density of Soils and Calculation of Relative Density
- ASTM D 4318 (1984) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

### OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

- OSHA 29 CFR 1910 Occupational Safety and Health Regulations for General Industry
- OSHA 29 CFR 1926 Occupational Safety and Health Regulations for Construction Industry

## 3.0 DEFINITIONS

### 3.1 COHESIONLESS MATERIALS

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

### 3.2 COHESIVE MATERIALS

Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH.

### 3.3 DEGREE OF COMPACTION

Degree of compaction required is expressed as a percentage of the maximum density obtained in accordance with ASTM D 1557 for cohesive materials and as a percentage of relative density obtained in accordance with ASTM D 4253 and ASTM D 4254 for cohesionless materials.

### 3.4 EXPANSIVE SOILS

Soils that have a plasticity index equal to or greater than 20 when tested in accordance with ASTM D 4318.

### **3.5 UNYIELDING MATERIAL**

Unyielding materials are rock and gravelly soils with stones greater than 6 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller.

### **3.6 UNSTABLE MATERIAL**

Unstable materials are materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

### **3.7 ROCK**

Rock shall consist of (1) boulders measuring approximately 1/2 cubic yard or more, (2) materials that cannot be removed without systematic drilling and blasting, such as rock material in ledges, bedded deposits, unstratified masses, and conglomerate deposits, and (3) below-grade concrete or masonry structures, exceeding 1/2 cubic yard in volume and greater than 9 inches in thickness. Asphaltic or portland cement pavements will not be considered as rock.

### **3.8 UNSATISFACTORY FILL AND BACKFILL**

Unsatisfactory fill and backfill material is defined as material that is (1) too wet or too soft to properly support the associated construction as determined by Bechtel, (2) expansive soils (Section 1.3.4), (3) contaminated, or (4) materials classified in accordance with ASTM D 2487 as PT, OH, and OL (5) stones larger than 3 inches in any dimension, or (6) man-made fills, refuse, or backfills from previous construction.

### **3.9 BEDDING MATERIAL FOR UTILITIES**

Bedding material for utilities shall consist of select granular material or satisfactory materials free from rocks 2 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, the initial backfill material shall be free of stones larger than 1 inch in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

## **4.0 SUBMITTALS**

### **4.1 GENERAL**

Not all submittals defined herein may be required. Only engineering document requirements as summarized in Exhibit F, Subcontractor Submittals Requirements Summary (SSRS), shall apply. Submittals identified shall meet the detailed requirements herein. Bechtel will determine if

documentation is complete as submitted by the Subcontractor and reserves the right to disapprove and require the resubmittal of any submittal that does not meet the specified requirements. Unless indicated otherwise submittals shall be made to Bechtel at least two weeks prior to delivery, use, or implementation.

#### **4.2 TESTING REPORTS**

Submit testing reports within 24 hours of conclusion of physical tests. Submittals shall include two unbound copies of test results, including calibration curves and results of calibration.

#### **4.3 TESTING LABORATORY CERTIFICATIONS AND QUALIFICATIONS**

Submit qualifications and certifications of the commercial testing laboratory.

#### **4.4 LIST OF EQUIPMENT**

Submit a list of equipment proposed for use. This list shall include the type, size, and rating of the equipment proposed to be used. For compactive rollers, the weight, drum, or wheel size and cleat size, if any, shall also be given.

#### **4.5 ONSITE BORROW PIT OPERATION**

Bechtel will provide the information on onsite borrow pit location and available test reports on the borrow material. Proposed operation plans for any onsite borrow pit(s) shall be submitted. The operation plan shall include proposed procedures and plans for water control, erosion and dust control, access road construction and maintenance, equipment type and purpose, and borrow excavation.

#### **4.6 OFFSITE BORROW PIT MATERIALS**

Submit the following information on the proposed offsite borrow pit: (1) borrow pit location and address, (2) owner's name and state permit/licensing number, and (3) reports of the ASTM tests required to satisfy requirements listed in Section 5.0.

#### **4.7 AGGREGATE SOURCE**

Submit the following information on the proposed offsite aggregate source: (1) aggregate source location and address, (2) owner's name and state permit/licensing number, and (3) reports of the ASTM tests required to satisfy the requirements listed in Section 5.0.

#### **4.8 PROTECTION OF EXISTING FOUNDATIONS**

Submit proposed modifications to protect existing foundations in accordance with Section 6.7.4.

#### **4.9 SHORING DESIGN AND CALCULATIONS**

Submit proposed shoring design or alternate slope protection methods in accordance with Section 6.7.4.

#### **4.10 SOILS LABORATORY TEST RESULTS**

Submit the following laboratory tests results (1) Proctor curves, (2) soil classification test results, (3) relative density test results.

### **5.0 PRODUCTS**

#### **5.1 COARSE AGGREGATE**

Coarse aggregate shall consist of clean, well-graded crushed stone with all particles passing the 3" sieve and no more than 5% passing the 1 $\frac{1}{2}$ " sieve. Fines shall be limited to not more than 2 percent by weight passing the No. 4 size sieve.

#### **5.2 BACKFILL**

##### **5.2.1 General Backfill**

General backfill shall include cohesive or cohesionless materials free of trash, debris, roots or other organic matter, frozen material, stones or other material larger than 4 inches in any dimension, and contamination.

##### **5.2.2 Structural Backfill**

Structural backfill shall include materials classified in accordance with ASTM D 2487 as GW, SW, GC, GM, SC, and SM and shall be free of trash, debris, roots or other organic matter, frozen material, and contamination. It shall have no more than 15 percent of the material passing a number 200 sieve, and no material shall exceed 2 inches in any dimension.

#### **5.3 TEMPORARY SEDIMENT BARRIERS**

Materials used for sediment barriers shall consist of straw bales, synthetic sediment fencing, geotextile filter fabric made expressly for use as a silt screen, or other suitable materials

reviewed by Bechtel prior to use. Straw bales shall not be used for permanent sediment barriers unless specifically required by Bechtel.

#### 5.4 SELECT GRANULAR MATERIAL

Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone, or crushed slag composed of hard, tough, and durable particles and shall contain not more than 10 percent by weight of material passing a No. 200 mesh sieve and no less than 95 percent by weight passing the 1-inch sieve. The maximum allowable aggregate size shall be 3/4-inch or the maximum size recommended by the pipe manufacturer, whichever is smaller.

#### 5.5 PLASTIC MARKING TAPE

Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6-inches wide with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be manufactured with integral wires, foil backing, or other means to enable detection by a metal detector when the tape is buried in soil up to 3 feet deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other metallic core type to protect it from corrosion. Tape color shall be as specified below and shall bear a continuous printed inspection describing the specific utility.

<u>Tape Color</u>	<u>Utility</u>
Red	Electric
Yellow	Gas, Oil, Dangerous Materials
Orange	Telephone, Telegraph, Television, Police, Fire and Communication
Blue	Water Systems
Green	Sewer Systems

### 6.0 FIELD OPERATIONS

#### 6.1 PRE-EARTHWORK EVALUATION

Before beginning any earthwork, carefully examine the work area to identify any pre-existing conditions (e.g., overhead power lines, access, etc.) that could impact the performance and completion of work. Bechtel will provide available information concerning the location of underground utilities, and the Subcontractor shall verify those locations, coordinate any required inspection with utility companies, provide support to utility companies, and provide structural support to utility lines. Unless noted otherwise, the Subcontractor shall maintain the services of all underground utilities encountered during excavation activities and shall restore the services to

their original condition. The Subcontractor shall obtain all applicable permits prior to commencing work, unless noted otherwise in the contract documents.

## **6.2 EROSION AND SEDIMENT CONTROL**

Erosion and sediment control shall be provided and maintained in accordance with the engineering drawings.

Temporary sediment barriers shall be installed and maintained during the construction period until permanent sediment barriers are in place. Permanent sediment barriers shall be installed in accordance with the engineering drawings.

## **6.3 CLEARING AND GRUBBING**

Clearing and grubbing shall be performed in accordance with specification 22567-001-SP000-002.

## **6.4 TOPSOIL REMOVAL**

Topsoil within the designated excavations and grading lines shall be stripped and stockpiled in the designated onsite areas. The actual depth of stripping will be determined in the field by Bechtel. Measures (e.g., erosion control, stable slopes, adequate compaction, etc.) shall be taken to prevent loss of stockpiled topsoil.

## **6.5 DRAINAGE, DEWATERING, AND STREAM DIVERSION**

### **6.5.1 Drainage**

Surface water shall be directed away from excavation and construction areas. Diversion ditches, check dams, dikes, and/or grades shall be developed and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing.

### **6.5.2 Dewatering**

Unless noted otherwise, all excavations shall be kept in a dewatered condition. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls; boils, uplift, and heave in the excavation; and to eliminate any interference with the orderly progress of excavation. French drains, sumps, ditches, or trenches will not be permitted within three feet of the foundation of any existing structure, and only with written Bechtel approval. Water control measures shall be taken prior to excavating to groundwater level in

order to maintain the integrity of the in situ material. Water collected during dewatering shall be pumped or collected and transported to designated onsite discharge points.

### **6.5.3 Stream Diversion**

Stream diversion(s) shown on engineering drawings shall be developed and maintained.

## **6.6 BLASTING**

Blasting will not be permitted.

## **6.7 EXCAVATION**

### **6.7.1 General**

Excavations shall include the removal of materials to the lines, grades, and elevations indicated on contract documents. Grading shall conform with the typical sections shown on the engineering drawings and the tolerances specified herein. Positioning of heavy equipment, stockpiles, etc. shall be outside the edges of excavation a distance equal to or greater than the full depth of the excavation, unless otherwise allowed by Bechtel.

Excavations shall be maintained until final acceptance of the work by Bechtel.

### **6.7.2 Classification of Excavation Materials**

Materials from uncontaminated excavations shall be unclassified regardless of the nature encountered. Disintegrated rock will not be considered as rock excavation. Excavation materials shall include all materials encountered (e.g., soils, concrete, rock, asphalt, stumps, rubbish, etc.).

### **6.7.3 Excavation Slopes**

Excavation slopes shall be established in strict accordance with OSHA 2207, specifically 29 CFR 1926, Subpart P, "Excavation, Trenching, and Shoring." Slopes shall be protected to prevent erosion or sloughing. Remove and handle any additional material caused by erosion or sloughing.

### **6.7.4 Shoring**

Shoring, including temporary sheet piling, shall be furnished and installed as necessary to protect workers, slopes, adjacent paving, structures, and utilities. Shoring design and installation plans, including engineering calculations, shall be developed in accordance with OSHA 2207,

specifically 29 CFR 1926 Subpart P, and submitted to Bechtel for review. Shoring, bracing, and sheeting shall be removed as excavations are backfilled in a manner to prevent cave-ins.

Alternate slope protection methods (e.g., benching, sloping, trench boxes, etc.) may be used where applicable. Proposed alternate methods, including plans and calculations, shall be developed by the Subcontractor in accordance with 29 CFR 1926 Subpart P and submitted to Bechtel for review prior to implementation.

Shoring inspections, including qualifications and frequency, shall be in accordance with 29 CFR 1926 Subpart P.

#### **6.7.5 Excavation for Foundation Systems of Structures**

Excavations shall extend a sufficient distance from walls and footings to allow for placement and removal of forms. Excavation to final grade shall be performed within 48 hours of subsequent concrete placement. Only excavation methods that will leave the foundation soils in a solid condition shall be used.

#### **6.7.6 Excavation for Utilities**

##### **Trench Excavation**

Trench walls below the top of the pipe shall be sloped or made vertical as recommended by the manufacturer of the pipe to be installed subject to conformance to OSHA 2207, specifically 29 CFR 1926, Subpart P, "Excavation, Trenching, and Shoring." Trench walls more than 5 feet deep shall be shored, cut back to a stable slope at least equal to the angle of repose, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Special attention shall be given to slopes that may be adversely affected by construction vibration forces, weather conditions, or moisture content. Slopes shall be protected to prevent erosion or sloughing. Remove and handle any additional material caused by erosion or sloughing.

##### **Excavation Widths**

The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter (I.D) and shall not exceed 36 inches plus pipe (O.D.) for pipes larger than 24 inches (I.D). Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized.

## **Rock**

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 9 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock faces shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown on the engineering drawings or as directed by Bechtel. Loose disintegrated rock and thin strata shall be removed.

## **Excavation for Appurtenances**

Excavation for manholes, catch-basins, inlets, or similar structures shall be sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members of sufficient size to allow the placement and removal of forms for the full length and width of structure footings and foundations as shown on the engineering drawings. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown on the engineering drawings or as directed by Bechtel. Loose disintegrated rock and thin strata shall be removed. Removal of unstable material shall be as specified herein. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the structure is to be placed.

## **Bottom Preparation**

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe.

## **Replacement of Unstable and Unyielding Material**

Where unstable and/or unyielding material is encountered in the bottom of the trench, such material shall be removed to 6 inches below the required grade and replaced with select granular material or initial backfill material. The select granular backfill shall be compacted as specified in Section 6.10.

### **6.7.7 Ditches, Gutters, and Channels**

Ditches, gutters, and channel changes shall be cut accurately to the cross sections and grades indicated on the engineering drawings. All roots, stumps, rock, and foreign matter in the sides

and or bottom of ditches, or gutters, and channel changes shall be trimmed and dressed or removed to conform to the slope, grade, and shape of the section indicated.

#### **6.7.8 Overexcavation**

Care shall be taken not to excavate outside the elevations, grades, and lines indicated. Overexcavation shall be backfilled to design grade with general backfill and compacted to a density equal to or greater than that required for the subsequent fill material.

#### **6.7.9 Boulders**

Unless otherwise directed by Bechtel, boulders shall be removed from excavations for drainage routes and areas of structural backfill.

#### **6.7.10 Stockpiling and Stockpiles**

Excavated materials satisfying the requirements of Section 5.2 for backfill shall be transported to and placed in designated fills or stockpiled at Bechtel designated onsite locations. All materials to be stockpiled (e.g., soil and aggregate from offsite sources) shall be placed in areas that have been cleared and grubbed.

Stockpiles shall be kept in a neat and well-drained condition, giving due consideration to drainage. Excavated satisfactory and unsatisfactory materials shall be stockpiled separately. Stockpiles of satisfactory materials shall be protected from contamination. If the material in the stockpile becomes unsatisfactory for use as backfill, such material shall be removed and replaced with satisfactory material from approved sources. Locations of stockpiles of satisfactory materials shall be subject to prior approval of Bechtel.

### **6.8 SUBGRADE PREPARATION**

Subgrades in structural areas shall be proof-rolled prior to placement of fill. Unsatisfactory material identified by proof-rolling shall be removed and replaced with general backfill and compacted in accordance with this specification to meet the compaction requirements for subsequent fill material.

Slopes steeper than 1 vertical to 4 horizontal shall be stepped or benched during placement of lifts so that the fill material will bond with the existing material.

The subgrade material shall be scarified in accordance with Section 6.10.2.

## 6.9 BORROW AND AGGREGATE MATERIAL

Unless directed otherwise, all borrow material shall be obtained from onsite areas designated by Bechtel. Subcontractor shall clear, grub, dispose of all debris, and control surface water flow and erosion of borrow areas. All work shall be considered operations related to onsite borrow excavation and shall be performed in accordance with applicable portions of this specification.

If required by Bechtel, the Subcontractor shall identify offsite borrow and/or aggregate sources, provide to Bechtel for review certification that borrow/aggregate material meets the requirements of this specification, and transport material to the fill area. No borrow and/or aggregate shall be brought from an offsite source without prior written approval by Bechtel.

## 6.10 BACKFILLING

### 6.10.1 General

Unless noted otherwise in contract documents, general fill and backfill shall be used in bringing fills and excavations to the lines and grades indicated and for replacing unsatisfactory subgrade materials. Compaction shall be accomplished by segmented pad foot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other Bechtel reviewed equipment suited to the type of material being compacted. Backfill shall be placed in horizontal layers not exceeding 8 inches in loose thickness when using conventional compaction equipment or 6 inches when using hand-operated compaction equipment. Backfill shall not be placed on unsatisfactory materials.

Each lift shall be moisture conditioned or aerated as necessary and compacted to not less than the percentage of maximum density specified below:

- a) General and trench fill using cohesionless material (e.g., cover soil) shall be compacted to at least 70% relative density.
- b) General and trench fill using cohesive material (e.g., cover soil) shall be compacted to at least 85% maximum density.
- c) Structural fill using cohesionless material (e.g., buildings, steps, paved areas, sidewalks, footings, trenches, etc.) shall be compacted to at least 85% relative density.
- d) Structural fill using cohesive material (e.g., buildings, steps, paved areas, sidewalks, footings, trenches, etc.) shall be compacted to at least 95% maximum density.
- e) Bedding material for utilities shall be compacted to at least 85% relative density.

Compacted subgrades that are disturbed by the Subcontractor's operations shall be repaired as specified herein to the required density prior to further construction thereon.

### **6.10.2 Scarifying**

All subgrades and compacted lifts in the following applications shall be scarified 3 to 4 inches prior to placement of the subsequent lift: (a) embankments, (b) roadway routes, (c) railway routes, and (d) fill areas adjacent to and immediately below structural foundations.

In lieu of scarifying, compaction may be performed by sheepsfoot roller or similar equipment designed to compact the lift from the bottom to the top.

### **6.10.3 Additional Requirements for Structural Backfilling**

Structural backfilling shall not begin until construction below finish grade has been inspected by Bechtel, forms removed, and the excavation cleaned of trash and debris.

Backfill adjacent to structures shall be placed and compacted uniformly in such manner as to prevent wedging action or eccentric loading upon or against the structures. Backfill shall not be placed against concrete or masonry foundation walls prior to 7 days after completion of the walls. To the extent practical, backfill shall be brought up evenly on both sides of walls and sloped to drain away from the wall. Construction equipment and methods that will overload immediate and adjacent structures during backfilling and embankment formation operations shall not be used.

### **6.10.4 Additional Requirements For Trench Backfilling**

#### **General**

Trenches shall be backfilled to the grades shown on engineering drawings and in the following order. The bedding material shall be placed, followed by the initial backfill, and completed by the final backfill. Lift thickness shall be as specified in Section 6.10.1.

In compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Construction machinery shall not be moved over a culvert or storm drain at any stage of construction in a manner that might damage the culvert or drain. Any damaged pipe shall be repaired or replaced.

#### **Bedding**

Bedding shall be select granular material as described in Section 5.4. Care shall be taken to ensure thorough compaction of the bedding under the haunches of the pipe. Bedding material

shall be placed and compacted with approved tampers to a height of 1 foot above the utility pipe or as specified on the engineering drawings. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. The joints and/or couplings shall be left uncovered during pressure tests.

### **Final Backfill**

Final backfill shall not be placed until all specified tests are satisfactorily performed. The remainder of the trench, except at roadways and railroads shall be filled with satisfactory material. Backfill material shall be placed and compacted to grade in accordance with Section 6.10.

### **Backfill for Appurtenances**

Manholes, catch basins, inlets, or similar structures shall be placed in such a manner that the structure will not be damaged by the shock of falling earth while backfilling. Backfill material shall be deposited and compacted as specified for final backfill and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

### **Plastic Marking Tape**

Plastic marking tape per Section 5.5 shall be installed directly above the pipe, at a depth of approximately 18 inches below finished grade unless otherwise shown on the engineering drawings.

## **6.11 AGGREGATE BASES**

Aggregate bases shall be constructed under pavements, foundations, and slabs-on-grade and placed directly on the subgrade. The aggregate base shall be placed in 4 inch lifts and compacted with a minimum of two passes of a hand-operated plate-type vibratory compactor or equivalent compactive effort. Minimum compacted thickness of the aggregate base is 4 inches unless noted otherwise.

## **6.12 GRADING**

Graded areas shall be constructed true-to-grade, shaped to drain, and maintained free of trash and debris until final inspection has been completed and the work has been accepted. The surfaces of embankments and excavations shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown on engineering drawings. Unless indicated otherwise, tolerances for all graded areas shall be  $\pm 0.1$  foot for the grades and elevations indicated.

### **6.13 PROTECTION OF WORK**

Settlement or erosion that occurs in backfilled, filled, graded, or topsoiled areas prior to acceptance of the work shall be repaired to required conditions at Subcontractor's expense.

### **6.14 SECURITY**

When necessary and practical, as determined by Bechtel, work areas shall be secured using barriers (e.g. rope, snow fence) to prevent inadvertent entry to work areas.

## **7.0 QUALITY CONTROL AND VERIFICATION**

### **7.1 RESPONSIBILITY**

The Subcontractor shall verify that placement of backfill meets the requirements of this specification. Unless noted otherwise, testing shall be the responsibility of the Subcontractor and shall be considered part of earthwork.

### **7.2 TESTING LABORATORY**

Testing shall be performed by a Bechtel approved commercial testing laboratory.

### **7.3 MOISTURE-DENSITY RELATION**

Moisture-density relation shall be determined in accordance with ASTM D 1557 for each type of material or source of material, including borrow materials, to determine the optimum moisture and laboratory maximum density values.

### **7.4 IN-PLACE MOISTURE CONTENT**

In-place moisture content of soil backfill shall be determined in accordance with ASTM D 3017. Accuracy of the ASTM D 3017 tests shall be checked by performing ASTM D 2216 test for every ten ASTM D 3017 tests performed.

### **7.5 IN-PLACE DENSITY**

Field in-place density shall be determined in accordance with ASTM D 2922. Accuracy of the ASTM D 2922 tests shall be checked by performing one ASTM D 1556 or ASTM D 2167 test for every ten ASTM D 2922 tests performed.

When ASTM D 2922 is used, the calibration curves shall be checked and adjusted if necessary by the procedure described in ASTM D 2922, paragraph ADJUSTING CALIBRATION CURVE. The calibration curves furnished with the moisture gauges shall also be checked, along with density calibration checks, as described in ASTM D 3017. The calibration checks of the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at the beginning and ending of each day that the equipment is used.

Additional compaction and/or moisture conditioning shall be performed if the compaction or slope stability do not satisfy the requirements of this specification.

## 7.6 TESTING FREQUENCY

The following number of tests, if performed at the appropriate time, shall be the minimum acceptable for each type operation.

### 7.6.1 Moisture-Density Relation

- a) One representative test per 5,000 cubic yards of fill and backfill or when any change in material occurs that may affect the optimum moisture content or laboratory maximum density.
- b) One representative test per 1,500 cubic yards of bedding, fill and backfill for the utility excavation or when any change in material occurs that may affect the optimum moisture content or laboratory maximum density.

### 7.6.2 In-Place Density of Subgrades

- a) One test per 40,000 square feet or a minimum of 2 tests per area, whichever is greater, for subgrades of general backfill.
- b) One test per 20,000 square feet or a minimum of 2 tests per area, whichever is greater, for subgrades of structural backfill.
- c) The in-place density of subgrades of trenches and other areas less than 10 feet in width, shall be tested with 1 test per 1,000 square feet or one test for each 100 linear feet of length, whichever yields the greater number of tests.

### 7.6.3 In-Place Density and Moisture Content of Fills and Backfills

- a) One test per 20,000 square feet or minimum of 1 test per lift, whichever is greater, for general backfill areas compacted by other than hand or hand-operated machines.

- b) One test per 10,000 square feet or minimum of 1 test per lift, whichever is greater, for general backfill areas compacted by hand or hand-operated machines.
- c) One test per 2,000 square feet or minimum of 2 tests per lift, whichever is greater, for structural backfill areas compacted by other than hand or hand-operated machines.
- d) One test per 1,000 square feet or minimum of 2 tests per lift, whichever is greater, for structural backfill areas compacted by hand or hand-operated machines.
- e) The density of each lift of backfill materials for trenches, pits, building perimeters, or other structures or areas less than 10 feet in width, and compacted with hand or hand-operated machines shall be tested with 1 test per each area less than 1,000 square feet, or one test for each 100 linear foot of length, whichever is greater.

#### 7.6.4 Particle-Size Analysis

A minimum of one particle-size analysis shall be performed or data shall be provided for each different type of material to be used for bedding and backfill.

### 7.7 TEST RESULTS

Test results for a lift shall be submitted for review prior to placement of the next lift above that area. Approved lifts shall be covered by subsequent lifts within 24 hours of testing to protect the compacted condition of the fill. Any lift left exposed for longer than 24 hours shall be removed and replaced.

**APPENDIX B**

**TECHNICAL SPECIFICATION FOR  
CONTAMINATED EARTHWORK AND MISCELLANEOUS  
DEMOLITION**

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

CONTAMINATED EARTHWORK AND MISCELLANEOUS DEMOLITION

0	7/21/94	Issued for Use	KK	RTD	<i>[Signature]</i>	YMB
NO.	DATE	REASON FOR REVISION	BY	CHECK	SUPV	PE
ORIGIN		CONTAMINATED EARTHWORK AND MISCELLANEOUS DEMOLITION	JOB NO. 22567			
			TECHNICAL SPECIFICATION			REV
			001-SP000-005			0
			SHEET 1 OF 11			

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**TECHNICAL SPECIFICATION  
FOR  
CONTAMINATED EARTHWORK AND MISCELLANEOUS DEMOLITION**

**1.0 GENERAL**

This Specification provides the technical requirements for the excavation of contaminated earthwork and miscellaneous demolition. Not all work defined herein is necessarily required for this contract; reference is directed to the Scope of Work and engineering drawings for specific services required.

Contaminated earthwork includes excavating, loading, placing, and compacting contaminated materials. Transporting and unloading of contaminated materials is covered in Specification 001-SP000-003, "Transport of Contaminated Material." Backfilling of excavation is covered in Specification 001-SP000-006, "Uncontaminated Earthwork".

**2.0 QUALITY STANDARDS**

Unless otherwise specified or shown, the latest edition at the time of bid of the following Codes and Standards shall apply to the extent indicated herein:

- |                  |   |
|------------------|---|
| OSHA 29 CFR 1910 | Occupational Safety and Health Regulations for General Industry |
| OSHA 29 CFR 1926 | Occupational Safety and Health Regulations for Construction     |

**3.0 SUBMITTALS**

**3.1 GENERAL**

Not all submittals defined herein may be required. Only engineering document requirements as summarized in Exhibit F, Subcontractor Submittals Requirements Summary (SSRS), shall apply. Submittals identified shall meet the detailed requirements herein. BEI will determine if documentation is complete as submitted and reserves the right to require the resubmittal of any submittals that do not meet specified requirements. Unless indicated otherwise, submittals shall be made to BEI at least 2 weeks prior to delivery, implementation, or use.

**3.2 LIST OF EQUIPMENT**

Submit list of equipment for use in contaminated earthwork. The list shall include the type, size, and rated capacity of the equipment proposed.

### **3.3 TESTING REPORTS**

Submit testing reports within 24 hours of conclusion of physical tests. Submittals shall include 2 unbound copies of test results, including calibration curves and results of calibration.

### **3.4 TESTING LABORATORY CERTIFICATIONS AND QUALIFICATIONS**

Submit qualifications and certifications of the commercial testing laboratory.

### **3.5 DRAINAGE DESIGN**

Submit proposed drainage design in accordance with this specification.

### **3.6 SHORING DESIGN AND CALCULATIONS**

Submit proposed shoring design and engineering calculations or alternate slope protection measures, in accordance with this specification.

## **4.0 MATERIALS**

### **4.1 INSPECTION AND TESTING OF MATERIALS**

BEI reserves the right to inspect and test any and all materials in order to verify conformance with requirements.

### **4.2 NONCONFORMANCE**

Materials not in conformance with the Specification requirements shall be removed from the site and replaced.

### **4.3 SEDIMENT BARRIERS**

Materials used for sediment barriers shall consist of straw bales, hay bales, geotextile filter fabric made expressly for use as a silt screen, or other materials approved by BEI prior to their use. Straw and hay bales shall not be used for permanent sediment barriers unless approved by BEI.

#### **4.3.1 Hay/Straw Bales and Reinforcing Bars**

Baled hay or straw shall be laid end to end such that no gap exists between bales. Reinforcing bars shall be #4 bar and a minimum of 2<sup>1</sup>/<sub>2</sub> feet long.

#### 4.3.2 Filter Fabric

Filter fabric shall be a material made expressly for the purpose of sediment control such as Exxon GTF 101S Silt Screen or approved equal.

#### 4.4 EROSION CONTROL BLANKETS

Erosion control blankets shall be Curlex Blankets manufactured by American Excelsior Company, or approved equal.

### 5.0 FIELD OPERATIONS

#### 5.1 EROSION AND SEDIMENT CONTROL

Potentially contaminated material shall be prevented from being eroded or otherwise transported into an uncontaminated area or an area that has a lower level of contamination.

Install temporary sediment barriers in accordance with the contract documents and shall be maintain during construction until permanent sediment barriers are in place.

Permanent sediment barriers shall be installed in accordance with the engineering drawings.

Erosion and sediment shall be controlled by the following techniques subject to BEI review on a case-by-case basis:

- Covering with synthetic liner material
- Covering with uncontaminated soil material
- Sediment barriers

#### 5.2 DUST CONTROL

Dust shall be controlled by the following techniques subject to BEI review:

- Wetting with water
- Wetting with BEI-approved synthetic dust suppressant
- Establishing temporary vegetative cover
- Compaction
- Sealing by rolling with a smooth drum
- Maintaining slopes of exposed surfaces within defined limits

### **5.3 CLEARING AND GRUBBING**

Clearing and grubbing shall be performed in accordance with Specification 001-SP000-002.

### **5.4 DRAINAGE, DEWATERING, AND STREAM DIVERSION**

#### **5.4.1 Drainage**

Surface water shall be directed away from excavation and construction areas. Diversion ditches, check dams, dikes, and/or grading shall be developed and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be sloped at a minimum of 3% to promote runoff and shall be protected to prevent erosion and sloughing. Submit a proposed design to BEI for review prior to constructing any drainage systems not indicated by the engineering drawings.

#### **5.4.2 Dewatering**

Unless noted otherwise, all excavations shall be kept in a dewatered condition. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls; boils, uplift, and heave in the excavation; and to eliminate any interference with excavation progress. Water which has come in contact with contaminated material shall be collected and transported to an onsite location in accordance with Specification 001-SP000-003, "Transport of Contaminated Material."

#### **5.4.3 Stream Diversion**

Stream diversion(s) shall be developed as shown on the engineering drawings and maintained to prevent the spread of contamination. Blasting is not permitted.

### **5.6 EXCAVATION**

#### **5.6.1 General**

All excavation shall conform to lines, grades, and depths defined on the engineering drawings and field verified by BEI.

Rocks 6 inches or greater in any dimension shall be separated from the soil and given a gross decontamination (i.e., removal of most soil material by scrapers, brushes, etc.). These rocks shall be left in the excavation area.

Areas being excavated shall be maintained in a clean condition, free from leaves, brush, sticks, trash and other debris. Excavations shall be inspected in accordance with OSHA 29 CFR 1910 and 1926 prior to commencing work each day. All daily inspections shall be documented.

### **5.6.2 Contamination Control**

Dust generated during construction shall be controlled by water spraying with potable water or other approved methods.

Excavation shall be performed in such a manner that the spread of contamination is prevented. Unless indicated otherwise, the cutting edge of the excavator(s) shall be toothless and the excavation performed in the direction of surface run-off (i.e., from higher to lower elevation). Contamination spread through the improper execution of the subcontract documents shall be cleaned up to the satisfaction of BEI at the Subcontractor's expense.

Barriers (draped plastic sheeting, plastic mounted on wooden frame, or plywood) shall be placed against the sides of truckbeds to prevent contamination of the exteriors of transport vehicles while being loaded.

When transport vehicles are loaded in uncontaminated areas, those areas shall be protected from contamination with plastic overlain with plywood adjacent to the vehicle or with other BEI approved materials and arrangement.

Transport vehicles shall be maintained and used in accordance with Specification 001-SP000-003, "Transport of Contaminated Material."

At least 1 ft of freeboard shall be maintained between top of soil and sideboards on loaded haul trucks.

### **5.6.3 Excavation Slopes**

Excavation slopes shall be established in strict accordance with Subpart P, "Excavation, Trenching, and Shoring," of 29 CFR 1926. Side slopes shall be protected to prevent materials from eroding or sloughing. Any additional material removal and handling caused by erosion or sloughing shall be performed at the expense of the Subcontractor.

### **5.6.4 Shoring**

Shoring, including temporary sheet piling, shall be furnished and installed as necessary to protect workers, slopes, and adjacent paving, structures, and utilities. Shoring design and installation plans including engineering calculations shall be developed by the Subcontractor in accordance

with 29 CFR 1926 Subpart P and submitted to BEI for review. Shoring, bracing, and sheeting shall be removed as excavations are backfilled in a manner to prevent cave-ins.

Alternate methods (e.g., benching, sloping, trench boxes, etc.) may be used where applicable. Alternate methods proposed by the Subcontractor shall be developed in accordance with 29 CFR 1926 Subpart P and submitted to BEI for review.

Provide a shoring inspector that is qualified in accordance with 29 CFR 1926, Subpart P. The scope and frequency of inspections shall be in accordance with 29 CFR 1926 Subpart P.

Care shall be taken to minimize exposure of shoring or other slope protection devices to contamination. These items shall not be released from the site until they have been decontaminated in accordance with this specification.

#### 5.6.5 Excavation Sequence

The sequence for excavation of contaminated material shall be as follows:

- (1) Define and isolate exclusion zones per engineering drawings.
- (2) Construct haul roads per engineering drawings.
- (3) Perform initial excavation to indicated lines and grades indicated on engineering drawings.
- (4) Allow excavated area to be sampled to determine if the area meets the remedial cleanup standards. Sampling is outside the scope of this Specification.
- (5) Continue excavation as directed by BEI, if an area within the excavation does not meet cleanup standards. Allow the excavated area to be resampled after each lift of material is removed. Repeat the process until all areas within the excavation meet the cleanup standards as directed by BEI.
- (6) Cease excavation upon direction by BEI.
- (7) Load contaminated material in accordance with this specification.

## **5.7 DEMOLITION**

### **5.7.1 General**

Demolition shall consist of demolishing, rubblizing or scabbling and/or disposing of asphalt, concrete, or bituminous concrete surfaces within the limits to be excavated as shown on the engineering drawings and/or as directed by BEI.

Construction joints shall be saw cut in existing concrete or asphalt where new concrete or asphalt will be placed.

Demolished debris shall be reduced to a size no larger than 2 feet long, 2 feet wide and 2 feet thick.

Reinforcing bars encountered during concrete removal shall be cut with an approved method.

### **5.7.2 Inspection**

Work areas shall be inspected in accordance with OSHA 29 CFR 1910 and 1926 when fuel powered tools are used indoors. No personnel shall enter the work area until required corrective measures are completed. Inspections shall include review of administrative and engineering controls and measurement of air quality in confined spaces. These daily inspections shall be documented.

## **5.8 LOADING**

### **5.8.1 Onsite Disposal or Storage**

All excavated materials shall be transported to and placed in areas indicated on the engineering drawings or as directed by BEI. Material shall be loaded into designated haul trucks using the contamination control techniques defined in this specification.

### **5.8.2 Offsite Disposal**

Excavated contaminated soils designated for offsite disposal shall be loaded into designated haul trucks using the contamination control techniques defined in this specification. Haul trucks for offsite disposal will be provided by others.

## **5.9 TEMPORARY STORAGE OF CONTAMINATED MATERIALS**

Material designated for temporary storage shall be off loaded at the temporary storage pad unless directed otherwise by BEI. Material shall be positioned with rubber-tired equipment (e.g., bobcat or front-end loader).

Compaction shall be performed with rubber-tired equipment well suited to the type of material being compacted. Material compaction and slope stability shall be sufficient to support the equipment and earthwork activities, as determined by BEI. Compacted material should not remain deformed under foot traffic. Activities shall be conducted in a manner that will prevent contact of contaminated materials with areas outside the asphalt pad.

In the event a permanent disposal area is used for temporary storage of contaminated material, placement shall comply with requirements for temporary storage. In addition, the area used for temporary storage shall be clearly identified by fencing, sediment barriers, or other BEI-approved methods.

## **5.10 EQUIPMENT DECONTAMINATION**

Where discussed below, the term decontamination facility shall mean both the site decontamination facility and portable decontamination facilities, if any.

### **5.10.1 Procedure**

All equipment and tools used in contaminated areas shall be decontaminated by the Subcontractor in accordance with field procedure EP-003, "Procedures for Equipment Decontamination."

### **5.10.2 Authorization**

The Subcontractor shall obtain authorization from BEI before entering or exiting the decontamination facility.

### **5.10.3 Operations**

Operation of a decontamination facility is outside the scope of this Specification. Subcontractor(s) or person(s) responsible for operating the decontamination facility are identified elsewhere in the control documents.

#### **5.10.4 Decontamination**

Equipment that has been in contaminated areas shall be decontaminated. The decontamination facility shall be used only for light and final decontamination and not for operations that would require gross decontamination (i.e., removal of most visible materials by scrapers, brushes, etc). Gross decontamination, if required, shall be performed as part of the specified earthwork at the area where trucks are loaded or unloaded. Decontamination shall be repeated as required.

#### **5.10.5 Inspection**

Following decontamination, all equipment shall be made available for inspection by BEI. Equipment shall be cleaned to the satisfaction of BEI.

#### **5.11 VEHICLE RELEASE**

Subcontractor shall obtain written approval from BEI prior to removing trucks from the site.

#### **5.12 PROTECTION OF WORK**

Settlement or erosion that occurs in compacted materials prior to acceptance of the work shall be repaired to required conditions at Subcontractor's expense.

#### **5.13 SECURITY**

When necessary and practical, as determined by BEI, work areas shall be secured using barriers (e.g. rope, snow fence) to prevent inadvertent entry to work areas.