N65928.AR.002360
NTC ORLANDO
5090.3a

REMEDIATION WORK PLAN NTC ORLANDO FL

11/1/1994

BECHTEL ENVIRONMENTAL, INC

REMEDIATION WORK PLAN

NAVAL TRAINING CENTER

ORLANDO, FLORIDA

Prepared for

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Under Contract No. N62467-93-D-0936

Prepared by

BECHTEL ENVIRONMENTAL, INC.
OAK RIDGE, TENNESSEE

NOVEMBER 1994

REVISION 0

Bechtel Job No. 22567

Prepared:	J. R. Mann Senior Scientist	11/8/94 Date
Approved:	O. N. M. Neal Jr. Project Manager	11/8/94 Date
Approved:	Ron Anderson Navy Contracting Officer	14 NOV 94 Date

CONTENTS

APPENDIXES

FIGURES

ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc.
AST	Above Ground Storage Tank
BEI	Bechtel Environmental, Inc.
BGS	Below Ground Surface
BRAC	Base Realignment and Closure
CA	Contamination Assessment
CS	Confirmation Study
EBS	Environmental Baseline Study
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FID	Flame Ionization Detector
FFA	Federal Facilities Agreement
IAS	Initial Assessment Study
IR	Installation Restoration
NIRP	Navy Installation Restoration Program
NTC	Naval Training Center
OAFB	Orlando Air Force Base
OHM	OHM Remediation Services
PSC	Potential Source of Contamination
RAP	Remedial Action Plan
ROICC	Resident Officer in Charge of Construction
RWP	Remediation Work Plan
SAP	Sampling and Analysis Plan
SMP	Site Management Plan
SOUTHDIVNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
UST	Underground Storage Tank
VS	Verification Study

FOREWORD

This Remediation Work Plan (RWP) has been prepared to describe the scoping and planning for Initial Remedial Action activities being performed by the U.S. Navy at the Naval Training Center (NTC), Orlando, Orange County, Florida. NTC Orlando is scheduled to be closed by 1999, and a negotiated, signed Federal Facilities Agreement (FFA) is in place for the site.

Three major environmental investigations have been conducted under the Navy's Installation Restoration Program (NIRP) to support the decision-making process for evaluating interim measures and remedial action alternatives. The three investigations are (1) the Initial Assessment Study (IAS), (2) the Verification Study (VS) and the Confirmation Study (CS), and (3) the Environmental Baseline Survey (EBS).

The FFA requires a Site Management Plan (SMP) to be submitted by NTC Orlando yearly. The SMP includes a schedule for disposition of the Potential Sources of Contamination (PSC) identified in the Installation Restoration (IR) Program. An Underground Storage Tank (UST) Program has been established for NTC Orlando under the Florida Administrative Code (FAC), Section 17-770 for investigation and remediation of above ground and underground storage tanks and related piping systems.

Remedial action is necessary in selected areas identified in the UST program for the protection of human health and the environment. This RWP describes the approach that will be used to conduct initial remedial actions for sites located at Buildings 7174, 607, and 610 under the UST Program. A responsibility assignment matrix is included as Appendix H to illustrate the roles of the parties to this remedial action.

1.0 INTRODUCTION

The U.S. Navy is conducting environmental programs at NTC Orlando, Florida through the Southern Division, Naval Facilities Engineering Command (SOUTHDIV) and has adopted the format of the Installation Restoration (IR) program, an environmental program conducted at military installations nationwide to address areas of potential sources of contamination (PSC) from past operations. A separate UST program addresses sites related to petroleum USTs. The purpose of the IR program is to define these areas and remediate them to current acceptable standards. Bechtel Environmental, Inc. (Bechtel), the Environmental Response Action Contractor, will perform remedial action on selected UST Program sites.

This Remediation Work Plan (RWP) documents the scope of the remediation effort and the procedures to be used to perform remedial actions for sites located at Buildings 7174, 607, and 610, NTC Orlando, Florida under the UST Program. This RWP has been prepared by Bechtel for SOUTHDIV, under contract N62467-93-D-0936.

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

- the Contamination Assessment Report, McCoy Annex Base Exchange Service Station Building 7174, Naval Training Center, Orlando, Florida, as prepared by ABB-ES dated March 1992; and

- the Remedial Action Plan, McCoy Annex Base Exchange Service Station, Building 7174, Naval Training Center, Orlando, Florida, as prepared by ABB-ES, dated April 1993; and

- the Remedial Action Plan Addendum, Naval Training Center, McCoy Annex Service Station Building 7174, NTC Orlando, Florida, as prepared by OHM Remediation Services, dated May 1993; and

- discussion and conclusions from a site visit on July 6 and 7, 1994 by Bechtel, ABB-ES, and SOUTHDIV personnel at NTC Orlando; and

- the Technical Memorandum, Remedial Design Validation Report, Building 7174, McCoy Annex, Naval Training Center (NTC) Orlando, Florida, as prepared by ABB-ES dated October 14, 1994.

Bechtel will supply qualified personnel and equipment to the project; coordinate, manage, and supervise construction activities onsite and assure compliance with contract and regulatory requirements. Documentation provided to the Navy will include a summary of the services provided and a project completion summary for each of the sites where work is performed. The approach to complete these tasks 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.

1.1 GENERAL SITE INFORMATION

The NTC Orlando complex covers approximately 2019 acres in Orange county, Florida, in the central portion of the state. The complex is comprised of four noncontiguous properties; The

Main Base, (1093 acres), area "C" (46 acres), Herndon Annex (54 acres), and the McCoy Annex (826 acres). Figure 1-1 provides the location of each property associated with the NTC Orlando complex.

The majority of the operational and training facilities within the NTC complex are located at the Main Base. Located at this property are the Naval Hospital and approximately 254 acres of lakes. The Main Base lies approximately four miles northeast of downtown Orlando. Area "C" is located approximately two miles west of Main Base off Maguire road and is the primary supply center for the complex. The Herndon Annex is located approximately five miles south of Main Base and is adjacent to the City-owned Herndon Executive Airport. Herndon Annex provides research, design, development, testing, evaluation, procurement, fabrication, maintenance, and logistic support for Naval training devices and equipment. A supply warehouse is also located at Herndon Annex. The most distant of the remote areas is the McCoy Annex which is located in Pinecastle, Florida approximately 12 miles south of Main Base. McCoy Annex serves mainly as a housing and community support activity for the NTC complex. The surrounding areas consist primarily of both residential and commercial properties with some agricultural land use occurring to the west and south of McCoy Annex.

NTC Orlando's mission is to exercise command over and coordinate the efforts of the assigned subordinate activities in effecting basic indoctrination and other training of Navy personnel. In support of this mission hazardous waste materials have been generated. This facility is scheduled for closure under the Base Realignment and Closure (BRAC) Act of 1993. Operations at this facility are anticipated to end by 1999. All remediation activities related to this scope of work except for routine operation and maintenance are intended to be completed by 28 February 1995.

Building 7174 is the McCoy Annex Base Exchange Service Station and is scheduled for permanent closure by the end of 1994. Soil and groundwater contamination at the site will be remediated by installing soil vapor and groundwater recovery and treatment systems. Four 10,000 gallon USTs and associated piping and dispensers will be removed, and a 1,000 gallon waste oil above ground storage tank (AST) will be removed. Excavated soil that does not meet or exceed the criteria for "excessively contaminated soil" in the FAC Section 62-770.200(2) will be returned to the excavation for treatment, clean fill will be added as required, and the pavement will be replaced. Excessively contaminated soil will be disposed offsite in accordance with local, State, and Federal requirements.

Buildings 607 and 610 are located at the Herndon Annex. There is a 10,000-gallon heating oil UST at Building 607, and a 360-gallon hydraulic oil UST at Building 610. There have been no known releases at either location. The USTs will be removed and the sites will be closed in accordance with FDEP regulations. (Note: As of the date of this Work Plan, the Navy is considering retaining the 10,000 gallon tank at Building 607.) Contaminated soil that exceeds 10 ppm VOC as measured by a field FID will be excavated for disposal offsite. ABB-ES will monitor the tank removals and excavations, and will determine the limits of soils to be excavated. Closure assessments will be performed by ABB-ES, including required reports to FDEP.

1.2 JUSTIFICATION AND OBJECTIVES FOR THE PROPOSED ACTION

The primary threat to human health and the environment associated with the USTs located at Building 7174 is related to the contamination of the groundwater from high levels of petroleum

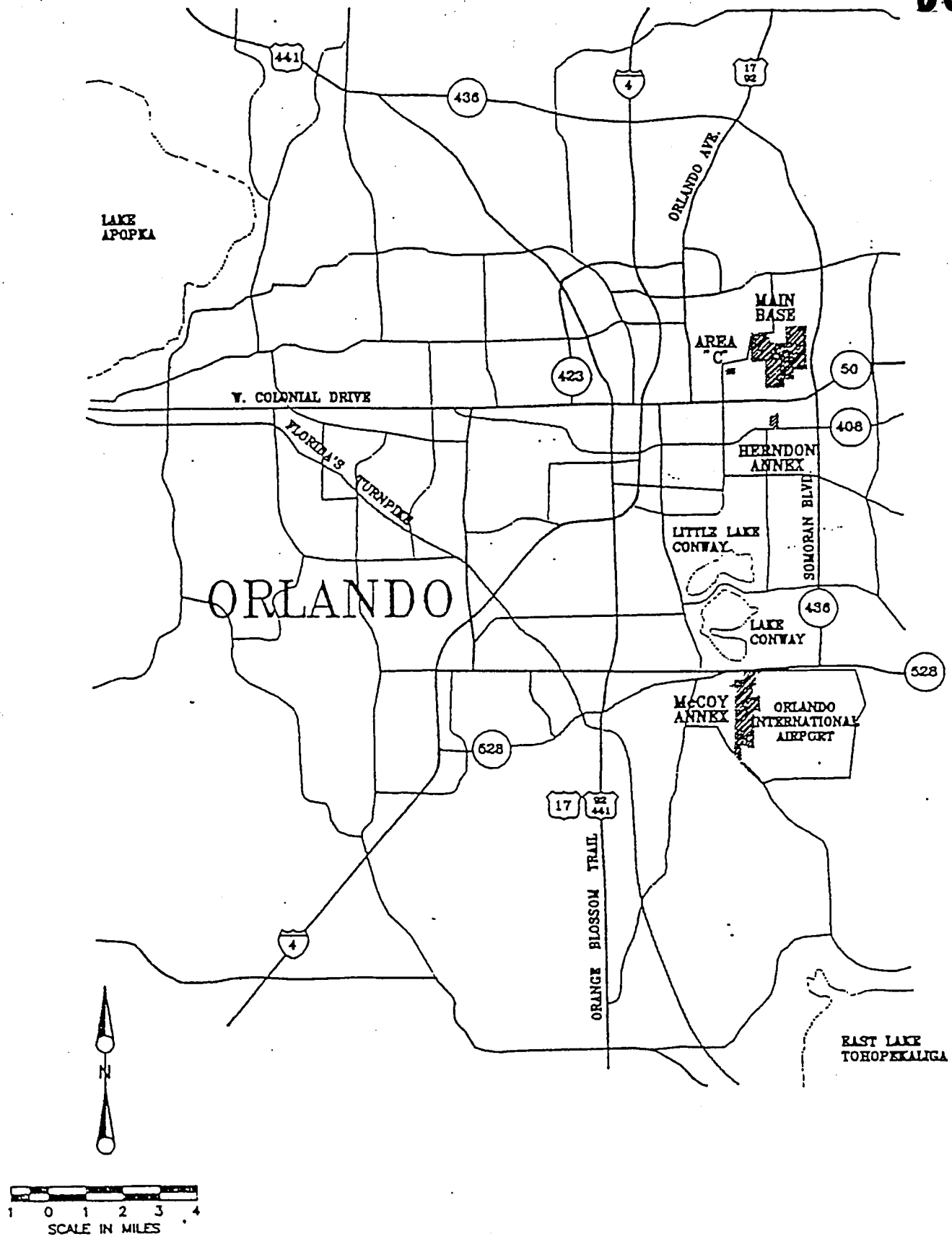


Figure 1-1
Facility Location Map
NTC Orlando, Florida

hydrocarbons adsorbed to the underlying soil in the vicinity of the current USTs. Groundwater contamination appears to be moving southward toward Binnacle Way; however, there is no evidence of contamination having migrated off the facility. The goal of the remedial action for building 7174 is: (1) The recovery and reduction of the soil contamination by vapor recovery and (2) the recovery and treatment of contaminated groundwater by groundwater recovery and treatment procedures according to criteria set forth in Florida Administrative Code (FAC) Chapter 17-775, and closure of the UST system and waste oil AST at this site.

The USTs located at Buildings 607 and 610 are to be removed in accordance with the UST management program for the NTC Orlando complex. There have been no reported releases from activities associated with either of these USTs and no treatment action is planned. The objective for these UST removals is a clean closure at the time of removal; therefore, any contaminated soil that is encountered will be immediately removed for disposal offsite.

2.0 ORGANIZATION AND RESPONSIBILITIES

2.1 PROJECT ORGANIZATION

Bechtel provides leadership for project execution and acts as prime contractor for the various phases of work. Bechtel's project is the Environmental Response Action Contractor for Navy installations at NCR, Orlando, Florida. An organization chart is provided in Figure 2-1.

2.2 COORDINATION AND RESPONSIBILITIES FOR FIELD

As the Environmental Response Action Contractor, Bechtel is responsible for implementation and management of remedial action field activities, which include all activities necessary to implement field work delineated in this work plan. Typically, these activities include development and procurement of subcontractor services; materials; 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; schedule control; and health and safety.

The Bechtel project manager is responsible to the Navy for completion of all aspects of the work. The project manager is supported by 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 key member of Bechtel's project team is described below.

2.2.1 Project Manager

- Responsible for accomplishing all aspects of the work on time and within budget, while meeting high standards of quality

- Interfaces directly with Navy Remedial Project Manager to implement directions on a site-specific basis

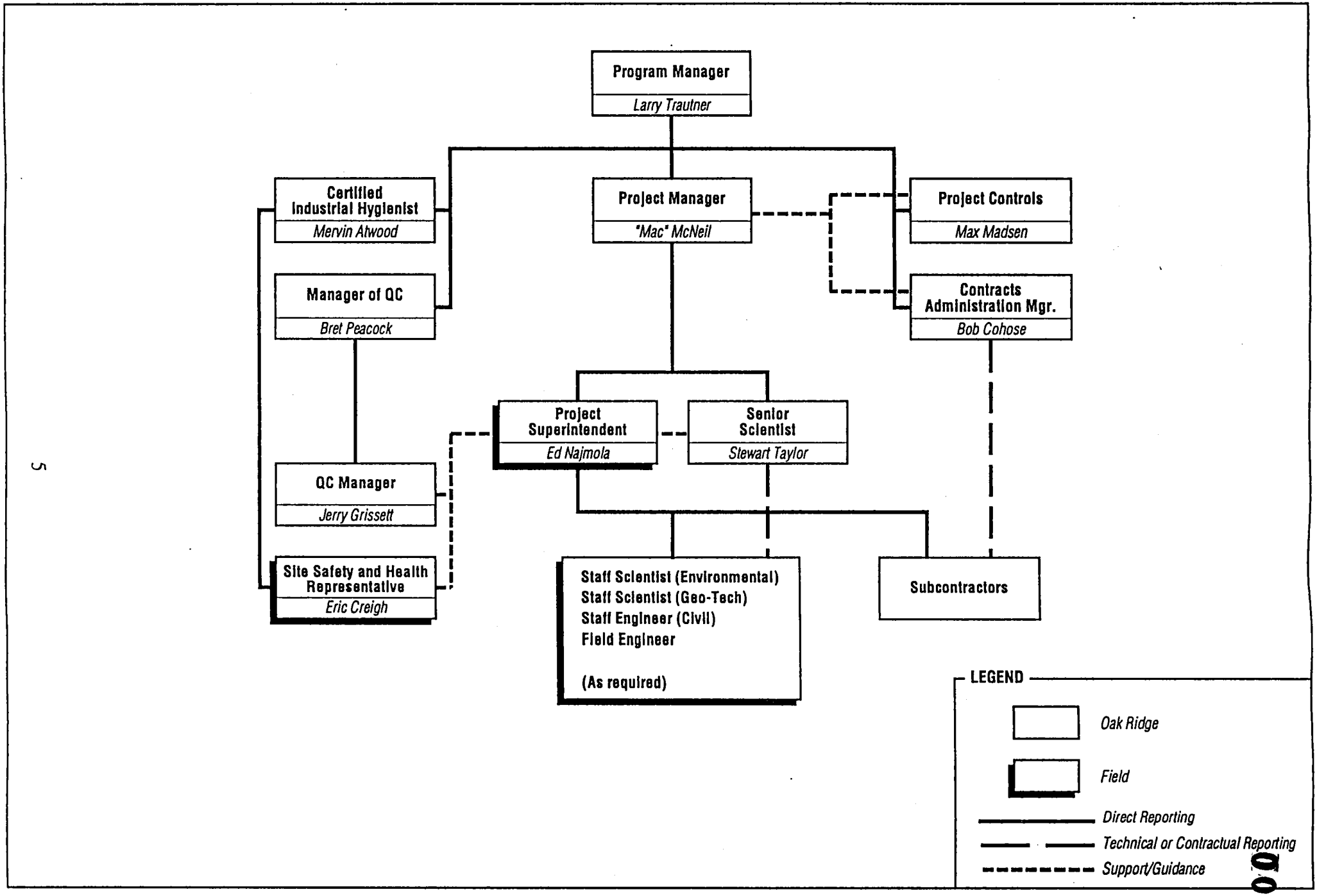


Figure 2-1
Project Organization

1 114 6406

- Manages a team of professionals from each of the disciplines described below
- Implements overall guidance provided by the Bechtel program manager

2.2.2 Senior Scientist

- Develops information required for technology selection
- Develops work plans for remedial action
- Provides technical specifications and drawings
- Develops scopes of work and technical specifications for subcontracted work
- Provides engineering and geotechnical home office and field support to remedial action efforts
- Provides interface/coordination with regulatory agencies and regulatory compliance
- Provides onsite waste management and identification
- Manages and evaluates chemical and radiological data obtained during remedial action activities

2.2.3 Project Superintendent

- Responsible for successful execution of the work at the site
- Responsible for health, safety, and environmental compliance in all site operations
- Manages subcontractors to complete work plans
- Directs crafts to implement work plans
- Serves as primary point of contact with the station and Resident Officer in Charge of Construction during construction

2.2.4 Certified Industrial Hygienist

- Develops requirements and plans for all safety and health matters
- Advises and assists the Project Manager and Project Superintendent with respect to health and safety matters
- Ensures that all applicable federal, state, and local regulatory requirements are met
- Provides a site safety and health representative (SSHR)
- Provides site-specific safety and health training

- Performs audits of site activities to ensure implementation of the Site Safety and Health Plan (SSHP) and to assess the effectiveness of the program

2.2.5 Contract Administration Manager

- Identifies bidders for subcontract work
- Prepares bid packages
- Manages subcontract bid and award process
- Administers subcontracts and subcontract modifications
- Ensures compliance with Prime Contract

2.2.6 Quality Control Manager

- 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 Manager

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

3.0 SITE BACKGROUND AND SETTING

In 1940 the Orlando Municipal Airport was taken over by the Army Air Corps for the construction of what was then called the Orlando Air Base. The Army Air Corp conducted operations at the facility from 1940 to 1947. In 1947, the Air Force assumed command of the facility as the Orlando Air Force Base (OAFB). The Base was deactivated in 1949 and remained on standby status until 1951 when it was reactivated as an Aviation Engineers Training Site.

The Navy began moving its Training Device Center from Port Washington, New York to OAFB in 1965. In 1968 the Air Force ceased operations at OAFB, (Area "C" and Herndon Annex). This property was commissioned as the Naval Training Center, Orlando in July of 1968. In 1973 the Air Force closed what was known as McCoy Air Force Base. Following the closure of McCoy Air force Base the Navy acquired title to the property and renamed it McCoy Annex. McCoy Annex was acquired to serve as community support to the NTC Orlando complex.

In support of NTC Orlando's mission, hazardous materials have been employed and waste products generated. Over the years these waste have consisted of mineral spirits, waste oils,

solvents, waste paints, X-ray developer, and a variety of other hazardous wastes associated with routine operations at the NTC Orlando complex.

3.1 BUILDING 7174

Building 7174 is a Base Exchange Service Station located at the McCoy Annex at the intersection of Binnacle way and Daetwyler Drive (Figure 3-1). The site measures approximately 210 feet by 180 feet and is covered by asphalt and concrete. Building 7174 houses the garage facility and office complex.

In 1942, six gasoline storage tanks were installed at the site, (one 3,000 gallon and five 5,000 gallon tanks). These tanks were abandoned in place by backfilling them with sand in 1986 in accordance with Florida Department of Environmental Protection (FDEP) regulations. Following the abandonment of these tanks, four 10,000 gallon tanks were installed. Four compliance monitoring wells were also installed during this period in order to meet FDEP requirements.

During sampling of the compliance wells in 1988, a strong hydrocarbon odor was detected in three of the wells, and a preliminary contamination assessment was performed by E. C. Jordan. Results from the preliminary contamination assessment indicated that the tanks and associated piping tested tight; however, it was observed that the annuli around the fill ports of the tanks were not properly sealed. During routine filling of the tanks excess fuel left in the refueling hose was apparently draining down into the fill ports at the completion of refilling the tanks and percolating down into the surrounding soil and groundwater. This contamination was confirmed from groundwater samples collected during the preliminary contamination assessment.

In June 1991, ABB-ES performed a Contamination Assessment (CA) at the site. The results of this investigation revealed that petroleum hydrocarbon contaminants were present in both the soil and groundwater at levels which exceeded the allowable concentrations as established by the FDEP. A Remedial Action Plan (RAP) was prepared to address the soil and groundwater contamination at the site. The RAP was completed by ABB-ES in April 1993 and in turn was reviewed by OHM in May 1993 under the direction of SOUTHDIV personnel. OHM issued a RAP addendum for Building 7174 which was approved by the FDEP. The RAP and RAP addendum recommended the implementation of both soil vapor and groundwater recovery at the site to remediate the contaminated soil and groundwater and to comply with FDEP regulations. In September 1994, ABB-ES resampled the existing monitoring wells and collected additional soil samples, to confirm that the system designs presented in the RAP and RAP addendum were still valid for existing site conditions. A Technical Memorandum (TM) describing this investigation was issued in October 1994, which concluded that the designed air stripper tower is adequate to reduce the levels of contamination to below state target levels.

3.2 BUILDINGS 607 AND 610

Buildings 607 and 610 are located in close proximity to one another at the Herndon Annex (Figure 3-2). The UST at Building 610 is a 360-gallon hydraulic oil tank used to support the flight simulator equipment at the Applied Research Laboratory in the building. The UST is located adjacent to the building in a grassed area. The UST at Building 607 is a 10,000-gallon heating oil tank that is located under a grassed area adjacent to the building. The USTs are to be

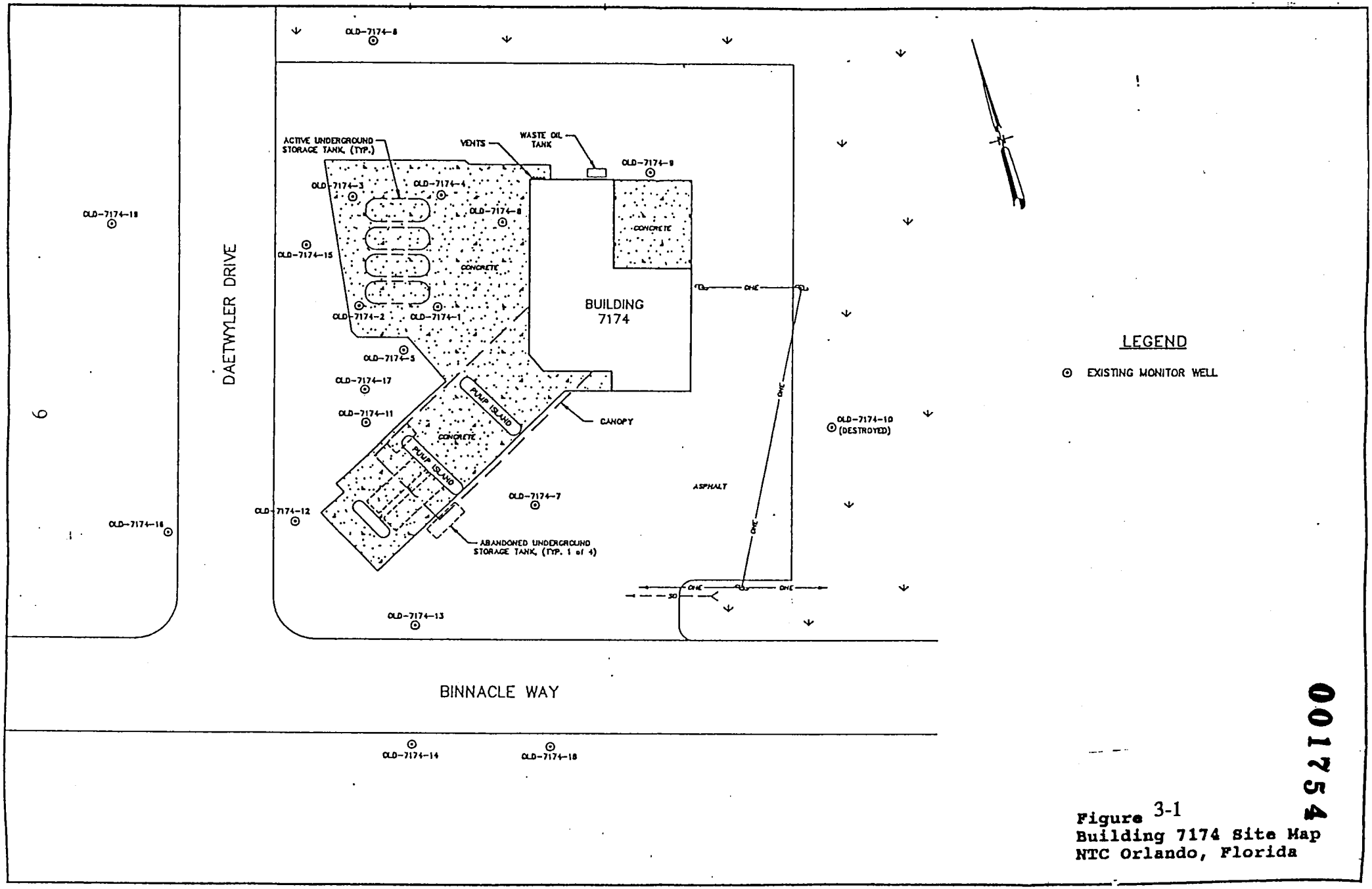


Figure 3-1
Building 7174 Site Map
NTC Orlando, Florida

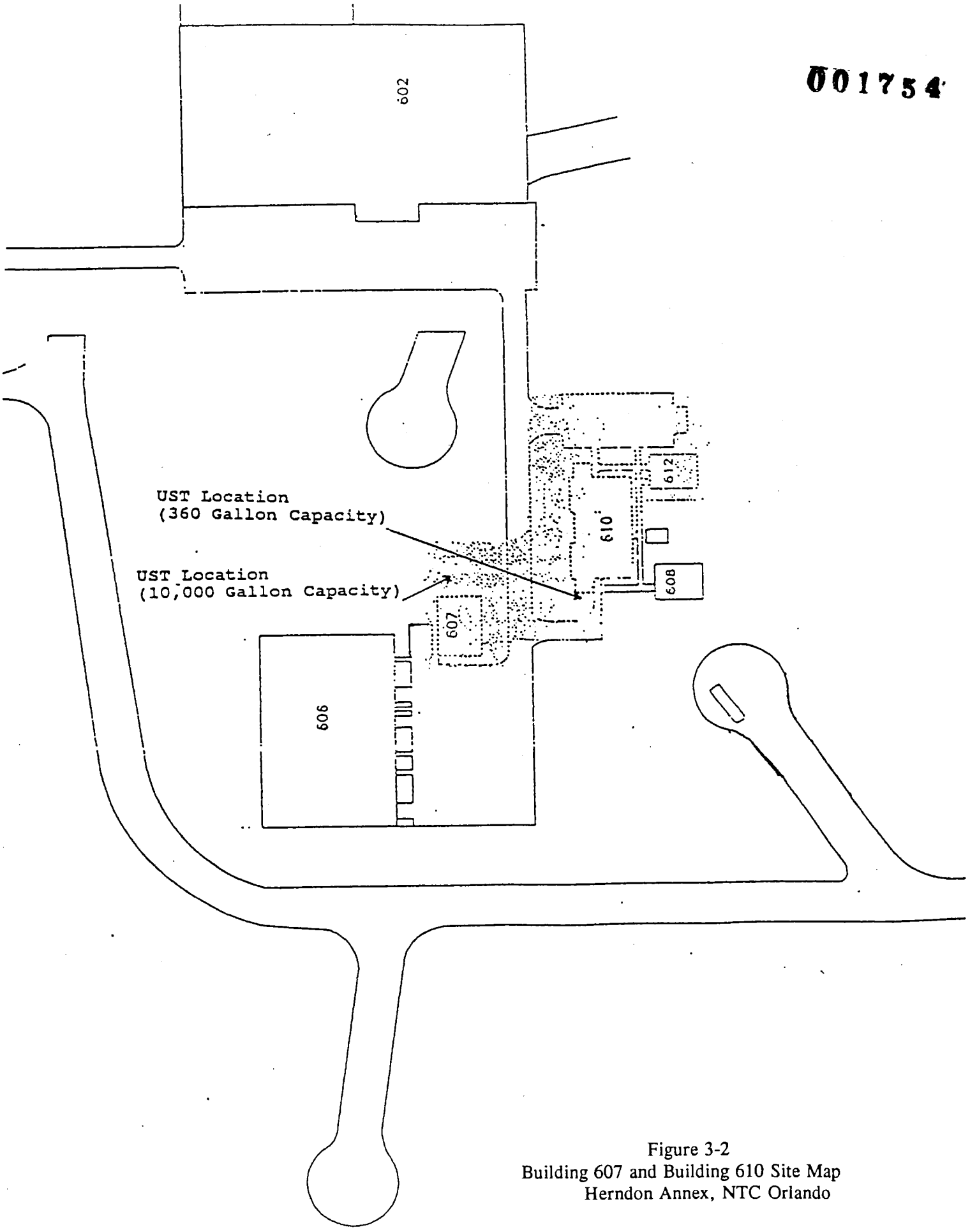


Figure 3-2
Building 607 and Building 610 Site Map
Herndon Annex, NTC Orlando

removed in accordance with FDEP closure requirements in FAC Section 62-761.800. There have been no reported releases from these USTs.

4.0 SCOPE OF WORK

The objective at NTC Orlando is to perform remedial action at UST sites located at Buildings 7174, 607, and 610. Remedial action at Building 7174 will consist of removal of the USTs and associated piping and dispensers and the recovery and treatment of both soil vapor and groundwater that are contaminated by petroleum hydrocarbons. Separate soil vapor and groundwater recovery systems will be installed. Remedial actions to be performed at Buildings 607 and 610 consist of the removal of existing underground tanks from these facilities in accordance with the UST program for the NTC Orlando complex. All construction activities at this site will be coordinated with the NTC Orlando Public Works Department and the Resident Officer in Charge of Construction (ROICC). It is assumed that a combined total of up to 100 cubic yards of contaminated soil will be removed from these sites.

To accomplish this objective, the following services will be performed:

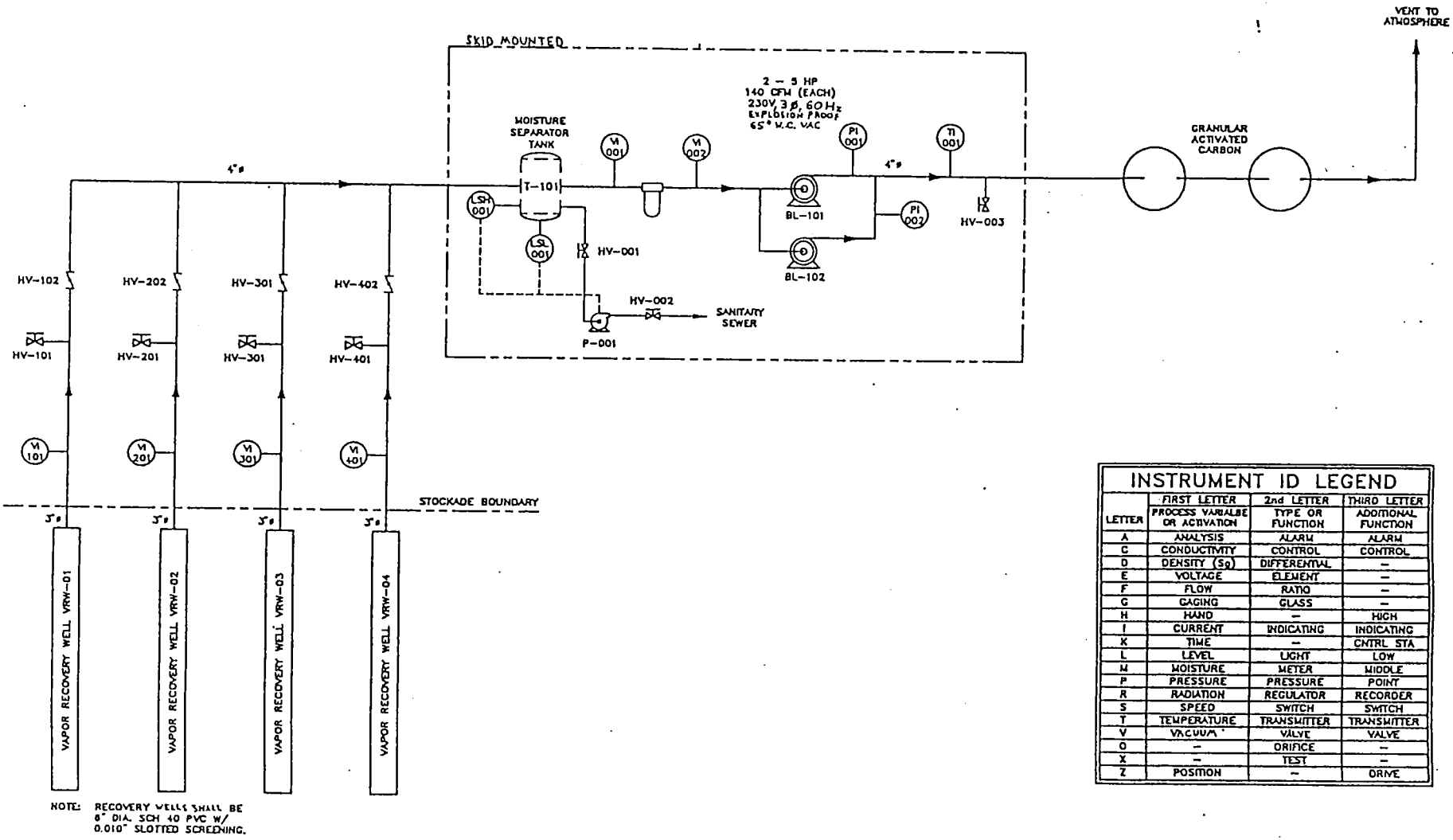
- civil survey
- mobilization
- tank removal and disposal
- well installation
- soil vapor recovery and treatment and discharge
- groundwater recovery and discharge
- soil excavation and backfill
- waste management
- safety and health
- quality control
- replacement of concrete pavement

A detailed scope for Building 7174 and Buildings 607 and 610 is presented in Sections 4.1 and 4.2. Sections 4.3 through 4.10 provide description of the services to be performed.

4.1 BUILDING 7174

The scope for Building 7174 includes removal of the UST system currently used for the distribution of fuel at the facility, installation of soil vapor recovery wells, installation of groundwater recovery wells, monitoring wells, a soil vapor treatment system, and a groundwater treatment system. Figures 4-1 (soil vapor recovery) and 4-2 (groundwater recovery) display the treatment concepts for Building 7174 which were designed by ABB-ES and OHM.

Four 10,000 gallon fiberglass tanks with associated distribution piping and dispensers will be excavated and removed from the site in accordance with the Technical Specification for Removal and Disposal of USTs (Appendix A). It is assumed that the Navy will remove the gasoline and diesel fuel from these tanks to the maximum extent possible prior to turning over the site to Bechtel for remedial action. Based on available information, the tanks are approximately 4 ft below the ground surface (BGS) buried to a depth of approximately 15 ft. All soil removed during the UST system closure (estimated 970 cubic yards) will be stockpiled onsite on plastic



INSTRUMENT ID LEGEND			
LETTER	FIRST LETTER PROCESS VARIABLE OR ACTIVATION	2nd LETTER TYPE OR FUNCTION	THIRD LETTER ADDITIONAL FUNCTION
A	ANALYSIS	ALARM	ALARM
C	CONDUCTIVITY	CONTROL	CONTROL
D	DENSITY (Sg)	DIFFERENTIAL	–
E	VOLTAGE	ELEMENT	–
F	FLOW	RATIO	–
G	GAGING	GLASS	–
H	HAND	–	HIGH
I	CURRENT	INDICATING	INDICATING
K	TIME	–	CNTRL STA
L	LEVEL	LIGHT	LOW
M	MOISTURE	METER	MIDDLE
P	PRESSURE	PRESSURE	POINT
R	RADIATION	REGULATOR	RECORDER
S	SPEED	SWITCH	SWITCH
T	TEMPERATURE	TRANSMITTER	TRANSMITTER
V	VACUUM	VALVE	VALVE
O	–	ORIFICE	–
X	–	TEST	–
Z	POSITION	–	DRIVE

Figure 4-1
(Supplied by OHM Corporation)
Treatment Concept Building 7174
Soil Vapor Extraction System
NTC Orlando, Florida

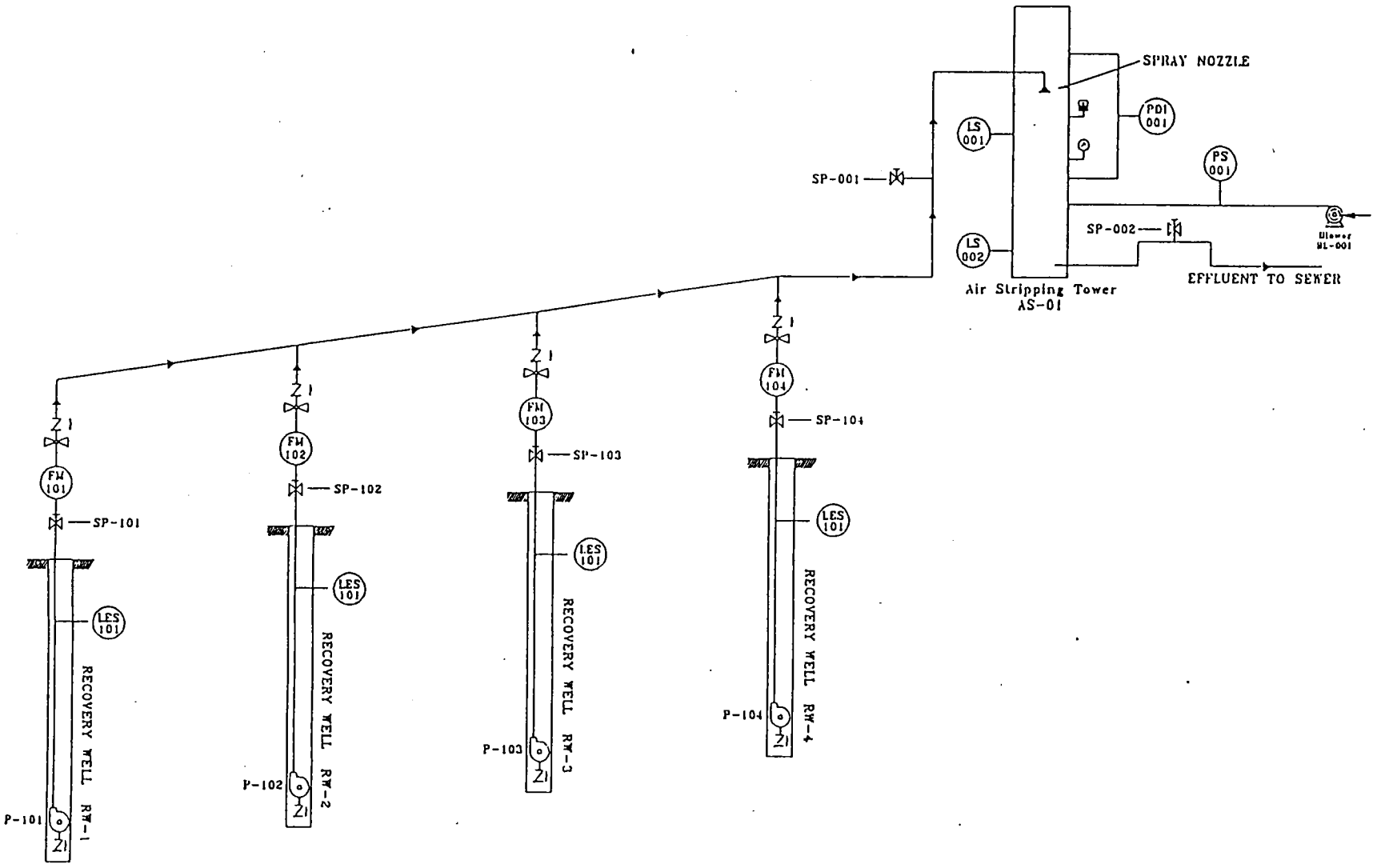


Figure 4-2
(Supplied by ABB-ES)
Treatment Concept Building 7174
(Groundwater Extraction System)
NTC Orlando, Florida

within a bermed enclosure, and covered with plastic to prevent leaching of contaminants that may be present. Soil removal will be limited to that which is necessary to complete the actual tank and piping removal and that which is loosened by the tank removal process. No additional excavation of contaminated soil is to be performed. The USTs will be disposed of in accordance with all applicable state and federal guidelines. The excavated area will be backfilled using the soil that was stockpiled from the excavation, plus similar clean backfill soil as required. Soil that is excessively contaminated will be disposed offsite in accordance with FAC Section 62-770.300(7). The concrete anchors which were used to hold the USTs in place will be abandoned in place. All pavement that is removed for UST and piping excavation will be replaced with 4 in. of concrete pavement.

Four groundwater recovery wells will be installed. Each well will be installed to a depth of 25 ft BGS. Recovery wells will be constructed using 6-in. diameter schedule 40 Polyvinyl Chloride (PVC) screen slot size 0.020 and schedule 40 PVC riser pipe. Technical specifications for borehole drilling and well installation are included in Appendix B.

Four soil vapor recovery wells will be installed at the site. Each soil vapor recovery well will be installed to a depth of 6 ft BGS. Each well will be constructed by placing one section of 6-in. diameter (slot size 0.010) PVC screen into the borehole.

A Consumptive Use Permit must be obtained for the groundwater recovery wells to comply with FAC 40.C-2. A civil survey will be performed to determine the coordinates of the groundwater recovery wells. Bechtel will provide the survey and prepare the permit application for submittal by the Navy.

Five vapor monitoring wells will be installed at the site. Each soil vapor monitoring well will be installed to a depth of eight feet BGS. These wells are to monitor the vapor recovery process, as well as to serve as air inlet wells for the system. These wells will be constructed of 2-in. schedule 40 PVC screen (slot size 0.010) and two inch schedule 40 PVC riser pipe. Technical specifications for borehole drilling and vapor well installation are included in Appendix B. Locations of all recovery wells and new and existing monitoring wells are shown in Figure 7 of Appendix C.

Utilities and facilities will include excavation/trenching approximately 215 cubic yards of soil, tying into a 6-in. sanitary sewer line, installing 75 ft of 6-in diameter PVC sanitary sewer line, and installing 72 ft of 4-ft tall (wooden) fencing. A 12 ft x 14 ft, 10 in. thick concrete slab will be prepared onsite for placement of the remedial systems. The site will be completely fenced with temporary chain link fence 6 ft high prior to removal of the UST systems.

Soil vapor treatment components will consist of a vapor recovery and collection system, treatment units and vapor discharge. Vapor recovery will be accomplished by installing a vacuum unit connected to a network of header piping connected to each vapor recovery well. The extracted soil vapors will be conveyed to the treatment unit. The soil vapors will be remediated in the treatment units and discharged to the atmosphere via a 4-in. vent pipe. Technical specifications for the vapor recovery and treatment unit are provided in Appendix C.

Groundwater treatment components will consist of a recovery and collection system, treatment units and groundwater discharge. Groundwater recovery will be accomplished using submersible

pumps installed into selected recovery wells. The collection system will consist of a network of header piping connected to each recovery well and conveying extracted groundwater to the treatment unit. The discharge of the effluent treated groundwater will be through a 6-in. sanitary sewer line tied into the City of Orlando publicly owned treatment works (POTW). Technical specifications for the groundwater recovery and treatment systems are provided in Appendix C.

Bechtel will provide operation and maintenance of the treatment system for a period of 12 months.

4.2 BUILDINGS 607 AND 610

The scope of work at Buildings 607 and 610 consists of the removal of two USTs and associated fill, vent, and service piping. A 360-gallon hydraulic oil tank will be removed from the grassed area adjacent to Building 610, and a 10,000-gallon heating oil tank will be removed from the grassed area near Building 607. It is assumed that the petroleum will have been removed by the Navy to the maximum extent practical from both tanks before they are turned over to Bechtel for closure. Approximately 520 gallons of sludge is assumed to remain in the tanks for removal by Bechtel prior to cleaning. Piping will be removed back to the building foundation and plugged with concrete at the interface with the building. The concrete pad or ballast blocks for each tank will be removed from the tank pit and disposed of in accordance with all local, State, or Federal requirements.

All clean excavated soil will be temporarily placed on plastic and returned to the tank pit following removal of the tanks. Clean fill will be added as required to bring the elevation back to existing grade. A clean closure will be performed for each tank by removing all soil that exceeds 10 ppm VOC based on field FID results. ABB-ES will perform concurrent FID field screening to guide the soil excavation, and will make the final determination of clean closure. Sod will be replaced after the soil has been compacted and has settled.

Samples required for the Closure Assessment will be collected by ABB-ES, who will also prepare the required closure documents.

4.3 MOBILIZATION

Mobilization will include delivering to the jobsite and work areas all construction equipment, tools, materials, supplies and miscellaneous articles and established work force sufficient to commence and sustain construction activities as required.

Building 7174 will be used as the site construction office, to avoid the cost of separate trailers for offices and decon.

4.4 CIVIL SURVEYING

Civil surveying will be performed in accordance with the technical specifications for Surveying Services, included in Appendix D.

4.5 EARTHWORK CONSTRUCTION

The public works division will be contacted prior to excavations to check for buried utilities. Earthwork construction will include trenching, general excavation, and backfilling, and will be performed in accordance with the Technical Specifications for Uncontaminated Earthwork, included in Appendix E, and Technical Specifications for Contaminated Material and Miscellaneous Demolition, included in Appendix F.

4.6 PAVEMENT REPLACEMENT

Pavement replacement will be performed in areas where the asphalt and concrete are removed in association with onsite remedial activities. These areas will be covered with a 4-in. section of concrete.

4.7 FENCING

Fencing shall be installed in accordance with the Technical Specification for Fencing, as included in Appendix G.

4.8 OPERATION AND MAINTENANCE

Operation and maintenance of the treatment system will consist of collecting groundwater effluent samples from the groundwater treatment system, collection of groundwater samples from existing monitoring wells, and collecting influent and effluent samples from the vacuum recovery system and submitting them for chemical analysis. The sampling frequency for the effluent groundwater treatment system,and vacuum recovery system will be weekly for the first four weeks and then monthly for approximately 11 months. The sampling frequency for the existing groundwater monitoring wells will be quarterly for 12 months. Carbon canisters and effluent filters will be replaced as required to maintain efficient system operation. Operating parameters will be observed and recorded, and reports will be issued to the FDEP as required. ABB-ES will perform sample collection, analysis, and reporting. Bechtel will perform system inspections and maintenance, including canister and filter changes and repairs as required.

5.0 SAMPLING AND ANALYSIS PLAN

This section describes the sampling and analysis for: field screening of excavated soils; groundwater pump and treat system effluent for disposal to the POTW; air samples for the SVE system; and groundwater monitoring on an ongoing basis.

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* (DER-QA-001/92) and *Quality Assurance Standard Operating Procedures for Petroleum Storage System Closure Assessments*.

For soil and groundwater sampling, confirming that remediation and/or treatment goals have been achieved, United States Environmental Protection Agency (EPA) Data Quality Objective (DQO) Level III data will be 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 local, State, and Federal requirements.

5.1.2 Collection

No samples will be collected by Bechtel aside from those used for field screening. 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,* and FAC 62-770.200(2).

5.1.3 Sample Identification

Sample identification for field screening samples will be in accordance with 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 Section 5.0, "Sample Custody and Documentation," of FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*. This Standard Operating Procedure (SOP) includes the minimum requirements for recordkeeping. A field logbook will be maintained for field screening samples.

5.2 FIELD SAMPLING AND ANALYSIS

Sampling protocol for samples identified in this section will be in accordance with FDEP's SOPs as outlined in Section 5.1.2. Analysis of these samples will be in accordance with Florida Department of Environmental Protection's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*. All field sampling and analysis will be performed by ABB-ES.

5.2.1 Groundwater Sampling

Upon completion of construction and installation of the equipment and prior to the startup of each system, groundwater from the monitoring well designated for monthly sampling and from the recovery wells will be collected for analysis by ABB-ES.

During startup of the Pump and Treat System, the spray distribution in the air stripper will be adjusted for optimal treatment efficiency. When the spray distribution is satisfactory, the system will be allowed to run for approximately 30 minutes, at which time influent and effluent samples

from the air stripper will be collected. These samples will be analyzed on a portable gas chromatograph (GC) calibrated to detect benzene, toluene, ethyl benzene, xylene (BTEX) to the 1 ppb range. Bechtel will support ABB-ES performing system adjustments during this startup sampling.

When the GC results indicate that the water treatment system is functioning adequately, a sample from the total system effluent will be collected and laboratory analyzed on a rapid turnaround basis for BTEX, and methyl tertiary butyl ether (MTBE) to confirm the field GC results. In the event the initial GC results indicate problems, the necessary adjustments will be made to the system and the GC sampling repeated after a 30 minute run time. Bechtel will perform the necessary system adjustments, and ABB-ES will perform the sample collection and analysis.

5.2.2 SVE Air Stream Startup Sampling

During SVE system startup, air samples will be collected from the vapor recovery system. These samples will be analyzed by EPA Method T03 to determine contaminant concentrations in the air stream. ABB-ES will perform this task.

5.2.3 SVE Air Stream Operational Sampling

After the SVE system is accepted and balanced for normal operation, the influent and effluent air streams of the vacuum recovery system will be sampled weekly during the first month of operation and monthly for the remainder of the first year. ABB-ES will conduct this required operational sampling.

6.0 WASTE MANAGEMENT

Waste management practices, as defined in the Program Hazardous Waste Management Plan, will be used as guidance and appropriately followed for this work. Waste management will be performed in accordance with our plan and coordinated with the ROICC, as appropriate.

Waste minimization practices will be implemented during operations to minimize the amounts of materials that must eventually be eliminated. These practices will include, but not be limited to:

- No extraneous materials taken into contamination control areas;
- Decontamination and free release of equipment used to support onsite activities, to the extent practicable;
- 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 managed as hazardous waste.

All soils and other materials that are generated during the remediation activities that comply with 40 CFR 268 will be redeposited into the excavated areas at Buildings 7174 and 607/610.

All nonhazardous solid waste that is generated as a result of mobilization and clearing activities will be properly disposed onsite or offsite as directed by the Navy. Any petroleum hydrocarbon contaminated debris and waste that cannot be treated onsite to specified cleanup levels will be analyzed for hazardous waste characteristics, packaged, labeled, and handled in accordance with approved procedures. All waste material will be packaged in U.N. Class 1A2 55 gallon drums and labeled with the container's contents, date generated, and location from where it was derived.

Hazardous waste will be identified and managed in accordance with RCRA, 40 CFR Parts 260, 261, 262, 264, 265, 270, and 271. In the event that hazardous waste is generated, an EPA identification number will be obtained from the Navy before treatment, storage, disposal, or transportation of hazardous wastes. In addition, hazardous waste will not be offered to any transporters or treatment, storage, or disposal facilities that do not have an EPA identification number.

All hazardous waste will be packaged, labeled, marked, and transported offsite in accordance with applicable Department of Transportation hazardous material shipping regulations (49 CFR 171-179). Proper manifest documentation will be required at the time of shipping per 40 CFR 262.

7.0 SAFETY AND HEALTH

A Program Safety and Health Plan (PSHP) defines policies for work on the Navy RAC project. A Site Safety and Health Plan has been prepared for the Navy RAC Bases. Addendum 13 to the Site Safety and Health Plan for Navy RAC Bases has been prepared for NTC Orlando and will be followed during remediation of the site.

8.0 QUALITY CONTROL PLAN

A Quality Control Program Plan (QCPP) defines policies for work on the Navy RAC project. A Quality Control Plan Addendum (QCPA) has been prepared for NTC Orlando, Florida. The QCPA defines site-specific requirements for the remediation at NTC Orlando.

9.0 REGULATORY REQUIREMENTS

The scope of work for this Remediation Work Plan is being conducted under authority of the Navy's Underground Storage Tank Program. As such, Florida regulations for USTs and petroleum cleanup standards apply.

9.1 UNDERGROUND STORAGE TANK SYSTEMS

Florida Administrative Code (F.A.C.) Chapter 17-761 provides for the removal and disposal of UST systems.

9.2 FLORIDA PETROLEUM CLEANUP REGULATIONS

When it has been determined that a UST site has been contaminated with petroleum, as defined in the cleanup regulations, then the provisions of Chapter 17-770 must be met. In addition,

should thermal treatment be selected to remediate the petroleum contamination, then the procedures and cleanup goals in the soil thermal treatment guidelines must be met.

F.A.C. Chapter 17-770, Petroleum Contamination Cleanup Criteria
F.A.C. Chapter 17-775, Soil Thermal Treatment Facilities

(Note: Regulations contained in Chapter 17 of the F.A.C., including Chapters 17-761, 17-770, and 17-775 are being recodified by FDEP into Title 62.)

9.3 AIR EMISSIONS REQUIREMENTS

Operation of an air stripper for remediation of petroleum contaminated groundwater requires compliance with limits and procedures dictated by the local Air Quality District. Some areas of Florida are designated as non-attainment zones for various air pollutants. Local Air Quality District offices, in conjunction with county authorities, will establish emissions limitations and/or control technology requirements for such units.

9.4 MONITORING AND EXTRACTION WELL REQUIREMENTS

Water Management Districts have been delegated the authority to regulate surface and groundwater projects and uses. Procedures and requirements for permitting of consumptive uses of water and water well regulations for the St. John's River Water Management District are contained in F.A.C., Chapter 40C-1 et. seq.

10.0 SCHEDULE

A project scheduleis included as Appendix I.

APPENDIX A

TECHNICAL SPECIFICATION FOR UNDERGROUND STORAGE TANK REMOVAL AND DISPOSAL

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

REMOVAL AND DISPOSAL OF UNDERGROUND STORAGE TANKS AND ASSOCIATED PIPING

FOR

FLORIDA

0	11/3/94	Issued for use	MAC	SMY		JRM
REV	DATE	REVISION	BY	CHK'D	SUPV	PE

ORIGIN	REMOVAL OF UNDERGROUND STORAGE TANK AND ASSOCIATED PIPING	JOB NO. 22567	
		TECHNICAL SPECIFICATION	REV.
		301-SP000-002	0
		SHEET 1 OF 10	

CONTENTS

TECHNICAL SPECIFICATION
FOR
REMOVAL OF UNDERGROUND STORAGE TANK AND ASSOCIATED PIPING

1.0 GENERAL

Not all activities defined herein will be required. Only those activities required in the applicable Subcontract Scope of Work and Engineering Drawings for specific services shall apply.

2.0 ABBREVIATIONS

The abbreviations listed below, where used in this specification shall have the following meaning:

API	American Petroleum Institute
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
DNS	Department of the Navy's Specification

3.0 QUALITY STANDARDS

Unless otherwise specified or shown, the following code and standard of the latest issue at time of bid shall apply to the extent indicated herein.

API RP 1604	Removal and Disposal of Underground Petroleum Storage Tanks
API Publication 1628	Assessment and Remediation of Underground Petroleum Releases
API Publication 2015	Safe Entry and Cleaning of Petroleum Storage Tanks
API Publication 2015 A	Controlling Lead Hazards Associated with Tank Entry and Cleaning
ASTM D 4397	Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
40 CFR 280 G	Out of Service UST Systems and Closure
EPA SW846	1986 Evaluations Solid Waste
EPA 660-4-79-20	1976 Contaminant Monitoring
DNS 13219	Cleaning Petroleum Storage Tanks

FDEP — Quality Assurance Standard Operating Procedures for Petroleum Storage System Closure Assessments (2/94)

In addition to the above referenced guidance documents, all work is to be performed in accordance with local, state, and federal regulations.

4.0 SUBMITTALS

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

4.1 EXCAVATION AND MATERIAL HANDLING PLAN

Describe methods, means, equipment, sequence of operations, and schedule to be employed in excavation, transport, handling, and stockpiling of soil during underground tank removal. Fifteen days before beginning tank removal work, submit to Bechtel for approval a material handling plan that describes contaminated soil and water handling activities related to the proposed tank(s) and piping removal. Include methods of excavating; a material handling plan for the contaminated material (if applicable); soil and groundwater testing requirements; safety precautions and requirements; handling of recovered free product; and water pumping and collection requirements.

4.2 TANK AND PIPING REMOVAL AND DISPOSAL PLAN

Describe methods, means, sequences of operations, and schedule to be employed in the testing, pumping, cleaning, de-vaporizing, inspecting, removal, and disposal of underground storage tanks and piping. This plan must include methods for removal and disposal of residual tank contents before cleaning, and removal and disposal of wastes that are generated during tank cleaning.

4.3 SPILL AND DISCHARGE CONTROL PLAN

Describe procedures and plans related to potential residual product and wastewater spills and discharge of contaminated soils and water.

4.4 REPORTS AND PERMITS

Reports which describe the field activities during the tank removal process are to be submitted by the subcontractor. These reports should contain the following information.

- Identification of tank(s) removed and disposed of. Also include the starting and ending dates of the reporting period as well as the cumulative quantities of soil excavated with each tank removal.

- Closure report in accordance with Florida Department of Environmental Protection (FAC) 17-761.900(6).

- Laboratory testing reports for soil and groundwater samples collected in association with the removal of each tank in accordance with FAC 17-770.

Records to be submitted will consist of the following:

- Building or inspection permits and other permits necessary for underground tank removal.

- Tank disposal paperwork such as the UST Removal Notification Form and the method used for conditioning the tank for disposal in accordance with FAC 17-761.900(6).

- Certification of destruction (scrapping) or other approved disposition of USTs.

5.0 MATERIALS

5.1 PLASTIC SHEETING

Plastic sheeting used during the excavation, removal, storage, and transportation of excavated soil, tanks, and piping will conform to ASTM D 4397 specifications.

6.0 EQUIPMENT

The subcontractor shall maintain sufficient equipment, materials, parts, tools, and supplies to meet the requirements of the work. Excavation equipment shall be subject to inspection by Bechtel and, if deemed unsatisfactory, shall be removed from the site and replaced by satisfactory equipment.

7.0 FIELD OPERATIONS

7.1 TRAINING

Prior to starting any onsite work, an onsite safety and health training class shall will be conducted by Bechtel to discuss the implementation of the Site Safety and Health Plan. The class will discuss activities which are to be followed during the actual site work in accordance with the Site Safety and Health Plan as well as other training requirements as deemed appropriate by Bechtel.

7.2 HEALTH AND SAFETY PROCEDURES

Onsite activities must conform to health and safety guidelines and site specific standards identified in the site specific Safety and Health Plan. These standards are:

OSHA 29 CFR 1910	Occupational Safety and Health Regulations for General Industry
OSHA 29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
OSHA 29 CFR 1910.146	Permits Required for Confined Spaces
OSHA 29 CFR 1926	Occupational Safety and Health Regulations for Construction

7.3 TANK CONTENTS REMOVAL

Liquid tank contents at the time of removal will be considered contaminated or waste fuel. Remaining liquid, if any, will be pumped from its respective tank into either 55-gallon drums or other suitable containers for disposal in accordance with local, state, or federal guidelines. All drums, tanks, or other containers used to store removed fuel or waste sludge and residue will be properly marked in the field. An example for identifying drums or tanks used to store waste material is provided below.

Drum or Tank No.	Product	Hazardous Waste, Status, Type, and Basin Known
1	MOGAS	Sludge and sandblasted residue

7.4 EXCAVATION

The subcontractor must notify the Bechtel Contracting Officer at least 48 hours prior to beginning any tank removal work. Operations shall be staged to minimize the time the tank excavation is open and the time that contaminated soil is exposed to weather. Excavation will be performed in accordance with Technical Specification 22567-001-SP000-005, "Contaminated Earthwork and Miscellaneous Demolition." Transportation of contaminated soil, if required, will be performed in accordance with Technical Specification 22567-001-SP000-003, "Transportation of Contaminated Material."

7.4.1 Excavation Procedures

Prior to beginning excavation, the Department of Public Works or other appropriate agencies shall be notified to determine the location of any subgrade utilities which may affect the excavation, and obtain any required permits.

The Fire Marshall or other local fire protection authority shall be notified at least 3 days before beginning excavation.

The subcontractor shall excavate as required around the tanks and piping as necessary for removal. Excavated soil will be placed within a temporary containment area as described in Section 7.5. Excavated soils will be monitored onsite using a Flame Ionization Detector (FID) to determine the presence or absence of petroleum compounds above the allowable levels according to local, State, and Federal guidelines. Excavation shall be classified as contaminated earth work unless otherwise specified by Bechtel.

The sequence for excavation shall consist of the following:

- Perform required notifications.
- Define the exclusion zones per the site safety and health plan.
- Perform initial excavation to indicated lines as indicated on engineering drawings.
- Continue excavation as directed by Bechtel. Excavation is to consist of removing only that soil which is deemed necessary to remove the underground tanks and associated lines unless otherwise directed by Bechtel.
- Cease excavation upon direction of Bechtel or upon encountering unexpected conditions.
- Periodically load and transport, and segregate if necessary, the excavated material to the predetermined temporary containment area as directed by Bechtel.

The subcontractor is responsible for selecting methods and equipment to remove soil to minimize disturbance to areas beyond the limits of the excavation area. Material that becomes contaminated as a result of the contractor's negligence shall be removed and disposed of at no additional cost to the Government or Bechtel. Where excavation extends into groundwater, dewatering methods will be employed on a localized basis to facilitate excavation operations with prior approval of Bechtel. Water generated by dewatering during excavation required for removal of tanks or piping, surface water collected in open excavation, or water used for washing bituminous surfaces shall be collected and tested as described in Section 8.0. Disposal of water which contains levels of contaminants above the locally acceptable levels shall be disposed of in accordance with all local, state, or federal guidelines. Water that is determined

not to be contaminated will be disposed of onsite in accordance with all applicable local, state, and federal regulations.

During the excavation activities some asphalt and concrete structures will be removed. Disposal of contaminated structures or debris will be performed in accordance with Technical Specification 22567-001-SP000-005, "Contaminated Earthwork and Demolition."

7.5 TEMPORARY CONTAINMENT OF EXCAVATED SOIL

During excavation, the subcontractor is to provide temporary containment of excavated soil. The temporary containment area will be located within close proximity of the excavation area. The excavated soil is to be placed on 30-mil or heavier polyethylene sheeting which will be draped over a perimeter berm built of straw bales. At the completion of each work day, the excavated soil shall be covered with 6-mil or heavier polyethylene sheeting. The edges will be secured to keep the polyethylene sheeting in place. The subcontractor may submit an alternative plan for temporary containment of excavated soil, however, this plan must be in accordance with Navy requirements and local, state, and federal guidelines and is subject to approval by Bechtel.

Upon the completion of the excavation, the excavated soil with contamination exceeding FDEP regulatory limits as indicated by the FID will be disposed of in accordance with all local, state, and federal requirements unless otherwise specifically directed by Bechtel. Material designated for offsite disposal will be loaded into designated haul trucks using the contamination control techniques defined in Section 7.4. The polyethylene sheeting used to contain the contaminated soil will be disposed of in accordance with all local, state, or federal guidelines. Uncontaminated soil shall be returned to the excavation.

7.6 CONTAMINATION CONTROL

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

7.7 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, will be conducted as part of the specified earthwork at the area where trucks are loading or unloading. Decontamination shall be repeated as required.

7.8 REMOVAL OF UNDERGROUND STORAGE TANKS AND ASSOCIATED PIPING

7.8.1 Preparation

Tank and dispenser line removal will be performed in accordance with API RP 1604 as well as applicable local or State agency requirements.

Prior to removal of the tank, remove the fill pipe, gage pipe, vapor recovery truck connection, submersible pumps, and drop tube. Cap or remove non-product piping, except vent piping. Plug tank openings so that vapors will exit through vent piping during the vapor freeing process (API Publication 2015). Product lines are to be drained back into the tanks prior to removal. After lines have been drained they will be capped prior to removal.

7.8.2 Purging

Remove flammable vapors in accordance with API Publication 2015. Tanks shall be verified as "vapor free" prior to further work.

7.8.3 Cleaning and Testing

Cleaning and tank atmosphere testing shall be in accordance with API Publication 2015. Distribution piping shall be cleaned and removed. The tank atmosphere and excavation area must be monitored for flammable or combustible vapor concentrations, with a combustible gas indicator until the tank is removed from the excavation and from the site.

7.8.4 Tank Removal

Prior to removing the tank, plug or cap accessible holes. One plug shall have a minimum 1/8 inch vent hole. Excavate around the tank to uncover it for removal. Remove the tank from the excavation and place it on a level surface and render it useless in accordance with API Publication 1604. Provide warning labels on a tank that has contained leaded fuels. After the tank has been made unusable for future use, transport and dispose of the tank in accordance with all local, state, or Federal guidelines deemed applicable.

7.9 SPILLS OF CONTAMINATED SOILS

Use appropriate vehicles and operating practices to prevent spillage or leakage of contaminated materials from occurring during operations. Vehicles leaving the area are to be inspected to ensure that no contaminated materials adhere to the wheels or undercarriage.

7.10 SECURITY

When applicable and practical, as determined by Bechtel, work areas will be secured using barriers (e.g., rope, snow fence, chain link fence, etc.) to prevent inadvertent entry to work areas and exclusion zones.

7.11 BACKFILL

The subcontractor is to provide backfill, compaction, and grading of the area in accordance with Technical Specification 22567-001-SP000-006, "Uncontaminated Earthwork."

8.0 SAMPLING AND ANALYSIS

Soil and groundwater samples associated with UST removal will be collected and analyzed in accordance with Chapters 17-761, 17-762, and 17-775, Florida Administrative Code (F.A.C.), unless otherwise directed by Bechtel. When UST removals are performed as part of an approved cleanup program (IRA, CAR, RAP, RA, etc.) the sampling and analysis requirements may be modified in the site specific scope of work.

APPENDIX B

TECHNICAL SPECIFICATION FOR WELL INSTALLATION

001754

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

WELL INSTALLATION

0	8/1/94	Issued for use	BFN	STB	BB for	JRM
REV	DATE	REVISION	BY	CHK'D	SUPV	PE

ORIGIN	JOB NO. 22567	
BECHTEL	TECHNICAL SPECIFICATION	REV.
WELL INSTALLATION	301-SP000-001	0
	SHEET 1 OF 18	

CONTENTS

TECHNICAL SPECIFICATION FOR WELL INSTALLATION

1.0 GENERAL

This technical specification establishes the quality of materials and workmanship required for installing monitoring wells at existing borehole locations. Not all activities defined herein may be required. Only those activities required in the applicable Subcontract Scope of Work and engineering drawings for specific services shall apply.

2.0 ABBREVIATIONS

The abbreviations listed below, where used in this specification, shall have the following meanings:

ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
ID	Inside Diameter
OD	Outside Diameter
OSHA	U.S. Occupational Safety and Health Administration
psi	Pounds per square inch
PVC	Polyvinyl chloride

3.0 QUALITY STANDARDS

Subcontractor shall control the quality of items and services to meet the requirements of the Subcontract documents. Unless otherwise specified or shown, the following codes and standards of the latest issue at the time of bid shall apply to the extent indicated herein.

ASTM C 150	Portland Cement
ASTM A 312	Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipe
ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
ASTM C 136	Standard Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM F 480	Thermoplastic Water Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), Schedules 40 and 80

4.0 SUBMITTALS

Refer to Subcontract Exhibit A, Subcontractor Submittal Requirements Summary (SSRS) for submittal requirements. Bechtel will determine if documentation is complete as submitted by the Subcontractor, and reserves the right to reject and require resubmittal of any submittal that does not meet the Subcontract requirements.

Unless noted otherwise, all Subcontractor submittals shall be made to Bechtel at least one (1) week prior to use, fabrication, or implementation. For those submittals required within the two (2) weeks following Subcontract award, submittals shall be made no later than mobilization to the site; Bechtel will notify the Subcontractor of the status of the submittal by telephone within three (3) work days following receipt of the submittal.

5.0 EQUIPMENT AND MATERIALS

5.1 DRILLING EQUIPMENT AND MATERIALS

Each drilling rig and support equipment shall be provided with all necessary protection measures to operate safely in accordance with the OSHA requirements set forth in 29 CFR 1910 and 29 CFR 1926. Equipment should be adaptable to work in conditions associated with hazardous waste/environmental investigation.

Drilling equipment required to install boreholes shall be rotary type with hydraulic feed and in good working condition. Drill rig(s) shall be equipped to minimize disturbance in the areas in which they are drilling. Drilling equipment shall be of sufficient capacity to install the holes to the specified diameter and depth in accordance with the scope of work outlined in the documents (Exhibit C).

Materials for drilling shall include all augers, temporary casings, casing shoes, tools, bits suitable for penetrating the materials being drilled, drill rods, pipe, pumps, potable water, compressors, and other incidentals necessary to perform the work in accordance with the Subcontract documents. Drilling fluid shall be potable water.

5.2 RISER PIPE

5.2.1 General

Riser pipe shall be of a diameter appropriate for the type well installation as shown on the engineering drawings (Exhibit B). Riser pipe shall be clean, straight, and free of obstructions. When certification of cleanness cannot be provided, all riser pipes will be cleaned in accordance with cleaning guidelines for small equipment set forth in Section 6.0 of this specification. The Subcontractor shall submit a catalog cut to Bechtel for review prior to use.

5.2.2 Stainless Steel

Stainless steel riser pipe shall conform to ASTM A 312 and shall be flush threaded joint, Schedule 5 S, Type 316 or 316L stainless steel pipe.

5.2.3 PVC

Riser pipe shall conform to ASTM F 480 and shall be flush threaded joint, Schedule 40 or 80 PVC pipe as indicated in Exhibit B. When certification of cleanness cannot be provided, all riser pipes will be cleaned in accordance with cleaning guidelines for small equipment set forth in Section 6.0 of this specification.

5.3 SCREEN

5.3.1 General

Well screen shall be compatible for use with the specified riser pipe. The width of the slots shall be as shown on the engineering drawings (Exhibit B). Screens shall be of a diameter appropriate for the type well installation as shown on the engineering drawings. Screens shall be in multiples of 5 and/or 10 feet in length. The Subcontractor shall submit a catalog cut of the screen material to Bechtel for review prior to use. The bottom of the screen shall be fitted with flush threaded joint blank casing (riser pipe) at least 1 foot in length to serve as a sump, or as shown on the engineering drawings. The bottom of the blank casing shall be capped.

5.3.2 Stainless Steel

Stainless steel screens shall be flush threaded joint, Type 316 or 316L stainless steel, continuously slotted, wire wrapped and shall have a minimum open area of approximately 13 square inches per linear foot. When certification of cleanness cannot be provided, all screens will be cleaned in accordance with cleaning guidelines for small equipment set forth in Section 6.0 of this specification.

5.3.3 PVC

PVC screens shall be flush threaded joint, Schedule 40 or 80 PVC, as indicated in Exhibit B, and shall have a minimum open area of 4.8 square inches per linear foot. When certification of cleanness cannot be provided, all screens will be cleaned in accordance with cleaning guidelines for small equipment set forth in Section 6.0 of this specification.

5.4 FILTER PACK

Filter pack material for wells shall be clean, well-graded sand, free from deleterious material, conforming to ASTM C 136 Fine Aggregate. Filter pack material shall have a uniformity coefficient of less than 2.5, and shall meet the following dry sieve analysis:

U.S. Standard Sieve	Percent Passing
# 8	100%
# 20	5 - 95%
# 40	0 - 10%
# 60	0 - 6%
#100	0 - 5%
#200	0%

The Subcontractor shall submit a certified sieve analysis of the filter pack material to Bechtel for review prior to use.

5.5 ANNULAR SEAL

The annular seal above the filter pack for groundwater extraction wells shall consist of bentonite pellets tamped in place to the thickness shown on engineering drawings. Bentonite for the annular seal shall meet the following dry sieve analysis:

U.S. Standard Sieve	Percent Passing
1/2#	100%
# 10	0 - 20%

Bentonite granules are not acceptable. Bentonite pellets shall be high-swelling and sodium-based material. The Subcontractor shall submit a catalog cut to Bechtel for review along with identification of source (location) from which the bentonite was mined prior to use. Bechtel reserves the right to check the bentonite sample to determine if the bentonite meets the requirement of this specification.

Alternatively, Bechtel may require the Subcontractor to use Pure Gold (trade name) grout or equal, a high solids bentonite clay grout manufactured by American Colloid Company.

5.6 BACKFILL MATERIALS

The following materials shall be used as backfill only to the extent allowed in the Scope of Work or engineering drawings.

5.6.1 Cement/Bentonite Grout

Cement/bentonite grout shall be mixed approximately in the following proportions: 7.5 gallons of water and 2.5 pounds of bentonite per 94 pound sack of Portland cement. Water shall be potable.

Bentonite shall be free flowing, high-swelling, sodium-based bentonite meeting the following dry screen analysis:

U.S. Standard Sieve	Percent Passing
#16	100%

The Subcontractor shall submit a catalog cut of the bentonite to Bechtel for review prior to use. The catalog cut shall include the source (location) from which the bentonite was mined. Bechtel may check the bentonite sample to determine if the bentonite meets the requirement of this specification. Portland cement shall be Type I or Type II in accordance with ASTM C 150.

5.6.2 Gravel

Gravel stone shall be used as backfill material when specified in the scope of work. The material must be well graded and conform to Department of Transportation specifications for number 57 stone.

5.7 SURFACE CASING AND PROTECTIVE CAP

This section applies to the outer protective surface casing for standard and hardened surface seals only. Requirements for flush mount surface seals are in Section 5.10. Surface casing shall be steel pipe in accordance with ASTM A 53 and/or square steel covers (e.g. B-K TC-200) of an appropriate diameter and schedule for the type well installation as shown on the engineering drawings. Surface casing shall be vented and fitted with a lockable steel protective cap. The minimum thickness of the steel used in cap shall be 3/16 inch. Casing shall be installed into the borehole after the annular grout has set-up for at least 24 hours. The casing shall be plumb centered around the riser pipe. The protective casing shall be placed so that the cap of the inner well casing is exposed when the outer casing is opened.

5.8 WELL CAP

Each well cap shall consist of a slip-on or threaded, vented cap fittable to and of the same material as the specified riser casing unless otherwise authorized by Bechtel. The Subcontractor shall submit a catalog cut or shop drawing of the well cap to Bechtel for review prior to use. Well cap for flush mount surface seal shall be padlockable.

5.6.1 Cement/Bentonite Grout

Cement/bentonite grout shall be mixed approximately in the following proportions: 7.5 gallons of water and 2.5 pounds of bentonite per 94 pound sack of Portland cement. Water shall be potable.

Bentonite shall be free flowing, high-swelling, sodium-based bentonite meeting the following dry screen analysis:

U.S. Standard Sieve	Percent Passing
#16	100%

The Subcontractor shall submit a catalog cut of the bentonite to Bechtel for review prior to use. The catalog cut shall include the source (location) from which the bentonite was mined. Bechtel may check the bentonite sample to determine if the bentonite meets the requirement of this specification. Portland cement shall be Type I or Type II in accordance with ASTM C 150.

5.6.2 Gravel

Gravel stone shall be used as backfill material when specified in the scope of work. The material must be well graded and conform to Department of Transportation specifications for number 57 stone.

5.7 SURFACE CASING AND PROTECTIVE CAP

This section applies to the outer protective surface casing for standard and hardened surface seals only. Requirements for flush mount surface seals are in Section 5.10. Surface casing shall be steel pipe in accordance with ASTM A 53 and/or square steel covers (e.g. B-K TC-200) of an appropriate diameter and schedule for the type well installation as shown on the engineering drawings. Surface casing shall be vented and fitted with a lockable steel protective cap. The minimum thickness of the steel used in cap shall be 3/16 inch. Casing shall be installed into the borehole after the annular grout has set-up for at least 24 hours. The casing shall be plumb centered around the riser pipe. The protective casing shall be placed so that the cap of the inner well casing is exposed when the outer casing is opened.

5.8 WELL CAP

Each well cap shall consist of a slip-on or threaded, vented cap fittable to and of the same material as the specified riser casing unless otherwise authorized by Bechtel. The Subcontractor shall submit a catalog cut or shop drawing of the well cap to Bechtel for review prior to use. Well cap for flush mount surface seal shall be padlockable.

5.9 SURFACE SEAL

Surface seal shall be concrete with Type I or II Portland cement with minimum 28-day compressive strength of 3000 psi. The surface seal shall extend a minimum of two feet below ground level or below the frost line, whichever is greater.

5.10 CENTERING DEVICES

Centering devices shall be stainless steel and shall maintain the riser casings in the center of the drill holes. Subcontractor shall submit catalog cut or shop drawing of the centering devices to Bechtel for review prior to use.

5.11 DRILL SPOILS HANDLING EQUIPMENT

The Subcontractor shall containerize spoils in 55-gallon UN1A2 steel drums (49 CFR 173), load, haul, unload and place them at location(s) onsite as designated by Bechtel. Equipment used for this purpose shall prevent the spread of contamination.

5.12 SOAP

Soap shall be a biodegradable, laboratory grade, phosphate free soap such as Liquinox, or equal material. A catalog cut shall be submitted to Bechtel for review prior to use.

5.13 LUBRICANTS

Tool joint lubricants other than Teflon tape, graphite powder, vegetable oil, and/or apiezon grease (e.g., Dow Corning High Vacuum grease or equal) shall not be used unless approved by Bechtel prior to use. For the threaded connections on the riser pipe assembly, no lubricant other than potable water is allowed unless approved otherwise by Bechtel.

5.14 FLUSH MOUNT SURFACE SEAL

For well installations in areas where an above grade casing would present a hazard or is otherwise undesirable, Bechtel will require the Subcontractor to install a flush mount surface seal. The cover for this seal will consist of either a 3 ft x 3 ft x 2 ft traffic bearing vault which conforms to Department of Transportation (DOT) H_2O standards, or have a pentagon lock nut or other intrusion deterrent device approved by Bechtel. The well cap for this type installation must be vented and lockable with a Bechtel provided padlock. The profile of the seal must slope outward to minimize the amount of precipitation/runoff entering the cover.

5.15 PROTECTIVE BARRIERS

5.15.1 Temporary Perimeter Barricades

Perimeter barricades shall be provided around borehole work areas during all work operations. Barricades shall be placed to provide sufficient mobility for work operations within the barricaded area and shall not interfere with activities of occupants of the work areas. Barricades shall remain in place until all work within that barricaded area is completed, at which time barricades shall be removed.

Perimeter barricades around each borehole location shall consist of snow fence or other suitable material to preclude inadvertent entry into work areas. The Subcontractor shall submit the proposed type of perimeter barricade to Bechtel for review prior to use.

5.15.2 Permanent Perimeter Barricades

If required, a minimum of three (3) guard posts shall be installed around above-ground wells. The guard posts shall be steel pipe 3/4 inches in diameter and a minimum five foot length installed to a minimum depth of two feet below the ground surface in a concrete footing and extend a minimum of three feet above ground surface. Concrete shall also be poured into the steel pipe for additional strength. Steel rails and/or other steel materials can be used in place of steel pipe but will require prior approval from Bechtel. Additionally, the posts shall be plumb and painted with a diagnostic color as directed by Bechtel.

5.16 BOREHOLE COVERS

Borehole covers shall be placed over open boreholes, regardless of depth, to minimize hazardous conditions and the accidental introduction of objects into the borehole. Covers shall remain in place until boreholes are completed as wells or are permanently closed.

Borehole covers shall consist of steel plate or other suitable material to preclude inadvertent access to boreholes. Covers shall also be equipped to prevent surface water runoff from entering the borehole. Subcontractor shall provide details of proposed borehole covers to Bechtel for review prior to use.

6.0 FIELD OPERATIONS

6.1 CLEANING

The work areas shall be kept in a neat and orderly condition at all times. Items shall not be brought onto the site nor removed from the site until so authorized by Bechtel.

Deposits of mud and other materials adhering to equipment shall be removed while at the drill site. This material shall be broadcast in the vicinity of the hole or containerized in 55 gallon UN1A2 steel drums (49 CFR 173), as directed by Bechtel.

Decontamination of all equipment shall occur at a decontamination pit or pad, either excavated or built above grade by the Subcontractor. The pit or pad and surrounding area will be lined with heavy duty plastic film of sufficient width to provide a seamless, lapless liner for the pit. All cleaning of drill rod, auger flights, well screen and casing, etc. will be conducted above the plastic film using non-wood saw horses or other appropriate means.

Cleaning shall utilize brushes, scrapers, rags, and other items as necessary to remove surface dirt. Equipment shall be decontaminated at the exclusion zone of the intrusive activities. Small field equipment, augers, drilling bits, large tools, drill rigs, monitoring well supplies and other large items shall be cleaned at this zone. All equipment and materials required for decontamination including water required for this purpose shall be provided by the Subcontractor. Potable water (tap water from any municipal water treatment system) shall be used. Organic free water and organic free water systems shall be stored separately from gasoline and/or fuel containers and gasoline powered equipment to prevent cross-contamination.

Small equipment shall be decontaminated as follows:

1. Wash thoroughly with laboratory detergent and tap water using a brush to remove all particulate matter and surface film.

2. Rinse thoroughly with tap water.

3. Rinse thoroughly with deionized water.

4. Rinse twice with isopropanol using only teflon-squeeze bottles.

5. Rinse thoroughly with organic-free water and allow to air-dry as long as possible.

Organic-free water is defined as water that contains no pesticides, herbicides, extractable organic compounds and less than 5 ug/L of purgeable organic compounds as measured by a low-level GC/MS scan. In addition, no metals or other organic compounds should be detected at routine detection limits.

6. If organic-free water is not available, allow equipment to air dry until the isopropanol has evaporated.

Decontaminated equipment shall be stored on clean tables with polyethylene sheeting and wrapped in aluminum foil between uses. Following decontamination, the sampling equipment shall not be allowed to touch the ground prior to use. All decontamination fluids shall be contained and care shall be taken to ensure that the isopropanol and other fluids do not contact

the ground surface. Isopropanol rinsates shall be segregated from other decontamination fluids and containerized. The Subcontractor shall store decontamination fluids in 55-gallon UN1A1 steel drums, load the drums, haul, unload and place them at the locations designated by Bechtel.

Large equipment shall be decontaminated using the following procedure:

1. Remove heavy accumulation of mud at drill site.

2. Move equipment to the exclusion zone of intrusive activities after sampling/field activities are complete.

3. Decontaminate equipment with a high pressure steam cleaner which utilizes a soap and water cycle. Scraping and scrubbing may be necessary to remove encrusted material. Items shall be placed on sawhorses, pallets, or the equivalent to prevent contact with the ground.

4. Rinse the equipment with isopropanol if needed and appropriate, followed by a tap water rinse.

5. Place equipment on polyethylene sheeting, saw horses, or clean pallets and allow to dry. Saw horses and pallets shall not be constructed of wood.

6. Sampling and field equipment shall not contact the ground surface prior to the next sampling location. Wrap appropriate equipment (i.e., monitoring well installation supplies) in polyethylene sheeting and secure with duct tape. The Subcontractor shall store decontamination fluids in 55-gallon UN1A1 steel drums (49 CFR 173), load the drums, haul, unload and place them at the locations designated by Bechtel.

6.2 WELL INSTALLATION

6.2.1 General

Wells shall be installed at the locations shown on the engineering drawings (Attachment B).

6.2.2 Annular Space

The borehole shall be of sufficient diameter so that well installation and construction can proceed without difficulties. To assure adequate size, a minimum 2-inch annular space is required between the well casing and the borehole wall (or the hollow stem auger wall).

6.2.3 Installing Screen and Riser Casing

Before installation of the riser pipe assembly (e.g., riser pipe, screen, sump, and bottom cap), the final depth of the hole shall be measured with a weighted tape to $\pm$ 0.1 feet, and the assembly and appurtenances cleaned in accordance with Section 6.0.

Equilibrium or excess water pressure inside the hollow-stem auger relative to the observed groundwater level shall be maintained at all times during the screen and riser installation (if necessary by adding potable water to the hollow stem) to prevent a "quick" condition at the bottom of the hole. This is particularly applicable when the bottom consists of loose, sandy soils.

The riser pipe assembly shall then be lowered into the hole. In boreholes greater than 50 feet deep, centering devices shall be used to maintain the entire riser pipe assembly in the center of the borehole. Centering of riser pipe assembly through the hollow stem of an auger shall be provided by suspending the assembly using the cable/hoist method such that the riser pipe assembly is located in the center of the borehole upon completion. All cuttings shall be flushed out of the hole prior to the installation of the monitoring well.

6.2.4 Installing Filter Pack

As soon as the riser pipe assembly is in place, clean water shall be pumped into the riser pipe so that return flow will rise to the surface through the annular space and clean the hole. Equilibrium or excess water pressure inside the hollow-stem auger relative to the observed groundwater level shall be maintained at all times. The pumping rate shall be adequate to flush the riser pipe assembly and hole. The filter pack shall then be placed into the annular space between the well screen and borehole wall by tremie method. The filter pack shall extend from the bottom of the hole to at least two feet but not more than five feet above the top of the screen. The temporary casing, if applicable, shall be removed upon direction from Bechtel.

Unless noted otherwise on the drawing, the Subcontractor shall install a meter and backflow preventer and use the designated water supply for dust control, flushing monitoring wells, and decontaminating drilling and sampling equipment including temporary casings. The equipment required may include pumps, water trucks or trailers, hoses and all other items necessary to meter and transfer the water supply to the work area. All water discharged from the boreholes during well installation shall be collected in 55-gallon UN1A1 steel drums (49CFR173). Drums shall be loaded, hauled, and unloaded to staging areas specified by Bechtel. Water shall be controlled by the Subcontractor to prevent erosion and other damages.

The filter pack for soil vapor monitoring wells will be installed by the tremie method. Potable water will only be as necessary in order to keep the filter pack material from bridging. The filter material for the vapor extraction wells shall be placed directly between the annular space of the borehole and auger flight.

6.2.5 Installing Seal and Backfill

For groundwater monitoring wells, an annular seal of bentonite pellets shall be installed in the hole after the filter pack is placed. The bentonite pellets shall be tamped in place using a rod, pipe, or heavy weight attached to a rope. The minimum thickness of this bentonite seal, after tamping, shall be two feet. The completed bentonite seal shall be allowed to hydrate for a minimum of eight hours or the manufacturer's recommended hydration time, whichever is greater, before proceeding with the grouting operation. Following placement of the annular seal, the remainder of the annular space between the riser casing and borehole wall shall be filled with cement/bentonite grout up to two feet below ground surface as shown on the engineering drawings. The cement/bentonite grout shall be installed by placing a rod, pipe, or hose to a point immediately above the seal and pumping the grout into the hole. The tremie pipe will be equipped with a side discharge port to preclude disruption of the annular seal and/or filter pack. Should loss or shrinkage of grout occur, holes shall be refilled until they remain full. The grout shall be allowed to set-up for a minimum of 24 hours before the concrete surface pad is installed. The backfilling of the annular space for soil vapor extraction and soil vapor monitoring wells shall be similar to the method used for groundwater monitoring wells with the exception of not installing a bentonite seal.

6.2.6 Well Testing

The alignment of the well screen will not be considered acceptable unless a decontaminated, clean, straight pipe of appropriate diameter can be passed freely down the length of the well. This test shall be performed approximately 24 hours after completion of grouting by the Subcontractor. Upon completion, each well shall be tested after annular seal and grout have set to confirm the well is operative. This shall be accomplished by bailing water from the riser casing and measuring recovery of the water level. An alternative testing method that may be requested by Bechtel is the slug method whereby the decay of the water level induced by the slug will be monitored.

6.2.7 Surface Casing, Cap and Seal

The surface pad, surface casing or vault, and cap if necessary, and seal shall be installed at each monitoring well as shown on the engineering drawings.

6.2.8 Well Development

Installed groundwater extraction wells shall be developed to maximize the yield of water per foot of drawdown, and extract from the water-bearing formation the maximum practical quantity of fines as may be drawn through the screen when the well is pumped under maximum conditions of drawdown. Well development shall not commence until the cement/bentonite grout has been in place for at least 72 hours. The procedure shall include water collection and disposal plan. Development shall proceed by pumping and/or bailing (using stainless steel or teflon bailers) techniques. Development will continue along the length of the well screen until the well

produces clear water, or the water temperature, pH, and conductivity have stabilized as indicated by three consecutive measurements within 10 percent of each other or a minimum of 10 well volumes has been removed. In the event wells are bailed dry, the wells must be developed to dryness 10 times to be considered complete. Development water shall be containerized by the Subcontractor in 55-gallon UN1A1 steel drums (49 CFR 173), loaded, hauled, unloaded and placed at staging areas designated by Bechtel. The Subcontractor shall submit a step-by-step well development procedure prepared using the above guidelines to Bechtel for review and approval prior to its implementation.

6.2.9 Permeability Testing

Following well development, permeability testing will be performed in selected groundwater extraction wells. The method for permeability testing will be determined by Bechtel based on well development test results.

The following narrative provides general guidelines for performing a permeability test by the slug test method, although Bechtel may chose an alternate method.

Preparatory Activities

- Develop each well
- Calculate gravel porosity
- Decontaminate all intrusive equipment

Field Equipment

The following equipment may be utilized for the slug test.

- Electronic water level indicator
- Pressure transducers (5 psi, 10 psi)
- Dedicated field logbook and semi-log graph paper
- Enviro-labs data logger Model DL-120-MCP or equivalent
- Cylindrical slug (solid), 1.5 in. O.D. and/or 3.5 in. O.D., 60 in. long
- Liquinox detergent, or equivalent
- Deionized, organic-free water
- Scrub brush
- Disposable 3/8 in. cord
- Pesticide grade isopropanol

Procedures

- Measure the water level in the well using the electronic water-level indicator and record the data in the field log book.

- Complete the system setup procedures by setting the internal clock in the data logger, input transducer scale factors, and selecting appropriate logging sequence for each well. Lower transducer into well to a depth of 8 ft beneath static water level to reduce the possibility of damage to the transducer by the slug. Allow transducer to stabilize, and record initial head reading in feet. Input the logging sequence in preparation of slug test.

- Lower slug into well, stopping at a pre-determined depth immediately above the static water.

- Instantaneously introduce the slug into the water so that the entire slug is submersed, keeping the bottom of the slug from touching the pressure transducer. Once the well has recovered to 90 percent or greater of the increase in water level elevation due to submergence of the slug, store data in unit memory as water level in the falling head measurements.

- Reset the data logger to standby mode.

- Leaving the logging sequence the same as for the falling head test, instantaneously remove the slug from the water. Tie off cord and leave the slug in the well suspended above the water surface.

- Once the water level in the well has recovered to 90 percent or greater of the decrease in water level elevation due to slug removal, store data in unit memory as rising head measurement.

- Output data in memory to a printer upon the completion of the test at each well.

- Evaluate the data obtained in monitoring wells and calculate the hydraulic conductivity and transmissivity.

A step-by-step slug testing procedure prepared using the above guidelines shall be submitted to Bechtel for approval prior to its implementation.

6.2.10 Drawdown Tests

The drawdown of each well during a 2-hour pumping period shall be measured. If the well yield is not sufficient to maintain a 2-hour pumping period, the pump rate shall be slowed to maintain pumping during this period. The discharge rate shall be determined using a stop watch and a calibrated bucket.

The water level in each well shall be determined by direct measurement using an electric sounding device. Water level shall be measured once every 30 seconds for the initial 10 minutes, once every minute for the next 10 minutes, and then once every 5 minutes. Both the time and drawdown for each water level measurement shall be recorded.

The time versus the drawdown shall be plotted on semi-logarithmic graph paper. The time in minutes after the start of pumping should be plotted on the logarithmic scale and the drawdown in feet plotted on the linear scale. The well's specific capacity (when the pumping level stabilizes) shall be calculated by dividing the discharge rate by the drawdown. If the pumping level has not stabilized after two hours, the 24-hour drawdown shall be estimated by extrapolating the time-drawdown plot. The predicted drawdown shall be used to calculate the well's specific capacity.

After 2 hours, pumping shall be stopped and water level measurements shall be taken at the following intervals:

0, 15, 30, 45 seconds
1, 2, 4, 8, 16, 30 minutes

and then at 15 minute intervals until the well has recovered to 90 percent of its static level.

Recovery data shall be recorded and time versus drawdown shall be plotted on the semilog graph paper. Recovery and pump data shall be verified to ensure that specific capacity calculations are correct.

A step-by-step drawdown test procedure prepared using the above guidelines shall be submitted to Bechtel for approval prior to its implementation.

6.3 WASTE DISPOSAL

Soil cuttings drilled from each borehole, shall be disposed of by the Subcontractor by placing onto plastic sheeting or other material approved by Bechtel. The soil cuttings will then be placed into 55-gallon UN1A2 steel drums (49 CFR 173) provided by the Subcontractor. The lids of the drums will be tightly secured by the Subcontractor. The Subcontractor shall mark each drum as to its contents, drill hole identification number, depth interval represented by the spoils, and the date. Discharge water shall be conveyed to UN1A1 steel drums (49 CFR 173). Used plastic sheeting and contaminated personal protective equipment shall be containerized in 55-gallon UN1A2 steel drums (49 CFR 173). Drums shall be filled with all waste generated by these operations and loaded, hauled, unloaded and placed at locations onsite as designated by Bechtel.

6.4 CLEANUP

The drilling locations and work areas shall be kept in a neat and orderly condition at all times. Cleanup includes but is not limited to the following:

- removal from the site of all uncontaminated equipment, trash, waste, and materials used in connection with the work

- decontamination of contaminated equipment and materials, which shall not be removed from the site until certified for release by Bechtel.

- placement of contaminated items, which cannot be decontaminated as determined by Bechtel, at locations onsite as designated by Bechtel.

- site restoration to a condition similar to that found before the work commenced.

- verification that all areas damaged or disturbed by the Subcontractor have been leveled, graded to drain, seeded, fertilized, and reseeded as necessary to establish turf for erosion control.

APPENDIX C

TECHNICAL SPECIFICATIONS FOR

SOIL VAPOR RECOVERY
AND
GROUNDWATER TREATMENT

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

SOIL VAPOR EXTRACTION AND GROUNDWATER TREATMENT

0		Issued for Use	WRZ	ABJ	Seg	DWL
NO.	DATE	REASON FOR REVISION	BY	CHECK	SUPV	PE

ORIGIN	SVE AND GROUNDWATER TREATMENT	JOB NO. 22567	
		TECHNICAL SPECIFICATION	
		300-SP200-001	0
		SHEET 1 OF 8	

CONTENTS

TECHNICAL SPECIFICATION FOR SOIL VAPOR EXTRACTION AND GROUNDWATER TREATMENT

1.0 GENERAL

This Specification provides the technical requirements for the Soil Vapor Extraction and Groundwater Treatment Systems. 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.

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:

AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICAILS (AASHTO) STANDARDS, AASHTO A-3

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B31.3a:\
Chemical Plant and petroleum Refinery Piping

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 698
Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

ASTM D 1784
Standard Specification for Rigid Polyvinyl Chloride Compounds

ASTM D 1785
Standard Specification for Polyvinyl Chloride Plastic Pipe

TITLE 29, CODE OF FEDERAL REGULATIONS, U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS

Part 1910 General Industrial Standards

Part 1926 Construction Standards

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 National Electrical Code

UNDERWRITER LABORATORIES, INC. (UL) PUBLICATIONS

586-77 Test Performance of High Efficiency Particulate, Air Filter Units

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. BECHTEL 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 BECHTEL at least 2 weeks prior to delivery, implementation, or use.

4.0 PRODUCTS

4.1 GENERAL

Materials and Equipment shall be standard products of the manufacturer. Standard replacement parts shall be readily available. Equipment shall essentially duplicate items which have been in satisfactory use for at least two years prior to bid.

4.2 PUMPING SYSTEM

4.2.1 Well Pumps

Pump and pump fittings shall be constructed of all corrosion resistant materials. Pump shall be capable of pumping at the design flow rate of 5.5 gpm against a Total dynamic head of 81 feet. Pump shall be a Grundfos™ Model 5E12, 1/2-Horsepower electric submersible pump or approved equal.

4.2.2 PVC Pipe and Fittings

All pipe, couplings, and fittings shall be manufactured of material conforming to ASTM D-1784, Class 1245B.

Screw Joint: Pipe to dimensional requirements of ASTM D-1785 Schedule 80, with joints meeting requirements of 150 psi working pressure, unless otherwise shown or specified. Pipe shall be fabricated and tested according to ASME B31.3.

Solvent Joint: Pipe to dimensional requirements of ASTM D-1785 Schedule 80 with joints meeting the requirements of 150 psi working pressure, unless otherwise shown or specified. Pipe shall be fabricated and tested according to ASME B31.3.

4.3 AIR STRIPPER

The air stripping unit shall be capable of treating groundwater pumped from 4 wells at a combined rate of 22 gpm (5.5 gpm each well). The air stripper shall reduce groundwater BTEX concentrations to less than 1 ug/l, and Methyl-tert-butyl ether (MTBE) levels to 5 parts per billion. The groundwater maximum contaminant concentrations are as follows: 323 ppb benzene, 1332 ppb toluene, 899 ppb xylene, 151 ppb ethyl-benzene, 56 ppb naphthalene, 1731 ppb MTBE, 0.07 ppb 1,2-Dibromoethane, 44 ppb Lead.

The air stripping unit shall be mounted on a 4'x6' skid. It shall consist of a 20 foot tall 1.5 foot-diameter tower with 15 feet of 2.3-inch polypropylene Lanpac™ random packing which has a geometric surface area of 68 square feet per cubic foot and a packing factor equal to 21 $feet^{-1}$. The skid mounted blower (American Fan model AF-8-1000 or approved equivalent) will operate on 208-Volt, three phase power and be capable of producing the design air flow of 300 cfm. Design air to water ratio is 100 to 1. The air stripping unit will also be equipped with influent and effluent sampling ports, a mist eliminator, an observation port, a pressure gauge to indicate the effects of fouling with time, and a 0.45 micron cartridge filter mounted in the influent line to remove lead contamination to levels below the City of Orlando established sanitary sewer influent limitations.

The unit will be equipped with controls to allow for complete system shutdown in the case of inadequate air delivery due to an unexpected increase in column operating pressure or blower failure. The sump of the column will be equipped with controls that will shut the system down in the event the water in the sump rises above a safe operating level.

4.4 VACUUM PUMP SYSTEM

The vacuum pump system shall operate at a flowrate of 260 cfm at a 65" H_2O vacuum drawing from four vapor recovery wells located as shown in Figure 7 of Exhibit E. The vacuum pump system shall use two Rotron Model EN707, 5 Hp, regenerative blowers or approved equal skid mounted in parallel. The system shall be equipped with a particulate filter, pressure and vacuum

gauges, an adjustable pressure relief valve, moisture separator, a flow meter, and a thermometer. The blowers shall be explosion proof (in accordance with the NEC, Artical 500) and shall operate on 208-Volt, three phase, AC power. The system will be operated from a control panel located on the skid. The control system will shutdown the blower if the liquid level in the separator tank is at or beyond a high level sensor. In addition, the blower will be shut down if its temperature reaches a factory set high temperature limit. The blower will be manually restarted after cooling. The adjustable pressure relief valve mounted on the skid will allow fresh air to enter the suction line if the vacuum reaches a set point. See Figure 6 of Exhibit E for the proposed Piping and Instrument Diagram of system.

4.5 GRANULAR ACTIVATED CARBON

Granular activated carbon (GAC) absorption canisters shall be installed downstream of the Soil Vapor extraction blower per Figure 6 of Exhibit E. In order to be prepared for an unexpectedly large carbon usage rate, ports for three, in series, carbon units for each stream will be provided. GAC absorption canisters shall be Carbtrol Corp. model G-2 or approved equal.

4.6 CONTROL PANEL

The control panel at this site will be mounted on the 4'x6' skid for the air stripper as shown in Figures 18 and 19 of Exhibit E. The panel shall be equipped with surge protection and will perform the following functions:

- The groundwater recovery wells will contain both high water and low water level sensors that will monitor the water levels in the wells. If a low water level is reached in a well, the pump in that well will be automatically shut off until the water level recovers to the high level sensor. The low level sensor will be capable of shutting off the pump if free product is encountered.

- The air stripper will be equipped with controls to cause complete system shutdown in case of inadequate air delivery due to an unexpected increase in column operating pressure or blower failure. The sump of the air stripper will be equipped with controls that will cause the control panel to shut down the groundwater recovery pumps in the event that the water in the sump rises above a safe operating level. In addition, a low level float will be placed in the sump to cause the air stripper influent pumps to be turned back on.

- A pressure switch will shut the entire vacuum system down if the pressure in the GAC units becomes excessive.

- The panel shall be configured with an alarm to alert service station personnel in the event of system shutdown.

5.0 FIELD OPERATIONS

5.1 PIPING SYSTEM

The piping system shall consist of 1-inch diameter schedule 80 PVC pipe from each groundwater recovery well and 3-inch diameter schedule 80 PVC pipe from each vapor recovery well laid in 3'x3' trenches backfilled with AASHTO A-3 material in 6-inch loose lifts. Each lift shall be compacted to 98% of the ASTM method D-698. Trench shall be capped with 6-inch 3,000 psi concrete pavement with No. 5 bar, grade 40 steel reinforcement. See Figure 17 of Exhibit E. The trenches will also contain 3/4 inch diameter electrical conduits necessary for pump power supply and well level instrument cables. Figures 14 and 15 of Exhibit E indicate how piping system influent lines connect to vapor treatment and groundwater treatment units.

5.2 WELL INSTALLATION

5.2.1 Groundwater Recovery Wells (RW-1 thru RW-4)

Groundwater recovery wells shall be installed and located per Figures 7, 12, and 13 of Exhibit E.

5.2.2 Vacuum Recovery Wells (VRW-1 thru VRW-4)

Vacuum recovery wells shall be installed and located per Figures 7, and 8 of Exhibit E.

5.2.3 Vacuum Monitoring Wells (VMW-1 thru VMW-5)

Groundwater monitoring wells shall be installed and located per Figures 7 and 23 of Exhibit E.

5.3 GROUNDWATER EFFLUENT DISCHARGE

Treated groundwater will be gravity fed into a 6-inch diameter sanitary sewer line located on the southeast corner of Building 7174.

5.4 TESTING

5.4.1 Operational Tests

Prior to acceptance, an operational test of all pumps, drivers, and control systems shall be performed to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that the equipment is not electrically, mechanically, structurally, or otherwise defective; is in safe and satisfactory operating condition; and conforms with the specified operating characteristics. Tests shall include checks for excessive vibration, leaks in all piping and seals, correct operation of control systems and equipment, proper alignment, excessive noise levels, and power or air consumption. If any deficiencies are revealed during any test, such deficiencies shall be corrected and the tests shall be reconducted.

5.4.2 Hydrostatic Testing

After pipe is laid, all joints are completed and before trenches are backfilled, the newly laid piping or any valved section of piping shall, unless otherwise specified, be hydrostatically tested according to ASME B31.3. Each valve shall be opened and closed several times during the test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, and valves discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory. Each joint and pipe run shall remain exposed until it has been hydrostatically tested as a system.

5.5 SYSTEM STARTUP

Upon completion of construction and installation of the equipment and prior to the startup of each system, groundwater from the monitoring and recovery wells designated for monthly sampling will be collected for laboratory analysis.

The groundwater well level sensors will be manually tested and checked for the proper control system response. Upon satisfactory completion of these tests, the pumps will be mounted in the recovery wells, the sensors will be set at their appropriate levels, ad the groundwater recovery system will be activated. The flow rate from each recovery well will be adjusted, and the spray distribution at the top of the air sparging tower will be inspected and adjusted if necessary. When the spray distribution is satisfactory, the system will be allowed to run for approximately 30 minutes, at which time influent and effluent samples from the air stripper will be collected.

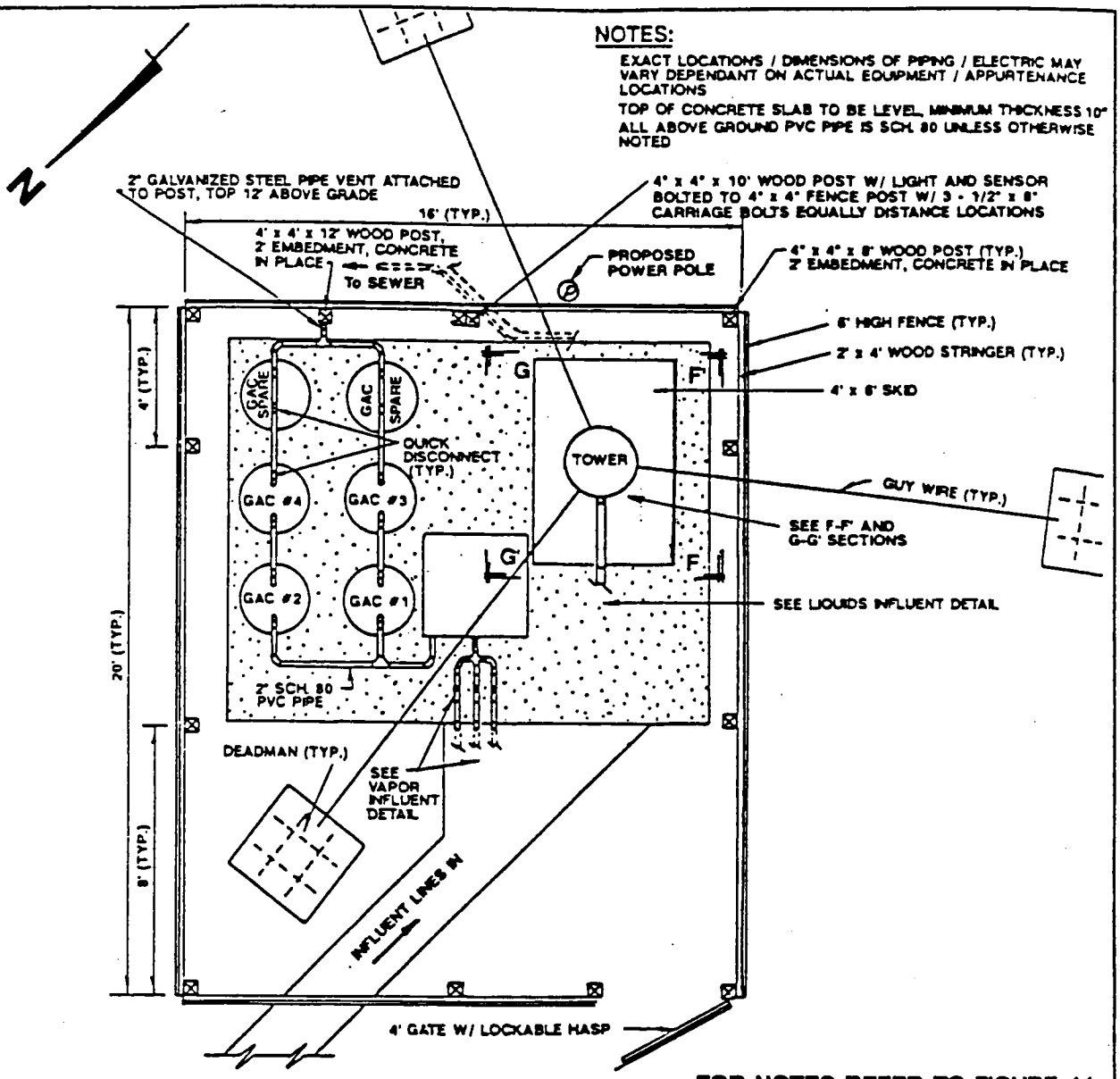
Samples will be analyzed on a portable gas chromatograph (GC) calibrated to detect BTEX to the 1 part per billion range.

Based on the results of the GC analysis and field observations, minor adjustments will be made as necessary. If the GC results indicate that the water treatment system is functioning adequately, a sample from the total system effluent will be collected and laboratory analyzed on a rapid turnaround basis for the analytical parameters appropriate for the site to confirm GC results.

The air flow rate of each vapor extraction system will be adjusted to achieve the desired vacuum at the vapor recovery wells. After the vacuum reading at each vapor recovery well has stabilized, the vacuum at the vapor monitoring wells will be checked. Air samples will be collected from the vapor extraction system. These samples will be analyzed by USEPA Method T03 to determine contaminant concentrations in the air stream.

Operational parameters will be recorded at initial start and after equilibrium. After the drawdown in the recovery wells equilibrates, water levels will be measured in selected monitoring wells and the recovery wells.

000908
Q01754



FOR NOTES REFER TO FIGURE 11

COMPOUND DETAIL

SCALE :

0 4 8 12 FEET

FIGURE 10

COMPOUND AREA DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70

NOTES: DETAILS

[A] **CONCRETE PAVEMENT:** 3000 PSI, TYPE I CEMENT, STANDARD DESIGN, 6 INCH. MINIMUM THICKNESS.

[B] **STEEL REINFORCEMENT:** No. 5 BAR, GRADE 40 STEEL; **24 INCH WIDE TRENCH:** 2 BARS, 12 INCHES C/C WITH CROSS BARS 24 INCHES C/C, **36 INCH TRENCH:** 3 BARS, 12 INCHES C/C WITH CROSS BARS 24 INCHES C/C.

[C] **A-3 MATERIAL:** COMPACT 12 INCH LOOSE LIFT ABOVE INFLUENT / VAPOR / EFFLUENT LINES, COMPACT REMAINING SOILS IN 6 INCH LOOSE LIFTS. ALL COMPACTION TO MEET 100% OF THE STANDARD PROCTOR ASTM D 698.

[D] 1" DIA. SCH. 80 PVC PIPE (INFLUENT) TESTED FOR 1 HOUR AT 80 PSI.

[E] 2" DIA. SCH. 40 PVC PIPE (VAPOR).

[F] **BLOWER:** 3.0 H. P., 230 VOLT SINGLE PHASE.

[G] 2.3 INCH LANPACS, 10 FEET OR EQUIVALENT.

[H] 4" DIA. SCH. 40 PVC PIPE (EFFLUENT).

[I] 3/4" ELECTRICAL CONDUIT FOR SENSOR, PAIRED WITH 1" DIA. ELECTRICAL CONDUIT FOR POWER TO GROUNDWATER PUMPS.

[J] SCH.40 PVC PIPE: HOUSES PRODUCT RECOVERY PIPING IF REQUIRED.

FIGURE 11

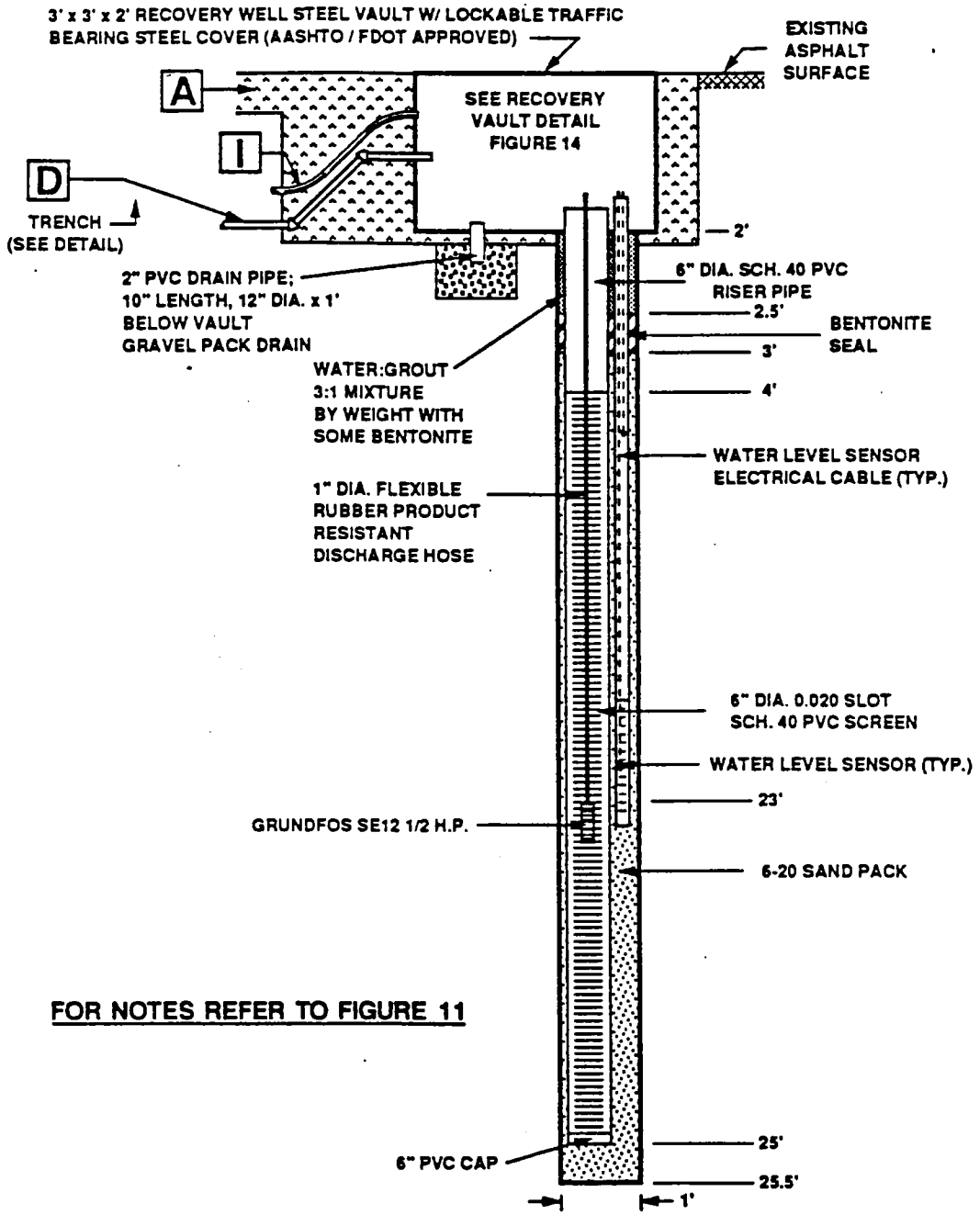
NOTES: DETAILS

7514-70

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

000908

001754



RECOVERY WELL DETAIL

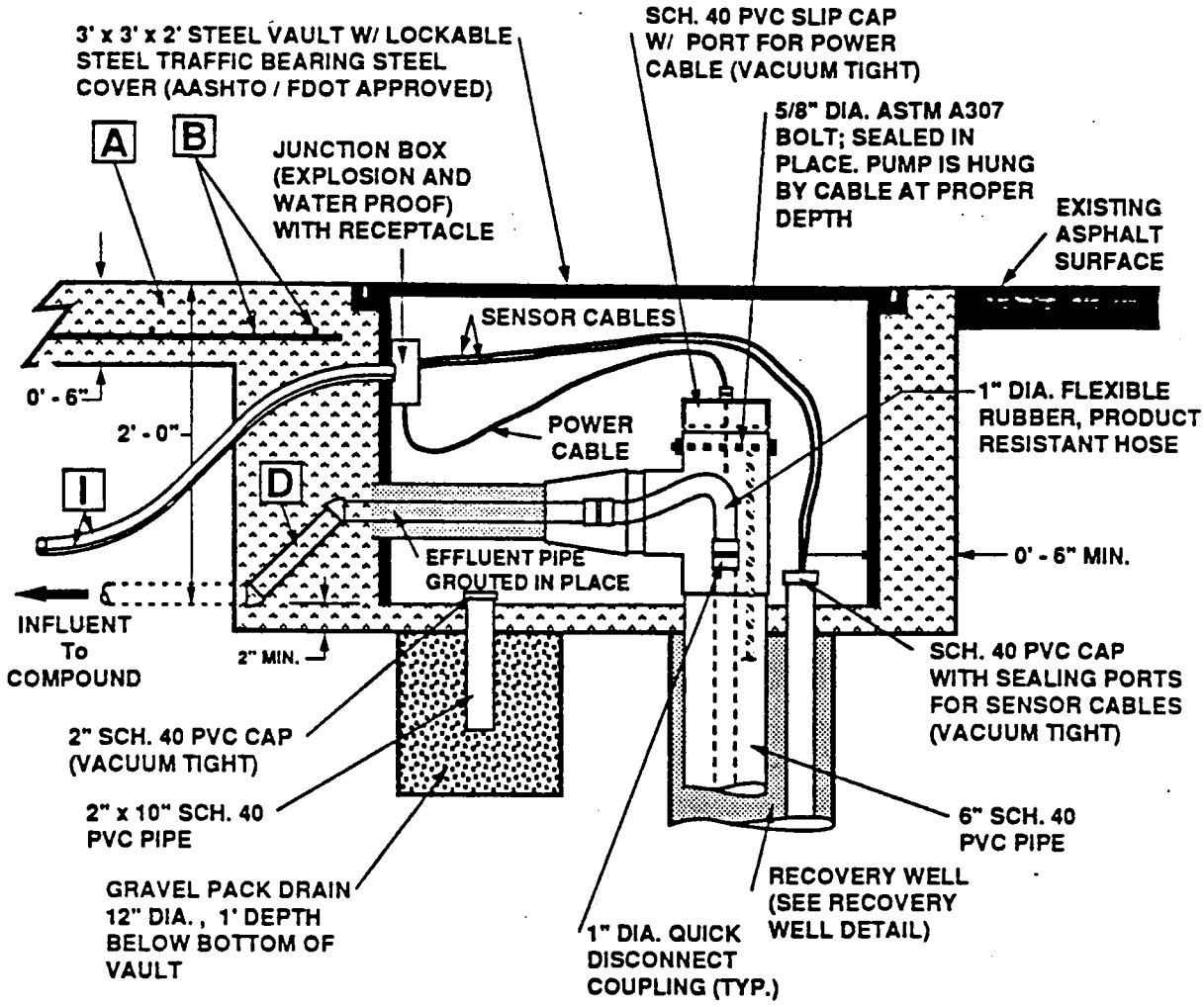
NOT TO SCALE

FIGURE 12

RECOVERY WELL DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



FOR NOTES REFER TO FIGURE 11

RECOVERY WELL VAULT DETAIL

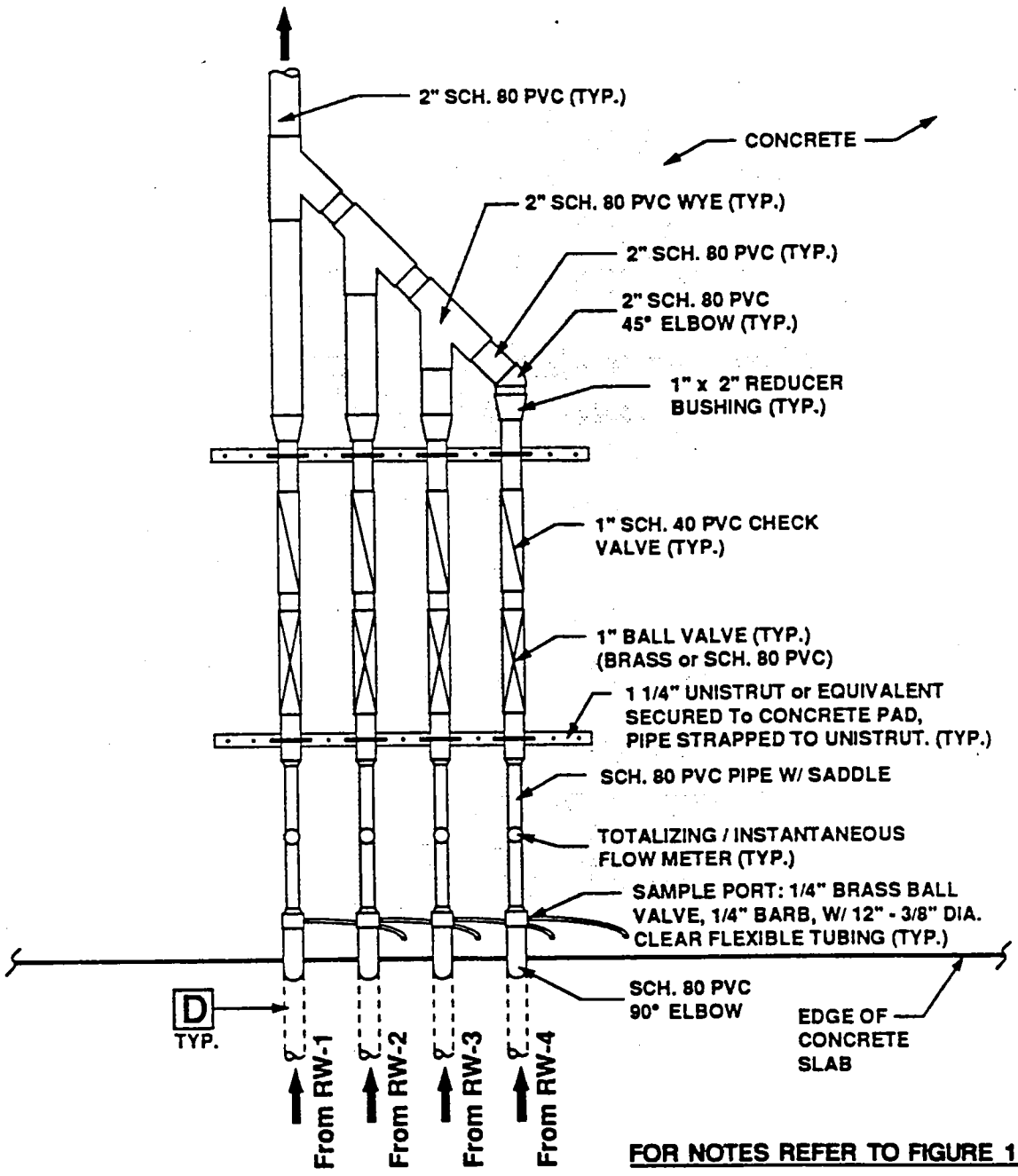
NOT TO SCALE

FIGURE 13

RECOVERY WELL VAULT DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



INFLUENT DETAIL

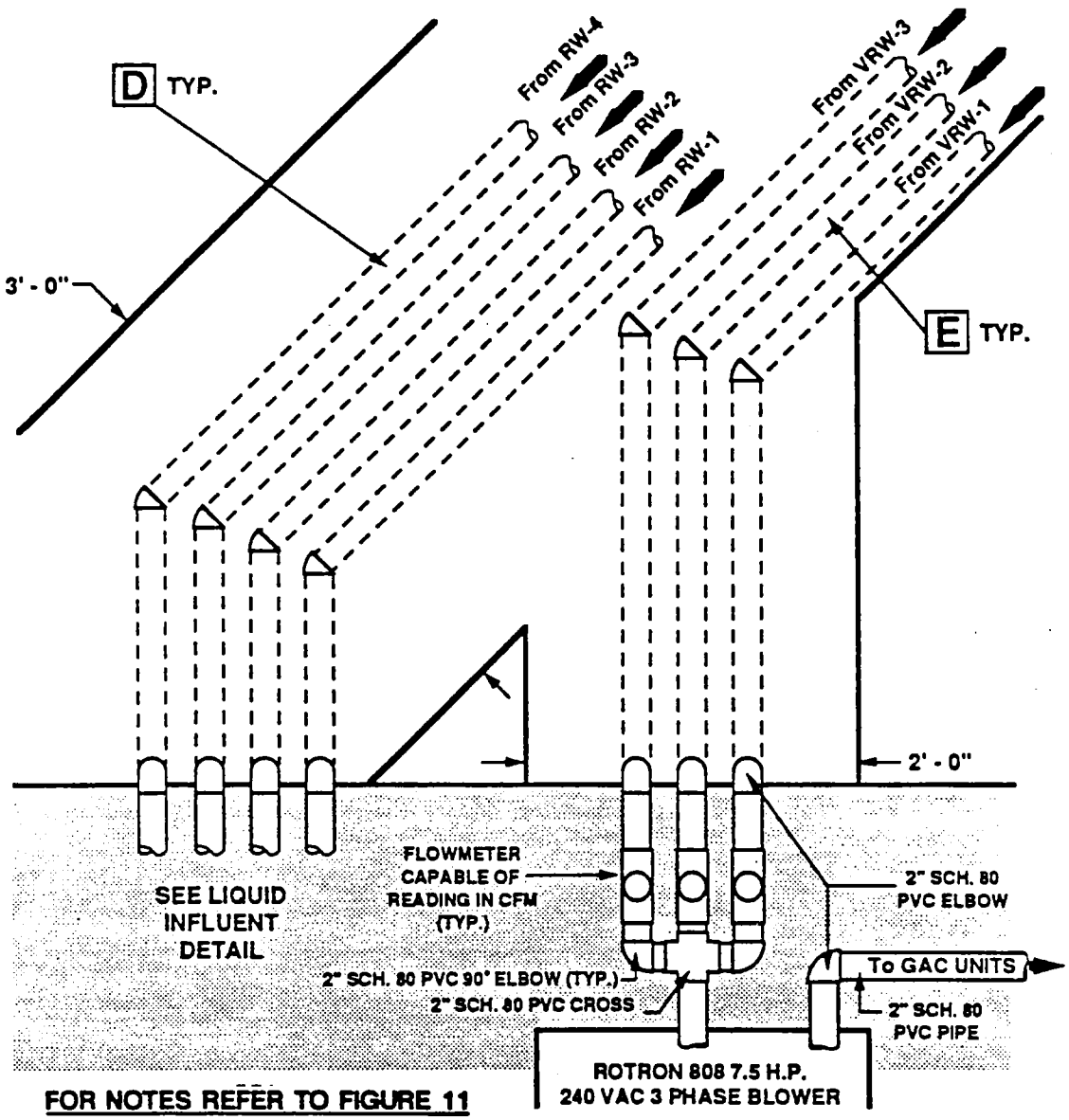
NOT TO SCALE

FIGURE 14

INFLUENT DETAIL (LIQUIDS)

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



FOR NOTES REFER TO FIGURE 11

VAPOR INFLUENT DETAIL

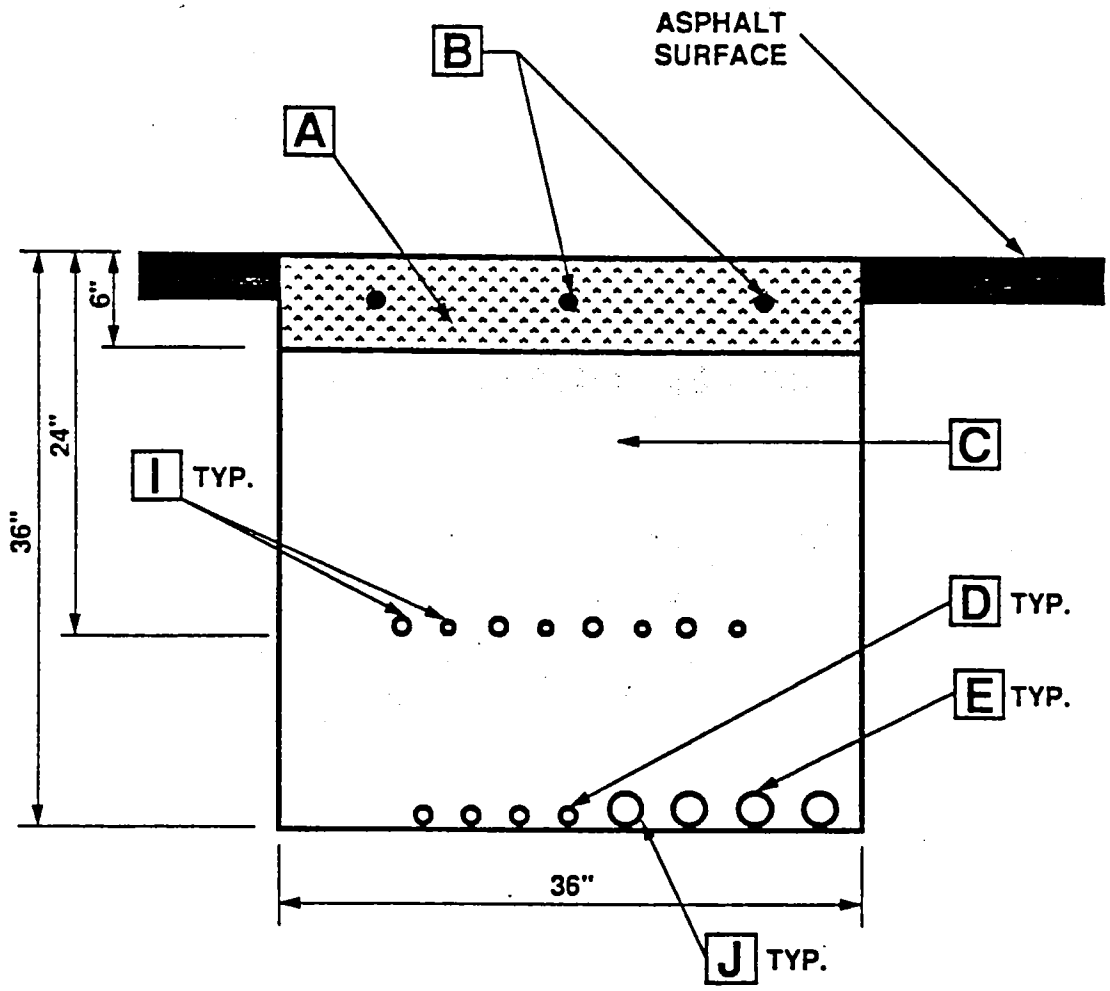
NOT TO SCALE

FIGURE 15

VAPOR INFLUENT DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



INFLUENT TRENCH DETAIL

NOT TO SCALE

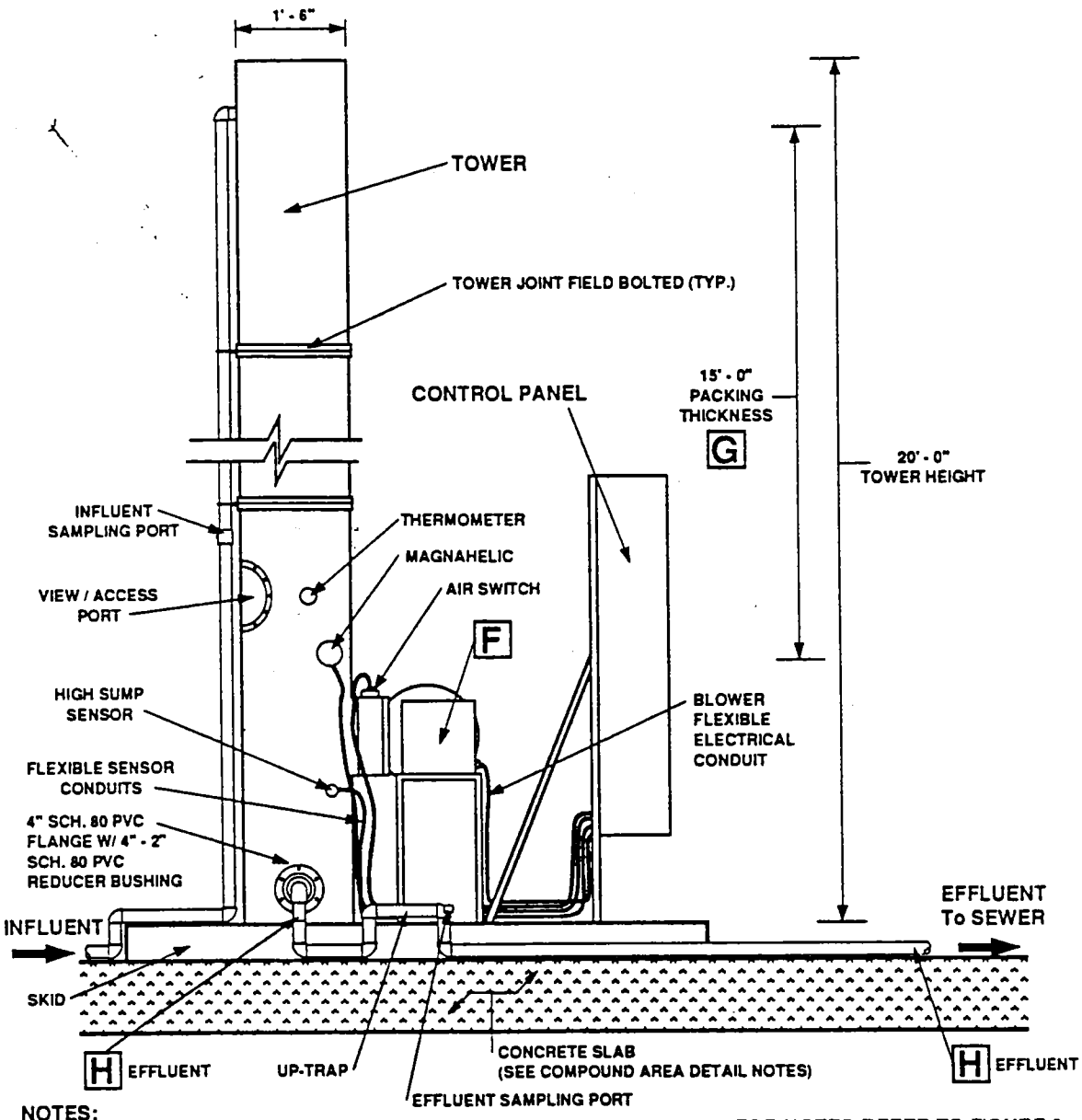
FOR NOTES REFER TO FIGURE 11

FIGURE 17

INFLUENT TRENCH DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



NOTES:
- SECTION F - F' IS GENERIC ONLY; LOCATION / SIZE OF TOWER APPURTENANCES, SKID, BLOWER AND CONTROL PANEL MAY BE DIFFERENT THAN SHOWN.
- ALL OFF-SKID ELECTRICAL TO CONTROL PANEL NOT SHOWN FOR CLARITY. SEE COMPOUND AREA (ELECTRICAL) DETAIL.

FOR NOTES REFER TO FIGURE 6

SECTION F - F'

NOT TO SCALE

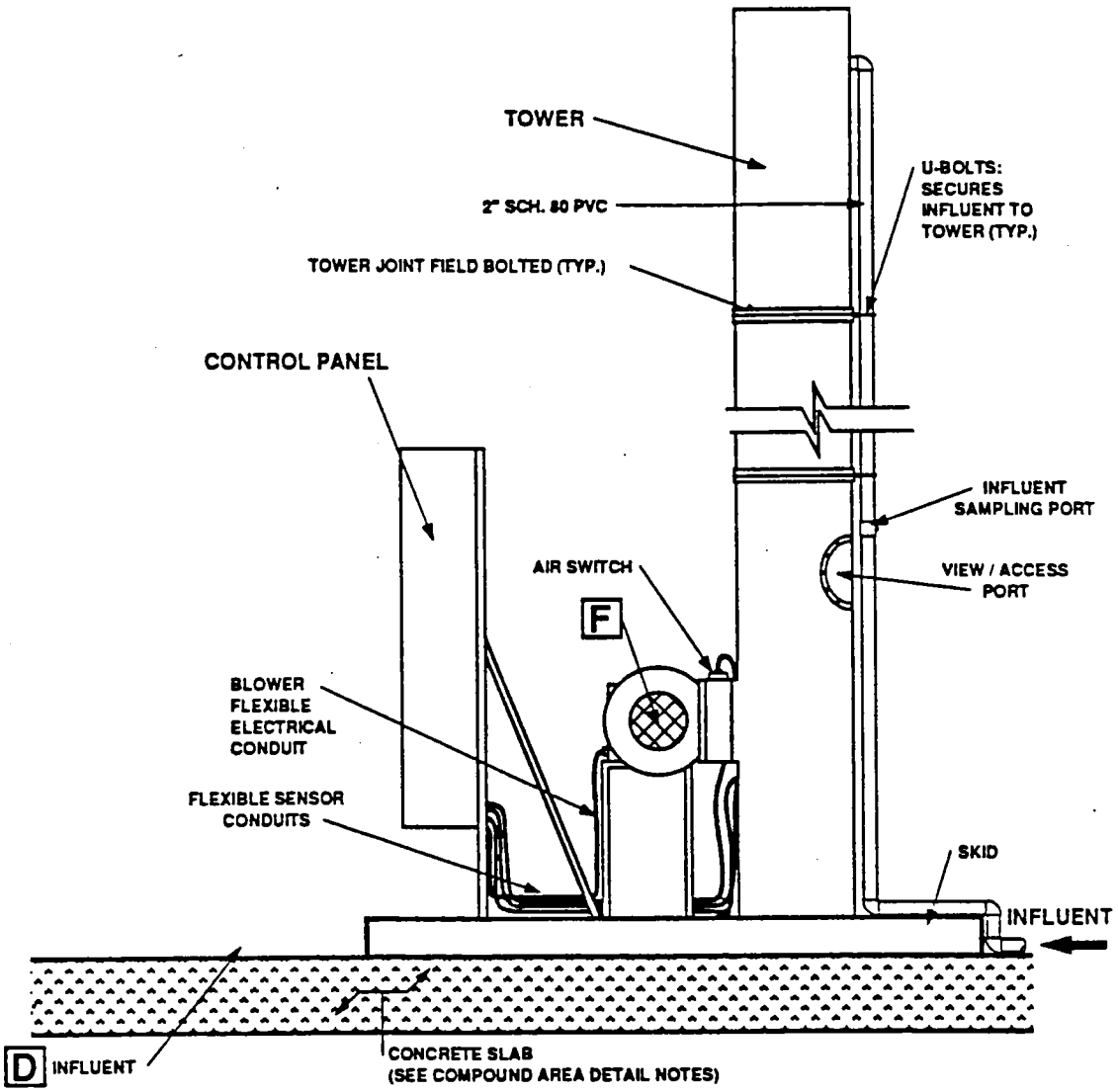
FIGURE 18

SECTION F-F'

REMEDIAL ACTION PLAN

BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



NOTES:
- SECTION G - G' IS GENERIC ONLY; LOCATION / SIZE OF TOWER APPURTENANCES, SKID, BLOWER AND CONTROL PANEL MAY BE DIFFERENT THAN SHOWN.
- FOR CLARITY, SEE COMPOUND AREA (ELECTRICAL) DETAIL.

FOR NOTES REFER TO FIGURE 11

SECTION G - G'

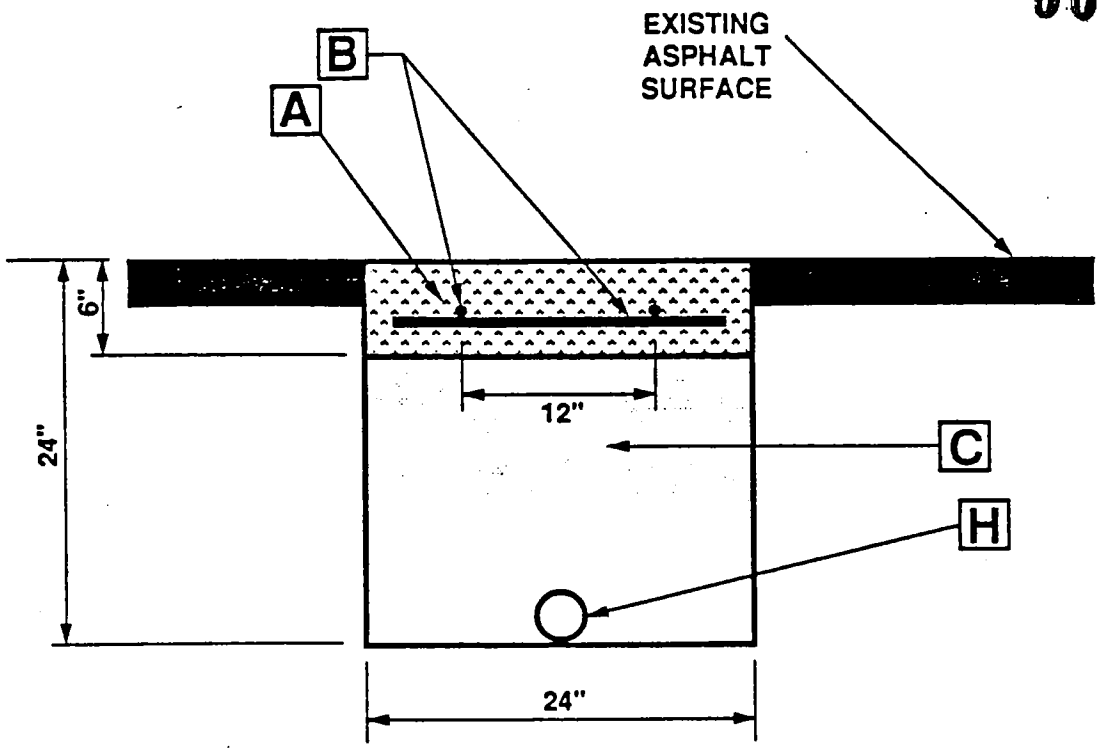
NOT TO SCALE

FIGURE 19

SECTION G - G'

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



EFFLUENT TRENCH DETAIL

NOT TO SCALE

FOR NOTES REFER TO FIGURE 11

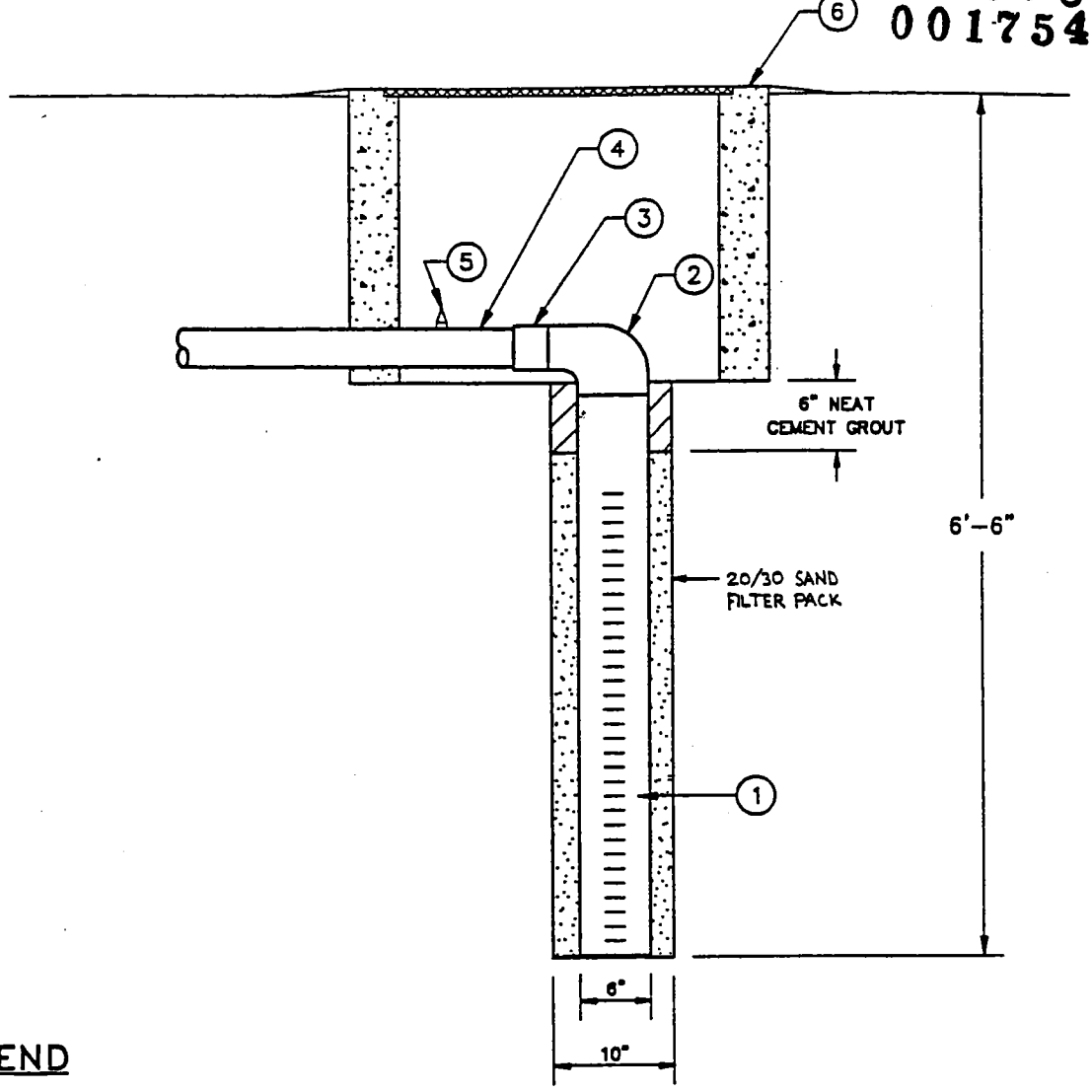
FIGURE 20

EFFLUENT TRENCH DETAIL

7514-70

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

000908
001754



LEGEND

1. 6" – 0.010" SLOT WELL SCREEN
2. 6"x 4" REDUCING 90° ELL
3. 4"x 3" BUSHING
4. 3" PIPING
5. 1/4" THREADED BRASS BARBED NIPPLE
6. 2'x 2'x 2' PRECAST REINFORCED CONCRETE UTILITY BOX WITH H20 LOAD RATED COVER

VAPOR RECOVERY WELL DETAIL

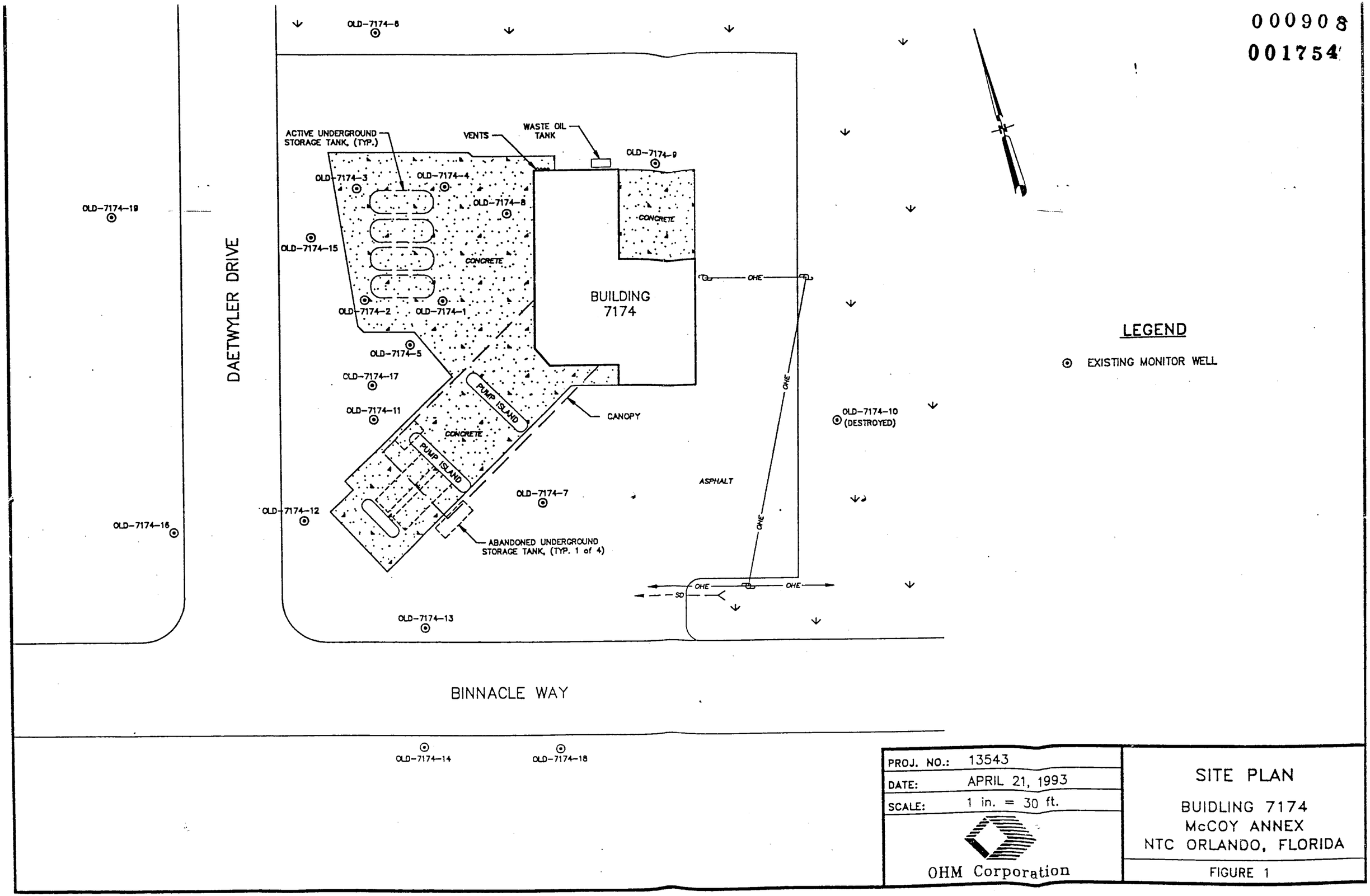
Scale: 3/4" = 1'-0"

Proj. No.:	13543
Date:	APRIL 21, 1993
Drawn By:	ECW
Checked By:	GD

Figure 8
VAPOR RECOVERY WELL DETAIL
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

OHM Corporation

000908
001754



PROJ. NO.:	13543
DATE:	APRIL 21, 1993
SCALE:	1 in. = 30 ft.

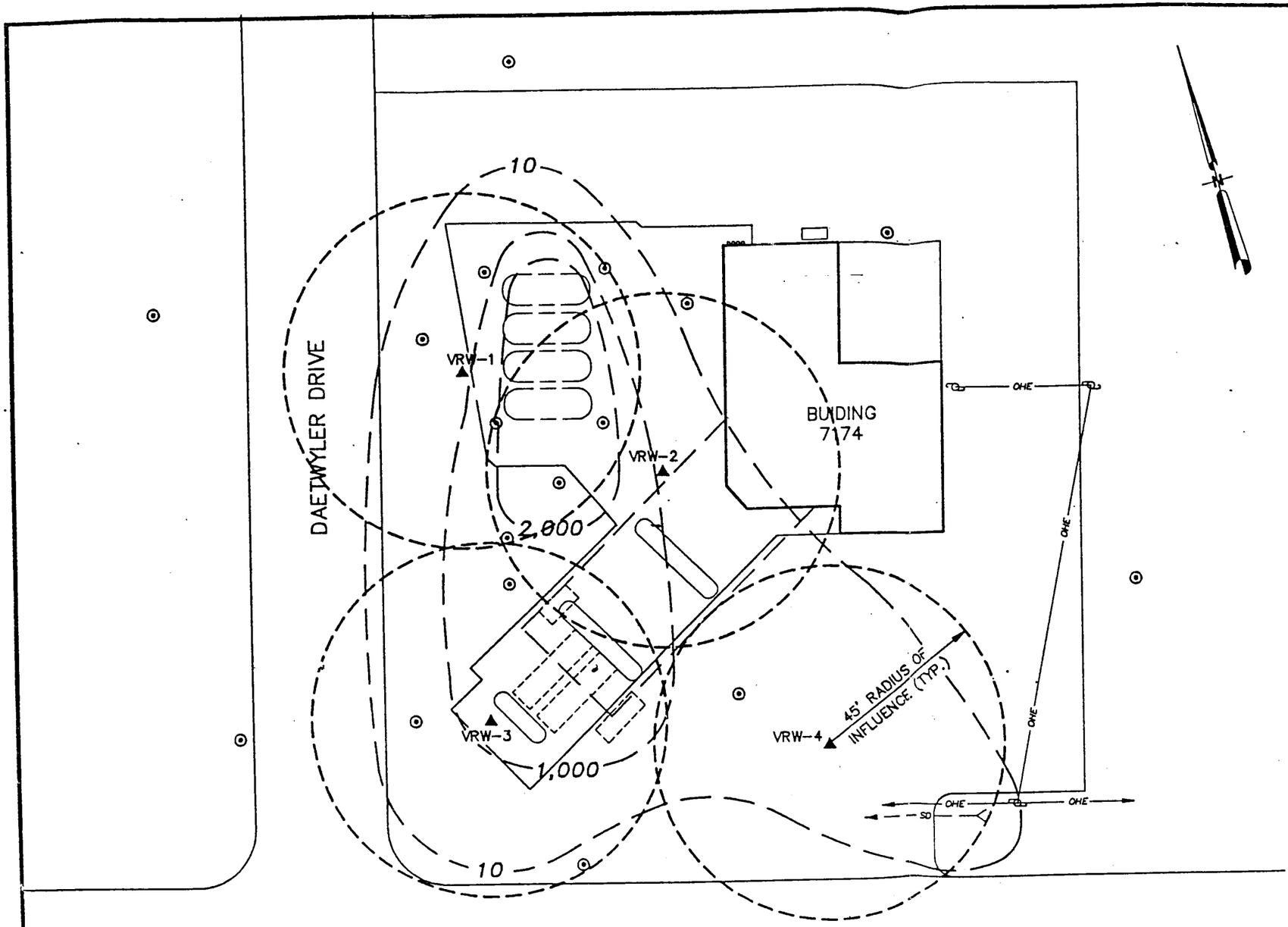
OHM Corporation

SITE PLAN

BUIDLING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

FIGURE 1

001754



LEGEND

- ⊙ EXISTING MONITOR WELL
- ▲ VAPOR RECOVERY WELL
- ——2,000—— SOIL CONTAMINATION ISOCONCENTRATION LINE (ppm)

PROJ. NO.:	13543
DATE:	APRIL 21, 1993
SCALE:	1 in. = 30 ft.

OHM Corporation

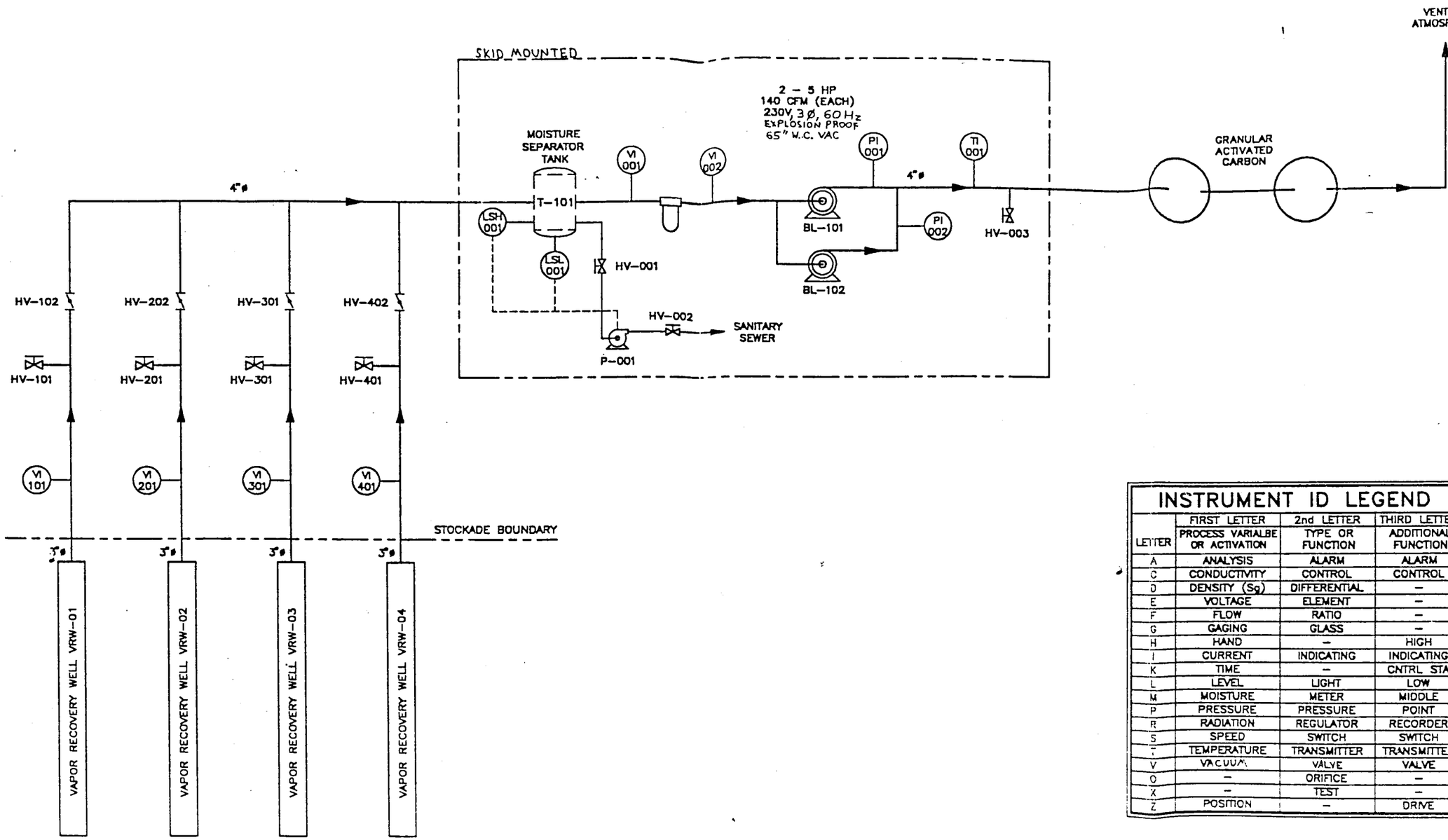
VAPOR RECOVERY WELL LOCATION PLAN

BUIDLING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

FIGURE 5

000908

001754



NOTE: RECOVERY WELLS SHALL BE 6" DIA. SCH 40 PVC W/ 0.010" SLOTTED SCREENING.

INSTRUMENT ID LEGEND

LETTER	FIRST LETTER PROCESS VARIALBE OR ACTIVATION	2nd LETTER TYPE OR FUNCTION	THIRD LETTER ADDITIONAL FUNCTION
A	ANALYSIS	ALARM	ALARM
C	CONDUCTIVITY	CONTROL	CONTROL
D	DENSITY (Sg)	DIFFERENTIAL	–
E	VOLTAGE	ELEMENT	–
F	FLOW	RATIO	–
G	GAGING	GLASS	–
H	HAND	–	HIGH
I	CURRENT	INDICATING	INDICATING
K	TIME	–	CNTRL STA
L	LEVEL	LIGHT	LOW
M	MOISTURE	METER	MIDDLE
P	PRESSURE	PRESSURE	POINT
R	RADIATION	REGULATOR	RECORDER
S	SPEED	SWITCH	SWITCH
T	TEMPERATURE	TRANSMITTER	TRANSMITTER
V	VACUUM	VALVE	VALVE
O	–	ORIFICE	–
X	–	TEST	–
Z	POSITION	–	DRIVE

PROJ. NO.:	13543
DATE:	APRIL 21, 1993
SCALE:	NONE

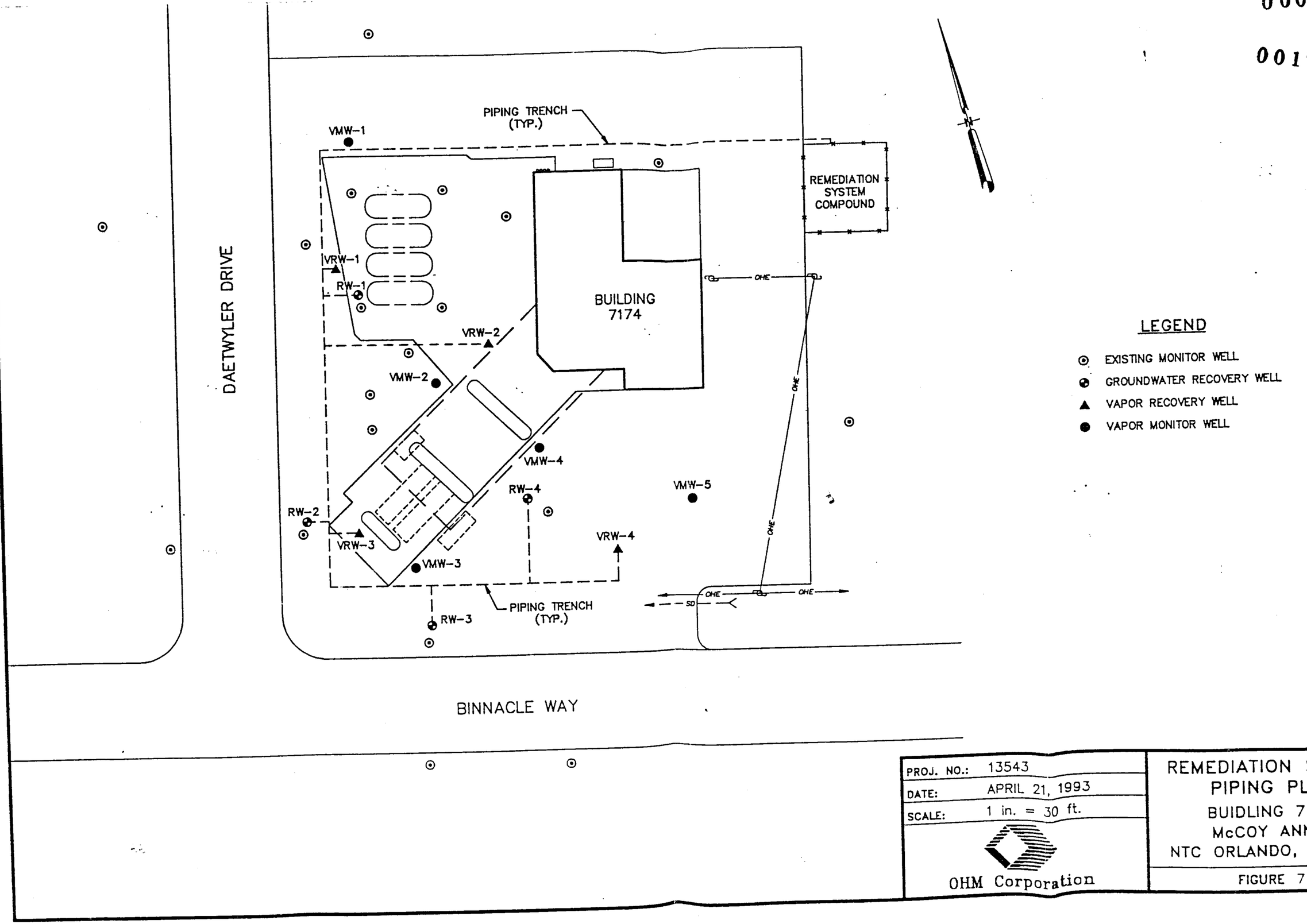
OHM Corporation

SVE PIPING & INSTRUMENTATION DIAGRAM
BUIDLING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

FIGURE 6

000908

001754



LEGEND

- EXISTING MONITOR WELL
- GROUNDWATER RECOVERY WELL
- VAPOR RECOVERY WELL
- VAPOR MONITOR WELL

PROJ. NO.:	13543
DATE:	APRIL 21, 1993
SCALE:	1 in. = 30 ft.

OHM Corporation

REMEDIATION SYSTEM PIPING PLAN

BUIDLING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

FIGURE 7

APPENDIX D

TECHNICAL SPECIFICATION FOR SURVEYING SERVICES

001754

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

SURVEYING SERVICES

0	8/1/94	Issued for use	RD	NSH	NSH	SWT VBB
NO.	DATE	REASON FOR REVISION	BY	CHECK	SUPV	PE

ORIGIN	SURVEYING SERVICES	JOB NO. 22567	
		TECHNICAL SPECIFICATION	REV.
		001-SP000-007	0
		SHEET 1 OF 13	

001754

CONTENTS

Page

001754

TECHNICAL SPECIFICATION FOR SURVEYING SERVICES

1.0 GENERAL

Not all activities defined herein may be required. Only those activities required in the applicable Subcontract Scope of Work and engineering drawings for specific service shall apply.

2.0 ABBREVIATIONS

The abbreviations listed below, where used in this specification, shall have the following meaning:

NOAA	National Oceanic and Atmospheric Administration
USGS	Unites States Geological Survey
ASCII	American Standard Code for Information Interchange
CADD	Computer Aided Design and Drafting
DOS	Disk Operating System
IGDS	Interactive Graphic Design Software
NAD	North American Datum

3.0 QUALITY STANDARDS

3.1 Unless otherwise specified or shown, the following code and standard of the latest issue at the time of bid shall apply to the extend indicated herein:

NOAA Classification, Standards of Accuracy, and General Specification of Geodetic Control Surveys, 1974

3.2 Standards of accuracy for all survey work shall be in accordance with NOAA standards and the minimum accuracy set forth below. The horizontal accuracy for location of all grid intersections and planimetric features shall be (±) 0.1 feet. Bench mark elevation accuracy and elevation accuracy of other permanent items (e.g., structures, pavements, etc.) shall be ± 0.01 feet.

3.3 All work shall be performed under the direct supervision of a Land Surveyor registered in the state where the work is located. Survey crew personnel shall be competent and experienced in performing land survey work.

3.4 Horizontal ground control surveys shall be based on NAD 83. State Plane coordinates shall be computed for NAD 83, NAD 27, and any applicable BEI project coordinate system. Vertical ground control surveys shall be based on NAD 29. Elevations shall be computed for NAD 29. All coordinates and elevations shall be stated in English units of measure (Decimal Feet).

3.5 Drawings and calculations (except for originals) submitted by the Subcontractor shall be signed, sealed, and certified by a Land Surveyor registered in the state where the work is located.

4.0 SUBMITTALS

4.1 Not all submittals defined herein may be required. Only engineering documentation requirements as summarized on the Subcontractor Submittal Requirements Summary (SSRS), Exhibit "F", shall apply. Submittals identified shall meet the detailed requirements listed herein. BEI will determine if documentation is complete as submitted by the Subcontractor, and reserves the right to reject and require resubmittal of any submittal that does not meet the Subcontract requirements.

4.2 Submittal of data on magnetic storage media shall be accompanied by a hard copy list of the media contents and a letter of transmittal including the following:

- Subcontract number
- A description of contents per the Subcontract
- Number and type of items (floppies, etc.)
- Note if the submittal is a resubmittal

5.0 MATERIALS

5.1 CONCRETE MONUMENTS

Concrete monuments shall be as shown on Attachment C or an equivalent as approved by BEI prior to use. Concrete shall have a minimum 28-day compressive strength of 3000 psi.

5.2 MAGNETIC MEDIA

Floppy disk: 5 1/4" (1.2 MB) or 3 1/2" (1.44 MB), DOS 3.3 or higher. DOS backup for files greater than 1.44 MB.

5.3 FIELD BOOKS AND DATA SHEETS

The necessary field data shall be recorded by the surveyor in a standard field book or on standard surveying data sheets using generally accepted surveying field note recording practices. Corrections to field books shall be made by marking through the incorrect data, writing the correct data above it, and initialing. Erasure of field data is not acceptable.

5.4 IRON PINS

Iron pins shall consist of an 18-in. length of reinforcement steel (minimum #5) or equivalent.

5.5 METAL MONUMENTS

Metal monuments shall be as indicated on the engineering drawings.

5.6 WOODEN HUBS

Wooden hubs shall be 2 in. × 2 in., at least 8 in. long, milled from solid lumber, and shall be pointed on one end. Approved substitutes may be used with the permission of the BEI Site Superintendent.

5.7 WOODEN STAKES

Wooden stakes shall be 1 in. × 2 in., at least 3 ft long, milled from solid lumber, and shall be pointed on one end. Wooden stakes shall be clearly marked with bright orange weatherproof flagging and paint. Approved substitutes may be used with the permission of the BEI Site Superintendent.

5.8 MISCELLANEOUS

Miscellaneous materials (e.g., P-K nails, flagging, etc.) shall be of the type and quality normally used for land survey work.

6.0 EQUIPMENT

The Subcontractor shall maintain sufficient equipment, materials, parts, tools, and supplies to meet the requirements of the work. Surveying equipment shall be subject to inspection by BEI and, if deemed unsatisfactory, shall be removed from the site and replaced by satisfactory equipment. Surveying instruments (level, transit, EDM, etc.) shall have been inspected and calibrated by an authorized manufacturer's representative not more than six months prior to the survey; the Subcontractor shall submit a certificate of compliance for each instrument to BEI at the beginning of the Subcontract.

7.0 FIELD OPERATIONS

7.1 The Subcontractor shall verbally notify BEI in advance of commencing survey work and shall provide a minimum of 24 hours notice to BEI when it is necessary to have site access.

7.2 When any survey work is conducted during the construction period, the Subcontractor shall employ all possible means to minimize interference with construction work by others. Any damage to facilities caused by the Subcontractor shall be repaired or replaced at the expense of the Subcontractor.

7.3 Pertinent data and information obtained and/or established during the boundary, grid, contour and planimetric surveys shall be shown on the drawings and submitted to BEI on magnetic media in accordance with this specification.

8.0 OFFICE WORK

8.1 For digital maps, drawings, data, and other surveying, the Subcontractor may be required to provide and accept design files for Intergraph and/or Autocad.

8.2 Digital map data shall be input into a SINGLE 3D design file and shall be placed on designated levels in accordance with a BEI CADD Level Index Record as described in Attachment A.

8.3 The digital map shall utilize state plane coordinates based on NAD 27 and elevations based on NAD 29.

8.4 Map data shall be input into the design file at a scale ratio of 1:1 and any patterning, cells, text, or other scale dependent items shall be sized for a plot scale of 1" = 20' and a minimum lettering size of 1/8" in height.

8.5 Line Strings shall be used for linear features; shapes for enclosed features (buildings, ponds, etc.); arcs should only be used when standard radii are given (curb intersections, etc.). Curve strings should not be used.

8.6 Linear patterning of features such as railroads, fences, etc. is not required. If any linear patterns are used, they must retain the original element (class 5) intact when pattern display is turned off. All symbols shall be cells from the BEI-provided cell library.

8.7 Active attributes (color, line code, weight, font, etc.) shall be set to zero unless otherwise specified in Attachment A. Map features shall not be clipped around text or symbols.

8.8 All drawing files shall be based on the state plane coordinates system using the global origin and working units set up in the BEI-provided "state" .STP design files.

8.9 The Subcontractor shall place his own drawing format around the digital map with a legend, date, notes on accuracy, and any miscellaneous notes.

8.10 The Subcontractor shall submit one digital copy of the digital map to BEI for review and comment. Once Subcontractor has incorporated comments, he shall submit one digital copy of the digital map within one week to BEI along with a Letter of Certification for the map that is signed, sealed, and certified by a registered Land Surveyor.

8.11 The Subcontractor shall reduce field notes and perform all calculations required to develop the information needed in each type of survey. Field books and data sheets will become the property of BEI at the close of the Subcontract.

8.12 When electronic equipment is used to store survey data, a printout of the data (with notations to identify and explain data) and magnetic media containing the data in an ASCII format shall be submitted.

8.13 Drawings shall be submitted to BEI within ten (10) working days from the completion of the survey.

9.0 BOUNDARY SURVEYS

9.1 FIELD OPERATIONS

9.1.1 The Subcontractor shall perform surveys and deed research necessary to define the property boundaries for the properties shown on the drawings and as directed by BEI.

9.1.2 Coordinates for all boundary surveys shall be based on the local state plane coordinate system.

9.1.3 Concrete or metal monuments or iron pins, as indicated on the engineering drawings, shall be set at each property corner not having a permanent marker.

9.2 OFFICE WORK

9.2.1 Drawings for boundary surveys shall show:

- Major structures (buildings, storage tanks, etc.)
- Property corners and lines
- Tie to closest street intersection
- State plane coordinates for two property owners
- Property line dimensions, political boundaries, bearings, and other miscellaneous data pertinent to the boundary survey

10.0 GRID SURVEYS

10.1 FIELD OPERATIONS

10.1.1 The Subcontractor shall perform grid surveys within the limits and at the intervals shown on the drawings or as directed by BEI.

10.1.2 Unless noted otherwise on the engineering drawings, the intersection of the grid lines shall be marked with wooden hubs driven flush with the ground to a minimum depth of 8 inches. Where wooden hubs cannot be driven, P-K nails or chiseled crosses shall be used to establish grid intersection points. The coordinates and elevations of the hubs at the grid points shall be established, recorded, and marked on wooden stakes driven within 12 inches of said hubs. The Subcontractor shall establish a bench mark within the property at the location shown on the drawings or as directed by BEI. The Subcontractor shall not use spray paint marking on buildings, structures, or pavements.

10.1.3 Where the grid intersection location is obstructed by physical barriers, wooden hubs shall be set on the grid line to mark the obstruction. The coordinates and ground surface elevation at these points shall be established, recorded, and marked as described above.

10.1.4 Coordinates for grid surveys shall be based on the coordinate system shown on the drawings; at least two coordinates for grid surveys shall be tied into the local state plane coordinate system.

10.1.5 The grid shall be referenced to permanent features within or immediately adjacent to the survey area so that the grid may be readily reestablished in the event that it is removed or disturbed.

10.2 OFFICE WORK

10.2.1 Drawings and documentation for grid surveys shall show:

- Plan of area grid
- Coordinates and elevations of grid intersection points and of other points along the grid lines shown in tabular form
- Grid lines and all other miscellaneous data pertinent to the grid survey
- Property lines and major structures (buildings, storage tanks, etc.)
- Ties to the state plane coordinate system sufficient to enable the survey to be reestablished at a future date

11.0 CONTOUR SURVEYS

11.1 FIELD OPERATIONS

11.1.1 The Subcontractor shall perform contour surveys within the limits shown on the drawings and as directed by BEI.

11.1.2 Sufficient surface elevations shall be measured to define the contour interval required on the drawings and to define breaks in the terrain.

11.2 OFFICE WORK

11.2.1 Drawings for contour surveys shall show:

- Property lines and major structures (buildings, storage tanks, etc.)
- Contours of the terrain and elevations of breaks in the terrain
- Bench marks and all other miscellaneous data pertinent to the contour survey
- Ties to the state plane coordinate system sufficient to enable the survey to be reestablished at a future date

12.0 PLANIMETRIC SURVEYS

12.1 FIELD OPERATIONS

12.1.1 The Subcontractor shall perform planimetric surveys within the limits shown on the drawings and as directed by BEI.

12.1.2 All planimetric features shall be located, including but not limited to paved surfaces, vegetation, fences, power poles, walkways, underground utilities, structures and all other obstructions.

001754

12.2 OFFICE WORK

12.2.1 Drawings for planimetric surveys shall show:

- Property lines and major structures (buildings, storage tanks, etc.)
- All planimetric features, including but not limited to, paved surfaces, vegetation, fences, power poles, walkways, underground utilities, structures and all other obstructions
- Bench marks and all miscellaneous data pertinent to the planimetric survey
- Ties to the state plane coordinate system sufficient to enable the survey to be reestablish at a future date

12.2.2 An inventory of all trees and plants, shown on the planimetric survey, shall be recorded and will include the correct botanical names, common names, sizes, condition, and identification number. See Attachment B.

13.0 CONSTRUCTION SURVEYS

13.1 The Subcontractor shall perform construction surveys and related calculations as directed by BEI.

13.2 Pertinent data and information obtained and/or established during the construction surveys shall be submitted as directed by the BEI Site Superintendent.

13.3 Drawings for construction surveys, if required by the BEI Site Superintendent, shall be submitted to BEI on magnetic media for review in accordance with the requirements of this specification.

14.0 ADDITIONAL DATA FILES

Any digital models used for contour generation shall be provided to BEI, including any of the following:

FILE	DESCRIPTION
.DAT	ASCII point data (east, north, elevation)
.XYZ	Intergraph binary point data
.TIN	Binary triangle data
.TTN	Binary terrain model data
.DTM	Binary terrain model data

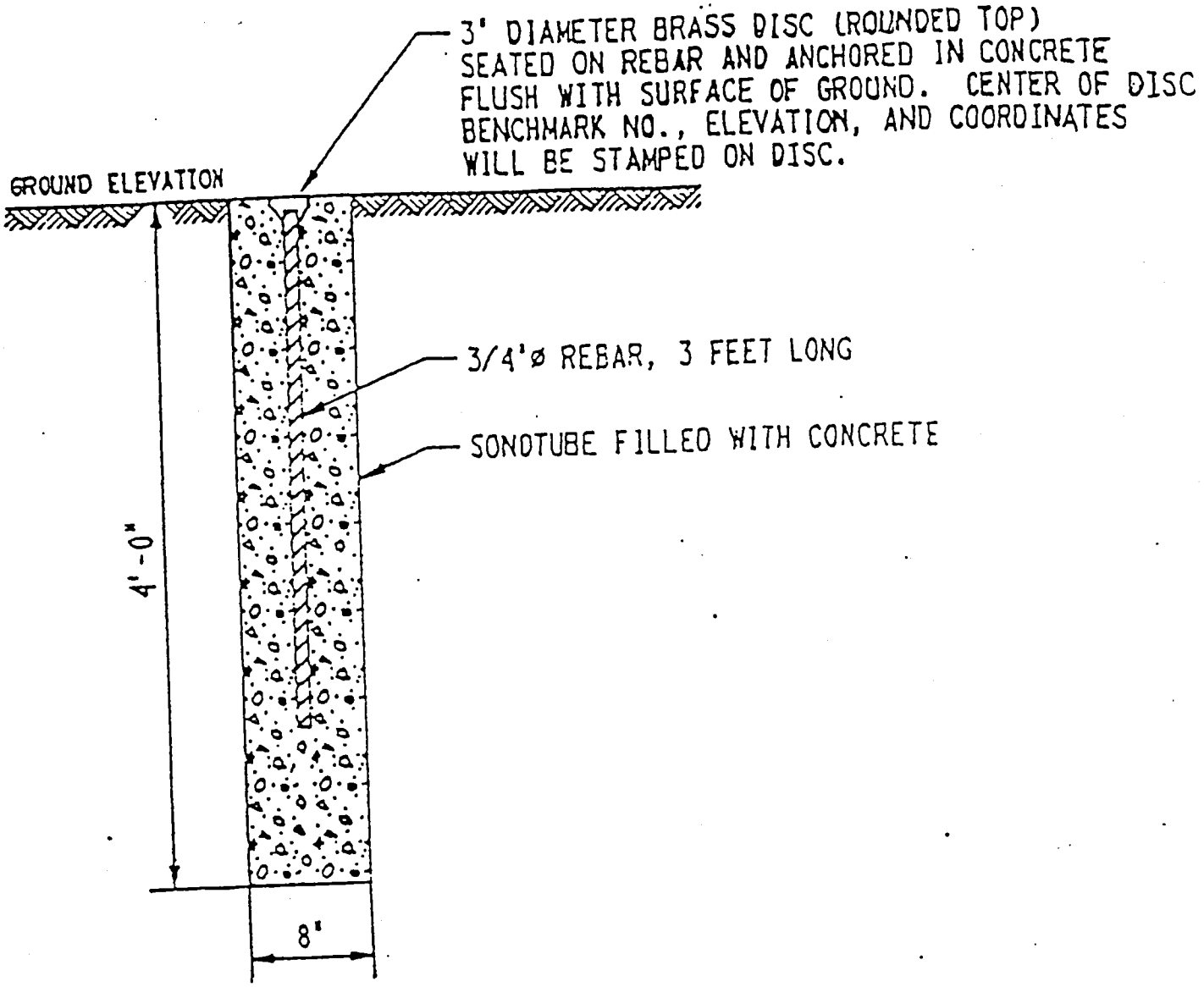
001754

ATTACHMENT A
NAVY RAC CADD LEVEL INDEX
BECHTEL ENVIRONMENTAL, INC.
OAK RIDGE, TN

LEVEL	DESCRIPTION	LEVEL	DESCRIPTION
1	*	33	Spot elevations
2	*	34	*
3	* Well locations	35	*
4		36	*
5	*	37	*
6	*	38	Railroads
7	* Contamination areas	39	Primary roads
8	*	40	Secondary roads
9	*	41	Primary structures
10	Drawing border & title block info., north arrow, scale	42	Secondary structures
11	*	43	Fences
12	*	44	Primary above ground utilities
13	*	45	Secondary above ground utilities
14	*	46	*
15	Revision clouds and triangles	47	Primary below ground utilities
16	Monuments and benchmarks	48	Secondary below ground utilities
17	Primary grid lines	49	*
18	Primary grid lines	50	Primary landscaping
19	Secondary grid lines	51	*
20	Secondary grid labels	52	*
21	*	53	*
22	*	54	Primary text
23	*	55	Secondary text & dimensioning
24	*	56	*
25	Major project-specific boundaries	57	*
26	Minor project specific boundaries	58	*
27	Local boundaries (property lines, etc.)	59	*
28	Primary hydrology	60	*
29	Secondary hydrology	61	*
30	Index contours & text	62	Data to be saved, but not viewed or plotted
31	Primary contours	63	Empty
32	Secondary contours	64	* = project specific

ATTACHMENT B

QUANTITY	I.D. NO.	BOTANICAL NAME	COMMON NAME	EXISTING SIZE	REPLACEMENT SIZE	REMARKS & CONDITION
2	S1	Taxus Dens	Spreading Yew	6'	5	Good
1	S2	Syringa Vulgaris	Lilac	10'	8'	Good
1	S3	Syringa Vulgaris	Lilac	12'	6'	Fair
1	S4	Paulownia Tomentosa	Paulownia	10'	0	Poor
1	S5	Rosa Species	Rose	6'	4'	Fair
3	T1	Tsuga Canadensis	Canadian Hemlock	12'	8-10'	Fair
2	T2	Acer Planatoides	Norway Maple	12'	6'	Good
3	T3	Pseudotsuga Taxifolia	Douglas Fir	6'	4'	Fair
1	T4	Pseudotsuga Taxifolia	Douglas Fir	15'	12'	Good
EXAMPLE ASSOCIATES Engineers and Surveyors 1000 Union Avenue Middlesex, New Jersey 08846 (201) 666-7777			Owners: Joseph N. and Susan Hughes			
STEPHEN EXAMPLE, L.S., Lic. 5000 CLYDE EXAMPLE, P.E., L.S., Lic. 200			Plant Inventory 1999 Wilkinson Road Maywood, New Jersey			



CONCRETE SURVEYING MONUMENT DETAIL

Attachment C

SPECIFICATION 001-SP000-007

INSTRUMENT ID LEGEND

LETTER	FIRST LETTER PROCESS VARIABLE OR ACTIVATION	2nd LETTER TYPE OR FUNCTION	THIRD LETTER ADDITIONAL FUNCTION
A	ANALYSIS	ALARM	ALARM
C	CONDUCTIVITY	CONTROL	CONTROL
D	DENSITY (Sq)	DIFFERENTIAL	–
E	VOLTAGE	ELEMENT	–
F	FLOW	RATIO	–
G	GAGING	GLASS	–
H	HAND	–	HIGH
I	CURRENT	INDICATOR	INDICATOR
K	TIME	–	CNTRL STA
L	LEVEL	LIGHT	LOW
M	MOISTURE	METER	MIDDLE
O	–	ORIFICE	–
P	PRESSURE	PRESSURE	POINT
R	RADIATION	REGULATOR	RECORDER
S	SPEED	SWITCH	SENSOR
T	TEMPERATURE	TRANSMITTER	TRANSMITTER
V	VACUUM	–	VALVE
X	–	TEST	–
Y	–	RELAY	–
Z	POSITION	–	DRIVE

VALVES & ACTUATORS

- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- BALL VALVE
- BUTTERFLY VALVE
- NORMALLY CLOSED VALVE
- THROTTLING VALVE
- SAFETY RELIEF VALVE
- NEEDLE VALVE
- ANGLE VALVE
- DIAPHRAGM ACTUATOR
- ELECTRIC MOTOR ACTUATOR
- PNEUMATIC ACTUATOR (PISTON)
- SOLENOID ACTUATOR
- FLEXIBLE CONNECTOR
- HOSE
- SAMPLING PORT
- THERMOMETER
- PRESSURE GUAGE

EQUIPMENT

- CENTRIFUGAL PUMP
- POSITIVE DISPLACEMENT PUMP
- BLOWER OR FAN
- FILTER
- HEAT EXCHANGER
- EDUCTOR OR EJECTOR
- Y PATTERN STRAINER
- BASKET STRAINER
- DUPLEX BASKET STRAINER

FIGURE 25
PIPING AND INSTRUMENTATION LEGEND

REMEDIAL ACTION PLAN

BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

SCHM

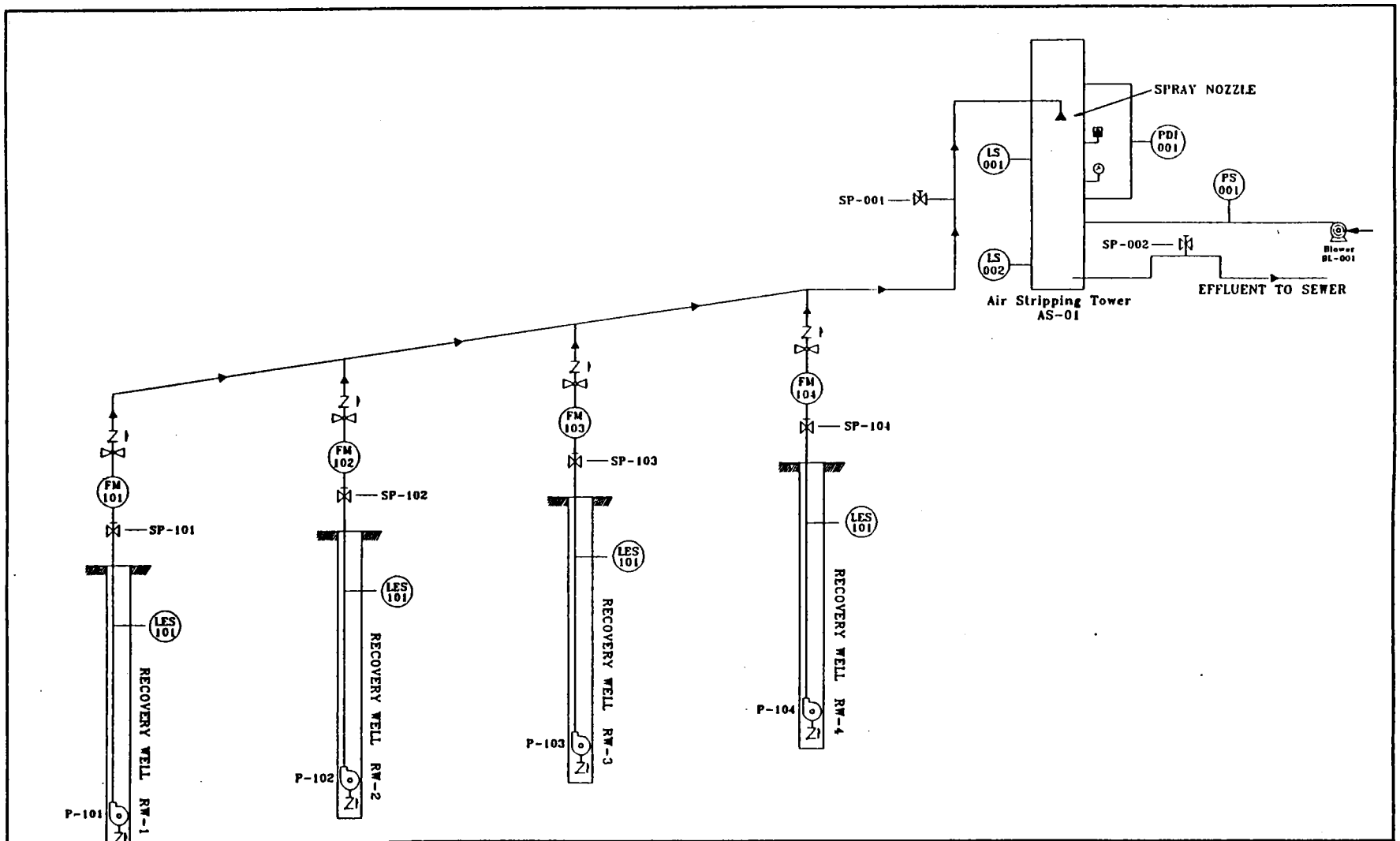


FIGURE 27
GROUNDWATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM

REMEDIAL ACTION PLAN

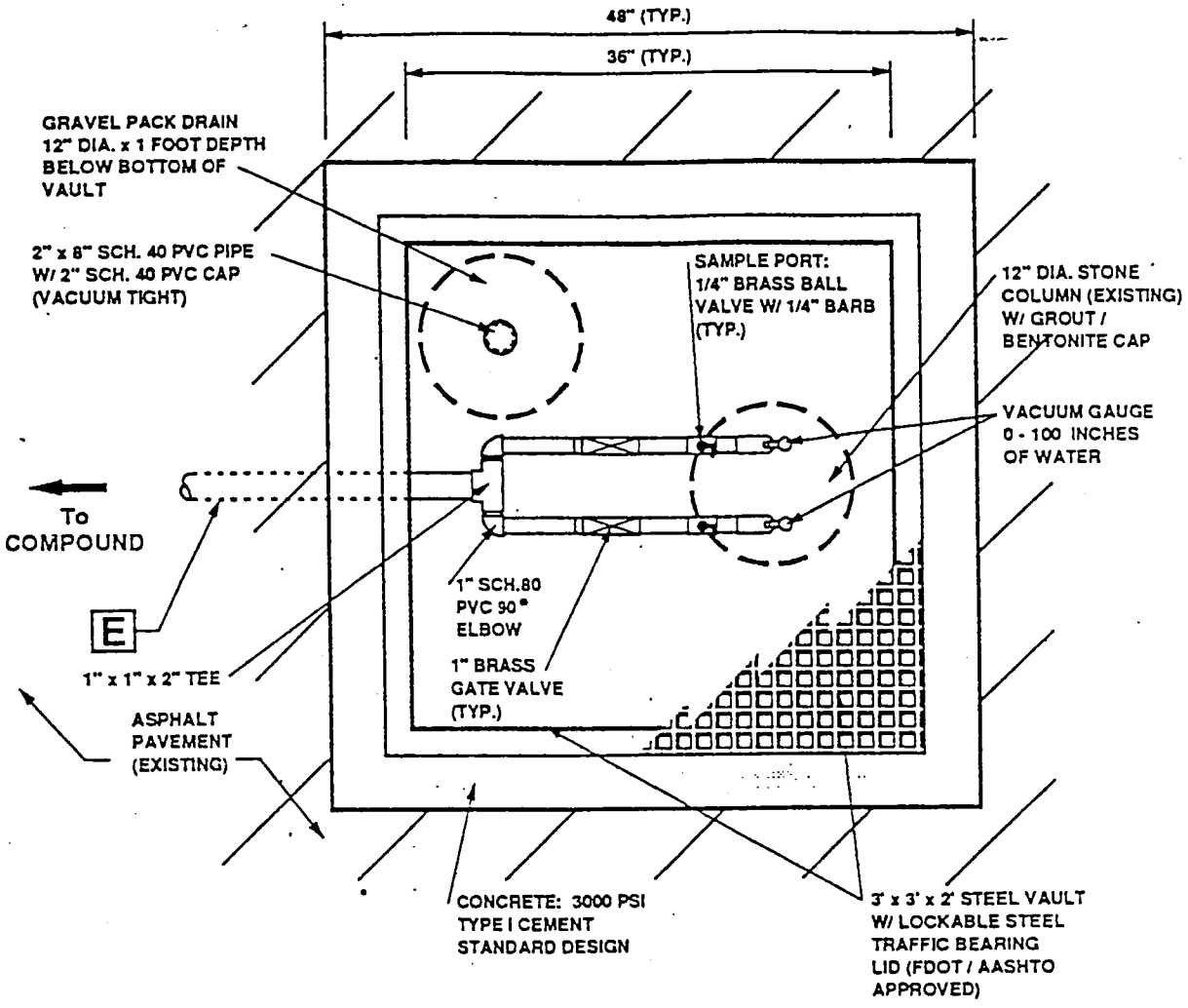
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

Groundwater Treatment Process Controls
(refers to Figure 27)

Sensor ID No.	Description	Location	Interlocks	Local Indicators
P-101	Pump	RW-01		
P-102	Pump	RW-02		
P-103	Pump	RW-03		
P-104	Pump	RW-04		
FM-101	Flow meter	Before Header		Indicates instantaneous and total flow from RW-01
FM-102	Flow meter	Before Header		Indicates instantaneous and total flow from RW-02
FM-103	Flow meter	Before Header		Indicates instantaneous and total flow from RW-03
FM-104	Flow meter	Before Header		Indicates instantaneous and total flow from RW-04
LES-101	Level element sensor	RW-01	1. Low level shuts down P-101 2. High level starts P-101	
LES-102	Level element sensor	RW-02	1. Low level shuts down P-102 2. High level starts P-102	
LES-103	Level element sensor	RW-03	1. Low level shuts down P-103 2. High level starts P-103	
LES-104	Level element sensor	RW-04	1. Low level shuts down P-104 2. High level starts P-104	
SP-101	Sampling port	RW-01		
SP-102	Sampling port	RW-02		
SP-103	Sampling port	RW-03		
SP-104	Sampling port	RW-04		
SP-001	Sampling port	After Header		Sampling device after flows combined
LS-001	Level switch in the tower	AS-01		High level shuts down BL-001
LS-002	Level switch in the tower	AS-01		Low level shuts down BL-001
PDI-001	Pressure differential indicator	AS-01		Indicates fouling of packing media
SP-002	Sampling port	After AS-01		Sampling device before being discharged to sewer
PS-001	Pressure switch	BL-001	Low pressure shuts down BL-001	

Notes:
- AS = air stripping tower.
- FM = flow meter.
- SP = sampling port.
- LS = level switch.
- BL = blower.
- PS = pressure switch.
- P = pump.
- RW = recovery well.
- LES = level element sensor.
- PDI = pressure differential indicator.

FIGURE 27A



VACUUM RECOVERY WELL VAULT DETAIL

NOT TO SCALE

FOR NOTES REFER TO FIGURE 11

FIGURE 22

VACUUM RECOVERY VAULT
WELL DETAIL

7514-70

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

Soil Vapor Extraction System Process Controls
(Refers to Figure 6)

Sensor ID No.	Description	Location	Interlocks	Local Indicators
VI-101	Vacuum gauge	VRW-01		Indicates vacuum at VRW-01
VI-201	Vacuum gauge	VRW-02		Indicates vacuum at VRW-02
VI-301	Vacuum gauge	VRW-03		Indicates vacuum at VRW-03
VI-401	Vacuum gauge	VRW-04		Indicates vacuum at VRW-04
HV-101	Sampling Port	VRW-01		Sampling Device at VRW-01
HV-201	Sampling Port	VRW-02		Sampling Device at VRW-02
HV-301	Sampling Port	VRW-03		Sampling Device at VRW-03
HV-401	Sampling Port	VRW-04		Sampling Device at VRW-04
LSH-001	Level Switch High	T-101	Starts P-001 on high water level	
LSL-001	Level Switch Low	T-101	Stops P-001 on low water level	
VI-001	Vacuum gauge	Before filter		Indicates vacuum
VI-002	Vacuum gauge	After filter		Indicates vacuum
PI-001	Pressure Indicator	Skid	Shuts down BL-101 on high pressure	
PI-002	Pressure Indicator	Skid	Shuts down BL-102 on high pressure	
TI-001	Temperature Indicator	Skid	Shuts down BL-101/102 on high temperature	
HV-003	Sampling Port	Before GAC		Sampling Device after blower
*HV-004	Sampling Port	After GAC		Sampling Device after GAC
*FM-001	Flow Meter	Before Header		Indicates flow from VRW-001
*FM-002	Flow Meter	Before Header		Indicates flow from VRW-002
*FM-003	Flow Meter	Before Header		Indicates flow from VRW-003
*FM-004	Flow Meter	Before Header		Indicates flow from VRW-004

Notes:
- VRW = Vapor Recovery Well
- GAC = Granular Activated Carbon
- * = Devices Not Shown on Figure 6

FIGURE 6A

APPENDIX E

TECHNICAL SPECIFICATION FOR UNCONTAMINATED EARTHWORK

001754

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

UNCONTAMINATED EARTHWORK

0	7/21/94	Issued for Use	KK	PD		
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	

CONTENTS

TECHNICAL SPECIFICATION FOR UNCONTAMINATED EARTHWORK

1.0 GENERAL

1.1 SUMMARY

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.

1.2 REFERENCES

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

1.3 DEFENITIONS

1.3.1 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.

1.3.2 COHESIVE MATERIALS

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

1.3.3 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.

1.3.4 EXPANSIVE SOILS

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

1.3.5 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.

1.3.6 UNSTABLE MATERIAL

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

1.3.7 ROCK

Rock shall consists 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.

1.3.8 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.

1.3.9 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.

1.4 SUBMITTALS

1.4.1 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.

1.4.2 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.

1.4.3 TESTING LABORATORY CERTIFICATIONS AND QUALIFICATIONS

Submit qualifications and certifications of the commercial testing laboratory.

1.4.4 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.

1.4.5 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.

1.4.6 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.

1.4.7 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.

1.4.8 PROTECTION OF EXISTING FOUNDATIONS

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

1.4.9 SHORING DESIGN AND CALCULATIONS

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

1.4.10 SOILS LABORATORY TEST RESULTS

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

1.5 QUALITY ASSURANCE

1.5.1 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.

1.5.2 TESTING LABORATORY

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

1.5.3 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.

1.5.4 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.

1.5.5 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.

1.5.6 TESTING FREQUENCY

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

1.5.6.1 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.

1.5.6.2 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.

1.5.6.3 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.

1.5.6.4 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.

1.5.7 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.

2.0 PRODUCTS

2.1 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 $1^1/_2$" sieve. Fines shall be limited to not more than 2 percent by weight passing the No. 4 size sieve.

2.2 BACKFILL

2.2.1 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.

2.2.2 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.

2.3 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.

2.4 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.

2.5 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.

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

3.0 FIELD OPERATIONS

3.1 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.

3.2 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.

3.3 CLEARING AND GRUBBING

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

3.4 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.

3.5 DRAINAGE, DEWATERING, AND STREAM DIVERSION

3.5.1 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.

3.5.2 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.

3.5.3 Stream Diversion

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

3.6 BLASTING

Blasting will not be permitted.

3.7 EXCAVATION

3.7.1 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.

3.7.2 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.).

3.7.3 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.

3.7.4 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.

3.7.5 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.

3.7.6 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.

3.7.7 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.

3.7.8 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.

3.7.9 Boulders

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

3.7.10 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.

3.8 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.

3.9 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.

3.10 BACKFILLING

3.10.1 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.

3.10.2 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.

3.10.3 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.

3.10.4 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.

3.11 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.

3.12 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.

3.13 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.

3.14 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.

APPENDIX F

TECHNICAL SPECIFICATION FOR EXCAVATION OF CONTAMINATED EARTHWORK AND MISCELLANEOUS DEMOLITION

001754

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

CONTAMINATED EARTHWORK AND MISCELLANEOUS DEMOLITION

0	7/21/94	Issued for Use	KK	RD		
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	

CONTENTS

Specification
22567-001-SP000-005
Revision 0

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 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."

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 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 $2^1/_2$ 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 DRAINAGE, DEWATERING, AND STREAM DIVERSION

5.3.1 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.

5.3.2 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."

5.3.3 Stream Diversion

Stream diversion(s) shall be developed as required by site conditions, authorized and verified by the Bechtel site superindent, and maintained to prevent the spread of contamination. Blasting is not permitted.

5.4 EXCAVATION

5.4.1 General

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.

5.4.2 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.

5.4.3 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.

5.4.4 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.

5.4.5 Excavation Sequence

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

(1) Define and isolate exclusion zones determined in the field by BEI.

(2) Recondition the existing haul road sufficient to allow flow of construction traffic.

(3) Perform initial excavation to the extent defined by BEI in the field.

(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.

5.5 LOADING

5.5.1 Onsite Disposal or Storage

All excavated materials shall be transported to an approved treatment/disposal facility as directed by BEI. Material shall be loaded into designated haul trucks using the contamination control techniques defined in this specification.

5.5.2 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.

5.6 EQUIPMENT DECONTAMINATION

5.6.1 Decontamination

Equipment that has been in contaminated areas shall be decontaminated. The decontamination facility (provided by the Subcontractor) shall be used only for light and final decontamination and

APPENDIX G

TECHNICAL SPECIFICATION FOR FENCING

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

CHAIN LINK FENCING

0	8/31/94	Issued for use	KK	PJD	MSM	JRM
NO.	DATE	REASON FOR REVISION	BY	CHECK	SUPV	PE

ORIGIN 	CHAIN LINK FENCING	JOB NO. 22567
		TECHNICAL SPECIFICATION
		001-SP000-001 0
		SHEET 1 OF 8

Specification
22567-001-SP000-001
Revision 0

CONTENTS

1.0 GENERAL

This technical specification establishes the quality of materials and workmanship for furnishing and erecting chain link and temporary fencing.

Not all activities defined herein are required. Only those activities required in the applicable subcontract Scope of Work and/or engineering drawings for specific services shall apply.

2.0 ABBREVIATIONS

ASTM	American Society for Testing and Materials
ft	foot
in.	inch
O.D.	Outside Diameter

3.0 QUALITY STANDARDS

ASTM A 491	Aluminum-Coated Steel Chain Link Fence Fabric
ASTM A 585	Aluminum-Coated Steel Barbed Wire
ASTM A 824	Metallic-Coated Steel Marcelled Tension Wire
ASTM C 94	Ready-Mixed Concrete
ASTM F 552	Definitions of Terms Relating to Chain Link Fencing
ASTM F 567	Installation of Chain Link Fencing
ASTM F 626	Fence Fittings
ASTM F 900	Industrial and Commercial Swing Gates
ASTM F 1083	Pipe, Steel, Hot-Dipped, Zinc-Coated (galvanized), Welded, for Fence Structures

4.0 SUBMITTALS

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.

4.1 MANUFACTURER'S PRODUCT DATA

Subcontractor shall submit shop drawings and/or product data, and manufacturer's details of fence and gate installation.

5.0 MATERIALS

5.1 CHAIN LINK FENCE

5.1.1 Framework

Framework shall be galvanized steel pipe per ASTM F 1083. Framework O.D.'s are as follows:

Swing Gate Posts

Gate Leaf Width	Post O.D.
≤ 6 ft	2.875 in.
> 6 ft to 13 ft	4.000 in.
> 13 ft to 18 ft	6.625 in.
> 18 ft to 32 ft	8.625 in.

Line Posts	2.375 in.
Corner and Terminal Posts	2.875 in.
Brace Rails	1.66 in.
Gate Frame	1.90 in.
Gate Frame Interior Bracing	1.66 in.

5.1.2 Chain Link Fabric

Chain link fabric shall be aluminum-coated steel per ASTM A 491. Fabric shall be woven from 9-gage (coated size) wire in 2-inch mesh. Fabric less than or equal to 5-feet shall be knuckled at both selvages. Fabric greater than or equal to 6 feet shall be knuckled at one selvage and twisted and barbed at the other selvage.

5.1.3 Tension Wire

Tension wire shall be aluminum-coated steel per ASTM A 824, Type 1.

5.1.4 Fittings

Fittings shall be per ASTM F 626.

5.1.5 Swing Gates

Swing gates shall be per ASTM F 900.

5.1.6 Concrete Mix

Concrete mix shall be per ASTM C 94. Minimum strength shall be 3,000 psi at 28 days with 3/4-inch maximum size coarse aggregate and a maximum slump of 3 1/2-inches.

5.1.7 Gate Hardware

Gate hardware shall be certified malleable iron, hot-dip galvanized. Hinges shall be of ball-and-socket design with full 180° swing from closed to open position. Single gate latches shall permit gate to open only one way. All gate latches shall have provisions for a padlock. Padlock will be provided by Bechtel.

5.1.8 Line Post Bands

Line post bands shall be .062 in. x .375 inch flat aluminum alloy wire.

5.1.9 Tie Wires

Tie wires for securing fabric to horizontal rails shall be 9 gage aluminum alloy.

5.1.10 Hog Rings

Hog rings for securing fabric to tension wire shall be 9-gage aluminum alloy.

5.1.11 Barbed Wire

Barbed wire shall be aluminum-coated double strand 12½-gage twisted wire with 14-gage, 4 point round aluminum barbs spaced on approximately 5-inch centers per ASTM A 585, Type I.

5.1.12 Extension Arms

Extension arms shall accommodate 3 strands of barbed wire extending at a 45° angle facing to the outside of the fence line.

6.0 FIELD OPERATIONS

6.1 GENERAL

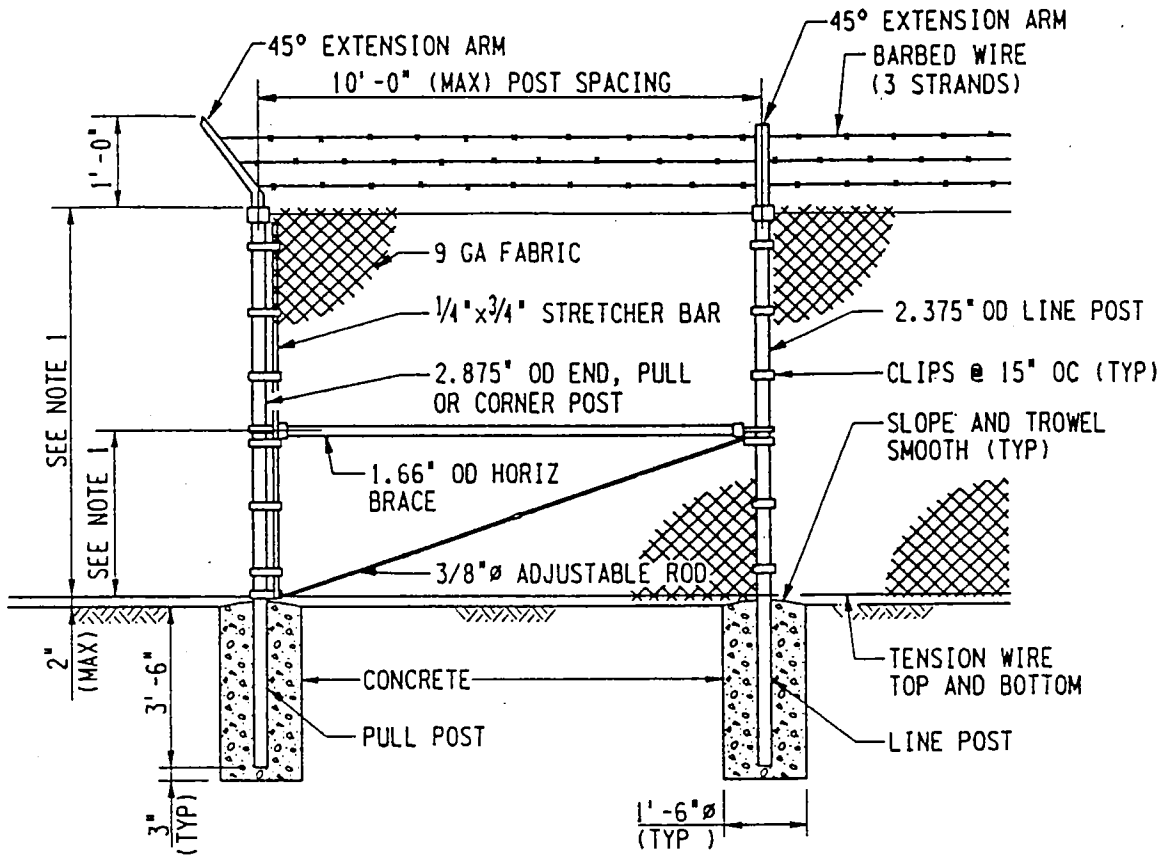
Fence type (i.e. temporary, permanent, barbed, etc.), locations and fence height shall be as shown either in the Scope of Work and/or the engineering drawings. All debris shall be disposed of at a licensed solid waste landfill as directed by Bechtel. See Attachments A and B for typical chain link fence and typical double swing gate details.

6.2 CHAIN LINK FENCE

Install fence per ASTM F 567.

6.3 TEMPORARY FENCE

Temporary fencing shall be securely set delineating the work areas. Posts may be driven into soil as directed by Bechtel.



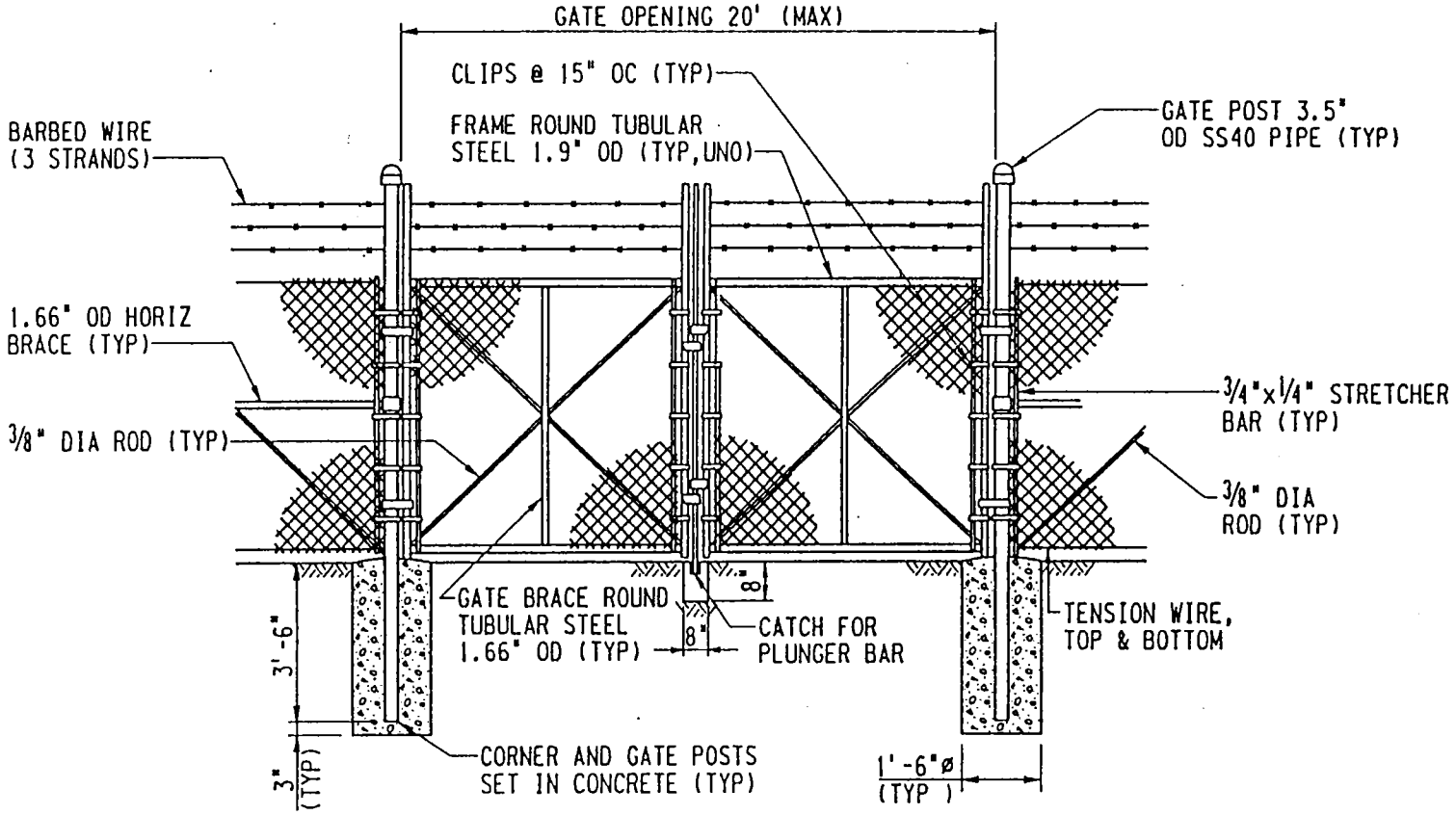
NOTES:
1. DIMENSIONS GIVEN IN THE SCOPE OF WORK.
2. SEE ASTM F 567 FOR INSTALLATION.

TYPICAL CHAIN LINK FENCE DETAIL

NTS

22567 201 SP001.DGN
8/24/94

ATTACHMENT A



NOTES:
1. DIMENSIONS GIVEN IN THE SCOPE OF WORK.
2. SEE ASTM F 567 FOR INSTALLATION.

TYPICAL DOUBLE SWING GATE DETAIL

NTS

22567 201 SP002.DGN
8/25/94

ATTACHMENT B

APPENDIX H

RESPONSIBILITY MATRIX

McCOY ANNEX, BUILDING 7174 RAM

TASK	ABB	BEI	SOUTHDIV	ACTIVITY	FDEP	ROICC
RAM	L	I	A	NA	NA	I
SOW	R	NA	L	NA	NA	NA
POA	L	NA	R/A	NA	NA	NA
Sampling & Analysis	L	I	R/A	NA	NA	I
Redesign/Validate RAP	L	S(R)	R/A	NA	I/A	NA
RAC SOW Estimate	NA	L	A	NA	NA	NA
Phase 2 RWP	R	L	R	R	N	R
Phase 3 Construction	S	L	A	S	I	R
UST Closure	S	L	A	S	I	R
UST Closure Report	L	S	R	I	A	I
Install SVE/P&T Systems	S	L	A	S	I	R
System Acceptance Test	S	L	S	S	NA	A
Baseline Sampling	L	S	R	I	I	I
Phase 4 Cleanup	S	L	R	S	N	I
Sampling (Permit Compliance)	L	S	R	S	R	I
Compliance Reporting	L	S	R	S	A	I
Demolition/Demobilization	S	L	I	I	I	I

A = Approval
L = Lead
S = Support
I = Information

R = Review
N = Notify
NA = Not Applicable

McCOY ANNEX, BUILDING 7175 RAM

TASK	ABB	BEI	SOUTHDIV	ACTIVITY	FDEP	ROICC
RAM	L	I	A	NA	NA	I
SOW	R	NA	L	NA	NA	NA
POA	L	NA	R/A	NA	NA	NA
Negotiate POA	L	NA	L	NA	NA	NA
NTP	S	NA	L	NA	NA	NA
Soil Screening	L	I	R	S	I	S
Soil Screening/SOW	L	I	A	I	I	I
Execute Field Work	S	L	S	S	I	R/A
Complete GWCA	L	I	S	S	I	S
CAR	L	I	R	R	R/A	I
Followup Report	L	S	R	R	R/A	I

A = Approval
L = Lead
S = Support
I = Information

R = Review
N = Notify
NA = Not Applicable

APPENDIX I

SCHEDULE

ACTIVITY ID	EARLY START	EARLY FINISH	ORIG DUR	REM DUR	PCT	FY95 OCT–SEP / FY96 OCT–APR
						PHASE 2 SET UP
30112900		3NOV94	0	0	0	FENCE SUBCONTRACT OUT TO BID
30112910		9NOV94	0	0	0	TANK REMOVAL SUBCONTRACT OUT FOR BID
30112920		9NOV94	0	0	0	RECEIVE FENCING BIDS
30112970		14NOV94	0	0	0	SURVEYING SUBCONTRACT OUT FOR BID
30112930	17NOV94	18NOV94	2	2	0	PRE BID MEETING FOR TANK REMOVAL SUBCONTRACT
30113030	17NOV94	17NOV94	1	1	0	FENCE INSTALLATION
30112980		22NOV94	0	0	0	TREATMENT SUBCONTRACT OUT FOR BID
30112940		28NOV94	0	0	0	RECEIVE TANK REMOVAL SUBCONTRACT BIDS
30112973		28NOV94	0	0	0	SURVEYING SUBCONTRACT BIDS RECEIVED
30112950	29NOV94	2DEC94	4	4	0	NAVY REVIEW TANK REMOVAL SUBCONTRACT BIDS
30112960		2DEC94	0	0	0	AWARD TANK SUBCONTRACT
30112983		5DEC94	0	0	0	TREATMENT SUBCONTRACT BIDS RECEIVED
30112975		12DEC94	0	0	0	AWARD SURVEYING SUBCONTRACT
30112985		12DEC94	0	0	0	AWARD TREATMENT SUBCONTRACT
						TANK REMOVAL
30113100	5DEC94	9DEC94	5	5	0	MOBILIZE BECHTEL SUPERINTENDENT
30113150	7DEC94	9DEC94	3	3	0	SUBMITTALS/TRAINING
30113125	12DEC94	12DEC94	1	1	0	TANK REMOVAL SUBCONTRACTOR MOBILIZATION

Plot Date 8NOV94
Data Date 30OCT94
Project Start 1APR94
Project Finish 8FEB96

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

OR13

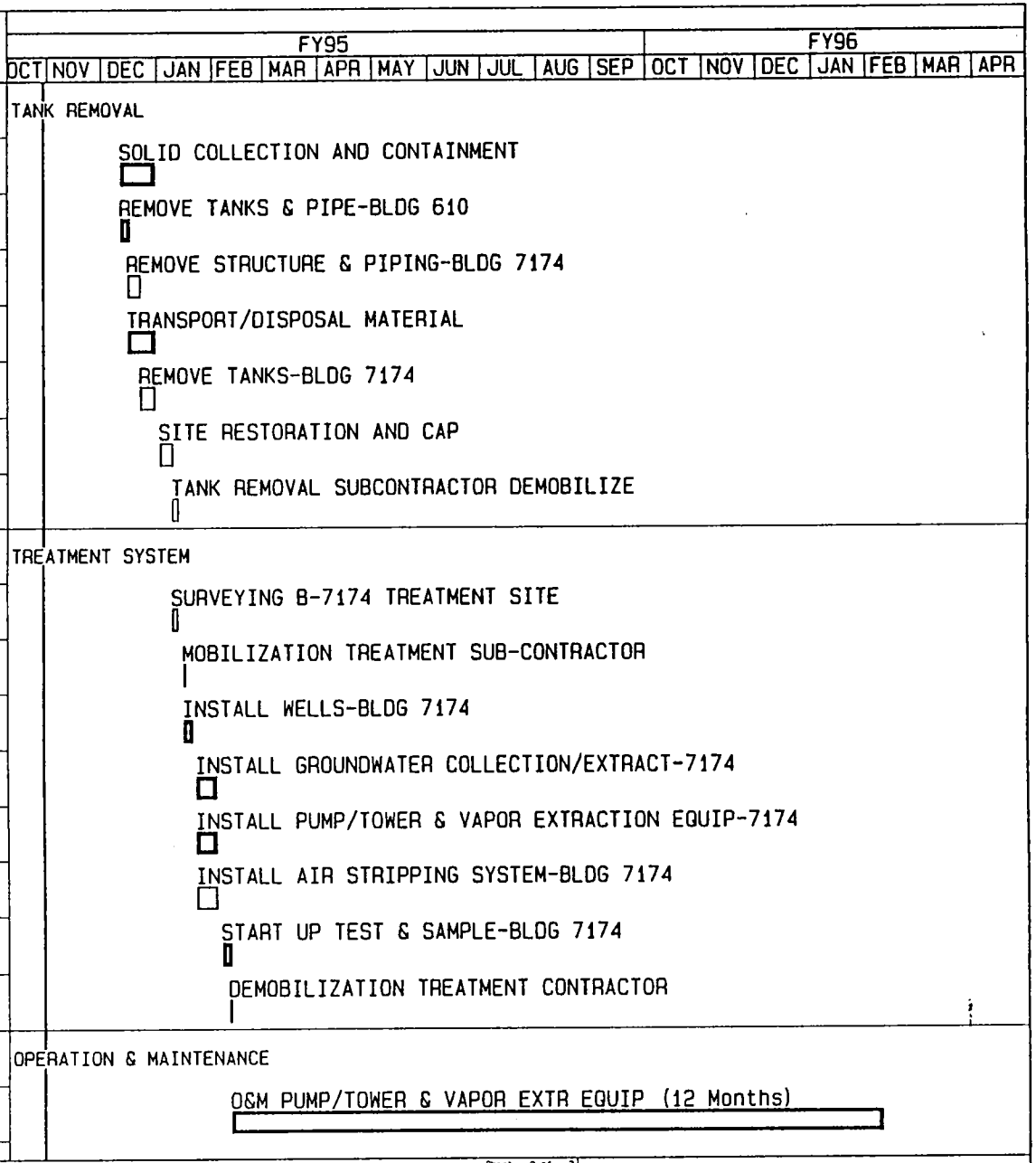
Sheet 1 of 3

NTS ORLANDO, FL
TASK 1: PHASE 3
BASELINE SCHEDULE AND WORK PLAN

SUB JOB 301 DO#0002

Date	Revision	Checked	Approved

ACTIVITY ID	EARLY START	EARLY FINISH	ORIG DUR	REM DUR	PCT
30113260	12DEC94	30DEC94	14	14	0
30113650	12DEC94	16DEC94	5	5	0
30113200	16DEC94	22DEC94	5	5	0
30113310	16DEC94	30DEC94	10	10	0
30113230	23DEC94	30DEC94	5	5	0
30113290	3JAN95	9JAN95	5	5	0
30113800	10JAN95	12JAN95	3	3	0
30113910	10JAN95	12JAN95	3	3	0
30113390	16JAN95	16JAN95	1	1	0
30113420	16JAN95	20JAN95	5	5	0
30113490	23JAN95	2FEB95	9	9	0
30113520	23JAN95	2FEB95	9	9	0
30113550	23JAN95	2FEB95	9	9	0
30113450	6FEB95	10FEB95	5	5	0
30113580	10FEB95	10FEB95	1	1	0
30113610	11FEB95	8FEB96	355	355	0



Plot Date 8NOV94
Data Date 30OCT94
Project Start 1APR94
Project Finish 8FEB96

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

ORIG

Sheet 2 of 3

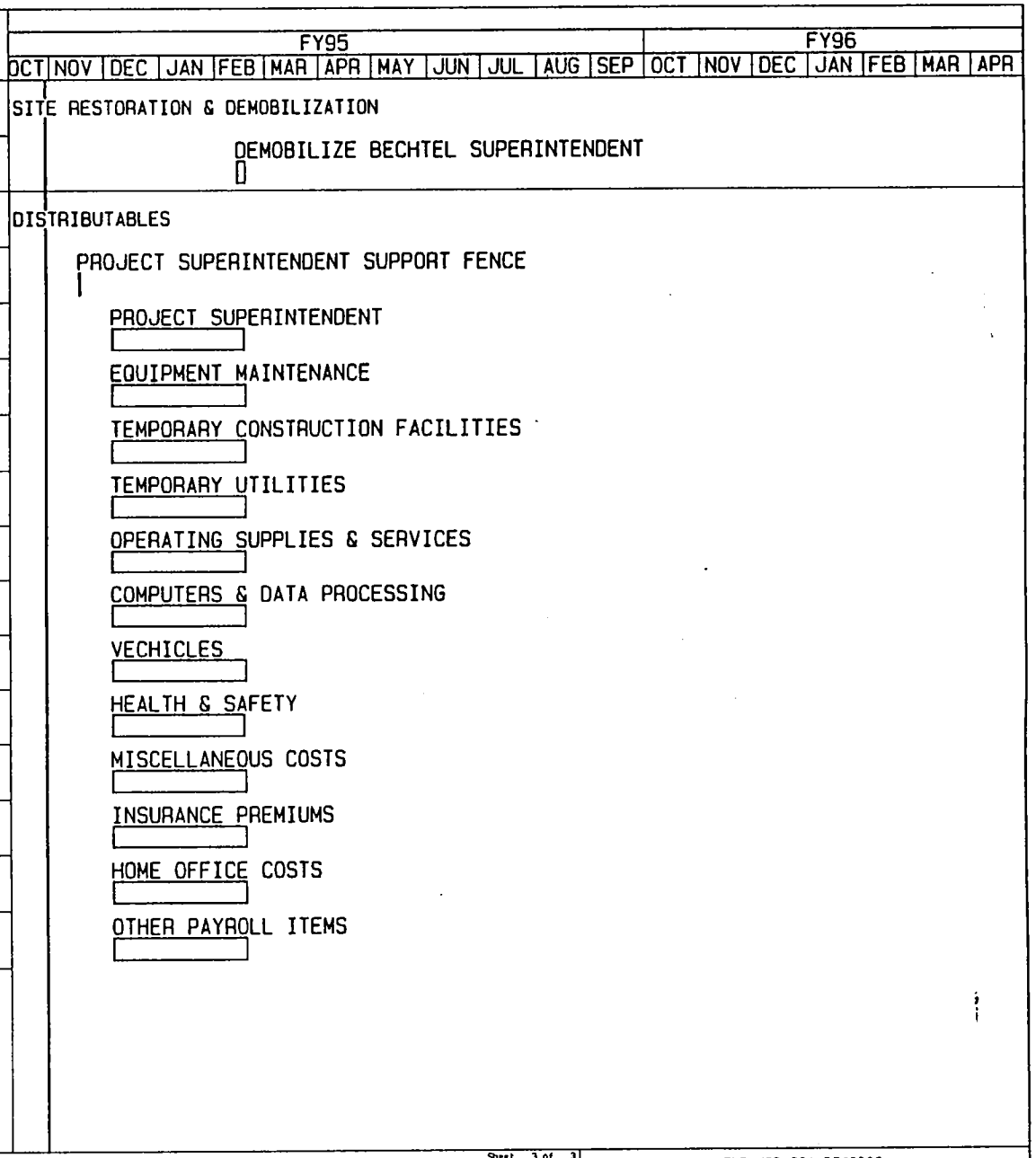
NTS ORLANDO, FL
TASK 1: PHASE 3
BASELINE SCHEDULE AND WORK PLAN

SUB JOB 301 DO#0002

Date	Revision	Checked	Approved

001754

ACTIVITY ID	EARLY START	EARLY FINISH	ORIG DUR	REM DUR	PCT
30113850	13FEB95	17FEB95	5	5	0
30113900	17NOV94	17NOV94	1	1	0
30113905	5DEC94	16FEB95	42	42	0
30113915	5DEC94	17FEB95	53	53	0
30113920	5DEC94	17FEB95	53	53	0
30113925	5DEC94	17FEB95	53	53	0
30113930	5DEC94	17FEB95	53	53	0
30113935	5DEC94	17FEB95	53	53	0
30113940	5DEC94	17FEB95	53	53	0
30113945	5DEC94	16FEB95	42	42	0
30113950	5DEC94	17FEB95	53	53	0
30113955	5DEC94	17FEB95	53	53	0
30113960	5DEC94	17FEB95	53	53	0
30113970	5DEC94	17FEB95	53	53	0



Plot Date 8NOV94
Data Date 30OCT94
Project Start 1APR94
Project Finish 8FEB96

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

OA13

Sheet 3 of 3

NTS ORLANDO, FL
TASK 1: PHASE 3
BASELINE SCHEDULE AND WORK PLAN

SUB JOB 301 DO#0002

Date	Revision	Checked	Approved

ENVIRONMENTAL PROTECTION PLAN

NAVAL TRAINING CENTER, ORLANDO, FLORIDA

DELIVERY ORDER NO. 002

Prepared for

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Under Contract No. N62467-93-D-0936

Prepared by

BECHTEL ENVIRONMENTAL, INC.
OAK RIDGE, TENNESSEE

REVISION 0

NOVEMBER 1994

Bechtel Job No. 22567

Prepared:	Richard K Atwood Environmental Compliance Technical Lead	11/8/94 Date
Concurred:	O. N. McNeil Project Manager	11/8/94 Date
Approved:	Ron Anderson Navy RAC Contracting Officer	14 NOV 94 Date

CONTENTS

FIGURES

1.0 DESCRIPTION OF THE ENVIRONMENTAL PLAN

1.1 GENERAL OVERVIEW AND PURPOSE

The purpose of this Environmental Protection Plan is to outline the methods and responsibilities for protection of natural resources and the environment during execution of the delivery order work. To accomplish this goal, Bechtel Environmental, Inc. (BEI) will comply with applicable Federal, State, local, and base environmental laws, properly control and dispose of all waste generated, document and report on pollution prevention measures, and prepare all reports required by outside agencies.

The objective of this project is to decontaminate selected sites to permit their use without land use restrictions or to stabilize and/or otherwise control residual contamination at the sites to meet current guidelines for the protection of public health and safety.

It should be noted that the program is, fundamentally and exclusively, an environmental restoration program. Essentially all substantive Navy RAC activities are design implementations of response actions for contaminated media. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Environmental Policy Act (NEPA) establish extensive environmental documentation requirements for remedial action programs such as Navy RAC. Many of the methods and responsibilities for protection of natural resources will be embodied in existing legislation and rules, and will be documented in the course of remedial action.

1.2 GENERAL SITE INFORMATION

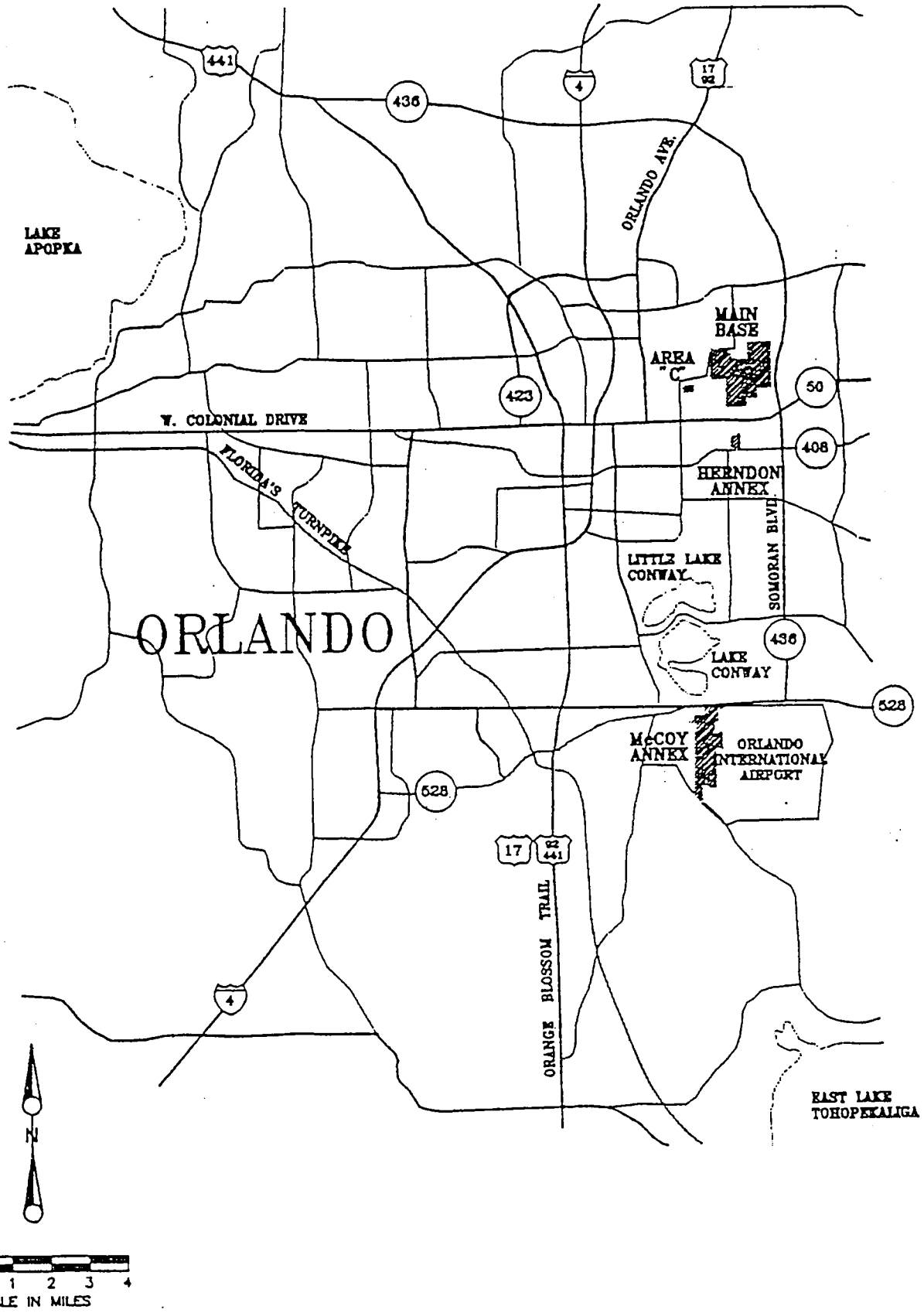
The Naval Training Center (NTC), Orlando, Florida, covers 2,019 acres in Orange County, Florida. The complex is comprised of four noncontiguous properties: the Main Base, Area "C," Herndon Annex, and McCoy Annex. The majority of the operational and training facilities within the NTC complex are located at the Main Base, which lies entirely within the city limits of Orlando. Area "C" is the primary supply center for the complex. Herndon Annex provides research, design, development, testing, and logistic support for Naval training devices and equipment. McCoy Annex serves mainly as a housing and community support activity for the NTC complex. A site location map has been attached as Figure 1-1.

NTC Orlando is scheduled to be closed by 1999. Remedial actions are necessary at NTC Orlando in order to meet the Department of the Navy's requirements for property disposal and reuse activities associated with the base closure.

Interim remedial actions will consist of removals of underground storage tanks and associated piping, removal, treatment, and/or disposal of contaminated soil, installation of groundwater pump and treat systems, and demolition and removal of concrete and other debris.

2.0 PROTECTION OF NATURAL RESOURCES

BEI will preserve natural resources within the project boundaries. Preservation of natural resources will be achieved through the use of project procedures designed to minimize



SITE LOCATION MAP

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

3/94

Figure 1-1

environmental impacts and restore areas that must be disturbed during the course of remedial activities.

Procedures are in place to protect the natural resources as described in the Contract, Part 4.4, Protection of Natural Resources.

2.1 LAND RESOURCES

Except in areas to be cleared, BEI will not remove or deface trees or shrubs without approval.

2.2 TREE PROTECTION

BEI will protect existing trees that will remain after completion of work.

2.3 REPLACEMENT

BEI will restore landscape features damaged by equipment operations.

2.4 TEMPORARY CONSTRUCTION

BEI will remove traces of temporary construction facilities such as haul roads, work areas, structures, foundations, and stockpiles of excess or waste materials.

2.5 STREAM CROSSINGS

Contracting Officer's approval will be obtained before any equipment fords a stream. Temporary culverts or bridges will be utilized where necessary.

2.6 FISH AND WILDLIFE RESOURCES

Fish and wildlife will not be unnecessarily disturbed. Stream flows and other significant native habitats will be protected.

2.7 WETLAND AREAS

BEI will not disturb any wetland area without authorization. Approval may be required by an affected state or local agency, or the Army Corps of Engineers. Such approval will be obtained through the Navy designated representative.

3.0 PROTECTION OF HISTORICAL AND ARCHAEOLOGICAL RESOURCES

3.1 OBJECTIVE

BEI will contact state agencies for known locations of historical or archaeological areas prior to the start of any work.

BEI will preserve and report to the Contracting Officer historical or archaeological items or human skeletal remains discovered in the course of work.

3.2 METHODS

BEI will provide guidance and training to field operations management on the importance and requirements related to historical resource protection.

4.0 PROTECTION OF SURFACE SOIL, VEGETATION, AND SURFACE WATERS

4.1 GROUND COVER

Burnoff of ground cover will not be permitted.

4.2 ERODIBLE SOILS

All earthwork will be brought to a final grade, as specified in delivery orders. Side slopes and back slopes will be protected immediately upon completion of rough grading. Protection against erosion will prevent any sedimentation of nearby creeks or streams.

4.3 TEMPORARY MEASURES

The following methods will be used to prevent erosion and control sedimentation.

4.3.1 Mechanical Retardation and Control of Runoff

BEI will mechanically retard and control rate of runoff from the site. This method includes building of diversion ditches, benches, and berms as required to retard and divert runoff to protected drainage courses.

4.3.2 Vegetation and Mulch

BEI will provide temporary protection on side and back slopes as soon as rough grading is completed if sufficient soil is exposed to require erosion protection. Slopes will be protected by accelerated growth of permanent vegetation, mulching, or netting.

5.0 PROTECTION OF THE ENVIRONMENT FROM POLLUTION DERIVED FROM OPERATIONS

5.1 CONTROL AND DISPOSAL OF SOLID AND SANITARY WASTES

Solid wastes will be collected, placed in containers, and regularly emptied at intervals to prevent the attraction of rodents or disease vectors. Debris, garbage, and sewage will be disposed of according to procedures and requirements specified by a designated Navy representative, and in compliance with applicable laws and regulations.

Procedures for collecting and properly disposing of solid wastes is addressed in the Program Hazardous Waste Management Plan.

5.2 MANAGE AND DISPOSE OF HAZARDOUS WASTE

Procedures and requirements for the generation, management, transportation, and disposal of hazardous waste, as defined in the Resource Conservation and Recovery Act (RCRA), are described in the Program Hazardous Waste Management Plan.

6.0 NOTIFICATION OF ENVIRONMENTAL OCCURRENCES

Environmental occurrences will be recorded and reported to the Resident Officer in Charge of Construction (ROICC) for NTC, Orlando, Florida, Kurt Musser (telephone number 407/646-5345). For an emergency or an occurrence involving CERCLA/Superfund Amendments and Reauthorization Act (SARA) reportable event (e.g., spill), the event must be reported to the National Response Center, (Telephone Number 1-800-424-8802), as well as to the Contracting Office or his designee.

7.0 WASTE MINIMIZATION AND POLLUTION PREVENTION

An important element of providing environmental protective measures is to minimize the volume and toxicity of all wastes that are generated, or existing wastes that are being managed, to the extent practical. To achieve this goal, management must maintain project employees' awareness of waste management policies, plans, procedures, and activities.

7.1 VOLUME REDUCTION

Due to decreasing available disposal space, increasing disposal costs, and liability associated with hazardous material, a greater emphasis is being placed on waste reduction. Because new waste will be generated as a result of response actions and not by process operations, only a limited number of waste minimization techniques are appropriate. Techniques that will be used to minimize the volume of newly generated waste include material substitution, segregation, consolidation, loss prevention, supply control, reuse, and good housekeeping.

7.2 REDUCTION OF TOXICITY

The toxicity of waste managed as part of remedial activities must be reduced to meet RCRA requirements for hazardous waste disposal. Reduction of waste toxicity will be achieved when required by RCRA land disposal restrictions, as well as when appropriate to achieve CERCLA cleanup goals.

ADDENDUM NO. 13

TO THE

SITE SAFETY AND HEALTH PLAN

DELIVERY ORDER NO. 0002 AT

NTC ORLANDO, FLORIDA

Prepared for

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Contract No. N62467-93-D-0936

Prepared by

BECHTEL ENVIRONMENTAL, INC.
OAK RIDGE, TENNESSEE

REVISION 0

NOVEMBER 1994

Bechtel Job No. 22567

Approved:	Melvin D Atwood for Libby Calley Bechtel Corp. Safety and Health Services	11/7/94 Date
Approved:	Melvin D Atwood Program Safety and Health Manager/CIH	11/7/94 Date
Approved:	O. N. McNeil Project Manager	11/7/94 Date
Approved:	Ron Mercer Navy Contracting Officer	14 NOV 94 Date

CONTENTS

TABLES

1.0 GENERAL INFORMATION

This Task-Specific Safety and Health Plan (TSSHP) addresses safety and health issues related to soil and groundwater remediation at the underground storage tanks (USTs) at buildings 7174, 607, and 610 at the Naval Training Center (NTC) Orlando. In addition to these task-specific requirements, general requirements are given in the Naval Remedial Action Contract (Navy RAC) Program Safety and Health Plan (PSHP), the Site Safety and Health Plan (SSHP) for Navy RAC Bases, the safety and health standard operating procedures (Navy RAC SOPs) for the Navy RAC program, and other work controlling documents such as hazardous work permits (HWPs).

The TSSHP has been developed in compliance with requirements of 29 CFR 1910.120 (b) for a Site Safety and Health Plan.

The TSSHP is issued under controlled distribution. A TSSHP may be revised during the annual review process or at any time it is apparent that there has been a change in site conditions or scope of work. In addition, the Bechtel Environmental, Inc. (BEI) Program Safety and Health Manager (SHM) and/or the Navy Contracting Officer (CO) reserves the right to require changes to the TSSHP and operations as necessary to ensure the safety and health of persons on or near the site. BEI will revise the TSSHP if it does not seem adequate to protect site workers, the general public, or the environment. Any revision to an approved TSSHP shall require the written concurrence of the CO and the SHM. Changes are typically done by completing the Field Change Notices/Requests found in the SSHP.

All site safety and health personnel shall be familiar with the information and requirements contained in the TSSHP. Levels of protection may be up or downgraded by the Site Safety and Health Representative (SSHR) based on site conditions and air sampling results.

1.1 IDENTIFICATION

Site Name:	NTC Orlando
Site Location:	Orlando, Florida
Client:	Department of the Navy Southern Division Naval Facilities Engineering Command (SOUTHDIVNAVFACENGCOM)

1.2 DESCRIPTION OF ACTIVITIES

The following general categories of work are covered by this plan:

- Remedial Action (RA) of soil, groundwater, and USTs.

Table 1-1 shows the activities and their descriptions.

Table 1-1
Activity Description

Site[a]	Activity[b]	Description
7174, 607, and 610	1	Mobilization, Site Restoration, Demobilization using backhoe and front end loader
7174, 607, and 610	2	Excavate contaminated soils using backhoes and recover free product using skimmer on bladder pump
7174, 607, and 610	3	Cleaning USTs using high pressure water with detergent solution
7174, 607, and 610	4	Removal of USTs and disposal using backhoe, crane, jackhammer, front end loader, bush hog, and truck
7174, 607, and 610	5	Sampling of soils during remediation using scoop and FID
7174, 607, and 610	6	Backfilling of excavation with clean soils using front end loader
7174	7	Drilling of soil vapor extraction (SVE) and groundwater (GW) recovery wells, development of GW wells using drill rig
7174	8	Installation of SVE trench system using backhoe
7174, 607, and 610	9	Decontamination of equipment using high pressure water or steam cleaner
7174	10	O&M of SVE and GW recovery systems
7174	11	Routine sampling of GW using bailer
7174	12	Recovery of free product from monitoring wells using bailer or pneumatic pump
7174	13	Placement of concrete pavement using cement mixer and wheelbarrows

[a]Chemical contaminations for each site is listed in Table 2-1 and 2-2.
[b]Personal protective equipment for each activity is listed in Table 7-1.

1.3 SITE HISTORY

Location, description, and history of the NTC Orlando is found in Attachment D of the SSHP.

1.3.1 Site Type and Regulatory Status

- Active
- Federal Government

a. USEPA : RCRA regulations, including but not limited to, 40 CFR Part 50
b. DOT : Department of Transportation regulations including but not limited to 49 CFR 172.700
c. OSHA : 29 CFR 1910, 1926, and State OSHA-specific chemical hazard substance standards
   - 29 CFR 1926.62 Lead
   - 29 CFR 1926.1128 Benzene
d. Other : A Federal Facilities Agreement is in place for the site. The Site Management Plan for NTC Orlando includes a Remedial Action/Feasibility (RI/FS) report to be submitted for approval by EPA Region IV, and Florida Department Environmental Protection

1.3.2 Site Owner

United States Navy

2.0 HAZARD ANALYSIS

2.1 TYPES OF HAZARDS

2.1.1 Physicochemical Hazards Listing

- Flammable Chemicals
- Mutagen
- Toxic inorganic chemicals
- Toxic organic chemicals
- Carcinogen
- Neurotoxin
- Dermatitis

2.1.2 Biological Hazards Listing

- Insects (mosquitos, spiders, ticks, etc.)

2.1.3 Radiation Hazard Listing

- UV sunlight

2.1.4 Physical Hazards and General Safety Hazard Listing

- Ladders
- Heavy lifting
- Pinch points
- Intense sunlight
- Trenching
- Hand tools (power tools)
- Excavations
- Underground utilities
- Slips, trips, falls
- Traffic
- Pressurized water/steam
- Overhead utilities
- Flying debris
- Heavy equipment use
- Electrical connections
- Heat
- Noise

2.2 KNOWN AND/OR SUSPECTED CHEMICAL HAZARDOUS MATERIALS ONSITE

2.2.1 Chemical Hazards

Known or suspected hazardous chemicals identified include the constituents of gasoline at Building 7174, hydraulic oil at Building 610, and heating oil at Building 607.

2.2.2 Chemical Hazard Assessment

The chemical hazard for the work is moderate. Table 2-1 indicates chemicals and their known maximum concentration in groundwater. Table 2-2 shows the exposure limits, symptoms of exposure, harmful effects of exposure, routes of exposure, and methods for detection.

3.0 MEDICAL SURVEILLANCE

In addition to the basic medical examination described in Navy RAC SOP 2.1.80, workers participating in the activities covered under TSSHP shall receive the tests specified below. Workers outside regulated areas **with no potential for exposure are exempted** from the medical surveillance program. Exemption is determined on a case-by-case basis by the SHM. Specific bioassay include the following and will be completed in compliance with 29 CFR 1926.62 and 29 CFR 1926.1128.

Contaminant	Media
Benzene	Blood sample analysis.
Lead	Blood sample analysis which determines levels of lead and zinc protoporphyrin (ZPP).

4.0 TRAINING

Project training requirements are contained in Sections 9 and 11 of the PSHP. General training requirements are specified in Section 10 of the Navy RAC SSHP.

Prior to starting work, each worker assigned to perform tasks covered under this TSSHP will receive an initial safety and health orientation training from NTC Orlando, or designee. Workers outside regulated areas **with no potential for exposure** are exempted from HAZWOPER training requirements. This exemption is determined on a case-by-case basis by the SHM.

Table 2-1
Maximum Chemical Concentration in Groundwater

Chemical	Building 7174[a,b]	Building 607[c]	Building 610[c]
Volatiles			
Benzene	4.3 mg/l	NS	NS
Ethylbenzene	1.1 mg/l	NS	NS
Methyl-tert-butyl Ether	36.0 mg/l	NS	NS
Toluene	9.8 mg/l	NS	NS
Tetraethyl lead	NS[d]	NA[e]	NA[e]
Tetramethyl lead	NS[d]	NA[e]	NA[e]
Xylene	6.4 mg/l	NS	NS
Semivolatiles			
Naphthalene	0.28 mg/l	NS	NS
Metals			
Lead	190 mg/l	NS	NS

[a]No soil analytical data was provided. Monitoring of soil sample headspace with an organic vapor analyzer (OVA) showed readings in excess of 1000 ppm.
[b]*Source:* Remedial Action Plan Addendum, Naval Training Center, McCoy Annex Service Station Building 7174, May 3, 1994, OHM Remediation Services Corp.
[c]No contamination is expected.
[d]Building 7174 had six (6) gasoline UST installed in 1942 and would have contained leaded gasoline. While these tanks are not being removed, they were abandoned in-place and these contaminants could still be present.
[e]UST did not contain gasoline.

NS - Not sampled

Table 2-2
Chemical Hazard Information

Chemical	Exposure Limits	Harmful Effects	Symptoms	Sampling Media	Routes of Exposure
Volatiles					
Benzene	AL: 0.5 ppm PEL: 1 ppm STEL: 5 ppm TLV: 0.1 ppm IDLH: 3000 ppm	Blood, CNS, skin, bone marrow, eyes, respiratory system, carcinogen	Irritated eyes, nose, respiratory system; giddiness; headache; nausea; staggering gait; fatigue; anorexia; lassitude; dermatitis	Charcoal tube	Inhalation, skin absorption, ingestion, contact
Ethylbenzene	AL: 50 ppm PEL: 100 ppm STEL: 125 ppm TLV: 100 ppm IDLH: 2000 ppm	Eyes, upper respiratory system, skin, CNS	Irritated eyes, mucous membrane; headache; dermatitis; narcolepsy, coma	Charcoal tube	Inhalation, ingestion, contact
Methyl-Tert-Butyl Ether (MTBs)	AL: NA PEL: NA STEL: NA TLV: 40 ppm IDLH: NA	Eyes, respiratory, CNS, skin	Irritated eyes, headache, weakness, drowsiness	Charcoal tube	Inhalation, skin absorption, ingestion, contact
Toluene	AL: 50 ppm PEL: 100 ppm STEL: 150 ppm TLV: 50 ppm IDLH: 2000 ppm	CNS, liver, kidneys, skin	Irritated nose, throat; choking, paroxysmal cough; chest pain, rester soreness; nausea, vomiting, abdominal pain; bronchitis spasm, pulmonary edema; asthma, dermatitis	Charcoal tube	Inhalation, skin absorption, ingestion, contact
Tetraethyl lead	AL: .038 mg/m^3 PEL: .075 mg/m^3 STEL: TLV: .1 mg/m^3 IDLH: 40 mg/m^3	CNS, CVS, kidneys, eyes	Insomnia, lassitude, anxiety; tremors, hyper-reflexia, spastic; hypotension, pallor, nausea, anorexia, disorientation, hallucinations	XAD-2 Solid Sorbent Tube	Inhalation, skin absorption, ingestion, contact
Tetramethyl lead	AL: .038 mg/m^3 PEL: .075 mg/m^3 STEL: TLV: .15 mg/m^3 IDLH: 40 mg/m^3	CNS, CVS, kidneys	Insomnia, bad dreams, restlessness, anxious; hypotension; nausea, anorexia, convulsion	XAD-2 Solid sorbent tube	Inhalation, skin absorption, ingestion, contact
Xylene	AL: 50 ppm PEL: 100 ppm STEL: 150 ppm TLV: 100 ppm IDLH: 1000 ppm	CNS, eyes, GI tract, blood, liver, kidneys, skin	Dizziness, excited, drowsy, incoherent, staggering gait; irritated eyes, nose, throat, dermatitis	Charcoal tube	Inhalation, skin absorption, ingestion, contact
Semi-volatiles					
Naphthalene	AL: 5 ppm PEL: 10 ppm STEL: 15 ppm TLV: 10 ppm IDLH: 500 ppm	Eyes, blood, liver, kidneys, skin, CNS	Dermal blemishes; respiratory irritation; kidney irritation; bronchitis	2 μm, 37 mm PTFE membrane filter and sorbent	Inhalation, skin absorption, ingestion, contact
Metals					
Lead	AL: 30 μg/m^3 PEL: 50 μg/m^3 STEL: NA TLV: 150 μg/m^3 IDLH: 700 mg/m^3	GI tract, CNS, kidneys, blood, gingival tissue	Weakness, lassitude, insomnia; facial pallor; pale eyes; anorexia; abdominal pain; anemia; tremors; irritated eyes	0.8 μm MCEF filter	Inhalation, ingestion, contact

AL - Action Limit, OSHA
PEL - Permissible Exposure Limit, OSHA
STEL - Short Term Exposure Limit, OSHA
TLV - Threshold Limit Values, ACGIH
IDLH - Immediately Dangerous to Life and Health

5.0 SITE CONTROLS

Program requirements for site controls are specified in Section 4 of the PSHP and Navy RAC SOP 2.1.40, "Site Control." General site control requirements for NTC Orlando are specified in Section 4 of the SSHP. At a minimum, HWPs will be initiated for activities requiring Level C protection (see Table 7-1).

6.0 SAFETY AND HEALTH SURVEYS AND MONITORING

6.1 SAFETY AND HEALTH REQUIREMENTS FOR SPECIAL TECHNOLOGIES

NS Mayport will be utilizing two (2) special technologies. They are:

- SVE at Building 7174
- Air stripping at Building 7174

6.1.1 Soil Vapor Extraction SVE

SVE will be accomplished using an efficient scrubber and/or filtering system to remove volatile organic hydrocarbons from air emissions. Air emissions to protect the general public will be accomplished by sampling as per EPA method T014. Emissions will be monitored to determine compliance with the state of Florida air emission standards. Section 6.3 defines the criteria, action levels, and responses based on air emissions in the work place and at the site perimeter.

6.1.2 Air Stripping

Groundwater will have volatile organics removed via air stripping. Emissions will be monitored to determine compliance with the state of Florida air emission standards. Section 6.3 defines the criteria, action levels, and responses based on air emissions in the work place and at the site perimeter.

6.2 AIR MONITORING EQUIPMENT

The air monitoring devices used will be (1) a flame ionization and a photoionization detector; (2) a four-gas meter capable of determining oxygen (O_2) lower explosive limit (LEL), carbon monoxide (CO), and, hydrogen sulfide (H_2S); (3) colormetric detector tubes for benzene, ethylbenzene, toluene, and xylene; (4) personal sampling pumps and collection media for benzene and lead; and, (5) equipment to perform EPA T014 monitoring and 40 CFR Part 50, Appendix G, Sampling.

6.3 WORK STATION AND PERIMETER MONITORING REQUIREMENTS AND ACTION LEVELS

Table 6-1 provides occupational and perimeter monitoring action levels and responses to known and suspected site hazards. The table also provides the required instrumentation and frequency of monitoring. Perimeter monitoring will be conducted based on exposure levels found in the work area. Action levels and frequency of sampling acceptable at the perimeter are found in Table 6-2.

7.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Program requirements for components of Level A, B, C and D levels of protection are specified in Sections 8 and 10 of the PSHP and Section 8 and 9 of the SSHP. PPE for specific activities are shown in Table 7-1.

The SSHR will specify PPE requirements in HWPs. Due to the contamination it is anticipated that most work will be in Level D. Table 7-1 shows the activity, expected hazards, level of protection, and possible upgrade in the level of protection. Respirator canisters will be specified by the SSHR. Table 7-2 is a list of equipment expected to be needed.

Equipment for Levels C and D, and Construction Attire (C.A.) personal protection is as follows:

- Level B Protection
  -Positive-pressure, pressure-demand self-contained breathing apparatus (SCBA)
  -Chemical resistant clothing (e.g., polyethylene or Saranex)
  -Inner PVC or vinyl gloves
  -Outer Neoprene or nitrile gloves
  -Sturdy work shoes
  -Hard hat
  -Neoprene or rubber overboots

- Level C Protection
  -Full face air purifying respirator
  -Organic vapor cartridges with HEPA filter
  -Chemical resistant clothing (e.g., polyethylene or Saranex)
  -Inner PVC or vinyl gloves
  -Outer Neoprene or nitrile gloves
  -Sturdy work shoes
  -Hard hat
  -Neoprene or rubber overboots

- Level D Protection
  -Hard hat
  -Chemical resistant clothing (e.g., polyethylene or Saranex)
  -Sturdy work shoes
  -Neoprene or rubber overboots
  -Neoprene or nitrile gloves with PVC or vinyl inner gloves (if there is a potential for dermal

Table 6-1
Work Station Air Monitoring Requirements and Action Levels

Activity	Instrument or Contaminant	Frequency of Monitoring	Action Levels	Response
2, 3, 4, 5, 7, and 8	Four-gas meter	Initial and periodic NOTE: Continuous monitoring during Activity 3	LEL < 5%	No action, periodic monitoring
			5% ≤ LEL < 10%	Continuous monitoring
			LEL ≥ 10%	Stop work, engineering controls
			O_2 ≤ 19.5%	Stop work, engineering controls
			O_2 ≥ 22%	Stop work, engineering controls
			CO ≥ 200 ppm (instantaneous)	Stop work, engineering controls
			CO ≥ 1 ppm (routine)	Exhaust equipment away from source. Continue monitoring.
			CO ≥ 35 ppm TWA	Stop work, engineering controls
			H_2S ≥ 10 ppm TWA	Stop work, engineering controls
			H_2S ≥ 300 ppm (instantaneous)	Stop work, engineering controls
	FID/PID*	Initial and periodic NOTE: Continuous monitoring during Activity 3	< 1 ppm	Level D
			≥ 1 ppm	Level C, engineering controls
			≥ 10 ppm	Improve engineering controls, perimeter monitoring
			≥ 50 ppm	Level B, improve engineering controls
	Benzene tube		< 0.5 ppm	No action.
			≥ 0.5 ppm	Medical surveillance, training
			≥ 1 ppm ≤ 50 ppm	Engineering controls Level C, perimeter monitoring
			≥ 50 ppm	Level B, improve engineering controls
	Lead[2]	Initial and periodic	≥ 10 $\mu g/m^3$	Perimeter monitoring
			≥ 30 $\mu g/m^3$	Medical surveillance training, Bioassay
			≥ 50 $\mu g/m^3$ ≤ 2,500 $\mu g/m^3$	Regulated areas, change and shower rooms, engineering controls, Level C
	Tetraethyl lead	Initial and periodic	≥ 0.075 mg/m^3	Level C, engineering controls, perimeter monitoring
			≥ 3.75 mg/m^3	Level B, improve engineering controls
	Tetramethyl lead	Initial and periodic	≥ 0.075 mg/m^3	Level C, engineering controls, perimeter monitoring
			≥ 3.75 mg/m^3	Level B, improve engineering controls

*Based on Benzene, PEL of 1 ppm.

Table 6-2
Perimeter Monitoring, Action Levels, and Responses

Contaminant	Action Level	Response[c]
Lead[a]	12.8 $\mu g/m^3$ (1.5 ppb)	Stop work, engineering controls
Benzene[b]	1 ppm	Stop work, engineering controls

[a]High volume sampling.
[b]T014 EPA method.
[c]Frequency of monitoring will be determined on a case-by-case basis by the SHM and SSHR.

Table 7-1
Levels of Personal Protective Equipment

Activity[a]	A	B	C	D	E	F	G	H	I	J	K	L	Level of Protection	Possible Upgrade
1	X			X						X		X	C.A.	NA
2	X	X		X	X	X	X	X	X	X			D	C
3	X		X	X	X	X	X	X	X	X	X		B	NA
4	X	X		X	X	X	X	X	X	X			D	C
5	X				X	X	X	X	X	X	X[b]		D/B[c]	C/NA[c]
6	X			X			X			X			C.A.	D
7	X	X		X	X	X	X	X	X	X			C	B
8	X				X		X	X	X	X			D	C
9	X			X	X	X	X	X	X	X			D	C
10	X						X		X	X			C.A. (modified)[d]	D
11	X					X			X	X			C.A. (modified)[d]	D
12	X		X		X	X	X	X	X	X				
13	X													

[a]Activities from Table 1-1.
[b]Confined space entry if excavation is 4 ft or greater in depth.
[c]Level of protection for non-confined space sampling/level of protection for confined space sampling.
[d]Modified C.A. includes additional requirement of outer neoprene or nitrile gloves and neoprene or rubber overboots.

Key:
A Physical Injury Hazard
B Overhead/underground Utility Hazard
C Fire/explosion Hazard
D Noise Hazard
E Contact with Contaminated Soil Hazard
F Contact with Contaminated Water Hazard
G Inhalation Hazard
H Ingestion Hazard
I Skin Contact Hazard
J Heat/cold Stress Hazard
K Confined Space Entry
L Vandalism Hazard

Hazard[e]	Safety & Health (S&H) Document/ Standard Operating Procedure (SOP) References
Physical Injury Hazard	S&H, SOP 2.1.17A, 2.1.40A; TSSHP 2.5.1
Overhead/Underground Utility Hazard	S&H, SOP 2.1.40B, 2.1.40C
Fire Explosion Hazard	S&H, SOP 2.1.24A
Noise Hazard	S&H, SOP 2.1.21
Contact with Contaminated Soil Hazard	S&H, SOP 2.1.60A, 2.1.60B, 2.1.70
Contact with Contaminated Water Hazard	S&H, SOP 2.1.60A, 2.1.60B, 2.1.70
Inhalation Hazard	S&H, SOP 2.1.15B, 2.1.30H, 2.1.65D, 2.1.80
Ingestion Hazard	S&H, SOP 2.1.15B, 2.1.110
Skin Contact Hazard	S&H, SOP 2.1.70A
Heat/Cold Stress Hazard	S&H, SOP 2.1.60C
Confined Space	S&H, SOP 2.1.17-D
Vandalism Hazard	S&H, SOP 2.1.40; 2.1.15A

Table 7-2
Equipment List

MSA Full face respirator, or equivalent
MSA GMC-H cartridges, or equivalent
Respirator cleaner/sanitizer
Respirator cleaning basins
Soft bristle cleaning brushes
Rinse basins
Clean storage bags, zip-loc
Face shields
Polycoated disposable coveralls
Neoprene overboots
Nitrile outer gloves
Vinyl inner liners
Outer cotton gloves
Leather work gloves
Goggles
Safety glasses
Ear plugs
Hard hats
Spectacle kits
Orange safety vests
Sunscreen
Absorbent material
Air horn
First aid kit
PID analyzer
Electrolyte replenishment fluid (e.g., Gatorade)
Eye wash station
Eye wash bottles, 500 ml
Duct tape
Insect repellent
Fire extinguisher 5-lb ABC
Fire extinguisher - 20 lb ABC
Safety barrier tape
Yellow and black rope
3/8 O.D. Tygon tubing
Cotton inner liners
Drager pump/tubes for benzene, ethylbenzene, toluene and xylenes
Smoke tubes for respirator fit testing
Bloodborne pathogen waste container/signs
Lockout/tagout locks and tags
Stretcher
Dustpans/broom
Street broom
Coal shovel
10 mil plastic trash bags
12 inch by 12 inch plastic bags
Wind sock with pole
Ice vests
Blue ice for vests, 9 oz.
FID analyzer
Personal sampling pump w/low flow capacity
Cal gas 37 ft^3 10 ppm methane
Cal gas 37 ft^3 100 ppm methane
Cal gas 37 ft^3 1,000 ppm methane
Cal gas 37 ft^3 30% LEL methane
Hydrogen gas 300 ft^3 GC grade
4 gas meter with O_2, LEL, CO, and H_2S
Gilibrator (or equivalent)
Noise SLM/DOS meter with calibrator
Cal gas 37 ft^3 10 ppm H_2S
Cal gas 37 ft^3 250 ppm isobutylene
Cal gas 37 ft^3 90 ppm CO
Cal gas 37 ft^3 zero air
Confined space retrieval equipment
SCBAs with regulator capable of supplied air connection
Grade D or better breathing air

exposure - otherwise leather gloves may be used)
-Chemical safety goggles (must be worn for groundwater sampling and well pumping if splash hazard is present)

- Construction Attire (C.A.)
  -Hard hat - Safety glasses
  -Sturdy work shoes - Long pants
  -Sleeved shirt

All personal protective equipment used during the course of this field investigation must meet the following applicable OSHA standards:

Type of Protection	Regulation	Source
Eye and face	29 CFR 1910.133	ANSI Z87.1-Latest Edition
Respiratory	29 CFR 1910.134	ANSI Z88.1-Latest Edition
Head	29 CFR 1910.135	ANSI Z89.1-Latest Edition
Foot	29 CFR 1910.136	ANSI Z41.1-Latest Edition

ANSI = American National Standards Institute

The above designated levels of protection will be upgraded or downgraded by the SSHR based on site conditions and air monitoring results.

8.0 EMERGENCY RESPONSE

Emergency response and notification procedures are specified in Attachment A of the Navy RAC Bases SSHP.

9.0 HURRICANE AND DESTRUCTIVE WEATHER RESPONSE

Hurricane and destructive weather procedures are specified in Attachment B of the Navy RAC Bases SSHP.

10.0 SPILL PREVENTION AND CONTROL

Spill control procedures are specified in Attachment C of the Navy RAC Bases SSHP.

ADDENDUM

TO THE

QUALITY CONTROL PROGRAM PLAN

DELIVERY ORDER NO. 002
AT NTC ORLANDO, FLORIDA

Prepared for

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Under Contract No. N62467-93-D-0936

Prepared by

BECHTEL ENVIRONMENTAL, INC.
OAK RIDGE, TENNESSEE

NOVEMBER 1994

REVISION 0

Bechtel Job No. 22567

Approved: _____ 11/8/94
Project Manager — Date

Approved: _____ 11-8-94
Quality Control Manager — Date

Approved: _____ 14 NOV 94
Navy Contracting Officer — Date

TABLE OF CONTENTS

FIGURES

ATTACHMENTS

INTRODUCTION

The purpose of this Quality Control Plan Addendum (QCPA) is to define those activities necessary to provide adequate confidence that the interim remedial action/source removal of contaminants action defined in the Delivery Order (DO) No. 002 at Naval Training Center (NTC) Orlando, Florida site have been satisfied.

SCOPE OF WORK

This QCPA addresses site-specific requirements for Tasks 1 of DO No. 002 and is intended to be used to provide additional information to the program requirements presented in the Quality Control Plan (QCP). Both the QCP and the QCPA will be used to direct QC activities for Task 1.

Task 1 is the removal of underground storage tanks (USTs) at various locations at NTC Orlando. A detailed description of Task 1 is provided in the BEI Remediation Work Plan for Do. No. 002.

Bechtel

SECTION I - APPOINTMENT LETTER

Oak Ridge Corporate Center
151 Lafayette Drive
P.O. Box 350
Oak Ridge, Tennessee 37831-0350

Facsimile: (615) 220-2100

November 8, 1994

Mr. Jerry A. Grissett
Bechtel Environmental, Inc.
151 Lafayette Drive
Oak Ridge, Tennessee 37830

Dear Mr. Keller:

Pursuant to Section 6.7.1(b) of the Quality Control Requirements contained within the Naval Facilities Engineering Command, Southern Division, Contract No. N62467-93-D-0936, you have been appointed as Quality Control Manager for the environmental remedial action project for Delivery Order No. 002 at the Naval Training Center, Orlando, Florida. You have full responsibility and authority for implementation of the quality control program, including stop work authority in accordance with the Quality Control Program Plan.

Since the Quality Assurance Department maintains a reporting relationship independent of that for project personnel, you will report directly to me and coordinate project activities with the Project Manager.

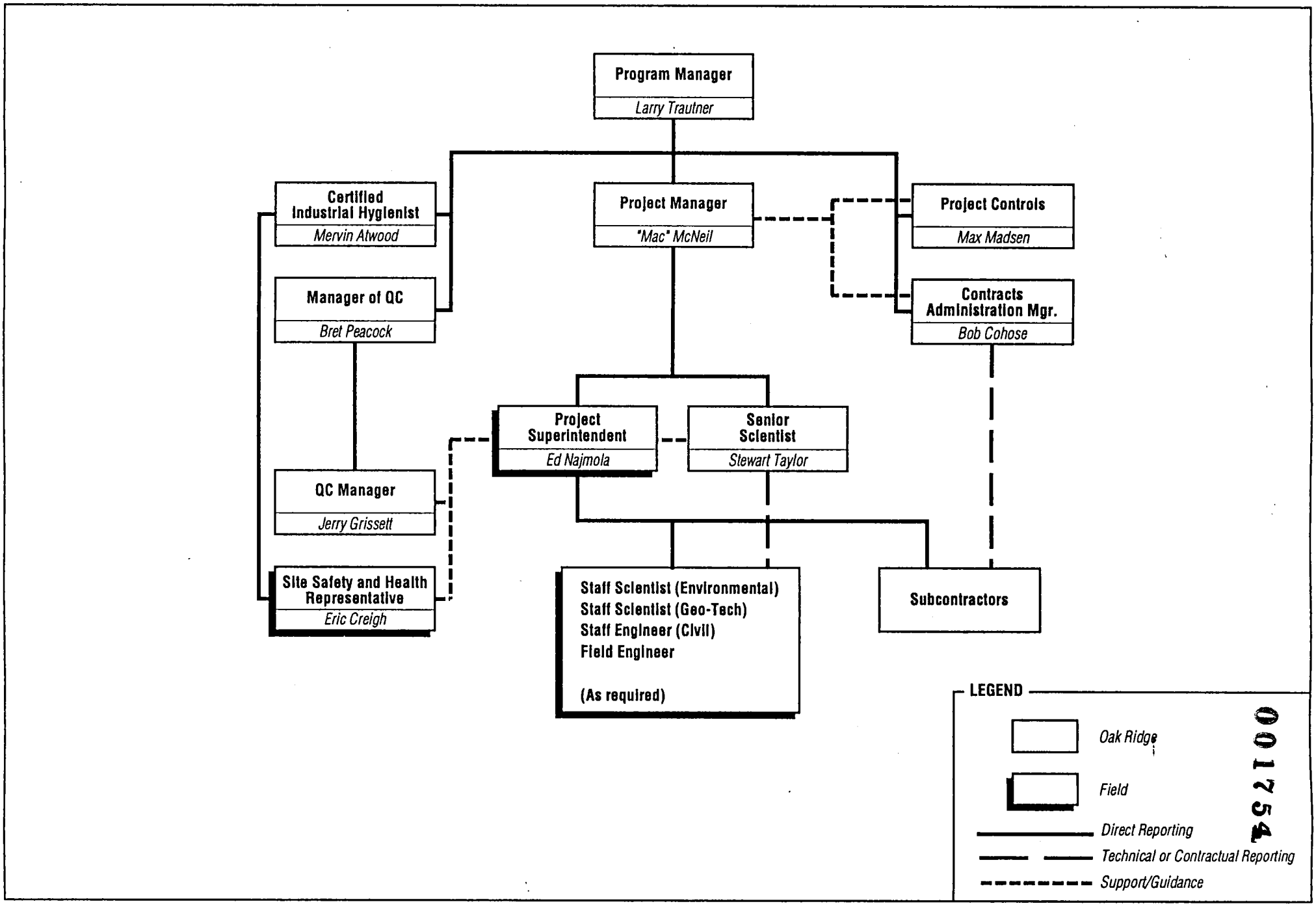
Should you have any questions, please feel free to contact me.

Sincerely,

Bret Peacock
BEI Manager of Quality Control

BP/pw

ACTION REQ'D [ ] YES [ ] NO DUE DATE _____
RESPONSE TO CHRON NO. _____



001254

1 114 6406

Figure 2-1
Project Organization

SECTION III - NAMES AND QUALIFICATIONS

Professional Profile

Name: Jerry Grissett Job Title: QA Supervisor

Proposed Project Title: Field QC Manager

Years' Experience with Proposing Firm: 11

Years' Experience with Other Firm: 8

Education (Degrees, year, specialization): BA, 1976, Political Science

Active Registration:
(Year First Registered and Discipline)

1992, Lead Auditor, ASME NQA-1
1982, Auditor, ANSI N45.2.23

Health and Safety Training:
(Course(s) and Date(s))

Safety Supervisory Training, 1990
CPR First-Aid Training, 1991

Experience and Qualifications:

Jerry Grissett has more than 19 years' experience on engineering, construction, and environmental remediation projects including 15 years in QA/QC. He currently directs the QA/QC programs of environmental restoration and remedial action projects that include tasks involved in the proposed projects.

In his position as QA Supervisor in Bechtel's Oak Ridge office, Mr. Grissett develops and implements QA programs for several environmental restoration projects simultaneously. His responsibilities include conducting/directing field surveillances/inspections of Bechtel and subcontractor activities for waste packaging, decommissioning, sampling, analysis, and other remedial actions. Mr. Grissett also conducts home-office and jobsite audits, approves laboratory QA/QC plans, and leads laboratory audits to ensure their satisfactory compliance with approved plans/procedures.

He has written numerous quality plans on remedial action and remedial investigation. Most recently, Mr. Grissett received DOE approval of a QA plan he developed for compliance with ASME NQA-1, DOE 5700.6C, and EPA QAMS 005/80. This plan directs the investigation and remediation of a former Manhattan Project research laboratory site that contains a buried uranium reactor bioshield, gasoline storage/dispensing tanks, septic drain systems, and waste from support facilities such as a lead foundry, dormitories/cafeteria, and a metallurgical lab.

In the last few years, Mr. Grissett has performed QA/QC surveillances/audits for FUSRAP (C3, p. 155), and the ORNL RI/FS project, which involves nearly all aspects of contamination control, remedial investigation, and remedial action, including groundwater monitoring, excavation of contaminated sediments and soils, and transport of wastes. He has performed audits on the USACE projects (C1, p.151), which have involved neutralization, chemical stabilization, transportation and disposal of contaminated materials, groundwater monitoring, pumping and treating contaminated groundwater, and chemical decomposition and solidification.

Previously, Mr. Grissett developed and enforced the ASME NQA-1 quality program for the decontamination and decommissioning of a nuclear fuels production facility in California. He was responsible for assuring that project plans, technical documents, procedures, and jobsite activities provided for compliance with federal and state regulations. Before coming to

Bechtel in 1982, Mr. Grissett worked two years for Public Service of Indiana as an Electrical QA Engineer. From 1972 to 1980, Mr. Grissett held positions in construction, engineering, and QC with Brown and Root Construction on its Brunswick and South Texas projects.

- **Maintaining internal and external communications:** Mr. Grissett conducts monthly QA management review meetings for his environmental projects, which involve project management and staff, to communicate on QA actions and trends. In addition, he summarizes QA activities for monthly project reports; which are in turn summarized in the monthly office report submitted by the Oak Ridge office QA Manager to Bechtel's corporate QA Department.
- **Applying quality assurance to individual tasks:** Mr. Grissett's job duties consist of supervising project QA implementation. He regularly reports trends in QA, tracks corrective action, performs QA audits, and develops project QA programs and procedures. In addition, Mr. Grissett has received training in continuous improvement principles from the QA department's TQM coach and applies these principles to his daily tasks.
- **Resolving problems:** When QA deficits recur, Mr. Grissett and his staff report them as "trends," and propose corrective actions. Some corrective actions are taken during the audit process; those that cannot be resolved immediately are tracked through a corrective action/nonconformance report. Mr. Grissett or his representative(s) approve resolutions and verify that corrective actions have been made.
- **Planning and scheduling:** Each monthly report contains an audit and surveillance schedule developed by Mr. Grissett or his representative(s). This schedule reflects project QA activities from 3 months to 1 year in advance.
- **Cost estimating and cost control:** Mr. Grissett is responsible for monitoring budget and jobhours for project QA activities.
- **Budgeting and accounting:** Mr. Grissett is also responsible for developing and forecasting costs and jobhours for project QA activities.
- **Coordinating technical reports and submittals:** Mr. Grissett has written numerous QA project procedures and plans, as well as supervising his staff in developing project deliverables relating to QA. He also reviews and approves procedures and plans for other project departments (Engineering, H&S, Procurement, etc.).
- **Managing multiple projects concurrently:** Mr. Grissett serves as QA Supervisor for several projects simultaneously.
- **Working with consultants and subcontractors:** As project QA supervisor, Mr. Grissett audits the work of consultants and subcontractors to ensure that they adhere to project requirements.

List of Technical Documents:

Quality Assurance Program Plan for the Palos Park Site

Quality Assurance Plan for the UC-Davis LEHR Site

Quality Assurance Program Plan for the Sorrento Valley Associates Site

QA/QC Procedures [over 100]

Has reviewed/approved more than 50 engineering design specifications

Reviews/approves project procedures for all disciplines as well as all project planning documents

SECTION IV - DUTIES, RESPONSIBILITIES, AND AUTHORITIES OF QC PERSONNEL

The duties, responsibilities, and the authorities of the QC personnel assigned to NTC Orlando for tasks associated with DO No. 002 are described in detail in Section IV of the Quality Control Plan (QCP).

SECTION V - OUTSIDE ORGANIZATIONS

Outside organizations may be employed by Bechtel as required by the BEI Interim Remedial Action Work Plan to provide specific services. BEI will provide QC oversight for subcontractors performing work on these tasks. These outside organizations for DO No. 002 may include but are not limited to:

- Clearing & Grassing
- Civil Survey
- Utilities & Facilities
- UST System Earthwork Construction
- Excavation/Removal
- Soil Treatment Systems
- Extraction Well & Development
- Groundwater Treatment
- Environmental Health & Safety Equipment
- Construction Vehicles
- Miscellaneous Support
- Typing, Reproduction, & Clerical Support Clerk
- Hazardous Waste Transport and Disposal

SECTION VI - SUBMITTALS

Submittals and reporting requirements for DO No. 002 tasks are specified in Section VI of the QCP. The QC Manager for NTC Orlando is responsible for the completion and submission of all required QC submittals as specified in the QCP.

SECTION VII - INSPECTION SYSTEM

Inspections will be conducted per Section VII of the QCP. Inspections to be conducted for tasks associated with DO No. 002 are listed in the Inspection Schedule Log (Attachment 1). Actual dates for QC inspections will be provided at the preconstruction meeting.

SECTION VIII - TESTING

Testing for NTC Orlando includes, but is not limited to, offsite analytical laboratory analysis, and onsite field screening for organic and inorganic parameters. Testing is addressed in Section VIII of the QCP. Additional requirements associated with testing, such as calibration, audits, subcontractor submittals, and data review are addressed in the QCP.

SECTION IX - REWORK PROCEDURES

Rework procedures and associated requirements for DO No. 002 are addressed in Section IX of the QCP.

SECTION X - DOCUMENTATION

Refer to Section X of the QCP for QC documentation requirements for tasks associated with DO No. 002.

SECTION XI - CERTIFICATIONS

Certification requirements are addressed in Section XI of the QCP.

SECTION XII - PROGRESS SCHEDULE

Scheduling will be performed by BEI and is discussed in detail in the BEI Remedial Action Work Plan for DO No. 002.

NR_0095.R1
November 8, 1994 9:41am

ATTACHMENT 1

8

Issue Date ____________

By ________________

Sheet 1 of 1

INSPECTION SCHEDULE LOG

DO Reference	Item	Inspection Phase & Schedule									Remarks
		Preparatory			Initial			Follow-up			
		Sched	Actual	By	Sched	Actual	By	Sched	Actual	By	
	Preparatory Phase Completion										
	Soil - Sampling										
	Chain-of-Custody										
	Waste Management										
	Equipment Decontamination Area										
	Field Measurements										
	Sample Preservation & Container										
	Sample Containers and Sampling										
	Packaging Samples for Transportation										
	Logbook Protocols										
	QC Sample Verification										

22567

001754

FIELD INSPECTION REPORT

Location/Description: _____

_____

Item & Spec Nos.	Accept	Reject	Date	Remarks
PREPARATORY				
100 Sample Preservation & Container Material				
105 Sample Containers and Sampling Devices				
000 Preparatory-Phase Completion				
INITIAL				
010 Groundwater - Sampling				
015 Soil - Sampling				
000 Air - Sampling				
025 Chain-of-Custody				
050 Equipment Decontamination Area				
055 Field Measurements				
140 Packaging Samples for Transportation				
150 Logbook Protocols				
FOLLOW-UP				
045 Waste Management				
COMPLETION				

By: _____ Date: _____

QC Manager/QC Field Engineer

ATTACHMENT 2