

N00207.AR.002545
NAS JACKSONVILLE
5090.3a

REMEDATION WORK PLAN FOR POTENTIAL SOURCE OF CONTAMINATION 26 AND 27
(PSC26) (PSC27) OPERABLE UNIT 1 (OU1) NAS JACKSONVILLE FL
10/1/1997
BECHTEL ENVIRONMENTAL, INC

REMEDIATION WORK PLAN

For

POTENTIAL SOURCES OF CONTAMINATION 26 AND 27
OPERABLE UNIT 1

NAVAL AIR STATION JACKSONVILLE, 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

OCTOBER 1997

REVISION 0

Bechtel Job No. 22567

Approved:	<u><i>Dale Olunau</i></u>	<u>10/2/97</u>
	Project Engineer	Date
Approved:	<u><i>D. H. James</i></u>	<u>10/13/97</u>
	Project Manager	Date
Approved:	<u><i>[Signature]</i></u>	<u>10/16/97</u>
	Navy Contracting Officer	Date

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
ACRONYMS.....	IV
UNITS OF MEASURE.....	V
FORWARD.....	6
1.0 INTRODUCTION	7
1.1 BACKGROUND INFORMATION	8
1.1.1 Site Description.....	8
1.1.2 Site History	8
1.2 REGULATORY SETTING.....	9
2.0 PRE-REMEDICATION ACTIVITIES	10
2.1 MOBILIZATION	10
2.2 CONSTRUCTION INTERFERENCE IDENTIFICATION	10
2.3 TEMPORARY FACILITIES	10
2.4 TEMPORARY DECONTAMINATION/WASTE STAGING AREA	11
2.5 CLEARING AND GRUBBING.....	11
2.6 EXCAVATION PRE-SAMPLING	11
2.7 MONITORING WELL ABANDONMENT	12
3.0 REMEDIATION ACTIVITIES	12
3.1 CONSTRUCTION DRAWINGS	12
3.2 SOIL AND SEDIMENT EXCAVATION	12
3.3 DRAINAGE REQUIREMENTS.....	14
3.4 CAP AND COVER DESIGN.....	14
3.5 ACCESS CONTROL	15
3.6 SITE RESTORATION	15
4.0 QUALITY CONTROL	15
4.1 EXCAVATION	16
4.2 FINAL COVER CONSTRUCTION	16
4.3 SITE RESTORATION	16

4.4 ACCESS ROAD CONSTRUCTION	17
5.0 WASTE MANAGEMENT PLAN	17
5.1 POTENTIALLY HAZARDOUS WASTES	17
5.1.1 Collection, Labeling, and Storage.....	17
5.1.2 Sampling	18
5.1.3 Characterization and Classification	18
5.1.4 Disposal.....	18
5.2 NON-HAZARDOUS WASTES.....	18
5.2.1 General Construction Waste and Personal Protective Equipment.....	18
5.2.2 Decontamination Products.....	19
5.3 WASTE MANAGEMENT PRACTICES - GENERAL	19
5.4 SPILL PREVENTION.....	19
6.0 SAMPLING AND ANALYSIS.....	20
6.1 SAMPLING PROTOCOL.....	20
6.2 FIELD SAMPLING AND ANALYSIS	20
6.2.1 Soil Sampling.....	20
6.2.2 Liquid Sampling	22
7.0 SAFETY AND HEALTH PLAN	22
8.0 PROJECT MANAGEMENT PLAN	22
8.1 PROJECT ORGANIZATION	22
8.2 SCHEDULE	24
REFERENCES	24

APPENDIXES

A DESIGN SPECIFICATIONS	A-1
B CONSTRUCTION DRAWINGS	B-1
C GENERAL SPECIFICATIONS	C-1

TABLES

	<u>Page</u>
6-1 Pre-Excavation Soil Sampling	21
6-2 Pre-Excavation Soil Analysis	21
6-3 – Liquid Disposal Sampling	23

ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Standard for Testing and Materials
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
CompQAP	Comprehensive Quality Assurance Plan
DO	Delivery Order
DOD	Department of Defense
DOT	Department of Transportation
EPA	U.S. Environmental Protection Agency
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
HDPE	High-Density Polyethylene
IRP	Installation Restoration Program
LNAPL	Light Non-Aqueous Phase Liquid
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Contingency Plan
NPL	National Priorities List
OU	Operable Unit
PCBs	polychlorinated biphenyls
PCE	Perchloroethylene (aka:Tetrachloroethene)
pH	Negative Logarithm of the Hydronium Ion Concentration
PP	Project Procedure
PPE	Personal Protective Equipment
PSC	Potential Source of Contamination
PSHP	Program Safety and Health Plan
PWC	Public Works Center

ACRONYMS (Continued)

QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Program Plan
QCPA	Quality Control Program Plan Addendum
RA	Remedial Action
RAC	Response Action Contractor
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROICC	Resident Officer In Charge of Construction
RWP	Remediation Work Plan
SARA	Superfund Amendments and Reauthorization Act
SSHP	Site Safety and Health Plan
SVOC	Semi-volatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TSS	Total Suspended Solids
TSSHHP	Task-Specific Safety and Health Plan
VOC	Volatile Organic Compound
WMP	Waste Management Plan

UNITS OF MEASURE

bls	below land surface
gpm	gallons per minute
mil	millimeter
psi	pounds per square inch
yd ³	cubic yards

FORWARD

Bechtel Environmental, Inc. (Bechtel) has been contracted by the Department of the Navy, Naval Facilities Engineering Command, Southern Division, to provide remedial services as the Navy's Environmental Response Action Contractor (RAC). Under Delivery Order (DO) 037, of the Prime Contract N62467-93-D-0936, Bechtel has been contracted to prepare a Remediation Work Plan (RWP) for remediation of Potential Sources of Contamination (PSCs) 26 and 27 in Operable Unit (OU) 1 at NAS Jacksonville, in accordance with the requirements of the *Draft Record of Decision, Potential Sources of Contamination 26 and 27, Operable Unit 1, Naval Air Station Jacksonville, Jacksonville, Florida*, ABB Environmental Services, Inc. (ABB-ES), July 1996.

A final Remedial Design has been developed for PSCs 26 and 27. The information contained in the *Remedial Design for Potential Sources of Contamination 26 and 27, Operable Unit 1, Naval Air Station Jacksonville, Jacksonville, Florida*, ABB-ES, June 1997 was used as guidance for the development of the RWP and is provided in the appendices of this plan. After approval of the RWP by the Navy, Bechtel intends to implement this RWP as part of the same DO.

This RWP describes the implementation of the Remedial Action (RA) activities associated with the excavation of contaminated soil and sediment outside the boundary of PSC 26, the excavation of contaminated soil at PSC 27, the disposal of the contaminated soil and sediment within PSC 26, and the installation of a partial cap and cover system. This RWP provides the background information and regulatory setting, describes the approach that will be used to conduct the RA activities, and identifies Bechtel's management organization.

1.0 INTRODUCTION

The United States Department of Navy, Southern Division, Naval Facilities Engineering Command, intends to conduct remedial action (RA) in Operable Unit (OU) 1 at Naval Air Station (NAS) Jacksonville, Florida. The goals of the RA at OU 1 are to contain and control the contamination at OU 1, and to reduce the risks posed by the contaminants of concern to acceptable levels (ABB-ES 1996b). This remedial work plan (RWP) addresses several of the activities required to perform the RA as defined in the Draft Record of Decision (ROD) (ABB-ES 1996b) and the final Remedial Design (ABB-ES 1997). The intent of this RWP is to perform source removal actions at potential source areas of contaminated soil and sediment located in, OU 1. The excavated soil and sediment will be placed at Potential Source of Contamination (PSC) 26 within OU 1, and will be capped with a geomembrane, compacted soil, and a vegetation layer.

and adjacent to.

For Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) landfills that contain large volumes of heterogeneous mixtures of municipal, industrial, or hazardous wastes, the U.S. Environmental Protection Agency (EPA) presumptive remedy is containment, including a cover system. The intent of the presumptive remedy was integrated into the remedial investigation/feasibility study process for OU 1. For the former disposal area at OU 1, implementing a containment technology, including a cap and cover, source control, and institutional controls, was determined to be the minimum acceptable action for the site.

The specific remedial action presented in the RWP addresses the following items:

- Excavation of contaminated surface soil and sediment from outside PSC 26 (including sediment from the unnamed tributary) & PSC-27
- Disposal of the excavated soil and sediment in PSC 26 within the area covered by the presumptive remedy.
- Installation of a cap and cover system at PSC 26.

The documents that provide the basis for this RWP are as follows:

- *Draft Record of Decision, Potential Sources of Contamination 26 and 27, Operable Unit 1, Naval Air Station Jacksonville, Jacksonville, Florida*, ABB Environmental Services, Inc., July 1996
- *Remedial Design for Potential Sources of Contamination 26 and 27, Operable Unit 1, Naval Air Station Jacksonville, Jacksonville, Florida*, ABB Environmental Services, Inc., June 1997.

It should be noted that the final Remedial Design provides the design criteria as established by the Engineer of Record (i.e., ABB Environmental Services, Inc.), in cooperation with the NAS Jacksonville Partnering Team. This RWP is intended to provide guidance to the field crew during implementation of the remedial design and presents instructions to the field crew for

execution of the RA. This RWP also provides necessary information for regulatory and Navy approval to proceed with the RA. Section 1.0 provides the background information, including site description, site history, and the regulatory setting. Sections 2.0 and 3.0 present the actual activities associated with the remedial action and provide the primary field guidance for the remedial action. Section 4.0 addresses quality control for the project. Section 5.0 describes the field approach to waste management for this specific action. Section 6.0 presents the field methods and techniques to be used during remedial action and the waste management sampling requirements. Sections 7.0 and 8.0 address safety and health and the project management plan, respectively.

Appendix A of this RWP contains the design technical specifications. Appendix B of this RWP contains the construction drawing set. Final record set drawings will be issued to the appropriate parties at the completion of the project by the Engineer of Record, ABB Environmental Services, Inc. Field copies of the current record sets (updated due to field conditions or approved revisions) will be maintained at the Bechtel NAS Jacksonville office. All submitted record copies will be sealed by a professional engineer, in accordance with Florida Statute 471.

To supplement the design technical specifications, typical Bechtel Navy RAC technical specifications that are applicable to the remedial action described in this work plan have also been included (see Appendix C). These specifications were developed as a cost savings measure for the majority of the Bechtel Navy RAC projects or delivery orders awarded through Southern Division. They were also developed with the idea that Bechtel would be subcontracting the work. In those cases where Bechtel is to provide direct hire labor and equipment for execution of project activities, references to subcontractor interface to Bechtel are not applicable. These specifications are provided as general guidance to the field construction management team for the work involved in the remedial action. In the event of conflict, the order of precedence for the remedial action described in this RWP would be (1) construction drawings and design technical specifications, (2) the work plan, and (3) typical technical specifications.

1.1 BACKGROUND INFORMATION

1.1.1 Site Description

NAS Jacksonville is located in Northeast Florida on the west bank of the St. Johns River, south of Jacksonville, Florida, in Duval County. OU 1 is located in the southern portion of the base. OU 1 consists primarily of the Old Main Registered Disposal Area (PSC 26) and the Former Transformer Storage Area (PSC 27). The locations of PSC 26 and 27 are shown on the construction drawings included in Appendix B.

1.1.2 Site History

The land at PSC 26 was used by the Navy for disposal of discarded vehicles, household and sanitary waste, liquid industrial waste such as oil and solvents, and demolition and construction debris. Beginning in approximately 1940, materials were sometimes burned in open pits or

trenches, which were covered with soil subsequent to incineration. Between 1940 and 1950, low level radioactive wastes were also disposed at PSC 26. Disposal of liquid wastes continued until 1978, when light non-aqueous phase liquid (LNAPL) was discovered in the subsurface north of Child Street. PSC 26 was officially closed as a disposal area on January 15, 1979 (ABB-ES 1996a).

The land at PSC 27 was used to store transformers during an unknown period of time. Reportedly, vandalism in 1978 caused an unknown amount of transformer oil containing polychlorinated biphenyls (PCBs) to spill onto the ground surface. At that time, the Navy removed the transformers and PCB-contaminated soil and transported them off-site for disposal. (ABB-ES 1996a).

In 1995, the Navy and its Comprehensive Long-Term Environmental Action (CLEAN) contractor performed a Remedial Investigation that resulted in the Draft ROD being issued for the site. Various assessments and interim remedial activities which have occurred at the site since 1973 are summarized in the Draft ROD. (ABB-ES, 1996b)

1.2 REGULATORY SETTING

In December 1989, NAS Jacksonville was placed on the Federal National Priorities List (NPL). This requires all remedial responses to be consistent with the guidelines specified within Section 120 (42 U.S. Code 9620). As part of the Department of Defense (DOD), the Navy is responsible for the investigation and remediation of these sites. Currently, NAS Jacksonville is participating in the DOD Installation Restoration Program (IRP), which complies with CERCLA, as amended. The Federal Facilities Agreement, signed by the EPA, Florida Department of Environmental Regulation (now the Florida Department of Environmental Protection or FDEP), and the Navy coordinates all IRP actions at NAS Jacksonville.

The actions described in this RWP are being implemented following the requirements presented in the Draft ROD and the final Remedial Design. CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and the National Oil and Hazardous Substances Contingency Plan (NCP), provides the regulatory basis for this action.

The Applicable or Relevant and Appropriate Requirements (ARARs) associated with the excavation and cap installation are administered by EPA Region IV, the FDEP, and the City of Jacksonville. The action-specific ARARs determined to be applicable for this RA can be found in the Draft ROD.

2.0 PRE-REMEDATION ACTIVITIES

2.1 MOBILIZATION

Mobilization will include delivering to the job site and work areas sufficient labor, materials, and equipment as needed to implement this work plan. Prior to the commencement of work, a preconstruction meeting will be held with the NAS Jacksonville Resident Officer In Charge of Construction (ROICC) and other Navy and Navy contractor personnel as the ROICC deems necessary. The purpose of the meeting will be to discuss the execution of the work and related topics.

2.2 CONSTRUCTION INTERFERENCE IDENTIFICATION

Prior to beginning any work, the boundaries of the planned excavations will be marked at the site. Bechtel will perform an initial survey to provide control points for the excavation activities if it is deemed necessary in the field. Bechtel may choose to subcontract this survey to a local survey company. Underground utilities will be identified as appropriate. The Bechtel site superintendent or his designated representative will perform a walk-through of the area to observe readily visible potential construction interferences. NAS Jacksonville personnel will be consulted for as-built locations of pipes, utilities, and other potential obstructions. If deemed appropriate, the project site will be scanned with electromagnetic equipment. Obstructions noted will be marked either through the use of colored flags or paint. Appropriate utility clearance personnel will be contacted to participate in this phase of the project. No excavation or intrusive work will be initiated until the subgrade interference survey is complete. Areas that cannot be cleared for equipment excavation will be hand excavated.

2.3 TEMPORARY FACILITIES

A construction trailer is currently located at the site for use as a field office. Additionally, a storage trailer and/or cargo boxes may be required for the storage of personal protective equipment (PPE), monitoring equipment, supplies, and miscellaneous materials. Note that the construction trailer and site storage facilities are currently located in an area which will be impacted by the remedial action and will have to be relocated prior to construction in that area. The new locations for trailers or cargo boxes will be confirmed with the ROICC or his designee. Temporary fencing may be installed around construction areas outside the boundaries of the old landfill with the approval of the ROICC. This fencing will not prevent intentional intrusion, but will prevent inadvertent access. Parking areas for the work crews will be designated during the preconstruction meeting. The specific locations will be determined in the field and coordinated with the ROICC.

2.4 TEMPORARY DECONTAMINATION/WASTE STAGING AREA

decon pad disposal

A temporary decontamination area is currently located near the construction field office and will be utilized during this RA. An area for the staging of any construction rubble or waste will be designated within the construction area. Potentially hazardous wastes awaiting confirmatory sample results and hazardous wastes requiring disposal will be staged in a separate area where cross-contamination of construction debris can be properly controlled.

Bechtel will use an installed wash pad to decontaminate tools, equipment, and PPE used in the work zone. The wash pad is constructed of concrete and includes a six-inch curb. The pad is assembled within the immediate vicinity of the work zone and is located in an area accessible to on-site traffic, but not in an area that interferes with Navy operations. The equipment will be washed with a pressure washer.

Note that the decontamination pad is currently located in an area which will be impacted by the remedial action and will have to be relocated prior to construction in that area. The new location for the pad will be confirmed with the ROICC or his designee.

2.5 CLEARING AND GRUBBING

Then what?

Clearing of soil excavation areas and the cap and cover areas will include the removal of vegetation, downed timber, snags, brush, and rubbish in accordance with the requirements of the technical specifications included in Appendix A. Trees in the radioactive contamination area of PSC 26 will be sampled to determine if they are free from contamination. Stumps within the limits of the geomembrane cover at PSC 26 will be removed. Stumps outside the geomembrane footprint may be left in place provided that they are dead; otherwise, they will be removed. All vegetative materials removed will be chipped and intermixed with the top layer of soil at PSC 26. Chipped material will not be placed under the geomembrane or beneath the top layer of the landfill cover. Mulch currently located on site will be removed from the footprint of the geomembrane.

Debris other than the materials to be chipped will be disposed of by Bechtel as construction debris if non-hazardous, or in coordination with the Public Works Center (PWC), NAS Jacksonville, if hazardous. Tent structures currently located on site at PSC 26 will be scrapped and disposed of as construction debris. Metal materials from the structures will be sent to base recycling, NAS Jacksonville.

2.6 EXCAVATION PRE-SAMPLING

where? FSAP?

Prior to excavation, samples will be collected at the perimeters of Soil Excavation Areas 1 through 9 and PSC 27 as shown in the construction drawings. Analytical results will be used to verify the area delineations and will be compared to the FDEP soil residential cleanup goals (FDEP 1995). Areas for which sample results are less than FDEP soil residential cleanup goals

greater than?

for the contaminants of concern may be excavated. Additional samples will be collected in those areas where analytical results exceed the FDEP soil residential cleanup goals. Pre-sampling will not be conducted at Sediment Removal Areas A, B, and C. The field methods and techniques that will be used to collect the samples are provided in Section 6.0, Sampling and Analysis.

Why and where?

2.7 MONITORING WELL ABANDONMENT *check for compliance w/res. OK*

A total of 58 existing monitoring wells and 8 piezometers at the site will be abandoned, as shown ~~in~~ *listed* in the construction drawings. The wells that are located within the limits of a planned excavation will be abandoned a minimum of 12 hours prior to the commencement of excavation activities. The wells that are located within PSC 26 will be abandoned a minimum of 12 hours prior to cap installation. Monitoring well abandonment will be performed in accordance with the technical specification included in Appendix A.

3.0 REMEDIATION ACTIVITIES

substantial differences require approval
is effect decision

This section of the document provides guidance and direction to the Bechtel field crew during the implementation of RA activities for OU 1. The design is specified in the final Remedial Design for OU 1 (ABB-ES June 1997). Revisions or suggested improvements that substantially differ from the activities described in this RWP will be provided in the form of written memoranda in accordance with Bechtel Navy RAC Project Procedure 6026, Project Plan Revisions, for approval by the ROICC and, (if necessary), the Engineer of Record and the FDEP prior to implementation. Long-term groundwater monitoring is not included within the scope of this work plan.

3.1 CONSTRUCTION DRAWINGS *not all*

Final design drawings have been previously issued as construction drawings (ABB-ES 1997) and are included in Appendix B. Details necessary for the field crew to implement the final Remedial Design are included on the construction drawings. These drawings will serve as the basis for the Record Drawings to be submitted to the Navy, the EPA, and the FDEP by the Engineer of Record. *need list*

3.2 SOIL AND SEDIMENT EXCAVATION *the geo. membrane cover at*

A total of approximately 14,257 cubic yards (yd³) of contaminated surface soil will be excavated from nine separate soil excavation areas in PSC 26 as delineated in the construction drawings (see Appendix B). Excavations will be limited to a depth of one foot. The limits of the soil excavations are based upon human health risk criteria. The excavated soil will be placed within the limits of PSC 26 prior to capping (see Section 3.4 for cap discussion). An existing passive recovery system, which is currently being utilized at the area north of Child Street for LNAPL recovery, will be protected and maintained during soil excavation. Soil Excavation Areas 1

through 9 will be backfilled with clean materials in accordance with the technical specifications to the original grade.

In Soil Excavation Area 7, soil will be excavated within existing base housing backyard areas in a manner that will not damage or affect the stability of houses. Soil excavated in the vicinity of large trees within backyard areas will be excavated in a manner to prevent damage to the tree root systems. Patios and storage sheds located in housing backyards within the limits of the soil excavation area will not be removed or relocated.

Approximately 700 yd³ of PCB-contaminated soil will be excavated from PSC 27 as delineated in the construction drawings. The excavation will be limited to a depth of one foot. The limit of the soil excavation is based upon human health risk criteria. The excavated soil will be placed within the limits of PSC 26 prior to capping. The soil excavation area at PSC 27 will be backfilled with clean materials in accordance with the technical specifications to the original grade.

the geomembrane cover at

Approximately 1,890 yd³ of sediment will also be removed from three sediment removal areas as shown on the construction drawings. Based on the Draft ROD, sediment excavation is to be limited to "hot spots" of contamination, due to practical and technical implementation issues. The sediment removal areas will be excavated to a depth of one foot. Surface water in Sediment Removal Area B has previously been determined by the Navy to be non-contaminated. Prior to sediment excavation, this surface water will be removed and utilized on PSC 26 for dust control. The excavated sediments will be stockpiled within the limits of the geomembrane cover at PSC 26 and protected from precipitation to facilitate dewatering.

berming around wet sed.

Subsequent to sediment excavation, Sediment Removal Area A will be backfilled with clean fill to the design elevations shown on the construction drawings or six inches above the groundwater table at the time of excavation, whichever is higher. Sediment Removal Area B will be regraded with adjacent bank materials to the design elevations shown on the construction drawings, and segments of the ditch will be protected with rip rap as indicated on the drawings. Sediment Removal Area C will be regraded with adjacent bank materials to the design elevations shown on the construction drawings.

Sediment Removal Area C and portions of Soil Removal Areas 1, 2, and 3 (as described in the construction drawings) lie within wetlands. The soil and sediment removal activity within the wetlands is authorized by the Department of the Army Nationwide Permit (i.e., NW-33, Temporary Construction and Access, and NW-38, Cleanup of Hazardous and Toxic Wastes) in accordance with the regulations as stated in the December 13, 1996, *Federal Register*, Final Notice of Issuance, Reissuance, and Modification of Nationwide Permits (61 FR 65874). No federal, state, or local permits are required for response actions conducted pursuant to CERCLA per 40 Code of Federal Regulations (CFR) 300.400(e); therefore, a Florida Environmental Resources Permit is not required.

During construction activities, surface water will be directed away from excavation areas by diversion ditches, dams, dikes, or grading, if necessary. Sediment and erosion control measures,

how?
plan to be
submitted?

such as the installation of silt fences or hay bale dikes referenced in the construction drawings, will be implemented during work activities at all areas where the potential for erosion is present to prevent sediments from being transported out of work areas. Such erosion control measures are particularly important at Sediment Area C adjacent to the St. Johns River and will be addressed prior to construction.

Final ditch bank

Sediment erosion control will be completed by placing rip rap in Sediment Removal Area B and segments of the perimeter ditch adjacent to PSC 26 as shown on the construction drawings.

3.3 DRAINAGE REQUIREMENTS

The drainage area northeast of Child Street, which includes Soil Excavation Area 8 and Sediment Removal Area A, will be redirected to the original drainage path through a new 15-inch drainage culvert and an existing 24-inch drainage culvert located approximately 500 feet east of OU 1. An existing 24-inch culvert which currently connects the drainage area to the perimeter ditch adjacent to PSC 26 will be permanently plugged.

how

what about
ditch water?

The drainage collection system (ditches) around the perimeter of PSC 26 will be regraded to the design elevations shown on the construction drawings. Sediment Removal Area A will be regraded to the design elevations shown on the construction drawings or six inches above the groundwater table at the time of excavation, whichever is higher. If the latter, the drainage flow line will be rechecked. Existing soil plugs within the perimeter ditch will be removed to allow continuous flow.

no

3.4 CAP AND COVER DESIGN

the limits of the geomembrane
cover at

Following the disposal of the excavated soil and sediment within PSC 26, a partial cap and cover will be installed over the extent of the former disposal area. The cap material will be installed in accordance with the requirements stated below:

- A 40-mil (minimum) high density polyethylene (HDPE) geomembrane will be installed over the radionuclide contaminated soil, the LNAPL waste, the excavated soil and sediment incorporated into PSC 26, and other areas as shown on the construction drawings to prevent infiltration of storm water into these areas. A geotextile will be placed on top of the soil and sediments prior to placement of the geomembrane for protection from stones.
- An 18-inch borrow material layer will be placed over the geomembrane and on the remainder of PSC 26. The borrow material will meet filtration requirements for the overlying vegetative soil. The in-place density of the borrow material will be required to meet 85 percent maximum dry density outside the limits of the cap and 90 percent maximum dry density within the limits of the cap. The borrow material will be clean and will meet the gradation requirements included in the technical specifications (Appendix A).
- A 6-inch layer of vegetative soil will be placed over the borrow material to support plant growth.

placed
in lifts
consistent
w/ specs

- The final grades at PSC 26 will be sloped from 1 to 1.5 percent.

3.5 ACCESS CONTROL

The existing entrance gate (off Child Street) and fence around PSC 26 will remain. No additional access control will be provided. A 48-inch reinforced pipe culvert will be used to permit access across the perimeter ditch to PSC 26 while maintaining continuity of the new storm water conveyance system. The access road will end immediately after crossing the perimeter ditch.

3.6 SITE RESTORATION

The cover and perimeter ditch at PSC 26, the nine soil excavation areas outside of PSC 26, and the excavation area at PSC 27 will be furnished with a vegetative soil layer, fertilizer, seed, and mulch as required by the technical specifications included in Appendix A. Areas excavated within existing housing backyard areas (in Soil Excavation Area 7) will be sodded to match existing lawn areas. Bechtel will ensure and maintain soil stability in disturbed wetland areas to prevent soil erosion and to allow revegetation of disturbed wetland areas to occur naturally.

Access roads passing through Soil Excavation Areas 4, 5, and 6 will be backfilled to original grade with aggregate base material. The path of the original access road will be maintained.

4.0 QUALITY CONTROL

Appropriate Quality Control (QC) criteria are developed and included in the site-specific addendum to the Quality Control Program Plan (QCP). This site-specific plan, called the Quality Control Program Plan Addendum (QCPA), is based on the Navy-approved QCP for the basic contract. The QCPA will be issued under separate cover to the Navy for approval. Bechtel will implement, maintain, and comply with the Navy-approved basic contract QCP and the site-specific QCPA, and will provide a trained, qualified Quality Assurance (QA) Representative to perform the function of QA.

In general, requirements of the final Remedial Design will be followed for QC criteria. The technical specifications include product standards, installation requirements, and testing procedures. Prior to beginning construction, the QC checklist will be created by the QC Manager. This checklist will detail items from the specifications that require certification and/or inspections.

This section of the RWP provides the basic outline for the QCPA and describes the general intent of the remedial action quality control/quality assurance. This section provides general guidance to the field construction crew for items that require inspection, and also identifies some of the critical items that require spot inspection.

concrete

within or adjacent to

and compacted

} check re: minor rgs.

4.1 EXCAVATION

During the excavation process, the QA Representative will ensure that the limits of excavation are staked or otherwise indicated prior to construction, and that records are kept on the actual limits of excavation and the amount of material excavated. Other excavation inspections include side wall stability, placement of the geotextile and geomembrane, and surveying of the control points for the limits of excavation.

4.2 FINAL COVER CONSTRUCTION

What qualifies the QA rep?

Prior to geomembrane installation, the QA Representative will obtain random samples from rolls delivered to the site and submit the samples to a qualified testing service vendor to determine material properties as required in Design Specification 02776. The QA Representative will ensure that the geomembrane is deployed consistent with the manufacturer's recommendations and in such a manner as to prevent any damage to the material. During installation of the geomembrane, the QA Representative will observe all non-destructive seam tests, observe each roll of liner material for defects, review the manufacturer's QC certificate for each roll, and cut coupons or conduct field destructive testing of seam samples as required. Detailed procedures for testing of seams and acceptance criteria will be referenced in the QCPA.

The material used for the construction of the final cover will be comprised of material as specified in the OU 1 Technical Specification 02220, provided in Appendix A. Certificates of material compliance will be provided by the borrow source for the material to be delivered. All delivery tickets will be retained.

Compaction tests outside the limits of the landfill cap will be provided per ASTM D 2922-91, ASTM D 1556-90, or ASTM D 2167-84 at a rate as specified in Technical Specification 02220. Compaction will be required to meet 85 percent maximum dry density outside the limits of the cap and 90 percent maximum dry density within the limits of the cap. The material will be placed in a maximum of 12-inch compacted lifts. *2 or 7 } chks.*

4.3 SITE RESTORATION

During site restoration activities, the QA Representative will ensure that compaction testing, grading, and seeding are consistent with the requirements of the technical specifications. Additionally, erosion controls will be inspected for proper placement and usage. Borrow source submittals will be checked to ensure gradation, certification, and TCLP testing. The top soil will not require compaction testing. Grass seed and fertilizer (20-3-6 analysis) will be applied to the top soil layer at the rates specified in Design Specification 02931. Material data sheets will be recorded for the seed and fertilizer. Quantities will be recorded by a Bechtel employee.

4.4 ACCESS ROAD CONSTRUCTION

The access road will be constructed to provide a functional access to the landfill. Standard crushed gravel or lime rock will be used to improve the roadway. Material delivery tickets will be recorded for each truck load. General construction techniques will be recorded in the daily construction log. Visual inspection of the grading and placement of the material will be performed. No density testing is required.

Yes
it
is

5.0 WASTE MANAGEMENT PLAN

There are several waste management activities anticipated during this remedial action. All wastes and hazardous substances generated during this remedial action will be managed in accordance with applicable federal and state laws and regulations, as well as the *Environmental Response Action Contract Waste Management Plan* (BEI 1995). The waste streams can be anticipated to be in one of the following two groups:

Potentially Hazardous

- PPE and Spent Decontamination Products (unless deemed non-hazardous)
- LNAPL recovered during excavation activities

Non-Hazardous

- Construction-generated non-hazardous waste.

5.1 POTENTIALLY HAZARDOUS WASTES

Existing analytical data and process knowledge indicate the likelihood of generating potentially hazardous wastes is minimal. However, if any hazardous wastes are identified, they will be managed in accordance with RCRA (40 CFR Part 260) and related federal and state regulations. Unless decontamination procedures and subsequent analytical results can demonstrate non-hazardous characteristics, all wastes that have been in contact with potentially hazardous wastes generated on this project will be classified as potentially hazardous. This section describes the procedures for the management of these wastes.

5.1.1 Collection, Labeling, and Storage

All potentially hazardous waste or hazardous waste generated during the remedial activities will be collected and stored in Department of Transportation (DOT)-approved drums and containers. Each container will be properly labeled with the appropriate label (e.g., unclassified, hazardous, etc.) following characterization as described in Section 5.1.2. Each label will be marked with the waste stream name and waste accumulation start date. DOT labels will be applied to the containers, if required, prior to transportation. Potentially hazardous wastes will be given to the Navy for proper storage and disposal.

5.1.2 Sampling

If required, samples for waste streams at OU 1 will be collected in accordance with the procedures included in Section 6.2.

5.1.3 Characterization and Classification

The selected disposal facility's permit constraints will determine the analyses required for characterization and approval prior to disposal. Samples for each waste stream will be collected by Bechtel and the results will be forwarded to the Navy. The Navy will then complete characterization of the wastes. All drums will be labeled in accordance with Bechtel Navy RAC waste management procedures (BEI 1995). LNAPL at Soil Excavation Area 8 and Sediment Removal Area A has previously been characterized by the Navy as PCB-contaminated and existing analytical data and waste profiles are available through PWC, NAS Jacksonville. Additional sampling of LNAPL at these two areas is not anticipated. However, additional sampling of LNAPL will be required if it is encountered in other excavation areas during remedial action.

5.1.4 Disposal

If it is determined that hazardous wastes are generated or discovered during this RA, Bechtel will coordinate disposal of such wastes with PWC, NAS Jacksonville, and will provide all information necessary for the Navy to characterize the wastes. Disposal manifesting and record keeping of hazardous wastes will be performed by the Navy, including notification to the EPA Region IV off-site coordinator if required. Prior to disposal, Bechtel will conduct weekly inspections of on-site accumulations of hazardous wastes and will submit inspection reports to the Hazardous Waste Manager, NAS Jacksonville.

5.2 NON-HAZARDOUS WASTES

Several non-hazardous wastes will be generated during this project. This section discusses disposal practices for the anticipated non-hazardous wastes. Non-hazardous construction waste generated during the remedial activities will be collected and stored in DOT-approved drums and containers. Bechtel will be responsible for the disposal of all non-hazardous wastes related to this project. It is important to note that disposal of all CERCLA remediation waste (including non-hazardous wastes) will fall under the requirements of the CERCLA "Off-site Rule" and will require Bechtel to contact the EPA Region IV representative and verify the acceptability of the proposed disposal facility.

5.2.1 General Construction Waste and Personal Protective Equipment

Non-hazardous solid waste that is generated as a result of mobilization, demobilization, and construction activities at the site will be properly disposed of at a Subtitle D or construction rubble landfill as appropriate, or as directed by the Navy. PPE that has been decontaminated will be disposed of by placing the materials in double plastic garbage bags and disposing at a Subtitle

D landfill, or as directed by the Navy. It is important to note that only those wastes that have not been in contact with potentially hazardous waste, as described in Section 5.1, can be classified as non-hazardous.

5.2.2 Decontamination Products

All personnel equipment will be decontaminated on site using sealable tubs or 5-gallon buckets. The volume of water generated during decontamination activities is anticipated to be small. The decontamination water will be generated primarily during cleaning of equipment involved with the remediation process. Any generated decontamination water will be collected in a 55-gallon drum. Drummed decontamination water will be managed as described in Section 5.1. Under no circumstances will excess cleaning solutions (e.g., isopropanol) which are not contaminated or spent be added to decontamination water. In addition, no solvents that could generate a hazardous waste will be used or discharged at this site. All unused decontamination solutions will be removed from the site at the time of demobilization.

5.3 WASTE MANAGEMENT PRACTICES - GENERAL

Waste management practices, as defined in the Bechtel Navy RAC Program Waste Management Plan (WMP) (BEI 1995), will be performed as described in the plan and will be coordinated with the Navy. The WMP provides guidance for uniform practices in this area. The Waste Tracking Log contained in the WMP will be completed by Bechtel personnel.

5.4 SPILL PREVENTION

Activities associated with the refueling of equipment will be conducted in a manner to ensure that product or fuel is not released into the environment. When conducting operations that may result in possible fuel release, the work will proceed in accordance with best management practices to preclude a spill. Provisions for spill prevention and control that will be used during transfer of fuel will include:

- Performing manual level checks in the portable fuel tank prior to refilling
- Performing manual level checks in the equipment tank prior to refueling
- Manual transfer of fuel
- Surveillance monitoring during refueling operations to ensure overflow conditions do not occur
- Use of process controls where feasible
- Proper liners and berms to prevent migration of contaminants if a spill occurs
- Immediate availability of spill mitigation equipment (e.g. absorbent materials)
- Immediate notification will be made to the NAS Jacksonville Fire Department and then to NAS Jacksonville FED personnel if a spill occurs.

Other provisions and procedures will be discussed with the Navy prior to implementation of the refueling operations. Daily inspections of the refueling operations will be performed by the Bechtel Safety and Health representative to ensure availability of prevention controls.

6.0 SAMPLING AND ANALYSIS

Bechtel's approved Comprehensive Quality Assurance Plan (CompQAP #940316) is presently on file with the FDEP. Project procedures based on EPA Region IV sample collection guidelines will be used throughout the data collection phase of this project. This section outlines the specific field methods and techniques that will be used to collect solid and liquid samples during the course of the activities outlined in this work plan.

6.1 SAMPLING PROTOCOL

The following Bechtel Navy RAC project procedures will be utilized for this work:

- Project Procedure (PP) 6003 Sample Identification and Data Coding
- PP 6004 Field Logbook Management
- PP 6005 Chain-of-Custody Record Procedures
- PP 6006 Sample Tracking
- PP 6010 Sample Containers, Preservation and Aliquot Requirements
- PP 6011 Sample Packaging and Shipment
- PP 6022 Surface Water Sampling
- PP 6024 Decontamination of Field Sampling Equipment
- PP 6025 Soil Sampling.

6.2 FIELD SAMPLING AND ANALYSIS

Samples identified in this section will be collected in accordance with the previously identified project procedures. Analysis of these samples will be in accordance with the EPA criteria for the defined method or by the procedure identified as appropriate.

6.2.1 Soil Sampling

Perimeter samples will be collected at soil excavation areas 1 through 9 and at PSC 27 to verify that the horizontal extent of contamination has been delineated. The number of samples per excavation area is summarized in Table 6-1 and is based on the *Guidance Document for Verification of Soil Remediation* (Michigan 1994). Minimum sampling will be one sample per side, or four samples total, taken at each midpoint. In the case of irregularly shaped excavations, where four walls will not readily be discernible, the total perimeter area will be divided into four segments of approximately equal size. If necessary, additional samples above the minimum

TABLE 6-1

Pre-Excavation Soil Sampling

Excavation Area	Total Perimeter (lineal feet)	Sample Interval (lineal feet)	Minimum Number of Samples
1	900	80	12
2	900	80	12
3	400	60	7
4	390	60	7
5	540	80	7
6	660	80	9
7	2040	120	13
8	1690	200	9
9	355	60	6
PSC 27	570	80	8

Note: Minimum number of samples is based on the *Guidance Document for Verification of Soil Remediation* (Michigan 1994) and is determined by total perimeter length. The number of samples may be increased based on judgment of the field sampling team.

TABLE 6-2

Pre-Excavation Soil Analysis

why

Excavation Area	Semivolatile Organics (EPA Method 8270)	Pesticides/PCBs (EPA Method 8080)	Dioxins/Furans (EPA Method 8280)	Inorganics (EPA Method 6000 Series/7190)
1	X			X
2	X	X		X
3	X			X
4	X			
5	X			
6	X			X
7	X	X	X	X
8	X	X		X
9		X		
PSC 27	X	X		X

required will be taken at locations incorporating all pertinent biases of the excavation area and using professional judgment. The samples will be a composite of material from land surface to one foot below land surface. The soil samples will be analyzed for the analytes summarized in Table 6-2. Analytical support level C will be required. One duplicate will be collected for every 20 soil samples.

6.2.2 Liquid Sampling

Surface water in the unnamed tributary has previously been determined by the Navy to be non-contaminated and additional sampling is not anticipated. However, if additional sampling is required based on changed site conditions, surface water samples will be collected at the same approximate locations summarized in the Remedial Investigation/Feasibility Study report for OU 1 (ABB-ES 1996a). Recommended analytical parameters are provided in Table 6-3.

The potential exists for encountering LNAPL during excavation of contaminated soil. LNAPL at Soil Excavation Area 8 and Sediment Removal Area A has previously been characterized by the Navy, and additional sampling of LNAPL at these two areas is not anticipated. However, additional sampling of LNAPL will be required if it is encountered at other excavation areas during remedial action.

Decontamination water will be sampled as indicated in Table 6-3, or as required by the Navy. The decontamination water will be temporarily containerized in 55-gallon drums.

7.0 SAFETY AND HEALTH PLAN

A Program Safety and Health Plan (PSHP) defines the policies for the Navy RAC project. A Site Safety and Health Plan (SSHP) has been prepared for each of the Navy RAC bases. An addendum to the SSHP, which is provided separately, defines task-specific requirements for the remediation activities at OU 1 that are described in this RWP.

8.0 PROJECT MANAGEMENT PLAN

8.1 PROJECT ORGANIZATION

As the Environmental RAC for the Navy, Bechtel provides NAS Jacksonville management of remedial action field activities, which includes all activities necessary to implement field work delineated in work plans. Typically, these activities include development and procurement of subcontract services; development, implementation, and overview of plans; collection and review of data, including sampling results, quality assurance/quality control submittals, and sample tracking and custody; technical guidance to on-site personnel; and report preparation, cost management, and schedule control. The key leadership from Bechtel is as follows: Project Manager, Hermann Bauer; Construction Manager, John Stone; Site Superintendent, Gene

TABLE 6-3
Liquid Disposal Sampling

Location ID	Analytical Parameters	Frequency	Analytical Method or Instrument	Analytical Support Level	Sample Matrix		Total Estimated Samples (per Event)		
					Gas	Liquid	Sample	Duplicate	Trip Blank
Surface Water Trenches	VOCs	As required for disposal or use on PSC 26 as dust control	EPA 8240	C		X	7	1	1
	SVOCs		EPA 8270	C		X	7	1	NA
	Metals		EPA 6000 series/7000	C		X	7	1	NA
	PCBs		EPA 8080	C		X	7	1	NA
	Pesticides		EPA 8150	C		X	7	1	NA
	pH		EPA 9045	C		X	7	1	NA
Decontamination Water Storage Area	VOCs	As required for disposal of collected decontamination water	EPA 8240	C		X	1	NA	1
	SVOCs		EPA 8270	C		X	1	NA	NA
	Metals		EPA 6000 series/7000	C		X	1	NA	NA
	pH		EPA 9045	C		X	1	NA	NA
	TSS		EPA 160.2	C		X	1	NA	NA

Notes: VOCs = volatile organic compounds
 SVOCs = semi-volatile organic compounds
 NA = not applicable

Rhodes; Safety and Health Representative, Tom Rountree; Field Engineer, Gene Jaska; Field Project Controls, Christine Kulac; and Quality Control Manager, Jerry Grissett.

on-site qc rep?

8.2 SCHEDULE

The schedule for the implementation of the actions described in this RWP is not finalized. When the schedule has been finalized, a copy will be forwarded to the Navy.

How is it proceeding.?

REFERENCES

ABB Environmental Services, Inc. (ABB-ES) 1996a. *Remedial Investigation and Feasibility Study, Operable Unit 1, Naval Air Station Jacksonville, Jacksonville, Florida*. March, 1996.

ABB-ES 1996b. *Draft Record of Decision, Potential Sources of Contamination 26 and 27, Operable Unit 1, Naval Air Station Jacksonville, Jacksonville, Florida*. July, 1996.

ABB-ES 1997. *Remedial Design for Potential Sources of Contamination 26 and 27, Operable Unit 1, Naval Air Station Jacksonville, Jacksonville, Florida*. June, 1997.

Bechtel Environmental, Inc. (BEI) 1995. *Environmental Response Action Contract Waste Management Plan*. September 1995.

Florida Department of Environmental Protection (FDEP) 1995. Memorandum from Director, Division of Waste Management, to District Directors and Waste Program Administrators. September 29, 1995.

Michigan Department of Natural Resources, Waste Management Division, Hazardous Waste Program Section, 1994. *Guidance Document for Verification of Soil Remediation*. April 1994.

APPENDIX A

DESIGN SPECIFICATIONS

TECHNICAL SPECIFICATIONS
REMEDIAL DESIGN
FOR
POTENTIAL SOURCES OF CONTAMINATION (PSCs) 26 AND 27
OPERABLE UNIT 1

NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Unit Identification Code: N00207

Contract No. N62467-89-D-0317/134

Prepared for:

Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Dana Gaskins, Code 1857, Engineer-In-Charge

June 1997

RECEIVED
JUN 30 1997
V. HERMANN BAUER

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

TABLE OF CONTENTS

SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

01010 Summary of Work

DIVISION 2 - SITE WORK

02102 Clearing and Grubbing

02220 General Excavation, Filling, and Backfilling

02272 Geotextiles

02673 Monitoring Wells

02720 Storm Drainage System

02776 Polyethylene Geomembrane

02931 Seeding

02990 Handling and Disposal of Contaminated Material

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Description

The United States (U.S.) Navy is conducting environmental programs at Naval Air Station (NAS) Jacksonville through the Southern Division Naval Facilities Engineering Command (NAVFACENGCOM). The various programs were initiated to investigate, and remediate conditions related to suspected past releases of hazardous materials at their facilities.

NAVFACENGCOM and NAS Jacksonville propose a remedial action at Operable Unit (OU) 1, which is comprised of Potential Source of Contamination (PSC) 26, Old Main Registered Disposal Area, and PSC 27, the Former Transformer Storage Area. PSC 26 (approximately 40 acres) is a landfill which was officially closed as a disposal area in 1979. PSC 27 (less than 1 acre) was used to store transformers until 1978.

The remedial action for OU-1 shall serve to contain and control the contamination at the landfill and adjacent areas where the presence of contaminated soils and sediments has been noted. The remedial action is designed to reduce the risks posed by contaminants to acceptable levels for protection of human health and the environment within 30 years.

The performance requirements of the remedial action at OU-1 are to provide containment and control of contamination in the landfill and adjacent areas noted above. Design implementation is intended to reduce the risks posed by contaminants to acceptable levels for protection of human health and the environment. The major components of the remedial action are as follows: pre-construction surface soil sampling and analysis of soil excavation area perimeters, excavation of contaminated soils and sediments (some sediments within the Unnamed Tributary); consolidation of these soil/sediments within the landfill; and installing a cap/cover system over the landfill. The soil cover will provide the necessary shielding of the low-level radioactive waste. A cap composed of a geotextile overlaid with an impermeable geomembrane will cover the low-level RAD contaminated soils, in addition to the contaminated soils, and sediments excavated from the adjacent areas.

1.1.2 Location

OU-1, which comprises PSCs 26 and 27, is located in the south-central portion of NAS Jacksonville. OU-1 is bordered by a forested area to the

northwest and south, base housing to the south and east, and a weapons storage area (restricted) to the west. Child Street bisects the northeastern portion of OU-1. Across Child Street, toward the north and east, is the base golf course. Within the forested area south of OU-1, is an unnamed drainage feature known as the "Unnamed Tributary" which flows southward to the St. Johns River, approximately 2,500 feet south of OU-1.

1.1.3 Scope of Work

1.1.3.1 General: The Contractor shall provide all labor, materials, and equipment necessary to perform the work as described in the Contract Drawings and Specifications. This scope includes, but is not limited to: pre-construction surface soil sampling and analysis of soil excavation area perimeters, excavation and placement of contaminated soil and sediment within the landfill, installation of geomembrane cap and soil cover system, abandonment of monitoring wells, installation of culverts, and restoration of an access road. Preservation or restoration of disturbed wetland areas, if required, will be in conformance with the dredge and fill regulatory constraints and/or applicable requirements.

1.1.3.2 Major scope items within the remedial construction shall generally consist of the following:

1. Excavation of identified contaminated soil and sediment areas to a depth of 1 foot. Pre-sampling (prior to excavation activities) shall be conducted at the perimeters of soil excavation areas (#1-#9 and PSC 27) to verify delineation areas indicated on the Drawings. The contractor shall develop a formal sampling plan and submit to the ROICC NTR for approval. Pre-sampling or confirmatory sampling will not be conducted at the sediment areas (A, B, and C). The excavated contaminated soil and sediment shall be placed and compacted within the limits of the geomembrane on the landfill.
2. The soil excavation areas #1 - #9 and PSC 27 shall be backfilled with 1 foot (back to match existing grade) of clean backfill and seeded. Sediment area A shall be backfilled with clean fill to the elevations indicated on the Drawings (minimum 0.5 feet above groundwater table). Sediment area B shall be restored with a riprap ditch lining as indicated on the Drawings and sediment area C shall be backfilled with adjacent bank material.
3. Preparation of the landfill subgrade and placement of a geotextile and a geomembrane liner to the limits shown on the Drawings.

4. Placement of the final cap and cover at the grades shown on the Drawings to ensure proper drainage. The existing perimeter ditch shall be filled to the elevations indicated on the Drawings (minimum 0.5 feet above groundwater table). At the locations indicated on the Drawings, new ditches shall be lined with Riprap (where axial ditch slopes are greater than .25 percent); all other ditches shall be loamed, seeded and protected with an erosion control blanket (i.e. jute).
5. Abandonment of the monitoring wells indicated on the Drawings shall be done in accordance with the Specification Section 02673, "Monitoring Wells" and the Florida Administrative Code (FAC) Chapter 40C-3 "Water Wells", Section 40C-3.517 "Grouting and Sealing, Subsection 9 Abandonment Procedures for Water Wells".
6. Installation of a 48-inch culvert and construction of a gravel access road to provide access across the perimeter ditch onto the landfill. Installation of a 15-inch culvert from the south side of sediment area A to the influent area of the existing 24-inch culvert under Child Street, located east (Child and Braun St. intersection) of OU-1. At the inlet and outlet of each culvert, a Riprap apron shall be constructed.
7. During construction activities, the installation and maintenance of erosion control measures at soil and sediment excavation areas and other work areas shall be required to prevent water-borne materials from leaving work areas and discharging to surface waters. Restore disturbed areas by seeding and mulching unless specified otherwise.

1.2 WORK NOT COVERED BY CONTRACT DOCUMENTS

The following work is assumed to be included with the RAC contract in force at the time of implementation.

- A. Decontamination of personnel and equipment.
- B. Transportation and disposal of hazardous materials including sediment and water from decontamination, and personal protective equipment.
- C. All health and safety issues associated with implementation of the design.

- D. All quality assurance and quality control issues except as specified herein.

1.3 CONTRACTOR ACCESS AND USE OF PREMISES

1.3.1 NAS Jacksonville Regulations

Access and use of premises shall be in accordance with the RAC contract in force at the time of implementation. Pertinent issues which may be included in this agreement, and are associated with work at this site are identified in this subsection. Ensure that Contractor personnel employed on the Station become familiar with and obey NAS Jacksonville regulations. Keep within the limits of the work and avenues of ingress and egress. Do not enter restricted areas unless required to do so and until cleared for such entry. Permission to interrupt any station roads, railroads, or utility services shall be requested in writing a minimum of (15) fifteen working days prior to the desired date of interruption or as directed by ROICC NTR. The Contractor's equipment shall be conspicuously marked for identification.

1.3.2 Working Hours

Regular working hours shall be in accordance with the RAC contract in force at the time of implementation.

1.3.3 Work Outside Regular Hours

Work outside regular working hours requires ROICC NTR approval and shall be permitted in accordance with the RAC contract in force at the time of implementation. During periods of darkness, the different parts of the work shall be lighted in accordance with USACE EM 385.1.1 and as approved by the ROICC NTR.

1.3.4 Utility Cutovers and Interruptions

- a. Interruptions and cutovers shall be coordinated with the ROICC NTR a minimum of 15 working days prior to date of the planned interruption.
- b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.
- c. Interruption to Water, Sanitary Sewer, and Electric Service shall be considered utility cutovers pursuant to the paragraph entitled "NAS Jacksonville Regulations (1.3.1)."
- d. Provide a written request to the ROICC NTR for an underground utility locate at least 10 working days prior to date of planned locate.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

1.4 PRECONSTRUCTION CONFERENCE

Prior to commencement of any work at the site, meet with the Contracting Officer's Representative and other representatives of impacted areas to discuss and develop a mutual understanding relative to administration of the safety program, design changes, additional engineering requirements, submittals, scheduling, programming and prosecution of work.

1.5 HEALTH AND SAFETY

Activities conducted as part of this work shall be in accordance with the Contractor's Health and Safety Plan, submitted as an Appendix to the Contractor's approved Work Plan. It is currently anticipated that construction activities will be conducted using Level D personal protective equipment (PPE), however the approved Contractor's Work Plan will take precedence in this matter. There are five potential media that may be sources of human exposure to chemicals at OU-1. Table 01010-1 below summarizes the human health contaminants of potential concern (HHPCs) and associated media at Operable Unit 1.

1.6 Red-Line Markup Drawings

The Contractor shall submit red-line, marked up drawings consistent with, and reflecting specific dimensions, slopes, installation details, design changes, and other specific information required to reflect implementation details of the remedial design.

The final red-line drawings shall be signed and dated by a Contractor authorized representative, who is familiar with and can attest to the accuracy of the drawings. Originals of these drawings shall be submitted to the Contracting Officer's Representative and the Engineer-of-Record (EOR).

Subsequent to substantial completion of construction activities, an as-built topographic survey of the project site shall be prepared utilizing one foot contour intervals and indicating general slopes (as a percentage) on the landfill surface. The survey shall be signed and sealed by a professional land surveyor (PLS) registered in the State of Florida. A minimum of two (2) signed and sealed copies shall be submitted to both the Contracting Officer's Representative and the EOR.

The Engineer-of-Record shall use the final submittals as the basis for preparation of the official, signed and sealed Record Drawings.

OPERABLE UNIT 1 - SUMMARY OF HUMAN HEALTH CHEMICALS OF POTENTIAL CONCERN
(HHPCs)

TABLE 01010-1	
Environmental Medium	HHCPCs
Surface Soil	Inorganics: antimony, arsenic, cadmium, chromium, cobalt, lead, manganese, nickel.
	Organics: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, 4,4-DDD, 4,4-DDT, Aroclor-1254, Aroclor-1260, alpha-chlordane, gamma-chlordane, 1,2,3,4,6,7,8-HpCDF, HpCDF's (total), HxCDF's (total), OCDF, 1,2,3,4,6,7,8-HpCDD, HpCDD's (total), OCDD
	Radioisotopes: gross alpha, gross beta
Subsurface Soil	Inorganics: aluminum, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, vanadium, zinc
	Organics: 1,2-dichloroethane, benzene, chlorobenzene, chloroform, ethylbenzene, tetrachloroethene, toluene, trichloroethene, xylenes, 2-methylnaphthalene, acenaphthene, dibenzofuran, fluoranthene, naphthalene, phenanthrene, pyrene
	Radioisotopes: gross alpha, gross beta
Surface Water	Inorganics: aluminum, antimony, arsenic, beryllium, cadmium, cobalt, iron, manganese, sodium
	Organics: 1,2-dichloroethene, benzene, trichloroethene, vinyl chloride
	Radioisotopes: actinium-228, gross alpha, gross beta, lead-214, radium-226, radium-228, thallium-208
Sediment	Inorganics: arsenic, beryllium, chromium, manganese, mercury, thallium
	Organics: benzo(a)anthracene, benzo(a)pyrene, benzo(h)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, Aroclor-1248, Aroclor-1260, 1,2,3,4,6,7,8-HpCDD, OCDD, 2,3,7,8-TCDF, OCDF
	Radioisotopes: bismuth-214, cesium-137, gross alpha, gross beta, lead-212, lead-214, potassium-40, radium-226, radium-228, thallium 208, uranium-235
Groundwater	Inorganics: aluminum, arsenic, barium, beryllium, chromium, cobalt, iron, lead, nickel, thallium, vanadium

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

TABLE 01010-1	
Environmental Medium	HHCCPs
	Organics: 1,1-dichloroethane, 1,2 dichloroethane 1,2 dichloroethene, total benzene, carbon disulfide, ethylbenzene, trichloroethane, vinyl chloride, 2-methyl-naphthalene, 2-methylphenol, 4-methylphenol, acenaphthene carbazole, dibenzofuran, naphthalene, phenanthrene, phenol, bis(2-ethylhexyl) phthalate
	Radioisotopes: bismuth-214, gross alpha, gross beta, radium-223, radium-226, radium-228, thorium-232
<p>Notes: PSC = potential source of contamination. OU = operable unit. DDD = dichlorodiphenyldichloroethane. DDT = dichlorodiphenyltrichloroethane. HpCDF = heptachlorodibenzo-p-furan. HxCDF = hexachlorodibenzofuran. OCDF = octachlorodibenzofuran. HpCDD = heptachlorodibenzo-p-dioxin. OCDD = octachlorodibenzodioxin. TCDF = tetrachlorodibenzo-p-furan.</p>	

--End of Section--

SECTION 02102

CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 DESCRIPTION

This section covers the Contractor's requirements for clearing and grubbing within the limits of soil excavation and the limits of the landfill cap and soil cover.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 PROTECTION

3.1.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.2 Utility Lines

- a. Contractor shall request, in writing, an underground utility locate through the ROICC NTR at least 10 working days prior to date of planned locate.
- b. Prior to initiation of construction activities, the Contractor shall notify, and request clearance from, appropriate utility location services, as typically used and available on NAS Jacksonville base properties. The Contractor shall protect existing utility lines that are to remain free from damage and notify the Contracting Officer immediately of damage to, or an encounter with, an unknown existing utility line.
- c. The Contractor shall be responsible for the repairs of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, the Contractor shall notify the Contracting Officer in ample time to minimize interruption of the service.

3.2 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the soil excavation areas and the landfill cap and cover areas. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface. After clearing, in-ground vegetative material, which is less than 2 inches in diameter, may remain in place.

3.3 GRUBBING

Remove roots larger than 2 inches in diameter, matted roots, and stumps from the cleared areas.

3.4 DISPOSAL OF CLEARED AND GRUBBED MATERIALS

3.4.1 Nonsaleable Materials

- a. All trees, stumps, limbs, brush, and roots shall be chipped onsite and used onsite as mulch or disposed as a single thin layer beneath the landfill cover.
- b. Debris, other than that listed above, shall pass all the hazardous waste and radiological disposal requirements, prior to coordination with PWC for potential offsite disposal.

-- End of Section --

SECTION 02220

GENERAL EXCAVATION, FILLING, AND BACKFILLING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Clearing and Grubbing: Section 02102.
- C. Geotextiles: Section 02272.
- D. PE Geomembrane: Section 02776.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1556-90	Test for Density of Soil in Place by the Sand Cone Method
ASTM D 1557-91	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft ³) (2,700 kN-m/m ³)
ASTM D 2167-84	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
ASTM D 2216	Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixture
ASTM D 2488-93	Practice for Description and Identification of Soils (Visual-Manual Procedure)
ASTM D 2922-91	Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017-88	Test Method for Moisture Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4718-87	Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.

FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)

FDOT 204-2 OR 901 Standard Specifications for Road and Bridge Construction, Tallahassee, 1991; Division II, Base Courses, Section 202-4: Graded Aggregate Base; and Division III, Materials, Section 901: Coarse Aggregate.

1.3 REGULATORY REQUIREMENTS

Materials and workmanship specified herein, with reference to State Standard, shall be in accordance with the referenced articles, sections, and paragraphs of the standard except that contractual and payment provisions do not apply.

1.4 SUBMITTALS

Submit the following to The ROICC NTR for approval and the EOR for information supporting the final Record Drawings.

1.4.1 Source Certification

- a. The Contractor shall provide documentation from an independent soils testing laboratory that the Contractor's proposed borrow sources contain earthen materials in adequate quantities which meet the requirements of this specification. Certification shall consist of adequate testing results to allow the ROICC NTR to accept/reject the proposed materials prior to such materials being brought to the site, based on the specifications herein.

1.5 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination, segregation or damage of materials.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

Free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and deleterious, or other materials which inhibit the materials ability to perform its intended use. Unless specified otherwise, the maximum particle diameter shall be 3-inches, or less-than one-half the lift thickness, which ever is less.

2.1.1 Vegetative Soil

Vegetative Soil shall be free of refuse, any material toxic to plant growth, subsoil, woody vegetation, stumps, roots, brush, stones, clay lumps, or similar material larger than 2 inches in greatest dimension. Sod and herbaceous growth such as grass and weeds need not be removed but shall be thoroughly broken up and mixed with the soil during handling operations. Vegetative soil shall have a pH between 5.5 and 7.6; an organic content between 2 and 20 percent; and have a maximum particle diameter of 2-inches.

2.1.2 Common Borrow:

- a. Soil suitable for subgrade fill construction, maximum 6-inch stone size.
- b. Free of perishable rubbish, peat and other unsuitable material.
- c. Moisture Content: Sufficient to provide the required compaction and stable embankment and in no case shall the moisture content exceed 4 percent above optimum.

2.1.3 Aggregate Base:

- a. Aggregate for access road construction.
- b. The aggregate base material shall be of uniform quality throughout, substantially free from vegetable matter, lumps, clay balls and other deleterious materials.
- c. Aggregate base material shall meet FDOT Specification 204-2 for Graded Aggregate Base and meet the following gradation requirements:

<u>Sieve Designation</u>	<u>Percent Passing by Weight</u>
2 in.	100
1-1/2"	95-100
3/4"	65-90
3/8"	45-75
No. 4	35-60
No. 10	25-45
No. 50	5-25
No. 200	0-10

2.1.4 Stone Bedding Material:

- a. Stone bedding material for culverts.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

- b. The stone bedding material shall be of uniform quality throughout, substantially free from vegetable matter, lumps and clay balls and other deleterious materials.
- c. Stone bedding material shall meet FDOT Specification 901 for Coarse Aggregate meeting the following gradation requirements for size number 78 coarse aggregate:

<u>Sieve Designation</u>	<u>Percent Passing by Weight</u>
3/4"	100
1/2"	90-100
3/8"	40-75
No. 4	5-25
No. 8	0-10
No. 16	0-5

2.1.5 Select Borrow

- a. Select Borrow suitable for placement directly on top of geomembrane, shall have a maximum 1-inch stone size.
- b. The borrow shall be free of perishable rubbish, peat and other unsuitable material.
- c. Moisture Content: The select borrow will be sufficient to provide the required compaction and stable embankment and in no case shall the moisture content exceed 4 percent above optimum.
- d. The select borrow material shall be of uniform quality throughout, substantially free from highly angular stones and other deleterious materials.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

3.1.1 Clearing and Grubbing

- a. Clearing and grubbing work, when applicable, includes but is not limited to, removal of trees, brush, stumps, wooded growth, grass, shrubs, poles, posts, signs, fences, culverts, and minor structures.
- b. Clearing and grubbing shall be conducted in accordance with Section 02102, "Clearing and Grubbing".

3.1.2 Limits of Work

- a. Perform clearing work within the areas required for construction.
- b. Clearing and grubbing of soil and sediment excavation areas outside the limits of the landfill, as well as PSC-27, will be limited to that work necessary to access the area and conduct the work.

3.1.3 Existing wells that are to remain shall not be disturbed unless they require further extension above the new final grades. This work shall be done by the Contractor in accordance with Section 02673. The ROICC NTR shall specify which structures, excess to those identified in the plan drawings, are to remain. Any existing wells or other structures which are to remain, that are disturbed by the Contractor, shall be replaced by the Contractor.

3.2 EXCAVATION

3.2.1 Classifications

- a. Earth Excavation: Removal and disposal of: pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions, and other materials encountered that are not classified as unauthorized excavation.
- b. Unauthorized Excavation
 - (1). Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the ROICC NTR.
 - (2). Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the ROICC NTR.
- c. Stability of Excavations
 - (1). The Contractor is responsible for maintaining safe excavation side slopes.
 - (2). Slope sides of excavations to comply with all codes and ordinances having jurisdiction.
 - (3). Sheet, shore, and brace where sloping is not possible either because of space restrictions or stability of material excavated.
 - (4). Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

c. Material Storage

- (1). Stockpile materials, until required for backfill or fill.
- (2). Place, grade, and shape stockpiles for proper drainage.

d. Excavation of Contaminated Soil and Debris

- (1). Excavation of contaminated soil and debris shall be performed in accordance with Section 02990.

3.3 BACKFILL AND FILL

A. General: Except for sediment area C, place the specified borrow material in compacted layers, to the required subgrade elevations, for each area classification listed below:

- (1). For landfill subgrade use common borrow and excavation area soil and sediment to subgrade elevation.
- (2). For soil excavation areas use common borrow to fill excavation to 4 inches below original grade. Bring to grade with 4 inches of vegetative soil to promote revegetation. For access roads in soil excavation areas 4, 5, and 6, see section (3) below.
- (3). Access roads passing through soil excavation areas 4, 5, and 6 shall be backfilled to original grade with aggregate base material. The continuity and path of the original access road shall be maintained.
- (4). For sediment excavation area A, use common borrow to bring the excavation area to the elevation identified in the design drawings or six (6) inches above the groundwater table elevation at the time of excavation, whichever is higher.
- (5). After clearing, grubbing, and any required surface preparation, sediment excavation area B embankments and streambed will be lined with riprap.
- (6). Sediment excavation area C will be graded to original elevations with surrounding earth and bank materials.

B. Backfill excavations as promptly as work permits, but not until acceptance of construction below finish grade by the ROICC NTR.

C. Placement (all backfill material)

- (1). Place backfill materials in lifts such that when compacted, the lifts will have the following maximum thicknesses:
 - (a). Common Borrow: 12 inches
 - (b). Vegetative Soil Layer: 6 inches
 - (c). Aggregate Base: 6 inches
 - (d). Excavated soil and sediment: 8 inches
 - (e). Select Borrow: 6 inches
- (2). Before compaction, moisten or aerate each lift as necessary to provide the moisture content required to meet the specified compaction requirements.
- (3). Implement appropriate measures to prevent wedging action of backfill against culverts.
- (4). Place the material uniformly around culverts to approximately the same elevation in each lift.

D. Placement of Select Borrow Above Geomembrane

- (1). Placement of select borrow soil shall proceed from a stable working area adjacent to the deployed geomembrane and gradually progress outward.
- (2). Soil is never to be dropped from dump truck, front end loaders, or other equipment used for transport of select borrow directly onto the geomembrane.
- (3). The soil shall be pushed forward in an upward tumbling action so as not to vertically impact or drop directly on the geomembrane.
- (4). Soil shall be placed by low ground pressure placement equipment (contact pressures less than 5 psi).
- (5). Construction equipment, including rubber tired vehicles such as automobiles and pickup trucks, shall not be allowed to move directly on the deployed geomembrane.

3.4 COMPACTION

A. General

- (1). Control soil compaction during construction and provide minimum percentage of density specified for each area classification.

B. Density Requirements

- (1). Compacted soils shall meet minimum required percent maximum dry density specified in the Article entitled Field Quality Assurance in Part 3.6 of this Section.

C. Moisture Requirements

(1). General

- (a). Provide moisture control to the extent that the soil remains in a workable state during placement.
- (b). Where subgrade or layer of soil material must be moisture-conditioned by increasing the moisture content before compaction, uniformly apply water to surface of subgrade, or layer of soil material at such a rate as to avoid free water from appearing on surface during or subsequent to compaction operations.
- (c). Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
- (d). Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing, until moisture content is reduced to a satisfactory value, as determined by moisture-density relation tests.

3.5 GRADING

A. General

1. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas, and in conformance to the Drawings.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

2. Smooth finish surface, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
3. Grade areas to drain and to prevent ponding.
4. Elevations shall be within ± 0.10 feet.

3.6 FIELD QUALITY CONTROL

A. Compacted Material Thickness

1. The Contractor shall maintain daily logs of measurements of soil lifts, soil characteristics, and other observations. Installation of a layer measured at 90 percent or less of the required thickness will not be accepted. A running average of 100 percent of the required thickness shall be maintained. Thicknesses of common borrow and vegetative soil shall be checked at 100-foot grid intervals. Thickness of aggregate base material shall be checked at a minimum once per 100 linear feet of material placed.

B. Compaction

1. Compaction will be measured in accordance with the procedures and frequencies specified below:
 - a. For each of the designated areas outside the landfill limits of waste, the Contractor will measure compaction as in-place density using ASTM D 2922-91 (nuclear methods) or ASTM D 1556-90 (sand cone method) and according to the following schedule:

Material	Required Percent of Maximum Dry Density	Minimum Frequency
Common Borrow	Min. 85%	5 per lift
Stone Bedding Material	Min. 90%	1 per lift/200 L.F.
Aggregate Base	Min. 95%	1/200 L.F.

- b. For areas within the limits of the landfill cap, the Contractor will prepare compaction test pads for each type of fill material (i.e., for each material or product listed in Part 2 of this Specification

section) to be placed within the landfill cap limits. The test pads are to match full scale construction conditions (i.e., the subgrade(s), lift thickness and type of fill material) as closely as possible and as approved by the ROICC NTR. Test pad procedures will be performed in areas indicated on the drawings where existing landfill waste layers are believed to be the thickest. Compaction test pad procedures will be performed using the same type and model of equipment that will be used to compact the fill material during construction. Test pad procedures will be incorporated into the construction schedule such that test results are evaluated and approved prior to initiating compaction on the remainder of the landfill. Test pad compaction testing will be performed at 5 random locations on each compacted test pad for the level of compactive effort required to provide the required compaction for each test pad. Compaction will be measured on the landfill cover and test pads as in-place density using ASTM D 1556-90 (sand cone method) or ASTM D 2167-84 (balloon method). Verification of compaction on the landfill areas outside of the test pads will be done at the frequencies identified below.

Material	Required Percent of Maximum Dry Density	Minimum Frequency
Common Borrow and Select Borrow	Min. 90%	1 per acre per lift
Excavated soil and sediment	Min. 90%	1 per acre per lift

2. Vegetative soil shall be compacted with a bulldozer making a minimum of 4 passes per lift.
3. Testing locations will be selected at random by the Contractor's on-site QA representative.
4. Determine maximum dry densities and optimum moisture contents in accordance with ASTM D 1557-91.
5. Correct unit weight and water content in accordance with ASTM D 4718-87, as appropriate.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

C. Moisture

1. The Contractor shall measure moisture content at all locations chosen for density testing.
2. Moisture content shall be measured by nuclear methods, ASTM D 3017-88 at locations where compaction is measured by the nuclear method, or laboratory oven-drying ASTM D 2216 where compaction is measured by the sand-cone method.

3.7 PROTECTION

3.7.1 Site Drainage

Provide for the collection and disposal of surface and subsurface water which interferes with construction activities, or poses a siltation hazard problem to surrounding waterbodies, or as directed by the ROICC NTR.

3.7.2 Underground Utilities

Location of the existing utilities indicated are approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction.

3.7.3 Protection of Surfaces

Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes for a minimum period of 6-months.

3.8 FIELD QUALITY CONTROL

3.8.1 Sampling

Take the number and size of samples required to perform the tests identified below in the presence of the ROICC NTR or his designated representative.

3.8.2 Testing

Perform one of each of the following tests for each material used. Provide additional tests for each source change.

3.8.2.1 Material Testing

Test materials in accordance with ASTM D 2488-93 for soil identification for the Riprap, and Topsoil. Test the Common Borrow and Select Borrow for moisture density relations by ASTM D 1557-91. Moisture density relations are required to evaluate the

degree of compaction during construction. If like material obtained from the same borrow source is used for more than one purpose one test will be acceptable, in addition to source certification.

3.8.2.2 Density Tests

Test density and moisture content in accordance with ASTM D 2922-91 and ASTM D 3017-88. Test each lift at randomly selected locations. Materials tested that have densities below those specified shall receive additional compactive effort and be re-tested until a passing test is achieved. In the event that the level of compaction specified is not being achieved with the equipment and methods being used, the ROICC NTR may direct the Contractor to modify equipment and/or procedures or remove the unsuitable material, supply, and place new material.

--End of Section--

SECTION 02272

GEOTEXTILES

PART 1 - GENERAL

1.1 DESCRIPTION

Furnish and install non-woven geotextile fabric at locations where riprap ditch is required and under the geomembrane liner (on top of excavated soil and sediments), in the manner shown on the Drawings and as specified in this Section.

1.2 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. For all references methods specified, the most recent revision shall apply if different from that listed.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3786-87	Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method.
ASTM D 4491-92	Test Method for Water Permeability of Geotextiles by Permittivity.
ASTM D 4533-85	Test Method for Trapezoidal Tearing Strength of Geotextiles.
ASTM D 4632-86	Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
ASTM D 4751-87	Test Method for Determining the Apparent Opening Size of a Geotextile.
ASTM D 4833-88	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
ASTM D 5261-92	Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Non-Woven Geotextile Fabric:

- a. Produced by heat bonding, needle punching or by the use of external adhesives.
- b. The network of fibers shall be bonded so the fibers will retain their relative position with respect to each other.
- c. Fibers may be polypropylene, polyvinyl chloride, nylon or polyester.
- d. Resistant to rot, mildew, insects, salt water, rodents and any other biological and chemical substances commonly encountered in the ground.
- e. Use a geotextile non-woven fabric meeting the following requirements:

PROPERTY	TEST METHOD	MIN. AVERAGE ROLL VALUES PERMISSIBLE
Weight (oz./s.y.)	ASTM D 5261	8
Grab Tensile Strength (lbs)	ASTM D 4632	200
Grab Elongation (%)	ASTM D 4632	50
Mullen Burst Strength (psi)	ASTM D 3786	400
Puncture Resistance (lbs.)	ASTM D 4833	100
Trapezoidal Tear Strength (lbs.)	ASTM D 4533	80
Equivalent Opening Size (Sieve size)	ASTM D 4751	70
Permittivity (gal/min/sf)	ASTM D 4491	90

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Non-Woven Geotextile Fabrics

- a. Place in the manner and at the locations shown on the Drawings.
- b. At the time of installation, fabric shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage.
- c. Lay smooth and free of tension, stress, folds, wrinkles, or creases.
- d. Provide a minimum width of 12 in. of overlap for bedding fabric applications.
- e. For placement on ditch or embankment slopes, meet the following:
 1. Place fabric as continuous sections from the anchor trench to the bottom of slope (no end splicing).
 2. Overlap sections a minimum width of 12 inches or sew sections together as recommended by the manufacturer.
 3. Place with the long dimension parallel to the centerline of the ditch.
- f. In the presence of wind, weight the materials with sandbags until final covers are installed.
- g. Care shall be taken to assure that any underlying materials are not damaged during placement of geotextiles.
- h. Care shall be taken to assure that stones, mud, and dirt are not entrapped in the geotextile during placement and seaming operations.
- i. Overlap joints and seams shall be measured as a single layer of cloth.
- j. The fabric shall be turned down and buried a minimum of 2 feet at all exterior limits or as indicated on the Drawings.
- k. Place so that the upstream strip of fabric will overlap the downstream strip.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

1. Protection of Fabrics:

1. Exercise necessary care while transporting, storing and installing the fabric to prevent damaging it.
2. Protect from prolonged direct exposure to sunlight, as recommended by the manufacturer and approved by the ROICC NTR.
3. Repair all damaged areas of the fabric by placing another piece of fabric of sufficient size to extend a minimum of 1.0 foot beyond the limits of the damage in all directions over the damaged area. Sew repairs as described below.
4. Protect from prolonged direct exposure to sunlight, as recommended by the manufacturer and approved by the ROICC NTR.
5. When required, sew overlaps and repairs to damaged fabric using a portable machine to provide a seam strength of at least 90 percent of the filter fabric strength.
6. Geotextile shall not be exposed to precipitation prior to being installed. Wrappings protecting geotextile rolls shall be removed less than one hour prior to unrolling the geotextile.
7. Bridging of fabric is not allowed.

--End of Section--

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

SECTION 02673

MONITORING WELLS

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

FLORIDA ADMINISTRATIVE CODE (FAC)

FAC 40C-3	Water Wells (Section 40C-3.517, Grouting and Sealing)
FAC 40E-30.042	General Permit For Construction, Repair or Abandonment of Wells
FAC 62-531	Water Well Contractors

1.2 DESCRIPTION OF WORK

Provide all necessary personnel, equipment, and materials required to decommission (abandon) specified monitoring wells and piezometers. A table identifying the wells to be abandoned is provided in the Drawings (Sheet C-12).

1.3 SUBMITTALS

If required by the St. Johns River Water Management District (District), obtain a well construction permit and submit a copy to the Contracting officer for the well abandonment activities. A well construction permit may be required in accordance with FAC 40C-3.041 and FAC 40E-30.042 prior to construction, repair, or abandonment for any well within the District's jurisdiction.

1.4 QUALITY ASSURANCE

The water well Contractor shall be licensed as required by FAC 62-531.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1

Slurry: A mixture of water and either Portland cement (Type I, II, III, or other types of cement that are approved by the District), or natural Bentonite meeting the following requirements:

- a. A mixture consisting of 5.5 to 6.0 gallons of water per sack of Portland cement or a mixture of 6.5 gallons of water per sack of Portland cement with 3 to 5 pounds of Bentonite not to exceed 5 percent by weight.
- b. A mixture of 8-20-mesh granular Bentonite, water and an approved liquid polymer viscosifier or untreated 200-mesh Bentonite and water is acceptable. In all mixtures, the manufacturer's mixing instructions shall be followed.

PART 3 - EXECUTION

3.1 PROTECTION OF WORK, PUBLIC AND PROPERTY

The means, methods, procedures, and techniques to be used by the Contractor are the responsibility of the Contractor, and shall be designed to meet the intent of the specifications. The Contractor shall continuously protect its work from damage and protect adjacent property as provided by law. The Contractor shall maintain safety devices as required. The Contractor shall promptly repair all damages caused by its operations. When using internal combustion equipment, The Contractor shall have available at the work site emergency fire extinguishers or other approved fire fighting apparatus at all times. During its operations, the Contractor may occupy only those portions of the site for which the required permits have been obtained by the Contractor. If the Contractor desires to use additional areas outside of those required for the borings, it shall arrange for such areas at its own expense.

3.2 DECOMMISSIONING EXISTING WELLS

Decommission existing wells shown on the Drawings in accordance with FAC 40C-3.512 and FAC 40C-3.517, subsection 9, Abandonment Procedures for Water Wells, a copy of these procedures are attached to this Section. The well casing and cover shall be removed to depth of 6 inches below grade for each well abandoned within the landfill area. The well casing and cover shall be removed to depth of 6 inches below the bottom of the excavated grade for each well abandoned in the soil excavation areas or

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

PSC-27. Abandoned monitoring wells in the areas where the landfill cap\cover is to be placed, shall be abandoned prior to placement of the cap or cover.

3.3 CLEAN UP

Upon completion of the work, the Contractor shall remove its rigs and all surplus and unused material and leave the site in a clean condition to the satisfaction of the Contracting Officer.

3.4 INSPECTION OF WORK

The Contracting Officer shall at all times have access to the work, and the Contractor shall provide proper facilities for such access and for inspection.

--End of Section--

Section 02673 Attachment

FLORIDA ADMINISTRATIVE CODE (FAC)
FAC 40C-3.512 and 40C-3.517

40C-3.512 Well Construction Requirements.

1) In the construction of a well, reasonable caution shall be taken to maintain the work site so as to minimize the entrance of contaminants into the water resource. Materials used in construction shall be reasonably free of contamination. The requirements for construction of public supply wells can be found in chapter 17-555, FAC

(a) During construction, the water used to mix the drilling fluids must either maintain a minimum free chlorine residual of 10 mg/l or be supplied from a potable well or water supply. If the well or water supply is a known source of contamination or is within a known area of contamination, it shall not be used to provide water to construct the well.

(b) Disinfection of filter or gravel pack materials will follow guidelines found in AWWA Standard A100-84, section 11.4, unless materials are obtained from a commercial source.

(c) Upon completion of construction, the well must be disinfected using a solution of water and available chlorine compounds providing a concentration not less than 50 mg/l. USEPA Manual of Well Construction Practices, EPA-570/9-75-001, section 54.001-000-000, provides a tabular determination of disinfectant per 100 feet of well depth to achieve the required residual.

(d) For non-potable (non-domestic) wells the contractor may elect either to maintain a minimum of 10 mg/l free chlorine in the water used to mix the drilling fluid during construction of the well or to disinfect the completed well with a solution of water and available chlorine compounds at a concentration of no less than 50 mg/l

Development should occur prior to disinfection so the well may be cleared of chlorine by flushing the entire water system prior to use. The disinfecting agent shall be left in the well for a period of at least twelve hours and then pumped to clear the disinfecting agent taking care to minimize potential damage to the environment. Free-flowing artesian wells will be disinfected by using either potable water or maintaining a minimum free chlorine residual of 10 mg/l in water used to mix the drilling fluid until the free flowing water zone is reached.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

(2) For wells which penetrate multiple aquifers or water bearing zones the well shall be completed so as to prevent cross-contamination. If significantly different water quality exists between these aquifers or water bearing zones, leakage of water from one aquifer or water bearing zone to another must be prevented.

(3) For wells finished into unconsolidated aquifers, continuous casing shall extend from the well's terminus to the well screen. The well screen shall be attached to the casing with a watertight seal. The lower terminus of the well screen shall be sealed to prevent the entrance of particulate materials. A tailpipe is allowed if affixed to the screen with a watertight seal and plugged at its lower terminus.

(4) For wells completed into consolidated aquifers, a continuous casing shall extend from the upper terminus and be seated into:

(a) the producing aquifer, or

(b) into a consolidated stratum within a continuous non-caving confining unit immediately overlying the aquifer from which the water is to be withdrawn.

(5) For wells completed into consolidated aquifers which are constructed using telescoping casings the following practices will be acceptable:

(a) Two casings may be telescoped and sealed with a packer and one casing centralizer when paragraph 40C-3.517(4)(c) construction methods are used. Two centralizers shall be used when the internal casing is grouted. A minimum of 5 feet overlap is required for nonpublic supply wells which are less than 6" in diameter. A minimum ten feet of overlap is required for nonpublic supply wells a minimum of 6" or more in diameter. The minimum required overlap for public supply wells remains 20 feet, as set forth in chapter 17-555, FAC

(b) The annular space between telescoped casings shall meet minimum grouting standards in subsections 40C-3.517(2) and (3).

(6) The upper terminus of the well to which the well head is affixed shall extend either to land surface or to finished grade, whichever is higher, or where a potential physical or traffic hazard exists, the well head must:

(a) be placed in an appropriate enclosure terminating at land surface or finished grade, whichever is higher, that allows vertical access to the casing and proper drainage, and that protects the well head from the entrance of contaminants;

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

(b) be completed to a point 18 inches or less below land surface or finished grade, whichever is higher. There must be a concrete marker 10 inches in diameter and 4 inches thick with an inserted metal disk clearly marked as required in subsection 40C-3.461(2) placed at land surface or finished grade. The upper terminus of the casing shall be sealed in a manner which prevents the entrance of contaminants into the well; or

(c) be completed to a point 18 inches or less below land surface or finished grade, whichever is higher. A tee and nipple must be affixed so that the casing extends to land surface or finished grade while permitting a below grade water line to extend to a designated location remote to the water well. This subsection does not apply to public supply wells regulated under chapter 17-555, FAC.

(7) For wells constructed in those areas of the District in which chert occurs, the well casing shall extend from its upper terminus to:

(a) a point below the dry season water level of the producing aquifer, or

(b) a point firmly seated in chert overlying a stratum of limestone if the underlying limestone does not produce a quantity of particulate materials after development that will clog a filter or decrease the ability of the well to produce water.

(8) Water wells constructed using Bentonite grouts shall meet all the following requirements:

(a) The casing seat must be clean allowing the casing to set at the total depth bored in a hole reasonably free of drill cuttings;

(b) A formation boot or Portland Cement plug must be installed at the casing seat;

(c) Portland Cement must be placed in the upper three feet of the annular space to prevent deterioration of or damage to the Bentonite seal; and

(d) Bentonite grout may be used only on domestic, irrigation, water source or ground source heat pump installations or well abandonments with a nominal casing diameter of four inches or less. Use of Bentonite grout is not allowed on public supply wells or where artesian flow occurs or in any identified contamination sites.

In all circumstances the requirements of subsection 40C-3.512(2) must be met. All caving zones within the well must be cased or lined when caving occurs

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

below the casing seat. No casing may be seated into an unconsolidated unit above the producing aquifer.

(9) In addition to the other applicable standards contained in this chapter, wells constructed in the Picketville Landfill Special Construction Criteria Area shall meet the following minimum criteria:

(a) For Zone A, of new wells which are completed into the surficial aquifer system, including the upper sand and lower shallow-rock zone, to a depth of 110 feet below land surface or less than five feet into the intermediate aquifer system are prohibited. This prohibition of new wells does not apply to monitor wells, recovery wells or piezometers which may be used for assessment of clean up of contamination sites.

(b) New wells may be completed into the intermediate aquifer system producing zone at least 300' below ground surface, or into the Floridan aquifer system.

(c) New wells penetrating the intermediate system or Floridan aquifer producing zones shall be constructed in the following manner:

1. A minimum 6-inch exterior casing shall be installed and grouted to no less than five feet into the top of the confining unit immediately below the shallow rock zone of the surficial aquifer system.

2. A minimum 2-inch interior casing within the 6-inch casing shall be installed and grouted to the producing zone. For wells constructed into the intermediate system, the intermediate aquifer shall be screened unless the entire producing zone is consolidated.

3. The top casing diameters shall allow a minimum nominal grouting annulus of two inches.

4. For telescoped wells constructed in reliance on the criteria of paragraph 40C-3.517(4)(c), FAC, in addition to the overlap created by the telescope, a fifty foot minimum length of internal casing shall be grouted below the telescoped joint.

5. The internal casing of all wells shall be completed to a minimum of twelve inches above grade.

(d) In Zone A, each existing well in the surficial aquifer system shall be abandoned when public supply lines are installed adjacent to the property served by the well.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

(e) All chapter 17-524, FAC, construction standards shall be met in both Zone A and Zone B.

(10) In addition to the other applicable standards contained in this chapter, wells constructed in the Fairbanks Special Construction Criteria Area shall meet the following minimum criteria:

(a) In Zone A, new wells which are completed into the Surficial Aquifer System or into the Intermediate Aquifer System, are prohibited. This prohibition of new wells does not apply to monitor wells, recovery wells or piezometers which may be used for assessment or cleanup of contaminated sites.

(b) In Zone A, new wells penetrating the Floridan Aquifer producing zones must be constructed in the following manner:

1. A minimum 12-inch exterior casing shall be installed and grouted to no less than five feet into the upper confining unit of the intermediate aquifer system.

2. A minimum 8-inch interior casing within the 12-inch casing shall be installed and grouted to no less than five feet into the lower confining unit of the Intermediate Aquifer System.

3. A maximum 4-inch permanent water bearing casing within the 8-inch casing must be installed into the Floridan Aquifer System to a depth of at least one full casing lengths below the formation contact.

4. The casing diameters shall allow a minimum nominal grouting annulus of two inches.

5. The internal casing of all wells shall be completed to a minimum of twelve inches above grade.

6. In Zone A, all new wells shall be logged using gamma, caliper or video equipment.

(c) In Zone A, each existing well in the Surficial and Intermediate Aquifer System shall be abandoned when public supply lines are installed adjacent to the property served by the well.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

(d) In Zone A, water quality samples must be taken and analyzed by Environmental Protection Agency methods 601, 602 and 610 where the casing is set in the Floridan Aquifer System. Water quality results from the Floridan Aquifer System shall reveal no contaminants before well construction is completed. In the event that water quality testing indicates that there is contamination in the groundwater, the well shall be plugged and abandoned pursuant to Chapter 40C-3, FAC

(e) In Zone B, new wells shall be logged, sampled and analyzed by Environmental Protection Agency methods 601, 602 and 610 for groundwater contaminants.

(f) Prior to any well construction in the Fairbanks Special Construction Criteria Area identified in 40C-3.502(3), FAC, all persons shall obtain a well construction permit from the St. Johns River Water Management District. Construction standards as provided in chapter 62-524, FAC, shall be applicable to all well construction in the Fairbanks Special Construction Criteria Area.

(g) In Zone A and Zone B, all unused wells must be capped and locked or plugged and abandoned. In Zone A, wells connecting separate aquifer systems must be plugged and abandoned.

40C-3.517 Grouting and Sealing.

Wells shall be grouted and sealed to protect the water resource from degradation caused by movement of waters along the well annulus either from the surface to the aquifer or between aquifers, and to prevent loss of pressure in artesian aquifers. All wells shall be constructed and sealed using a method which insures that an open or unnaturally permeable annular space does not remain when a well is completed.

(1) All wells that are constructed in a manner which creates an annular space between the casing and the naturally occurring geologic formations will be grouted and sealed in accordance with the methodologies listed in this section.

(2) Wells obtaining water from a formation and having a casing less than four inches in outside diameter shall have a nominal one inch thickness of grout sealing the annular space to ensure that an open or unnaturally permeable annular space does not remain when the well is completed.

(3) Wells having a nominal casing size equal to or greater than four inches in outside diameter and obtaining water from a formation shall have a nominal two inch thickness of grout sealing the annular space for the entire length of casing.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

(4) Wells obtaining water from a consolidated formation and which are constructed using telescoping casings shall meet the following conditions:

(a) The annular space between the casings shall be sealed by grout, by packers or both as described in subsection 40C-3.512(5).

(b) The annular space between each casing and the borehole shall be grouted in accordance with the provision of subsection (1)--(3) above.

(c) For wells in which the largest external nominal casing size is four inches or less and the annular space between the internal casing and the borehole wall is less than one inch, the provisions of subsections (1)--(3) above will not apply, provided that the clay formation through which the internal casing passes is of such a caving nature so as to naturally seal the annular space. If such caving nature is not present, the provisions in subsections (1)--(3) above must be met. In all circumstances the external casing must be grouted and sealed into a consolidated unit within the intermediate confining unit.

(5) For wells constructed using a jetting method and obtaining water from an unconsolidated formation of a naturally caving nature in which the annular space is completely filled with formation material, then only the upper three feet shall be grouted to provide protection from contaminated surface water.

(6) Wells obtaining water from an unconsolidated formation using a method other than jetting or driving a casing, shall be grouted from the filter pack plug to the upper terminus with a grout allowed in subsection 40C-3.517(8).

(7) Cuttings shall not be reintroduced into the annular space. Wells which breach confining units and special monitor well installations will be grouted as outlined below.

(a) When confining units are breached and the guidelines in subsection 40C-3.512(2) are not met, the following practices will be acceptable:

1. Seating of a casing into the confining unit and grouting as required, or

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

2. Placing of grout in the annular space to meet subsection 40C-3.512(2) requirements. When caving materials are present above and below the confining unit, temporary casing or drilling fluids will be placed in the borehole to maintain an opening to the confining unit.

3. In all circumstances, the annular space shall be maintained by use of either drilling fluids or temporary surface casing until the confining unit breach is plugged.

(b) Monitor wells required to comply with chapter 17-761, FAC, shall be grouted in the following manner:

1. The terminal box in traffic areas and well casing shall be sealed to a depth of eighteen inches below land surface with cement grout.

2. The well casing or outside protective casing in high water table areas shall be grouted to a depth of eighteen inches in a non-traffic area.

(8) Unless a variance has been granted by the District, grouting and sealing of water wells shall be accomplished in the following manner:

(a) The grout mixture shall consist of either Portland Cement or a natural bentonite slurry for wells and boreholes meeting the requirements in subsection 40C-3.512(8).

1. A mixture consisting of 5.5 to 6.0 gallons of water per sack of Portland Cement or a mixture of 6.5 gallons of water per sack of Portland Cement with 3 to 5 pounds of Bentonite not to exceed 5% by weight will meet minimum requirements.

2. A mixture of 8-20-mesh granular Bentonite, water, and an approved liquid polymer viscosifier or untreated 200-mesh Bentonite and water is acceptable. In all circumstances, the manufacturer's mixing instructions shall be followed.

(b) The minimum set time for grouting of casing using either Portland Cement or Bentonite before drilling operations may continue is 12 hours.

The minimum set time for grouting of casing using Portland Cement and 2% calcium chloride by weight as an accelerator will vary with depth. Set times are listed in Table 3 below. The addition of Bentonite as specified in subsection 40C-3.517(7)(a) does not change the set times listed in Table 3.

TABLE 3
INITIAL SET TIMES FOR SPECIFIED DEPTH RANGES WHEN 2% CALCIUM CHLORIDE
IS MIXED BY WEIGHT WITH PORTLAND CEMENT

<u>Depth (in feet)</u>	<u>Set Time (in hours)</u>
0-200	4
201-400	3.5
401-600	3
601-800	2
801 & greater	1

(c) Special application grout mixtures or depth of grout placement may require adjustments in water per sack of cement, cement types, or additives. All adjustments shall be approved by the District prior to use and will be based on industry standards or recommendations.

(d) The casing shall be centered in the borehole prior to grouting and sealing.

(e) In all cases grout will be introduced into the annular space from bottom to top unless conditions in paragraph 40C-3.517(9)(e) for abandonments are met. To assure that the grout will satisfactorily seal the annular space, the contractor must employ one or a combination of the following procedures:

1. The "Casing method" by which a calculated volume of grout slightly greater than the volume of the annular space of the entire length of casing is forced under pressure down the inside of the casing, which is followed by a volume of water or mud necessary to clear the grout from all but the last ten to fifteen feet of casing. This should continue until a return of cement is observed in the annular space at the upper terminus. If, after the set time has elapsed an open annular space still exists the remaining void must be filled with grout.

2. The "Tremie method" in which a grout pipe is lowered into the annular space to slightly above the bottom casing and grout pumped through the pipe. As the pumping begins the tremie is gradually raised, keeping the discharge end of the pipe submerged in the grout, until the grout has been brought to the upper terminus. This procedure may be done in one continuous operation or in stages. If, after the set time has elapsed, an open annular space still exists the remaining void is to be filled with grout.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

3. The "Packer method" in which a grout pipe is attached to a drillable packer and positioned at the bottom inside the casing. The casing is then suspended above the bottom of the borehole, and the grout is forced upward into the annular space either by pumps or pneumatic pressure. Once the grout has reached land surface, the grout pipe is disconnected. After the set time has elapsed, the operation is continued by drilling out the packer and continuing into the next formation.

4. The "Halliburton method" in which the grout is forced through the casing, preceded and followed by a "spacer" or "piston." A calculated volume of grout is used to seal the annular space. A measured amount of water equal to the volume of the entire length of casing is used to force the second "spacer" to the end of the casing. After the set time has elapsed the construction may continue by drilling out the "spacers."

(f) In those cases where, during grouting operations, circulation of the grout is lost so that the annular space being grouted cannot be filled in one continuous operation, a tremie pipe shall be installed in the annular space to a point immediately above the zone of lost circulation. The annulus shall be bridged at that point by sand and other suitable material introduced through the pipe until a level is reached at which grouting can be continued.

(9) Abandonment procedures for water wells shall be undertaken in the following manner:

(a) Portland Cement or natural Bentonite slurry mixed as required in paragraph 40C-3.517(8)(a) shall be pressure injected either from bottom to top by the methods listed in paragraph 40C-3.517(8)(e) or from top to bottom at the well head if the conditions in paragraph 40C-3.517(9)(e) are met.

(b) Use of clean aggregate to bridge cavernous or lost circulation zones may be allowed if measurements indicate loss of grout and the borehole or screened portion does not connect two or more producing units. Grouting of confining units is required to segregate producing units of significantly differing water quality as set forth in subsection 40C-3.512(2).

(c) Proper sealing of the casing seat must be accomplished by injecting grout where appropriate from a point twenty feet below the seat to the upper terminus of the well. This depth will be the minimum allowable in order to abandon a water well no matter what cavity development is encountered below the casing seat unless the

open hole is less than twenty feet deep. In that case, the entire open hole will be grouted.

(d) An abandonment plan may be approved prior to the commencement of grouting if geophysical logs are provided. The minimum logs required are caliper and natural gamma. Other logs may be required or recommended based on individual well problems. The contractor must notify the District at least 24 hours prior to commencement of a District approved abandonment plan so that a District representative may be on site to monitor the abandonment procedure.

(e) Abandonment by pressure injection of Portland Cement or Bentonite from top to bottom at the well head will be acceptable to the District if one of the following criteria is met:

1. Access to the site near the well head is difficult as determined by District staff and will cause the contractor excessive economic hardship;
2. Overhead safety such as power lines or trees is of concern to the contractor or District staff; or
3. Surface stability is of concern around the well site due to collapse or cavity development.

(10) Obstructions must be cleared in all wells prior to grouting unless an alternate plan is approved by the District. If a reasonable attempt cannot be made to clear the entire length of casing and borehole or screen an alternative plan may be considered. A contractor must supply the following minimum information to the District prior to abandonment: well diameter, total depth, casing depth, and grout volume required. A District representative may be on site to monitor the clearing of obstructions or to observe the grouting. The contractor must notify the District at least 24 hours prior to commencement of the abandonment.

(11) Wells constructed by methods which require driven well casing are exempt from grouting and sealing guidelines set forth in previous sections, provided that the following conditions are met:

(a) Casing is driven from land surface to its final depth in a borehole smaller in diameter than the nominal outside diameter of the casing used, or is driven from land surface to its final depth ahead of the drill bit; and

(b) A drive shoe in consolidated materials, or coupling in unconsolidated materials, is used; and

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

(c) All annular space created while the casing is being driven shall be sealed by adding dry Bentonite to the casing string at land surface and allowing that material to be carried down the borehole as the casing is driven. In all circumstances, dry Bentonite shall be added at the full rate required to maintain an envelope of grout around the casing; and

(d) Wells permitted under chapters 17-555 and 10D-4, FAC, shall have the bottom five feet under-reamed using either a commercially manufactured underreamer bit or an underreamer bit constructed by a contractor and approved by the District in the following manner: An under-reamed borehole will be tested using a downhole caliper tool to determine if the required two inch annular space has been achieved; and

(e) All other requirements are met.

SECTION 02720

STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)

ACPA 01-102	1988 Concrete Pipe Handbook
ACPA 01-103	1990 Concrete Pipe Installation Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 497	1990 (Rev. B) Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615	1990 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 14	1990 Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C 76	1989 Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 443	1985 (Rev. A) (R 1990) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 506	1990 Reinforced Concrete Arch, Culvert, Storm Drain, and Sewer Pipe

1.2 RELATED REQUIREMENTS

Section 02220, "General Excavation, Filling, and Backfilling", applies to this section with additions and modifications specified herein.

1.3 DELIVERY, STORAGE, AND HANDLING

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

1.3.1 Delivery and Storage

1.3.1.1 Culverts

Inspect materials delivered to site for damage; store with minimum of handling. Do not store materials directly on the ground. Keep inside of culverts free of dirt and debris.

1.3.2 Handling

Handle culverts and accessories in a manner to ensure delivery to the trench in sound undamaged condition. Carry, do not drag culverts to trench.

PART 2 - PRODUCTS

2.1 CULVERT MATERIALS

2.1.1 Precast Concrete Culvert

Conform to the requirements of ASTM C 506. Provide an air content of 6 percent, plus or minus 2 percent and a minimum wall thickness of 4 inches. Provide reinforcing in accordance with ASTM A 615 for reinforcing bars and/or ASTM A 497 for welded wire fabric. Use ASTM C 443 or AASHTO M198, Type B gaskets for joint connections.

2.2 EROSION CONTROL RIPRAP

Provide and install non-erodible rock not exceeding 15 inches in its greatest dimension with the D50 rock dimension equal to 10 inches. Lay riprap so that voids are choked with sufficient small rocks to provide a dense mass with a minimum thickness as indicated in the Drawings. RipRap shall be installed on a geotextile fabric in accordance with Section 02272, "Geotextile Fabrics".

2.3 EROSION CONTROL BLANKET

Provide and install a flexible erosion control and revegetation mat where any work is done in the drainage channel areas not covered by riprap. Use the jute blanket described below and in the plan drawings, or equal.

- A. Straw Mulch Blankets - Made of a uniform layer of straw with a net covering on one side. Straw should be clean wheat straw free of weeds and weed seeds.
- B. Excelsior Blankets - Made of evenly distributed coarse wood fibers reinforced by netting.

- C. Jute Blankets - Made from undyed, biodegradable jute woven into a uniform, plain mesh with approximately 0.6-inch openings and weighing not less than 14 ounces per square yard.

PART 3 - EXECUTION

3.1 INSTALLATION OF CULVERTS AND APPURTENANT CONSTRUCTION

3.1.1 Installation of Concrete Culverts

Inspect each section before and after installation; remove those found defective and replace with new. The laying of the culvert shall proceed from the upgrade end to the lower end of the line and shall have a uniform pitch to the outlet, as identified by invert elevations noted in the Drawings. Watertight jointing of the precast concrete culvert sections shall be in accordance with manufacturer's recommendations. Provide a 6-inch layer of clean gravel bedding with a maximum size of 2 inches.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The ROICC NTR or his authorized representative will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing. The Contractor shall be able to produce evidence, when required, that each item of work has been constructed properly and in accordance with the drawings and specifications.

3.2.2 Pipeline Testing

Check each culvert run for gross deficiencies by holding a light at one end; it shall show a full circle of light through the culvert when viewed from the other end of line.

3.3 RIPRAP

A. Riprap Stones

1. Laid upward from the toe of the slope with the larger stones at the toe of the slope.
2. Lay with close joints roughly perpendicular to the slope.
3. Fill open joints with smaller particles conforming to the required gradation.

- B. Finished Surface: Reasonably uniform in appearance, approximately parallel to and within 2 in. of the lines and grades shown on the Drawings or as modified by the ROICC NTR.

3.4 EROSION CONTROL BLANKETS

Blankets shall be applied at the locations indicated on the Drawings immediately after seeding operations have been completed. Apply netting side up. Lay downslope blankets first, working upslope. Install in accordance with manufacturer's published specifications and as indicated on the Drawings.

--End of Section--

SECTION 02776

POLYETHYLENE GEOMEMBRANE

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. For all test methods specified, the most recent revision shall apply if different from that listed.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 638-89	Test Method for Tensile Properties of Plastics.
ASTM D 746B-79	Brittleness Temperature of Plastics and Elastomers by Impact.
ASTM D 751-89	Method of Testing Coated Fabrics (as modified in MSF 54, App. A).
ASTM D 792-86	Test Method for Specific Gravity (Relative Density) and Density of Plastics by Displacement.
ASTM D 1004-66	Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
ASTM D 1204-84	Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
ASTM D 1505-85	Test Method for Plastics by the Density-Gradient Technique.
ASTM D 1603-76	Test Method for Carbon Black in Olefin Plastics.
ASTM D 1693-70	Test Method for Displacement Environmental Stress-Cracking of Ethylene Plastics.
ASTM D 3015-85	Recommended Practice for Microscopical Examination of Pigment Dispersion in Plastic Compounds.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

ASTM D 4437-84 Integrity of Field Seams Used in Joining
Manufactured Flexible Polymeric Sheet
Geomembranes.

FEDERAL TEST METHOD STANDARD (FTMS)

FTMS 101C Method 2065, Puncture Resistance.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA)

Technical Guidance Document: "Quality Assurance and Quality Control for
Waste Containment Facilities." Sept.
1993.

Technical Guidance Document: "Inspection Techniques for the Fabrication
of Geomembrane Field Seams." May 1991.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Excavation, Backfill and Compaction: Section 02221

Geotextiles: Section 02272

1.3 DESCRIPTION OF WORK

Furnish all labor, materials, and equipment to install smooth polyethylene (PE) geomembrane on the landfill surfaces in conformity with the Drawings and as specified in this section. The geomembrane liner shall be placed on top of a geotextile as specified in Section 02272, "Geotextiles".

1.4 SUBMITTALS

Submit at least one (1) copy for approval by the ROICC NTR and a minimum of two (2) copies to the EOR for information in support of Record Drawings, unless approval authority or number of copies are specified otherwise in the text.

1.4.1 Manufacturer's Data

- a. Experience information for approval before material shipment.
- b. Supplier's and manufacturer's certificates for approval before installation as specified in Quality Control in Part 1.5.2.a and b of this Section.
- c. Panel layout with seam locations and details for approval before material shipment.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

- d. Quality control testing reports before material installation as specified in Source Quality Control in Part 2.4 of this Section.
- e. Warranty before acceptance of installed liner as specified in Manufacturer's Warranty in Part 1 of this Section.

1.4.2 Installer's Data

- a. Experience information for approval before material shipment.
- b. Cold/wet weather seaming procedures for approval before start of installation.
- c. Site preparation certificate before start of installation as specified in Quality Control in Part 1.5.2.c of this Section.
- d. Field Technical Service reports during installation and before acceptance as specified in Field Quality Control in Part 3 of this Section.

1.4.3 Contractor's Provided Third-Party Independent Geomembrane Testing Service

- a. Experience information for approval before subcontracting.

1.5 QUALITY CONTROL

1.5.1 Qualifications

- a. Manufacturer's Experience:
 - 1. Production and in service use of similar geomembrane materials for not less than 1 year.
 - 2. At least 10 million square feet of VLDPE, LLDPE, or HDPE geomembrane has been installed.
- b. Installer's Experience:
 - 1. Installation of at least 1 million square feet of VLDPE, LLDPE, or HDPE geomembrane using dual hot wedge seaming methods by both company and its field representative(s).

1.5.2 Certifications

- a. Resin suppliers to manufacturer shall certify resin used contains less than 2% clean recycled polymer by weight, a density of 0.94 g/cc and a melt index less than or equal to 1.0 gram/10 min.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

- b. Manufacturer shall certify the geomembranes meet the specifications.
- c. Installer shall certify site preparation is acceptable for geomembrane installation including the following issues:
 - 1. Subgrade directional changes will not create sharp bends in the geomembrane.
 - 2. Subgrade is adequately firm and dry to allow satisfactory seaming.
 - 3. Subgrade surface is free of hard and sharp objects capable of damaging the liner.

1.6 QUALITY ASSURANCE

1.6.1 Contractor's Provided Geosynthetic Inspection and Testing (CQA Representative) Service.

- a. The Contractor's will provide approved personnel to inspect placement of the geomembrane, obtain samples of the geomembranes for testing, perform quality assurance testing of the geomembranes, and to review the results of the quality assurance testing.

- 1. Approval of the Contractor's's personnel to perform this function will be based on an Engineer-of-Record (EOR) approved submittal of information supporting the individual(s) qualifications for QA/QC inspection and sampling of membrane liner installations. Qualifications shall include an appropriate and current certification of qualifications from a recognized industry group or organization.

- 2. The Contractor may also hire an independent, third party to fulfill these functions, subject to the same approval and qualifications noted above.

- b. Should an independent third party be utilized, the Contractor's shall provide assistance during the testing and inspection. Assistance may include sampling geomembrane materials and providing split samples, when requested.

1.7 DELIVERY, STORAGE, AND HANDLING OF GEOMEMBRANE

1.7.1 Using indelible marking, identify each roll with:

- a. Name of manufacturer

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

- b. Manufacturer's batch code
- c. Physical dimensions (thickness, length, width)
- d. Roll number
- e. Date of fabrication
- f. Directions for unrolling and unfolding

1.7.2 Individually package and protect to prevent damage during shipment and storage.

- a. Identify each package in the same fashion as the sheet within and show the date of shipment.

1.7.3 Storage

- a. Indoors: In original, unopened protective covering
- b. Outdoors: Per manufacturer's recommendations.

1.8 PROJECT CONDITIONS

1.8.1 Temperature Constraints

- a. Extrusion or Fusion Bonding of Field Seams:
 - 1. Take ambient temperature readings at no longer than two-hour intervals, two feet above the liner, using thermocouples or other acceptable means.
 - 2. If ambient temperature, as described above, is measured above 105°F, seaming shall proceed with increased caution because of difficult working conditions.
 - 3. If ambient temperature, as described above, is measured between 105°F and 40°F, seaming may proceed without additional constraints.
 - 4. If ambient temperature is below 40°F, additional constraints will be imposed in accordance with the approved cold weather procedures.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

b. Cold Weather Seaming

1. Submit for approval cold weather procedures for seaming when temperatures may drop below 40°F.
2. Cold weather procedures shall include but not be limited to the following:
 - a) Preheating sheets
 - b) Providing liner protection with coverings
 - c) Changing test frequencies
 - d) Bridging
 - e) Increasing trial welding

1.9 MANUFACTURER'S WARRANTY

1.9.1 Warrant that geomembranes shall be free from defect in materials for a period of 20 years.

a. Will not develop cracks or holes..

b. Is immune to chemical attack and degradation by chemicals specified in the manufacturer's literature.

1.9.2 Should defects or service degradation occur during the 20 year warranty period, the manufacturer shall supply repair or replacement material or refund the pro-rata part of the unexpired term of the warranty at the then-current price.

1.9.3 Warranty shall continue in effect on the repaired or replaced material for the unelapsed term of the original warranty.

1.9.4 Southern Division Naval Facilities Engineering Command will present, in writing, to manufacturer and installer, claim for alleged breach of warranty within 30 days after alleged defect is noticed.

PART 2 - PRODUCTS

2.1 MANUFACTURER

PE geomembrane shall be manufactured by GSE Lining Technology, Inc., 19103 Gundle Road, Houston, Texas; or approved substitute.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

2.2 SMOOTH PE GEOMEMBRANE

2.2.1 Physical Characteristics

- a. Physical properties required of the geomembranes are shown on Table 02776-1.

2.2.2 Factory Bonded Seam

- a. Fabricate calendered sheeting into large sections by using one of the following seaming techniques:
 1. Hot air/hot wedge.
 2. Flat weld extrusion.
- b. Seam strengths shall exhibit the same physical strength as the parent material.
- c. Fabricated seams shall pass a 100 percent vacuum test.

2.2.3 Extrusion Joining Resin

- a. Use materials meeting manufacturer's requirements.

2.3 OTHER MATERIALS

2.3.1 Pipe Boots, Vents, Patches

- a. Same material and thickness as the geomembrane or a compatible approved equal.

2.4 SOURCE QUALITY CONTROL

2.4.1 Manufacturer Testing

- a. Furnish factory quality control test data on rolls to be shipped for material thickness, tensile strength and tear resistance.
- b. Furnish test data on fabricated seams.

2.5 SOURCE QUALITY ASSURANCE

2.5.1 CQA Testing

- a. Rolls delivered to the site:
 1. Prior to geomembrane installation the Contractor's's Construction Quality Assurance (CQA) Representative or

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

independent third party inspector shall obtain random samples 3 feet long by roll width from rolls at locations selected by the CQA Representative at a rate of one sample per 40,000 s.f. or once per change in resin batches. Samples are to be sent by the CQA Representative to the Contractor's's Geosynthetic Testing Service to determine density, carbon black content, thickness and tensile characteristics. Testing shall be performed in accordance with the methods listed in Table 02776-1.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

3.1.1 Requirements

- a. Subgrade preparation shall meet manufacturer's recommendations.

3.2 HANDLING AND PLACEMENT

3.2.1 Requirements

- a. Geomembranes shall be deployed in strict accordance with good construction practice and particularly in such a manner as to prevent any damage to the material.
- b. If possible, actual placement shall proceed from the highest elevation to the lowest to facilitate drainage in the event of precipitation.
- c. Methods of deployment shall be consistent with manufacturer's recommendations.

3.3 FIELD SEAMS

3.3.1 Preparation

- a. Clean dust and dirt from areas to become seam interfaces.
- b. For extrusion bonded seams, roughen slick sheet surfaces to become seam interfaces with a hand-held disk grinder.
 1. The grinder grit paper should be no coarser than #80 or finer than #100.
 2. Grinding depth must roughen membrane surface but must not exceed 10% of the membrane thickness.

3. The grinder marks shall not appear beyond 1/8 inch on each side of the extrusion joining resin after seaming. Place cap strip or patch, over entire seam length where excessive grinding (>1/8 inch beyond weld or >10% of membrane thickness) occurs.
4. Grinding shall not take place more than 10 minutes before placement of extrusion joining resin to prevent surface oxidation of the surface.
- c. For hot wedge fusion-bonded seams, sheet surface should not be roughened by grinding or other means. Surfaces to be bonded must be clean and dry.
- d. Sheet shall be dry. Seaming shall not occur over fully saturated subgrade soil without appropriate procedures and precautions, as the heat will draw water to the seam.
- e. Ambient Temperature: See Article entitled Project Conditions in Part 1 of this Section.

3.3.2 Seaming Methods

- a. Make maximum use of large panels unless special requirements are necessary for liner configuration and termination.
- b. To the maximum extent possible, field seams shall be made parallel to the slope (i.e., up and down) as opposed to horizontally along the slope. Where horizontal seams are necessary, the higher elevation membrane shall overlap the lower elevation membrane. The number of seams shall be minimized in corners and odd-shaped geometric locations.
- c. Overlap adjacent sheets a minimum of 4 inches.
- d. Use the following field seaming technique to seam geomembrane panels together:
 1. Dual Hot Wedge Fusion Bonding:
 - a) Each seaming unit shall include a thermometer giving machine temperature at the metal surface.
 - b) Maintain seaming unit at a recordable temperature determined by on-site conditions.
 - c) Seaming unit temperature shall not vary more than recommended by the Manufacturer, as approved by ABB-ES.
 - d) Press geomembranes together mechanically.

- e. Use the following seaming method for repairs or patches and in areas where use of the dual hot wedge is not feasible (e.g., pipe and manhole penetrations):

- 1. Extrusion Welding:

- a) Soften liner material by heated air.
- b) Air Temperature Impinging on Sheet: 420°F to 680°F.
- c) Installation supervisor shall determine exact temperature used based on scrap welds.
- d) Directly following heat application, extrude a 1½ inch minimum width resin strip between overlapped sheets. For flat welds and for flat fillet welds extrude a 1½-inch minimum width resin strip centered over the exposed overlap edge.
- e) Extrusion Die Resin Temperature: 428°F to 536°F.
- f) Firmly press overlapped sheets together by mechanical means to form the extrusion joint.

3.3.3 Seaming Wrinkles

- a. Cut fishmouths or wrinkles along the top ridge of the wrinkle, and overlap for a flat surface.
- b. Seam the cut fishmouths or wrinkles where the overlap is greater than 3 inches.
- c. Where the overlap is less than 3 inches, patch with oval or round patch extending a minimum of 6 inches in all directions.

3.3.4 Patching

- a. Use extrusion or fusion welding to bond materials.
- b. Clean liner material of all dirt, dust and other foreign material.
- c. Roughen smooth surfaces and heat material as required.
- d. Cut patch in oval or round shape, extending a minimum of 6 inches beyond hole, in all directions.

3.3.5 Small Hole Repairs

- a. Use an extrusion hand welder.
- b. Clean liner material of all dirt, dust and other foreign material.
- c. Roughen smooth surfaces and air heat to prescribed temperature.

- d. Extrude a resin strip over the hole.

3.4 PIPE BOOTS, VENTS, AND PATCHES

Construct as shown on Drawings and as recommended by manufacturer. Use seaming techniques to the membrane as recommended by the manufacturer. Install all devices to provide an effective, watertight seal.

3.5 MECHANICAL FASTENINGS

Construct mechanical fastenings and sealing details if required, as recommended by manufacturer. Install all devices to provide an effective watertight seal.

3.5.1 Sealing Materials and Contact Adhesives

- a. Compatible with membrane and chemical environment of installation.
- b. As recommended by manufacturer.

3.6 FIELD QUALITY CONTROL

3.6.1 Contractor's's CQC Manager shall observe all installation of geomembrane and report progress to ROICC NTR.

3.6.2 Tests

The Contractor's's QA/QC Plan, as part of the approved Work Plan, shall, at a minimum, provide detailed procedures and acceptance criteria for testing, related to installation of the geomembrane, identified in the following subsections. The test descriptions provided may be referenced in the QA/QC Plan. Alternatively, should different procedures be identified by the Contractor's to meet test requirements, the alternative procedures provided by the Contractor's shall provide at least as much verifiable information as the methods described below.

a. Test Welds

- 1. Run a test weld from each seaming machine a minimum of 3 times per day, at the beginning of the day, around mid-day, and near the end of the day. In addition, test welds shall be run when a new operator takes over or whenever the welding machines are shut off and allowed to cool down, or when machines are idle for more than 60 minutes. If the ambient temperature, as defined in Project Conditions, Part 1 of this Section, drops 20° or more in 2 hours, a test weld shall also be performed.

2. Test strip should be at least 48 in. for extrusion welds and 96 in. for hot wedge welds measured along the length of the seam and extended at least 6 in. on each side of the seam. Run test weld under the same conditions that exist for welding of the seam.
 - a) The test weld shall be cut in 14 in. coupons and be distributed to the following parties:
 - To the installer to perform field testing.
 - To the CQA Representative for field testing/screening purposes.
 - b) Each sample coupon shall be marked with test weld date, ambient temperature, and welding machine number.
 - c) For field testing/screening, a passing test weld for peel shall exhibit Film Tear Bond (FTB) with no brittle cracking and have a peel separation of 10% or less.
 - d) For field testing/screening, a passing test weld for shear shall exhibit necking of the parent material prior to any necking or splitting of the weld.

b. Dual Hot Wedge Air Channel Seams

1. The hot wedge develops 2 welds separated by an air channel. This channel will be used for air testing in both field seams and seams created during manufacturing. The first phase of the test shall be to establish continuity along the entire length of the seam. This will be done by sealing one end of the seam, inserting a manometer (consisting of a hollow needle, pressure gauge and air valve) into the air channel, and pumping air through the channel. The opposite end shall then be inspected for passage of air. Once continuity is established, the opposite end of the seam from the manometer shall be sealed and the channel shall be pumped to 30 psi. The initial start pressure is read once the air in the air channel has had a chance to stabilize at the ambient liner temperature (up to a 5 minute wait). Once the pressure has stabilized (no lower than 25 psi) the test can start. The pressure shall not drop more than 3 psi in 5 minutes. Any leaks found shall be repaired by extrusion welding and vacuum tested. The hole made by the manometer needle will be patched and the patch will be vacuum or spark tested.
2. If the air channel is found to be plugged during the continuity test, then the plug shall be located. The pressure test shall be conducted on each side of a plug. It may be necessary to cut away the plug and patch the area after the pressure test.

3. Subject to approval, those dual hot wedge seams not feasible for air pressure testing shall be 100% vacuum tested.
4. The Contractor's shall provide at a minimum, two operational dual hot wedge welders with a third backup welder to be used only in emergencies.

c. Extrusion Seams (Flat Seams and Fillet Seams)

1. Vacuum Test: Perform vacuum test by experienced personnel using vacuum test box or other approved vacuum method where feasible along extrusion or fusion bonds (i.e., patches, pipe boots, etc.)
 - a) Spread soap solution over seam being tested, press vacuum box down and apply suction for 30 seconds.
 - b) When the vacuum box is moved along the seam during testing, maintain a 3 inch overlap with section tested.
 - c) The appearance of bubbles in rapid succession during the test is indicative of a leak.
 - d) Repair and retest structural faults in the welded seam.

d. Destructive Tests

1. Samples:

- a) Take random weld samples at locations selected by the CQA Representative at a frequency of 1 sample per 500 feet of welded seam, or at a minimum of 1 per seam, or at least one sample for each welding machine used on the project.
- b) The test strip shall be cut in 14 in. coupons and be distributed to the following:
 - The installer to perform Construction Quality Control (CQC) testing.
 - the CQA Representative for field testing/screening purposes and independent laboratory for testing.
 - Southern Division Naval Facilities Engineering Command for archiving.
- c) Each sample coupon shall be marked with date, location of sample, orientation with respect to machine direction, and welding machine number.

2. Field Testing:

- a) For field testing/screening, a passing test weld for peel shall exhibit Film Tear Bond (FTB) with no brittle cracking of 10% or less.
- b) For field testing/screening, a passing test weld for shear shall exhibit FTB with necking of the parent material prior to any necking or splitting of the weld.

3. Patches and Repairs:

- a) If the sample of the seam tested fails the criteria, cut samples 10 feet on both sides of failing sample. Send second sample to testing laboratory for analysis.
- b) If the criteria is not achieved for the second samples, follow the same procedure outlined above until the entire area of inadequate seaming is identified.
- c) Place a patch over the entire failed area of the seam.
- d) All repairs require 100% passing by non-destructive vacuum box testing.

4. Visual Inspection:

- a) Visually inspect all seams and geomembrane panels in-place for holes, blemishes, pores, penetrations or other detrimentation defects.

3.7 FIELD QUALITY ASSURANCE

3.7.1 Cooperation: Contractor's shall cooperate with the efforts and schedules of the work performed by the CQA Representative.

3.7.2 The CQA Representative or Independent Third Party inspection service will:

- a. Observe all non-destructive seam tests described under Field Quality Control.
- b. Observe each roll of liner material for defects.
- c. Review the manufacturer's quality control certificate for each roll delivered to the site.
- d. Cut coupons, conduct field destructive testing of seam samples and forward passing samples to independent laboratory for testing. Perform air testing at boots.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

- e. Prepare ongoing photographic documentation of the geomembrane installation.
- f. Keep a logical record of documentation of geomembrane installation. This will include panel placement log, seam testing and inspection log, and liner repair log.

3.7.3 Laboratory Testing

- a. From each 14 in. coupon submitted for destructive testing to the Contractor's Testing Service laboratory, five shear tests and five peel tests will be run, each on a 1 in. strip of material. Shear tests will be ASTM D 4437-84, 6.3 or equivalent and peel tests will be ASTM D 4437-84, 6.2 or equivalent.
- b. Seam samples submitted to the independent laboratory for testing shall conform to the pass/fail criteria for all peel and shear tests.
- c. The shear strength (tensile strength) of 4 of the 5 specimens obtained from each sample shall be equal to or exceed 80% of the mean tensile stress at yield of the parent material.
- d. The peel test of 4 of the 5 specimens obtained from each sample shall exhibit a Film Tear Bond (FTB) and have a peel seam separation of 10% or less. The peel seam separation is the area of the seam separation expressed as a percentage of the original fused area.

3.8 PROTECTION OF GEOMEMBRANE

Vehicle traffic in direct contact with the installed geomembrane is not allowable. Placement of soil above installed geomembrane must be done in a manner so as to not nick, cut, scrape, puncture or otherwise damage the geomembrane. Reasonable care must be taken at all times to protect the geomembrane from any activity with potential to damage the installed geomembrane. All damaged areas noted must be repaired and brought to the attention of the CQA Representative.

3.9 CLEANUP

Dispose of all trash and waste. Remove all excess material and equipment. Leave the premises in a neat and acceptable condition.

TABLE 02776-1

PHYSICAL PROPERTIES OF PE GEOMEMBRANE

PROPERTY	TEST METHOD	SMOOTH VALUE
Thickness (mil) - avg./min	ASTM D 751 (conical tip micrometer)	40/36
Minimum Tensile Properties (each direction)	ASTM D 638 Type IV Dumb-bell at 2 ipm	
1. Tensile Strength at Break (lbs/in)		152
2. Elongation at Break (%)		600
Tear Resistance Initiation (lbs min.)	ASTM D 1004, Die. C	28
Puncture Resistance (lbs min.)	FTMS 101C Method 2065	52
Density (g/cc)	ASTM D1505	0.94
SEAM STRENGTH (lbs/in min.)		
Shear	ASTM D4437	80
Peel	ASTM D4437	57
ENDURANCE PROPERTIES (minimums)		
Carbon Black Content (%)	ASTM D1603	2-3
Environment Stress Crack (minimum hours)	ASTM D1693	1500
Carbon Black Dispersion	ASTM D3015	A1/A2

--End of Section--

SECTION 02931

SEEDING

PART 1 - GENERAL

1.1 DESCRIPTION

This specification covers the Contractor's requirements for seeding, by Hydroseeding methods, the landfill cover and other disturbed areas. Furnish and place topsoil, fertilizer, seed, and mulch in the areas to be vegetated, and maintain new seeding through the contract maintenance period. Areas excavated within existing housing backyard areas (soil removal area #7) shall be restored fully with sod to match existing adjacent lawn areas.

1.2 QUALIFICATIONS

The Contractor shall be licensed in the State of Florida and comply with city, state, and federal regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

Obtain and retain as part of the project records, certifications, and/or labels of materials supplied.

2.1.1 Topsoil

See Specification Section 02220, Excavation, Backfill, and Compaction.

2.2.1 Fertilizer

1. The fertilizer analysis shall be as follows:

20-3-6 Analysis	
Total Nitrogen, not less than	20.00%
Water insoluble organic nitrogen, not less than	3.55%
Water soluble organic nitrogen, not less than	1.45%
Available phosphoric acid, not less than	3.00%
Water soluble potash, not less than	6.00%
Iron as Fe	1.50%
Sulfur as S (combined)	13.00%

2. Part of the nitrogen in this analysis shall contain 3.75% units of slow release nitrogen and shall be derived from ureaformaldehyde nitrogen.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

3. Fertilizer shall be packaged in containers that are fully labeled and comply with state laws and regulations when delivered to the site.

2.2.2 Seed

1. Seed blend shall consist of the following:

<u>Name</u>	<u>Mixture %</u>
Argentine Bahia grass	78.4
Unhulled Bermuda grass	7.8
Hulled Bermuda grass	7.8
Temporary grass seed*	<u>6.0</u>
Total	100

*October 1 to March 31 Temporary grass seed shall be Annual Rye grass. April 1 to September 30 Temporary grass seed shall be Brown Top Millet.

2. Quality Specifications shall not be less than:

SEED VARIETY	PURE SEED %	INERT MATERIAL %	GERMINATION %	DORMANT OR HARD SEED	TOTAL GERMINATION (GERM & DORMANT OR HARD TOTAL)
Bahia grass	80.00	15.00	85.00	0.00	85.00
Bermuda grass (Hulled & Unhulled)	85.00	5.00	90.00	0.00	90.00
Millet, Brown Top	85.00	5.00	85.00	0.00	85.00
Rye grass, Annual	88.00	5.00	90.00	0.00	90.00

3. The seed shall contain no noxious or prohibited weed seed.
4. The test date stated on the seed tag shall not be more than 6 months old and from a state-registered and licensed laboratory of the Florida State Seed Laboratory.
5. Seed shall be packaged in containers that are fully labeled and comply with the state laws (Florida) and regulations when delivered to the site.
6. Other suitable seed mix is acceptable if approved by the Duval County Soil and Water Conservation District and by the ROICC NTR.

2.2.3 Mulch

1. Wood cellulose fiber mulch for use with hydraulic application of grass seed and fertilizer shall consist of specially prepared wood cellulose fiber or a combination of wood cellulose and recycled newsprint, processed to contain no growth or germination inhibiting factors and dyed an appropriate color to facilitate visual metering of the application materials. The mulch material shall be supplied in packages having gross weight not in excess of 100 pounds. On air-dry weight basis, the wood cellulose fiber shall contain a maximum of 10 to 15 percent moisture, plus or minus 3 percent, at the time of manufacture. The wood cellulose fiber shall be manufactured so that after addition and agitation in slurry tanks with fertilizers, grass seed, water, and other approved additives, the fibers in the material will become uniformly suspended to form a homogeneous slurry. When hydraulically sprayed on the ground, the material will form a blotter like cover impregnated uniformly with grass seed.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 All Areas to be Seeded

- a. Shall meet the specified grades and be free of growth and debris.
- b. Take care to prevent the formation of low places and pockets where water will stand.

3.2 APPLICATION

3.2.1 Topsoil

See Section 02220, General Excavation, Backfill, and Compaction.

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

3.2.2 Slurry

The seed, fertilizer and mulch shall be distributed over the areas to be seeded, as a slurry composed of water, seed, fertilizer, mulch material, and tack or binder.

a. Fertilizer Rates of Application - 20-3-6 Analysis: 8 pounds per 1000 square feet or 350 pounds per acre.

b. Seeding:

<u>Name</u>	<u>Seed Wt. \Acre</u>
Argentine Bahia grass	100 lbs.
Unhulled Bermuda grass	10 lbs.
Hulled Bermuda grass	10 lbs.
Temporary grass seed*	7.5 lbs.
Total	127.5 lbs.

c. Wood Cellulose fiber: 30 pounds per 1000 square feet or 1300 pounds per acres.

d. Tack Material (binder): Shall be applied at the manufacturer's recommended rate.. The tack/binder shall be a biodegradable material. A printed material data sheet shall be supplied upon request by the ROICC NTR.

3.3 HYDROSEEDING EQUIPMENT

The hydroseeding unit shall be a 6,000 gallon steel self-contained unit mounted on an all wheel drive vehicle. The unit shall be capable of constant agitation to provide a homogeneous spray slurry. The unit shall also be capable of handling up to ten acres of stored material in a safe dry environment.

3.4 CARE AFTER SEEDING

a. Protect and care for seeded areas until final acceptance of the work, and repair any damage to seeded areas caused by pedestrians, vehicular traffic, or other causes, in accordance with the RAC Contract in force at the time of implementation. Refer to Section 02720 (Storm Drainage), for protection of slopes (3:1 or greater) with an erosion control blanket. If necessary, place barricades of brush or other materials, and suitable signs to protect the seeded areas. Apply water to maintain proper moisture to promote growth. Use approved water wagons or tanks or other approved devices to

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

apply water in the form of a spray or sprinkle without erosive force. Apply water prior to 10:00 a.m. and after 4:00 p.m. to minimize losses due to evaporation. Cut back weeds growing in seeded areas to prevent them from dominating the desired grass plants.

- b. Maintenance Period: There shall be a 60 day warranty period for establishment of an acceptable grass growth, as determined by the ROICC NTR, or reseeding shall be conducted by the Contractor.

--End of Section--

SECTION 02990

HANDLING AND DISPOSAL OF CONTAMINATED MATERIAL

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

CODE OF FEDERAL REGULATIONS (CFR) CITATIONS

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1910.1200	Hazard Communication Standard
29 CFR 1926	Construction Standards
40 CFR 261	Identification and Listing of Hazardous Wastes
40 CFR 262	Generator Standards
40 CFR 263	Transporter Standards
40 CFR 264	TSDF Standards
40 CFR 268	RCRA Land Disposal Restrictions
40 CFR 270	Hazardous Waste Permit Program
49 CFR 171	General Information
49 CFR 172	Hazardous Materials
49 CFR 173	General Shipping Requirements
49 CFR 177	Transporter Requirements
49 CFR 178-79	Container Specifications

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA/540/2-85/003 Dust Control at Hazardous Waste Sites (dated
November 1985)

OSWER Directive Revised Procedures for Implementing Off-site
9834.11 Response Actions

AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)

Z 9.2-79 Fundamentals Governing the Design and Operation
of Local Exhaust Systems

Z 88.2-80 Practices for Respiratory Protection

UNDERWRITERS LABORATORIES, INC. (UL)

586-85 High-Efficiency, Particulate, Air Filter Units

STATE OF FLORIDA ADMINISTRATIVE CODE (FAC)

FAC 62-150 Hazardous Substance Release Notification

FAC 62-730 Hazardous Waste

1.2 DESCRIPTION

This specification covers the Contractor's requirements for management of the materials, equipment, and personnel associated with the excavation, handling, and disposal of contaminated soil and sediment within the limits of the landfill as indicated on the Drawings. All activities conducted under this section shall be performed in strict accordance with the Contractor's Work Plan and approved Health and Safety Plan, as well as with other appropriate specification sections.

1.3 MATERIALS TO BE ENCOUNTERED

Based on human health risk assessments, the major contaminants of concern (and targeted for cleanup) in soil and sediment excavation areas adjacent to the landfill, include PCBs (Arochlor 1254 and 1260), benzo(a)pyrene; dibenzo(a,h)anthracene, and arsenic. In addition, there is an area of low level radioactive soil within the landfill limits, as indicated on the Drawings. A table of potential contaminants which may also be encountered is provided in Section 01010, "Summary or Work".

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

PART 2 - PRODUCTS

2.1 EQUIPMENT

- 2.1.1 Personal Protective Equipment (PPE): The Contractor shall select all PPE in accordance with the Contractor's approved Health and Safety Plan.
- 2.1.2 Tools: Remove all residual dirt and dust and properly decontaminate reusable tools prior to storage or reuse.
- 2.1.3 Vehicle decontamination shall be performed before leaving work areas or leaving the site, in accordance with the Contractor's Health and Safety Plan.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

Take all necessary precautions to adequately protect personnel and public and private property in the areas of work. The work shall be done in accordance with the Contractor's Health and Safety Plan, as included in the Contractor's approved Work Plan for this project.

3.2 ESTABLISHMENT OF WORK ZONES

Prior to commencing contaminated soil or sediment excavation activities, the Contractor shall locate, clearly delineate, and mark in the field the Exclusion Zone, the Contamination Reduction Zone, and the Support Zone, in accordance with the Contractor's Health and Safety Plan. .

3.3 PERMITS, STATE LICENSE, AND NOTIFICATIONS

The work shall be done in accordance with the Contractor's approved Health and Safety Plan.

3.4 DUST CONTROL

Provisions shall be taken during all construction activities to control dust generation. Dust control measures shall be in accordance with the Contractor's approved Work Plan.

3.5 VEHICULAR RESTRICTIONS

All vehicles and equipment entering the Exclusion Zone shall be considered contaminated and shall not leave the Exclusion Zone without being properly decontaminated at the Decontamination Pad. Route

traffic within the Exclusion Zone away from remediated areas to prevent recontaminating these areas.

3.6 CONTAMINATED SOIL AND SEDIMENT REMOVAL OUTSIDE OF THE LANDFILL

3.6.1 Excavated soil and sediment shall be transported to the landfill area designated on the Drawings. This soil and sediment shall be placed on the landfill in areas which will be covered with the geomembrane liner. All contaminated, excavated materials shall be stored in this area.

3.6.2 Existing Monitoring Wells - Existing monitoring wells at the project site and adjacent areas will be abandoned in accordance with the table found on Sheet C-12 of the drawings and Section 02673 of the specifications. Existing well(s) or other structure(s) that are to remain and become damaged by the Contractor shall be replaced by the Contractor.

3.6.3 Trees - Any trees or shrubs within the area of work shall be cleared and disposed by the Contractor in accordance with Section 02102, "Clearing and Grubbing".

3.6.4 On-site Hauling - Construction equipment working in or entering the Exclusion Zone may not leave the Exclusion Zone until it has been decontaminated at the Decontamination Pad.

3.6.5 Off-site Transport - Off-site disposal of drums or rollofs containing Contractor generated waste (PPE, decon water) shall be coordinated with the Public Works Center (PWC), NAS Jacksonville for manifesting, disposal, and transport to a designated area. The Contractor will not be responsible for off-base transport and disposal. Loading of on-site transport vehicles shall occur only in the area specified for this activity. The transport vehicles shall be equipped and permitted to carry hazardous material, and be placarded upon leaving the site.. Following loading, the transport vehicle shall be decontaminated at the Decontamination Pad and immediately leave the job site. Loading equipment is considered contaminated and shall not leave the Exclusion Zone without first being decontaminated. Vehicles shall leave the site by the route designated in the Contractor's approved Work Plan.

3.6.6 The Contractor shall implement the procedures for handling the drums and bulk containers in accordance with 29 CFR 1926.65 and the Contractor's approved Health and Safety Plan.

3.7 CLEAN-UP AND DISPOSAL

3.7.1 Housekeeping - Essential parts of dust control are housekeeping and cleanup procedures. Accumulations of dust in the Exclusion Zone shall be minimized. Meticulous attention shall be paid to restricting the spread of dust and debris; prevention of waste from being distributed

REMEDIAL DESIGN FOR OU-1, NAS JACKSONVILLE, JACKSONVILLE, FL

over the general area. Cleanup shall include loading of all debris in containers. Dispose of materials used for wiping, rinsing, and cleaning as hazardous waste.

3.7.2 Disposal of Contaminated Materials - Handling and off-site disposal of contaminated material shall be coordinated with the PWC, NAS Jacksonville.

3.7.3 Construction-Generated Debris - Contaminated scrap, debris, bags, containers, disposable equipment, and clothing shall be treated as hazardous. Disposal of this waste shall also be coordinated with the PWC NAS Jacksonville.. Place in containers approved for transportation of hazardous wastes.

All contaminated materials to be removed from the site as part of this Contract shall be disposed of at an EPA-approved TSDF. Procedures used for transport and disposal must be consistent with all applicable Federal, state, and local regulations. NAS Jacksonville will be considered as the Generator of all hazardous waste contaminated material. The Contractor shall prepare required hazardous waste manifests and disposal documents for the transport and disposal of contaminated items produced as part of this Contract. These manifests and documents shall be submitted to the ROICC NTR prior to NAS Jacksonville FED for Generator's signature. The ROICC NTR must be notified by the Contractor two days prior to the shipping of any waste contaminated material from the project site.

3.7.4 Soil from Decontamination Pad - All soil collected as a result of vehicle decontamination shall be removed on a daily basis or sooner if conditions warrant and disposed of within the landfill area to be capped as directed by the ROICC NTR. Care shall be taken not to spill or otherwise contaminate areas of the Contamination Reduction Zone outside of the Decontamination Pad.

3.7.5 Decontamination Wash-down Water - Water from the decontamination of vehicles and equipment shall be collected and containerized. Water shall be transported off-site for treatment and disposal at an approved facility. This water may be contaminated by listed hazardous wastes and shall be handled and disposed of as such. Frequency of this removal shall depend on the operation of the Decontamination Pad. Any spillage of this water onto previously uncontaminated areas shall be cleaned up and decontaminated to the satisfaction of the ROICC NTR. Decontamination water supply, collection, containerization, sampling and analysis, transport and disposal is the Contractor's responsibility and incidental to health and safety activities.

3.7.6 Non-Contaminated Debris - All other non-contaminated debris shall be placed in approved Contractor furnished containers to prevent the spread and accumulation of dust and dirt. Non-contaminated debris shall be

removed from the area as often as necessary, but not less than once at the end of each week. The non-contaminated debris shall not be disposed of in hazardous waste containers. Non-hazardous waste disposal shall be coordinated with the NAS Jacksonville environmental staff and the ROICC NTR.

3.8 SITE RESTORATION

Demolition of Decontamination Pad - Prior to demolition, the ROICC NTR will verify that all project related decontamination has been achieved. Following all decontamination activities, completely remove the decontamination facility. Resulting debris from demolition will be treated as contaminated waste and disposed of accordingly. Care shall be taken not to contaminate the site during decontamination, demolition, or disposal activities.

3.9 DEMOBILIZATION

3.9.1 Shall include the following activities:

- a. Decontamination and removal from site of all Contractor equipment and materials.
- b. Collection and disposal of all Contractor generated contaminated materials for which decontamination is inappropriate.
- c. Decontamination of site-dedicated equipment and facilities operated by the Contractor and removal from site of same.
- d. Disconnection and removal of temporary utilities from the site.

--End of Section--

APPENDIX B

CONSTRUCTION DRAWINGS

REMEDIAL DESIGN FOR POTENTIAL SOURCES OF CONTAMINATION (PSCs) 26 AND 27 OPERABLE UNIT 1

NAVAL AIR STATION JACKSONVILLE JACKSONVILLE, FLORIDA

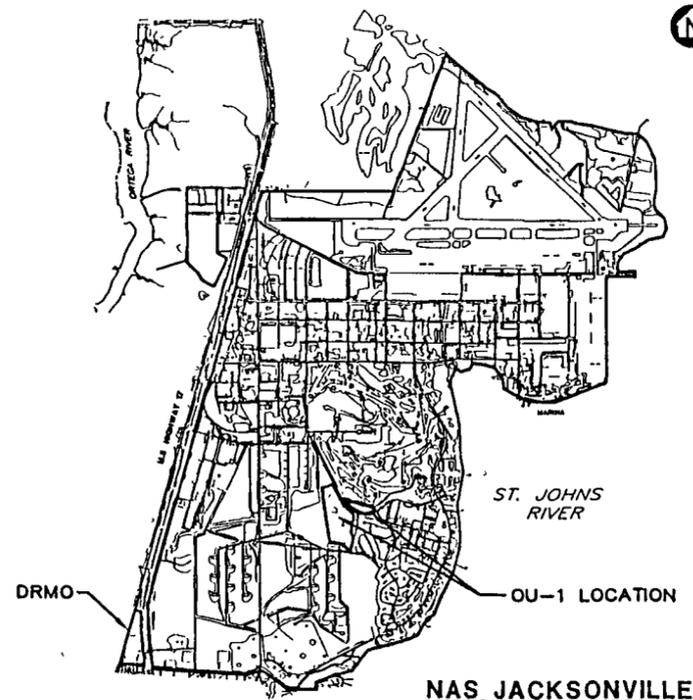
CONTRACT NO. N62467-89-D-0317/134

INDEX

SHEET NO.	NAVFAC DRAWING NO.	TITLE
T-1	5338915	TITLE SHEET
C-1	5338916	SYMBOLS, ABBREVIATIONS AND GENERAL NOTES
C-2	5338917	EXISTING CONDITIONS PLAN
C-3	5338918	EXISTING CONDITIONS PLAN
C-4	5338919	SUBGRADE PLAN
C-5	5338920	SUBGRADE PLAN
C-6	5338921	SEDIMENT EXCAVATION AREA C PLAN
C-7	5338922	FINAL GRADING PLAN (100 SCALE)
C-8	5338923	FINAL GRADING PLAN (60 SCALE)
C-9	5338924	FINAL GRADING PLAN (60 SCALE)
C-10	5338925	LANDFILL CROSS-SECTIONS
C-11	5338926	LANDFILL CROSS-SECTIONS
C-12	5338927	CONSTRUCTION DETAILS
C-13	5338928	CONSTRUCTION DETAILS

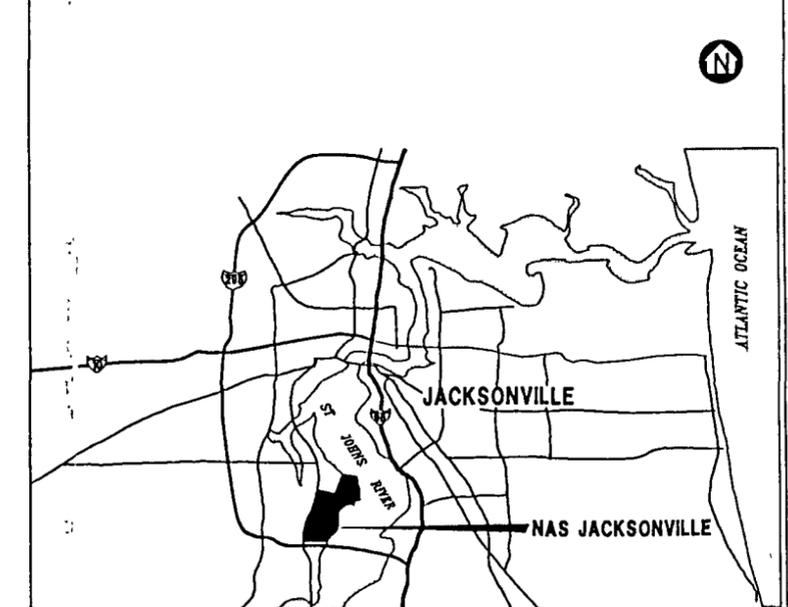
LOCATION MAP

0 1200 2500
SCALE: 1" = 2500'



VICINITY MAP

0 2 4 MILES
SCALE: 1" = 4 MILES



REV	DESCRIPTION	DATE	APPROVED
0	FOR CONSTRUCTION	6/27/97	E.L.
1	FINAL DESIGN REVIEW	5/2/97	S.M.

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

PROJECT: 8554
DESIGNER: E. LUDUC
DATE: 3/22/97
CHECKED: M. PETERS
DATE: 6/25/97
APPROVED: S. MITCHELL
DATE: 6/25/97

TITLE SHEET

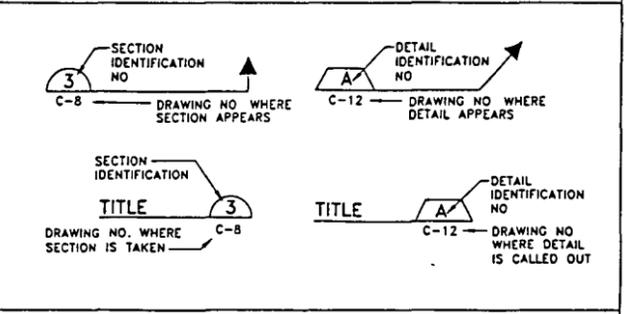
UC NO. D N00207
CITY NO. 134
NAVFAC Dwg. No. 5338915
REV. 0

SCALE AS NOTED
SHEET 1 of 14

SYMBOLS LEGEND

Existing	PROPOSED		Existing	PROPOSED	
		NORTH ARROW (PLAN)			WETLANDS
		CONTOUR LINES			WATER MAIN, SIZE
		WOODS OR BRUSH LINE			OVERHEAD ELECTRIC
		BUILDING OR STRUCTURE			PIEZOMETER AND NUMBER
		WATER COURSE CENTERLINE			MONITORING WELL AND NUMBER
		FENCE LINE (CHAIN LINK)			MONITORING WELL TO BE ABANDONED (HALFTONE)
		SLOPE RATIO (PLAN VIEW) (HORIZ. VERT)			LIGHTPOLE
		CULVERT, SIZE, AND TYPE			POWER POLE
		GEOTEXTILE FABRIC			RIPRAP
		LOW LEVEL RADIOACTIVE SOIL			CATCH BASIN
		AREA ACCEPTABLE FOR COMPACTION TEST PAD(S)			SPOT ELEVATION (GRADE)
		SEDIMENT REMOVAL AREA			WATER ELEVATION
		ACCESS ROAD (UNPAVED)			SUBSURFACE UTILITIES (CABLE TV & TELEPHONE)
		SLOPE RATIO HORIZONTAL TO VERTICAL (PROFILE OR SECTION VIEW)			LIMITS OF REMEDIATION

VIEW MARKERS AND IDENTIFICATION SYMBOLS



GENERAL NOTES:

- TOPOGRAPHIC INFORMATION TAKEN FROM FACILITY BASE PLANS PREPARED FROM AERIAL PHOTOGRAPHY DATED 1/11/92 BY SOUTHERN RESOURCE MAPPING CORP. WITH SUPPLEMENTAL DATA PROVIDED WITHIN PSC 26 AND PSC 27 BY FIELD SURVEY CONDUCTED BY L. D. BRADLEY, LAND SURVEYOR, DATE 1/29/97
- SOIL REMOVAL AREA LIMITS BASED ON EXTRAPOLATION OF AREAS SHOWN IN OU-1 RI/FS AND CROSS-CHECK WITH ORIGINAL SURFACE SOIL SAMPLING COORDINATES SOIL AREA 9 ADDED BASED ON SAMPLING POINT LOCATION ADJUSTMENT IN ACCORDANCE WITH SURVEY COORDINATES.
- LIMITS OF PSC 26 AND PSC 27 REFLECT LOCATIONS SHOWN IN THE RI/FS FOR OU-1 (ABB 1996). THEY ARE NOT BASED ON A FIELD SURVEY OF AN EXACT LINE OF DEMARCATION
- WETLANDS DELINEATION BOUNDARIES TAKEN FROM 1997 WETLANDS SURVEY INFORMATION PROVIDED BY NAS JACKSONVILLE - FACILITIES AND ENVIRONMENTAL DEPARTMENT.
- LIMITS OF LOW LEVEL RADIOACTIVE SOIL DETERMINED BY RADIOLOGICAL FIELD SURVEY CONDUCTED BY BECHTEL ENVIRONMENTAL, INC (BEI) DATE 12/96 AND MAPPED IN L.D. BRADLEY SUBMITTAL (NOTE 1)
- ABOVE GRADE UTILITY INFORMATION SHOWN ON THE DRAWINGS TAKEN FROM DATA PROVIDED BY FIELD SURVEY CONDUCTED BY L. D. BRADLEY, LAND SURVEYOR, DATE 1/29/97.
- BELOW GRADE UTILITY LOCATIONS ARE APPROXIMATE AND TAKEN FROM DRAWING REFERENCES 1, 4, 5. CONTRACTOR TO VERIFY LOCATIONS WHEN WORKING IN THOSE AREAS.
- THE CONTRACTOR SHALL COORDINATE THE CONSTRUCTION AND ABIDE WITH THE REGULATIONS, CODES AND NORMAL PRACTICES OF THE RESPECTIVE UTILITIES WHEN WORKING IN PROXIMITY TO UTILITY LINES AND STRUCTURES.
- THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL PERMITS AND REGULATIONS GOVERNING THE CONSTRUCTION ACTIVITY.
- THE CONTRACTOR SHALL COORDINATE AND SCHEDULE THE CONSTRUCTION TO MAINTAIN TRAFFIC AND THE OWNER'S USE OF ADJACENT FACILITIES AS DESIGNATED IN THE CONTRACT DOCUMENTS
- DISPOSAL OF WASTE MATERIALS, INCLUDING, BUT NOT LIMITED TO, WATER FROM THE PERIMETER DITCH, SEDIMENT EXCAVATION AREAS, AND DECONTAMINATION ACTIVITIES, IS THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE IN COMPLIANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL PERMITS AND REGULATIONS. ANY WASTE DISPOSAL BY THE CONTRACTOR SHALL BE COORDINATED WITH NAS JACKSONVILLE PWC.
- THE CONTRACTOR SHALL INSTALL, INSPECT, AND MAINTAIN EROSION AND SEDIMENT CONTROL DEVICES (SILT FENCING, HAY BALES, ETC.) AT ALL WORK AREAS WHERE THE POTENTIAL FOR EROSION IS PRESENT DURING THE CONSTRUCTION PROCESS. THE DEVICES SHALL BE CONSTRUCTED IN A MANNER TO PREVENT SEDIMENTS FROM BEING TRANSPORTED OUT OF DISTURBED AREAS AND BE CONSISTENT WITH APPLICABLE REGULATORY CONSTRAINTS.
- SEEDING AND REVEGETATION OF DISTURBED NON-WETLAND AREAS SHALL BE CONDUCTED AS REQUIRED BY THE SPECIFICATIONS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPMENT AND IMPLEMENTATION OF METHODS USED FOR ANY NECESSARY STREAM DIVERSIONS OF THE UNNAMED TRIBUTARY, WHILE CONDUCTING WORK IN SEDIMENT AREA C. METHODS AND IMPLEMENTATION SHALL BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATORY CONSTRAINTS AND SHALL BE PRE-APPROVED BY THE CLIENT, OR HIS AUTHORIZED REPRESENTATIVES, PRIOR TO IMPLEMENTATION.
- REVEGETATION OF DISTURBED WETLAND AREAS SHALL BE IN ACCORDANCE WITH REGULATORY AND CLIENT REQUIREMENTS.
- CONSTRUCTION WORK WITHIN WETLANDS SHALL COMPLY WITH APPLICABLE DREDGE AND FILL REGULATORY REQUIREMENTS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE REMOVAL AND RESTORATION OF EXISTING FENCING, WHERE REQUIRED, IN ORDER TO CONDUCT THE WORK
- THAT PORTION OF SOIL AREAS 1, 2, AND 3, WHICH IS CURRENTLY IDENTIFIED AS WETLANDS, WILL BE EXCAVATED, BACKFILLED AND REVEGETATED (SEE NOTE 15), IN ACCORDANCE WITH GUIDELINES PROVIDED BY THE NAS JACKSONVILLE FACILITIES AND ENVIRONMENTAL DEPARTMENT.
- AFTER EXCAVATION, SEDIMENT AREA A WILL BE BACKFILLED WITH CLEAN FILL TO GRADES INDICATED ON DWGS C-7 AND C-8. AFTER EXCAVATION, THE WATER COURSE WITHIN SEDIMENT AREA B WILL BE BACKFILLED WITH ADJACENT BANK MATERIALS TO THE GRADES INDICATED ON DWGS C-7 AND C-9. THE EMBANKMENT AND STREAM BED WILL BE REINFORCED AND PROTECTED WITH RIPRAP, AS INDICATED ON DWGS C-7, C-9, AND C-12. AFTER EXCAVATION SEDIMENT AREA C WILL BE REGRADED WITH ADJACENT BANK MATERIALS.

ABBREVIATIONS LEGEND

AC	ACRE	ENG	ENGINEER	PSC	POTENTIAL SOURCE OF CONTAMINATION
AGG.	AGGREGATE	EQ OR =	EQUAL	PWC	PUBLIC WORKS CENTER
ALT.	ALTERNATE	EQUIP	EQUIPMENT	PLMBG	PLUMBING
ALUM.	ALUMINUM	EST.	ESTIMATED	PT.	POINT OF CURVE
APPD	APPROVED	EXC.	EXCAVATE	P.I.	POINT OF INTERSECTION
APPROX	APPROXIMATE	EXCAV	EXCAVATION	P.T.	POINT OF TANGENT
ARCH	ARCHITECT	EXIST	EXISTING	P.V.C.	POINT OF VERTICAL CURVE
ASB	ASBESTOS	FIG.	FIGURE	P.V.I.	POINT OF VERTICAL INTERSECTION
ASPH.	ASPHALT	FT. OR'	FEET OR FOOT	P.V.T.	POINT OF VERTICAL TANGENCY
ASSY	ASSEMBLY	F.G.	FINISHED GRADE	P.O.C.	POINT ON CURVE
AUTO	AUTOMATIC	F.D.	FLOOR DRAIN	P.O.T	POINT ON TANGENT
AUX.	AUXILIARY	FTG.	FOOTING	P.V.C.	POLYVINYL CHLORIDE
AVE.	AVENUE	BDN.	FOUNDATION	LB.	POUND
AVG.	AVERAGE	GAL	GALLON	P.S.I.	POUND PER SQUARE INCH
B	BASELINE	GALV	GALVANIZED	PWR.	POWER
B.M.	BENCH MARK	GA.	GAUGE	PROJ.	PROJECT
BIT.	BITUMINOUS	GR.	GRADE	PL	PROPERTY LINE
B.C.C.M.P.	BITUMINOUS COATED CORRUGATED	HDPE	HIGH DENSITY POLYETHYLENE	PROP.	PROPOSED
BD.	BOARD	HMW	HAWTHORN MONITORING WELL	PZ	PIEZOMETER
B.O.B.	BOTTOM OF BANK	HOR.	HORIZONTAL	QTY.	QUANTITY
B.O.E.	BOTTOM OF EXPLORATION	HP.	HORSEPOWER	R	RADIUS
BOT.	BOTTOM	HYD.	HYDRANT	RR.	RAILROAD
BLDG	BUILDING	IN OR'	INCHES	REF.	REFUSAL
C.I.	CAST IRON	I.D.	INSIDE DIAMETER	REINF.	REINFORCED
C.B.	CATCH BASIN	INV.	INVERT	R.C.P.	REINFORCED CONCRETE PIPE
CEM.	CEMENT	LAB.	LABORATORY	REQD.	REQUIRED
CTR.	CENTER	L.F.	LINEAR FOOT	RT.	RIGHT
C TO C (C/C)	CENTER TO CENTER	LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID	R.O.W.	RIGHT OF WAY
CL	CHAIN LINK FENCE	MACH	MACHINE	ROUTE	ROUTE
CHAM.	CHAMFER	MH	MANHOLE	SAN.	SANITARY
C.O.	CLEAN OUT	MFR.	MANUFACTURE	SCH.	SCHEDULE
COL.	COLUMN	MAINT.	MAINTENANCE	SEC	SECOND
CONC	CONCRETE STEPS, WALKS & PAVING	MATL.	MATERIAL	SECT.	SECTION
COND.	CONDUIT	MAX.	MAXIMUM	SHT	SHEET
CONN	CONNECTION	MECH.	MECHANICAL	SDWK.	SIDEWALK
CONST.	CONSTRUCTION	MED.	MEDIUM	S	SLOPE
CONTR.	CONTRACTOR	M.P.H.	MILES PER HOUR	S.F.	SQUARE FOOT
C.J.	CONTROL JOINT	MIN	MINIMUM	S.F.	SQUARE YARD
C.M.P	CORRUGATED METAL PIPE	MISC	MISCELLANEOUS	STA.	STATION
CRS.	COURSE	MON	MONUMENT	SS	SANITARY SEWER
C.F.S.	CUBIC FEET PER SECOND	MW	MONITORING WELL	SD	STORM DRAIN
C.F.	CUBIC FOOT	N.R.	NO REFUSAL	ST.	STREET
C.Y.	CUBIC YARD	NOM.	NOMINAL	TECH	TECHNICAL
DEG. OR °	DEGREE	N.I.T.C.	NOT IN THIS CONTRACT	TEL. OR T	TELEPHONE
DEPT.	DEPARTMENT	N.T.S.	NOT TO SCALE	TEMP.	TEMPORARY
DET.	DETAIL	N/O	NOW OR FORMERLY	T.P.	TEST PIT
DIA. OR Ø	DIAMETER	N/O OR #	NUMBER	THK	THICK
DIM.	DIMENSION	O.C.	ON CENTER	T.O.B	TOP OF BANK
DIST.	DISTANCE	O.G.	ORIGINAL GROUND	T.O.C.	TOP OF CONCRETE
DR.	DRAIN	O.D.	OUTSIDE DIAMETER	TYP.	TYPICAL
DRMO	DEFENCE REUTILIZATION AND MARKETING OFFICE	OE	OVERHEAD ELECTRIC	UD	UNDERDRAIN
DWG.	DRAWING	OU	OPERABLE UNIT	U/G OR U.G	UNDERGROUND
D.I.	DUCTILE IRON	PAR	PARALLEL	U N	UNLESS OTHERWISE NOTED
EA	EACH	PAYMT.	PAYMENT	VERT	VERTICAL
ELL.	ELBOW	PERF	PERFORATED	W	WAREHOUSE
ELEC OR E	ELECTRIC			WHSE.	WITH
EL. OR ELEV.	ELEVATION			W/O	WITHOUT

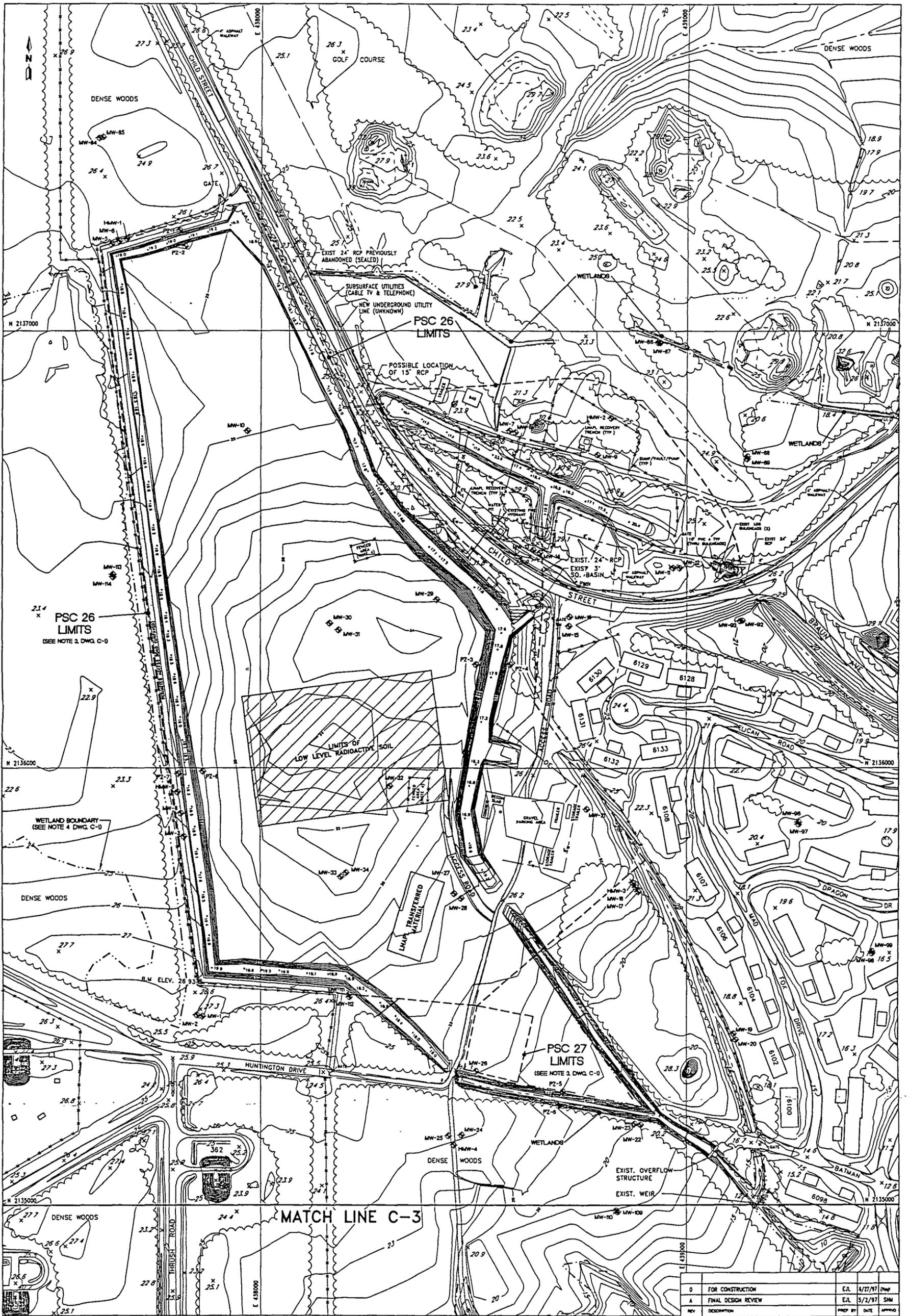
REFERENCE DRAWINGS

- TOPOGRAPHIC FACILITY BASE PLANS, U.S. NAVAL AIR STATION, JACKSONVILLE, FL., PREPARED BY SOUTHERN RESOURCE MAPPING CORP. FROM AERIAL PHOTOGRAPHY DATED JANUARY 11, 1992.
- SUPPLEMENTAL TOPOGRAPHIC DATA PREPARED BY L.D. BRADLEY, LAND SURVEYOR, BASED ON FIELD SURVEYS, DATED 1/29/97.
- WETLANDS DELINEATION BOUNDARIES TAKEN FROM 1997 WETLANDS SURVEY INFORMATION PROVIDED BY NAS JACKSONVILLE, FACILITIES AND ENVIRONMENTAL DEPARTMENT (FED).
- POLLUTION ABATEMENT FACILITIES FOR DISPOSAL AREA, NAVAL AIR STATION, JACKSONVILLE, FL., PREPARED BY FRED WILSON AND ASSOCIATES, DATED 1/22/82
- LNAPL SOURCE AREA, OU-1, NAS JACKSONVILLE, FL., DRAWING 2 OF 6, DATED 10/26/94.

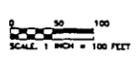
SEAL AREA

PROJECT	8554
DRAWN	E. LEDUC 3/11/97
CHECKED	M. PETERS 6/25/97
APPROVED	S. MITCHELL 6/25/97
APPROVED FOR NAVSTA	DATE
APPROVED FOR SDN	DATE

0	FOR CONSTRUCTION	E.A.	4/27/97	THP
A	FINAL DESIGN REVIEW	E.A.	5/2/97	SHW
REV	DESCRIPTION	PREP BY	DATE	APPROV
DEPARTMENT OF THE NAVY SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND CHARLESTON, SOUTH CAROLINA				
SYMBOLS, ABBREVIATIONS AND GENERAL NOTES				
SIZE	UNC NO	CTO NO	NAVFAC DWG NO	REV
D	N00207	134	5338916	0
			DWG NO	C-1
SCALE UNLESS NOTED NONE				
SHEET 2 OF 14				



- NOTES:
- SEE DRAWING C-1 FOR GENERAL NOTES
 - SPOT ELEVATIONS SHOWN IN EXISTING DITCHES ARE BOTTOM ELEVATIONS, NOT WATER ELEVATIONS.
 - SMALL DRAINAGE AREA NORTHWEST OF BRAUN/CHILD ST. (AT EXISTING BULKHEADS) HAS BEEN ADJUSTED BASED ON SITE VERIFICATION THAT INDICATES AREA NORTHWEST OF EXISTING LOG BULKHEAD TO BE AT OR NEAR ADJACENT GRADES.
 - FENCED AREAS NOTED WITHIN PSC-26 HAVE BEEN REPORTED AS FORMER LIQUID DECONTAMINATION WASTE AND WASTE SOIL DISPOSAL AREAS FROM PREVIOUS MONITORING WELL INSTALLATIONS AND SOIL SAMPLING ACTIVITIES.



SEAL AREA
[Signature]
 6/21/97

0	FOR CONSTRUCTION	E.L.	6/27/97	PH
A	FINAL DESIGN REVIEW	E.L.	5/2/97	SM
REV	DESCRIPTION	PREP BY	DATE	APPROV

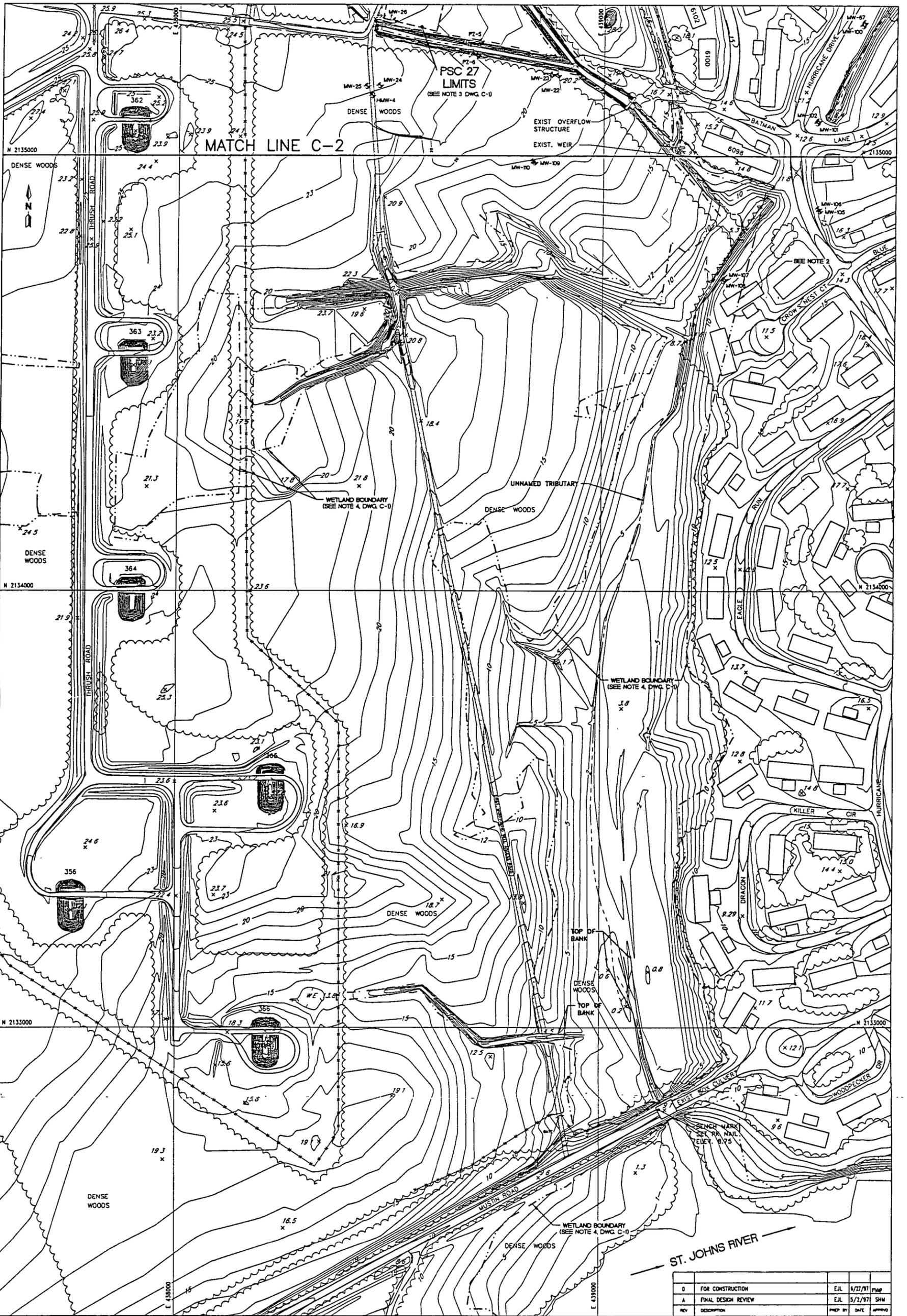
DEPARTMENT OF THE NAVY
 SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
 CHARLESTON, SOUTH CAROLINA

EXISTING CONDITIONS PLAN

PROJECT	8554	DATE	7/24/97
DRAWN	E. LEDUC	DATE	6/25/97
CHECKED	S MITCHELL	DATE	6/25/97
APPROVED FOR NAVSTA	DATE	SIZE	UC NO
APPROVED FOR SDV	DATE	CTD NO	NAVFAC DMC NO
		D NO0207	134
			5338917
			C-2
			0

SCALE UNLESS NOTED 1"=100'

SHEET 3 OF 14



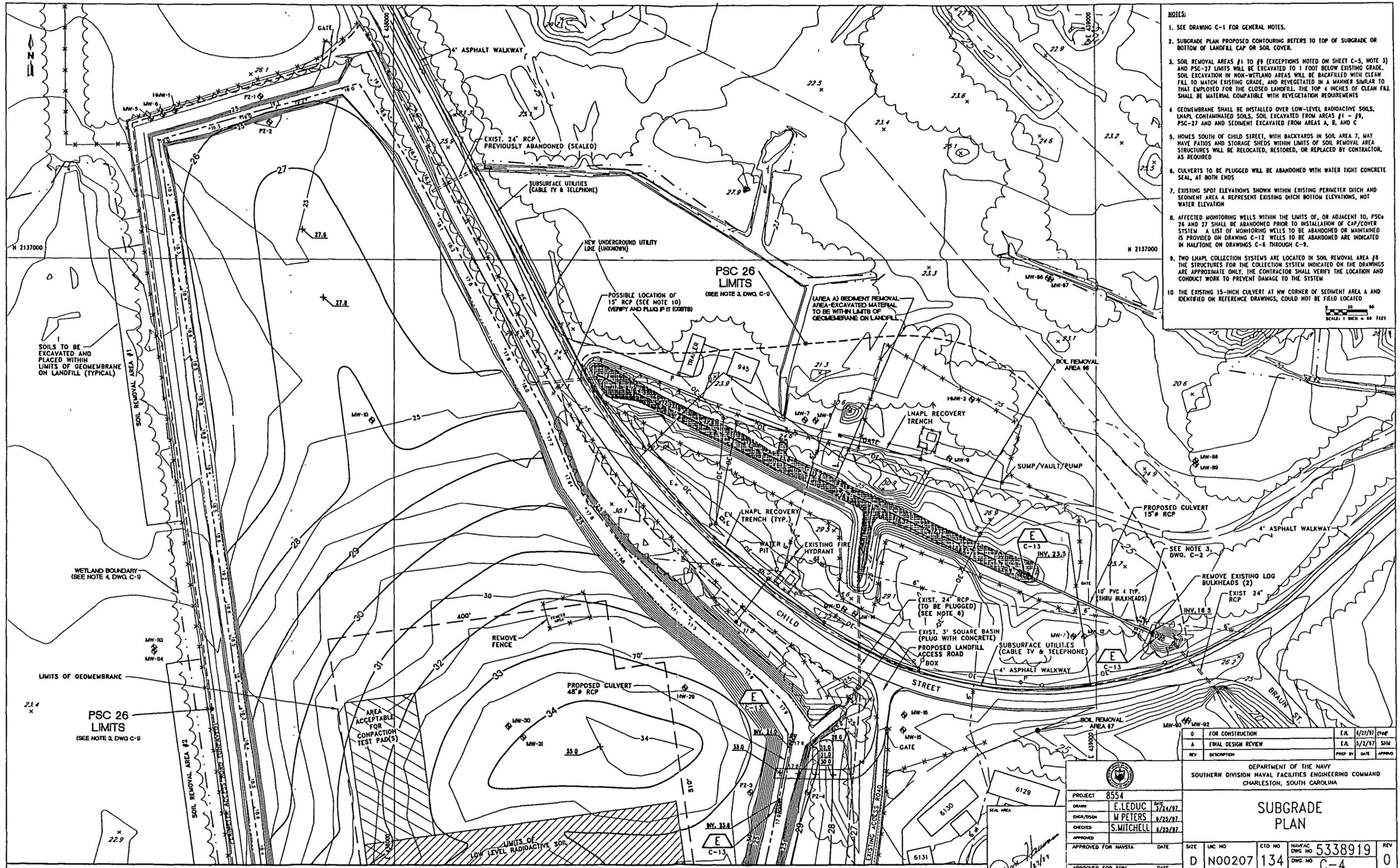
- NOTES**
- SEE DRAWING C-1 FOR GENERAL NOTES.
 - WETLAND DELINEATION (1/97) IN THIS AREA CONFLICTS WITH EXISTING SITE CONDITIONS SHOWN ON THE 1992 NAS-JAX BASE TOPOGRAPHIC SERIES.



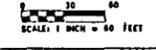
SEA. AREA
[Signature]
 6/25/97

0	FOR CONSTRUCTION	EAL	6/27/97	MSH
A	FINAL DESIGN REVIEW	EAL	5/7/97	SHW
REV	DESCRIPTION	PREP BY	DATE	APPROV

DEPARTMENT OF THE NAVY SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND CHARLESTON, SOUTH CAROLINA				
EXISTING CONDITIONS PLAN				
PROJECT	8554	DATE	2/24/97	
DRWING	E. LEDUC	DATE	6/25/97	
CHKD/DSGN	M. PETERS	DATE	6/25/97	
CHECKED	S MITCHELL	DATE	6/25/97	
APPROVED				
APPROVED FOR NAVSTA		DATE		
APPROVED FOR SDIV		DATE		
SIZE	UC NO	CTD NO	NAVFAC DWG NO	REV
D	N00207	134	5338918	0
			DWG NO	C-3
SCALE UNLESS NOTED				1"=100'
				SHEET 4 OF 14



- NOTES:**
- SEE DRAWING C-1 FOR GENERAL NOTES.
 - SUBGRADE PLAN PROPOSED CONTOURING REFERS TO TOP OF SUBGRADE OR BOTTOM OF LANDFILL CAP OR SOIL COVER.
 - SOIL REMOVAL AREAS #1 TO #9 (EXCEPTIONS NOTED ON SHEET C-3, NOTE 3) AND PSC-27 LIMITS WILL BE EXCAVATED TO 1 FOOT BELOW EXISTING GRADE. SOIL EXCAVATION IN NON-WETLAND AREAS WILL BE BACKFILLED WITH CLEAN FILL TO MATCH EXISTING GRADE, AND REVEGETATED IN A MANNER SIMILAR TO THAT EMPLOYED FOR THE CLOSED LANDFILL. THE TOP 4 INCHES OF CLEAN FILL SHALL BE MATERIAL COMPATIBLE WITH REVEGETATION REQUIREMENTS.
 - GEOMEMBRANE SHALL BE INSTALLED OVER LOW-LEVEL RADIOACTIVE SOILS, LNAPL CONTAMINATED SOILS, SOIL EXCAVATED FROM AREAS #1 - #9, PSC-27 AND AND SEDIMENT EXCAVATED FROM AREAS A, B, AND C.
 - HOUSES SOUTH OF CHILD STREET, WITH BACKYARDS IN SOIL AREA 7, MAY HAVE PATIOS AND STORAGE SHEDS WITHIN LIMITS OF SOIL REMOVAL AREA. STRUCTURES WILL BE RELOCATED, RESTORED, OR REPLACED BY CONTRACTOR, AS REQUIRED.
 - CULVERTS TO BE PLUGGED WILL BE ABANDONED WITH WATER TIGHT CONCRETE SEAL, AT BOTH ENDS.
 - EXISTING SPOT ELEVATIONS SHOWN WITHIN EXISTING PERIMETER DITCH AND SEDIMENT AREA A REPRESENT EXISTING DITCH BOTTOM ELEVATIONS, NOT WATER ELEVATION.
 - AFFECTED MONITORING WELLS WITHIN THE LIMITS OF, OR ADJACENT TO, PSC 26 AND 27 SHALL BE ABANDONED PRIOR TO INSTALLATION OF CAP COVER SYSTEM. A LIST OF MONITORING WELLS TO BE ABANDONED OR MAINTAINED IS PROVIDED ON DRAWING C-12. WELLS TO BE ABANDONED ARE INDICATED IN HALFTONE ON DRAWINGS C-6 THROUGH C-9.
 - TWO LNAPL COLLECTION SYSTEMS ARE LOCATED IN SOIL REMOVAL AREA #8. THE STRUCTURES FOR THE COLLECTION SYSTEM INDICATED ON THE DRAWINGS ARE APPROXIMATE ONLY; THE CONTRACTOR SHALL VERIFY THE LOCATION AND CONDUCT WORK TO PREVENT DAMAGE TO THE SYSTEM.
 - THE EXISTING 15-INCH CULVERT AT NW CORNER OF SEDIMENT AREA A AND IDENTIFIED ON REFERENCE DRAWINGS, COULD NOT BE FIELD LOCATED.



0	FOR CONSTRUCTION	E.L.	6/27/97	TM/P
A	FINAL DESIGN REVIEW	E.L.	5/2/97	SHM
REV	DESCRIPTION	PREP BY	DATE	APPROV

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

PROJECT	8554	DATE	3/21/97
DRAWN	E.LEDUC	CHECKED	M.PETERS
ENGR./DSGN		DATE	6/25/97
APPROVED	S.MITCHELL	DATE	6/25/97
APPROVED FOR NAVSTA		DATE	
APPROVED FOR SDV		DATE	

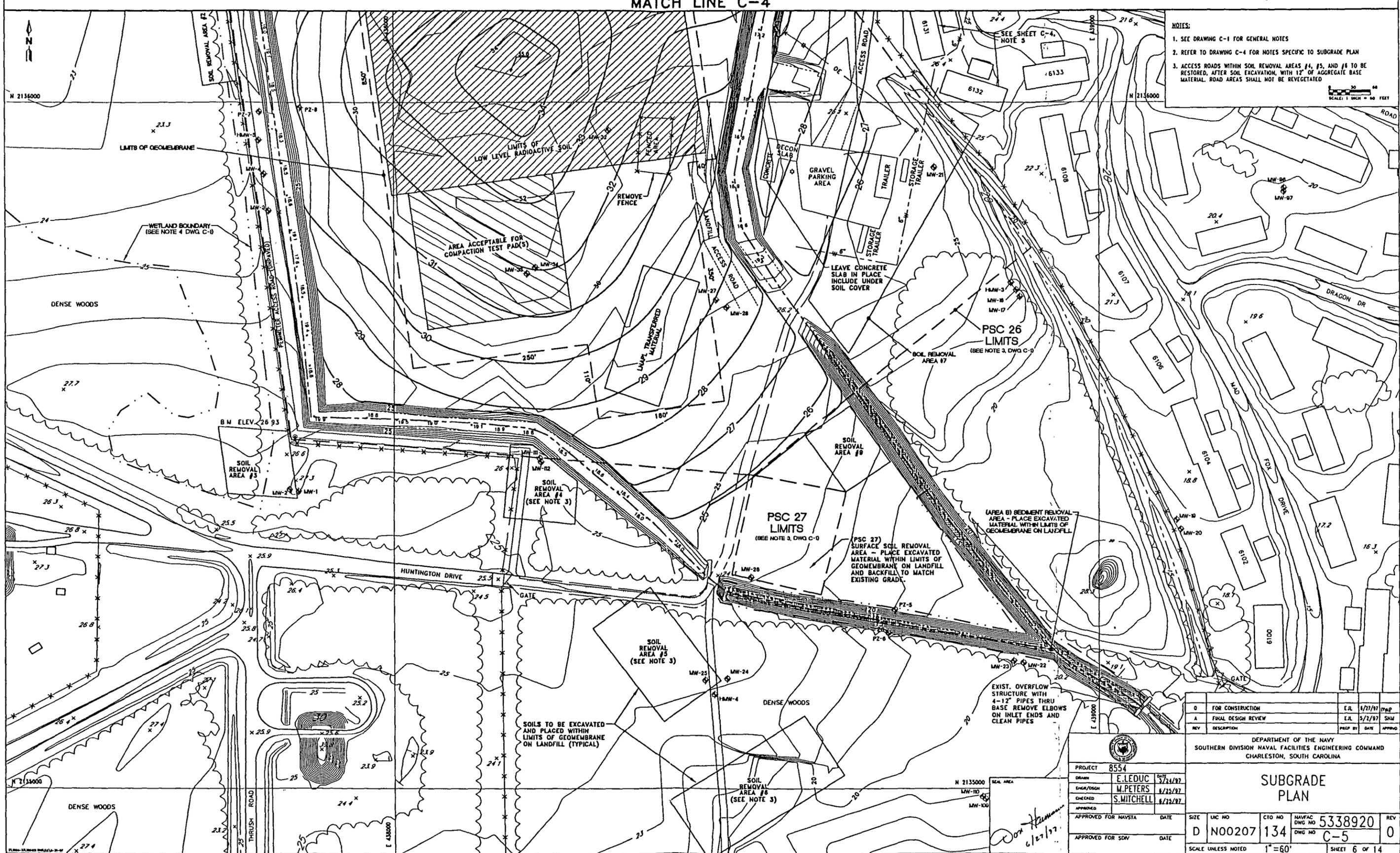
SUBGRADE PLAN			
SIZE	UNC NO	CTO NO	NAVFAC 5338919
D	N00207	134	DWG NO C-4
REV			0
SCALE UNLESS NOTED 1"=60'			
SHEET 5 OF 14			

MATCH LINE C-5

MATCH LINE C-4

NOTES:

1. SEE DRAWING C-1 FOR GENERAL NOTES
2. REFER TO DRAWING C-4 FOR NOTES SPECIFIC TO SUBGRADE PLAN
3. ACCESS ROADS WITHIN SOIL REMOVAL AREAS #4, #5, AND #8 TO BE RESTORED, AFTER SOIL EXCAVATION, WITH 12" OF AGGREGATE BASE MATERIAL. ROAD AREAS SHALL NOT BE REVEGETATED



0	FOR CONSTRUCTION	E.L.	6/21/97	TPP
A	FINAL DESIGN REVIEW	E.L.	5/21/97	SHM
REV	DESCRIPTION	PREP BY	DATE	APPROV

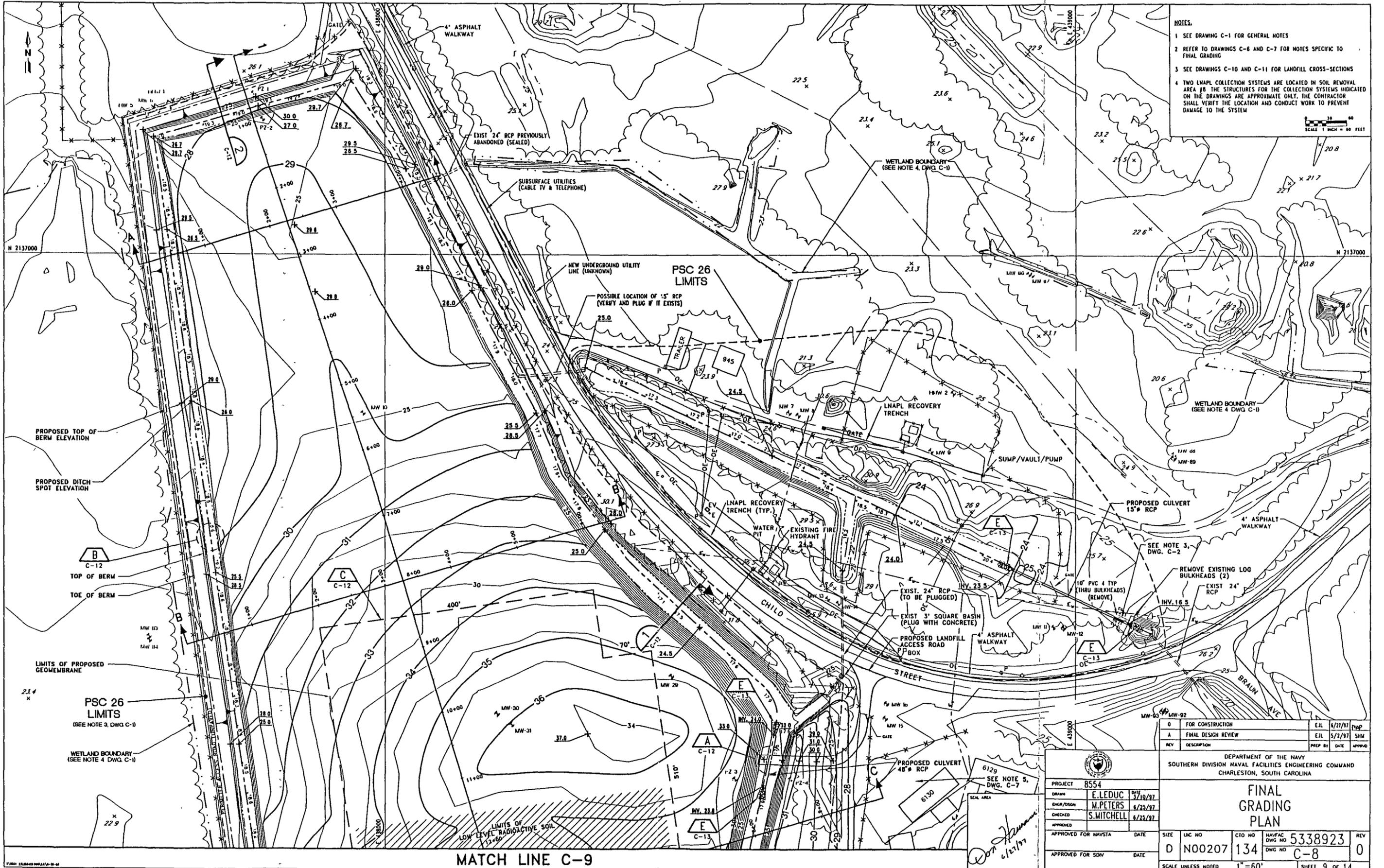
DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

SUBGRADE PLAN

PROJECT	8554
DRAWN	E.LEDUC 6/22/97
ENGR/DWG	M.PETERS 6/22/97
CHECKED	S.MITCHELL 6/22/97
APPROVED	
APPROVED FOR NAVSTA	DATE
APPROVED FOR SDV	DATE

SIZE	UCR NO	CTO NO	NAVSTA DWG NO	REV
D	N00207	134	5338920	0
DWG NO	C-5			
SCALE UNLESS NOTED 1"=60'				SHEET 6 OF 14

Don Hammon
6/27/97



- NOTES.**
- 1 SEE DRAWING C-1 FOR GENERAL NOTES
 - 2 REFER TO DRAWINGS C-6 AND C-7 FOR NOTES SPECIFIC TO FINAL GRADING
 - 3 SEE DRAWINGS C-10 AND C-11 FOR LANDFILL CROSS-SECTIONS
 - 4 TWO LNAPL COLLECTION SYSTEMS ARE LOCATED IN SOIL REMOVAL AREA #8 THE STRUCTURES FOR THE COLLECTION SYSTEMS INDICATED ON THE DRAWINGS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE LOCATION AND CONDUCT WORK TO PREVENT DAMAGE TO THE SYSTEM

SCALE 1" = 60 FEET

0	FOR CONSTRUCTION	E.L.	6/27/97	THP
A	FINAL DESIGN REVIEW	E.L.	5/27/97	SHW
REV	DESCRIPTION	PREP BY	DATE	APPROV

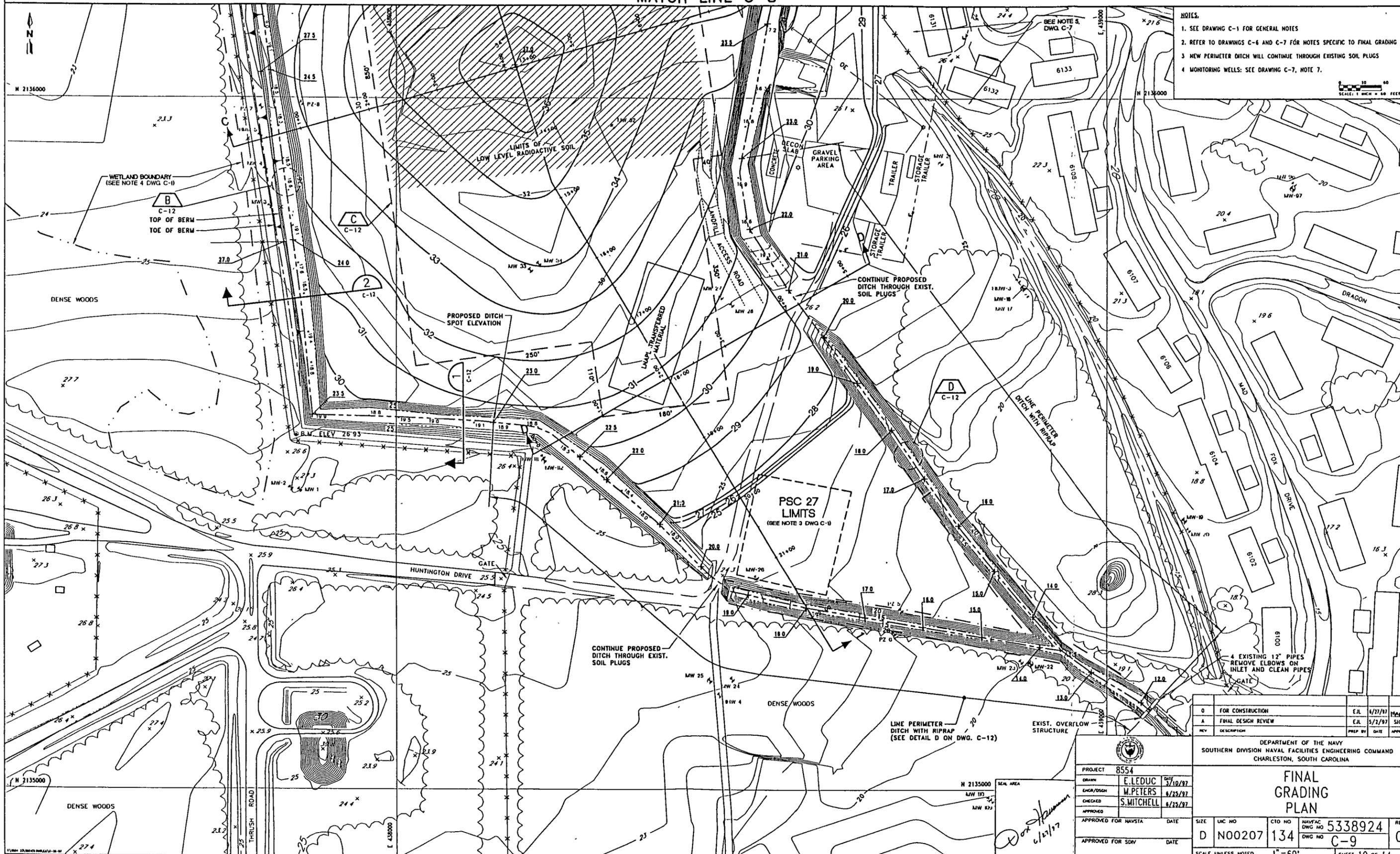
DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

PROJECT 8554		DATE 3/10/97	
DRAWN E.LEDUC		DATE 6/23/97	
ENGR/DISN M.PETERS		DATE 6/23/97	
CHECKED S.MITCHELL		DATE 6/23/97	
APPROVED		DATE	
APPROVED FOR NAVSTA	DATE	SIZE D	UNC NO N00207
APPROVED FOR SDV	DATE	CTO NO 134	NAVSTAC DWG NO 5338923
		DWG NO C-8	REV 0
SCALE UNLESS NOTED 1"=60'		SHEET 9 OF 14	

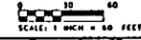
Don Hamman
6/23/97

MATCH LINE C-9

MATCH LINE C-8



- NOTES:
1. SEE DRAWING C-1 FOR GENERAL NOTES
 2. REFER TO DRAWINGS C-6 AND C-7 FOR NOTES SPECIFIC TO FINAL GRADING
 3. NEW PERIMETER DITCH WILL CONTINUE THROUGH EXISTING SOIL PLUGS
 4. MONITORING WELLS: SEE DRAWING C-7, NOTE 7.

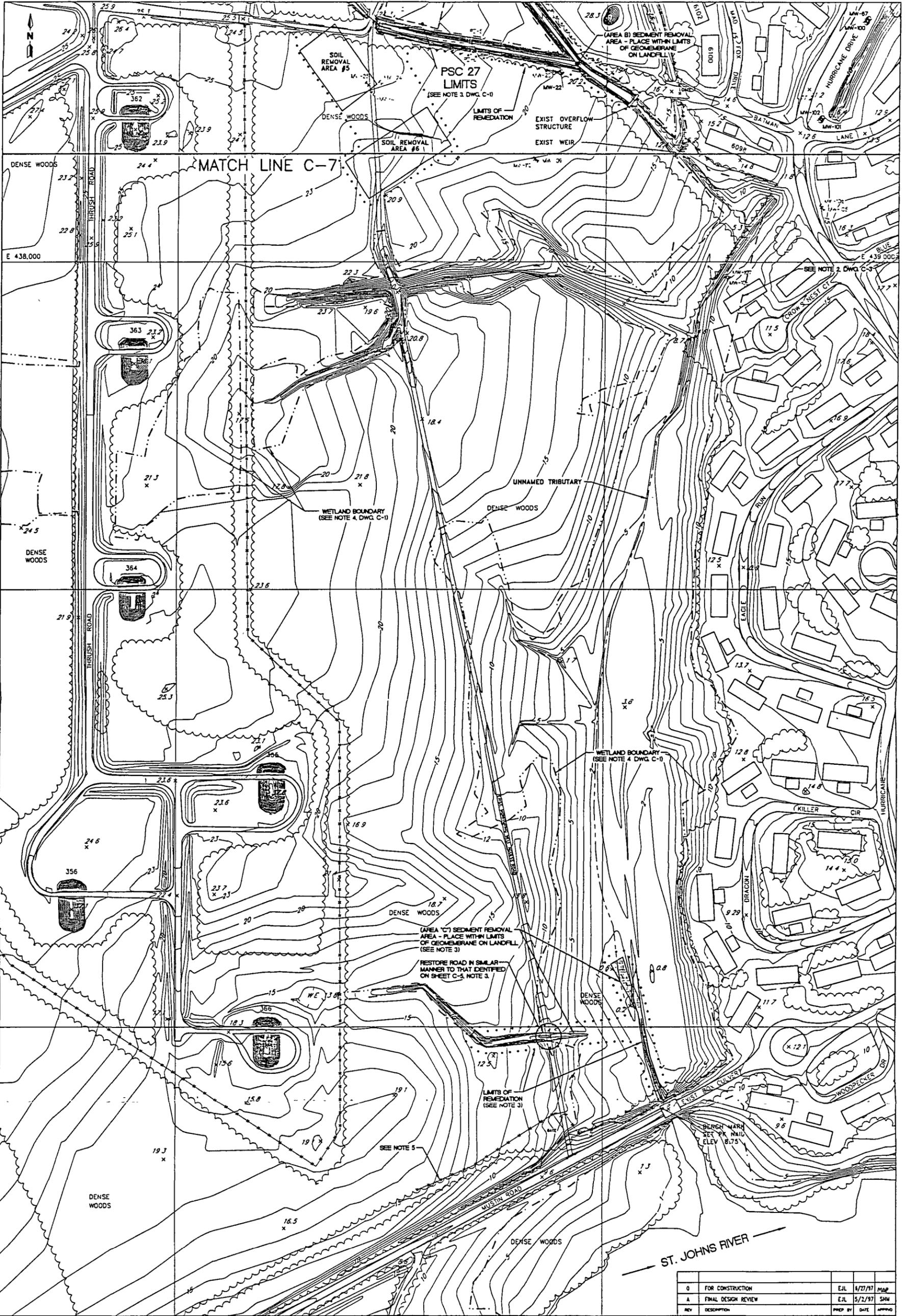


0	FOR CONSTRUCTION	E.L.	6/21/97	Map
A	FINAL DESIGN REVIEW	E.L.	5/3/97	SHM
REV	DESCRIPTION	PREP BY	DATE	APPROV

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

PROJECT 8554		DRAWN E.LEDUC DW/ 3/10/97	
ENGR/DSGN M.PETERS 6/25/97		CHECKED S.MITCHELL 6/25/97	
APPROVED FOR NAVSTA DATE		DATE	
APPROVED FOR SDV DATE		DATE	
SIZE D	UNC NO N00207	CTO NO 134	NAVFAC DWG NO 5338924
			DWG NO C-9
			REV 0
SCALE UNLESS NOTED 1"=60'		SHEET 10 OF 14	

Handwritten signature and date:
6/25/97

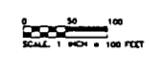


NOTES.

- SEE DRAWING C-1 FOR GENERAL NOTES.
- AFTER EXCAVATION, SEDIMENT AREA C WILL BE REGRADED WITH ADJACENT BANK MATERIALS. THOSE AREAS IMPACTED BY CONSTRUCTION ACCESS TO SEDIMENT AREA C WILL BE RESTORED IN ACCORDANCE WITH REGULATORY AND CLIENT REQUIREMENTS.
- LIMITS OF REMEDIATION FOR SEDIMENT AREA C ARE MARKED AS THE DARKLY SHADED AREAS DENOTED BY THE LABEL "LIMITS OF REMEDIATION".

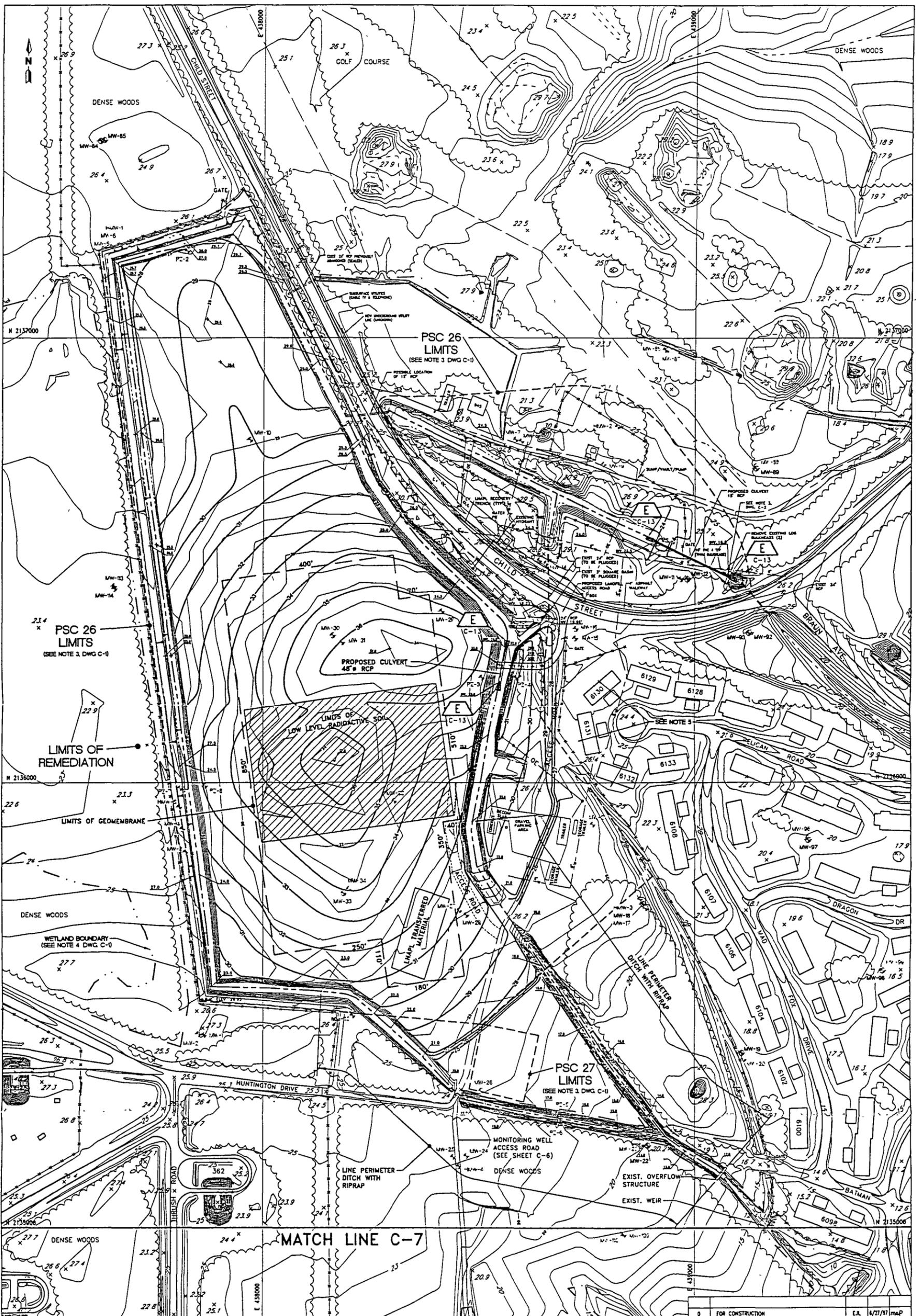
NOTES. (CONT.)

- LIMITS OF REHABILITATION SHALL ALSO INCLUDE SEDIMENT AREAS A AND B, AS WELL AS OTHER AREAS IDENTIFIED WITHIN THE LIMITS OF REMEDIATION. SEE DRAWINGS C-4 AND C-5.
- LIMITS OF SUPPLEMENTAL SURVEY INFORMATION (L.D. BRADLEY, 2/97). FIELD OBSERVATION INDICATES FENCELINE CONTINUES WEST, PARALLEL WITH MUSTIN RD.
- MONITORING WELLS (MW) SHOWN IN HALF-TONE WILL BE ABANDONED IN ACCORDANCE WITH THE SPECIFICATIONS.



SEAL AREA
[Signature]
 6/27/97

0	FOR CONSTRUCTION	E.J.L.	1/27/97	Map
A	FINAL DESIGN REVIEW	E.J.L.	5/2/97	SHN
REV	DESCRIPTION	PREP BY	DATE	APPROV
DEPARTMENT OF THE NAVY SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND CHARLESTON, SOUTH CAROLINA				
SEDIMENT EXCAVATION AREA C PLAN				
PROJECT	8554	DATE	3/24/97	
DRAWN	E. LEDUC	CHECKED	M. PETERS	6/25/97
APPROVED	S. MITCHELL	DATE	8/25/97	
APPROVED FOR NAVSTA	DATE	SIZE	UNC NO	CTO NO
APPROVED FOR SDV	DATE	D	N00207	134
		NAVFAC DWG NO	5338921	REV
		DWG NO	C-6	0
		SCALE UNLESS NOTED	1"=100'	SHEET 7 OF 14



NOTES.

- SEE DRAWING C-1 FOR GENERAL NOTES.
- PROPOSED CONTOURING SHOWN IN FINAL GRADING PLAN REFERS TO TOP OF FINAL CAP/COVER SYSTEM. ELEVATION FOR FINAL GRADE BASED ON ESTIMATED 14,257 CUBIC YARDS (ONE FOOT OF EXCAVATION AT SOIL REMOVAL AREAS #1 - #9, PSC-27, AND SEDIMENT AREAS A, B, AND C); EXCAVATED SOIL AND SEDIMENT TO BE PLACED BENEATH GEOMEMBRANE, MAINTAINING SLOPES OF 1 TO 1-1/2 PERCENT. FINAL GRADES MAY BE FIELD ADJUSTED TO REFLECT ACTUAL SOIL AND SEDIMENT EXCAVATION VOLUME, HOWEVER, SLOPES WILL REMAIN 1 TO 1-1/2 PERCENT ON CAP. MAXIMUM SLOPES AT DITCH SIDE SLOPES SHALL BE 3 HORIZ. AND 1 VERT. NEW ACCESS ROAD SHALL HAVE SLOPE AS INDICATED BY SPOT ELEVATIONS.

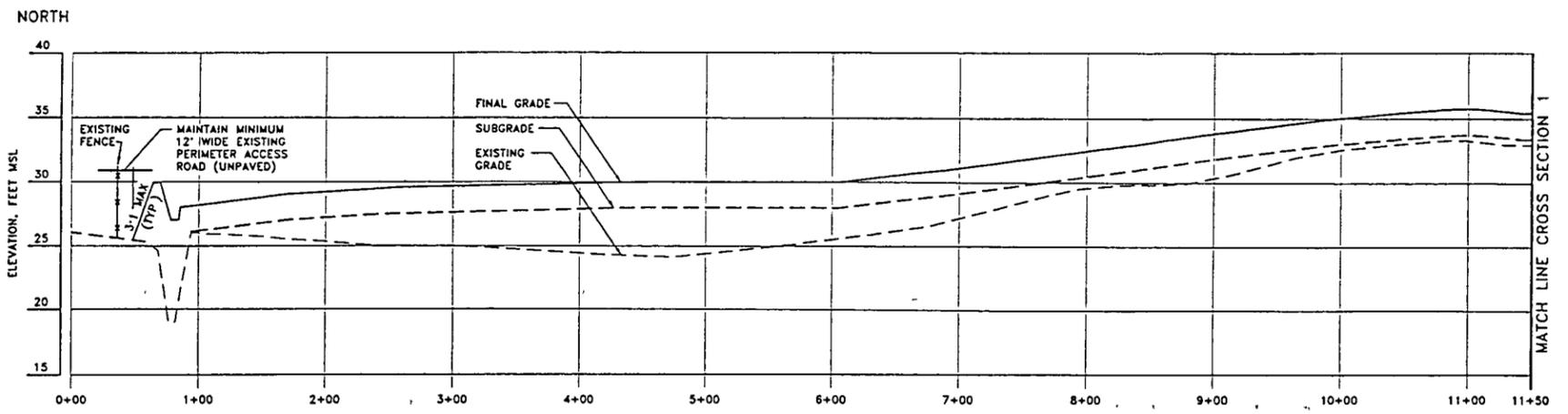
NOTES. (CONT.)

- LIMITS OF REMEDIATION SHALL ALSO INCLUDE SEDIMENT AREA C. SEE DRAWING C-5.
- EXISTING WEST PERIMETER UNPAVED ACCESS ROAD TO BE MAINTAINED BETWEEN THE NORTH LANDFILL AREA ACCESS GATE AND HUSTON ROAD. SEE SHEET C-6.
- BASE HOUSING LAWN AREAS LOCATED WITHIN SOIL REMOVAL AREA #7 SHALL BE RESTORED WITH SOO
- SEE 60 SCALE DRAWINGS C-8 AND C-9 FOR MORE DETAIL.
- MONITORING WELLS (MW) SHOWN IN HALF-TONE WILL BE ABANDONED IN ACCORDANCE WITH THE SPECIFICATIONS.
- BACKFILL OF SOIL EXCAVATION AREAS AND PSC-27 SHALL BE IN ACCORDANCE WITH SHEET C-4, NOTE 3.

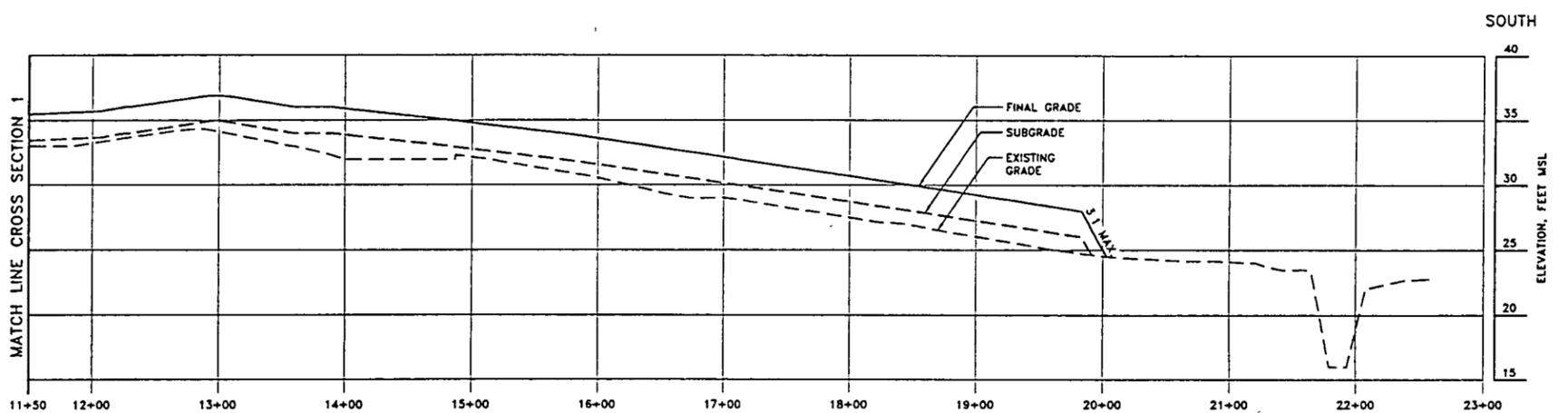


SEA AREA
[Signature]
 6/21/97

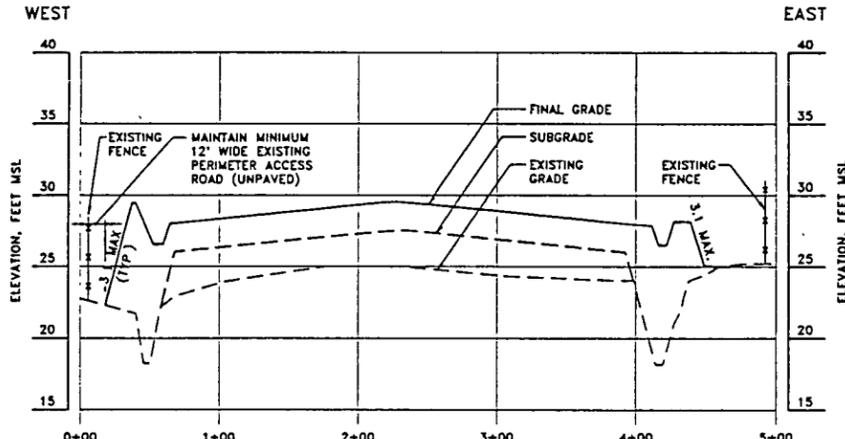
0	FOR CONSTRUCTION	EAL	4/27/97	FM&P
A	FINAL DESIGN REVIEW	EAL	5/2/97	SHM
REV	DESCRIPTION	PREP BY	DATE	APPROV
DEPARTMENT OF THE NAVY SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND CHARLESTON, SOUTH CAROLINA				
FINAL GRADING PLAN				
PROJECT	8554	DATE	5/24/97	REV
DRAWN	E. LEDUC	CHECKED	M. PETERS	5/25/97
APPROVED	S. MITCHELL	DATE	6/25/97	
APPROVED FOR NAVSTA	DATE	SIZE	UC NO	CTO NO
APPROVED FOR SDV	DATE	D	N00207	134
		NAVFAC DWG NO	5338922	REV
		DWG NO	C-7	0
SCALE UNLESS NOTED 1"=100'				
SHEET 8 OF 14				



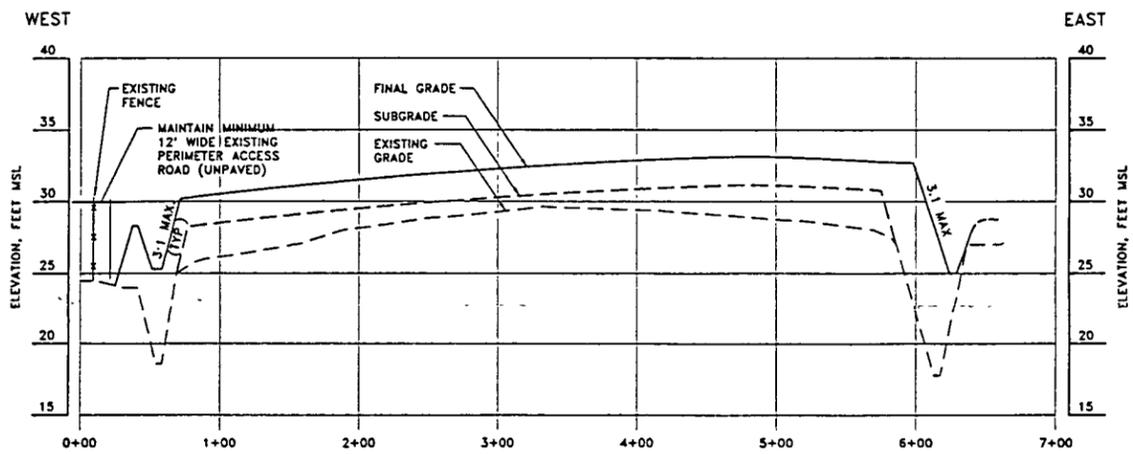
CROSS-SECTION 1
SCALE HORIZ 1"=60'
VERT 1"=6'



CROSS-SECTION 1
SCALE HORIZ 1"=60'
VERT 1"=6'



CROSS-SECTION A
SCALE HORIZ 1"=60'
VERT 1"=6'



CROSS-SECTION B
SCALE HORIZ 1"=60'
VERT 1"=6'

0	FOR CONSTRUCTION	E.A.	6/27/97	MJP
A	FINAL DESIGN REVIEW	E.A.	5/2/97	SMW
REV	DESCRIPTION	PROJ BY	DATE	APPROV

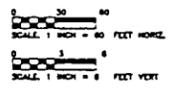
DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

LANDFILL CROSS-SECTIONS

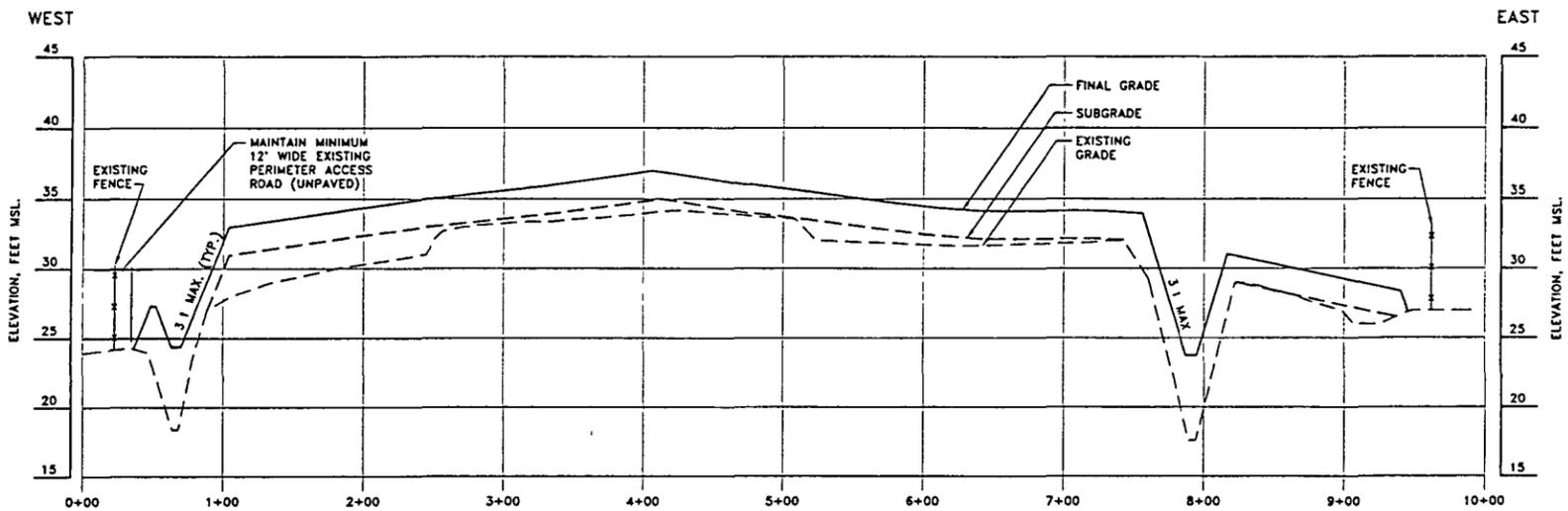
PROJECT	8554	DATE	3/28/97
DESIGNER	E. LEDUC	CHECKED	S. MITCHELL
DATE	6/25/97	DATE	6/25/97

SIZE	UNC NO.	CTD NO.	NAVFAC DWG NO.	REV
D	N00207	134	5338925	0
			C-10	

SCALE UNLESS NOTED NOTED SHEET 11 OF 14

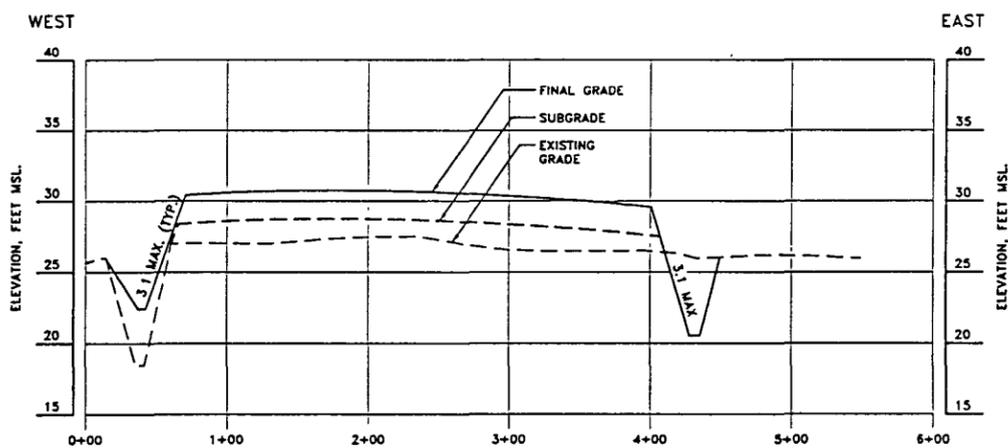


REAL AREA
[Signature]
6/27/97



CROSS-SECTION C

SCALE: HORIZ. 1"=60'
VERT. 1"=6'



CROSS-SECTION D

SCALE: HORIZ. 1"=60'
VERT. 1"=6'

0	FOR CONSTRUCTION	E.L.	4/27/97	MMO
A	FINAL DESIGN REVIEW	E.L.	5/2/97	SHM
REV	DESCRIPTION	PREP BY	DATE	APPROV

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON SOUTH CAROLINA

PROJECT	8554
DRAWN	E.LEDUC 3/28/97
CHECKED/OSDN	M.PETERS 6/25/97
CHECKED	S.MITCHELL 6/25/97
APPROVED	
APPROVED FOR NAVSTA	DATE
APPROVED FOR SDN	DATE

**LANDFILL
CROSS-SECTIONS**

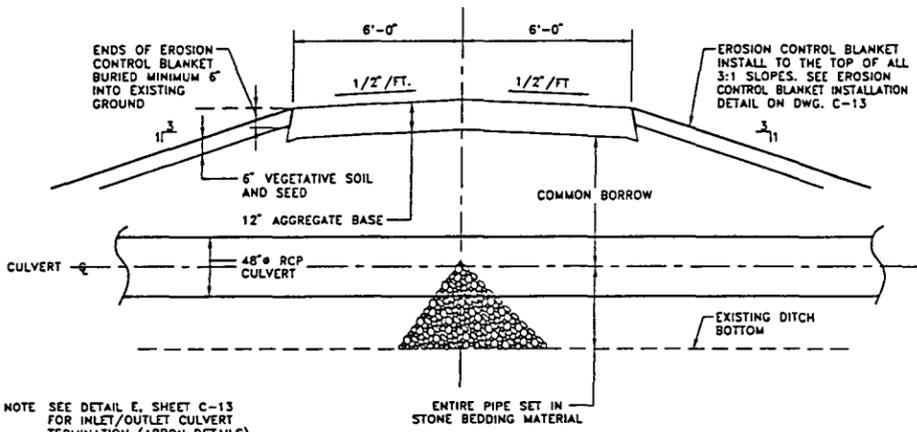
SIZE	UC NO	CTO NO.	NAV/FAC DWG NO	5338926	REV
D	N00207	134	DWG NO	C-11	0

SCALE UNLESS NOTED NOTED SHEET 12 OF 14

SCALE: 1"=60' HORIZ.
SCALE: 1"=6' VERT.

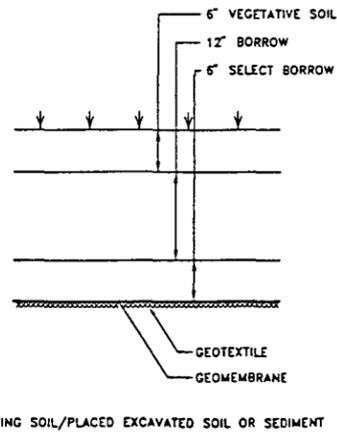
SEAL AREA

Don Johnson
6/27/97

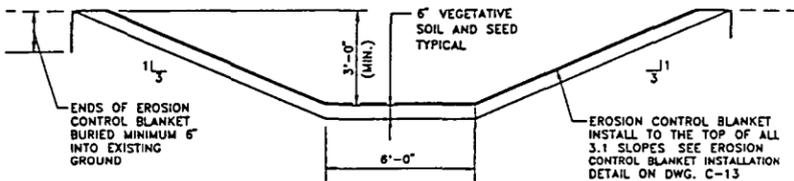


NOTE SEE DETAIL E, SHEET C-13 FOR INLET/OUTLET CULVERT TERMINATION (APRON DETAILS)

ACCESS ROAD A
N.T.S. C-8

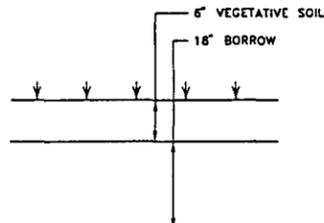


CAP W/GEOMEMBRANE DETAIL C
N.T.S. C-8 C-9

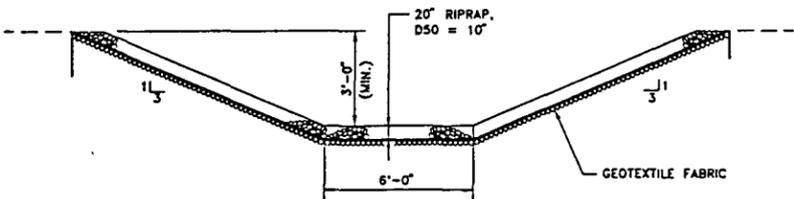


NOTE: EROSION CONTROL BLANKET TO BE PLACED OVER SEEDED AREAS

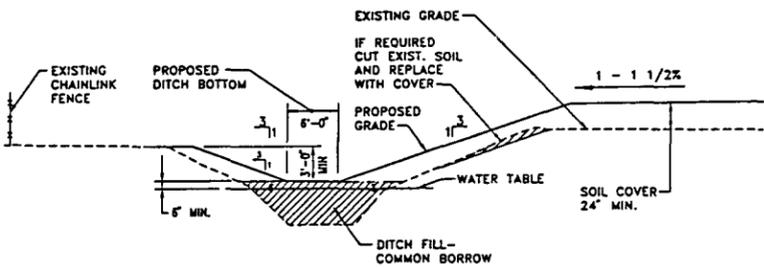
GRASS-LINED PERIMETER DITCH B
N.T.S. C-8 C-9



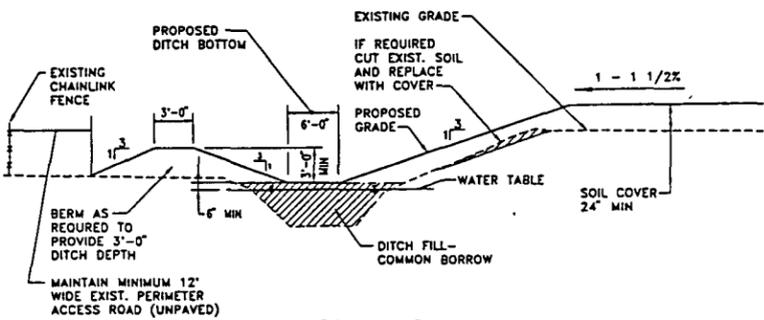
COVER DETAIL ON LANDFILL AREA
N.T.S.



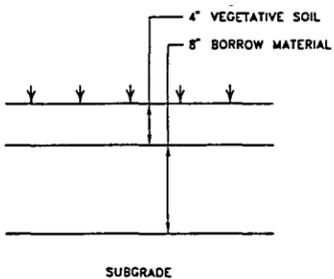
RIPRAP LINED PERIMETER DITCH D
N.T.S. C-9



CONDITION 1 PROPOSED DRAINAGE DITCH (TYP.) 1
N.T.S. C-8 C-9



CONDITION 2 PROPOSED DRAINAGE DITCH (TYP.) 2
N.T.S. C-8 C-9



COVER DETAIL SOIL EXCAVATION AREAS
N.T.S.

MONITORING WELL STATUS TABLE

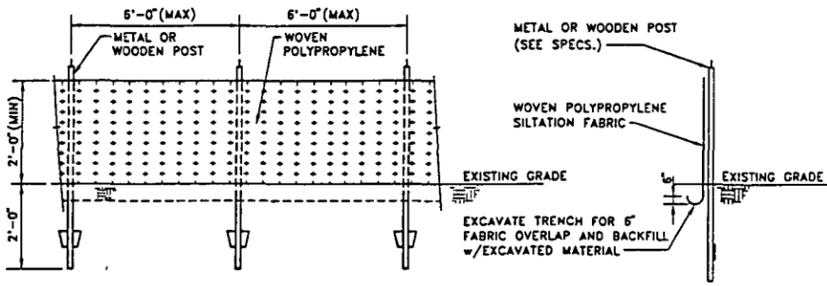
Well Number	Total Depth	Recommendations
HMW-1	150.0	Abandon
HMW-2	150.0	Abandon
HMW-3	150.0	Abandon
HMW-4	150.0	Abandon
HMW-5	150.0	Abandon
MW-1	13.0	Abandon
MW-2	38.0	Abandon
MW-3	13.0	Abandon
MW-4	32.0	Abandon
MW-5	18.0	Abandon
MW-6	28.0	Abandon
MW-7	12.5	Abandon
MW-8	32.0	Abandon
MW-9	13.0	Abandon
MW-10	13.0	Abandon
MW-11	13.5	Abandon
MW-12	35.5	Proposed long-term monitoring
MW-13	14.0	Abandon
MW-14	43.0	Abandon
MW-15	45.5	Abandon - Note 1
MW-16	13.5	Abandon
MW-17	14.5	Abandon
MW-18	35.0	Proposed long-term monitoring
MW-19	24.5	Proposed long-term monitoring
MW-20	13.5	Abandon
MW-21	14.5	Abandon
MW-22	30.5	Proposed long-term monitoring
MW-23	14.5	Abandon
MW-24	14.5	Abandon
MW-25	33.5	Abandon
MW-26	14.5	Abandon
MW-27	14.5	Abandon
MW-28	30.5	Abandon
MW-29	17.5	Abandon
MW-30	17.5	Abandon
MW-31	38.5	Abandon
MW-32	17.5	Abandon
MW-33	16.5	Abandon
MW-34	49.0	Abandon
MW-67	14.0	Proposed long-term monitoring
MW-84	41.0	Proposed long-term monitoring - Note: 2
MW-85	13.5	Proposed long-term monitoring - Note: 2
MW-86	33.5	Abandon
MW-87	13.5	Abandon
MW-88	30.0	Abandon
MW-89	13.5	Proposed long-term monitoring
MW-90	26.5	Abandon
MW-91	13.5	Abandon
MW-92	32.0	Abandon
MW-93	13.5	Proposed long-term monitoring - Note: 3
MW-94	30.0	Abandon
MW-95	13.5	Proposed long-term monitoring - Note: 3
MW-96	13.5	Abandon
MW-97	28.0	Proposed long-term monitoring
MW-98	26.0	Proposed long-term monitoring
MW-99	13.5	Abandon
MW-100	22.0	Proposed long-term monitoring
MW-101	13.5	Proposed long-term monitoring
MW-102	21.0	Proposed long-term monitoring
MW-103	13.5	Abandon
MW-104	30.0	Abandon
MW-105	13.5	Abandon
MW-106	27.3	Abandon
MW-107	13.5	Abandon
MW-108	27.0	Abandon
MW-109	13.5	Abandon
MW-110	29.2	Abandon
MW-111	13.5	Abandon
MW-112	33.5	Abandon
MW-113	13.5	Abandon
MW-114	32.0	Abandon
MW-115	13.5	Abandon
MW-116	35.0	Abandon
PZ-1	15.0	Abandon
PZ-2	14.9	Abandon
PZ-3	15.5	Abandon
PZ-4	13.5	Abandon
PZ-5	14.5	Abandon
PZ-6	14.5	Abandon
PZ-7	12.5	Abandon
PZ-8	15.0	Abandon

- NOTES:**
- Formerly proposed for monitoring
 - Proposed by FDEP as Background monitoring location
 - Proposed by FDEP as pre-groundwater discharge monitoring location

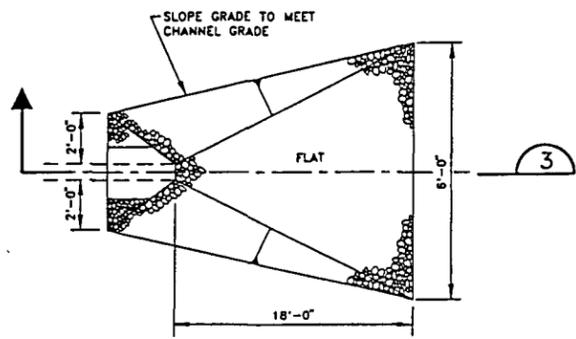
0	FOR CONSTRUCTION	E.L.	8/27/97	Map
A	FINAL DESIGN REVIEW	E.L.	5/2/97	SHM
REV	DESCRIPTION	PREP BY	DATE	APPROV

DEPARTMENT OF THE NAVY SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND CHARLESTON, SOUTH CAROLINA				
CONSTRUCTION DETAILS				
PROJECT	8554	SIZE	UNC NO	CTD NO
DRAWN	E.LEDUC 8/24/97	DWG NO	134	134
CHECKED	M.PETERS 8/25/97	NAVFAC DWG NO	5338927	REV
APPROVED	S.MITCHELL 8/25/97	DWG NO	C-12	0
APPROVED FOR NAVSTA	DATE	SCALE UNLESS NOTED	NOTED	SHEET 13 OF 14
APPROVED FOR SDV	DATE			

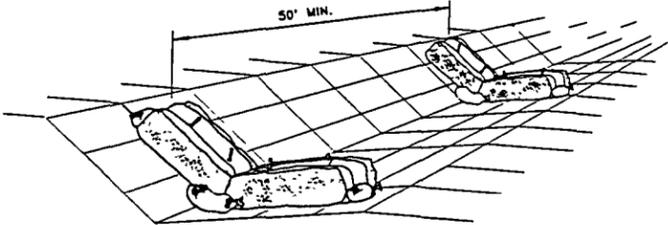
SEA AREA
[Signature]
6/20/97



TYPICAL SILT FENCE DETAIL
N.T.S.

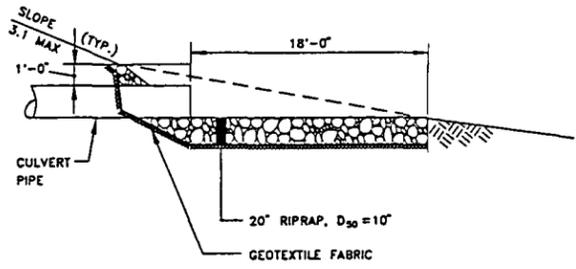


PLAN



EROSION CHECK - TO BE HAYBALES SECURED TO THE GROUND WITH 2-4 FT. LONG GRADE STAKES FOR EACH HAYBALE. SAND-BAG AS REQUIRED

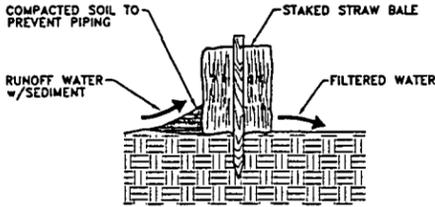
TYPICAL HAYBALE EROSION CONTROL DETAIL
N.T.S.



SECTION 3

NOTE.
1. TYPICAL FOR CULVERT INLET AND OUTLET.

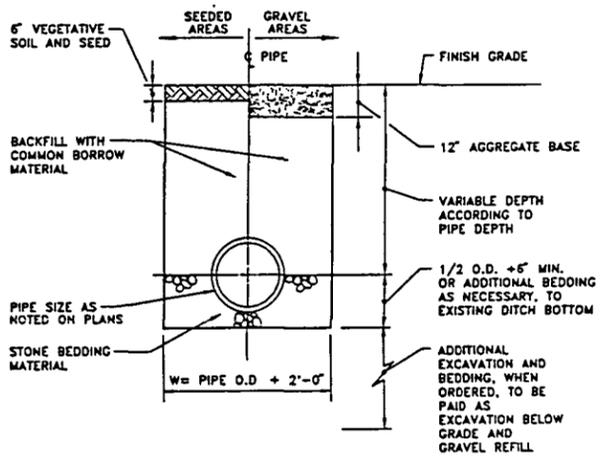
RIPRAP APRON E
N.T.S.



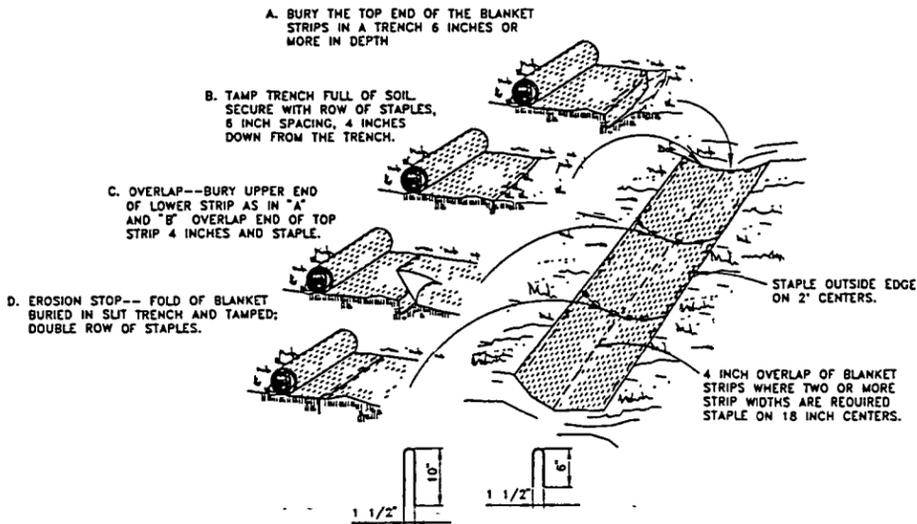
HAYBALE DIKE - TO BE CONSTRUCTED IN SIMILAR MANNER AS FOLLOWS:

- BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
- EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4 INCHES.
- BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES 2"x2" OR REBARS DRIVEN THROUGH THE BALES THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
- INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
- BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

TYPICAL HAYBALE DIKE DETAIL
N.T.S.



CULVERT SECTION
N.T.S.



TYPICAL STAPLES
NO. 11 GAUGE WIRE

NOTE:
1. EROSION CONTROL BLANKET TO BE IMMEDIATELY INSTALLED AFTER SEEDING OPERATIONS FOR DITCH BOTTOM AND DITCH SIDE SLOPE PROTECTION.

EROSION CONTROL BLANKET INSTALLATION
N.T.S.

NOTE.
1. EROSION CONTROL DETAILS: SILT FENCE AND HAYBALES ARE TEMPORARY EROSION CONTROL MEASURES TO BE USED DURING CONSTRUCTION TO PREVENT SEDIMENT TRANSPORT OUT OF WORK OR DISTURBED AREAS.

SEA AREA
Don Johnson
6/21/97



0	FOR CONSTRUCTION	E.L.	6/21/97	MSB
A	FINAL DESIGN REVIEW	E.L.	5/2/97	SHM
REV	DESCRIPTION	PREP BY	DATE	APPROV

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

**CONSTRUCTION
DETAILS**

PROJECT	8554	DATE	6/24/97
DRAWN	E.LEDUC	CHECKED	S.MITCHELL
APPROVED FOR NAVSTA	DATE	SIZE	UKC NO.
APPROVED FOR SDV	DATE	SCALE UNLESS NOTED	NOTED
CTD NO.	134	MANFAC DWG NO.	5338928
DWG NO.	C-13	REV	0
SHEET 14 OF 14			

APPENDIX C

GENERAL SPECIFICATIONS

INDEX TO APPENDIX C

<u>Title</u>	<u>Number</u>
Technical Specification for On-Site Transportation of Contaminated Materials	201-SP007-001
Scope of Work for Surveying Services in Northeast Florida	003-SW000-003
Standard Specification for Surveying Services	01051
Scope of Work for Material Testing Services in Northeast Florida	003-SW000-004

NOTE:

The specifications and scopes of work attached are intended to be generic documents that are part of specific subcontract packages issued for execution of the described work by Subcontractors, as part of Bechtel's prime contract with the Navy. The general scopes of work require specific clarification as a specific delivery order tasking to the Subcontract for execution of the work described in this document. These specifications and scopes are not intended to stand alone as design documents, but are tied to the description and execution described in the RWP. Clarification of the documents within the Subcontract for the actual execution of the work is required.

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

ON-SITE TRANSPORTATION OF CONTAMINATED MATERIALS

NO.	DATE	REASON FOR REVISION	BY	CHECK	SUPV	PE
0	7/21/94	Issued for use	KK	MMR	Hed	JRM
ORIGIN		TRANSPORTATION OF CONTAMINATED MATERIALS	JOB NO. 22567			
			TECHNICAL SPECIFICATION		REV	
			201-SP007-001		0	
			SHEET 1 OF 5			

CONTENTS

	Page
1.0 GENERAL	3
2.0 CODES AND STANDARDS	3
3.0 SUBMITTALS	3
4.0 MATERIALS	3
4.1 TRUCK DRAPE CURTAIN	3
4.2 TARPAULINS AND SIDE BOARDS	3
5.0 FIELD OPERATIONS	4
5.1 GENERAL VEHICLE OPERATION	4
5.2 LOADING OF CONTAMINATED MATERIAL	4
5.3 TRANSPORTATION OF CONTAMINATED MATERIAL	5
5.4 UNLOADING OF CONTAMINATED MATERIAL	5
5.5 VEHICLE MONITORING, DECONTAMINATION, AND RELEASE	5

**TECHNICAL SPECIFICATION
FOR
ON-SITE TRANSPORTATION OF CONTAMINATED MATERIALS**

1.0 GENERAL

This Specification defines the quality of workmanship required and defines how quality is measured for the on-site transportation of contaminated material.

2.0 CODES AND STANDARDS

The Subcontractor shall control the quality of items and services to meet the requirements of this specification and other Subcontract documents.

3.0 SUBMITTALS

Only engineering document requirements as summarized on the Subcontractor Submittal Requirements Summary (SSRS) 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 disapprove any materials, schedules, methods, equipment, plans, drawings, or other submittals that do not meet the Subcontract requirements.

4.0 MATERIALS

4.1 TRUCK DRAPE CURTAIN

The truck drape curtain shall be constructed from non-porous reusable material of sufficient strength to withstand the physical demands of installation and the subsequent operation of loading of contaminated material.

4.2 TARPAULINS AND SIDE BOARDS

Tarpaulins used shall be without visual damage from wear or misuse and of a quality highly resistant to tears, rips, snags, puncture, abrasion, cracking, peeling, weathering, and that are suitable for use as an external cargo wrap.

Side boards that are suitable as a frame for use with tarpaulins to form a closed transport vehicle shall be provided.

5.0 FIELD OPERATIONS

5.1 GENERAL VEHICLE OPERATION

- 5.1.1 The Subcontractor shall provide equipment that is appropriate to accomplish this type of work and shall maintain and use it in strict compliance with manufacturer's recommendations and OSHA requirements. The Subcontractor shall take all necessary precautions for safe operations of his equipment and the protection of the public from injury and damage from such equipment.
- 5.1.2 All vehicles will be inspected by BEI at the site prior to loading to ensure the vehicles have no fluid leaks, no unusually noisy mufflers and/or tailpipes, tires that are in good condition, and operational brakes, horn, steering, operating controls, and safety devices. Vehicles shall also be free of excess dirt, debris, oil, grease, and major visible rust.
- 5.1.3 The truckbeds used for contaminated material haulage shall be free from drain holes, cracks, or other conditions that might permit waste material and/or contaminated water to leak from the truckbeds. If the trucks used for hauling have tailgates for dumping, the Subcontractor shall demonstrate to BEI that the tailgates can be sealed watertight during operation.
- 5.1.4 Trucks shall be subject to inspection by BEI prior to each loading of contaminated material to ensure that watertightness is maintained. Any truckbed not provided an adequate leakproof seal shall be repaired or replaced as required.

5.2 LOADING OF CONTAMINATED MATERIAL

- 5.2.1 Contaminated material shall be placed in trucks in such a manner as to prevent spilling waste on the clean soil or truck body. All spilled material and loose material on the truck surface shall be collected and placed in the truck.
- 5.2.2 Contaminated material shall be loaded up to 1 foot below the top of the truckbed side walls. Side boards shall not be used to increase hauling capacity of trucks.
- 5.2.3 Tarpaulin covers shall be installed and used on all trucks hauling contaminated material.
- 5.2.4 Protrusions or sharp objects shall be removed from the surface of the contaminated material prior to tarpaulin cover placement to prevent cover damage and ensure full coverage of load.
- 5.2.5 Tarpaulins shall be firmly secured over the contaminated material with an overlap on the back of the truckbeds to prevent material from being blown from the truck and to eliminate any spread of contamination during transport.

5.3 TRANSPORTATION OF CONTAMINATED MATERIAL

- 5.3.1 All haul and access roads shall be maintained in a clean condition so that no dirt or contamination is tracked onto clean areas or public roads and highways.
- 5.3.5 The trucks designated by the Subcontractor to haul contaminated material shall be used exclusively for this purpose (including return of empties) until released by BEI for "unrestricted use."
- 5.3.6 Transportation routes shall be as shown on the engineering drawings. No deviation from transportation routes shall be allowed without prior written approval from BEI.

5.4 UNLOADING OF CONTAMINATED MATERIAL

- 5.4.1 The Subcontractor shall unload contaminated material at the contaminated material stockpile using dumping ramps constructed to allow the waste to be unloaded in such a manner as to prevent contaminating the truck exterior. Ramp construction shall avoid or minimize the creation of additional contaminated materials. Trucks shall not drive directly upon contaminated materials.
- 5.4.2 The Subcontractor shall ensure that appropriate safeguards are maintained during unloading operations, such as backup alarms, flagmen, bumpguards, etc., to allow the safe unloading of contaminated material.
- 5.4.3 The tailgate shall be closed after unloading and secured for return trips.
- 5.4.4 The tarpaulin shall be reinstalled for return trips to avoid dirt and dust being blown from the truck and to eliminate any appearance of spreading contamination.

5.5 VEHICLE MONITORING, DECONTAMINATION, AND RELEASE

- 5.5.1 Vehicles will be monitored for external contamination by BEI prior to leaving the excavation sites and again prior to leaving the contaminated material stockpile area.
- 5.5.3 Before being released for unrestricted use, the entire piece of equipment will be monitored by BEI for any contamination. If any contamination is found on the exterior, bed, bucket, etc., the vehicle will be cleaned by the Subcontractor at the washdown facility. This process will be repeated until monitoring indicates that release levels are reached.

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION

SCOPE OF WORK
FOR
SURVEYING SERVICES
IN
NORTHEAST FLORIDA

0	9/20/96	Issued for Construction	BY	CHECK	EGS	PE		
REV	DATE	REASON FOR REVISION						
ORIGIN		SURVEYING SERVICES	JOB NO. 22567					
			SCOPE OF WORK				REV	
			003 - SW000 - 003				0	
			PAGE 1 of 5					

CONTENTS

	Page
1.0 GENERAL.....	3
1.1 PROJECT DESCRIPTION	3
1.2 SITE LOCATION	3
1.3 DEFINITIONS	3
1.4 WORK INCLUDED.....	3
1.4.1 Mobilization/Demobilization	3
1.4.2 Surveying Services	3
1.4.3 Safety and Health.....	4
1.5 SITE-SPECIFIC TRAINING	4
1.6 WORK NOT INCLUDED	4
1.7 REFERENCES	4
1.8 SUBMITTALS	4
1.9 DELIVERY, STORAGE, AND HANDLING	5
1.10 MAINTENANCE.....	5

SCOPE OF WORK FOR SURVEYING SERVICES

1.0 GENERAL

1.1 PROJECT DESCRIPTION

This Scope of Work (SOW) addresses SUBCONTRACTOR surveying services scope of work required to support remedial action activities associated with various Naval Facilities located in Duval County, Florida (i.e., NAS Jacksonville, NAS Cecil Field, FISC, and NS Mayport). The U.S. Department of the Navy, through Southern Division, Naval Facilities Engineering Command, intends to perform these remedial actions through the use of the Navy's Environmental Response Action Contractor (RAC), Bechtel Environmental, Inc. (Bechtel).

1.2 SITE LOCATION

The surveying services will be performed on sites located in Duval County, Florida.

1.3 DEFINITIONS

In the Standard Specification for Surveying Services:

- The Owner shall be defined as Bechtel Environmental, Inc.
- The Contract shall be defined as the surveying services subcontract.

1.4 WORK INCLUDED

The SUBCONTRACTOR shall be required to mobilize to perform survey services, demobilize, and provide equipment as outlined in the following sections. This SOW is developed as a generic Scope of Work to include surveying services that may or may not be authorized. Site-specific SOWs will be issued to address surveying activities involved with each Delivery Order or Task Order issued under this Subcontract. These SOWs will identify the specific activities that are generically identified below.

1.4.1 Mobilization/Demobilization

Mobilization includes delivering to the site all personnel, equipment, materials, and incidentals necessary to perform the work described in this SOW, detailed by the technical specification, and provided in the subcontract. Demobilization includes cleaning up the work area and removing from the site all personnel, equipment, and materials. The SUBCONTRACTOR shall take all precautions necessary for safe operation of his equipment/vehicle and to safeguard the public and the environment from injury.

1.4.2 Surveying Services

The work consists of furnishing all equipment, labor, supervision, supplies, and materials to successfully perform all operations in connection with the surveying services. Surveying services shall consist of performing the surveys listed below, included but not limited to, installing flags and/or pins, and preparing associated drawings and documentation on an "as requested" basis as indicated in this SOW

and shall be performed in accordance with Standard Specification, Section No. 01051, "Surveying Services" (excluding section 1.02 of this specification). However, this scope alone is not a true representation of the work to be performed. Additional SOWs will be attached which specify the work to be performed.

Surveying services may include, but are not limited to, the following on request by Bechtel:

- Control Surveys
- Boundary Surveys
- Topographic Surveys
- Construction Surveys
- GPS Surveys
- Minor clearing

The SUBCONTRACTOR shall provide requested services within 48 hours of notification from Bechtel. At the completion of surveying events, all field books (copies of appropriate pages of the field books), electronic files, and data sheets shall be submitted to Bechtel.

1.4.3 Safety and Health

The SUBCONTRACTOR will be responsible for the safety and health of the SUBCONTRACTOR's personnel on-site. All work shall be conducted in accordance with Bechtel's Safety and Health requirements as detailed in Exhibit G.

1.5 SITE-SPECIFIC TRAINING

All of the SUBCONTRACTOR's employees who work at the Site will attend a brief (two hour) site-specific training session at the site. This training will provide the site-specific safety and health aspects of the project in accordance with Bechtel's Safety and Health Plan. This is a one-time orientation requiring all personnel to be in attendance for the initiation of each task. Additional site specific training required because of SUBCONTRACTOR's employee turnaround will be provided by Bechtel, but not reimbursed.

1.6 WORK NOT INCLUDED

The SUBCONTRACTOR will not be responsible for:

- obtaining access agreements/permits

1.7 REFERENCES

The document referenced below forms a part of this SOW to the extent referenced and intended for use. The document is referred to in the text by basic designation only.

- Standard Specification, Section No. 01051, "Standard Specification for Surveying Services"

1.8 SUBMITTALS

The SUBCONTRACTOR shall provide submittals as required in Exhibit F, "Subcontractor Submittal Requirements Summary." Submittals identified shall meet the detailed requirements listed herein. Bechtel reserves the right to disapprove any materials, schedules, methods, equipment, plans, drawings, or other submittals that do not meet the Subcontract requirements which shall be resubmitted correctly at SUBCONTRACTOR's expense.

The SUBCONTRACTOR shall submit:

- a. Tabulated Data Sheets - hard copy and electronic file [Excel (preferred) or Lotus]
- b. Field Books
- c. Survey Drawings - hard copy and electronic file (Micro Station or ACAD)

1.9 DELIVERY, STORAGE, AND HANDLING

The SUBCONTRACTOR is responsible for delivering to the site equipment in good working order and for providing any secured areas deemed necessary.

1.10 MAINTENANCE

The SUBCONTRACTOR will provide regular maintenance on all SUBCONTRACTOR-supplied equipment to maintain it in good working order.

STANDARD SPECIFICATION

FOR

SURVEYING SERVICES

0	7/1/96	Issued for Use	KK	RTJ	NJA	JWG
REV	DATE	REASON FOR REVISION	BY	CHECK	Tech Lead	F. Man
ORIGIN						
Bechtel National, Inc		Surveying Services	Section No 01051			REV 0
Sheet 1a of 10						

TABLE OF CONTENTS

PART 1 GENERAL	2
1.01 WORK INCLUDED	2
1.02 RELATED WORK NOT INCLUDED.....	2
1.03 REFERENCES	2
1.04 SUBMITTALS	2
1.05 QUALITY ASSURANCE	3
PART 2 PRODUCTS	5
2.01 MATERIALS.....	5
2.02 EQUIPMENT	6
PART 3 EXECUTION	6
3.01 GENERAL	6
3.02 FIELD WORK.....	6
3.03 OFFICE WORK.....	8
3.04 PROTECTION.....	10

PART 1 GENERAL

1.01 WORK INCLUDED

This specification describes the quality of materials and workmanship for providing surveying services. Only those activities required in the Contract documents for specific service shall apply.

1.02 RELATED WORK NOT INCLUDED

- A. Clearing and grubbing
- B. Construction services

1.03 REFERENCES

Unless otherwise specified or shown, the latest edition of the following Codes and Standards at the time of bid shall apply to the extent indicated herein. The publications are referred to in the text by basic designation only.

- A. Federal Geodetic Control Committee (FGCC), US Department of Commerce
 - Standards and Specifications for Geodetic Control Networks
 - Geometric Geodetic Accuracy Standards and Specifications for using Global Positioning System (GPS) Relative Positioning Techniques.
- B. National Oceanic and Atmospheric Administration (NOAA)
- C. State land surveying standards.

1.04 SUBMITTALS

Not all submittals described herein may be required. The required submittals shall be as stated in the Scope of Work or Design Drawings. The Owner 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.

- A. Submittal of data on magnetic storage media, hard copies of the drawings and calculations shall be accompanied by a hard copy list of the media contents and a letter of transmittal including the following:

Section 01051
SURVEYING SERVICES

1. Contract number
2. A description of contents per the contract including an index of the drawing and calculations
3. Number and type of items (e.g., floppies)
4. Note if the submittal is a resubmittal

Magnetic storage media shall be 3 ½" (1.44 MB) microdisks, Disk Operating System (DOS) 3.3 or higher. DOS backup shall be provided for files greater than 1.44 MB.

When requested by the Owner, advance copies of survey data pending verification shall be submitted by the surveyor. This information shall be stamped "preliminary" or "advance copy".

- B. Original Field Books and Data Sheets
- C. Copy of Land Surveyor Registration
- D. Calibration certificate for each instrument
- E. Product literature and calibration for special instruments upon owner request

1.05 QUALITY ASSURANCE

A. QUALIFICATIONS

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

B. QUALITY REQUIREMENTS

Standards of accuracy for all survey work shall be in accordance with FGCC specifications and the state standards where the work is performed. In case of conflict, the surveyor shall comply with state standards.

Horizontal and vertical surveys shall meet the minimum accuracy requirements for the classification (e.g., order or category) of survey as specified by the surveying standards of the state where the work is performed. The order of survey shall be determined by the surveyor. If deemed necessary, the surveyor may use a

Section 01051
SURVEYING SERVICES

higher degree of accuracy than the minimum required by the state standards. The surveyor shall obtain approval of the survey classification from the Owner prior to performing work.

If not otherwise specified, a Third-order, class I survey shall be used. The angular error of closure shall not exceed 15 seconds times the square root of the angles turned. The linear error of closure shall not exceed 1 ft per 10,000 ft (1:10,000) of perimeter. When surveys of less than 1 acre are surveyed, the allowable error shall not exceed 0.1 ft of positional accuracy at any corner.

Horizontal survey information shall be based on the state plane coordinate system. Project specific coordinate systems may be used, but must be tied to the state plane coordinate system. This may not be practical in areas where state plane control monuments are limited. The surveyor shall determine and advise the Owner if establishing new monumentation using GPS is more practical than conventional surveying. The Owner shall make the final determination.

Vertical survey information shall be based on the National Geodetic Vertical Network (mean sea level datum). Other local vertical datum may be used upon approval from the Owner. If local vertical datum are used, then the equation between the local datum and the National Geodetic Vertical Network datum shall be determined and noted. Coordinates and elevations shall be stated in English units of measure (Decimal Feet).

If not otherwise specified, a Third-order leveling survey shall be used. The vertical error of closure (Y) shall not exceed 0.05 times the square root of the distance in miles (M) of the total level route running forward and backward between fixed elevations or along a level loop:

$$Y = 0.05\sqrt{M}$$

The elevation accuracy of bench marks and other permanent items (e.g., structures, pavements, etc.) shall be ± 0.01 ft. The accuracy of ground elevations shall be ± 0.1 ft.

Ninety percent of the contours shall be accurate to within $\frac{1}{2}$ the contour interval and no elevation shall be in error by more than one full contour interval.

C. CERTIFICATION

Drawings and calculations submitted by the surveyor shall be signed, sealed, and certified by a registered land surveyor licensed in the state where work is performed.

PART 2 PRODUCTS

2.01 MATERIALS

A. FIELD BOOKS AND DATA SHEETS

The necessary field data shall be recorded by the surveyor in a standard field book using generally accepted surveying field note recording practices. Corrections to field books shall be made by marking a single line through the incorrect data, writing the correct data above it, initialing, and dating. Erasure of field data is not acceptable. If data was collected by using a data collector, the surveyor shall submit hard copies of raw data files and coordinate files to the Owner. On the completion of a task, the surveyor shall submit all field books and data sheets to the Owner.

B. MONUMENTS

Concrete and metal monuments shall be of the type and quality to provide stability against frost heave action, changes in groundwater level, and settlement. Monuments shall meet the requirements for materials, dimensions, and marking as specified by NOAA and the state where the work is performed.

C. IRON PINS

Iron pins shall be of the diameter and length as specified by the Owner or the state standards where the work is performed.

D. WOODEN HUBS AND STAKES

Wooden hubs and stakes shall be milled from solid lumber, and shall be pointed on one end. The dimensions shall be of the sizes that are normally used for land survey work. Substitutes may be used upon approval from the Owner.

Wooden hubs and stakes shall be clearly marked with bright orange weatherproof paint. Stakes shall also be marked with flagging.

E. MISCELLANEOUS

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

2.02 EQUIPMENT

The Surveyor shall maintain sufficient equipment, materials, parts, tools, and supplies to meet the requirements of the work. Surveying equipment shall be subject to inspection by the Owner and, if deemed unsatisfactory, the surveyor shall remove from the site and replace by satisfactory equipment. To maintain optimum accuracy, surveying instruments shall have been inspected and calibrated by an authorized manufacturer's representative not more than six months prior to the survey and at regular intervals as defined by the state standards where the work is performed. The surveyor shall submit a certificate of calibration for each instrument one week prior to mobilization and after each calibration. The surveyor shall also provide product literature and calibration data of any special instruments when requested by the Owner.

PART 3 EXECUTION

3.01 GENERAL

Civil surveys will be requested in writing by the Owner.

3.02 FIELD WORK

A. CONTROL SURVEYS

The surveyor shall perform control surveys to establish on-site horizontal and vertical positions. A benchmark shall be established to reference control. Grids may be established within the limits of work and at the intervals specified by the Owner. If not provided by the Owner, the surveyor shall submit the initial horizontal and vertical control data for the Owner's approval.

Unless noted otherwise on the design drawings, the intersection of the grid lines shall be marked with wooden hubs driven flush with the ground. 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 approximately 12 in. of the intersection. The surveyor shall not use spray paint marking on buildings, structures, or pavements without written approval from the Owner.

Section 01051
SURVEYING SERVICES

Coordinates for control surveys shall be based on the coordinate system shown on the drawings; at least two coordinates for grid surveys shall be tied to the specified coordinate system.

Control points shall be referenced to permanent features within or immediately adjacent to the survey area so that the control points may be readily reestablished in the event that they are removed or disturbed.

Drawings and documentation for control survey shall show:

1. North arrow with indication as to whether it is true, magnetic, or other and the correlation to the grid
2. Plan view of area grid
3. Coordinates and elevations of grid intersection points and of other points along the grid lines shown in tabular form or other approved format
4. Grid lines and all other miscellaneous data pertinent to the grid survey
5. Ties to the state plane coordinate system sufficient to tenable the survey to be reestablished

B. BOUNDARY SURVEYS

The surveyor shall perform surveys and deed research necessary to define the property boundaries for the properties specified by the Owner.

Coordinates for all boundary surveys shall be based on the specified coordinate system.

All corners shall be established with permanent benchmarks or iron pins. The type of marker and status (old or new) shall be indicated on the drawings.

Drawings for boundary surveys shall be in accordance with state standards where the work is performed and will include, but not be limited to the following:

1. Property corners and lines
2. Tie to closest street intersection
3. Names of adjoining land owners and deed references
4. Property line dimensions, political boundaries, easements, bearings, and other miscellaneous data pertinent to the boundary survey

C. TOPOGRAPHIC SURVEYS

The surveyor shall perform topographic surveys within the limits shown on the drawings and as specified by the Owner.

Section 01051
SURVEYING SERVICES

Drawings for topographic surveys shall contain the information specified in the standards for the state where the work is performed. This information shall include, but not be limited to the following information:

1. Elevations shown as spot shots and contours with the contour interval noted. All contours shall extend to or slightly beyond the survey limits
2. Property lines and planimetric features including, but not limited to: paved surfaces, street names, vegetation, fences, power poles, walkways, boundaries of water courses, underground utilities, easements, structures, and all other obstructions
3. Bench marks with reference to datum

D. CONSTRUCTION SURVEYS

The surveyor shall perform construction surveys and related calculations as specified by the Owner.

Pertinent data and information obtained and/or established during the construction surveys shall be submitted as directed by the Owner.

Drawings for construction surveys, if required by the Owner, shall be submitted on magnetic media for review in accordance with this specification.

E. GPS SURVEYS

All GPS surveys shall be made in accordance with the FGCC specifications. Control surveys must meet or exceed the accuracy requirements described therein. The class of control survey shall be noted on the submittals.

3.03 OFFICE WORK

Pertinent data and information obtained and/or established during the control, boundary, and topographic surveys shall be shown on the drawings and submitted to the Owner on magnetic media in accordance with this specification.

For digital maps, drawings, data, and other surveying, the surveyor shall be required to provide and accept design files in Intergraph format. Digital map data shall be input into a SINGLE 3D design file and shall be placed on designated levels in accordance with the CADD Level Index Record as described in Attachment A. 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 $\frac{1}{8}$ in. height. The digital map shall utilize the specified coordinate and datum systems.

Section 01051
SURVEYING SERVICES

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

Section 01051
SURVEYING SERVICES

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 Owner-provided cell library.

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.

All drawing files shall be based on the specified coordinate system using the global origin and working units set up in the Owner-provided "state ".STP design files.

The surveyor shall place his own drawing format around the digital map with a legend, date, notes on accuracy, and any miscellaneous notes. One digital copy of the digital map shall be submitted for review and comment. Once the surveyor has incorporated comments, a digital copy shall be submitted to the Owner.

The surveyor 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 the Owner at the close of the Contract.

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.

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

<u>FILE</u>	<u>DESCRIPTION</u>
.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

3.04 PROTECTION

The surveyor shall employ all possible means to minimize interference with construction operations. Any damage to facilities caused by the survey crew shall be repaired at the expense of the surveyor.

The surveyor shall install guard stakes and flagging where necessary for protection of surveyed points. If required by the Owner, the surveyor shall install steel guard posts to protect monuments and benchmarks.

Section 01051
SURVEYING SERVICES

END SECTION

ATTACHMENT A

CADD LEVEL INDEX

LEVEL	DESCRIPTION	LEVEL	DESCRIPTION
1	*	33	Spot elevations
2	Well locations	34	*
3	*	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	*
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 labels	50	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

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION

SCOPE OF WORK
FOR
MATERIALS TESTING SERVICES
IN
NORTHEAST FLORIDA

0	8/24/96	Issued for Construction	<i>JIM</i>	<i>Shub</i>	<i>HR</i>	<i>HR</i>
REV	DATE	REASON FOR REVISION	BY	CHECK	EGS	PE
ORIGIN		MATERIAL TESTING SERVICES	JOB NO. 22567			
			SCOPE OF WORK			REV
			003 - SW000 - 004			0
		PAGE 1 of 8				

CONTENTS

	Page
1.0 GENERAL.....	3
1.1 PROJECT DESCRIPTION	3
1.2 SITE LOCATION	3
1.3 WORK INCLUDED	3
1.3.1 Mobilization/Demobilization.....	3
1.3.2 On-Site Testing and Sample Collection	3
1.3.3 Off-Site Testing	5
1.3.4 Reporting Results	7
1.3.5 Safety and Health	7
1.4 SITE-SPECIFIC TRAINING	7
1.5 WORK NOT INCLUDED	7
1.6 REFERENCES	8
1.7 SUBMITTALS	8
1.8 DELIVERY, STORAGE, AND HANDLING.....	8
1.9 MAINTENANCE.....	8

SCOPE OF WORK FOR MATERIALS TESTING SERVICES

1.0 GENERAL

1.1 PROJECT DESCRIPTION

This Scope of Work (SOW) addresses SUBCONTRACTOR scope required to support remedial action activities associated with material testing services at various Naval Facilities located in Duval County, Florida (i.e., NAS Jacksonville, NAS Cecil Field, FISC, and NS Mayport). The U.S. Department of the Navy, through Southern Division, Naval Facilities Engineering Command, intends to perform these remedial actions through the use of the Navy's Environmental Response Action Contractor (RAC), Bechtel Environmental, Inc. (Bechtel).

1.2 SITE LOCATION

The materials testing services will be performed on sites located in Duval County, Florida.

1.3 WORK INCLUDED

The SUBCONTRACTOR shall be required to mobilize, demobilize, perform on-site testing, perform off-site testing and sample collection, and report results of testing of materials as outlined in the following sections. This Scope of Work is developed as a generic scope of work to include material testing services that may or may not be authorized. Specific Scopes of Work will be issued to address specific material testing activities involved with each Delivery Order or Task Order issued under this Subcontract. These specific Scopes of Work will identify the appropriate activities that are generically identified below.

1.3.1 Mobilization/Demobilization

Mobilization includes delivering to the site all personnel, equipment, and materials and incidentals necessary to perform the work described in this scope and provided in the subcontract. Demobilization includes cleaning up the work area and removing from the site all personnel, equipment, and materials. The SUBCONTRACTOR shall take all precautions necessary for safe operation of his equipment/vehicle and to safeguard the public and the environment from injury.

The SUBCONTRACTOR shall obtain all necessary state and/or local permits for this work. Copies of all required permits, including a copy of the proposed laboratory's certifications, shall be submitted to Bechtel prior to mobilization.

1.3.2 On-Site Testing and Sample Collection

The work consists of furnishing all equipment, labor, supervision, supplies, and materials needed to successfully perform all operations in connection with the on-site testing and sample collection services. The work includes sample collection (as specified by Bechtel) and on-site testing of various non-contaminated materials as indicated in this Scope in accordance with the following American Society for Testing and Materials (ASTM) standards listed below. Bechtel will collect materials that may be

contaminated. However, this scope alone is not a true representation of the work to be performed. Additional scopes will be attached which specify the work to be performed.

A technician will be required to perform the following on-site testing and document the test results on a standardized form (as dictated by the referenced performance standards) before leaving the site. On-site office space will be provided, as necessary, by Bechtel.

ASTM C 143	Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM C 173	Standard Test Method for Air Content of Freshly-Mixed Concrete by the Volumetric Method
ASTM C 231	Standard Test Method for Air Content of Freshly-Mixed Concrete by the Pressure Method
ASTM D 421	Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants
ASTM D 653	Standard Terminology Relating to Soil, Rock, and Contained Fluids
ASTM D 979	Standard Practice for Sampling Bituminous Paving Mixtures
ASTM D 1452	Standard Practice for Soil Investigation and Sampling by Auger Borings
ASTM D 1556	Standard Test Method for Density and Unit Weight of Soil In-Place by the Sand-Cone Method
ASTM D 1587	Standard Method for Thin-Walled Tube Sampling of Soils
ASTM D 2217	Standard Practice for Wet Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants
ASTM D 2488	Standard Practice for Description and Identification of Soils
ASTM D 2922	Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods
ASTM D 2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Method
ASTM D 3017	Standard Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3385	Standard Test Method for Infiltration Rate of Soils in Field using Double-Ring Infiltrimeters
ASTM D 3549	Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens

< 1557-91

- ASTM D 4220 Standard Practice for Preserving and Transporting Soil Samples
- ASTM D 4437 Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes
- ASTM D 4944 Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester
- ASTM D 5093 Standard Test Method for Field Measurement of Infiltration Rate Using Double-Ring Infiltrometer with a Sealed Inner Ring

4718-87

Containers for samples and transport of samples to a laboratory (when required) shall be the responsibility of the SUBCONTRACTOR. Sample and/or test locations will be directed by Bechtel. Bechtel will provide 24-hour notice before requiring sampling and/or testing.

1.3.3 Off-Site Testing

The work consists of furnishing all equipment, labor, supervision, supplies, and materials, to successfully perform all operations in connection with off-site testing. The work includes laboratory testing of various materials as indicated in this Scope in accordance with the following ASTM and American Association of State Highway and Transportation Officials (AASHTO) standards listed below. Off-Site laboratory testing will include the testing of both non-contaminated and contaminated materials.

- ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- ASTM C 136 Standard Method for Sieve Analysis of Fine and Coarse Aggregates
- ASTM D 5 Standard Test Method for Penetration of Bituminous Materials
- ASTM D 113 Standard Test Method for Ductility of Bituminous Materials
- ASTM D 422 Standard Method for Particle Size Analysis of Soils
- ASTM D 427 Standard Test Method for Shrinkage Factors of Soils
- ASTM D 653 Standard Terminology Relating to Soil, Rock, and Contained Fluids
- ASTM D 698 Standard Test Method for Moisture-Density Relations of Soils and Soil Aggregate Mixtures, Using 5.5 lb Rammer and 12 in. Drop
- ASTM D 854 Standard Test Method for Specific Gravity of Soils
- ASTM D 1557 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Method

ASTM D 1559	Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 1856	Standard Test Method for Recovery of Asphalt from Solution by Abson Method
ASTM D 2166	Standard Test Methods for Unconfined Compressive Strength of Cohesive Soil
ASTM D 2172	Standard Test Method for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2216	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock
ASTM D 2434	Standard Test Method for Permeability of Granular Soils (Constant Head)
ASTM D 2487	Standard Practice for Classification of Soils for Engineering Purposes
ASTM D 2488	Standard Practice for Description and Identification of Soils
ASTM D 4186	Standard Test Method for One-Dimensional Consolidation Properties of Soils Using Controlled-Strain Loading
ASTM D 4253	Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D 4254	Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D 4318	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4525	Standard Test Method for Permeability of Rocks by Flowing Air (to be applied to soil)
ASTM D 4526	Standard Test Methods for One-Dimensional Swell or Settlement Potential of Cohesive Soils
ASTM D 5084	Standard Test Method for Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
AASHTO T-30	Standard Method of Test for Mechanical Analysis of Extracted Aggregate
AASHTO T-166	Standard Method of Test for Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens

1.3.4 Reporting Results

Preliminary on-site results shall be submitted to the Bechtel Project Superintendent before the technician leaves the site. A final written report shall be submitted to document the on-site results; this report shall be reviewed and approved by a registered professional engineer, and as a minimum shall include the following:

- Name(s) of technician(s) performing test
- Date and time of field test
- Test procedure followed
- Summary of results
- Verification of instrument calibration, if applicable

A final written report reviewed and approved by a registered professional engineer shall be submitted to document the final test results for off-site testing. As a minimum, this report shall include the following:

- ID of sample
- Description of sample
- Name(s) of technician(s) performing test
- Date and time of sample receipt
- Test procedure followed
- Summary of results
- Preparation and analysis dates

1.3.5 Safety and Health

The SUBCONTRACTOR will be responsible for the safety and health of the SUBCONTRACTOR's personnel on Site. All work shall be conducted in accordance with Bechtel's Safety and Health requirements as detailed in Exhibit G.

1.4 SITE-SPECIFIC TRAINING

All of the SUBCONTRACTOR's employees who work at the Site will attend a brief (two hour) site-specific training session at the site. This training will provide the site-specific safety and health aspects of the project in accordance with the Bechtel Safety and Health Plan. This is a one-time orientation requiring all personnel to be in attendance for initiation of each task.

1.5 WORK NOT INCLUDED

The SUBCONTRACTOR will not be responsible for:

- designating required test(s) for each sample

1.6 REFERENCES

The document referenced below forms a part of this SOW to the extent referenced and intended for use. The document is referred to in the text by basic designation only.

- American Society of Testing Materials Standards
- American Association of State Highway and Transportation Officials Standards

1.7 SUBMITTALS

The SUBCONTRACTOR shall provide submittals as required in Exhibit F, "Subcontractor Submittal Requirements Summary." Submittals identified shall meet the detailed requirements listed herein. Bechtel reserves the right to disapprove any materials, schedules, methods, equipment, plans, drawings, or other submittals that do not meet the Subcontract requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

The SUBCONTRACTOR is responsible for delivering to the site equipment in good working order and for providing any secured areas deemed necessary.

1.9 MAINTENANCE

The SUBCONTRACTOR will provide regular maintenance on all SUBCONTRACTOR supplied equipment to maintain it in good working order.