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Final Remedial Action Design Submittal

for

Site 12 – Town Gut Landfill

Indian Head Division
Naval Surface Warfare Center
Indian Head, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298
Contract Task Order 0325

February 2002

REVISION 0
FEBRUARY 2002

FINAL REMEDIAL ACTION DESIGN SUBMITTAL FOR SITE 12 - TOWN GUT LANDFILL

INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity Chesapeake
1314 Harwood Street, S.E.
Washington Navy Yard, D.C. 20374-5018

Submitted by:
Tetra Tech NUS, Inc.
600 Clark Avenue, Suite 3
King of Prussia, Pennsylvania 19406-1433

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0325

FEBRUARY 2002

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Basis of Design
for
Site 12 - Town Gut Landfill

Indian Head Division
Naval Surface Warfare Center
Indian Head, Maryland

Engineering Field Activity Chesapeake
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ACRONYM LIST

µg/kg	microgram per kilogram
µg/L	microgram per liter
ARARs	Applicable or Relevant and Appropriate Requirements
B&R Environmental	Brown & Root Environmental
bgs	below ground surface
Bo	Bibb Silt Loam
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
COCs	chemicals of concern
COMAR	Code of Maryland Regulations
CTO	Contract Task Order
cy	cubic yards
EOD	Explosive Ordnance Disposal
FEMA	Federal Emergency Management Agency
FS	feasibility study
IAS	initial assessment study
IHDIV-NSWC	Indian Head Division, Naval Surface Warfare Center
IR	Installation Restoration
MCL	maximum contaminant levels
MDE	Maryland Department of the Environment
Mo	Matawan Loamy Sand
msl	mean sea level
NACIP	Naval Assessment and Control of Installation Pollutants
NEESA	Naval Energy and Environment Support Activity
NPL	National Priorities List
PAHs	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
RAO	remedial action objectives
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROD	Record of Decision
SaE	Sandy Land, Steep
sf	square feet

Site 12	Site 12 - Town Gut Landfill
SVOCs	Semivolatile organic compounds
TAL	Target Analyte List
TBC	to be considered
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
Tm	Tidal Marsh
TtNUS	Tetra Tech NUS, Inc.
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VOCs	volatile organic compounds

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this report is to provide the basis for a remedial action design at Site 12 - Town Gut Landfill (Site 12) at the Indian Head Division, Naval Surface Warfare Center (IHDIV-NSWC), in Indian Head, Maryland. The remedial action design consists of placing a vegetated soil cover over the landfill and implementing institutional controls to prohibit residential development or use of contaminated groundwater. In addition, the existing wetlands disturbed during remedial action activities will be restored. This Basis of Design Report was prepared by Tetra Tech NUS, Inc. (TtNUS) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract No. N62472-90-D-1298, Contract Task Order (CTO) 0325.

The IHDIV-NSWC is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC, as shown on Figure 1-1. The IHDIV-NSWC is a military facility consisting of the main area on the Cornwallis Neck Peninsula and the Annex on Stump Neck. The main area is bounded by the Potomac River to the northwest, west, and south, Mattawoman Creek to the south and east, and the town of Indian Head to the northeast. Stump Neck Annex is located across Mattawoman Creek. The Stump Neck Annex is not contiguous with the main area and is operated by a tenant. The primary mission of IHDIV-NSWC is to provide services in energetics, ordnance devices and components, and other related ordnance engineering standards, including chemicals, propellants, and their propulsion systems, explosives, pyrotechnics, warheads, and simulators. The United States Environmental Protection Agency (USEPA) added IHDIV-NSWC to the National Priorities List (NPL) in September 1995, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. Site 12 is one of the 48 sites at the main facility currently included in the IHDIV-NSWC Installation Restoration (IR) Program. This remedial action design is limited to Site 12 in the main area of IHDIV-NSWC (Figure 1-2).

The remedial action is the first and final remedial action for Site 12. The selected remedy is to place a soil cover over the landfill to reduce risks to human health and the environment associated with exposure to buried wastes and contaminated soil and shallow groundwater. The Navy's goal is to begin remedial actions at IHDIV-NSWC as quickly as possible to protect human health and the environment and to comply with Applicable or Relevant and Appropriate Requirements (ARARs) and to be considered (TBC) criteria. The nature and extent of contamination and the associated risks at Site 12 were derived from the investigations conducted by Fred C. Hart Associates, Inc., CH2M Hill, and TtNUS. The reports generated from the previous studies include the following:

- Hart (Fred C. Hart Associates, Inc.), 1983. Initial Assessment Study of Naval Ordnance Station, Indian Head, Maryland (13-021), May. Prepared for Naval Energy and Environmental Support Activity.

- CH2M Hill, 1985. Naval Assessment and Control of Installation Pollutants (NACIP) Confirmation Study Naval Ordnance Station, Indian Head, Maryland.

- B&R Environmental (Brown & Root Environmental), 1997. Background Investigation Report, Indian Head and Stump Neck Annex, Naval Surface Warfare Center, Indian Head, Maryland, December.

- TtNUS, 1999. Remedial Investigation Report, Site 12 - Town Gut Landfill, Site 39/41 - Organics Plant/Scrap Yard, Site 42 - Olsen Road Landfill, Site 44 - Soak Out Area, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland. Prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command, Washington, D.C., July.

- TtNUS, 2001. Feasibility Study Report, Site 12 - Town Gut Landfill, Site 41 - Scrap Yard, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland. Prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command, Washington, D.C., January.

- USEPA, et al., 2001. Draft Final Record of Decision, Site 12 - Town Gut Landfill, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, November.

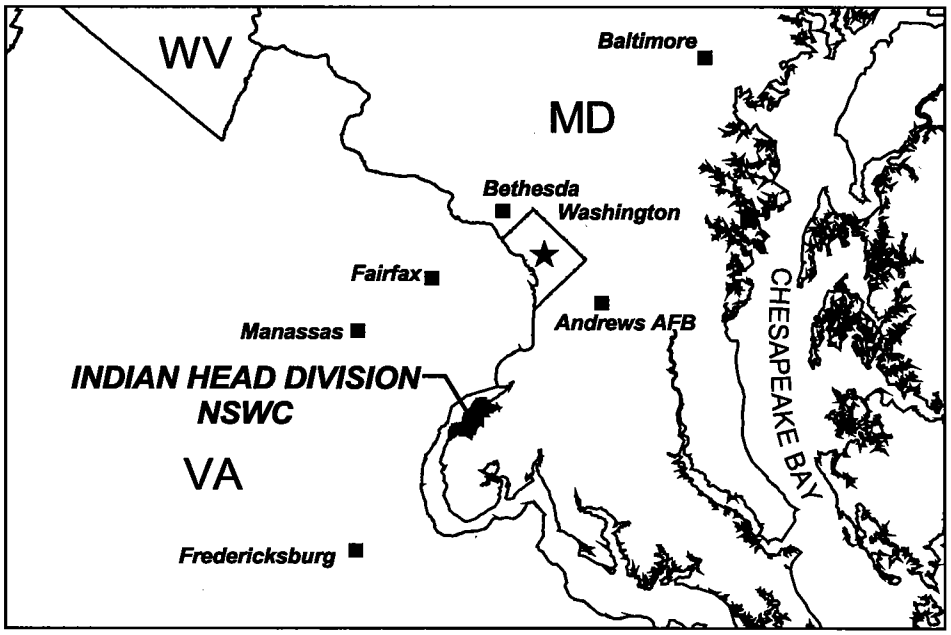
1.2 BASIS OF DESIGN AND REPORT ORGANIZATION

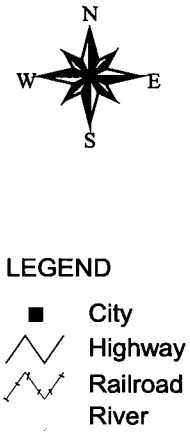
The following highlights the information contained in each section of this report.

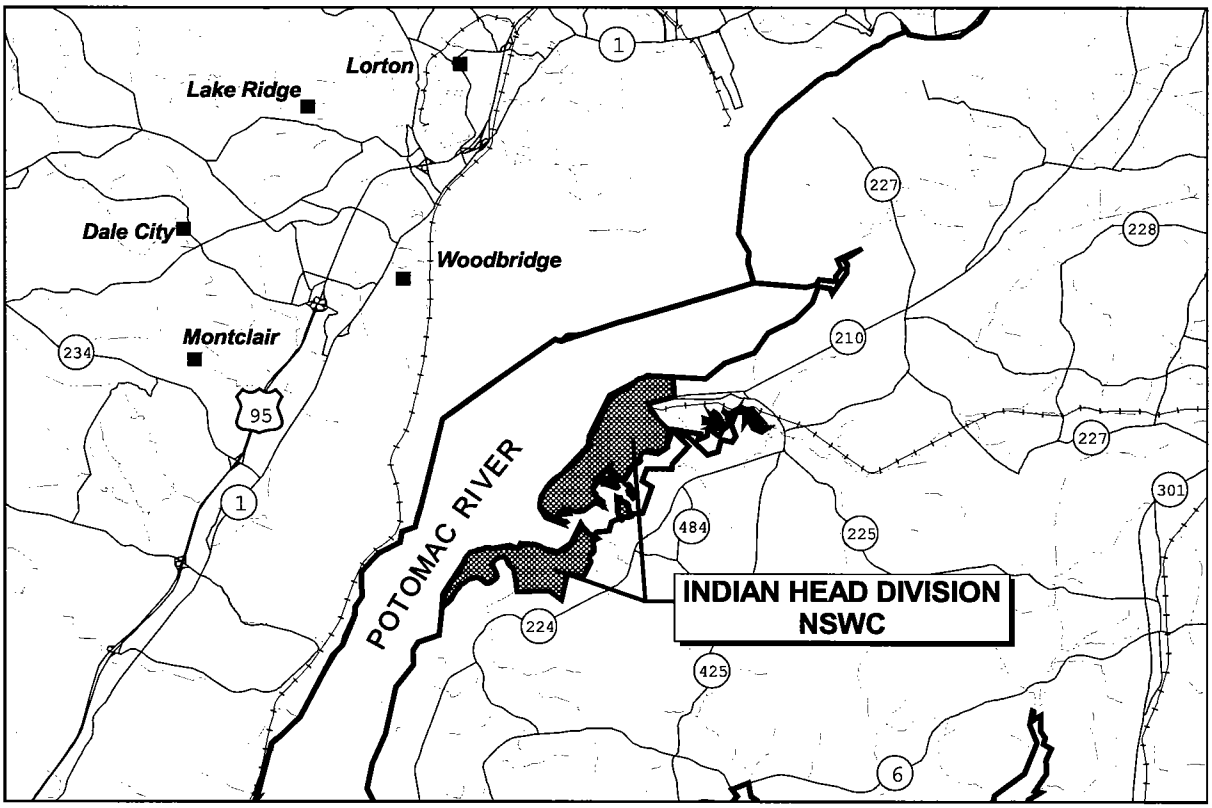
- Section 1.0 provides an introduction and summary of the Basis of Design.

- Section 2.0 summarizes site characteristics including site history, surface/subsurface soil and hydrological characteristics, findings from the feasibility study (FS) field investigation, wetlands delineation, and nature and extent of contamination.

- Section 3.0 presents the selected remedy from the Record of Decision (ROD) (USEPA, et al., 2001) and discusses design requirements for the remedial action.







DRAWN BY J. LAMEY DATE 8/2/01	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0525	OWNER NO. 0325
CHECKED BY GJL DATE 8/3/01	FACILITY LOCATION MAP SITE 12 - TOWN GUT LANDFILL INDIV - NSWC, INDIAN HEAD, MARYLAND	APPROVED BY GJL DATE 8/3/01	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 1-1	REV 0

P:\GIS\NSWC_INDIAN_HEAD\SITE_LOCATION.APR FACILITY LOCATION MAP 2/13/02 KMP

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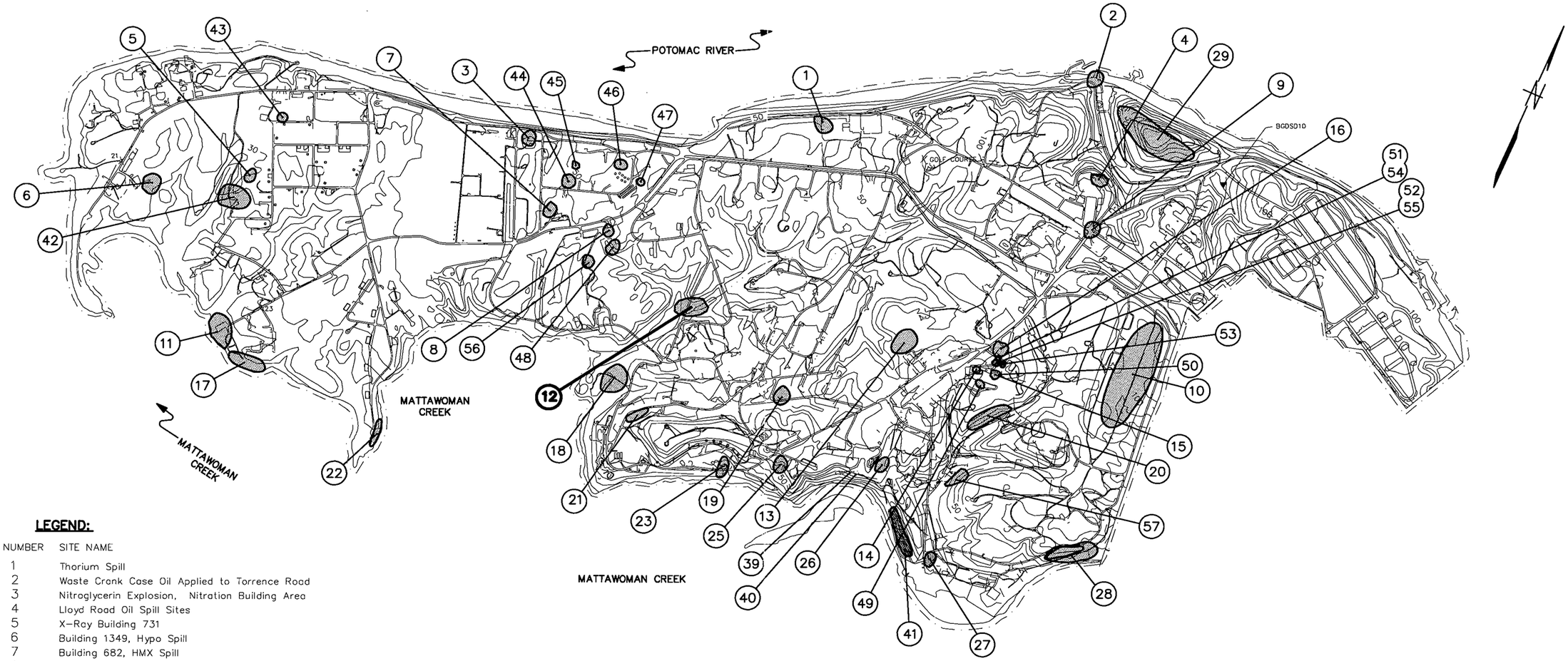

LEGEND:

SITE NUMBER	SITE NAME
1	Thorium Spill
2	Waste Crank Case Oil Applied to Torrence Road
3	Nitroglycerin Explosion, Nitration Building Area
4	Lloyd Road Oil Spill Sites
5	X-Ray Building 731
6	Building 1349, Hypo Spill
7	Building 682, HMX Spill
8	Building 766, Mercury Deposits
9	Patterson Avenue, Oil Spill
10	Single-base Propellant Grains Spill
11	Caffee Road Landfill
12	**Town Gut Landfill**
13	Paint Solvents Disposal Ground
14	Waste Acid Disposal Pit
15	Mercury Deposits in Manhole, Flourine Lab
16	Laboratory Chemical Disposal
17	Disposal Metal Parts Along Shoreline
18	Hog Island
19	Catch Basins at Chip Collection Houses
20	Single-base Powder Facilities
21	Bronson Road Landfill
22	NG Slums Burning Site
23	Hydraulic Oil Spill Discharges From Extrusion Plant
24	Abandoned Drain Lines (Not Shown)
25	Hypo Discharge X-Ray Building No. 2
26	Thermal Destructor 2
27	Thermal Destructor 1
28	Original Burning Ground
29	The Valley
30-38	Stump Neck Annex (Not Shown)
39	Organic Plant Outfall
40	Palladium Catalyst in Sediments
41	Scrap Yard
42	Olsen Road Landfill
43	Toluene Disposal Site
44	Soak Out Area
45	Abandoned Drums
46	Cadmium Sandblast Grit
47	Mercuric Nitrate Disposal Area
48	Nitroglycerine Plant Disposal Area
49	Chemical Disposal Area
50	Building 103, Crawl Space
51	Building 101, Dry Wall
52	Building 102, Dry Wall
53	Mercury Contamination of the Sewage System
54	Building 101
55	Building 102
56	IW87 - Lead Contamination
57	TCE Building 292 Area

APPROXIMATE SITE LOCATION
INTERMITTENT STREAM
NAVAL RESERVE BOUNDARY
100 CONTOUR INTERVAL 10 FEET
FLOW DIRECTION

0 1600 3200
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/12/01
CHECKED BY DATE 10/4/01
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SITE LOCATION MAP
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CONTRACT NO. 0525
OWNER NO. 0325
APPROVED BY
DATE 10/4/01
APPROVED BY
DATE
DRAWING NO. FIGURE 1-2
REV. 0

FORM CADD NO. SOUTH_BH.DGN - REV 0 - 02/11/97

2.0 EXISTING SITE CHARACTERISTICS

2.1 SITE DESCRIPTION

Site 12 - Town Gut Landfill comprises approximately 4 acres of undeveloped land located on the southwestern side of the IHDIV-NSWC. The western and northern edges of Site 12 are bounded by two ponds that are connected by a 78-inch diameter metal culvert located under Atkins Road Extension. The site is bisected by an arm of the northern pond and is traversed by Atkins Road Extension, which is oriented in a northwest-southeast direction (Figure 2-1). Runoff from the site flows into the two ponds. The pond water surface elevation and discharge are controlled by a weir located at the discharge (southern) end of the southern pond and by conditions in Mattawoman Creek, located south of the ponds.

Between 1968 and June 1980, IHDIV-NSWC used Site 12 to dispose landscaping waste, fill material, and rubble. Reportedly, material from outside the IHDIV-NSWC (landscaping waste and/or waste/rubble) was also deposited at the site until 1972. Based on visual observations and examination of historical maps and aerial photographs, the landfill material appears to have been dumped first on the eastern side of the site, in a topographically low area. Dumping then continued in a westward direction. It is estimated that the top of the waste material is currently 10 to 15 feet above the original ground surface (B&R Environmental, 1997). The total fill area is estimated to be approximately 4 acres.

It has been estimated that Site 12 contains approximately 70,000 cubic yards (cy) of mixed solid waste materials, primarily landscaping wastes, tree stumps, and demolition debris (TtNUS, 2001). Interviews conducted during the initial assessment study (IAS) indicated that unauthorized dumping of trash may have occurred, although quantity estimates for this unauthorized dumping of trash were not available. Some of the unauthorized items reportedly dumped at Site 12 include paints, varnishes, and other chemical wastes.

2.2 GEOLOGY

A composite of the geologic units underlying the Indian Head peninsula, in stratigraphically ascending order, consists of the Lower Cretaceous Potomac Group, the Tertiary age (Upper Paleocene) Aquia Formation and Park Hall Formation, and several Quaternary fluvial and estuarine deposits (McCartan, 1989). The Potomac Group (Lower Cretaceous) consists of three geologic units (in descending stratigraphic order): the Patapsco Formation, the Arundel Formation, and the Patuxent Formation. A generalized geologic cross-section of the Indian Head peninsula is provided on Figure 2-2. Additional description of the geologic units is provided in Section 3 of the remedial investigation (RI) report (TtNUS, 1999a).

Subsurface soil conditions at Site 12 were investigated during the installation of six monitoring wells during the RI (TtNUS, 1999a). Subsurface materials generally consist of silt, sand, and gravel (fill) overlying refuse material (wood, plastic, cloth, concrete, and tar shingles) mixed with silt, sand, and gravel and interspersed with void spaces. Natural materials beneath the refuse consist of greenish-gray silt and gravel. Geologic cross sections are provided on Figure 2-3. Boring log sheets, well construction sheets, and well completion/abandonment reports are provided in Appendix A. The monitoring well and cross section locations are shown on Figure 2-1.

2.3 SOILS

The dominant soil series in the Indian Head area as mapped by the Soil Survey of Charles County, Maryland (USDA, 1974) are the Evesboro-Keyport-Elkton association and the Beltsville-Gravelly land-Bourne association. The Evesboro-Keyport-Elkton association consists of level to moderately sloping, excessively drained, sandy soils and moderately well-drained and poorly drained, level to gently sloping, loamy soils that have clayey subsoil. The Beltsville-Gravelly land-Bourne association consists of level or moderately sloping and moderately drained, deep and dense loamy soils. Areas of cut-and-fill soils are also found on the IHDIV-NSWC. Cut-and-fill lands are areas where the native soils have been removed and graded or filled with other material or soil. According to the Soil Survey (USDA, 1974), the predominant soil at Site 12 is classified as Sandy Land Steep (SaE), very sandy soils along stream valleys, with sediments similar to the sandy material that underlies the Evesboro, Galestown, and Westphalia soils. Other soils present at Site 12 include Bibb Silt Loam (Bo), Matawan Loamy Sand (Mo), and Tidal Marsh (Tm). The USDA soils map is shown on Figure 2-4. Additional details for the on-site soils is provided in the Erosion and Sediment Control Plan Report.

2.4 HYDROGEOLOGY

The Patapsco and Patuxent Formations of the Potomac Group are the main groundwater aquifers used for supply purposes in the Indian Head peninsula area. The aquifers are separated by the Arundel Formation confining unit. Figure 2-2 presents a generalized cross-section of the Indian Head peninsula. Additional description of the regional and Indian Head peninsula hydrogeology is provided in Section 2.1.6 of the FS (TtNUS, 2001).

The shallow water-table beneath Site 12 occurs primarily under unconfined (water-table) conditions. Shallow water-table flows toward and into the adjacent ponds. The shallow water-table is primarily recharged by downward migration of precipitation through the unsaturated zone. In addition, recharge of the shallow water-table may occur along the edges of the ponds during high water conditions. The depth to the water table ranges from 1 foot to 4 feet below ground surface (bgs). The shallow water-table is not

used as a potable water supply. Drinking water is obtained from a deeper aquifer (190 to 240 feet deep). Groundwater in the deeper aquifer beneath the site is relatively confined by overlying deposits. There is no hydrogeological connection or communication between the shallow water-table and the deeper aquifer used for drinking water.

Shallow water-table elevations, based on January 1998 measurements, ranged from 5.01-feet mean sea level (msl) in monitoring well 12WP02 to 5.21-feet msl in monitoring well 12WP06. A summary of the shallow water-table elevations measured at Site 12 is provided on Table 2-1. The well locations are shown on Figure 2-1.

2.5 SURFACE WATER HYDROLOGY

Surface water runoff from the site flows into two currently non-tidal ponds located on the western and northern edges of the site. The ponds are connected by a 78-inch diameter metal culvert located under Atkins Road Extension. The pond water surface elevation and discharge are controlled by a weir located at the discharge (southern) end of the western pond. In the absence of the weir, the pond discharge to Mattawoman Creek is influenced by the water surface elevation in Mattawoman Creek. Mattawoman Creek is a tributary to the Potomac River, both of which are tidally influenced. A portion of Site 12 and the associated ponds lie within the 100-year flood boundary of Mattawoman Creek [Federal Emergency Management Agency (FEMA), 1985] with a base flood elevation of 8 feet (NGVD29). The base flood elevation is presented on Figure 2-5.

2.6 HISTORICAL INVESTIGATIONS

The Naval Energy and Environmental Support Activity (NEESA) conducted an IAS to evaluate various sites at IHDIV-NSWC including Site 12 to determine if a potential threat to human health or the environment existed. The report identified five sites, including Site 12, that exhibited a potential threat (Hart, 1983). A NACIP Confirmation Study was subsequently conducted at three of the five NEESA-evaluated sites (Sites 5, 8, and 12) (CH2M Hill, 1985). Removal actions were subsequently conducted at two of the sites (Sites 5 and 8). Site 12 was described as being in need of further investigation.

An RI field investigation was performed at Site 12 in 1997. The investigation included installation of soil borings and shallow water-table monitoring wells, and collection and analysis of surface soil, shallow groundwater, surface water, and sediment samples (TtNUS, 1999a).

2.6.1 Geophysical Survey

A geophysical survey was performed as part of the RI field investigation in a cleared area located across Atkins Road, southwest of Building 469, to determine if landfilling activities took place in this area. A reference grid consisting of 522 grid nodes spaced at 10-feet intervals, covering an area of approximately 49,200 square feet, was established for the magnetometer/gradiometer geophysical survey. The geophysical survey results are provided on Figure 2-6. The data are plotted as vertical magnetic gradient values. The magnetic anomalies indicate the presence of buried metallic material. The anomalies occur primarily in the southern half of the study area. The high density of the anomalies along the ponds and in the southern portion of the site may indicate that the waste material observed along the pond shoreline may extend beneath the study area. The anomalies along the northern edge are likely due to the fill material used for the construction of Atkins Road (TtNUS, 1999a).

2.6.2 Feasibility Study Field Investigation

FS field activities conducted at Site 12 included test pit excavation and wetlands delineation. The findings of the test pit excavation and wetlands delineation activities, as provided in the FS (TtNUS, 2001) are presented below.

2.6.2.1 Test Pit Installation

Thirteen test pits (S12TP001, S12TP003, S12TP007, S12TP009, S12TP010, S12TP011, and S12TP013 through S12TP019) were excavated as part of the FS field investigation to better define the boundary of the landfill. The FS field investigation work plan (TtNUS, 1999b) proposed the installation of 19 test pits; however, not all of the proposed test pits were excavated due to the methodology used and logic applied during test pit excavation activities (see below). The Site 12 test pit locations (installed and not installed), along with the proposed extent of the landfill, are shown on Figure 2-1. Table 2-2 provides a summary of the test pit excavations, including type of waste encountered, depth, and cover thickness. The test pits were excavated using a rubber-tired backhoe. Each test pit location was visually inspected for the presence of unexploded ordnance (UXO) prior to and during the excavation activities. If no landfill material was encountered in a test pit, the excavation was terminated at approximately 10 to 11 feet bgs and backfilled. When landfill material was encountered in a test pit, excavation of the test pit was terminated, and the test pit was backfilled with the excavated material before moving to the next test pit location. All test pits were photographed, and the location of each test pit was staked in the field and surveyed by a licensed land surveyor. Test pit logs are provided in Appendix B.

The excavation depths ranged from approximately 3 to 11 feet bgs and the lengths varied from approximately 15 to 28 feet. The typical length of a test pit was approximately 15 feet. However, in some

instances, the test pit excavation was extended to better define the lateral extent of the landfill. The width of each test pit was approximately 3 feet.

Landfill material was encountered in eight (S12TP001, S12TP003, S12TP007, S12TP010, S12TP011, S12TP013, S12TP014, and S12TP018) of the 13 excavated test pits. The landfill material was encountered just below the ground surface in test pit S12TP003 and as deep as 8 feet bgs in test pit S12TP010. Generally, the depth to the landfill material ranged from approximately 1 to 2 feet bgs. The cover consisted mostly of brown silt and sand topsoil with plant roots. The landfill material generally consisted of concrete, wood logs (cut), charred wood, and metal debris and, in some areas, included demolished steel drums and tar shingles. The test pit excavation methodology and test pit findings for each test pit are presented below.

- Test Pit S12TP001: The geophysical anomaly recorded in this area during the magnetometer survey may be related to both utilities and landfill material in the area. Test pit S12TP001 was installed at the proposed location based on field observations. Abundant landfill material was found within the subsurface soils in test pit S12TP001. The water table was encountered at 3 feet bgs. The landfill material extended below the water table, becoming very loose. The landfill material extended to the southern and northern ends of the test pit. The test pit excavation was limited to the north by the presence of utilities along Atkins Road. The landfill material consisted of concrete, wood logs (cut), charred wood, and trace metal debris.

- Test Pit S12TP017: Test pit S12TP017 was installed in the northeastern corner of Site 12. No landfill material was found. Therefore, test pit S12TP018 was installed 60 feet to the southwest.

- Test Pit S12TP018: Test pit S12TP018 was installed at the proposed location 60 feet southwest of test pit S12TP017. Landfill material was encountered and diminished at the northern end of the pit, marking the northeastern limit of the landfill. Therefore, test pits S12TP004 and S12TP005 were not installed.

- Test Pit S12TP003: Test pit S12TP003 was installed at the proposed location, approximately 80 feet southeast of test pit S12TP001. Landfill material was encountered, marking the north-central limit of the landfill. Therefore, proposed test pit S12TP002 was not installed. Test pit S12TP006 was not installed because of the abundant landfill material encountered in test pits S12TP001 and S12TP003. The geophysical anomaly recorded in the area of the proposed test pit S12TP006 is likely due to landfill material, based on the test pit findings at test pits S12TP001 and S12TP003.

- Test Pit S12TP007: Test pit S12TP007 was installed at the proposed location in the central portion of the landfill. Abundant landfill material was encountered to approximately 3 feet bgs at the northeastern end of the test pit and approximately 8 feet bgs at the southwestern end. The landfill material was underlain by silt and sand, which were probably reworked natural material. The landfill material consisted of finished wood fragments, glass, metal, terra cotta, and concrete. Test pit S12TP007 marks the northeastern extent of the landfill in the central portion of Site 12. Therefore, proposed test pit S12TP008 was not installed.

- Test Pit S12TP009: Test pit S12TP009 was installed at the proposed location along the eastern edge in the central portion of the landfill. No landfill material was encountered, thereby limiting the eastern extent of the landfill farther west.

- Test Pit S12TP010: Test pit S12TP010 encountered trace amounts of landfill material, beginning at approximately 8 feet bgs. The landfill does not extent beyond Atkins Road, east of test pit S12TP10, as suggested by the road cut into the hill east of the intersection of Atkins Road Extension and Atkins Road. Aerial photographs also indicate that the landfill does not extend east beyond Atkins Road in this area.

- Test Pit S12TP011: Test pit S12TP011 was installed at the proposed location northwest of test pit S12TP010. Abundant landfill material was encountered within the subsurface soil, suggesting that the landfill material extends southwest beneath Atkins Road Extension. Test pit S12TP012 was not installed because landfill material was encountered at test pit S12TP011 and well boring S12WP02.

- Test Pit S12TP013: Test pit S12TP013 was installed at the proposed location south of Atkins Road Extension. Abundant landfill material was encountered within the subsurface soil, suggesting that the landfill material extends northeast beneath Atkins Road Extension.

- Test Pit S12TP014: S12TP014 was installed at the proposed location southeast of test pit S12TP013 to determine the thickness of existing cover in the southern portion of the landfill. The topsoil is approximately 1.0 to 1.5 feet thick at test pit S12TP014.

- Test Pit S12TP016: Test pit S12TP016 was installed at the proposed location northwest of S12TP013. No landfill material was encountered, suggesting that the landfill extends no farther northwest than the southern side of the metal culvert.

- Test Pit S12TP015: Test pit S12TP015 was installed approximately 30 feet northeast of its proposed location. The test pit was relocated because the southeastern boundary in the southern portion of the

landfill was identified in the drainage ditch to the southeast. The toe of the landfill is exposed on the northern bank of the drainage ditch. No landfill material was encountered in test pit S12TP015, marking the northeastern extent of the landfill along the drainage ditch southwest of Atkins Road Extension. However, a concrete slab was found at approximately 4 feet bgs on the east wall of the test pit, extending the length of the excavation. The slab may be a relic of the old road surface.

- Test Pit S12TP019: An additional test pit was excavated approximately 75 feet northeast of test pit S12TP007 to determine the northeastern extent of the landfill along the pond in the central portion of the landfill. No landfill material was encountered; therefore, test pits S12TP007 and S12WP01 marked the northeastern boundary of the landfill.

2.6.2.2 Wetlands Delineation

Wetlands were delineated as part of the FS field investigation at Site 12 during the September 1999 field activities. The extent of the wetlands is illustrated on Figure 2-1. This wetlands delineation identifies 1.06 acres of wetlands within the limits of investigation. The wetlands delineation report is provided in Appendix C.

2.7 NATURE AND EXTENT OF CONTAMINATION

Based on the results of the geophysical survey, soil borings, and test pits, the landfill covers an area of approximately 4 acres. Landfilled material was encountered just below the ground surface at one location and as deep as 8 feet bgs at another location. Generally, the depth to the landfill material ranged from approximately 1 to 2 feet bgs. The FS estimated that the volume of landfilled waste is approximately 70,000 cy. No hazardous wastes, as defined by the Resource Conservation and Recovery Act (RCRA), were identified.

A complete summary of surface soil, subsurface soil, groundwater, surface water, and sediment analytical results is provided in the RI Report (TtNUS, 1999a). Positive detections for surface soil, groundwater, surface water, and sediment are presented on Figures 2-7, 2-8, 2-9, and 2-10 of the RI report. A summary of the nature and extent of contamination at Site 12, as presented in the RI Report, is as follows:

- With the exception of two pesticides detected at relatively low concentrations [endosulfan II and heptachlor epoxide at concentrations ranging from 0.001 microgram per liter (µg/L) to 0.006 µg/L] and a few metals detected at concentrations exceeding ambient water quality criteria (arsenic, iron, manganese, and mercury), the surface water analytical results suggest that activities at Site 12 have had minimal impact on Site 12 surface water quality.

- Vinyl chloride and cis-1,2-dichloroethene were detected at concentrations of 317 µg/L and 306 µg/L, respectively, in the groundwater sample collected from monitoring well S12WP01. With these exceptions, volatile organic compounds (VOCs) were detected infrequently and, in general, at low concentrations in all Site 12 samples, regardless of matrix.

- Several semivolatile organic compounds (SVOCs), primarily polynuclear aromatic hydrocarbons (PAHs), were detected in Site 12 surface soil samples. The same list of SVOCs that was detected in surface soil samples was also detected in Site 12 sediment samples. However, maximum concentrations of SVOCs detected in Site 12 sediment samples were generally from 10 to 20 times greater than maximum concentrations of SVOCs detected in Site 12 surface soil samples. With the exception of bis(2-ethylhexyl) phthalate, the maximum concentrations of all the SVOCs detected in surface soil samples were associated with the surface soil sample collected from location S12SS01, located south of the northern pond. The maximum concentrations of all SVOCs except bis(2-ethylhexyl) phthalate detected in sediment samples were associated with the sediment sample collected from location SW/SD06, located in the northern portion of Site 12. SVOCs were detected infrequently and at low concentrations (ranging from 2 µg/L to 17 µg/L) in Site 12 groundwater samples.

- One pesticide, 4,4'-DDT, and its degradation products were detected in most or all the Site 12 surface soil and sediment samples. Concentrations of these three pesticides in surface soil samples ranged from 0.93 microgram per kilogram (µg/kg) to 21 µg/kg, and concentrations of these pesticides in sediment samples ranged from 1.5 µg/kg to 53 µg/kg. A few additional pesticides were sporadically detected in Site 12 surface soil and sediment samples. In addition, one polychlorinated biphenyl (PCB) (Aroclor 1254) was detected in a single surface soil sample, and Aroclor 1260 was detected in a single sediment sample. 4,4'-DDT and its derivatives were not detected in any of the Site 12 groundwater samples. However, four other pesticides were detected (each in only a single sample) at low concentrations (ranging from 0.002 µg/L to 0.005 µg/L) in Site 12 groundwater samples.

- One explosive, nitrocellulose, was detected in a single Site 12 surface soil sample (46,200 µg/kg). Nitrocellulose was also detected in four of six Site 12 sediment samples, at concentrations ranging from 26,700 µg/kg to 471,000 µg/kg. No other explosives were detected in Site 12 surface soil or sediment samples.

- Several metal concentrations exceed basewide background concentrations for surface soil (arsenic, barium, cadmium, calcium, chromium, copper, cyanide, magnesium, mercury, selenium, silver, and

zinc), groundwater (arsenic, barium, cadmium, copper, iron, lead, magnesium, mercury, sodium, and zinc), and sediments (antimony, cadmium, mercury, and silver).

Chemicals of concern (COCs) have been identified based on the analytical data, risk drivers from the human health and ecological risk assessments, and exceedances of regulatory standards and criteria. The COCs for soil based on protection of human health for the hypothetical future resident are arsenic and iron. The concentrations of arsenic and iron were similar in all soil samples. No COCs were identified for the other human receptor scenarios evaluated. Additional soil COCs based on protection of ecological receptors are PCB (Aroclor 1254), mercury, and silver. Aroclor 1254 was only detected in one sample (S12SS05). This sample also had the highest concentrations of mercury and silver. Additional chemicals that were detected in soil but did not result in unacceptable risks include PAHs, pesticides, and other metals. The concentrations of the soil COCs and the soil sampling locations are presented in the FS. None of the soil concentrations exceeded USEPA screening levels for migration of soil contaminants to groundwater.

The COCs for shallow water-table, based on protection of human health (hypothetical future resident), are cis-1,2-dichloroethene, vinyl chloride, arsenic, iron, and manganese. No groundwater COCs were identified for the other human receptor scenarios evaluated. Additional COCs for shallow water-table, based on exceedances of federal and state maximum contaminant levels (MCLs), are trichloroethene and lead. There is no discernible plume of the organic COCs evident from the data. The organic COCs were only detected at one location (S12PW01). Additional chemicals that were infrequently detected in shallow water-table but did not result in unacceptable risks include PAHs, pesticides, and other metals. The concentrations and locations of the groundwater COCs are presented in the FS.

No COCs have been identified for surface water or sediment.

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TABLE 2-1

SUMMARY OF SHALLOW WATER-TABLE LEVEL MEASUREMENTS
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Monitoring Well	Elevation of Measuring Point (ft above msl)	Depth to Shallow Water-Table (Jan. 1998) (ft)	Shallow Water-Table Elevation (Jan. 1998) (ft above msl)
12WP01	8.41	3.37	5.04
12WP02	8.63	3.62	5.01
12WP03	8.37	3.32	5.05
12WP04	8.12	3.09	5.03
12WP05	12.11	7.09	5.02
12WP06	8.05	2.84	5.21

Notes:
1 See Figure 2-1 for monitoring well locations.
2 Information obtained from Table 4-2 of RI Report (TtNUS, 1999).

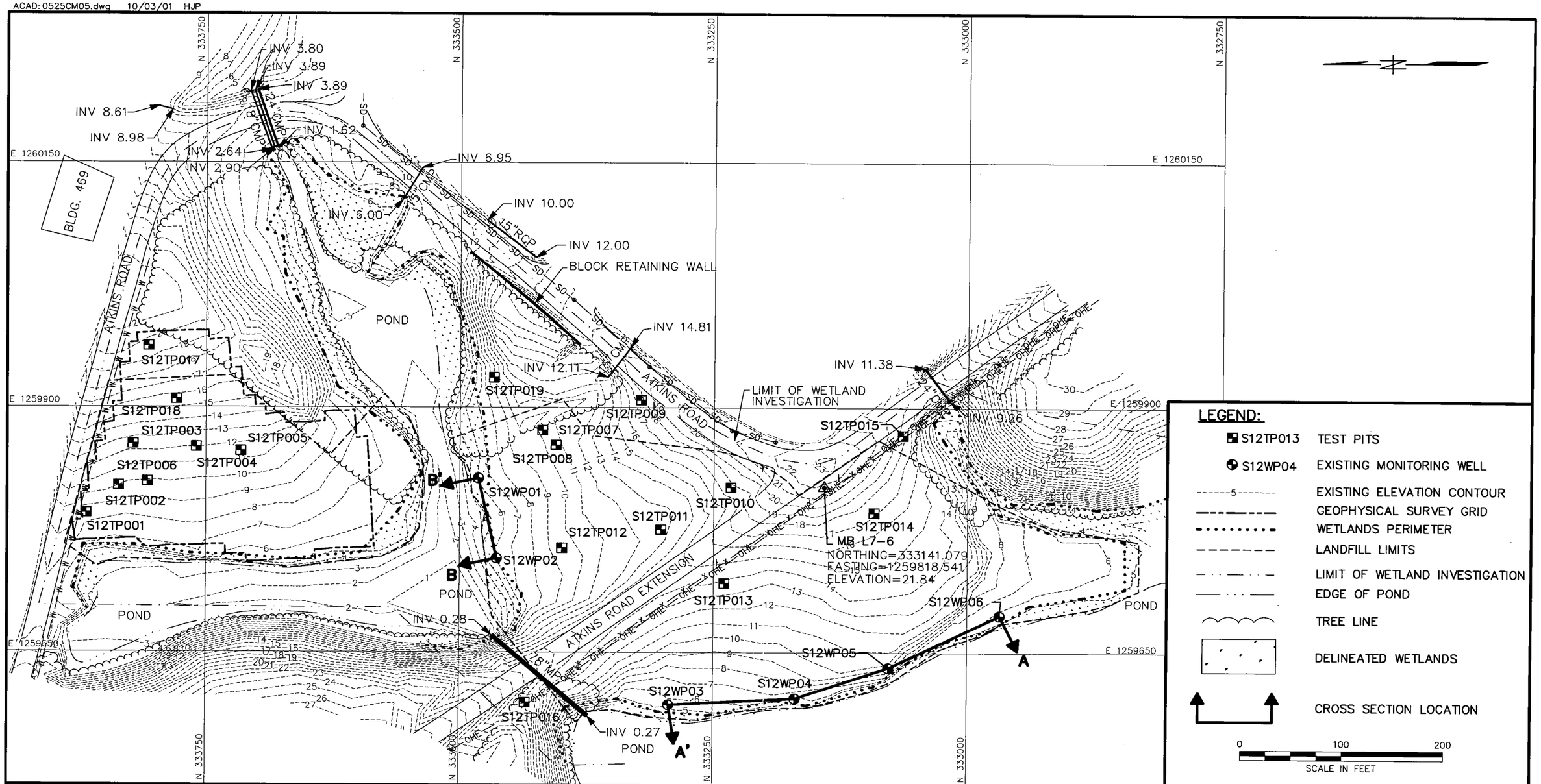
msl - mean sea level (National Geodetic Vertical Datum, 1929)

TABLE 2-2

TEST PIT SUMMARY
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

TEST PIT	LANDFILL MATERIAL FOUND	NO LANDFILL MATERIAL FOUND	NOT INSTALLED	COMMENTS	TEST PIT DEPTH (feet)	EXISTING LANDFILL COVER THICKNESS (feet)
S12TP01	X			Wood (some charred), Concrete, Metal debris	3	2
S12TP02			X			
S12TP03	X			Wood (some charred), Concrete, Metal debris	8	0.5
S12TP04			X			
S12TP05			X			
S12TP06			X			
S12TP07	X			Wood fragments, Glass, Conduit, Plastic, Aluminum gutters	10	1
S12TP08			X			
S12TP09		X			10	
S12TP10	X				12	8
S12TP11	X			Wood (charred), Metal, Plastic	5	1.5
S12TP12			X			
S12TP13	X			Wood (charred), Tar Shingles, Terra Cotta, Metal debris, Concrete fragments	4	1
S12TP14	X			Wood (charred), Metal	3	1.5
S12TP15		X			10	
S12TP16		X			10	
S12TP17		X			8	
S12TP18	X			Wood fragments, Plastic, Wire, Bottles	5	1 to 3
S12TP19		X			10	

ACAD: 0525CM05.dwg 10/03/01 HJP



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/12/01
CHECKED BY DATE 10/4/01
COST/SCHED-AREA
SCALE AS NOTED

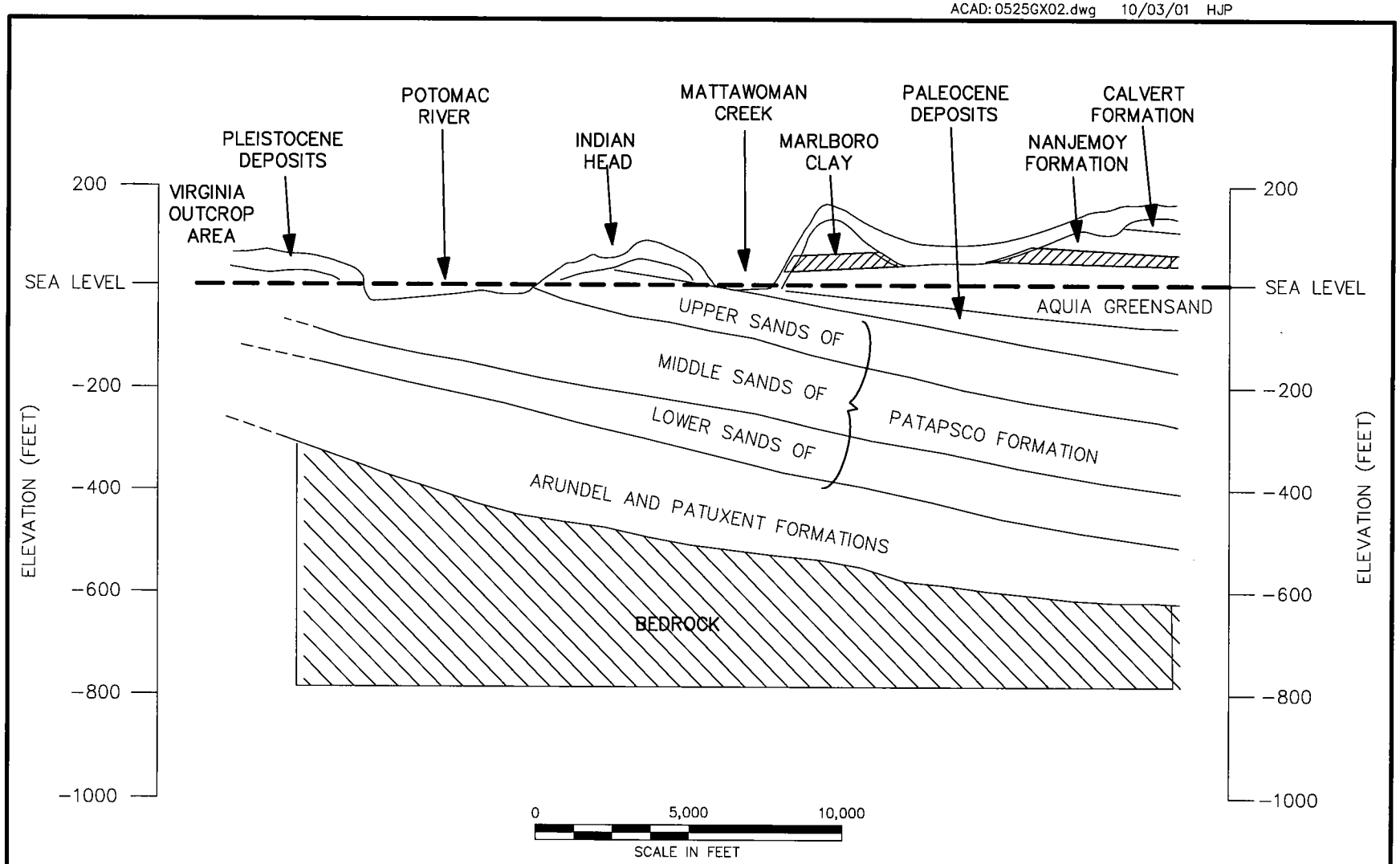
Tetra Tech NUS, Inc.

SITE LAYOUT
SITE 12 – TOWN GUT LANDFILL
INDIV–NSWC, INDIAN HEAD, MARYLAND

CONTRACT NO. 0525
OWNER NO. 0325
APPROVED BY
DATE 10/4/01
APPROVED BY
DATE
DRAWING NO. FIGURE 2–1
REV. 0

FORM CADD NO. TtNUS_BH.DGN – REV 0 – 1/20/98

ACAD: 0525GX02.dwg 10/03/01 HJP



DRAWN BY HJP DATE 4/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 0525	OWNER NO. 0325
CHECKED BY DATE 10/4/01	GENERALIZED CROSS SECTION OF THE REGION SITE 12 – TOWN GUT LANDFILL IHDIV–NSWC, INDIAN HEAD, MARYLAND	APPROVED BY	DATE 10/4/01
COST/SCHED–AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 2–2	REV. 0

FORM CADD NO. T+NUS_AH.DWG – REV 0 – 1/22/98

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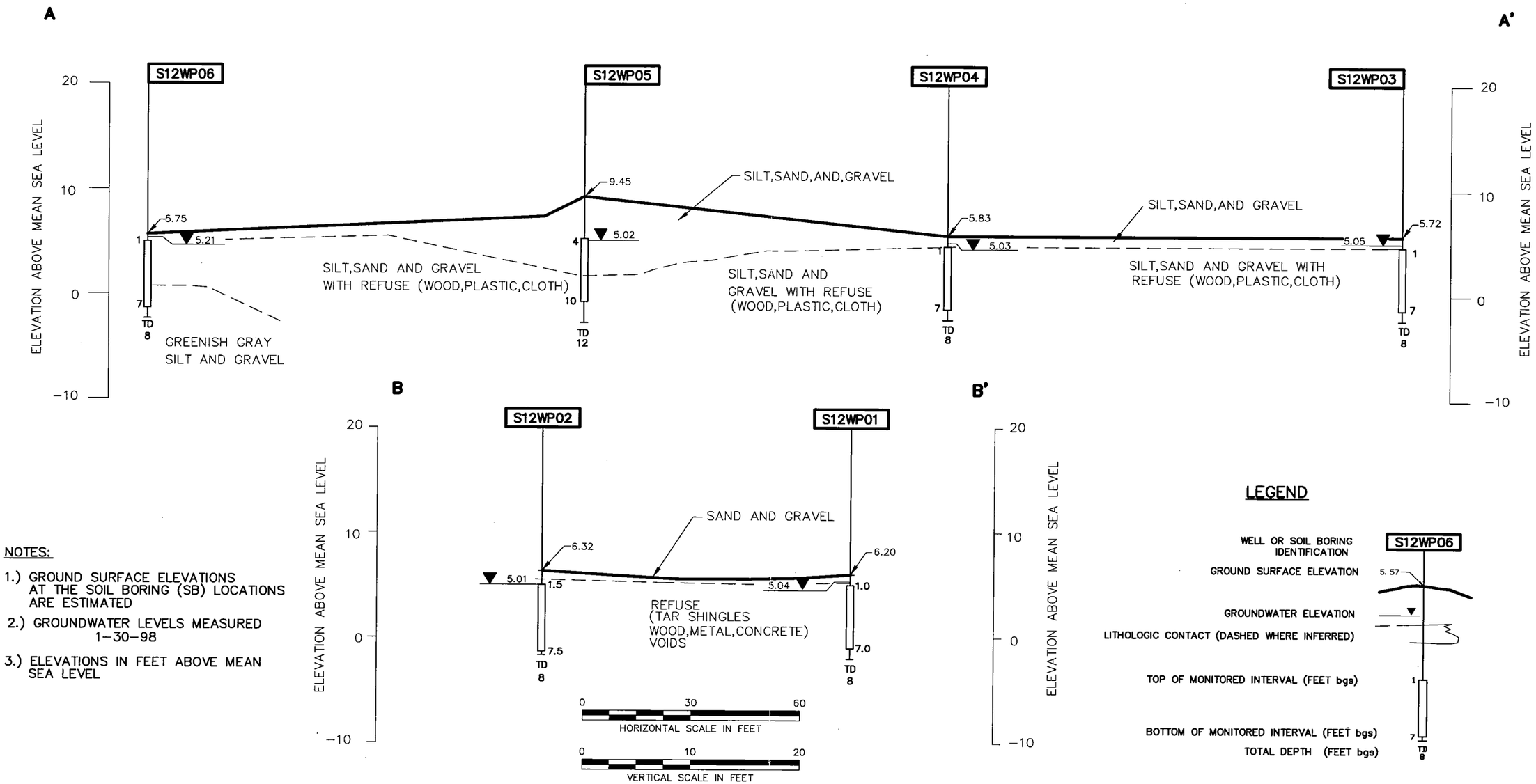


NOTES:

1.) GROUND SURFACE ELEVATIONS AT THE SOIL BORING (SB) LOCATIONS ARE ESTIMATED

2.) GROUNDWATER LEVELS MEASURED 1-30-98

3.) ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/12/01
CHECKED BY DATE 10/4/01
COST/SCHED-AREA
SCALE AS NOTED

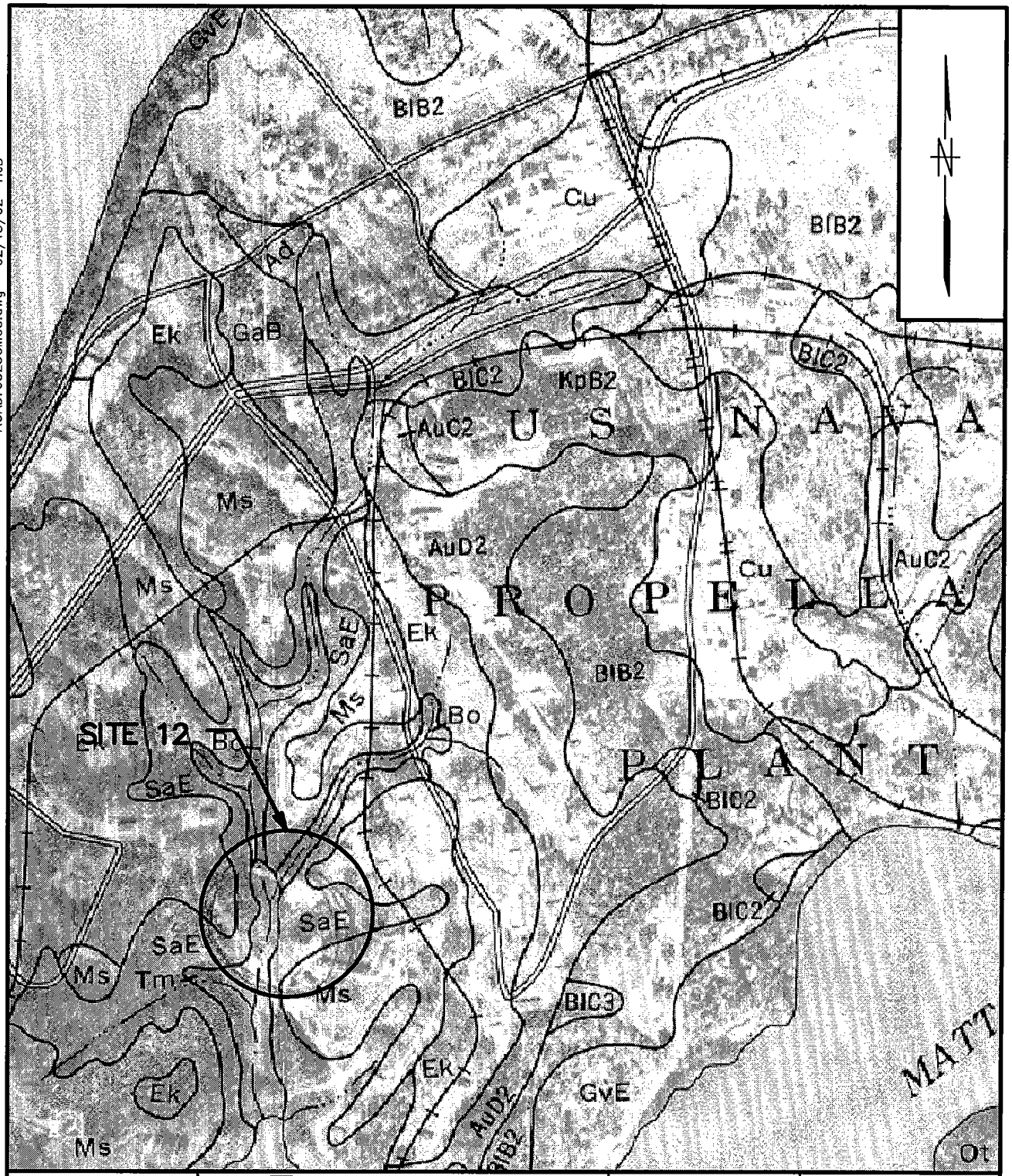
Tetra Tech NUS, Inc.

CROSS SECTIONS A-A' AND B-B'
SITE 12-TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CONTRACT NO. 0525
OWNER NO. 0325
APPROVED BY
DATE 10/4/01
APPROVED BY
DATE
DRAWING NO. FIGURE 2-3
REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

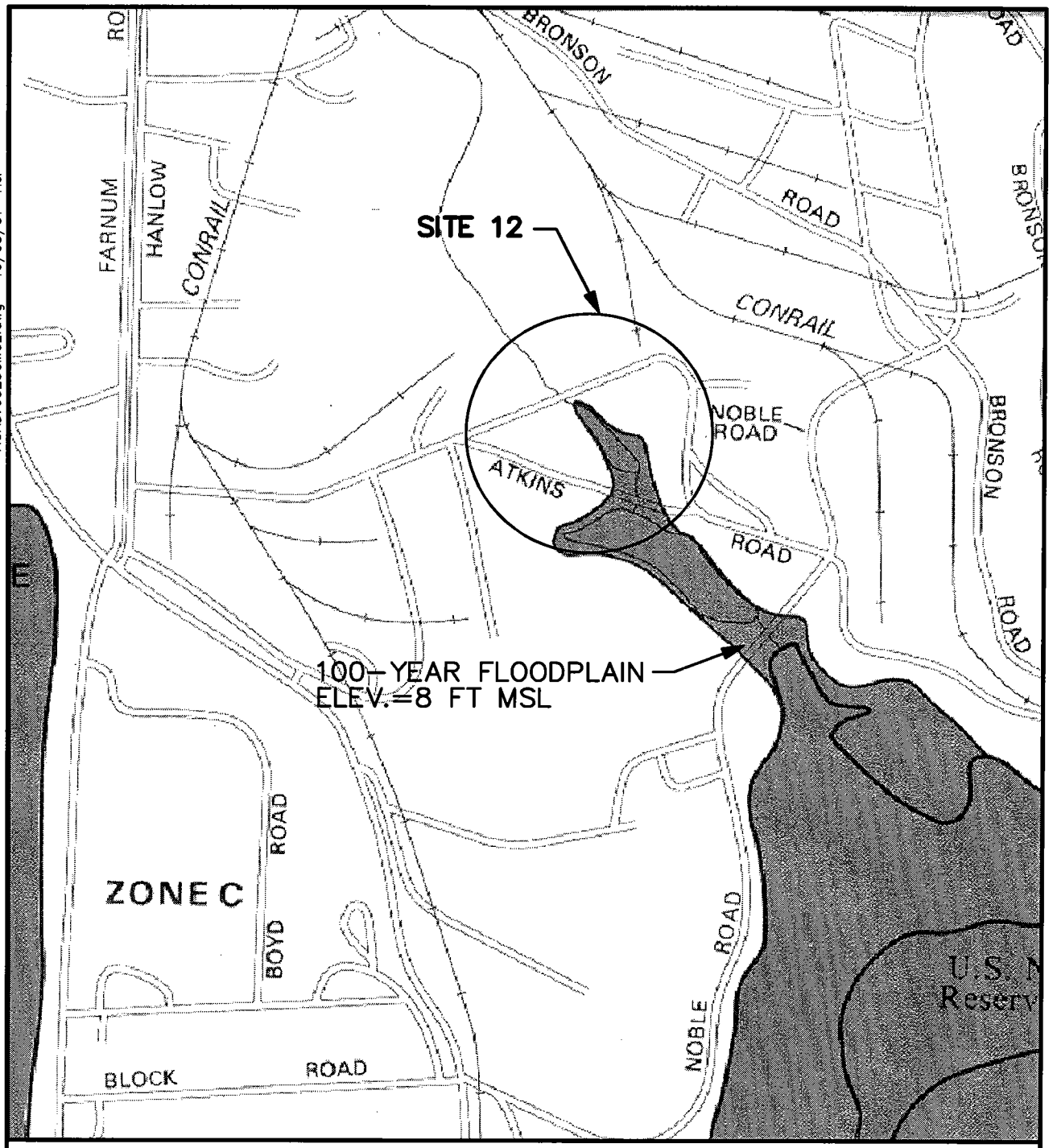
ACAD: 0525GM03.dwg 02/13/02 HJB



DRAWN BY HJP DATE 4/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 0525	OWNER NO. 0325
CHECKED BY TWJ DATE 2/13/02	SOILS MAP SITE 12 – TOWN GUT LANDFILL INDIV–NSWC, INDIAN HEAD, MARYLAND	APPROVED BY DATE 2/14/02	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE NOT TO SCALE		DRAWING NO. FIGURE 2–4	REV. 0

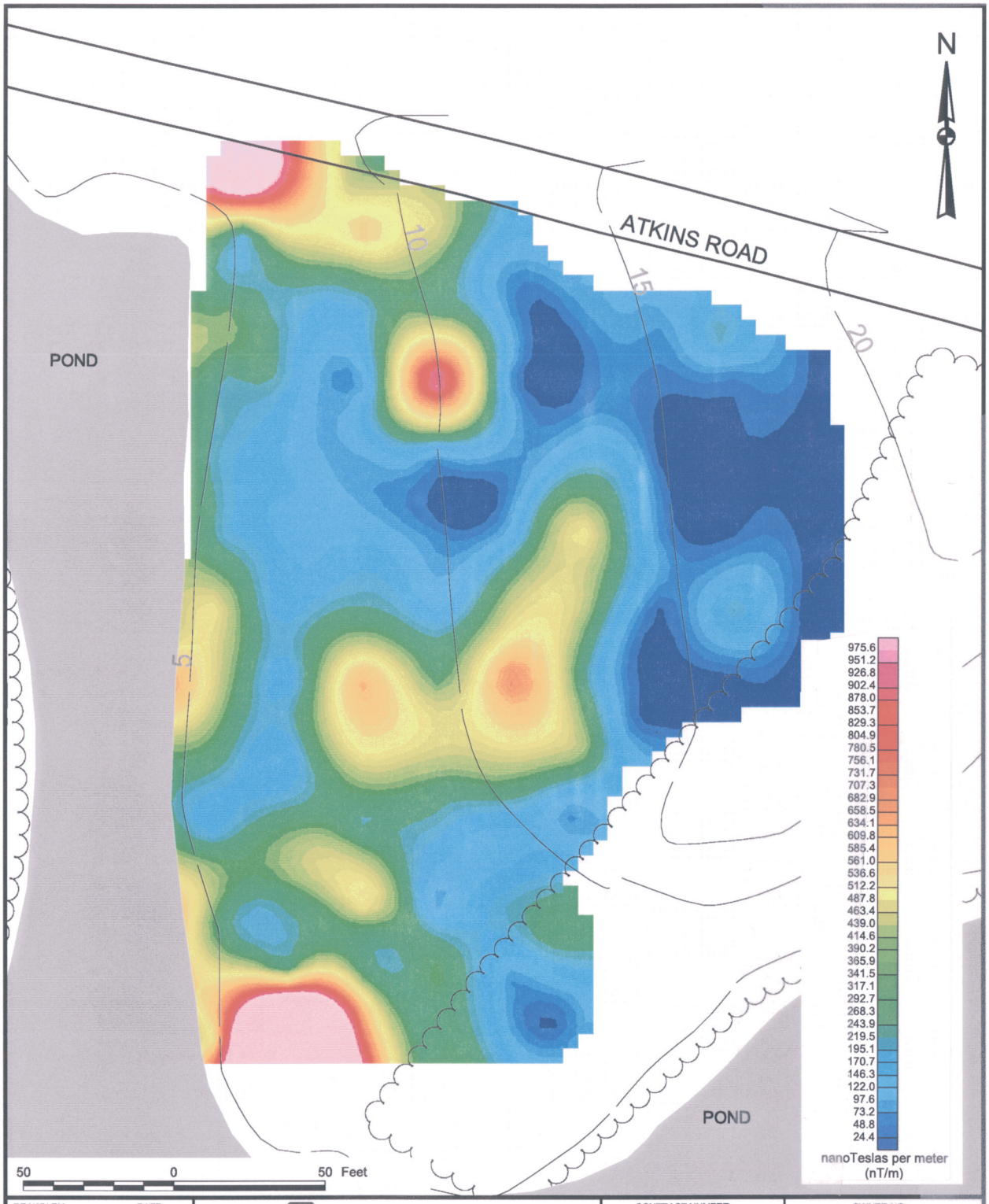
FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98

ACAD: 0525GM02.dwg 10/03/01 HJP



DRAWN BY HJP DATE 4/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 0525	OWNER NO. 0325
CHECKED BY TMS DATE 10/4/01	FLOOD INSURANCE RATE MAP SITE 12 – TOWN GUT LANDFILL IHDIV–NSWC, INDIAN HEAD, MARYLAND	APPROVED BY DATE 10/4/01	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE NOT TO SCALE		DRAWING NO. FIGURE 2–5	REV. 0

FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98



DRAWN BY	DATE	Tetra Tech NUS, Inc.	CONTRACT NUMBER	OWNER NO.
D. PERRY	15-MAY-98		0525	0325
CHECKED BY	DATE	VERTICAL MAGNETIC GRADIENT RESULTS SITE 12 - TOWN GUT LANDFILL IHDIV-NSWC, INDIAN HEAD, MARYLAND	APPROVED BY	DATE 10/4/01
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-6	REV 0

P:\GIS\INDIANHD\7129.APR 15-MAY-98 DNP SITE 12 - VERTICAL MAGNETIC GRADIENT RESULTS LAYOUT

3.0 DESIGN REQUIREMENTS

3.1 DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for Site 12 - Town Gut Landfill as identified in the ROD, includes soil cover, land use controls, and monitoring. The selected remedy meets the remedial action objectives (RAOs), provides adequate protection of human health and the environment, and attains ARARs in the most cost-effective manner of all the alternatives evaluated in the FS. The selected remedy consists of removing exposed waste, placing sufficient soil to ensure a minimum 2 feet thick soil cover (including 6 inches of topsoil) over the existing waste material landfill, planting vegetation, and implementing land use controls, monitoring, and maintenance programs. The soil cover will eliminate direct contact by ecological and human receptors with contaminated surface soil and landfilled materials, and reduce potential transport of surface soil contaminants to the adjacent ponds via stormwater runoff. The vegetative layer installed to prevent or discourage animals from burrowing into the landfill will also reduce risks to ecological receptors. Land use controls will be implemented to prohibit residential development or use of contaminated groundwater.

The RAOs for the remedial action are as follows:

- Prevent future residential exposure to soil and groundwater contaminants.
- Remove the potential for direct contact between receptors and surface soil contaminants.
- Close the landfill in a manner that protects human health and the environment and controls air, water, and land pollution.

The major components of the selected remedy, consistent with the ROD, are as follows:

Waste Removal

Excavation of material along the pond shorelines is necessary at the toe of the soil cover to allow a smooth transition from the covered landfill to the wetlands and the ponds. In addition, some waste and debris are present in the pond and in the wetland areas adjacent to the landfill.

To preserve the existing shoreline, landfilled materials near the edge of the ponds not currently covered with at least 2 feet of soil will be removed to a depth of at least 2 feet. The average width of the excavation was estimated to be 5 feet along the length of the shorelines. The excavation will be backfilled with clean select fill and topsoil.

Wetlands along the edge of the proposed soil cover within the landfill area will be removed to a depth of 2 feet. The area of wetlands that will be disturbed is estimated to be 0.43 acre. Large items of exposed waste and debris along the edges of the ponds will be excavated and disposed off site. Soil, sediment, and small objects will be excavated and consolidated on-site. Disturbed wetlands will be backfilled with clean select fill and topsoil and revegetated to replace the wetland.

Earthwork activities will include screening for UXO in accordance with NAVSEA Instruction 8023.11, Standard Operating Procedures for the Manufacture, Handling, and Storage of Expandable Ordnance at Navy and Marine Corps Activities (NAVSEA, 1991).

Erosion controls, such as a turbidity curtain, will be needed to minimize the potential for downstream migration of contaminants during activities in the wetlands or near the pond shorelines.

Some of the excavated soil, sediment, and landfilled material will be dewatered prior to off-site disposal. Excavated materials that contain free liquids will be placed on a materials handling pad and allowed to dewater naturally (i.e. free liquids will be allowed to either runoff to the ponds or infiltrate to the groundwater). It is anticipated that all excavated materials will be disposed at a nonhazardous waste landfill.

Soil Cover

Covering the landfill will be a containment action. The purpose of the soil cover is to eliminate or reduce the possibility of exposure to receptors, eliminate physical hazards, reduce erosion, and improve aesthetics. Although there is currently a soil cover over the landfill, the FS field investigation indicated that the existing cover does not have a thickness of 2 feet or more over the entire landfill. In accordance with regulations on final soil covers for landfills, clean select fill and topsoil will be added to the existing cover where necessary to achieve the regulatory requirement of a 2-feet cover over the existing waste.

Based on the RI and the FS field investigations, it is estimated that approximately 50 percent of the landfill does not have sufficient cover. The cover will consist of up to 18 inches of clean select fill and 6 inches of topsoil. Areas of the landfill that already have sufficient soil cover will be tilled. The entire landfill surface (4.3 acres) will then be graded and revegetated with grass or other type of vegetation that will discourage animals from burrowing into the landfill.

Maintenance of the soil cover and vegetation will be required. The grass, or other vegetation, will not be mowed short. Many burrowing animals prefer a habitat with relatively short vegetation so that they can look for predators from the entrance to their burrows. It is anticipated that allowing the vegetation to grow

will discourage burrowing animals from inhabiting the site. In addition, the thickness of the soil cover will also decrease the possibility of animals contacting contaminated soil and landfilled materials.

Land Use Controls

Land use controls will include land and groundwater use restrictions to eliminate or reduce exposure pathways and prevent activities that could damage the soil cover. Land use controls will consist of the Navy maintaining records of the existence of contamination at Site 12 in the Base Master Plan and designating the site as a restricted or limited-use area. The information in the Base Master Plan will be used so that the Navy can take adequate measures to minimize adverse human health and environmental effects at the time of any future land development. The land use controls include the following:

- No residential use.
- No use of groundwater as a potable water supply.
- Other groundwater uses require Navy approval.
- After construction of the landfill cover, prior approval of any activities that may disturb the cover must be authorized by the Navy prior to said disturbance.

The Navy, USEPA, and Maryland Department of the Environment (MDE) are developing a facility-wide Land Use Control Assurance Plan (LUCAP) for IHDIV-NSWC, as well as a Land Use Control Implementation Plan (LUCIP) specific to Site 12 to implement these restrictions. USEPA and MDE will properly notified of proposed future construction plans at Site 12 prior to commencement of any construction activities.

The Navy will develop and maintain a plan to ensure these restrictions will be implemented. Details on the land use controls will need to be developed and concurred with by USEPA and MDE.

Long-Term Monitoring

The FS assumed that monitoring of groundwater and surface water would be conducted to confirm that migration of contaminants from the site is not occurring and to evaluate the need for future actions. For FS costing purposes, periodic sampling would include collection of groundwater samples from the six monitoring well locations and surface water samples from six locations. It was also assumed that samples would be collected on an annual basis and analyzed for the contaminants of concern [target compound list (TCL) VOCs and target analyte list (TAL) metals]. The existing groundwater monitoring wells will be abandoned and new groundwater monitoring wells installed. A long-term monitoring plan will

need to be developed with USEPA and MDE concurrence to detail the frequency, media type, analysis, and locations of the long-term monitoring program.

Site Review

Within 5 years, a site review will be conducted to evaluate the site status and determine whether further action is necessary. The site review will be required because the selected remedy will allow contaminants to remain at concentrations exceeding those suitable for unlimited use and unrestricted exposure.

Remedy Modifications

The components of the selected remedy that will be modified as part of the remedial action design are as follows:

- The Proposed Plan for Site 12, at IHDIV-NSWC, Indian Head, Maryland was released for public comment in January 2001. The Proposed Plan identified Alternative 2, Soil Cover with Land Use Controls and Monitoring, as the preferred alternative. After the public comment period, IHDIV-NSWC Safety Department identified the possibility that Site 12 soil may contain objects with explosive residue. Therefore, because of safety concerns, the Navy, USEPA, and MDE decided that soil, sediment, and small objects removed from near the shore line of the ponds would be consolidated on site, as identified in Alternative 3, instead of being disposed off site. Large excavated objects would still be disposed off site.

- Erosion and sediment control features used during waste removal will consist of conveyance channels, silt fence, super silt fence, and rock check dams. The section “Waste Removal” above suggests that erosion controls, such as a turbidity curtain, will be needed to minimize the potential for downstream migration of contaminants during activities in the wetlands or near the pond shorelines. It is judged that a turbidity curtain is not required because the pond water surface elevations can be lowered to allow placement of the super silt fence outside the limit of waste.

- The excavated soil, sediment, and waste material that contains free liquids will be placed on a materials handling pad(s) located within the soil cover limits and allowed to dewater naturally (i.e., free liquids will be allowed to either runoff to the ponds or infiltrate to the shallow water table). It is anticipated that all large items of waste and debris will be disposed at a nonhazardous waste landfill.

- The remedial action design reflects placing an additional two feet of soil cover over the entire landfill. The section "Soil Cover" above states that soil will be added to the existing cover where needed to establish a total of two feet of soil cover over the landfill.

- In order to establish a 2-foot soil cover over the entire landfill while providing adequate space beneath the soil cover for regrading excavated soil, sediment, and waste, Atkins Road Extension will be elevated. Elevating Atkins Road Extension will eliminate the need for drainage channels and culverts to convey flow from the edges of the road across the closed landfill to the surrounding ponds. The material used to elevate Atkins Road Extension will be certified clean common fill.

3.2 PERFORMANCE STANDARDS

The selected remedy will manage residuals, achieve all RAOs, and meet all ARARs and TBCs for the site. Specific performance standards are as follows:

Soil Removal

All soil, sediment, and waste excavated from the pond shorelines will be placed beneath the soil cover.

In addition to the performance standards for the remedy stated in the ROD, sediments removed from the erosion and sediment control devices through general maintenance during the excavation of pond shoreline materials and grading of existing cover soil and waste will be placed beneath the soil cover, along with the excavated pond shoreline soil, sediment, and waste. Sediment removed from erosion and sediment control devices after placement of the clean select fill will be incorporated into the soil cover.

Soil Cover

The soil cover will be designed, constructed, operated, and maintained to meet the performance requirements of RCRA Subtitle D regulations specified in 40 Code of Federal Regulations (CFR) § 258.60-61 and Maryland Regulations for Solid Waste Management Code of Maryland Regulations (COMAR) 26.04.07.

Disposal

Large items of waste and debris excavated from the pond shorelines will be stockpiled and tested for Toxicity Characteristics Leaching Procedure (TCLP) characteristic waste before transport for off-site disposal.

Erosion and Sedimentation Control

Before excavation, erosion and sediment controls will be established to prevent impacts to downgradient areas of the site. During excavation, grading, and backfilling activities, and until vegetation is established, the erosion and sediment controls will be regularly inspected and maintained. Erosion and sediment control regulations to be complied with during remedial activities include Maryland Water Pollution Permit Regulations (COMAR 26.08.04) and Maryland Water Management Regulations (COMAR 26.17.01 and 26.17.02).

Wetlands Restoration

Wetlands that are disturbed will be reestablished with wetland species of plants and shrubs that are similar to those currently existing at the site. The wetlands restoration at the site will be conducted in accordance with the applicable portions of Erosion and Sediment Control Regulations, Federal Protection of Wetlands and Floodplains (E.O. 11990 and 11998), Maryland Regulations on Construction on Nontidal Waters and Floodplains (COMAR 26.17.04), Maryland Nontidal Wetlands Regulations (COMAR 26.23), and relevant portions of the Clean Water Act (Sections 404 and 401).

3.3 MATERIAL/SOILS MANAGEMENT

This remedial action is intended to provide a soil cover over the landfill. Material and soils management include excavation of soil, sediment, and waste material from the pond shorelines, regrading of existing cover soils up slope of the pond shorelines, installation of a two foot thick soil cover, installation of conveyance channels, elevating Atkins Road Extension, management of material resulting from installation of sediment, and erosion control features, wetlands restoration, and decontamination pad.

The existing landfill limits presented on Drawing C-1 were determined based on test pitting performed during the FS field investigation (refer to Section 2.6.2) and the location of the pond shorelines during the topographic survey. The pond shorelines (water elevation) vary due to precipitation, the time of year, conditions in downstream features, and elevation of the weir located at the discharge of the western pond. The soil cover will extend to the landfill limits as indicated on Drawing C-7. Large items of waste and debris exposed in the ponds during construction will be removed and disposed off-site. Soil, sediment, and waste material excavated during pond shoreline excavation activities will be placed beneath the soil cover. In addition, the soil cover limits may extend beyond the landfill limits to promote surface water run-off.

Clearing and Grubbing

Clearing and grubbing will be performed within the landfill limits identified on Drawing C-2. Grubbed material from within the landfill limits will be placed beneath the soil cover. Clearing, grubbing, and topsoil stripping will be performed in the remaining area within the limits of disturbance but outside the landfill limits.

Clearing consists of the removal of above-ground vegetation within the limits of disturbance. Saleable timber will be removed from the site. The remaining cleared vegetation will be chipped and used as mulch for wetland restoration activities or placed within the landfill limits under the soil cover.

Grubbing consists of the removal of stumps and root systems. Grubbed material will be chipped and placed within the landfill limits under the soil cover.

Topsoil from outside the landfill limits will be stripped to a depth of approximately 6 inches and stockpiled for use during site restoration activities.

The total disturbed area is estimated to be 205,250 square feet (sf) (4.7 acres). A portion of this area, 5,000 sf (0.11 acres), is located outside the landfill limits, therefore, approximately 93 cy of clean topsoil will be excavated during stripping activities. This assumes 6-inches of topsoil exists in these areas.

Excavation and Regrading

Materials that will be excavated and disposed off-site include the following:

- Large items of waste and debris removed from the ponds. The presence of waste material in the ponds is unknown.

- Large items of waste and debris located beyond the pond shorelines excavation face (pond side), which is located outside the landfill limits. The visible waste material in this area will be removed and disposed off-site.

Select fill material will be placed in the areas excavated as described above to 0.5 foot below final grade (unless otherwise noted). Topsoil will be placed for the final 0.5 foot to establish the final grades indicated on Drawing C-7.

The regrading, select fill, and topsoil volumes were estimated based on the interim and final grades shown on Drawings C-6 and C-7. Several assumptions directly affecting excavation quantities are as follows:

- Landfill planar limits as shown on Drawing C-1.
- 4% minimum grade.
- 4H:1V maximum grade for aesthetics and creation of a slope that is as natural as possible.
- Grading of site and changing the elevation of Atkins Road Extension to provide adequate space beneath the soil cover for excavated soil, sediment, and waste while providing positive drainage.
- Graded existing cover soil and waste in place and compacted volumes are equal (e.g. compaction factor equals 1.0).

The cut and fill reports generated by Terramodel™ are presented in Appendix D.

The estimated regrading, excavation, and off-site disposal volumes are as follows:

Location	Area (sf)	Earthworks Volume (cy)
Pond Shorelines Excavation	18,730	1,350
Pond Waste	NA	TBD
Pond Shorelines Excavation Face	NA	TBD
E&S Features (pre-Select Fill)	NA	TBD
TOTAL OFF-SITE DISPOSAL	NA	TBD
Regraded Existing Cover Soil and Waste (cut)	189,082	3,900
Regraded Existing Cover Soil (fill)	189,082	3,780
Select Fill (soil cover)	189,082	10,110
Topsoil (soil cover)	189,082	3,370
Common Fill(1)	5,800	200
E&S Features (post-Common Fill)	NA	TBD
Wetlands Restoration(2)	NA	NA
Miscellaneous (decontamination pad solids, support area grubbing, etc.)	NA	TBD

NA – Not Applicable
TBD – To Be Determined (in the field)
1 Common fill is to be used to raise 275-feet of Atkins Road Extension (see Drawing C-9).
2 Wetlands restoration earthworks quantities are comprised of select fill (1,040 cy) and topsoil (350 cy) which are included in the line items “Select Fill” and “Topsoil” above.

As previously indicated, water resulting from the draining of soil, sediment, and waste will be allowed to infiltrate to the shallow water-table or run-off to the ponds. All decontamination water will be collected in a specifically designed, lined decontamination pad area and transported to an approved off-site treatment facility. All waters generated during excavation dewatering activities will be conveyed to a location with free draining soil within the limits of the landfill and allowed to infiltrate. All sediments will be removed from the water prior to treatment or discharge.

3.4 LANDFILL SOIL COVER DESIGN

The soil cover footprint will occupy an approximate surface area of 186,600 sf (4.3 acres). The soil cover will be sloped from 4.0% to 25% (4H:1V), and will have a peak elevation of 22 feet msl. The sides of the soil cover will tie into the existing ground surface, with a maximum slope of 4H:1V. The perimeter landfill sideslopes will be covered with topsoil (as part of the soil cover) and vegetated with grasses selected for soil stabilization, as shown on Drawing C-7.

The landfill soil cover comprises of a minimum of 6 inches of topsoil over 18 inches of select fill material. The landfill soil cover is designed to promote surface water run-off.

The vertical alignment of Atkins Road Extension will be increased within the landfill limits to provide a high point or ridge line. The road will be elevated using imported certified clean common fill. The road will be reconstructed using the criteria set forth by Maryland Department of Transportation and the Ammunition and Explosives Ashore Safety Regulations for Handling, Storing Production, Renovation, and Shipping (NAVSEA OP 5). The final roadway section will include in ascending order certified clean common fill (thickness varies along length of road), a 6- to 8-inch subbase layer, a 3-inch base layer, and a 2-inch wearing course. The geometry of the new road will correspond to the requirements set forth in NAVSEA OP 5 (Section 8-7) for Tertiary Roads (two-lane road, 10-feet minimum lane widths and a 2-feet minimum shoulder width). The materials used to construct the road and shoulders are presented on Drawing C-9. The pavement design calculations are presented in Appendix E.

3.5 WETLANDS RESTORATION

The selected remedy will require temporary disturbance of approximately 0.43 acre of nontidal wetlands where the landfill abuts the ponds. In September 1999, TtNUS conducted a wetlands delineation of the landfill and adjoining areas using the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). The delineation identified narrow fringes of dense emergent wetland vegetation dominated by smartweeds (*Polygonum*) at the edges of the ponds. Soils in those wetlands are kept permanently saturated by the impounded fresh water in the ponds. The wetland fringe is between 10 and

20 feet wide at most locations where the landfill abuts the ponds. The wetlands delineation report is included as Appendix C.

Disturbance of the wetland fringes adjoining the ponds is necessary because the landfill extends slightly waterward of the shoreline. Excavation of landfill material at the edge of the ponds is necessary to prevent chemical contamination from migrating into the waters and sediments of the ponds, thereby exposing aquatic receptors. The remedial action design requires that the wetlands be restored to the shoreline of the ponds when the proposed excavation and installation of the soil cover is completed. The area associated with wetland disturbance is identified on Drawing C-2. The extent of wetlands restoration is identified on Drawing C-7. The excavated material will be placed beneath the soil cover.

3.5.1 Wetlands Restoration Concept

Mitigation is defined by the Council on Environmental Quality (CEQ) as avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts (40 CFR 1508.20). For mitigation of wetland impacts, the USEPA encourages a sequential approach considering (in order), avoidance measures, minimization measures, and compensatory mitigation measures (USEPA, 1997).

Avoidance and minimization measures to reduce wetland impacts were considered throughout the remedial action design. However, the affected wetlands are located directly over landfill material at the edge of the ponds. That material must be excavated to prevent seepage of contaminants into the ponds. Excavation cannot be accomplished without disturbance of the overlying wetlands. A soil cover over the wetlands would not adequately prevent the seepage of contaminants into the ponds. But, even if it could, the soil cover could not be installed without also disturbing the wetlands.

Best management practices will be taken throughout implementation of the remedy to minimize the potential for sedimentation of the pond or of other wetlands adjoining the landfill. These practices will include the use of silt fences and vegetative stabilization (see Erosion and Sediment Control Plan).

The remedial action design requires restoration of the wetland fringe to the pond shoreline following the proposed excavation work and installation of the soil cover. The excavated area will be restored to its existing elevation using clean fill, and wetland vegetation will be planted in the same areas where it currently exists. The restored wetlands will experience the same hydrological conditions experienced by the existing wetlands. Because the wetlands will be restored in the same location as the existing wetlands, there will be no net loss of wetland area.

The restored wetlands fringe will provide functions and values that are equivalent to those of the existing wetlands. The restored wetlands will be revegetated with plants of equivalent or greater value to wildlife.

The plants selected for revegetation will be fast growing and will form dense stands capable of stabilizing the pond shoreline at least as well as the existing wetlands vegetation. The restored vegetation will export nutrients to the pond at least as well as the existing wetlands vegetation. The restored vegetation will provide an aesthetically pleasing fringe to the open water in the ponds, as does the existing vegetation.

The landfill soil cover will provide a less pervious surface than the existing soil cover over upland portions of the landfill. The result will be a greater quantity of surface runoff entering the ponds. The vegetation proposed for the restored wetlands will include more rushes, bulrushes, and other grass-like plants that can form denser stands than the broadleaf plants that dominate the existing wetlands. That vegetation will better function to slow the entry of surface runoff into the ponds.

3.5.2 Proposed Grading and Hydrology

An estimated 1,350 cy of soil, sediment, and waste will be excavated from the wetlands. The excavated material will be placed beneath the soil cover. An equivalent quantity of soil (select fill and topsoil) will be added to the excavated area to restore the original surface grade. The side slope extending landward from the wetlands will be graded to a slope no steeper than 4H:1V. A 4H:1V slope will be gradual enough to allow for permanent stabilization using only vegetation and will provide suitable access to the wetlands and ponds for most species of terrestrial wildlife. The slope will appear to be natural rather than artificially steep.

3.5.3 Proposed Topsoiling

The remedial action design requires that 6 inches of topsoil be placed over the surface of the restored wetlands. Wetland scientists often recommend that topsoil from natural wetlands undergoing disturbance from construction activities be stockpiled and applied to new wetlands restored or created as mitigation, as long as the soil does not contain propagules of invasive (weedy) species (Hayes et al., 2000). Use of stockpiled topsoil can provide a seed reserve of native wetland plants and can help inoculate the soil of the new wetland with microorganisms typically present in the soils of established wetlands. Of particular importance are mycorhizal fungi, symbiotic soil fungi that are necessary for optimal growth of certain plant species.

However, the only wetlands that will be disturbed are wetlands overlying landfill material that must be excavated. The existing topsoil in these areas must be removed for off-site disposal. Replacement topsoil will therefore be obtained from other suitable on-base or off-base sources as necessary.

3.5.4 Proposed Revegetation

The proposed wetland revegetation is outlined in Table 3-1. The revegetation will use a mixture of smartweeds (which dominate the existing vegetation in the affected wetlands), pickerel weed, lizard's tail, and several grass-like plants that are indigenous to natural wetlands fringing the shores of fresh open waters in central Maryland. As noted above in Section 3.5.1, the inclusion of grass-like plants will form denser vegetation better capable of slowing the entry of surface runoff from the landfill soil cover into the ponds.

The proposed revegetation does not include planting trees or shrubs. Woody plants are not present in the existing vegetation in the affected wetlands. Woody plants would render the restored wetlands of greater value as wildlife habitat, and the roots of the woody plants would over time help to better stabilize the shorelines. However, the trees and shrubs would tend to shade the dense emergent vegetation, rendering it sparser. They would therefore reduce the effectiveness of the vegetation in slowing the entry of surface runoff from the landfill. A fringe of trees and shrubs will, however, likely volunteer at the shoreline through natural successional processes.

3.5.5 Maintenance and Monitoring

The restored wetlands would be regularly monitored for at least three growing seasons or until it is determined that the wetlands have established successfully. At least one monitoring visit will be made during each growing season. More frequent monitoring visits will be performed if serious problems are observed.

If more than 15 percent of the planted specimens of any species in any area of the project is found to have died as determined during any monitoring visit, dead plants will be replaced on a 1:1 ratio. A substitute species will be designated if it is determined that the original species died because of site conditions. Dead plants will not be replaced, however, if an equivalent number of indigenous plants are found to have colonized the area on a volunteer basis (i.e., through natural succession). If after three growing seasons, the soil surface in any area is not completely covered by indigenous or naturalized vegetation, whether planted or volunteer, supplementary planting will be performed to fill the coverage gaps.

Each monitoring visit will include inspection for the invasive grass Phragmites (*Phragmites australis*). Any patches of Phragmites that are found will be immediately eradicated by hand pulling or by spot application of an appropriately licensed postemergent herbicide. Although not designated for planting because of their aggressive properties, common cattail or narrowleaf cattail species (*Typha angustifolia*) will not be eradicated if found to have colonized. Both species are indigenous to, and commonly found in,

freshwater marshes in central Maryland and are of moderate value as food and cover for waterfowl and muskrats (Thunhorst, 1993).

3.6 EROSION, SEDIMENT, AND STORMWATER MANAGEMENT REQUIREMENTS

3.6.1 Erosion and Sediment Control

An erosion and sediment control plan was prepared and has been included in this design submission. The plan was prepared in accordance with state of Maryland regulations, as set forth in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control handbook. Runoff quality during the remedial action is addressed via erosion and sediment control devices located around the perimeter of disturbed areas. Refer to the Erosion and Sediment Control Plan Report for detailed information regarding the planned controls as well as pre- and post-development run-off calculations.

3.6.2 Stormwater Management

As the site will be returned to a grassed or natural type existing condition following the remedial action, extensive stormwater management structures are not required.

3.6.3 Floodplain Protection Measures

Although the 100-year floodplain extends to an elevation of 8 feet msl in and around Site 12 (refer to Figure 2-5), it is not anticipated that any additional protection of the floodplain will be required other than the vegetation planted on the site.

3.7 OTHER DESIGN REQUIREMENTS

3.7.1 Utilities

Underground utilities exist adjacent to Atkins Road and Atkins Road Extension and lie within the limits of disturbance. The contractor will be obligated through specification to verify all utility locations and adequately protect the utilities before any earth disturbing activities.

3.7.2 Groundwater Monitoring Wells

Existing groundwater monitoring wells 12WP01 through 12WP06 will be impacted by excavation, grading, and soil cover placement efforts and will therefore be abandoned. The groundwater monitoring program for Site 12 will include a network of seven new groundwater monitoring wells installed during the remedial action. The new monitoring well locations are shown on Drawing C-7. Work associated with monitoring

well abandonment and installation will be performed in accordance with Maryland Well Construction Regulations (COMAR 26.04.04)

3.7.3 Maintenance and Repair

There should be very little maintenance required for the constructed soil cover. An annual inspection and repair procedures will be established in the Site 12 Operation and Maintenance Plan. Plans for periodic mowing, reseeding, and repair of sparsely vegetated areas, repair of areas of differential settlement, etc. will be identified in the Operation and Maintenance Plan. The Operation and Maintenance Plan is not part of the remedial action design submissions.

3.7.4 Regulatory Standards

The Site 12 soil cover system complies with the action-specific ARARs and TBCs as discussed in the Environmental Permits Report.

3.8 IMPLEMENTATION

The contractor will coordinate field work through Base Environmental and Safety for specific requirements related to Site 12 and the surrounding area. Additional coordination will be required with Base Environmental and Safety and Explosive Ordnance Disposal (EOD) in the event ordnance is discovered during excavation. As with all excavation activities at IHDIV-NSWC, the possibility that UXO is present should be anticipated. Therefore, a UXO expert is required to be on-site during all excavation activities. Additionally, all excavations must follow the standard operating procedure concerning UXO.

TABLE 3-1

PLANT SCHEDULE FOR PALUSTRINE EMERGENT WETLAND FRINGE
SITE 12 – TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Quantity	Botanical Name	Common Name	Form	Unit	Size	Spacing
935	*Polygonum pensylvanicum*	Pennsylvania Smartweed	Herb	BR or PP	N/A	Space herbs 2 feet OC. Alternate species so each represents 20 percent of the total.
935	*Scirpus pungens*	Common Three-square	Herb	BR or PP	N/A	
935	*Scirpus validus*	Soft-stem Bulrush	Herb	BR or PP	N/A	
935	*Pontederia cordata*	Pickerel Weed	Herb	BR or PP	N/A	
935	*Saururus cernuus*	Lizard's Tail	Herb	BR or PP	N/A	

BR - Bare Root
PP - Peat Pot
N/A - Not Applicable
OC - On Center

Note: Quantities based on a wetlands restoration area of 0.37 acres.

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APPENDIX A

SUBSURFACE INVESTIGATION LOGS

A.1 BORING LOG SHEETS

A.2 WELL CONSTRUCTION SHEETS

A.3 WELL COMPLETION/ABANDONMENT REPORTS

A.1 BORING LOG SHEETS

BORING LOG

PROJECT NAME: INDIAN HEAD RI SITE 12
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP01
DATE: 10-8-97
GEOLOGIST: FRED W RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1605	S 1				LOOSE								
	2						~1' OF VERY BROWN SAND + GRAVELS	GM	DRY				
	3						~1' OF BLK TAR SHINGLES		ROOF SHINGLES				
	4		2.0 / 4.0	FILL			SATURATED		VERY LOOSE				
S-2 1615	5				LOOSE								
	6												
	7												
	8		.8' / 4.0				~.8' OF BLK TAR SHINGLES SATURATED		RODS SATURATED @ 2' w/ LG INSPL				
									SCREEN ~~1.5'-7.1'~~ FR				
									REMEASURED H_2O @ 1.5' BGS				
									PLACE SCREEN				
									@ 1'-7'				
									SAND @ 9" BGS - 7'				
									BENT @ 3" BGS				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ____

Remarks: 4' MACRO CORE SAMPLER FOR LITHOLOGIC LOG W/ PLASTIC TUBE

Converted to Well: Yes ✓ No ____ Well I.D. #: S12WP01

BORING LOG

PROJECT NAME: INDIAN HEAD RI SITE 12
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP02
DATE: 10-8-97
GEOLOGIST: FRED W RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1510	1			FILL?									
	2						NO RECOVERY						
	3								HIT H_2O ~3.5				
	4						MEASURE HOLE OPEN		SLEEVE WET @3.5				
S-2 1520	5						TO 2.5'						
	6								WATER ON				
	7						NO RECOVERY		RODS AT 2' BGS				
	8								WILL INSTALL				
									WELL @				
									1.5 - 7.5				
									SAND @ 1.0 → 2.5				
							6' STAINLESS STEEL						
							OUTER SCREEN W/ PVC INNER						
							SCREEN						
							RISER IS 3/4" OD PVC						
							RISER						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: GEOPROBE DP W/ 4' MACRO CORE SAMPLER LINED WITH PE TUBE

Converted to Well: Yes ✓ No ___ Well I.D. #: S12WP02

BORING LOG

Page ___ of ___

PROJECT NAME: INDIAN HEAD RI
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP03
DATE: 10-9-97
GEOLOGIST: FRED WRAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1555	1			FILL			YELORG SILT FG SAND	SM	ROOT MATL				
	2						AND TR GRA.		DRY				
	3						F-G SAND + GRAVEL TR SILT+CLAY	SM	SATURATED @ 2'				
	4		3.0/4.0										
S-2 1600	5						BLK SILT + GRA.						
	6						POOR RECOVERY						
	7												
	8		1.0/1.0										
									PLACE SCREEN				
									@ 1'-7'				
									SAND @ 9"-7'				
									BENT @ 3"-9"				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: GEOPROD ATV BIG DP, MACRO CORE SAMPLER

Converted to Well: Yes ✓ No ___ Well I.D. #: S12 WP03

BORING LOG

Page ___ of ___

PROJECT NAME: Indian Head
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP-04
DATE: 10-9-97
GEOLOGIST: PAUL DAVIS
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 @	1					Brn	silt - some pebbles						
	2												
	3					Yel-brn	Clayey silt with		wet				
	4		3.0/4.0				fill - wood, plastic, cloth		creosote odors				
S-2 @	5					gray	Clayey silt some						
	6					brn	pebbles & sand -		saturated				
	7						pc. of wood						
	8		1.0/4.0										
							SCREEN 4'-10' BGS						
							SAND @ 3'-4' BGS						
							BENT @ 1'-3' BGS						

FILL

* When rock coring, enter rock brokeness.

** Include monitor reading in 5 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: 4' MACRO CORE SAMPLER FOR LITHOLOGIC

Converted to Well: Yes ✓ No ___ Well I.D. #: S12WP04

BORING LOG

PROJECT NAME: Indian Head RI
PROJECT NUMBER: 7129
DRILLING COMPANY: Hardin Huber
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP05
DATE: 10-9-97
GEOLOGIST: PAUL DAVIS
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 @	1			FILL		or. brn.	silt w/ gravels		Dry				
	2						↓		↓				
	3					Brn.	silt w/ gravel & pebbles		↓				
	4		4.0/4.0			↓	↓ some cinders		moist				
S-2 @	5						↓		satur. 5'				
	6												
	7					gray brn	silt some sand		~~saturated 4.7'~~				
	8		2.5/4.0				and gravels/pebbles		(organics)				
S-3 @	9					gray brn	silt with		saturated				
	10						wood (lumber)						
	11												
	12		2.0/4.0										
							SCREEN @ 4'-10' BGS						
							SAND @ 3'-4'						
							BENT @ 1'-3'						
							water in hole 4.5' to 5.0'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: 4' MACRO CORE SAMPLER W/PLASTIC LINER FOR LITHO. ONLY

Converted to Well: Yes ✓ No ___ Well I.D. #: S12WP05

BORING LOG

Page ___ of ___

PROJECT NAME: INDIAN HEAD RT
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP06
DATE: 10-9-97
GEOLOGIST: FRED RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 0900	1			FILL ↑									
	2						POOR RECOVERY		TOP 6" DRY LOWER 3" SATURATED				
	3						SILT + SAND + GRAVEL		SILT + GRAVEL TR. WOOD FRAG.				
	4		0.8 / 4.0										
S-2 0905	5												
	6			FILL?	SOFT		GREENISH GREY SILT +		SATURATED				
	7						GRAVEL						
	8		3.0 / 4.0										
							MEASURED H2O IN						
							HOLE @ 2'		PLACE SCREEN				
									1'-6'				
									SAND TO 9" BGS				
									BENT TO 3" BGS				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: 4' MACRO CORE SAMPLER W/PLASTIC LINER FOR LITHOLOGIC.

Converted to Well: Yes ✓ No ___ Well I.D. #: S12WP06

BORING LOG

Page ___ of ___

PROJECT NAME: INDIANHEAD RI SITE 12
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN-HUBER
DRILLING RIG: DP ATV GEOPROBE.

BORING NUMBER: RI12GW01
DATE: 8-5-97
GEOLOGIST: PURAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1			SSS			PALE YEL BRN SILT+SAN GRADING DOWNWARD		ROOT MATL TO 1.0 ABUNDANT				
	2						TO SILT W/SOME CLA. @ 4'		LESSER ROOT DOWN WARD				
	3								LOOKS NATURAL? MAY BE REWORKED				
	4		3.0 / 4.0						TD MEASURED @ 4'				
	5												
	6												
	7												
	8		1.0 / 4.0				YEL BROWN CLAYEY SILT + SAND		TR. ROOT SATURATED @ 8' STILL LOOKS NATURAL				
									WILL PLACE SCREEN				
									@ ~~4-14~~				
									4.5'-9.5'				
									SCREEN				
									HOLE COLLASPED				
									PUSHED SCREEN TO ONLY 8.5' BGS				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: ___

Converted to Well: Yes ✓ No ___ Well I.D. #: ___

BORING LOG

Page ___ of ___

PROJECT NAME: SITE 12, INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: ATV MT. GEOPROBE

BORING NUMBER: RI12GW02
DATE: 8-5-97
GEOLOGIST: R. KRAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
S-1	1			SSS			LIGHT BRN SILT+SAND		TO 6" ROOT MATL DOWN	0			
	2						LIGHT BRN TO MOD BRN SAND W/SOME GRA. TR SILT		DRY	0			
	3						BLK ASPHALT 2-2.5'			0			
	4		3/4	▽			YEL BRN GRAVEL+SAND 2.5'-2.7'			0			
S-2	5						BLK ASPHALT TO 3.8'		CLAY W/ WOOD MATL SAT @ 3.8'-4.0' (FILL)				
	6												
	7												
	8		1.1/4				BLK. METAL FRAGS IN SHOE ORGANIC MATL.		SAT (FILL)				
									TOOK 2 4' SPL				
									0-4, 4-8				
							MEASURED WATER		SATURATED @				
							IN HOLE AT 4'		4'				
							WILL PLACE SCREEN						
							4'-9'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: TEMPORARY WELL POINT, 1.5" ID PVC RISER + SCREEN

Converted to Well: Yes ✓ No ___ Well I.D. #: TEMP WELL

BORING LOG

Page ___ of ___

PROJECT NAME: SITE 12 RI INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: RI12GW03
DATE: 8-5-97
GEOLOGIST: FRED W. RAMSER
DRILLER: BILL KIMESI

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1						PALE YEL BRN			0			
	2						YEL BRN SAND+SILT			0			
	3			?					VERY HARD AT 2' BROKE				
	4		2.0/4.0						THROUGH WAT ON SPL @ 2'				
									REFUSAL @ 4.5'				
									USED DRIVE POINT TO GET THROUGH				
									SOFT FROM 5.5' ON DOWN TO 7.5'				
									WILL PLACE SCREEN @ 2.5-7.5				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: ___

Converted to Well: Yes ✓ No ___ Well I.D. #: ___

BORING LOG

Page ___ of ___

PROJECT NAME: SITE 12 RI INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: RI12GW04
DATE: 8-5-97
GEOLOGIST: FRED W RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1430	1						YEL ORG SILT + SAND		ROOT MATL. DRY				
	2						AS ABOVE W/GRAVEL						
	3						WOOD FRAG @ 3-3.1		DRY				
	4		4.0/4.0						SATURATED @ 4'				
S-2 1445	5						SAND + SILT WOOD						
	6						FRAGMENT APPARE CHARRED		REFUSAL @ 7'5"				
	7												
			3.5						WOOD IN SHOE — REFUSAL				
							PLACE SCREEN		2.5'-7.5'				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: ___

Converted to Well: Yes ✓ No ___ Well I.D. #: ___

BORING LOG

Page ___ of ___

PROJECT NAME: SITE 12, RI INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: ATV MT. GEOPROBE

BORING NUMBER: RI12GW05
DATE: 8-5-97
GEOLOGIST: FRED W. RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1330	1						YEL BRN SILT + SAND		ORGANIC MATL				
	2		2.0/2.0				W/TR GRA.		HIT REFUSAL @ ~2'				
	3			?			PROBABLY CONCRETE		DRIVE POINT TO 4'				
	4												
									HAD DRIVE PT REFUSAL @				
									5' MOVE RIG.				
	0												
	1						MOD YEL BRN SILT + SAND CLAY CONTENT INCREASES		SOME GRA.				
	2						DOWNWARD TO 4.0'						
	3												
	4		4.0/4.0				CLAYEY GRAVEL						
	5						YEL BRN SANDY CLAY						
	6						↓						
	7						DK YEL BRN MOTTLED BLK CLAY + GRA		TR GLASS FRAG BRICK "FILL"				
	8		4.5/4.0				AS ABOVE		SATURATED @ 6'				
	9						AS ABOVE						
	10						WOOD FRAGMENTS						
	11						BLK LAYER @ 10'						
	12		4.0/4.0						THICK WOOD IN SHOE				
							PLACE SCREEN @						
							6.8" TO 11'8"						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: GEOPROB DP 4' MACRO CORE SAMPLERS
WILL USE 5' SCREEN

Converted to Well: Yes ✓ No ___ Well I.D. #: ___

BORING LOG

Page ___ of ___

PROJECT NAME: SITE 12 RI INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: ATV MT. GEOPROBE
BORING NUMBER: RI12GW06
DATE: 8-5-97
GEOLOGIST: FURAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1220	1			SSS			YELORN SILT+f-g-SAND		TR ROOTS	0			
	2						MOD BRY TO YEL BRN SILT+f-g SAND TR GR.		DRY	0			
	3								WOOD FRAG. WELL ROUND GRA.	0			
	4		3.0/4.0				YEL BRN f-g SAND		TR ~~ASPHALT~~ (FILL) DRY	0			
S-2 1230	5			FILL			LARGE REDDISH WOOD FRAGS. 4-4.4		ASPHALT				
	6						PALE YEL BRN TO MOD BRN f-g SAND W/SOME GRA. TR SILT		DRY	0			
	7						LT BRNISH GREY CONCRETE? SAND ~~STONE~~?		CONSOLIDATED MAYBE CONCRETE	0			
	8		4.0/4.0				OLIVE GREY CLAY W/ SOME GRA. AND PLANT MATL		(FILL) ~~CRET~~ WET IN TIP OF SHOE @ 8'	0			
S-3 1245	9									0			
	10						DK YEL BRN CLAY ~~Y~~ SAND TR GRA.		SATURATED				
	11								LOOKS NATURAL				
	12		4.0/4.0				ABUNDANT PLANT MATL. TR SAND	PT	LEAVES SATURATED				
S-4 1255	13								OPERATOR STATES MATL. VERY SOFT				
	14						AS ABOVE	PT					
	15		1.0/3.0						NET REFUSAL AT 15' BGS LARGE				
									METALLIC FRAG IN CUTTING SHOE?				
							WILL PLACE IN		1) MAY STILL BE IN FILL				
							5' SCREEN		2) OR WE DRAGGED FRAG TO BOTTOM?				
							7'-12' BELOW						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ____

Remarks: ____

Converted to Well: Yes ✓ No ____ Well I.D. #: ____

A.2 WELL CONSTRUCTION SHEETS

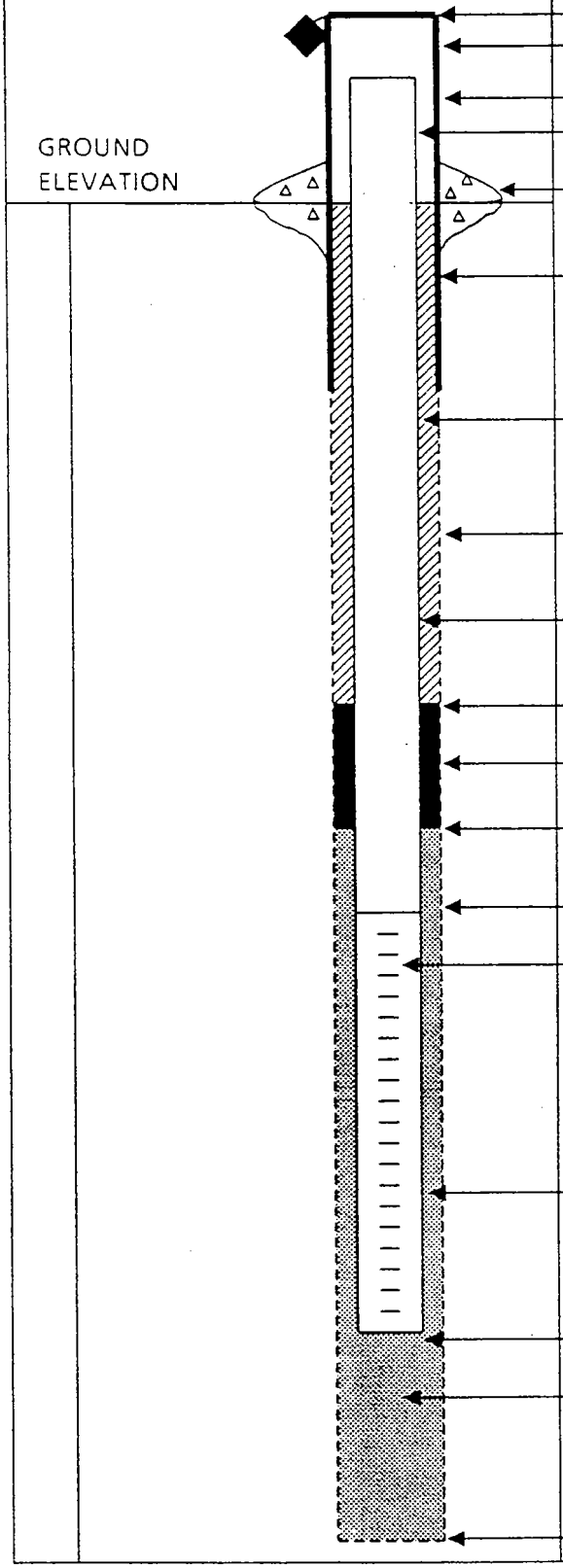
BORING NO.: S12WP01

OVERBURDEN
MONITORING WELL SHEET

PROJECT: SITE 12 RI
PROJECT NO.: 7129
ELEVATION:
FIELD GEOLOGIST: FRED W RAMSER

LOCATION: INDIAN HEAD
BORING: S12WP01
DATE: 10-8-97

DRILLER: BILL KIMES
DRILLING METHOD: GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD: SURFACE PUMP



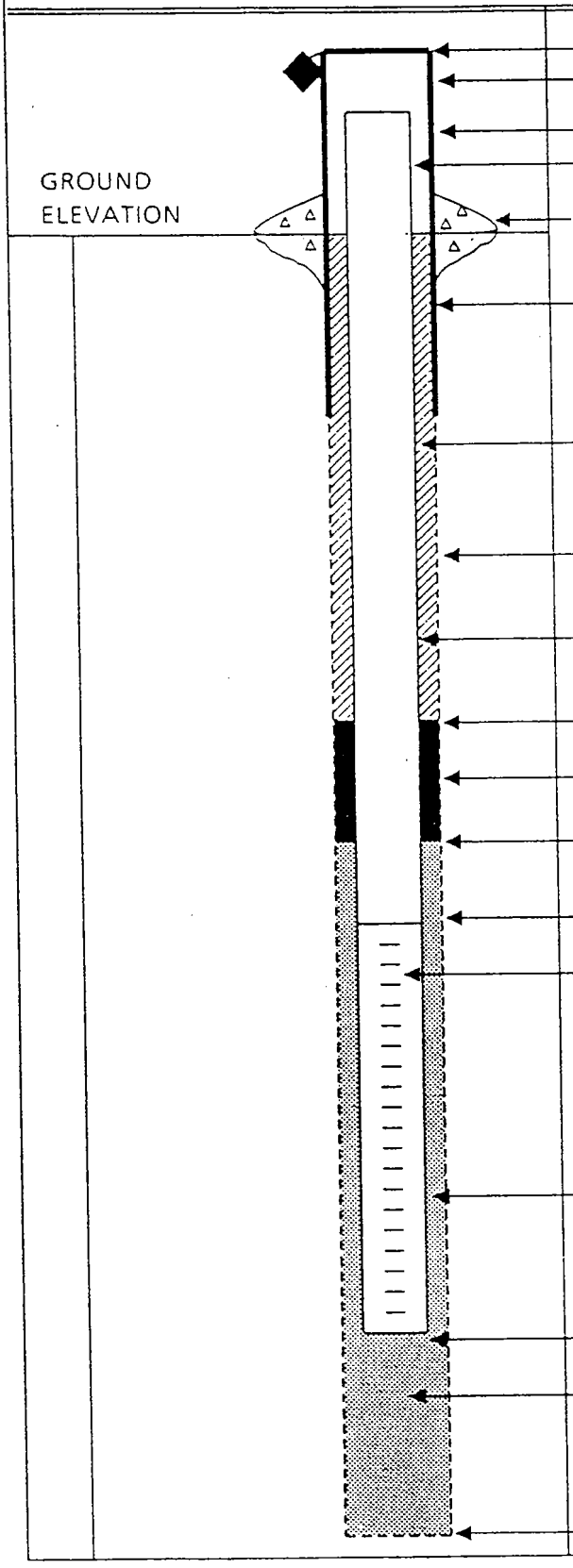
ELEVATION OF TOP OF SURFACE CASING:
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE: ~2'
TYPE OF SURFACE SEAL: 2'x2'x6" CONCRETE PAD
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL
RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: ~2"
TYPE OF BACKFILL: NONE
ELEVATION / DEPTH TOP OF SEAL: 1.25'
TYPE OF SEAL: BENTONITE CHIPS
DEPTH TOP OF SAND PACK: .75'
ELEVATION / DEPTH TOP OF SCREEN: 11.0'
TYPE OF SCREEN: GW2010 GEOPROBE 997JS
SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'
I.D. OF SCREEN: 1/2" ID 1.5" OD
TYPE OF SAND PACK: DSI, MILLERSVILLE #2 SILICA SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 17.0'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 18.0'
TYPE OF BACKFILL BELOW OBSERVATION WELL: SAND PACK
ELEVATION / DEPTH OF HOLE: 18.0'

BORING NO.: S12WPØ2

OVERBURDEN
MONITORING WELL SHEET

PROJECT: SITE 12 RI
PROJECT NO.: 7129
ELEVATION:
FIELD GEOLOGIST: FRED W RAMSER
LOCATION: INDIAN HEAD
BORING: S12WPØ2
DATE: 10-8-97

DRILLER: BILL KIMES
DRILLING METHOD: GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD: SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING:
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE: 2'
TYPE OF SURFACE SEAL: 2' x 2' x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL
RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: ~2"
TYPE OF BACKFILL: NONE
ELEVATION / DEPTH TOP OF SEAL: 1.5'
TYPE OF SEAL: BENTONITE CHIPS
DEPTH TOP OF SAND PACK: 1'
ELEVATION / DEPTH TOP OF SCREEN: 11.5'
TYPE OF SCREEN: GW2010 GEOPROBE 997JS
SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'
I.D. OF SCREEN: 1/2" ID 1.5" OD
TYPE OF SAND PACK: DSI, MILLERSVILLE A & L SILICA SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 17.5'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 18'
TYPE OF BACKFILL BELOW OBSERVATION WELL: SAND PACK
ELEVATION / DEPTH OF HOLE: 18'

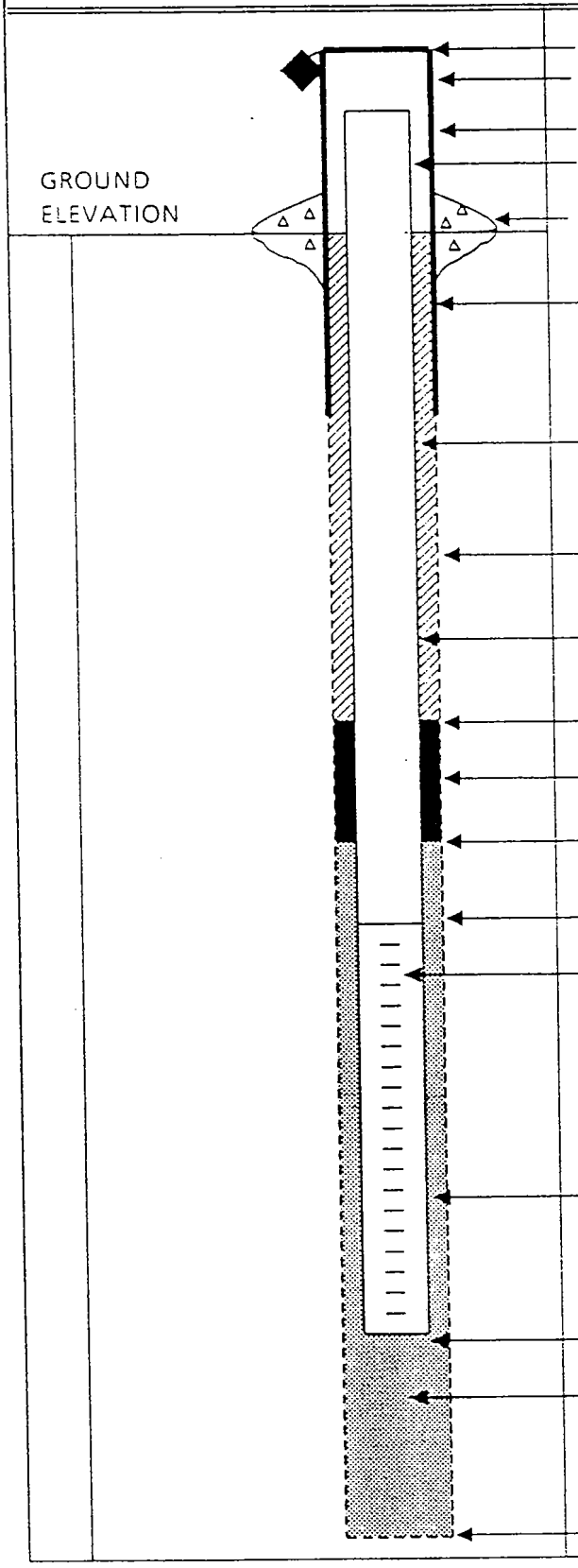
BORING NO.: S12WP03

OVERBURDEN
MONITORING WELL SHEET

PROJECT: SITE 12 RI
PROJECT NO.: 7129
ELEVATION:
FIELD GEOLOGIST: FRED W RAMSER

LOCATION: INDIAN HEAD
BORING: S12WP03
DATE: 10-9-97

DRILLER: BILL KIMES
DRILLING METHOD: GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD: SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING:
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE: 2'
TYPE OF SURFACE SEAL: 2' x 2' x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL
RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: ~2"
TYPE OF BACKFILL: NONE
ELEVATION / DEPTH TOP OF SEAL: 1.25'
TYPE OF SEAL: BENTONITE CHIPS
DEPTH TOP OF SAND PACK: .75'
ELEVATION / DEPTH TOP OF SCREEN: 11'
TYPE OF SCREEN: GW2010 GEOPROBE 997JS
SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'
I.D. OF SCREEN: 1/2" ID 1.5" OD
TYPE OF SAND PACK: DSI, MILLERSVILLE #1 SILICA SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 17'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 18'
TYPE OF BACKFILL BELOW OBSERVATION WELL: SANDPACK
ELEVATION / DEPTH OF HOLE: 18'

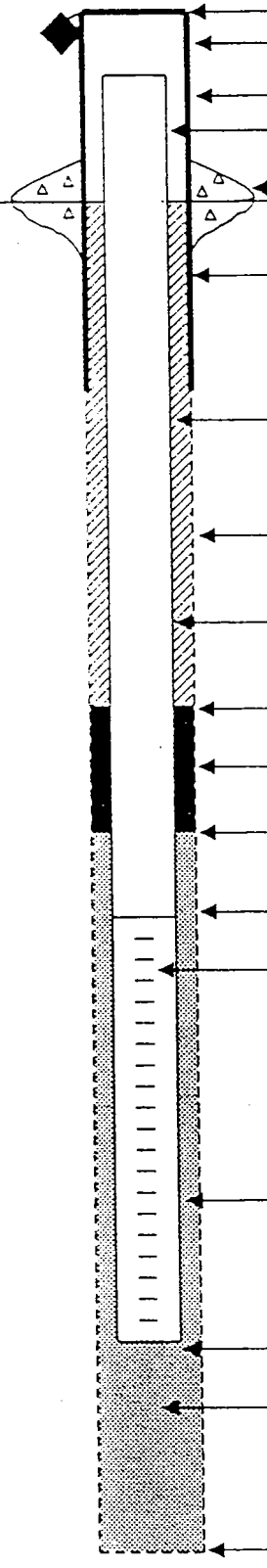
BORING NO.: S12WP04

OVERBURDEN
MONITORING WELL SHEET

PROJECT SITE 12 RI
PROJECT NO. 7129
ELEVATION
FIELD GEOLOGIST FRED W RAMSER

LOCATION INDIAN HEAD
BORING S12WP04
DATE 10-9-97

DRILLER BILL KIMES
DRILLING METHOD GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD SURFACE PUMP



GROUND ELEVATION

ELEVATION OF TOP OF SURFACE CASING :
ELEVATION OF TOP OF RISER PIPE:

STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE : 2'

TYPE OF SURFACE SEAL: 2'x2'x6" CONCRETE PAD

I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: ~2"

TYPE OF BACKFILL: NONE

ELEVATION / DEPTH TOP OF SEAL: 1.25'

TYPE OF SEAL: BENTONITE CHIPS

DEPTH TOP OF SAND PACK: .75'

ELEVATION / DEPTH TOP OF SCREEN: 1 1'

TYPE OF SCREEN: GW2010 GEOPROBE 997JS

SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'

I.D. OF SCREEN: 1/2" ID 1.5" OD

TYPE OF SAND PACK: DSI, MILLERSVILLE #1 SILICA SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: 1 7'

ELEVATION / DEPTH BOTTOM OF SAND PACK: 1 8'

TYPE OF BACKFILL BELOW OBSERVATION WELL: SANDPACK

ELEVATION / DEPTH OF HOLE: 1 8'

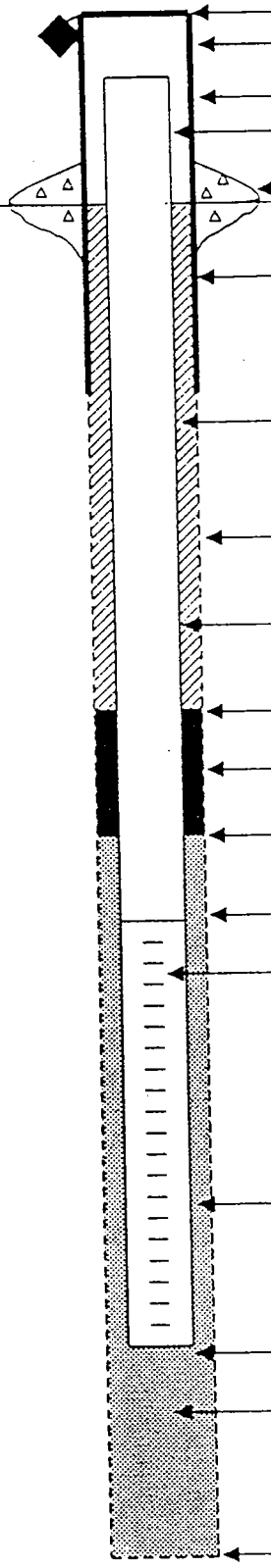
BORING NO.: S12WP05

OVERBURDEN
MONITORING WELL SHEET

PROJECT: SITE 12 RI
PROJECT NO.: 7129
ELEVATION:
FIELD GEOLOGIST: FRED W RAMSER

LOCATION: INDIAN HEAD
BORING: S12WP05
DATE: 10-9-97

DRILLER: BILL KIMES
DRILLING METHOD: GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD: SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING:
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE: 2'
TYPE OF SURFACE SEAL: 2' x 2' x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL
RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: ~2"
TYPE OF BACKFILL: NONE
ELEVATION / DEPTH TOP OF SEAL: 11'
TYPE OF SEAL: BENTONITE CHIPS
DEPTH TOP OF SAND PACK: 3'
ELEVATION / DEPTH TOP OF SCREEN: 14'
TYPE OF SCREEN: GW2010 GEOPROBE 997JS
SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'
I.D. OF SCREEN: 1/2" ID 1.5" OD
TYPE OF SAND PACK: DSI, MILLERSVILLE #1 SILICA SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 10'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 10'
TYPE OF BACKFILL BELOW OBSERVATION WELL: NATURAL MATL.
ELEVATION / DEPTH OF HOLE: 12'

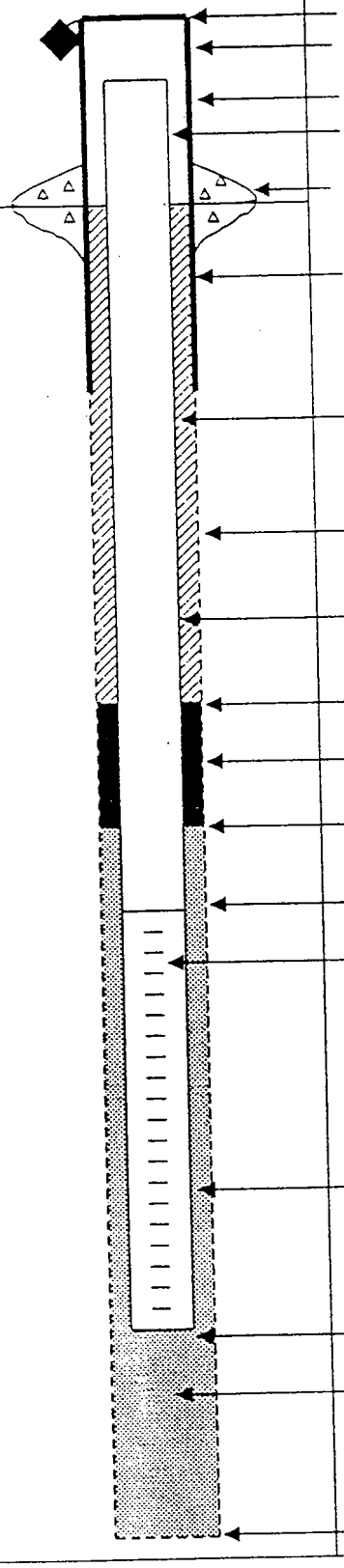
BORING NO.: S12WP06

OVERBURDEN
MONITORING WELL SHEET

PROJECT: SITE 12 RI
PROJECT NO.: 7129
ELEVATION:
FIELD GEOLOGIST: FRED W RAMSER

LOCATION: INDIAN HEAD
BORING: S12WP06
DATE: 10-9-97

DRILLER: BILL KIMES
DRILLING METHOD: GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD: SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING:
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE: 2'
TYPE OF SURFACE SEAL: 2' x 2' x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL
RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: ~2"
TYPE OF BACKFILL: NONE
ELEVATION / DEPTH TOP OF SEAL: 1.25'
TYPE OF SEAL: BENTONITE CHIPS
DEPTH TOP OF SAND PACK: .75'
ELEVATION / DEPTH TOP OF SCREEN: 11'
TYPE OF SCREEN: GW2010 GEOPROBE 997JS
SLOT SIZE x LENGTH: CONTINUOUS WRAPPED x 6'
I.D. OF SCREEN: 1/2" ID 1.5" OD
TYPE OF SAND PACK: DSI, MILLERSVILLE #1 SILICA SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 17'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 18'
TYPE OF BACKFILL BELOW OBSERVATION WELL:
ELEVATION / DEPTH OF HOLE: 18'

A.3 WELL COMPLETION/ABANDONMENT REPORTS

(MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-310-W(M)

ST/CO USE ONLY
DATE Received

DATE WELL COMPLETED: 08 05 97

Depth of Well: 12 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": CH-94-1511

OWNER: Naval Surface Warfare Center
STREET OR RFD: Indian Head Division TOWN: Indian Head
SUBDIVISION: SECTION: LOT:

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow silt and sand	0	4	
olive gray clay	4	10	
dark yellow/ brown clay and sand	10	12	

*temporary geoprobe points - to be abandoned after installation.

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED: yes Y / no N

N/A

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD
DRILLERS LIC. NO. MGD046
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. MGD081
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): yes Y / no N

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS NO. OF POUNDS
GALLONS OF WATER
DEPTH OF GROUT SEAL (to nearest foot) from ft. to ft. (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE: PL
Nominal diameter top (main) casing (nearest inch): 1
Total depth of main casing (nearest foot): 7

OTHER CASING (if used) — EACH CASING: diameter inch, depth (feet) from, to

SCREEN RECORD

screen type or open hole insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	7	12
2			
3			

SLOT SIZE 1 0 2 1 3 0
DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK from to
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE CASING LOG INDICATOR OTHER DATA

C3

N/A

PUMPING TEST

HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING ft.
WHEN PUMPING ft.

TYPE OF PUMP USED (for test)
A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible

GEOPROBE

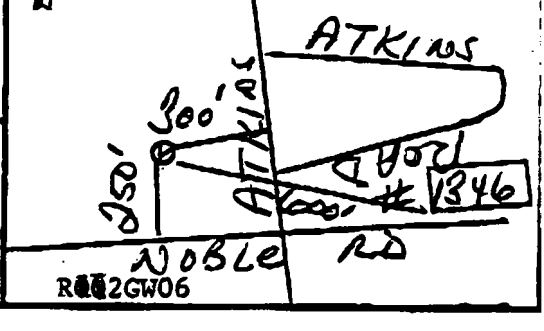
PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO): YES / NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)
CASING HEIGHT (circle appropriate box and enter casing height) + above / − below
LAND SURFACE 0 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R02GW06

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

- ★ COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- • WELL OWNER
- ★ MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

• PERMIT NUMBER OF ABANDONED WELL (if any) CH __ 94 __ 1511

• PERMIT NUMBER OF REPLACEMENT WELL __ __

★ PERSON ABANDONING WELL: Bill Kimes

WELL DRILLERS LICENSE NUMBER: MGD081

CIRCLE: MWD/MSD/MGD

• OWNER'S NAME: Naval Surface Warfare

• WELL LOCATION: Atkins Road
COUNTY: Charles County
NEAREST TOWN: Indian Head
TAX MAP _____ BLOCK _____ PARCEL _____
SUBDIVISION: _____
SECTION: _____ LOT: _____
NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

★ TYPE OF WELL BEING ABANDONED:

_____ DRILLED _____ JETTED
X BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

★ USE CODE:

_____ DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
X TEST/OBSERVATION

★ TYPE OF CASING:

_____ STEEL X PLASTIC
_____ CONCRETE _____ OTHER (specify) _____

• SIZE OF CASING: 1" INCHES IN DIAMETER

• DEPTH OF WELL: 12' FEET DEEP

★ WAS ANY CASING REMOVED? X YES _____ NO
if yes, length removed, in feet: _____

★ WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
bentonite	12'	0'

Michael W. Huber — Michael W. Huber — MGD046 — MWD/MSD/MGD — 12/08/97

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # — CIRCLE ONE — DATE

C1 9332 SEQUENCE NO. (MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-311-W(M)

ST/CO USE ONLY
DATE Received

DATE WELL COMPLETED: 08 05 97

Depth of Well: 11.8 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": CH-94-1512

OWNER: Naval Surface Warfare Center
STREET OR RFD: Indian Head Division TOWN: Indian Head
SUBDIVISION: SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow/brown silt & sand	0	4	
yellow/brown sandy clay	4	7	
yellow/brown clay & gravel	7	10	
wood fragments	10	11.8	
water @ approx 6'			

*temporary geoprobe points - to be abandoned after installation.

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

N/A CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD
DRILLERS LIC. NO. MGD046
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. MGD081
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS NO. OF POUNDS
GALLONS OF WATER
DEPTH OF GROUT SEAL (to nearest foot)
from ft. to ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	1	6.8

OTHER CASING (if used)
EACH CASING — diameter inch — depth (feet) from — to

SCREEN RECORD
screen type or open hole insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	6.8	11.8
2			
3			

SLOT SIZE 1 .0 2 .1 3 .0
DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from — to

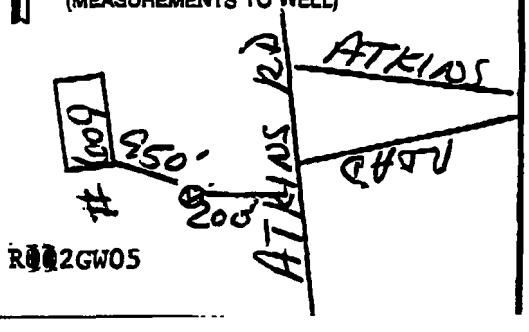
MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) — W Q
TELESCOPE CASING — LOG INDICATOR — OTHER DATA

C 3

PUMPING TEST N/A
HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING ft.
WHEN PUMPING ft.
TYPE OF PUMP USED (for test)
A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible
GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)
CASING HEIGHT (circle appropriate box and enter casing height) + above, − below
LAND SURFACE 0 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R02GW05

SEQUENCE NO. (MDE USE ONLY) 7555

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-312-W(M)

ST/CO USE ONLY DATE Received

DATE WELL COMPLETED: 08 05 97

Depth of Well: 75 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": CH-94-1513

OWNER: Naval Surface Warfare Center

STREET OR RFD: Indian Head Division (first name) TOWN: Indian Head

SUBDIVISION: SECTION: LOT:

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow silt & sand	0	3	
wood fragments	3	5	
sand, silt and wood	5	7'.5"	
Water@ approx 4'			
*temporary geoprobe points - to be abandoned after installation.			

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N

N/A

CIRCLE APPROPRIATE LETTER

- A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD

DRILLERS LIC. NO. MGD046

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. MGD081

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS ____ NO. OF POUNDS ____

GALLONS OF WATER ____

DEPTH OF GROUT SEAL (to nearest foot)

from ____ ft. (TOP) to ____ ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	7	25

OTHER CASING (if used)

EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

EACH SCREEN	TYPE	DEPTH (nearest ft.) from	to
1	PL	25	75
2			
3			

SLOT SIZE 1 0 2 1 3 0

DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from ____ to ____

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) — W Q

TELESCOPE CASING ____ LOG INDICATOR ____ OTHER DATA ____

C 3

N/A

PUMPING TEST

HOURS PUMPED (nearest hour) ____

PUMPING RATE (gal. per min.) ____

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ ft.

WHEN PUMPING ____ ft.

TYPE OF PUMP USED (for test)

A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible

GEOPROBE

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

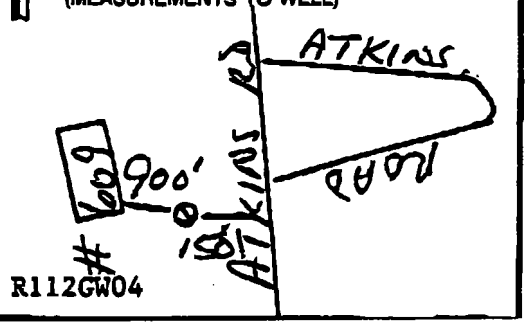
PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height) + above, − below LAND SURFACE 0 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R112GW04

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

- ★ COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- ★ WELL OWNER
- ★ MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

★ PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1512

★ PERMIT NUMBER OF REPLACEMENT WELL — —

★ PERSON ABANDONING WELL: Bill Kimes

WELL DRILLERS LICENSE NUMBER: MGD081

CIRCLE: MWD/MSD/MGD

★ OWNER'S NAME: Naval Surface Warfare

★ WELL LOCATION: Atkins Road
COUNTY: Charles County
NEAREST TOWN: Indian Head
TAX MAP _____ BLOCK _____ PARCEL _____
SUBDIVISION: _____
SECTION: _____ LOT: _____
NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 740 N 270 <

0 0 0 0 0 0	X

SHOW WELL LOCATION BY X WITHIN BOX

★ TYPE OF WELL BEING ABANDONED:

_____ DRILLED _____ JETTED
__X__ BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

★ USE CODE:

_____ DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
__X__ TEST/OBSERVATION

★ TYPE OF CASING:

_____ STEEL __X__ PLASTIC
_____ CONCRETE _____ OTHER (specify) _____

★ SIZE OF CASING: 1" INCHES IN DIAMETER

★ DEPTH OF WELL: 11.8 FEET DEEP

★ WAS ANY CASING REMOVED? X YES _____ NO
if yes, length removed, in feet: _____

★ WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
bentonite	11.8'	0'

Michael W. Huber — Michael W. Huber — MGD046 — MWD/MSD/MGD — 12/08/97

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # — CIRCLE ONE — DATE

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

- ★ COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- ★ WELL OWNER
- ★ MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

- PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1513
- PERMIT NUMBER OF REPLACEMENT WELL — —
- PERSON ABANDONING WELL: Bill Kimes
- WELL DRILLERS LICENSE NUMBER: MGD081
  CIRCLE: MWD/MSD/MGD
- OWNER'S NAME: Naval Surface Warfare
- WELL LOCATION: Atkins Road
  COUNTY: Charles County
  NEAREST TOWN: Indian Head
  TAX MAP _____ BLOCK _____ PARCEL _____
  SUBDIVISION: _____
  SECTION: _____ LOT: _____
  NEAREST ROAD: _____

MARYLAND GRID COORDINATES

BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

- TYPE OF WELL BEING ABANDONED:
  - _____ DRILLED
  - _____ JETTED
  - X BORED/AUGUERED
  - _____ HAND DUG
  - _____ OTHER (specify) _____

★ USE CODE:

- _____ DOMESTIC
- _____ MUNICIPAL/PUBLIC
- _____ IRRIGATION
- _____ INDUSTRIAL
- X TEST/OBSERVATION

- TYPE OF CASING:
  - _____ STEEL
  - X PLASTIC
  - _____ CONCRETE
  - _____ OTHER (specify) _____

★ SIZE OF CASING: 1" INCHES IN DIAMETER

- DEPTH OF WELL: 7.5' FEET DEEP

★ WAS ANY CASING REMOVED? X YES _____ NO
if yes, length removed, in feet: _____

★ WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
bentonite	7.5'	0'

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN		LICENSE #	CIRCLE ONE	DATE
Michael W. Huber	Michael W. Huber	MGD046	MWD/MSD/MGD	12/08/97

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

COUNTY NUMBER 97-313-W(M)

ST/CO USE ONLY
DATE Received

DATE WELL COMPLETED: 080697

Depth of Well: 75 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": CH-94-1514

OWNER: Naval Surface Warfare Center
STREET OR RFD: Indian Head Division (last name / first name) TOWN: Indian Head
SUBDIVISION: SECTION: LOT:

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
pale yellow/brown sand & silt	0	7.5'	
*temporary geoprobe points - to be abandoned after installation.			

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

N/A CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD
DRILLERS LIC. NO. MGD046
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. MGD081
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS NO. OF POUNDS
GALLONS OF WATER
DEPTH OF GROUT SEAL (to nearest foot)
from ft. TOP to ft. BOTTOM
(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE: PL
Nominal diameter top (main) casing (nearest inch): 1
Total depth of main casing (nearest foot): 25

OTHER CASING (if used) — EACH CASING: diameter inch, depth (feet) from, to

SCREEN RECORD

screen type or open hole insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	25	75
2			
3			

SLOT SIZE 1 0 2 1 3 0
DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK from to
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3

PUMPING TEST

N/A

HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING ft.
WHEN PUMPING ft.

TYPE OF PUMP USED (for test)
A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible
GEOPROBE

PUMP INSTALLED

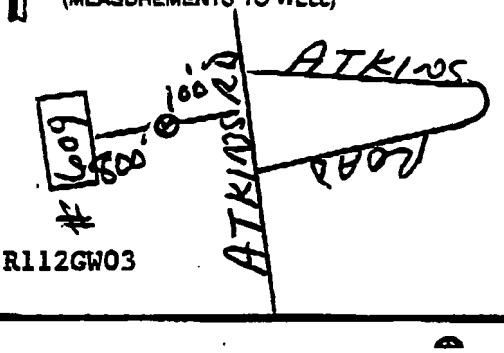
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)
+ above
− below
LAND SURFACE 0 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



ORIGINAL-STATE

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

- ★ COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- ● WELL OWNER
- ★ MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

● PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1514

★ PERMIT NUMBER OF REPLACEMENT WELL — —

★ PERSON ABANDONING WELL: Bill Kimes

WELL DRILLERS LICENSE NUMBER: MGD081

CIRCLE: MWD/MSD/MGD

★ OWNER'S NAME: Naval Surface Warfare

● WELL LOCATION: Atkins Road
COUNTY: Charles County
NEAREST TOWN: Indian Head
TAX MAP _____ BLOCK _____ PARCEL _____
SUBDIVISION: _____
SECTION: _____ LOT: _____
NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

★ TYPE OF WELL BEING ABANDONED:

_____ DRILLED _____ JETTED
X BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

● USE CODE:

_____ DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
X TEST/OBSERVATION

★ TYPE OF CASING:

_____ STEEL X PLASTIC
_____ CONCRETE _____ OTHER (specify) _____

★ SIZE OF CASING: 1" INCHES IN DIAMETER

● DEPTH OF WELL: 7.5' FEET DEEP

● WAS ANY CASING REMOVED? X YES _____ NO
if yes, length removed, in feet: _____

★ WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
bentonite	7.5	0'

Michael W. Huber — Michael W. Huber — MGD046 — MWD/MSD/MGD — 12/08/97

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # — CIRCLE ONE — DATE

C 1 9335 — SEQUENCE NO. (MDE USE ONLY) (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-314-W(M)

ST/CO USE ONLY DATE Received

DATE WELL COMPLETED 08 05 97

Depth of Well 9 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH-94-1515

OWNER Naval Surface Warfare Center

STREET OR RFD Indian Head Division (last name first name) TOWN Indian Head

SUBDIVISION ____ SECTION ____ LOT ____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
light brown silt and sand	0	8	
black fill	8	9'	
water @ approx 4'			
*temporary geoprobe points - to be abandoned after installation.			

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N — N/A

CIRCLE APPROPRIATE LETTER
- A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD

DRILLERS LIC. NO. MGD046

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. MGD081

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS ____ NO. OF POUNDS ____

GALLONS OF WATER ____

DEPTH OF GROUT SEAL (to nearest foot) from ____ ft. (TOP) to ____ ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	1	4

OTHER CASING (If used)
EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below

ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2

EACH SCREEN	TYPE	DEPTH (nearest ft.)	
1	PL	4	9
2			
3			

SLOT SIZE 1 0 2 1 3 0

DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK from ____ to ____

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER) — T ____ (E.R.O.S.) ____ W Q ____

TELESCOPE LOG OTHER DATA

C 3 — N/A

PUMPING TEST
HOURS PUMPED (nearest hour) ____

PUMPING RATE (gal. per min.) ____

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ ft.

WHEN PUMPING ____ ft.

TYPE OF PUMP USED (for test)

A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible

GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

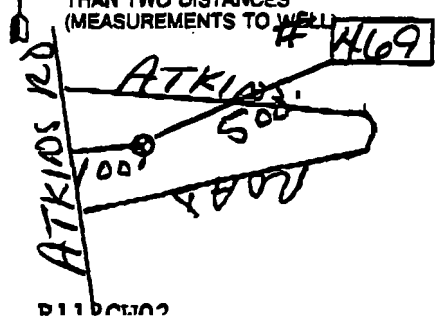
PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height) + above, − below — LAND SURFACE 0 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

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WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

- ★ COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- ★ WELL OWNER
- ★ MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

★ PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1515

● PERMIT NUMBER OF REPLACEMENT WELL — —

● PERSON ABANDONING WELL: Bill Kimes

WELL DRILLERS LICENSE NUMBER: MGD081
CIRCLE: MWD/MSD/MGD

● OWNER'S NAME: Naval Surface Warfare

★ WELL LOCATION: Atkins Road
COUNTY: Charles County
NEAREST TOWN: Indian Head
TAX MAP _____ BLOCK _____ PARCEL _____
SUBDIVISION: _____
SECTION: _____ LOT: _____
NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

★ TYPE OF WELL BEING ABANDONED:

_____ DRILLED _____ JETTED
X BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

★ USE CODE:

_____ DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
X TEST/OBSERVATION

★ TYPE OF CASING:

_____ STEEL X PLASTIC
_____ CONCRETE _____ OTHER (specify) _____

★ SIZE OF CASING: 1" INCHES IN DIAMETER

● DEPTH OF WELL: 9' FEET DEEP

★ WAS ANY CASING REMOVED? X YES _____ NO
if yes, length removed, in feet: _____

● WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
bentonite	9'	0'

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN	Michael W. Huber	MGD046	MWD/MSD/MGD	12/08/97
		LICENSE #	CIRCLE ONE	DATE

C 1 9336 SEQUENCE NO. (MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-315-W(M)

ST/CO USE ONLY
DATE Received

DATE WELL COMPLETED 08 05 97

Depth of Well 9.5 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH-94-1516

OWNER Naval Surface Warfare Center
STREET OR RFD Indian Head Division (last name) (first name) TOWN Indian Head
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
pale yellow/ brown silt and sand to silt	0	8	
yellow/brown clayey silt and sand	8	9.5	
water @ approx 8'			
*temporary geoprobe points - to be abandoned after installation.			

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N

N/A CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD
DRILLERS LIC. NO. MGD046
Michael W. Kahler
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. MGD081
Bill Smith
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permitee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS ____ NO. OF POUNDS ____
GALLONS OF WATER ____
DEPTH OF GROUT SEAL (to nearest foot)
from ____ ft. TOP to ____ ft. BOTTOM (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE: PL
Nominal diameter top (main) casing (nearest inch): 1
Total depth of main casing (nearest foot): 4.5

OTHER CASING (if used)
EACH CASING — diameter inch — depth (feet) from — to

SCREEN RECORD
screen type or open hole insert appropriate code below
ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2
EACH SCREEN — DEPTH (nearest ft.)
1 PL 4.5 9.5
2
3
SLOT SIZE 1 .0 2 .1 3 .0
DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK — from — to
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER) —
T (E.R.O.S.) W Q
TELESCOPE LOG OTHER DATA

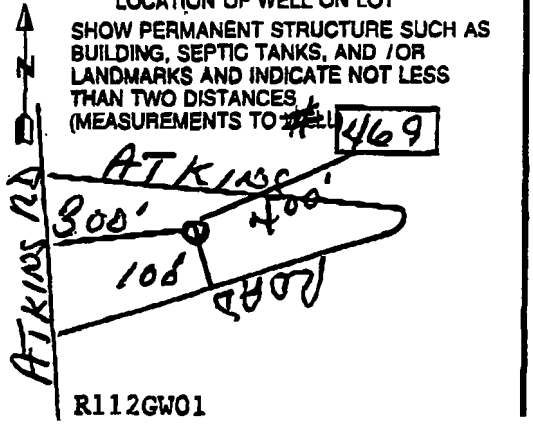
C 3

PUMPING TEST
N/A
HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING ____ ft.
WHEN PUMPING ____ ft.

TYPE OF PUMP USED (for test)
A air P piston T turbine
C centrifugal R rotary O other (describe below)
J jet S submersible
GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)
CASING HEIGHT (circle appropriate box and enter casing height)
+ above
− below
LAND SURFACE 0 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R112GW01

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

- ★ COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- ★ WELL OWNER
- • MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

★ PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1516

• PERMIT NUMBER OF REPLACEMENT WELL — —

• PERSON ABANDONING WELL: Bill Kimes

WELL DRILLERS LICENSE NUMBER: MGD081

CIRCLE: MWD/MSD/MGD

★ OWNER'S NAME: Naval Surface Warfare

• WELL LOCATION: Atkins Road
COUNTY: Charles County
NEAREST TOWN: Indian Head
TAX MAP _____ BLOCK _____ PARCEL _____
SUBDIVISION: _____
SECTION: _____ LOT: _____
NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

• TYPE OF WELL BEING ABANDONED:

_____ DRILLED _____ JETTED
X BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

★ USE CODE:

_____ DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
X TEST/OBSERVATION

• TYPE OF CASING:

_____ STEEL X PLASTIC
_____ CONCRETE _____ OTHER (specify)

• SIZE OF CASING: 1" INCHES IN DIAMETER

★ DEPTH OF WELL: 9.5 FEET DEEP

★ WAS ANY CASING REMOVED? X YES _____ NO
if yes, length removed, in feet: _____

• WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
bentonite	9.5	0

Michael W. Huber — Michael W. Huber MGD046 MWD/MSD/MGD 12/08/97

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN LICENSE # CIRCLE ONE DATE

C 1 3147 (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-505-W(M)

ST/CO USE ONLY DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM DD YY 10 09 97 18 20

Depth of Well 22 6' 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 1706 28 29 30 31 32 33 34 35 36 37

OWNER US Naval Surface Warfare Center 6511
STREET OR RFD Indian Head Division (last name / first name) TOWN Idnain Head 20640
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
silt, sand and gravel	0	6'	
water @ approx 2'+			

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N

N/A

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: MG D 046
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO.: MG D 081
SITE SUPERVISOR (sign. of driller or journeyman

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 44 no N 44
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM 45 BENTONITE CLAY BC 46
NO. OF BAGS 1 NO. OF POUNDS 200
GALLONS OF WATER 7
DEPTH OF GROUT SEAL (to nearest foot) 9"
from 0 TOP 52 ft. to 9 BOTTOM 58 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE PL 60 61 Nominal diameter top (main) casing (nearest inch) 1 63 64 Total depth of main casing (nearest foot) 1 66 70

EACH CASING — OTHER CASING (if used) diameter inch depth (feet) from to

SCREEN RECORD
screen type or open hole insert appropriate code below
ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2 1 2 DEPTH (nearest ft.)
EACH SCREEN 1 PL 8 9 1 11 15 6 17 21
2 23 24 26 30 32 36
3 38 39 41 45 47 51
SLOT SIZE 1 0 2 1 3 0
DIAMETER OF SCREEN 1 56 60 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 from 9" to 6 68

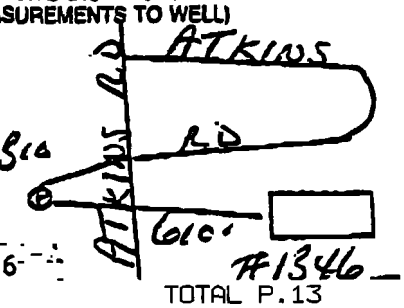
MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 72 74 75 76

C 3 1 2 N/A

PUMPING TEST
HOURS PUMPED (nearest hour) 8 9
PUMPING RATE (gal. per min.) 11 15
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING 17 20 ft.
WHEN PUMPING 22 25 ft.
TYPE OF PUMP USED (for test)
A air 27 P piston 27 T turbine 27
C centrifugal 27 R rotary 27 O other (describe below) 27
J jet 27 S submersible
GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. 29
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 31 35
PUMP HORSE POWER 37 41
PUMP COLUMN LENGTH (nearest ft.) 43 47
CASING HEIGHT (circle appropriate box and enter casing height)
+ above 49
− below 49
LAND SURFACE 00 50 51 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



S12WP06 #1346

C 1 [illegible] (MDE USE ONLY)

1 2 3 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-506-W(M)

ST/CO USE ONLY
DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM DD YY 10 09 97 (15 20)

Depth of Well 22 10' 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 1707 (28 29 30 31 32 33 34 35 36 37)

OWNER US Naval Surface Warfare Center (6512)
(last name first name)
STREET OR RFD Idnian Head Division TOWN Indian head
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
brown silt w/gravel	0	7	
gray/brown silt and sand	7	9	
gray/brown silt w/wood	9	10'	
water @ approx	4.5'		

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes [Y] no [N] N/A

CIRCLE APPROPRIATE LETTER
- A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CERTIFICATE PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M G D 046 1
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M G D 081 1
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] (44) no [N] (44)

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [C M] (45 46) BENTONITE CLAY [B C]

NO. OF BAGS 1 NO. OF POUNDS 100
GALLONS OF WATER 7
DEPTH OF GROUT SEAL (to nearest foot)
from 0 (48 TOP 52) ft. to 3 (54 BOTTOM 56) ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL (60 61)	1 (63 64)	4 (66 70)

EACH CASING — OTHER CASING (if used)

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below

[S T] STEEL [B R] BRASS BRONZE [H O] OPEN HOLE [P L] PLASTIC [O T] OTHER

C 2 (1 2)

EACH SCREEN — DEPTH (nearest ft.)

1	PL (8 9)	4 (11 15)	10 (17 21)
2	(23 24)	(26 30)	(32 36)
3	(38 39)	(41 45)	(47 51)

SLOT SIZE 1 10 2 1 3 0

DIAMETER OF SCREEN 1 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from 3 to 10 (68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 ____ 72 ____ 74 75 76
TELESCOPE CASING — LOG INDICATOR — OTHER DATA

C 3 (1 2)

PUMPING TEST N/A

HOURS PUMPED (nearest hour) ____ (8 9)

PUMPING RATE (gal. per min.) ____ (11 15)

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ (17 20) ft.

WHEN PUMPING ____ (22 25) ft.

TYPE OF PUMP USED (for test)

[A] air (27) [P] piston (27) [T] turbine (27)
[C] centrifugal (27) [R] rotary (27) [O] other (describe below) (27)
[J] jet (27) [S] submersible

GEOPROBE

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. ____ (29)

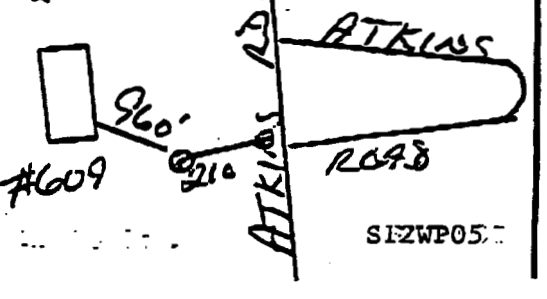
CAPACITY: GALLONS PER MINUTE (to nearest gallon) ____ (31 35)

PUMP HORSE POWER ____ (37 41)

PUMP COLUMN LENGTH (nearest ft.) ____ (43 47)

CASING HEIGHT (circle appropriate box and enter casing height)
[+] above (49) / [−] below (49) LAND SURFACE 00 (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



S12WP05

C | 3 | 1 | 1 (MDE USE ONLY)

1 2 3 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-507-W(M)

ST/CO USE ONLY
DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM DD YY 10 09 97 (15–20)

Depth of Well 22 -10' 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 1708 (28 29 30 31 32 33 34 35 36)

OWNER US Naval Surface Warfare Center 6513
STREET OR RFD Indian head Division (last name / first name) TOWN Indian Head
SUBDIVISION ____ SECTION ____ LOT ____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
brown silt	0	2	
yellow brown clayey silt, w/fill	2	5	
gray clayey silt and sand	5	10'	
water @ approx 2'			

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N
N/A

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M G D 046 1
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. M G D 081 1
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 44 no N 44
TYPE OF GROUTING MATERIAL (Circle one) CEMENT CM BENTONITE CLAY BC
NO. OF BAGS ____ NO. OF POUNDS 100
GALLONS OF WATER 3
DEPTH OF GROUT SEAL (to nearest foot) from 0 (48 TOP 52) ft. to 3 (54 BOTTOM 58) ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL (60 61)	1 (63 64)	4 (66 70)

OTHER CASING (if used) EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2 (1 2)

EACH SCREEN		DEPTH (nearest ft.)	
1	PL (8 9)	4 (11 15)	10 (17 21)
2	(23 24)	(26 30)	(32 35)
3	(38 39)	(41 45)	(47 51)

SLOT SIZE 1 0 2 1 3 0

DIAMETER OF SCREEN 1 (54 55) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 3 to 10

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 ____ 72 ____ 74 75 76
TELESCOPE CASING LOG INDICATOR OTHER DATA

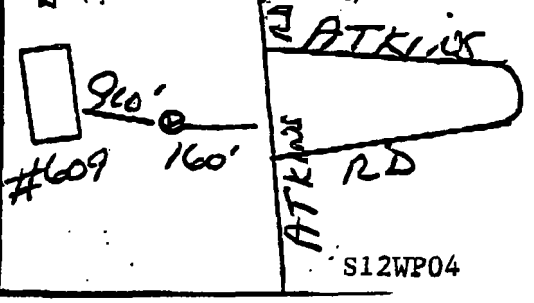
C 3 (1 2)

PUMPING TEST
N/A

HOURS PUMPED (nearest hour) ____ (8 9)
PUMPING RATE (gal. per min.) ____ (11 1)
METHOD USED TO MEASURE PUMPING RATE ____
WATER LEVEL (distance from land surface)
BEFORE PUMPING ____ (17 20) ft.
WHEN PUMPING ____ (22 25) ft.
TYPE OF PUMP USED (for test)
A air (27), P piston (27), T turbine (27), C centrifugal (27), R rotary (27), O other (describe below) (27), J jet (27), S submersible
GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. (29)
CAPACITY: GALLONS PER MINUTE (to nearest gallon) ____ (31 35)
PUMP HORSE POWER ____ (37 41)
PUMP COLUMN LENGTH (nearest ft.) ____ (43 47)
CASING HEIGHT (circle appropriate box and enter casing height) + above, − below (49) LAND SURFACE 60 (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



S12WP04

C 1 3752 — SEQUENCE NO. (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-508-W(M)

ST/CO USE ONLY DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM DD YY 10 09 97 (15–20)

Depth of Well 22 71 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 1709 (28 29 30 31 32 33 34 35 36 37)

OWNER US Naval Surface Warfare Center (last name) 6514 (first name)

STREET OR RFD Indian Head Division TOWN Indian Head

SUBDIVISION ____ SECTION ____ LOT ____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow silt and sand	0	3	
brown gravel, tr silt & clay	3	5	
black silt & gravel	5	7'	
water @ approx 2'			

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes [Y] no [N]

N/A CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M G D 046

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M G D 081

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] no [N]

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS 1 NO. OF POUNDS 100

GALLONS OF WATER 7

DEPTH OF GROUT SEAL (to nearest foot) from 0 ft. to 9" ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	1	1

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below

[S T] STEEL [B R] BRASS BRONZE [H O] OPEN HOLE [P L] PLASTIC [O T] OTHER

C 2 DEPTH (nearest ft.)

EACH SCREEN			
1	PL	1	7
2			
3			

SLOT SIZE 1 10 2 1 3 0

DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from 9" to 7

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE LOG

C 3

PUMPING TEST
N/A

HOURS PUMPED (nearest hour) ____

PUMPING RATE (gal. per min.) ____

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ ft.

WHEN PUMPING ____ ft.

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

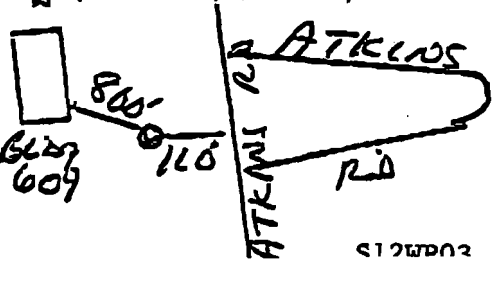
CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height) [+] above [−] below LAND SURFACE 00 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



S12WR03

C1 0100 (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-510-W(M)

ST/CO USE ONLY
DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM 10 DD 08 YY 97 (15–20)

Depth of Well 22 7.5 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH 94 1710 (28 29 30 31 32 33 34 35 36 37)

OWNER US Naval SUrfaec Warfare Cetner (last name) 6515
STREET OR RFD Indian Head Division (first name) TOWN Indian Head
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
brown sand and gravel	0	7.5	
water @ approx 2'			

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N
N/A

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M G D 046
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M G D 081
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permitee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y (44) no N (44)
TYPE OF GROUTING MATERIAL (Circle one) CEMENT CM (45–46) BENTONITE CLAY BC (45–46)
NO. OF BAGS 1 NO. OF POUNDS 100
GALLONS OF WATER ____
DEPTH OF GROUT SEAL (to nearest foot) from 0 (48 TOP 52) ft. to 10 (54 BOTTOM 58) ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL (60 61)	1 (63 64)	1.5 (66 70)

OTHER CASING (if used) EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2 (1 2) DEPTH (nearest ft.) EACH SCREEN

	TYPE	from	to
1	PL (8 9)	1.5 (11 15)	7.5 (17 21)
2	(23 24)	(26 30)	(32 36)
3	(38 39)	(41 45)	(47 51)

SLOT SIZE 1 0 2 1 3 0

DIAMETER OF SCREEN 1 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 65: from 1.0 to 7.5 (65)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 TELESCOPE CASING 72 LOG INDICATOR 74 75 76 OTHER DATA

C 3 (1 2)

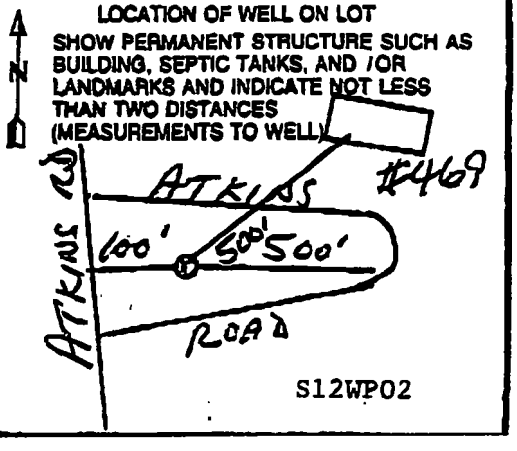
PUMPING TEST
N/A

HOURS PUMPED (nearest hour) ____ (8 9)
PUMPING RATE (gal. per min.) ____ (11 15)
METHOD USED TO MEASURE PUMPING RATE ____
WATER LEVEL (distance from land surface)
BEFORE PUMPING ____ (17 20) ft.
WHEN PUMPING ____ (22 25) ft.

TYPE OF PUMP USED (for test)
A air (27), P piston (27), T turbine, C centrifugal (27), R rotary (27), O other (describe below) (27), J jet (27), S submersible (27)
GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. ____ (29)
CAPACITY: GALLONS PER MINUTE (to nearest gallon) ____ (31 35)
PUMP HORSE POWER ____ (37 41)
PUMP COLUMN LENGTH (nearest ft.) ____ (43 47)
CASING HEIGHT (circle appropriate box and enter casing height)
+ above (49), − below (49) LAND SURFACE 00 (50 51) (nearest) foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



S12WP02

C 1 3154 (MDE USE ONLY)
1 2 3 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-511-W(M)

ST/CO USE ONLY
DATE Received MM DD YY
8 13

DATE WELL COMPLETED MM 10 DD 08 YY 97
15 20

Depth of Well 22 7 28
(TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL"
CH - 94 - 1711
28 29 30 31 32 33 34 35 36 37

OWNER US Naval Surface Warfare Center 6516
STREET OR RFD Indian Head Division TOWN Indian Head
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
dark brown sand and gravel	0	7'	
water @ approx 2'			

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N
N/A

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE GARTHONER PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M G D 046
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M G D 081
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 43 no N 44

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM 45 BENTONITE CLAY BC 46

NO. OF BAGS 1 NO. OF POUNDS 100
GALLONS OF WATER 7
DEPTH OF GROUT SEAL (to nearest foot)
from 0 48 TOP 52 ft. to 9' 54 BOTTOM 58 ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL (60 61)	1 (63 64)	1 (66 70)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below
ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2
DEPTH (nearest ft.)

EACH SCREEN			
1	PL (8 9)	1 (11 15)	7 (17 21)
2	(23 24)	(28 30)	(32 36)
3	(38 39)	(41 45)	(47 51)

SLOT SIZE 1 10 2 1 3 0

DIAMETER OF SCREEN 1 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68
from 9' to 7

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W O
70 TELESCOPE CASING
72 LOG INDICATOR
74 75 76 OTHER DATA

C 3
1 2

PUMPING TEST
N/A

HOURS PUMPED (nearest hour) 8 9

PUMPING RATE (gal. per min.) 11 15

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING 17 20 ft.

WHEN PUMPING 22 25 ft.

TYPE OF PUMP USED (for test)
A air (27) P piston (27) T turbine (27)
C centrifugal (27) R rotary (27) O other (describe below) (27)
J jet (27) S submersible
GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. 29

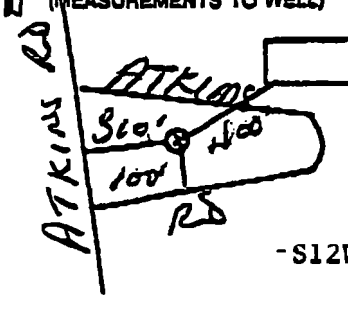
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 31 35

PUMP HORSE POWER 37 41

PUMP COLUMN LENGTH (nearest ft.) 43 47

CASING HEIGHT (circle appropriate box and enter casing height)
+ above
- below
LAND SURFACE
2 (nearest foot) 50 51

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



-S12W001

APPENDIX B

TEST PIT LOGS

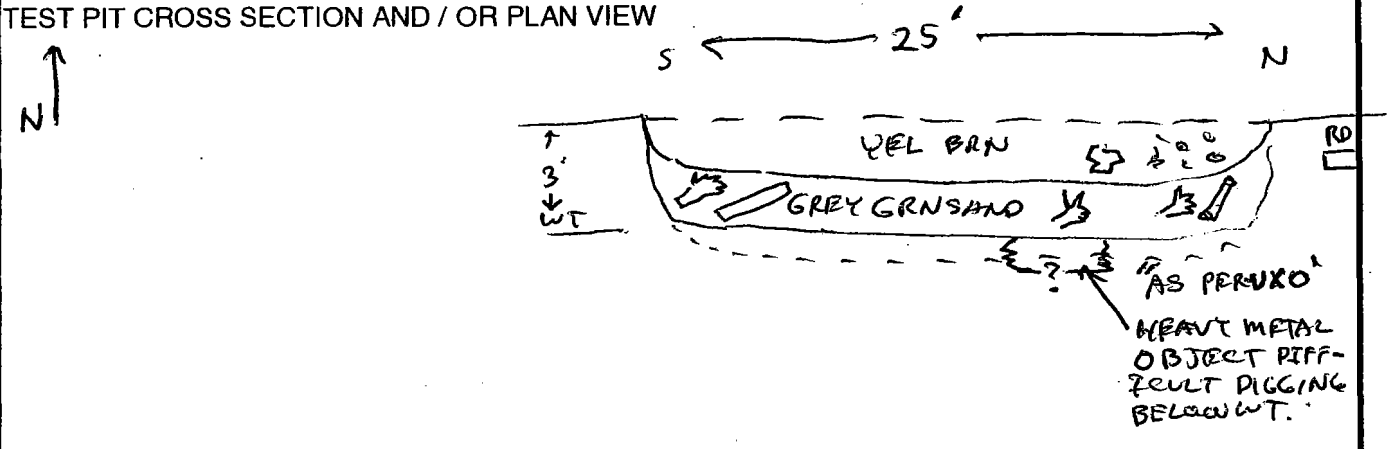
TEST PIT LOG

Tetra Tech NUS, Inc.

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC
TEST PIT No.: S12 TP01
DATE: 9-14-99
GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		YELLOW BRN SAND & SILT	SP			
2						
3		GREY GRN SAND + GRAVEL	GP	METAL		
		ABUNDANT CONCRETE BLOCKS		OBJECT		
		ABUNDANT SOME WOOD LOGS		ENC. @ ~3'		
		CHARRED WOOD, SLIGHT ODOR			0	0
		H_2O @ 3' BLS		WATER IN		
		CONTINUE TO TRENCH BACK TO THE		POND HIGH!		
		RD. (NORTH) GRAVEL INC AMOUNT		HEAVY METAL		
		WOOD & CONCRETE ~~DIMINISHES~~ INC TO THE NORTH.		OBJECT NOT		
		COPPER CABLE @ NORTHERN		UNCOVERED BELOW WT.		
		END, WOOD, CONCRETE, TRACE METAL				
		DEBRIS ENC TO NORTHERN EXTENT		SAWED WOOD LOGS		
		MARKED BY RD/WATER LINE		STUMPS CHARRED		
				SLIGHT ODOR NO PID RESP.		

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: START 1250 HRS FINISH 1320 HRS

PHOTO LOG: #27, LOOKING TO THE NORTH, STANDING @ THE SOUTH END.

TEST PIT LOG

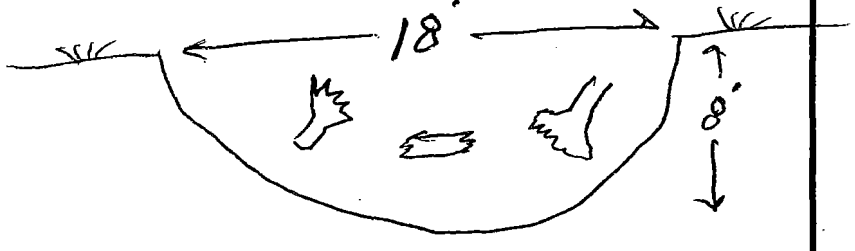
Tetra Tech NUS, Inc.

PROJECT NAME: SITES 12,41,42 PRE-FS TEST PIT No.: S12TP03
PROJECT NUMBER: 7129 DATE: 9-14-99
LOCATION: INDIAN HEAD NSWC GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		YEL BRN TOP				
2		DISTINCT BLK LAYER (ASH) 6"				
3		ABUNDANT WOOD, LOGS CUT,				
4		FINNISH WOOD CHARRED HEAVILY				
5		STAINED SOILS INTERLAYER				
6		GREY SILT. METAL DEBRIS ½" CABLE		(RARE METAL)		
		ABUNDANT WOOD FRAGS			0	0
		LANDSCAPING DEBRIS				
8		LEAVES, SHRUBS, ETC.				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

FINNISH DIGGING @ 1500
BACK FILLED @ 1520



REMARKS: BASED ON WASTE ENCOUNTERED HERE, WILL NOT DO TP02, TP04 + TP05

PHOTO LOG: #23 AND #22 LOOK NORTH

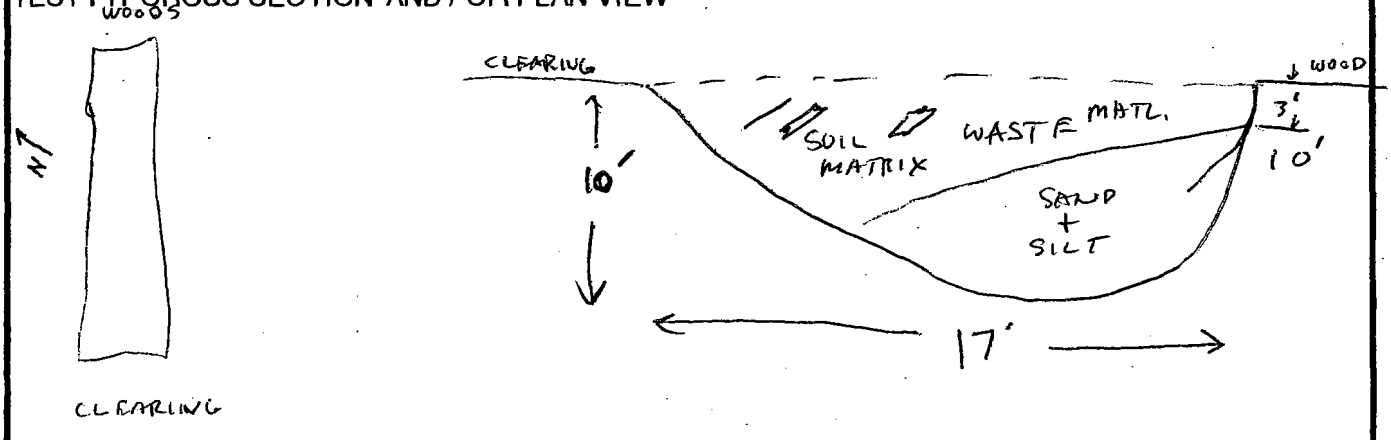
Tetra Tech NUS, Inc.

TEST PIT LOG

PROJECT NAME: SITES 12,41,42 PRE-FS TEST PIT No.: S12TP07
PROJECT NUMBER: 7129 DATE: 9-14-99
LOCATION: INDIAN HEAD NSWC GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		YEL BRN SAND + SILT,			0	0
2		WASTE ABUNDANT, METAL		DRY		
3		WOOD FRAG. GLASS, CONDUIT				
4		PLASTIC ALUMINU GUTTERS			0	0
5		TERRA COTTA ETC		MOIST		
6						
7						
8						
9		FINISHED @				
10		1715 HRS				

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS:

PHOTO LOG: #21 and #20

Tetra Tech NUS, Inc.

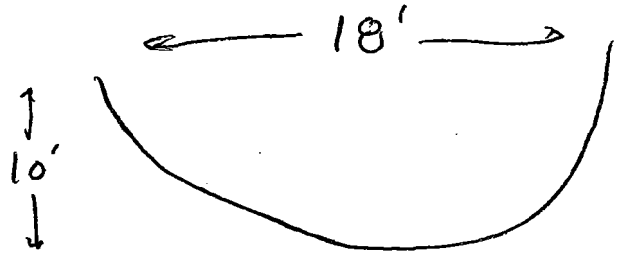
TEST PIT LOG

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC
TEST PIT No.: S12TP09
DATE: 9-15-99
GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		YEL BRN SAND + SILT	SP			
2		MOTTLED GREY INC				
3		DOWNWARD AND SILT				
4		CONT. INC DOWNWARD				
5						
6						
7			SP/SM			
8		TR CLAY				
9						
10			SP/SM			
		"NO WASTE"				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

HARD RAIN
NO PID READINGS
TAKEN.



REMARKS: START DIG @ 1130

PHOTO LOG: #19

Tetra Tech NUS, Inc.

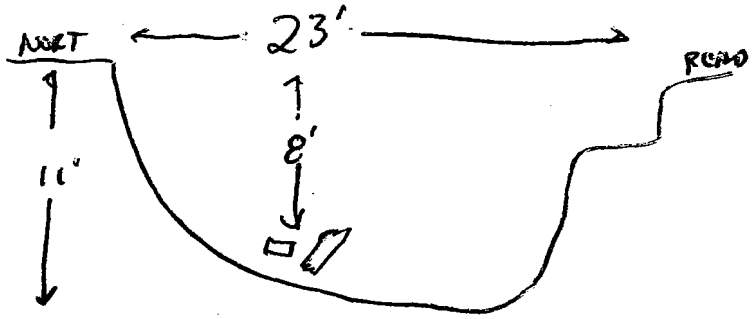
TEST PIT LOG

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC
TEST PIT No.: S12TP10
DATE: 9-15-99
GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		YEL BRN SAND TR SIL				
2		MOTTLED		NO WASTE		
3		↓		TO 3'		
4		GREY SAND & SILT		EXTENDED		
5				PIT TO THE		
6				NORTH ~10'		
7						
8						
9				@8' RARE		
10		↓		BRICK+WOOD		
11				ENCOUNTER		
12		WALL COLLASPED				
		"NEAR MISS"				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

BEGIN DIGGING @ 1205
RAIN NO PID READINGS
COMPLETE DIGGING
@ 1220 BEGIN TO BACKFILL
COMPLETED BACKFILLING
@ 1240



REMARKS:

PHOTO LOG: #18

Tetra Tech NUS, Inc.

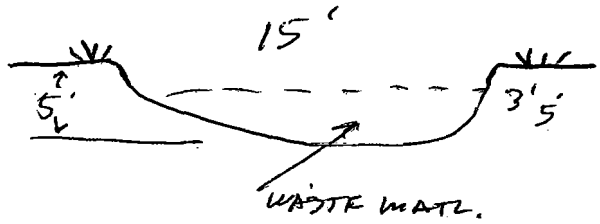
TEST PIT LOG

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC
TEST PIT No.: S12TP011
DATE: 9-15-99
GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		DK BRN SAND, TR GRA.	SP	MOIST		
2						
3		BLK STAINED SOILS SAND	SP	MOIST		
4		W/ABUNDANT WASTE		ODORIFFROUS		
5		CHARRED WOOD, METAL				
		PLASTIC		RAINY		
				NO PID		
				MEASUREMENTS		
		TD @ 5'				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

BEGIN DIGGING @ 1242
FINNISH DIGGING/BACKFILL 1300



REMARKS: #17

PHOTO LOG: #17

Tetra Tech NUS, Inc.

TEST PIT LOG

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC
TEST PIT No.: S12 TP13
DATE: 9-15-99
GEOLOGIST: FRED W. RAMSER

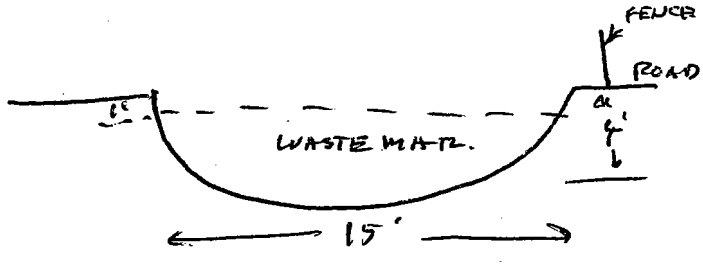
Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1	TOP	YEL ORG SAND, BLK STAIN				
2		SOILS W/ TAR SHINGLES		RAIN		
3		TERRA COTTA, METAL		NO PID		
4		DEBRIS, CONCRETE FRAG		USED		
	TD=4	WOOD (CHARRED)				
		"WASTE ENCOUNTERED"				
		AT ~~FROM~~ 1'-~~3'~~ 4' BGS TO				
		THE BOTTOM				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

START 1430

FINISH 1500

NOTE: MOVE PIT TO THE SOUTH EAST ~20' TO AVOID TELEPHONE POLE.



REMARKS:

PHOTO LOG: #16

Tetra Tech NUS, Inc.

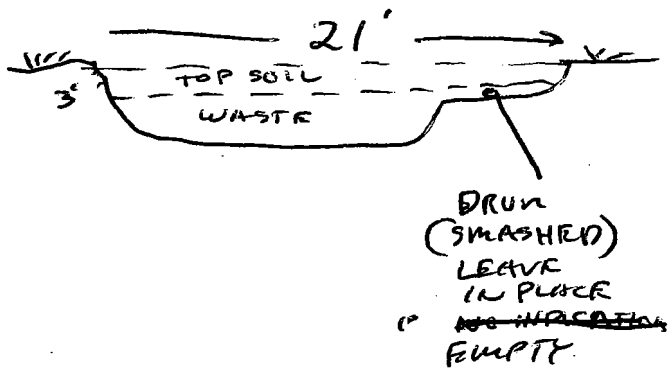
TEST PIT LOG

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC
TEST PIT No.: S12TP14
DATE: 9-15-99
GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		TOP SOIL ~TD-1.5'	SP			
2		WASTE MATL: SAND, WOOD		RAIN		
3		CHARRED WOOD, METAL		NO PID		
				MEASUREMENTS		
		TD @ 3'				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

START 1505
FINISH 1520



REMARKS:

PHOTO LOG: #15

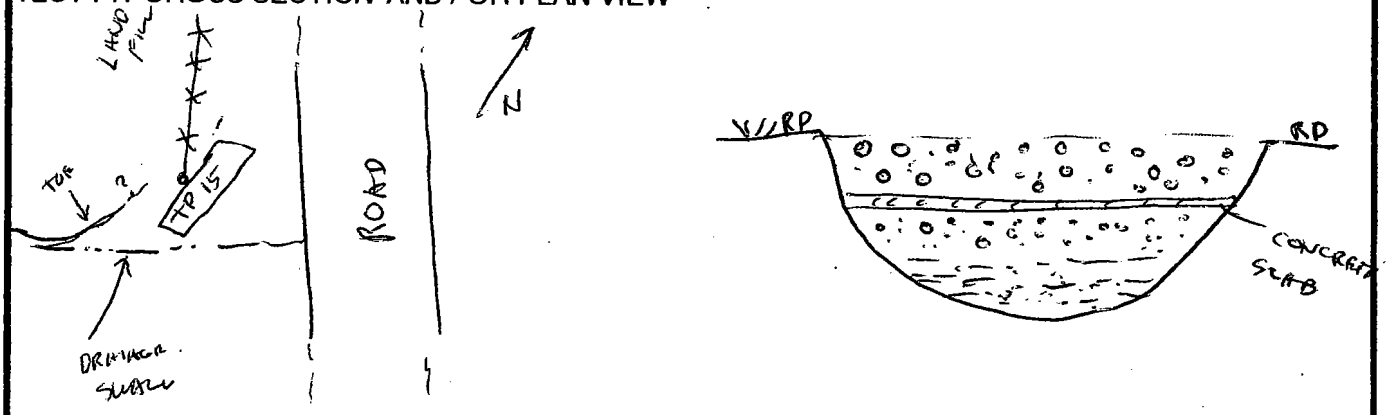
Tetra Tech NUS, Inc.

TEST PIT LOG

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC
TEST PIT No.: S12TP15
DATE: 9-17-99
GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		BRN SAND + GRAVEL	GM			
2		ORG	↓			
3			↓	NO PID		
4		CONCRETE CURB? LENGTH OF	↓	MEASUD		
5		TEST PIT ON THE ROAD SIDE	GM			
6		MAYBE RELIC ROAD SURFACE	SP			
7						
8		YEL BRN. SILT + SAND INC SILT				
9		MOTTLED GREY				
10			SP/SM			
		NO WASTE				

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS:

PHOTO LOG: #11 + #10

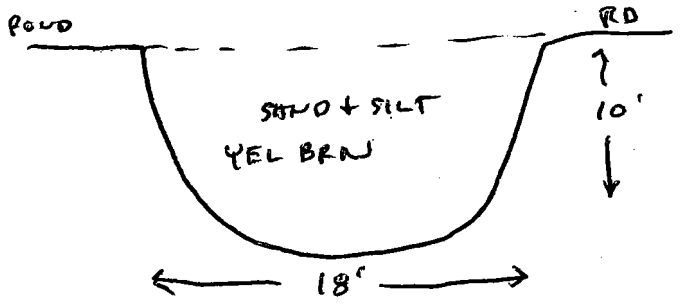
Tetra Tech NUS, Inc.

TEST PIT LOG

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC
TEST PIT No.: S12TP16
DATE: 9-15-99
GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		SAND TR SILT				
2		YEL BRN TO GREY	SP	HARD RAIN		
3				NO PID		
4				READINGS		
5						
6						
7						
8						
9						
10			SP			
		"NO WASTE"				

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS:

PHOTO LOG: #13

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC

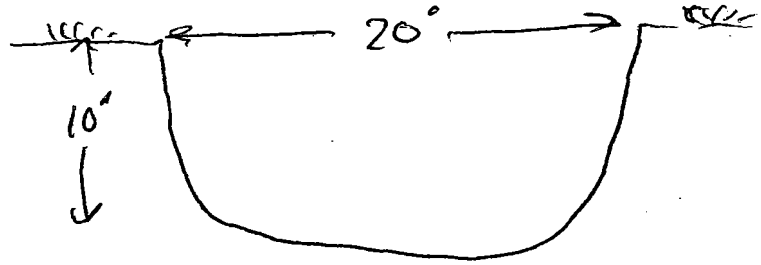
TEST PIT No.: S12 TP ~~02~~ 17 FRF 9-14-99
DATE: 9
GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		YEL BRN SAND + GRA. JR SILT	GP			
2		MOTTLED GREY Δ INC DOWN	SP	DRY	0	0
3		WARD. ORG BRN LAYERING				
4		APPEARS NATURAL.				
5		SILT CONTENT INC DOWNWARD				
6		TR CLAY				
7						
8		BECOMING MOIST @ 8' BGS	SM	MOIST	0	0
		NO H_2O ENCOUNTERED				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

START 1330 FINNISH DIGGING @ 1343 BEGIN TO BACK FILL

NO WASTE!!



FINNISH PIT @ 1400

REMARKS:

PHOTO LOG: #26 LOOKING TO THE NORTH (ROAD)

TEST PIT LOG

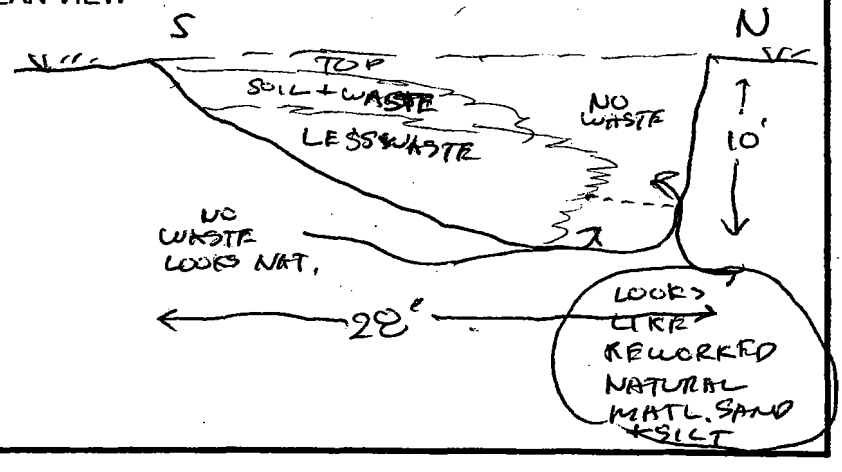
Tetra Tech NUS, Inc.

PROJECT NAME: SITES 12,41,42 PRE-FS
PROJECT NUMBER: 7129
LOCATION: INDIAN HEAD NSWC
TEST PIT No.: S12TP018
DATE: 9-14-99
GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1		YEL BRN SAND, WOOD FRAGS, PLASTIC		CONCRETE		
2		WIRE, BOTTLES (DOMESTIC WASTE		TRACE WASTE		
3		MIXED WELL IN SOIL MATRIX		CUT WOOD		
4		DARK BRN SAND + GRA, RARE		LOGS		
5		WASTE EXTENDED PIT TO THE				
		NORTH, WASTE VERY SPARSE		MOIST		
		SEEMS TO DIMINISH TO THE		GREY DKGREY		
		NORTH				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

START 1405
BEGIN TO BACKFILL @ 1425



REMARKS:

PHOTO LOG: #25 + #24 LOOKING NORTH + WAST PILE IN SOUTH PART.

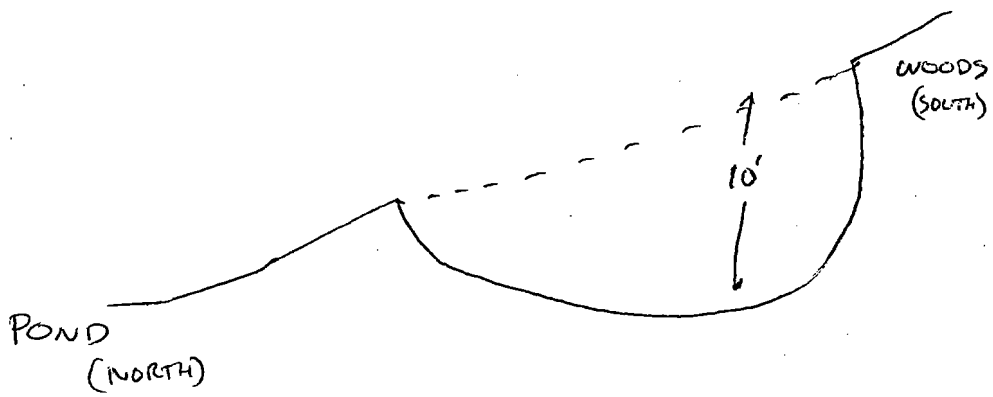
Tetra Tech NUS, Inc.

TEST PIT LOG

PROJECT NAME: SITES 12, 41, 42 PRE-FS TEST PIT No.: S12 TP19
PROJECT NUMBER: 7129 DATE: 9-15-99
LOCATION: INDIAN HEAD NSWC GEOLOGIST: FRED W. RAMSER

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
1			SM/SC			
2		YEL BRN SAND+SILT+CLAY				
3		GRADING DOWNWARD TO				
4		GREY SILT+CLAY				
5		LESSER AMOUNT OF	CL			
6		SAND				
7						
8						
9			CL			
10						

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS:

PHOTO LOG: #12

APPENDIX C

WETLANDS DELINEATION REPORT

Wetland Delineation Report
for
Site 12 (Town Gut Landfill) and Site 42 (Olsen Road Landfill)

Naval Surface Warfare Center
Indian Head Division
Indian Head, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298

Contract Task Order 0245

January 2000

010005/P

WETLAND DELINEATION REPORT FOR SITE 12 (TOWN GUT LANDFILL) AND SITE 42 (OLSEN ROAD LANDFILL)

NAVAL SURFACE WARFARE CENTER
INDIAN HEAD DIVISION
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity Chesapeake
Environmental Branch Code 18
Naval Facilities Engineering Command
Washington Navy Yard, Building 212
Washington, D.C. 20374-2121

Submitted by:
Tetra Tech NUS, Inc.
600 Clark Avenue, Suite 3
King of Prussia, Pennsylvania 19406-1433

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0245

JANUARY 2000

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A	**WETLAND DELINEATION FIELD DATA SHEETS - SITE 12**
B	**WETLAND DELINEATION FIELD DATA SHEETS - SITE 42**

FIGURES

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3-2	Wetland Delineation Map: Site 42	A-3-5

ACRONYMS

ARARs	Applicable, relevant, and appropriate regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DBH	diameter at breast height
EPA	United States Environmental Protection Agency
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
FWS	United States Fish and Wildlife Service
IHDIV-NSWC	Indian Head Division, Naval Surface Warfare Center
MDE	Maryland Department of the Environment
OBL	Obligate Wetland
SCS	United States Soil Conservation Service
TtNUS	Tetra Tech NUS, Inc.
UPL	Obligate Upland
USACE	U.S. Army Corps of Engineers

1.0 INTRODUCTION

Areas meeting the definition of wetlands used by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE), under Section 404 of the Clean Water Act (33 USC 1344), were delineated on those parts of Indian Head Division, Naval Surface Warfare Center (IHDIV-NSWC) designated as Site 12 (Town Gut Landfill) and Site 42 (Olson Road Landfill). The delineation also identified wetlands regulated by the state of Maryland under several natural resource protection acts.

The USACE and EPA define wetlands as "those areas that are inundated or saturated at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (40 CFR 230.3 and 33 CFR 328.3)." Maryland defines wetlands using the same definition but has enacted separate regulations for protecting tidal wetlands (the Maryland Tidal Wetlands Act) and nontidal wetlands (the Maryland Nontidal Wetlands Protection Act).

1.1 PURPOSE

The Navy is investigating Sites 12 and 42 under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 42 USC 9601 et seq.). Section 404 of the Clean Water Act and the Maryland wetland protection regulations constitute Applicable, Relevant, and Appropriate Regulations (ARARs) under CERCLA. Federal agencies such as the Navy are not required to formally apply for permits under ARARs when conducting activities in the context of CERCLA. But agencies are required to comply with the intent of ARARs by protecting environmental resources in a commensurate manner. Compliance with ARARs pertaining to wetland protection requires identifying, mapping, and describing the affected wetland areas. The following report summarizes an effort to map the wetlands on the sites and presents a descriptive baseline that can be used to develop a mitigation plan for restoring or replacing the wetlands, if necessitated by remediation activities.

1.2 SITE DESCRIPTION

The IHDIV-NSWC is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC (Figure 1-1). The main area of the installation occupies a peninsula termed Cornwallis Neck. The peninsula is bounded to the north and west by the Potomac River and to the south by Mattawoman Creek. Both the Potomac River and Mattawoman Creek are tidal. A separate area of the installation, the Annex on Stump Neck, is located across Mattawoman Creek from the main area. Sites 12 and 42 are both located within the main area. The active mission of IHDIV-NSWC includes research, development, testing, evaluation, and support services related to ordnance and explosives.

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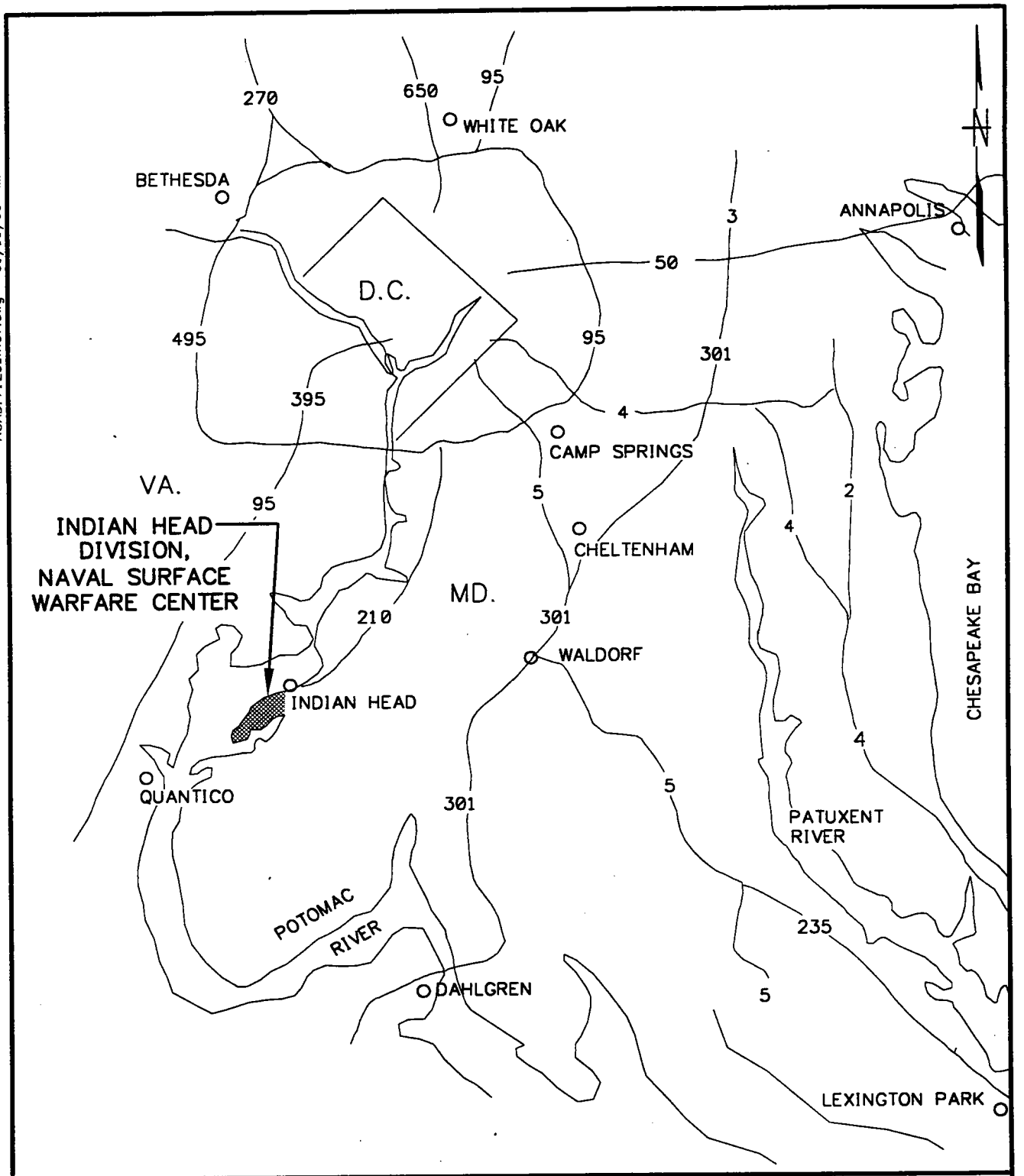

DRAWN BY TAD DATE 4/98	Tetra Tech NUS, Inc.	CONTRACT NO. 7129	OWNER NO. ———
CHECKED BY GVL DATE 02/08/00	VICINITY MAP IHDIV – NSWC, INDIAN HEAD, MARYLAND	APPROVED BY GVL	DATE 02/08/00
COST/SCHED-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 1–1	REV. 0

FORM CADD NO. SOUTH_AV.DWG - REV 0 - 02/07/97

CTO 0245

010005/P

1.2.1 Site 12

Site 12 comprises approximately 4 acres of undeveloped land in the south-central part of the main area (Figure 1-2). The site is bounded to the east, north, and southeast by Atkins Road. Atkins Road Extension crosses the middle of the site in a northwestward orientation, serving as a shortcut between segments of Atkins Road south and north of the site. This road extension divides Site 12 into western and eastern components.

Between 1968 and 1980, the site was used to dispose of landscaping waste, fill material, and rubble. Material generated outside the installation was also deposited at the site prior to 1972. Now abandoned, the landfill is estimated to contain approximately 80,000 cubic yards of material, or approximately 6,400 tons of mixed solid waste material comprising primarily landscaping wastes, tree stumps, and demolition debris. Some unauthorized dumping may have occurred at the landfill prior to closure. Unauthorized materials dumped at the site could have included paints, varnishes, and other chemical wastes (TtNUS, 1999)

The landfilled area is estimated to encompass approximately 1 acre, and the top of the fill is estimated to be approximately 10 to 15 feet over the original ground surface (TtNUS, 1999). The gently sloping surface currently supports perennial grasses and widely scattered deciduous tree saplings. Steeper slopes bordering the landfilled area support mature deciduous forest. The western edge of the site abuts a pond situated upstream of a dam constructed across a cove of Mattawoman Creek. A 72-inch pipe under the dam regulates the water level in the pond and allows excess water to flow out into tidal wetlands bordering Mattawoman Creek. Another 72-inch pipe provides continuity under Atkins Road Extension to another pond in the central part of the site. That pond bisects landfilled areas east of Atkins Road Extension into northern and southern components.

1.2.2 Site 42

Figure 1-2 shows the location of Site 42 on the facility. Site 42 includes approximately 2 acres formerly occupied by a landfill. An Assembly Building (Building 1866) was constructed on part of the abandoned landfill in 1992. An unnamed nontidal tributary to Mattawoman Creek flows southward along the western edge of the former landfill. The site was used for unauthorized disposal of solid wastes between 1982 and 1987 (TtNUS, 1999).

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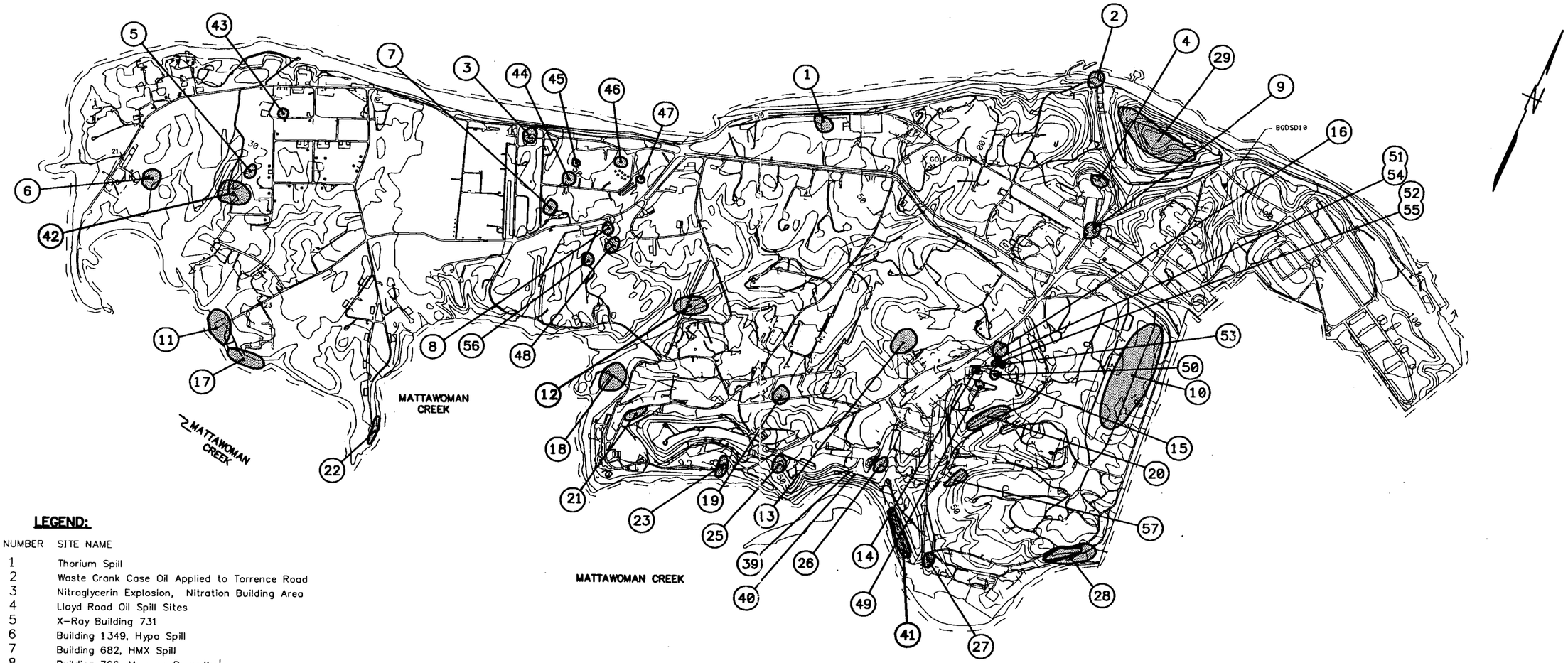

LEGEND:

SITE NUMBER	SITE NAME
1	Thorium Spill
2	Waste Crank Case Oil Applied to Torrence Road
3	Nitroglycerin Explosion, Nitration Building Area
4	Lloyd Road Oil Spill Sites
5	X-Ray Building 731
6	Building 1349, Hypo Spill
7	Building 682, HMX Spill
8	Building 766, Mercury Deposits
9	Patterson Avenue, Oil Spill
10	Single-base Propellant Grains Spill
11	Caffee Road Landfill
12	**Town Gut Landfill**
13	Paint Solvents Disposal Ground
14	Waste Acid Disposal Pit
15	Mercury Deposits in Manhole, Flourine Lab
16	Laboratory Chemical Disposal
17	Disposal Metal Parts Along Shoreline
18	Hog Island
19	Catch Basins at Chip Collection Houses
20	Single-base Powder Facilities
21	Bronson Road Landfill
22	NG Slums Burning Site
23	Hydraulic Oil Spill Discharges From Extrusion Plant
24	Abandoned Drain Lines
25	Hypo Discharge X-Ray Building No. 2
26	Thermal Destructor 2
27	Thermal Destructor 1
28	Original Burning Ground
29	The Valley
30-38	Stump Neck Annex (SEE FIGURE 3-2)
39	Organic Plant Outfall
40	Palladium Catalyst in Sediments
41	**Scrap Yard**
42	**Olson Road Landfill**
43	Toluene Disposal Site
44	Soak Out Area
45	Abandoned Drums
46	Cadmium Sandblast Grit
47	Mercuric Nitrate Disposal Area
48	Nitroglycerine Plant Disposal Area
49	Chemical Disposal Area
50	Building 103, Crawl Space
51	Building 101, Dry Wall
52	Building 102, Dry Wall
53	Mercury Contamination of the Sewage System
54	Building 101
55	Building 102
56	IW87 - Lead Contamination
57	TCE Building 292 Area

APPROXIMATE SITE LOCATION
INTERMITTENT STREAM
NAVAL RESERVE BOUNDARY
100 CONTOUR INTERVAL 10 FEET
FLOW DIRECTION

0 1600 3200
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY KW DATE 3/30/99
CHECKED BY GJL DATE 02/09/00
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SITE LOCATION MAP
INDIAN HEAD NSWC
INDIAN HEAD, MARYLAND

CONTRACT NO. 7129
OWNER NO.
APPROVED BY GJL DATE 02/09/00
APPROVED BY DATE
DRAWING NO. FIGURE 1-2
REV. 0

FORM CADD NO. SOUTH_BH.DGN - REV 0 - 02/11/97

010005/P

CTO 0245

Areas of the former landfill not occupied by Building 1866 and its parking lot currently support perennial grasses and widely scattered deciduous tree saplings. Two drainage ditches cross that part of the abandoned landfill north of Building 1866. Another drainage ditch is located close to the southern edge of the site and receives outflow from a drainage pipe (Outfall IW71). Areas west and south of the abandoned landfill support mature deciduous forest vegetation. Areas to the east and north are occupied by other facilities.

2.0 WETLAND DELINEATION METHODOLOGY

The wetland delineation followed the routine on-site methodology in the Corps of Engineers Wetlands Delineation Manual (1987 Manual) (Environmental Laboratory, 1987) and the USACE-issued memorandum on clarification and interpretation of that manual (USACE, 1992). Field data on vegetation, soils, and hydrology at points on representative transects perpendicular to each wetland were used to determine the exact position of each wetland boundary.

2.1 WETLAND DELINEATION BACKGROUND

Wetlands, as regulated under Section 404 of the Clean Water Act, are defined in 33 CFR 328 as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

For an area to be identified as a wetland according to the 1987 Manual, it must display positive evidence of each of three parameters:

- Hydrophytic vegetation
- Hydric soil
- Wetland hydrology

The 1987 Manual defines each parameter and lists specific field indicators that may be used to document evidence for each. Certain specific exceptions, under which wetlands may not necessarily show evidence of each parameter, are noted in the 1987 Manual. These exceptions pertain to disturbed areas and certain areas of exceptional complexity termed "problem areas."

2.2 WETLAND DELINEATION PROCEDURES

Each site was initially walked to determine those areas where wetlands could potentially be present. Representative transects were then established perpendicular to each area of potential wetlands. Vegetation, soil, and hydrology data were collected at each data point on the transects, as follows:

Vegetation: Each plant species observed within a 30-foot-diameter circular quadrant surrounding the center of each data point was recorded (a nested 5-foot-diameter quadrant was utilized to record herbaceous vegetation). Dominant species were determined, on the basis of estimated percent areal cover, for each of the following vegetative strata:

- Canopy - Trees over 5 inches in diameter at breast height (DBH)
- Saplings - Woody plants over 20 feet in height but under 5 inches DBH
- Shrubs - Woody plants under 20 feet in height
- Herbaceous Groundcover - Nonwoody plants and woody seedlings under 3 feet in height
- Woody Vines - Woody vines attached to the trunks of trees or saplings

The wetland indicator status for each dominant species was then recorded according to Reed (1988). Indicator statuses include the following:

- Obligate Wetland (OBL) - Species recognized as occurring in wetlands greater than 99 percent of the time.

- Facultative Wetland (FACW) - Species recognized as occurring in wetlands 67 to 99 percent of the time.

- Facultative (FAC) - Species equally likely to occur in wetlands or uplands (nonwetlands).

- Facultative Upland (FACU) - Species recognized as occurring in wetlands 1 to 33 percent of the time.

- Obligate Upland (UPL) - Species recognized as occurring in wetlands less than 1 percent of the time.

The 1987 Manual states that areas within which greater than 50 percent of the dominant plant species are OBL, FACW, and FAC display evidence of hydrophytic vegetation. Modifiers of "+" and "-" are added to the indicator statuses of plants considered to be slightly more or less prone to occur in wetlands than indicated by the indicator status alone. Species designated as "FAC-" are considered to count against rather than toward the 50-percent threshold. The 1987 Manual also lists several morphological adaptations of plants that are responses to wetland hydrology. Visual observation of one or more of these adaptations also constitutes evidence of hydrophytic vegetation, regardless of indicator status data.

Soil: Soil borings were hand augered to a minimum depth of 20 inches (or auger refusal) at each data point. The following data were recorded for each soil horizon (layer) encountered:

- Soil matrix color, using a Munsell Soil Color Chart. The matrix is the predominant color of a soil horizon. In most soils in the eastern United States, grayer matrix colors are generally indicative of extended periods of soil saturation, and brighter orange, yellow, or red matrix colors are generally indicative of infrequent saturation.

- Color, abundance, and distinctiveness of soil mottles, if present. Mottles are spots or streaks of a different color that occur within the matrix of a soil horizon. Bright orange, yellow, or red mottles contrasting with a gray matrix are generally indicative of extended periods of soil saturation.

- Texture, estimated subjectively in the field using definitions established by the U.S. Department of Agriculture (SCS, 1962).

- Presence of concretions or other irregularities.

The soil profile data were used to identify the soil series at each soil boring location. The soil profile data were compared against physical descriptions and characteristic soil profiles for specific soil series in the Soil Survey for Charles County, Maryland (SCS, 1974). If the soil series could be conclusively determined, the Hydric Soils List for Maryland (NRCS, 1999) was consulted to determine whether it was listed as hydric. Additionally, the profile properties were used to determine whether the soil displayed one or more of the field indicators of hydric soils listed in the 1987 Manual. Hydric soil field indicators recently adapted by the NRCS (NRCS, 1996) were also considered.

Hydrology: The depth of surface water, if present, was recorded at each data point. Otherwise, the depths to soil saturation and to free water in the soil borehole were recorded. If saturated soils were not encountered in a borehole, it was recorded as dry. The 1987 Manual lists several primary field indicators of wetland hydrology, including

- Visual observation of soil inundation (presence of surface water)
- Visual observation of soil saturation (free water within 10 inches of the surface)
- Presence of watermarks on trees or structures resulting from previous episodes of surface water
- Presence of drift lines caused by previous episodes of surface water
- Presence of sediment deposits resulting from earlier episodes of surface water
- Presence of surface drainage features indicative of episodes of surface water

The supplementary guidance also notes several secondary field indicators that can be used as evidence of seasonally saturated wetland hydrology when primary indicators are not present. At least two secondary field indicators must be documented as present for the wetland hydrology parameter to be met. Examples of secondary field indicators of wetland hydrology include, but are not limited to

- Passed FAC-Neutral Test (the number of dominant plant species with indicator statuses of OBL and FACW exceeds the number with FACU or UPL statuses).

- Presence of water-stained leaves on the soil surface.

- Presence of oxidized root channels surrounding living plant roots (narrow strips of orange or yellow soil adjoining roots in a gray-colored soil).

2.3 STAKING AND SURVEYING

Wetland boundaries on each site were marked in the field using wooden stakes. Each stake was labeled "WET" followed by the site number (12 or 42) and a sequential number. Each data point on the transects selected for recording field data was also staked, and the stakes were labeled "WET" followed by "DP" and the number assigned to the data point. The coordinates for each stake were subsequently determined through a conventional land survey and shown on topographic base maps for each site.

3.0 WETLAND DELINEATION RESULTS

Section 3.1 presents the results of the wetland delineation for Site 12. Section 3.2 presents the results of the wetland delineation for Site 42. Drawings depicting the wetland delineations are presented in Figure 3-1 for Site 12 and Figure 3-2 for Site 42. Data sheets presenting field data on vegetation, soil, and hydrology for representative data points on transects perpendicular to the delineated wetland boundaries are presented for Site 12 in Appendix A and for Site 42 in Appendix B.

3.1 SITE 12

Wetlands on formerly landfilled areas at Site 12 are limited to narrow zones of herbaceous vegetation on saturated soils at the shorelines of the ponds created by the dam south of the site (Figure 3-1). The vegetation in these narrow fringes of shoreline wetlands comprises a dense, nearly pure stand of smartweed (*Polygonum punctatum*). The zone of saturated wetlands fringing the ponds is generally between 5 and 15 feet wide at the edge of the pond west of Atkins Road Extension and between 10 and 50 feet wide at the edge of the pond east of that roadway. The additional width bordering the eastern pond is likely the result of recent beaver activity, which has partially restricted a culvert carry flow westward under the roadway. There are no wetlands on the surface of the abandoned landfill, except where the landfill immediately abuts the ponds. All the wetlands on Site 12 are nontidal.

Under the wetland classification system developed by the US Fish and Wildlife Service (FWS) (Cowardin et al., 1979), nearly all the wetlands on Site 12 would be best classified as palustrine emergent, dominated by persistent herbaceous vegetation. A small area of wetlands bordering a segment of shoreline near the eastern edge of Site 12, east of the landfill, would be classified as palustrine forested, dominated by broad-leaved deciduous trees.

The standing impounded water in the ponds supports dense, localized patches of the nonpersistent emergent plant, duck potato (*Sagittaria latifolia*). Nonpersistent emergent vegetation does not remain standing throughout a normal year. Wetlands dominated by nonpersistent vegetation may at many times appear to be open waters lacking vegetation. The ponds, which are nontidal, may thus be classified as palustrine emergent wetlands dominated by nonpersistent vegetation. Because of the small size of the ponds, they would not typically be classified as lacustrine under the FWS system.

3.1.1 <u>Pond West of Atkins Road Extension</u>

The zone of saturated wetlands fringing the shoreline of the pond west of Atkins Road Extension is delineated by Stakes "WET 12-1" through "WET 12-31." The transition between upland areas on the

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FIGURE 3-1

SHEET _ OF _

SPEC. NAVFAC DRAWING NO.

CONST. CONT. NO.

DRAWING SIZE: B

CODE I.D. NO. 80091

DEPARTMENT OF THE NAVY CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C.

IHDIV-NSWC INDIAN HEAD INDIAN HEAD, MD

WETLAND DELINEATION MAP
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SEAL AREA

Tetra Tech NUS, Inc.
FOSTER PLAZA VII
661 ANDERSEN DRIVE
PITTSBURGH, PA 15220

DES.	DR.	CHK.
DRAWN BY: J. BELLONE	TITLE	DATE 1/5/00
PROGRAM MANAGER		DATE
APPROVED		DATE

EFD FOR COMMAND NAVFAC

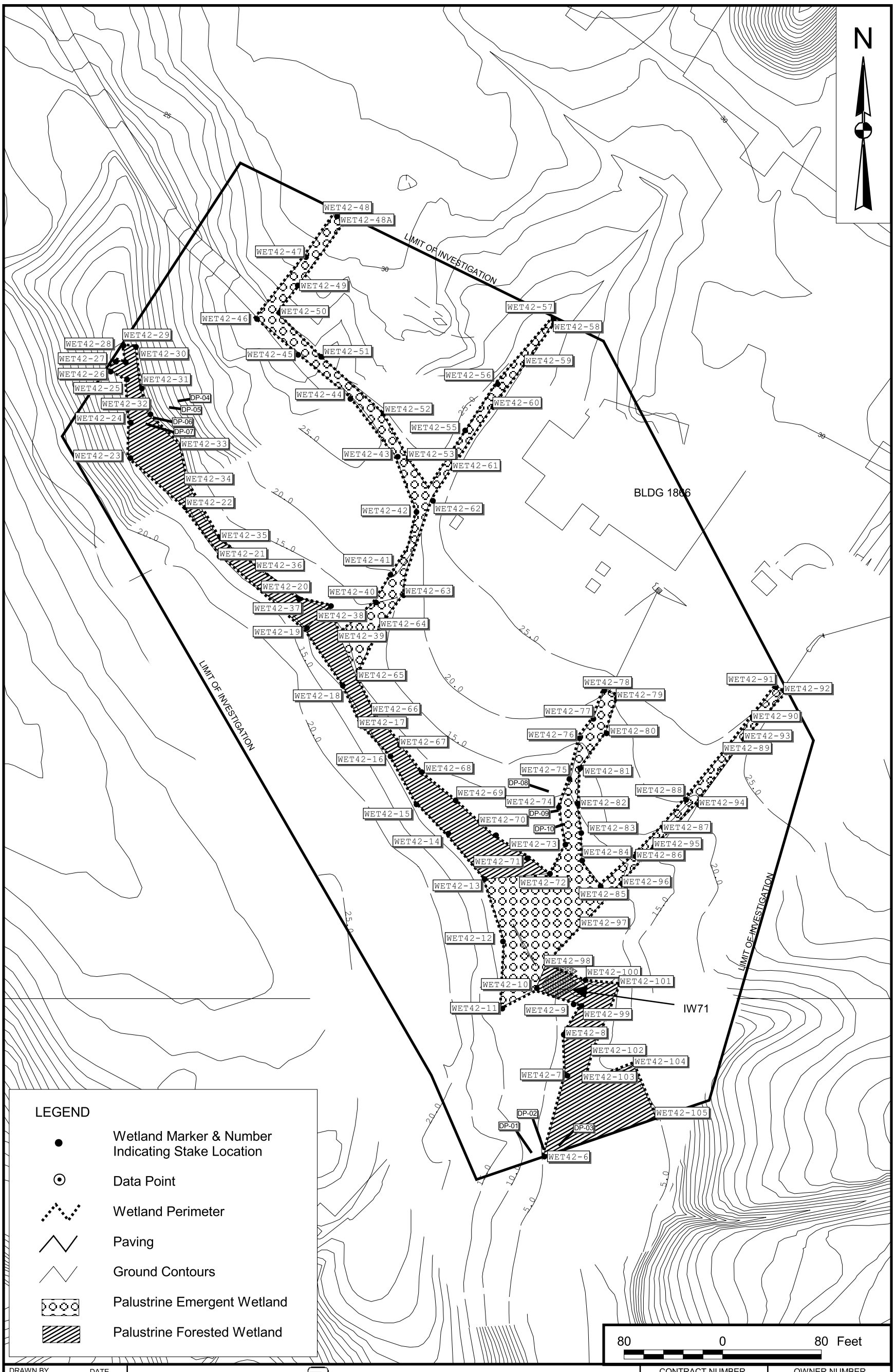
09A	403
04	404
E.I.C.	405
401	408
402	4B

REVIEWED BY ROICC DATE

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

P:\GIS\7129_PRESENTATION.APR\WETLANDPERIMETER APPENDIX (B) 02/28/02 KMP



DRAWN BY K. PEILA	DATE 02/28/02	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7129 / OWNER NUMBER —
CHECKED BY —	DATE —	WETLAND DELINEATION MAP SITE 42 - OLSON ROAD LANDFILL IHDIV-NSWC, INDIAN HEAD, MARYLAND	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 3-2 / REV 0

landfill and the wetlands is illustrated with Transect 1 (Appendix A), comprising three data points (1, 2, and 3) on a line perpendicular to the wetland boundary at Stake "WET 12-26."

Vegetation: Vegetation outside the delineated wetland boundary comprises a nearly pure turf of tall fescue (*Festuca arundinacea*), and vegetation inside the boundary comprises a dense stand of smartweed. Several saplings of black locust (*Robinia psuedoacacia*) are widely scattered over parts of the landfill. Saplings within the delineated wetland boundary are dead or dying. Black locust is generally intolerant of extended periods of soil saturation, and the dying saplings suggest that water levels in the pond may have recently risen.

Soils: Soils outside the delineated wetland boundary appear to be fill soils associated with the landfill. Surface soils do not change dramatically at the wetland boundary, but the matrix color does become somewhat grayer with more pronounced mottling. Distinctive changes in soil color due to saturated (anaerobic) conditions are not necessarily expected in fill soils. It was not evident from the transects where the fill soils stopped. It is expected that the fill soils associated with the landfill end somewhere under the ponded water. The Soil Survey of Charles County, Maryland maps the ponds and much of the landfill as tidal marsh soils (SCS, 1974). This mapping does not reflect current conditions. The soil survey reports observations made prior to 1970, before much of the landfill was established and before the nearby dam was constructed.

Hydrology: At the time of the delineation, soils inside the delineated wetland boundary were saturated at the surface. Soils outside the boundary were not saturated close to the surface. An abrupt topographic rise of 6 to 12 inches generally coincides with the transition from smartweed to tall fescue. The hydrology of the wetlands is likely a function of water levels in the pond, but it is possible that some surface water may also be seeping out from the fill soils on the landfill.

Other Observations: Small flocks of Canada geese (*Branta canadensis*) were observed on the adjoining pond on several occasions during the delineation. Certain trees close to the shoreline displayed chewed bark, indicative of recent activity by beaver (*Castor canadensis*).

Functions and Values: The wetland vegetation fringing the pond helps to stabilize the shoreline and prevent erosion of the soil covering the landfill. It may also help protect water quality in the pond by slowing the velocity of, and filtering, surface runoff coming off the landfill. The emergent vegetation may help improve the value of the ponds as habitat for fish and wildlife by contributing nutrients and organisms at the bottom of the food chain. The wetland fringe improves the aesthetic appearance of the ponds, making the site appear more natural than if the turf immediately abutted open water.

3.1.2 Pond East of Atkins Road Extension

The zone of saturated wetlands fringing the shoreline of the pond east of Atkins Road Extension is delineated by Stakes "WET 12A-1" through "WET 12A-43." On the south shore of the pond, the transition between uplands on the landfill and the wetlands is illustrated by Transect 2 (Appendix A), comprising three data points (4, 5, and 6) on a line perpendicular to the wetland boundary at Stake "WET 12A-5." On the north shore of the pond, the transition between uplands on the landfill and the wetlands is illustrated by Transect 4 (Appendix A), comprising four data points (11, 12, 13, and 14) on a line perpendicular to the wetland boundary at Stake "WET 12A-35."

The easternmost part of the site, just inside the bend in Atkins Road, includes an area of deciduous forest and pond shoreline whose surface soils have not been disturbed by landfill activity. Stakes delineating the wetland boundary in this part of the site number between "WET 12A-10" and "WET 12A-30." The transition from uplands to wetlands in this part of the site is illustrated by Transect 3 (Appendix A), comprising four data points (7, 8, 9, and 10) on a line perpendicular to the wetland boundary at Stake "WET 12A-28."

Vegetation: Vegetation on the landfilled areas east of Atkins Road Extension is similar to that on the landfilled areas west of the road. Vegetation outside the delineated wetland boundary comprises a nearly pure turf of tall fescue, and vegetation inside the boundary comprises a dense, nearly pure stand of smartweed. As is true west of the road, several saplings of black locust are widely scattered over areas of the landfill, and those within the delineated wetland boundary are dead or dying. Those outside the boundary appear to be normal. This may reflect a recent rise in the water level within this series of interconnected ponds.

Uplands in the easternmost part of the site, which was not previously occupied by the landfill, are relatively steep slopes that support mature deciduous forests dominated by species such as chestnut oak (*Quercus prinus*), white oak (*Quercus alba*), and tulip poplar (*Liriodendron tulipifera*). Many of the trees are over 18 inches in diameter at breast height (DBH, defined as trunk diameter 4.5 feet off the ground). Occasional saplings and seedlings of canopy trees and of Virginia pine (*Pinus virginiana*) are present under the canopy. Forest cover such as this is common on the steep slopes bordering the coves and inlets of Mattawoman Creek on IHDIV-NSWC.

Wetlands fringing the pond in the easternmost wooded area of the site are generally shaded and include trees and saplings typical of the bottomland hardwood forests typically associated with stream valleys in Charles County. The trees and saplings that were observed include red maple (*Acer rubrum*) and sweet gum (*Liquidambar styraciflua*).

Soils: Soils throughout Transects 2 and 4 appear to be fill soils associated with the landfill. Surface soil properties do not generally appear to change dramatically at the wetland boundary, but the soil matrix color does become somewhat grayer with more pronounced mottling at the boundary. Distinctive changes in soil coloration in response to conditions of saturation (anaerobic conditions) are not necessarily expected in fill soils. The Soil Survey of Charles County, Maryland maps the ponds and much of the landfill as tidal marsh soils (SCS, 1974). This mapping does not reflect current conditions. The soil survey reports observations made prior to 1970, before much of the landfill was constructed and before the nearby dam was constructed.

It is noted that changes in soil coloration on Transect 4 are substantially more distinct than those on Transects 1 and 2. The soil pits along that transect may have intercepted the tidal marsh soils reported to have originally been present on the site.

Hydrology: At the time of the delineation (September 30, 1999), areas inside the delineated wetland boundary on the former landfill were saturated at the surface. Areas outside the boundary were not saturated close to the surface. An abrupt topographic rise of 6 to 12 inches generally coincides with the transition from dense smartweed to dense tall fescue. The hydrology of the wetlands fringing the ponds is likely a function of the water level in the pond, although it is also possible that some surface water may be seeping out from the fill soil (the landfill) to the pond.

The hydrology of the wetlands in the easternmost (undisturbed) part of the site is also likely a function of water levels in the ponds. But at least one sizable seep was also observed (at Stake "WET 12A-26") where groundwater was flowing out from the toe of a slope.

Other Observations: Many trees and saplings close to the pond have experienced bark loss due to beaver activity, and many saplings have been felled. Tracks of whitetail deer (*Odocoileus virginianus*) were observed in saturated soil near Stake "WET 12A-25." A bald eagle (*Haliaeetus leucocephalus*) was observed flying over the site during the delineation.

Functions and Values: The wetland vegetation fringing the pond helps to stabilize the shoreline and prevent erosion of the soil covering the landfill. It may also help protect water quality in the pond by slowing the velocity of and filtering surface runoff coming off the landfill. The emergent vegetation may help improve the value of the ponds as habitat for fish and wildlife by contributing nutrients and organisms at the bottom of the food chain. The wetland fringe improves the aesthetic appearance of the ponds, making the site appear more natural than if the turf immediately abutted the open water.

3.2 SITE 42

Wetlands on Site 42 include narrow lowlands bordering the perennial stream west of the landfill, a swale carrying seepage from the edge of the Building 1866 parking lot to the stream, and the bottoms of several drainage ditches (Figure 3-2). An elevated berm associated with a steam pipe crosses the stream just downstream from Building 1866 and creates a shallow, marshy impoundment. This impoundment is a wetland dominated by dense herbaceous vegetation.

All the wetlands are nontidal. The stream channel would be classified as riverine, upper perennial by the FWS (Cowardin et al., 1979). The wetlands bordering the stream would be best classified as palustrine forested, broad-leaved deciduous. These wetlands generally support only herbaceous vegetation, but they are narrow and shaded by overhanging limbs from the adjoining uplands. The wetlands in the impoundment, in the drainage ditches, and in the swale would be best classified as PEM1.

3.2.1 Western Stream and Associated Wetlands

Stakes "WET 42-1" through "WET 42-28" mark the upland boundary of wetlands associated with the west side of the stream (opposite from the landfill). Stakes "WET 42-29" through "WET 42-39," Stakes "WET 42-65" through "WET 42-71," and Stakes "WET 42-85" through "WET 42-106" mark the upland boundary of wetlands associated with the east side of the stream (the same side as the landfill). The gaps in the stake numbers on the eastern side correspond to the drainage ditches and swale. The transition from uplands to wetlands bordering the stream is illustrated by Transects 1 and 2 (Appendix B), comprising data points on lines perpendicular to the wetland boundary at Stake "WET 42-6" and Stake "WET 42-32."

Vegetation: The stream channel itself generally lacks vegetation. Wetlands adjacent to the stream channel are generally characterized by dense smartweed with frequent false nettle (*Boemeria cylindrica*). The wetlands are narrow and shaded by deciduous trees growing on the adjoining uplands. The marshy impoundment is wider, not shaded, and includes patches of other emergent plant species such as common cattail (*Typha latifolia*) and tearthumb (*Polygonum sagittatum*).

Soils: The sediment in the stream channel is generally soft and unconsolidated. Surface soils in the wetlands bordering the streams are generally fine sandy loams or silt loams distinguished from adjoining upland soils by grayer colors and more distinctive mottling. The Soil Survey of Charles County, Maryland maps the soils in both the wetlands and uplands surrounding the stream in the moderately well drained Keyport series (SCS, 1974). Field observations suggest that undisturbed upland soils on the site are Keyport soils but that the wetland soils are better classified in the poorly drained Elkton series. Surface soils on the abandoned landfill are fill soils.

Hydrology: The stream originates as two intermittent headwaters just north of the site. Water in the channel flows southward. Water depth in the channel was generally under 6 inches at the time of the delineation. The stream enters a tidal cove of Mattawoman Creek several hundred feet south of the site. The wetlands bordering the stream were saturated at the surface at the time of the delineation.

Functions and Values: The small pools in the stream and the emergent vegetation in the wetlands help reduce the velocity of runoff entering the stream from uplands. Wetlands associated with headwater streams such as this are commonly recognized as playing a role in reducing flood levels. But the proximity of the stream to tidal waters (Mattawoman Creek) minimizes the importance of potential flooding. However, the deterrence of flow could help reduce the entry of oil and grease and other water-borne constituents from surrounding military operations into Mattawoman Creek. The stream channel and associated wetlands provide good habitat for small minnows and amphibians typically inhabiting small streams. The stream is too shallow to provide habitat for sportfish, but smaller organisms inhabiting the stream could migrate downstream into Mattawoman Creek to support the food chain there. The aesthetic value of the stream is considerable but is limited to only a small number of workers having business specifically at Building 1866.

3.2.2 Seepage Near Southwestern Corner of Landfill

A gentle swale originates near the southwestern corner of the parking lot for Building 1866 and proceeds downhill (southwestward) to the shallow impoundment bordering the stream. At the time of the delineation, water was observed to be seeping out of the soil near the top of the swale and flowing downhill toward the stream. There was no distinct channel. The water flowed through dense herbaceous vegetation. Interestingly, the water was observed to be unnaturally warm, over 90°F. The origin of the water and the reasons for the high temperatures are not clear.

The transition from uplands to wetlands in the swale is illustrated by Transect 3 (Appendix B), comprising data points on a line perpendicular to the wetland boundary at Stake "WET 42-74." Herbaceous vegetation within the swale is typical of marshes dominated by persistent emergent vegetation. However, some scattered upland trees and a patch of Allegheny blackberry (*Rubus allegheniensis*) within the swale are dead or dying. Particularly noteworthy is a large, dead tulip poplar tree (*Liriodendron tulipifera*) near the top of the swale. Surface soils throughout the swale and adjoining uplands are fill soils overlying the former landfill. Although fill soils are not necessarily expected to display color differences in response to saturation, soils within the swale were observed to be grayer than those of the adjoining uplands. Soils in the lower parts of the swale were very soft, much like quicksand.

As is true for the wetlands in the drainage ditch, the functions and values of the wetlands in the swale appear to be limited. The vegetation in the swale probably helps to reduce the velocity of the water as it

flows downhill through the swale toward the stream. This property is especially important considering the unusual high temperature of the water. Such water temperatures can be injurious to plants and microfauna in sediment and can hasten depletion of dissolved oxygen. The value of the swale as wildlife habitat appears to be minimal, but the dead tulip poplar could serve as a snag, offering a valuable roosting site for birds.

3.2.3 Drainage Ditches

Two drainage ditches cross the surface of the landfill north of Building 1866. Both are straight, with steep embankments. The ditches both originate in developed facilities north of Building 1866, merge near the northwestern corner of the building, and then flow into the stream. The sides of the ditches are marked with Stakes "WET 42-39" through "WET 42-65."

The bottoms of the ditches contained up to an inch of slowly running water and supported a dense stand of emergent vegetation at the time of the delineation. The vegetation comprises dense patches of herbaceous species such as common cattail, soft rush (*Juncus effusus*), and woolgrass (*Scirpus cyperinus*). That vegetation contrasts sharply with the tall fescue on the embankments and over the rest of the landfill. Soils under the ditches, as with the rest of the former landfill, are fill soils. The emergent vegetation in the ditches likely helps to slow runoff entering from adjoining uplands, including several parking lots and buildings used in explosives work, thereby potentially reducing water-borne constituents entering the streams. Otherwise, the functions and values of wetlands in such man-made ditches are very limited.

A third drainage ditch originates near the entrance to Building 1866's parking lot and runs westward (downhill) along the eastern side of the site and enters the impoundment associated with the stream. The sides of this ditch are marked by Stakes "WET 42-85" to "WET 42-96." The ditch receives discharges from a drainage pipe outfall (IW71) (TtNUS, 1999). It also appears to receive surface runoff from a roadway and from the parking lot for Building 1866. The sides of the ditch are very steep and over 10 feet in height at places. There is little or no vegetation in the bottom of the ditch, which is shaded by trees on the adjoining uplands. As for the other drainage ditches, the functions and values of wetlands in this ditch are highly limited.

4.0 SUMMARY

The following section briefly summarizes the findings of the wetland delineation and discusses how the delineated wetlands are addressed in ARARs identified for CERCLA compliance activities on the IHDIV-NSWC site.

4.1 AREAS ADDRESSED BY SECTION 404 CLEAN WATER ACT

All areas within the delineated wetland boundaries on both sites are regulated under Section 404 of the Clean Water Act. Section 404 regulates the discharge of dredged or fill material into "waters of the United States," a term that includes wetlands connected to navigable waterways subject to use in interstate commerce. The regulatory status of isolated wetlands lacking surface connections to navigable waterways remains uncertain. But each wetland delineated on each site is connected by streams or other surface connections to Mattawoman Creek, which is navigable. Most activities that involve soil disturbance, such as grading or the placement of fill, are regulated under Section 404. Activities that drain wetlands without filling or grading are not regulated, and vegetation disturbance is not regulated.

Outside the context of CERCLA, applicants proposing activities regulated under Section 404 must submit an application for a permit to the USACE (Baltimore District in Maryland). USACE reviews applications using technical criteria outlined in the "404(b)(1) Guidelines" before issuing or denying applications. Compliance with the intent of Section 404 during the remediation process would involve minimizing encroachment into any delineated wetlands or other waterways. If disturbance of surface soils in such areas is unavoidable, suitable mitigation would involve restoring the affected areas, if possible, or enhancing, restoring, or creating wetlands in another location in the same watershed.

4.2 AREAS ADDRESSED BY MARYLAND NONTIDAL WETLANDS PROTECTION ACT

All wetlands on both sites are above the head of tide for Mattawoman Creek and thus are nontidal. Theoretically, the impounded waters in the ponds on Site 12 are not actual wetlands, but the saturated soils fringing the ponds support persistent vegetation and clearly are nontidal wetlands. The act also regulates upland areas within 25 feet of nontidal wetlands (i.e. a nontidal wetland buffer). Unlike Section 404, the Maryland Nontidal Wetlands Protection Act regulates almost any activity that disturbs nontidal wetlands or the buffer, including clearing vegetation or draining.

Outside the context of CERCLA, applicants proposing activities that disturb nontidal wetlands or the buffer must submit an application for a permit to the Maryland Department of the Environment (MDE). To expedite the application process, MDE has developed a Joint Application Permit that can be submitted as

a single package to MDE, which then distributes the application to USACE. Compliance with the intent of the act would be similar to compliance with the intent of Section 404.

4.3 AREAS ADDRESSED BY OTHER MARYLAND REGULATIONS PERTAINING TO WETLANDS

Maryland Tidal Wetlands Act: Both sites lie more than 500 feet upgradient from the head of tides associated with Mattawoman Creek. Thus, neither site contains wetlands regulated under the Maryland Tidal Wetlands Act. The ponds on Site 12 are mapped as "tidal marsh" in the Soil Survey for Charles County (SCS, 1974). It appears as if the head of tides associated with Mattawoman Creek extended into Site 12 before a dam was constructed south of the site. That dam currently blocks the upstream (northward) movement of tides and permanently impounds the area formerly identified as tidal marsh, rendering it nontidal.

Maryland Chesapeake Bay Critical Areas Act: Most of Site 12 and the southern part of Site 42 lie within 1,000 feet of tidal areas associated with Mattawoman Creek and thus fall into what the State of Maryland defines as the Chesapeake Bay Critical Area. The act requires local jurisdictions to implement regulations for reviewing development activities, including land clearing and grading, in areas within 1,000 feet of tidal waters or wetlands associated with the Chesapeake Bay or its tributaries. Charles County, like most local jurisdictions, requires proponents of activities in the Critical Area to demonstrate efforts to minimize disturbance to tidal and nontidal wetlands, streams, forest cover, steep slopes (greater than 15 percent), highly erodable soils (Erodability Factor greater than 0.35), and other sensitive natural areas (Charles County Planning Commission, 1994).

The county reviews applications for grading permits, building permits, subdivisions, site plans, rezoning, special use permits, and special exceptions for compliance with its criteria for protecting the Critical Area. Compliance with the intent of the Act during the remediation process would involve minimizing disturbance of the sensitive areas noted above and implementing best management practices to reduce the potential for sedimentation of the ponds, streams, and wetlands.

Compliance with the intent of the act would also involve minimizing disturbance of areas outside the landfill proper at each site. The landfills themselves do not support forest cover. However, adjoining slopes in the eastern part of Site 12 and west and south of Site 42 are forested and exceed 15 percent in places. Additionally, intact upland soils adjoining both landfills are mapped in the Sassafras series (at Site 12) and the Keyport series (at Site 42) (SCS, 1974). Both soil series have Erodability Factors exceeding 0.35 (MWCOG, 1991).

Maryland Forest Conservation Act: The Maryland Forest Conservation Act requires local jurisdictions, including Charles County, to implement regulations protecting forest resources from land development activities. Compliance is integrated into the permit review process for grading permits and subdivision approvals. The compliance process is typically two steps: Applicants first map and characterize forest resources on the affected property (a forest stand delineation) and then prepare a forest conservation plan outlining efforts to minimize disturbance to forest resources and, if necessary, restore forest cover as a mitigation measure.

The act specifically exempts the Chesapeake Bay Critical Area and thus applies only to those areas greater than 1,000 feet from mean high tide. The two acts are somewhat complementary, the Forest Conservation Act extending many of the forest conservation practices prescribed under the Chesapeake Bat Critical Areas Act to lands more distant from the bay.

Forest is defined, for purposes of the act, as areas dominated by woody plants that are at least 10,000 square feet in area and include at least 100 trees per acre, of which at least half must exceed 2 inches in trunk diameter (DNR, 1997). There are no areas meeting this definition on the landfill proper at either site. The slope immediately west of the stream on Site 42 and the forested slopes and wetlands in the eastern part of Site 12 do meet the definition. Additionally, these forested slopes and wetlands meet the criteria for priority areas for forest retention under the act (DNR, 1997).

Compliance with the intent of the act would involve minimizing encroachment into forested wetlands or uplands at the edge of the landfills. It would also involve restoring tree seedlings to any unavoidably cleared forested area or to a nearby area of comparable size.

5.0 LIST OF PREPARERS

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APPENDIX A

WETLAND DELINEATION FIELD DATA SHEETS

SITE 12

SITE 12
WETLAND DELINEATION TRANSECT 1
DATA POINT 1
DATA POINT 2
DATA POINT 3

DATA POINT 1
10 FEET WEST OF STAKE "WET 12-26"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	OLD FIELD
Is the site significantly disturbed (Atypical Situation)?:		No	Transect ID:	1
Is the area a potential Problem Area?:	Yes		Plot ID:	1
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
FESTUCA ARUNDINACEA	H	FACU	POLYGONUM PUNCTATUM	H	OBL
			JUNCUS EFFUSUS	H	FACW+

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: DENSE TURF OF TALL FESCUE. NO INDICATORS OF HYDROPHYTIC VEGETATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	NONE	(in.)
Depth in Saturated Soil:	NONE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NO INDICATORS OF WETLAND HYDROLOGY.

DATA POINT 1
10 FEET WEST OF STAKE "WET 12-26"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	N/A	7.5YR 4/3	7.5YR 5/6	FAINT, IRREGULAR	SANDY CLAY LOAM
2-20+	N/A	7.5YR 5/3	7.5YR 5/6	APPROX. 50:50	SANDY CLAY WITH GRAVEL

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: NO INDICATORS OF HYDRIC SOIL. APPEARS TO BE FILL SOIL PLACED ON THE SURFACE OF THE ABANDONED LANDFILL.

WETLAND DETERMINATION

	(Circle)		(Circle)
Hydrophytic Vegetation Present?	Yes	Is this Sampling Point Within a Wetland?	Yes
Wetland Hydrology Present?	Yes		
Hydric Soils Present?	Yes		

Remarks: UPGRADIENT END OF TRANSECT IN OBVIOUS UPLAND.

Classification: UPLAND (U)

DATA POINT 2
AT STAKE "WET 12-26"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	TRANSITION
Is the site significantly disturbed (Atypical Situation)?:		No	Transect ID:	1
Is the area a potential Problem Area?:	Yes		Plot ID:	2
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
POLYGONUM PUNCTATUM	H	OBL			
FESTUCA ARUNDINACEA	H	FACU			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50

Remarks: PLOT LOCATED AT ABRUPT TRANSITION FROM HYDROPHYTIC TO UPLAND VEGETATION. FACU VEGETATION DOMINANT ONLY ON UPLAND SIDE OF PLOT; OBL VEGETATION DOMINANT ONLY ON WETLAND SIDE OF PLOT.

HYDROLOGY

____ Recorded Data (Described in Remarks):	Wetland Hydrology Indicators:
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
____ Other	X Saturated in Upper 12 inches
X No Recorded Data Available	____ Water Marks
	____ Drift Lines
Field Observations:	____ Sediment Deposits
Depth of Surface Water: NONE (in.)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: 6 (in.)	Secondary Indicators (2 or more required):
Depth in Saturated Soil: 3 (in.)	X Oxidized Root Channels in Upper 12 inches
	____ Water-Stained Leaves
	____ Local Soil Survey Data
	____ FAC-Neutral Test
	____ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH INDICATORS OF WETLAND HYDROLOGY

DATA POINT 2
AT STAKE "WET 12-26"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)*	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-3	N/A	7.5YR 4/3	7.5YR 5/6	APPROX. 50:50	SANDY CLAY LOAM
3-12	N/A	7.5YR 5/2	7.5YR 5/6	STREAKS, <20%	SANDY CLAY LOAM
12-20+	N/A	7.5YR 5/1	7.5YR 5/6	STREAKS, <20%	SANDY CLAY WITH GRAVEL

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH FIELD INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	[redacted]	No		
Hydric Soils Present?	Yes	[redacted]		

Remarks: AT ABRUPT TRANSITION FROM WETLAND TO UPLAND.

Classification: TRANSITION UPLAND (U) TO PALUSTRINE EMERGENT WETLAND (PEM)

DATA POINT 3
10 FEET EAST OF STAKE "WET 12-26"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND
Do Normal Circumstances exist on the site?:	No	Community ID:	MARSH FRINGE
Is the site significantly disturbed (Atypical Situation)?:	No	Transect ID:	1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes	Plot ID:	3

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
POLYGONUM PUNCTATUM	H	OBL			
ECHINOCHLOA CRUS-GALLI	H	FACU			
ECHINOCHLOA WALTERI	H	FACW+			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 67

Remarks: PLOT LOCATED WITHIN FRINGE OF EMERGENT WETLAND VEGETATION ALONG SHORE OF PERMANENTLY INUNDATED POND.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	Surface	(in.)
Depth to Free Water in Pit:	Surface	(in.)
Depth in Saturated Soil:	Surface	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: SATURATED FRINGE AT EDGE OF PERMANENTLY INUNDATED POND

DATA POINT 3
10 FEET EAST OF STAKE "WET 12-26"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-10	N/A	7.5YR 5/2	7.5YR 5/6	STREAKS, <20%	SANDY CLAY LOAM
10-20+	N/A	7.5YR 5/1	7.5YR 5/6	STREAKS, <20%	SANDY CLAY WITH GRAVEL

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: LOW CHROMA COLORS (DEPLETED MATRIX) ARE A FIELD INDICATOR OF HYDRIC SOILS

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted] No
Wetland Hydrology Present?	[redacted]	No		
Hydric Soils Present?	[redacted]	No		

Remarks: FRINGE OF PALUSTRINE ENERGENT WETLAND ALONG SHORE OF PERMANENTLY INUNDATED POND

Classification: PALUSTRINE EMERGENT WETLAND (PEM)

SITE 12
WETLAND DELINEATION TRANSECT 2
DATA POINT 4
DATA POINT 5
DATA POINT 6

DATA POINT 4
10 FEET SOUTH OF STAKE "WET 12A-5"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	OLD FIELD
Is the site significantly disturbed (Atypical Situation)?:		No	Transect ID:	2
Is the area a potential Problem Area?:	Yes		Plot ID:	4
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
FESTUCA ARUNDINACEA	H	FACU	LONICERA JAPONICA	H	FAC-

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: DENSE TURF OF TALL FESCUE. NO INDICATORS OF HYDROPHYTIC VEGETATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	NONE	(in.)
Depth in Saturated Soil:	15	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NO INDICATORS OF WETLAND HYDROLOGY.

DATA POINT 4
10 FEET SOUTH OF STAKE "WET 12A-5"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-2	N/A	7.5YR 4/2	NONE	N/A	SANDY CLAY LOAM
2-6	N/A	7.5YR 4/2	7.5YR 5/6	APPROX. 50:50	SANDY CLAY LOAM
6-15	N/A	7.5YR 5/6	NONE	N/A	SANDY CLAY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: NO INDICATORS OF HYDRIC SOIL. APPEARS TO BE FILL SOIL PLACED ON THE SURFACE OF THE ABANDONED LANDFILL. AUGER REFUSAL AT APPROXIMATELY 15 INCHES.

WETLAND DETERMINATION

	(Circle)		(Circle)
Hydrophytic Vegetation Present?	Yes [redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes [redacted]		
Hydric Soils Present?	Yes [redacted]		

Remarks: UPGRADIENT END OF TRANSECT IN OBVIOUS UPLAND.

Classification: UPLAND (U)

DATA POINT 5
AT STAKE "WET 12A-5"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND
Do Normal Circumstances exist on the site?:	No	Community ID:	TRANSITION
Is the site significantly disturbed (Atypical Situation)?:	No	Transect ID:	2
Is the area a potential Problem Area?:	Yes	Plot ID:	5
(If needed, explain on reverse)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
FESTUCA ARUNDINACEA	H	FACU	JUNCUS EFFUSIS	H	FACW+
POLYGONUM PUNCTATUM	H	OBL			
LONICERA JAPONICA	H	FAC-			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 33

Remarks: PLOT LOCATED AT ABRUPT TRANSITION FROM HYDROPHYTIC TO UPLAND VEGETATION. FACU VEGETATION DOMINANT ONLY ON UPLAND SIDE OF PLOT; OBL VEGETATION DOMINANT ONLY ON WETLAND SIDE OF PLOT.

HYDROLOGY

Recorded Data (Described in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	12	(in.)
Depth in Saturated Soil:	10	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- X Saturated in Upper 12 inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH INDICATORS OF WETLAND HYDROLOGY

DATA POINT 5
AT STAKE "WET 12A-5"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-2	N/A	7.5YR 4/3	NONE	N/A	SANDY CLAY LOAM
2-6	N/A	7.5YR 4/3	7.5YR 5/6	APPROX. 50:50	SANDY CLAY LOAM
6-12	N/A	7.5YR 5/6	NONE	N/A	SANDY CLAY LOAM
12-20+	N/A	7.5YR 5/1	7.5YR 5/6	STREAKS, <20%	SANDY CLAY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH FIELD INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	[redacted]	No		
Hydric Soils Present?	Yes	[redacted]		

Remarks: AT ABRUPT TRANSITION FROM WETLAND TO UPLAND.

Classification: TRANSITION UPLAND (U) TO PALUSTRINE EMERGENT WETLAND (PEM)

DATA POINT 6
10 FEET NORTH OF STAKE "WET 12A-5"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	TRANSITION
Is the site significantly disturbed (Atypical Situation)?:		No	Transect ID:	2
Is the area a potential Problem Area?:	Yes		Plot ID:	6
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
POLYGONUM PUNCTATUM	H	OBL	JUNCUS EFFUSIS	H	FACW+
			LONICERA JAPONICA	H	FAC-

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: PLOT LOCATED WITHIN FRINGE OF EMERGENT WETLAND VEGETATION ALONG SHORE OF PERMANENTLY INUNDATED POND. TWO DEAD BLACK LOCUST (*ROBINIA PSUEDOACACIA*) (FACU-) SAPLINGS WITHIN PLOT.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	4	(in.)
Depth in Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: SATURATED FRINGE AT EDGE OF PERMANENTLY INUNDATED POND

DATA POINT 6
10 FEET NORTH OF STAKE "WET 12A-5"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-12	N/A	7.5YR 5/2	7.5YR 5/6	APPROX 50:50	SANDY CLAY LOAM
12-20+	N/A	7.5YR 5/1	7.5YR 5/6	STREAKS, <20%	SANDY CLAY

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- X Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: DEAD UPLAND TREES IN THIS FRINGE AREA SUGGEST THAT HYDROLOGICAL CONDITIONS HAVE BECOME WETTER IN RECENT YEARS. SOIL COLORS MAY NOT YET REFLECT CURRENT HYDROLOGICAL CONDITIONS.

WETLAND DETERMINATION

	(Circle)		(Circle)
Hydrophytic Vegetation Present?	[redacted] No	Is this Sampling Point Within a Wetland?	[redacted] No
Wetland Hydrology Present?	No		
Hydric Soils Present?	No		

Remarks: FRINGE OF PALUSTRINE ENERGENT WETLAND ALONG SHORE OF PERMANENTLY INUNDATED POND

Classification: PALUSTRINE EMERGENT WETLAND (PEM)

SITE 12
WETLAND DELINEATION TRANSECT 3
DATA POINT 7
DATA POINT 8
DATA POINT 9
DATA POINT10

DATA POINT 7
15 FEET NORTH OF STAKE "WET 12A-28"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	MIXED OAK FOREST
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	3
Is the area a potential Problem Area?:	Yes	[redacted]	Plot ID:	7
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
QUERCUS PRINUS	C	UPL	ACER RUBRUM	SA	FAC
QUERCUS RUBRA	C	FACU-	QUERCUS ALBA	SA	FACU-
ACER RUBRUM	C	FAC			
QUERCUS ALBA	C	FACU-			
LIQUIDAMBAR STYRACIFLUA	C	FAC			
PINUS VIRGINIANA	SA	NONE			
LIQUIDAMBAR STYRACIFLUA	SH	FAC			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50

Remarks: NO INDICATORS OF HYDROPHYTIC VEGETATION. VIRGINIA PINE ALMOST NEVER OCCURS IN WETLANDS AND MAY BE THOUGHT OF AS "UPL". THE VIRGINIA PINES NEAR THIS PLOT ARE MOSTLY DEAD SAPLINGS THAT APPEAR TO HAVE BEEN SUPPRESSED BY THE CANOPY.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	NONE	(in.)
Depth in Saturated Soil:	NONE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NO INDICATORS OF WETLAND HYDROLOGY.

DATA POINT 7
15 FEET NORTH OF STAKE "WET 12A-28"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	SANDY LAND, STEEP	Drainage Class:	NOT SPECIFIED
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	[redacted] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-1	A	10YR 4/2	NONE	N/A	LOAM
1-12	B	10YR 6/6	NONE	N/A	SANDY CLAY LOAM
12-20+	B	10YR 5/4	NONE	N/A	SANDY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: NO INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes	[redacted]		
Hydric Soils Present?	Yes	[redacted]		

Remarks: UPGRADIENT END OF TRANSECT IN OBVIOUS UPLAND.

Classification: UPLAND (U)

DATA POINT 8
5 FEET NORTH OF STAKE "WET 12A-28"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	BTMLD HW FOREST
Is the site significantly disturbed (Atypical Situation)?:	Yes		Transect ID:	3
Is the area a potential Problem Area?:	Yes		Plot ID:	8
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
ACER RUBRUM	C	FAC	LIQUIDAMBAR STYRACIFLUA	SH	FAC
QUERCUS RUBRA	C	FACU-	CAREX PENSYLVANICA (?)	H	NONE
ACER RUBRUM	SA	FAC			
LIQUIDAMBAR STYRACIFLUA	SH	FAC			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 75

Remarks: DRY EDGE OF BOTTOMLAND HARDWOOD FOREST. DOMINATED BY FAC SPECIES WITH NO FACW OR OBL SPECIES.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:
- Depth of Surface Water: NONE (in.)
- Depth to Free Water in Pit: NONE (in.)
- Depth in Saturated Soil: NONE (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NO INDICATORS OF WETLAND HYDROLOGY.

DATA POINT 8
5 FEET NORTH OF STAKE "WET 12A-28"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	A	10YR 4/2	NONE	N/A	LOAM
2-15	B	10YR 6/6	10YR 6/1	APPROX. 80:20	CLAY
15-20+	B	10YR 6/6	10YR 6/1	APPROX. 50:50	SANDY CLAY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: NO INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes	[redacted]		
Hydric Soils Present?	Yes	[redacted]		

Remarks: AREA IS DOMINATED BY FAC PLANT SPECIES AND TECHNICALLY MEETS THE DELINEATION CRITERIA FOR HYDROPHYTIC VEGETATION. HOWEVER, DOMINANCE BY FAC SPECIES WITHOUT ANY OBL OR FACW SPECIES DOES NOT TRULY INDICATE HYDROPHYTIC VEGETATION.

Classification: UPLAND (U)

DATA POINT 9
AT STAKE "WET 12A-28"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND
Do Normal Circumstances exist on the site?:	No	Community ID:	BTMLD HW FOREST
Is the site significantly disturbed (Atypical Situation)?:	Yes	Transect ID:	3
Is the area a potential Problem Area?:	Yes	Plot ID:	9
(If needed, explain on reverse)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
ACER RUBRUM	C	FAC	QUERCUS RUBRA	C	FACU-
ACER RUBRUM	SA	FAC	JUNCUS EFFUSIS	H	FACW+
LIQUIDAMBAR STYRACIFLUA	SH	FAC	LONICERA JAPONICA	H	FAC-
CAREX PENSYLVANICA (?)	H	NONE			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: PLOT LOCATED AT ABRUPT TRANSITION FROM HYDROPHYTIC TO UPLAND VEGETATION. FACU VEGETATION DOMINANT ONLY ON UPLAND SIDE OF PLOT; OBL VEGETATION DOMINANT ONLY ON WETLAND SIDE OF PLOT.

HYDROLOGY

Recorded Data (Described in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observations:
- Depth of Surface Water: NONE (in.)
- Depth to Free Water in Pit: 10 (in.)
- Depth in Saturated Soil: 6 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- X Saturated in Upper 12 inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH INDICATORS OF WETLAND HYDROLOGY

DATA POINT 9
AT STAKE "WET 12A-28"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-2	A	10YR 4/1	NONE	N/A	LOAM
2-12	B	10YR 6/1	10YR 6/6	APPROX. 70:30	SANDY CLAY
12-20	B	1G 7/N	10YR 5/6	STREAKS, <10%	SANDY CLAY

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH FIELD INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted] No
Wetland Hydrology Present?		No		
Hydric Soils Present?		No		

Remarks: AT ABRUPT TRANSITION FROM WETLAND TO UPLAND.

Classification: TRANSITION UPLAND (U) TO PALUSTRINE FORESTED WETLAND (PFO)

DATA POINT 10
5 FEET SOUTH OF STAKE "WET 12A-28"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	BTMLD HW FOREST
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	3
Is the area a potential Problem Area?:	Yes	[redacted]	Plot ID:	10
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
ACER RUBRUM	C	FAC	JUNCUS EFFUSIS	H	FACW+
POLYGONUM PUNCTATUM	H	OBL	ELYMUS VIRGINICUS (?)	H	FACW-

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: PLOT LOCATED WITHIN FRINGE OF EMERGENT WETLAND VEGETATION ALONG SHORE OF PERMANENTLY INUNDATED POND. SEVERAL DEAD BLACK LOCUST (*ROBINIA PSUEDOACACIA*) (FACU-) SAPLINGS WITHIN PLOT. SMARTWEEDS (*POLYGONUM PUNCTATUM*) FORM A DENSE FRINGE AT EDGE OF POND, BUT WETLAND BOUNDARY IS SEVERAL FEET FURTHER LANDWARD.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	8	(in.)
Depth in Saturated Soil:	4	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: SATURATED FRINGE AT EDGE OF PERMANENTLY INUNDATED POND

DATA POINT 10
5 FEET NORTH OF STAKE "WET 12A-28"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-12	B	10YR 6/1	10YR 6/6	STREAKS, <20%	SANDY CLAY
12-20+	B	1G 6/N	10YR 5/6	STREAKS, <10%	CLAY

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: SOIL COLORS ARE INDICATIVE OF HYDRIC SOILS

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted] No
Wetland Hydrology Present?		No		
Hydric Soils Present?		No		

Remarks: FRINGE OF PALUSTRINE ENERGENT WETLAND ALONG SHORE OF PERMANENTLY INUNDATED POND

Classification: PALUSTRINE FORESTED WETLAND (PFO)

SITE 12
WETLAND DELINEATION TRANSECT 4
DATA POINT 11
DATA POINT 12
DATA POINT 13
DATA POINT 14

DATA POINT 11
20 FEET NORTHEAST OF STAKE "WET 12A-35"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:	No	Community ID:	OLD FIELD
Is the site significantly disturbed (Atypical Situation)?:	No	Transect ID:	4
Is the area a potential Problem Area?:	Yes	Plot ID:	11
(If needed, explain on reverse)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
FESTUCA ARUNDINACEA	H	FACU	LESPEDEZA CUNEATA	H	NI
			GLECOMA HEDERACEA	H	FACU
			SOLANUM CAROLINENSE	H	UPL

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: DENSE TURF OF TALL FESCUE. NO INDICATORS OF HYDROPHYTIC VEGETATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	NONE	(in.)
Depth in Saturated Soil:	NONE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NO INDICATORS OF WETLAND HYDROLOGY.

DATA POINT 11
20 FEET NORTHEAST OF STAKE "WET 12A-35"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	NOT SPECIFIED
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-6	N/A	10YR 5/2	10YR 5/6	FAINT STREAKS	SANDY CLAY LOAM
6-20+	N/A	10YR 5/6	10YR 5/2	APPROX. 75:25	SANDY CLAY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: NO INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION

	(Circle)		(Circle)
Hydrophytic Vegetation Present?	Yes [redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes [redacted]		
Hydric Soils Present?	Yes [redacted]		

Remarks: UPGRADIENT END OF TRANSECT IN OBVIOUS UPLAND.

Classification: UPLAND (U)

DATA POINT 12
10 FEET NORTHEAST OF STAKE "WET 12A-35"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	OLD FIELD
Is the site significantly disturbed (Atypical Situation)?:		No	Transect ID:	4
Is the area a potential Problem Area?:	Yes		Plot ID:	12
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
FESTUCA ARUNDINACEA	H	FACU	LESPEDEZA CUNEATA	H	NI
			GLECOMA HEDERACEA	H	FACU
			SOLANUM CAROLINENSE	H	UPL

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: DENSE TURF OF TALL FESCUE. NO INDICATORS OF HYDROPHYTIC VEGETATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	12	(in.)
Depth in Saturated Soil:	9	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: GRADUAL TRANSITION FROM DISTINCTLY WETLAND TO DISTINCTLY UPLAND HYDROLOGY

DATA POINT 12
10 FEET NORTHEAST OF STAKE "WET 12A-35"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-3	N/A	10YR 5/2	10YR 5/6	FAINT STREAKS	SANDY CLAY LOAM
3-15	N/A	10YR 5/2	10YR 5/6	STREAKS (<10%)	SANDY CLAY LOAM
15-20+	N/A	7.5YR 4/1	NONE	N/A	COURSE SANDT
					CLAY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: SOILS BELOW 15 INCH DEPTH MAY BE ORIGINAL SOILS UNDER LANDFILL

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	[redacted]	No		
Hydric Soils Present?	[redacted]	No		

Remarks: TRANSITIONAL AREA BUT STILL CLEARLY UPGRADIENT OF WETLAND BOUNDARY

Classification: UPLAND (U)

DATA POINT 13
AT STAKE "WET 12A-35"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	TRANSITION
Is the site significantly disturbed (Atypical Situation)?:		No	Transect ID:	4
Is the area a potential Problem Area?:	Yes		Plot ID:	13
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
FESTUCA ARUNDINACEA	H	FACU	GLECOMA HEDERACEA	H	FACU
POLYGONUM PUNCTATUM	H	OBL	SOLANUM CAROLINENSE	H	UPL

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50

Remarks: PLOT LOCATED AT ABRUPT TRANSITION FROM HYDROPHYTIC TO UPLAND VEGETATION. FACU VEGETATION DOMINANT ONLY ON UPLAND SIDE OF PLOT; OBL VEGETATION DOMINANT ONLY ON WETLAND SIDE OF PLOT.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	15	(in.)
Depth in Saturated Soil:	6	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH INDICATORS OF WETLAND HYDROLOGY

DATA POINT 13
AT STAKE "WET 12A-35"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-15	N/A	10YR 5/1	10YR 5/6	STREAKS, <10%	SANDY CLAY LOAM
15-20+	N/A	1G 4/N	NONE	N/A	SANDY CLAY

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH FIELD INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	[redacted]	No		
Hydric Soils Present?	[redacted]	No		

Remarks: AT TRANSITION FROM WETLAND TO UPLAND.

Classification: TRANSITION UPLAND (U) TO PALUSTRINE EMERGENT WETLAND (PEM)

DATA POINT 14
10 FEET SOUTHWEST OF STAKE "WET 12A-35"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 12	Date:	SEPTEMBER 30, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:	[redacted]	No.	Community ID:	FRINGE MARSH
Is the site significantly disturbed (Atypical Situation)?:	[redacted]	No	Transect ID:	4
Is the area a potential Problem Area?:	Yes	[redacted]	Plot ID:	14
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
POLYGONUM PUNCTATUM	H	OBL			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: PLOT LOCATED WITHIN FRINGE OF EMERGENT WETLAND VEGETATION ALONG SHORE OF PERMANENTLY INUNDATED POND. DENSE PURE COVER BY SMARTWEED (*POLYGONUM PUNCTATUM*).

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	12	(in.)
Depth in Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: SATURATED FRINGE AT EDGE OF PERMANENTLY INUNDATED POND

DATA POINT 14
10 FEET SOUTHWEST OF STAKE "WET 12A-35"

SITE 12 (TOWN GUT LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	TIDAL MARSH	Drainage Class:	VERY POOR
Taxonomy (subgroup):	N/A	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-15	N/A	10YR 5/1	10YR 5/6	STREAKS, <10%	SANDY CLAY LOAM
15-20+	N/A	1G 4/N	NONE	N/A	SANDY CLAY

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: SOIL COLORS ARE INDICATIVE OF HYDRIC SOILS. SOILS BELOW 15 INCH DEPTH MAY BE ORIGINAL SOILS UNDER THE LANDFILL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted] No
Wetland Hydrology Present?		No		
Hydric Soils Present?		No		

Remarks: FRINGE OF PALUSTRINE ENERGENT WETLAND ALONG SHORE OF PERMANENTLY INUNDATED POND

Classification: PALUSTRINE EMERGENT WETLAND (PEM)

APPENDIX B

WETLAND DELINEATION FIELD DATA SHEETS

SITE 42

SITE 42
WETLAND DELINEATION TRANSECT 1
DATA POINT 1
DATA POINT 2
DATA POINT 3

DATA POINT 1
10 FEET WEST OF STAKE "WET 42-6"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND
Do Normal Circumstances exist on the site?:	No	Community ID:	BTMLD HW FOREST
Is the site significantly disturbed (Atypical Situation)?:	No	Transect ID:	1
Is the area a potential Problem Area?:	Yes	Plot ID:	1
(If needed, explain on reverse)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
LIQUIDAMBAR STYRACIFLUA	C	FAC			
ROBINIA PSEUDOACACIA	C	FACU-			
PLATANUS OCCIDENTALIS	C	FACW-			
LIQUIDAMBAR STYRACIFLUA	SA	FAC			
LIQUIDAMBAR STYRACIFLUA	SH	FAC			
POLYGONUM PUNCTATUM	H	OBL			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 83

Remarks: HYDROPHYTIC VEGETATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	NONE	(in.)
Depth in Saturated Soil:	NONE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NO INDICATORS OF WETLAND HYDROLOGY.

DATA POINT 1
10 FEET WEST OF STAKE "WET 42-6"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	5-12% SLOPES	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-15	N/A	10YR 6/6	NONE	N/A	SANDY CLAY LOAM
15-20+	N/A	10YR 7/4	10YR 7/8	PATCHES, <10%	CLAY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: NO INDICATORS OF HYDRIC SOIL. THIS SOIL APPEARS TO BE FILL SOIL PLACED IN THE STREAM VALLEY AS PART OF THE STEAM PIPE CROSSING TO THE NORTH.

WETLAND DETERMINATION

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	Yes	[redacted]
Wetland Hydrology Present?	Yes	[redacted]			
Hydric Soils Present?	Yes	[redacted]			

Remarks: UPGRADIENT END OF TRANSECT IN OBVIOUS UPLAND. HYDROPHYTIC HERBACEOUS VEGETATION APPEARS TO BE AN UPLAND EXTENSION OF A PATCH OF VEGETATION LOCATED MOSTLY IN THE ADJOINING WETLANDS. WOODY VEGETATION IS MOSTLY FAC.

Classification: UPLAND (U)

DATA POINT 2
AT STAKE "WET 42-6"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	BTMLD HW FOREST
Is the site significantly disturbed (Atypical Situation)?:		No	Transect ID:	1
Is the area a potential Problem Area?:	Yes		Plot ID:	2
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
LIQUIDAMBAR STYRACIFLUA	C	FAC			
ROBINIA PSEUDOACACIA	C	FACU-			
PLATANUS OCCIDENTALIS	C	FACW-			
LIQUIDAMBAR STYRACIFLUA	SA	FAC			
LIQUIDAMBAR STYRACIFLUA	SH	FAC			
POLYGONUM PUNCTATUM	H	OBL			
BOEMERIA CYLINDRICA	H	FACW+			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 86

Remarks: PLOT AT EDGE OF AREA WITHIN WHICH FALSE NETTLE (*BOEMERIA CYLINDRICA*) OCCURS. THE UPWARD EXTENT OF HYDRIC SOILS AND VISIBLE WETLAND HYDROLOGY APPEARS TO CORRESPOND TO THE UPWARD EXTENT OF FALSE NETTLE.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	NONE	(in.)
Depth in Saturated Soil:	NONE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH INDICATORS OF WETLAND HYDROLOGY

DATA POINT 2
AT STAKE "WET 42-6"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	5-12% SLOPES	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-12	N/A	10YR 6/4	10YR 6/6	STREAKS (<10%)	SANDY CLAY LOAM
12-18	N/A	10YR 7/1	10YR 7/6	STREAKS (<10%)	SANDY CLAY LOAM
18-20+	N/A	10YR 7/1	10YR 7/6	STREAKS (<10%)	SANDY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH FIELD INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	Yes	[redacted]
Wetland Hydrology Present?	Yes	[redacted]			
Hydric Soils Present?	Yes	[redacted]			

Remarks: AT ABRUPT TRANSITION FROM WETLAND TO UPLAND.

Classification: TRANSITION UPLAND (U) TO PALUSTRINE FORESTED WETLAND (PFO)

DATA POINT 3
10 FEET EAST OF STAKE "WET 42-6"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	BTMLD HW FOREST
Is the site significantly disturbed (Atypical Situation)?:	[redacted]	No	Transect ID:	1
Is the area a potential Problem Area?:	Yes	[redacted]	Plot ID:	3
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
LIQUIDAMBAR STYRACIFLUA	C	FAC			
ROBINIA PSEUDOACACIA	C	FACU-			
LIQUIDAMBAR STYRACIFLUA	SA	FAC			
LIQUIDAMBAR STYRACIFLUA	SH	FAC			
LINDERA BENZOIN	SH	FACW-			
POLYGONUM PUNCTATUM	H	OBL			
BOEMERIA CYLINDRICA	H	FACW+			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 86

Remarks: HYDROPHYTIC VEGETATION. MOST OF THIS VEGETATION COMPRISES A NARROW STRIP OF HERBS AND SHRUBS OVERSHADED BY TREES GROWING ON ADJOINING UPLANDS.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	NONE	(in.)
Depth in Saturated Soil:	12	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: EVIDENCE OF WETLAND HYDROLOGY WEAK. RUNNING WATER IN ADJOINING STREAM MAY BE PROGRESSIVELY CUTTING A DEEPER CHANNEL INTO ADJOINING ALLUVIAL SOILS, LEAVING ADJOINING WETLANDS PROGRESSIVELY DRIER.

DATA POINT 3
10 FEET EAST OF STAKE "WET 42-6"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	5-12% SLOPES	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-2	N/A	10YR 6/4	10YR 6/6	STREAKS, <10%	SANDY CLAY LOAM
2-18	N/A	10YR 6/2	10YR 6/8	STREAKS, <20%	SANDY CLAY LOAM
18-20+	N/A	10YR 7/1	10YR 7/6	STREAKS, <20%	FINE SANDY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: LOW CHROMA COLORS (DEPLETED MATRIX) ARE A FIELD INDICATOR OF HYDRIC SOILS

WETLAND DETERMINATION

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?		No			
Hydric Soils Present?		No			

Remarks: NARROW STRIP OF WETLANDS BORDERING PERENNIAL HEADWATER STREAM CHANNEL.

Classification: PALUSTRINE FORESTED WETLAND (PFO)

SITE 42
WETLAND DELINEATION TRANSECT 2
DATA POINT 4
DATA POINT 5
DATA POINT 6
DATA POINT 7

DATA POINT 4
20 FEET NORTHEAST OF STAKE "WET 42-32"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	OLD FIELD
Is the site significantly disturbed (Atypical Situation)?:	[redacted]	No	Transect ID:	2
Is the area a potential Problem Area?:	Yes	[redacted]	Plot ID:	4
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
FESTUCA ARUNDINACEA	H	FACU	LIQUIDAMBAR STYRACIFLUA	SA	FAC
			LIQUIDAMBAR STYRACIFLUA	SH	FAC
			SOLANUM CAROLINENSE	H	UPL
			HELIANTHUS TUBEROSUS (?)	H	FAC
			ATHYRIUM FELIX-FEMINA	H	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: OLD FIELD VEGETATION ON WELL DRAINED AREA. THIS IS A DENSE TURF OF TALL FESCUE (*FESTUCA ARUNDINACEA*).

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	NONE	(in.)
Depth in Saturated Soil:	NONE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NO EVIDENCE OF WETLAND HYDROLOGY.

DATA POINT 4
20 FEET NORTHEAST OF STAKE "WET 42-32"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	2-5% SLOPES	Field Observations Confirmed Mapped Type?	[redacted] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-1	A	10YR 4/3	NONE	N/A	FINE SANDY LOAM
1-12	E	10YR 5/4	NONE	N/A	FINE SANDY LOAM
12-18	B	10YR 6/6	NONE	N/A	FINE SANDY LOAM
18-20+	B	10YR 7/6	NONE	N/A	SANDY CLAY

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: NO INDICATORS OF HYDRIC SOIL. ALTHOUGH IN CLEARED AREA ASSOCIATED WITH LANDFILL, SOILS APPEAR TO GENERALLY RESEMBLE THE ORIGINAL KEYPORT SERIES MAPPED FOR THIS LOCATION IN THE COUNTY SOIL SURVEY.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes			
Hydric Soils Present?	Yes			

Remarks: UPGRADIENT END OF TRANSECT IN OBVIOUS UPLAND.

Classification: UPLAND (U)

DATA POINT 5
10 FEET NORTHEAST OF STAKE "WET 42-32"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	DECIDUOUS FOREST
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	2
Is the area a potential Problem Area?:	Yes	[redacted]	Plot ID:	5
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
LIRIODENDRON TULIPIFERA	C	FACU	LONICERA JAPONICA	H	FAC-
FAGUS GRANDIDENTATA	C	FACU	SETARIA SP.	H	VAR
LIQUIDAMBAR STYRACIFLUA	C	FAC	COMMELINA COMMUNIS	H	FAC-
PRUNUS SEROTINA	SA	FACU			
LIQUIDAMBAR STYRACIFLUA	SA	FAC			
LIQUIDAMBAR STYRACIFLUA	SH	FAC			
POLYSTICHUM ACROSTICH.	H	FACU-			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 43

Remarks: NO EVIDENCE OF HYDROPHYTIC VEGETATION. THIS IS A SMALL REMNANT PATCH OF MATURE DECIDUOUS FOREST THAT WAS NOT CLEARED IN CONNECTION WITH THE LANDFILL OR SURROUNDING CONSTRUCTION ACTIVITIES.

HYDROLOGY

____ Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	NONE	(in.)
Depth in Saturated Soil:	NONE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NO EVIDENCE OF WETLAND HYDROLOGY.

DATA POINT 5
10 FEET NORTHEAST OF STAKE "WET 42-32"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	2-5% SLOPES	Field Observations Confirmed Mapped Type?	[redacted] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-1	A	10YR 4/3	NONE	N/A	FINE SANDY LOAM
1-6	B	10YR 6/6	NONE	N/A	FINE SANDY LOAM
6-8	?	10YR 4/2	NONE	N/A	FINE SANDY LOAM
8-20+	B	10YR 5/4	NONE	N/A	FINE SANDY LOAM
					FEW MN CONCRET.

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: DEEP OCCURRENCE OF MN CONCRETIONS IS NOT SUFFICIENT EVIDENCE TO DETERMINE THAT SOIL IS HYDRIC. PROFILE DATA SUGGESTS SOME DISTURBANCE OF THIS SOIL, BUT VERY OLD TREES SUGGEST THAT ANY DISTURBANCE WOULD HAVE DATED FROM MORE THAN A CENTURY AGO.

WETLAND DETERMINATION

	(Circle)		(Circle)
Hydrophytic Vegetation Present?	Yes [redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes [redacted]		
Hydric Soils Present?	Yes [redacted]		

Remarks: UPLAND SLOPE BORDERING STREAM CHANNEL.

Classification: UPLAND (U)

DATA POINT 6
AT STAKE "WET 42-32"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	TRANSITION
Is the site significantly disturbed (Atypical Situation)?:	Yes		Transect ID:	2
Is the area a potential Problem Area?:	Yes		Plot ID:	6
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
LIRIODENDRON TULIPIFERA	C	FACU	LONICERA JAPONICA	H	FAC-
FAGUS GRANDIDENTATA	C	FACU	SETARIA SP.	H	VAR
LIQUIDAMBAR STYRACIFLUA	C	FAC	COMMELINA COMMUNIS	H	FAC-
LIQUIDAMBAR STYRACIFLUA	SH	FAC	CAREX STRICTA	H	OBL
POLYSTICHUM ACROSTICH.	H	FACU-	JUNCUS EFFUSUS	H	FACW+
POLYGONUM PUNCTATUM	H	OBL			
BOEMERIA CYLINDRICA	H	FACW+			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 57

Remarks: AT SHARP TRANSITION FROM UPLAND TO WETLAND VEGETATION

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	16	(in.)
Depth in Saturated Soil:	12	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH INDICATORS OF WETLAND HYDROLOGY

DATA POINT 6
AT STAKE "WET 42-32"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	2-5% SLOPES	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	A	10YR 4/2	NONE	N/A	FINE SANDY LOAM
2-12	E	10YR 5/4	NONE	N/A	FINE SANDY LOAM
12-20+	B	10YR 5/1	10YR 5/6	STREAKS, <10%	FINE SANDY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH FIELD INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	[redacted]	No		
Hydric Soils Present?	Yes	[redacted]		

Remarks: AT ABRUPT TRANSITION FROM WETLAND TO UPLAND.

Classification: TRANSITION UPLAND (U) TO PALUSTRINE EMERGENT WETLAND (PEM)

DATA POINT 7
10 FEET SOUTHWEST OF STAKE "WET 42-32"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	SHADED MARSH
Is the site significantly disturbed (Atypical Situation)?:	Yes		Transect ID:	2
Is the area a potential Problem Area?:	Yes		Plot ID:	7
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
POLYGONUM PUNCTATUM	H	OBL	CAREX STRICTA	H	OBL
BOEMERIA CYLINDRICA	H	FACW+	JUNCUS EFFUSUS	H	FACW+

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: HYDROPHYTIC VEGETATION. AREA SHADED BY OVERHANGING LIMBS OF TREES ON UPLANDS, BUT THESE TREES NOT USED IN DETERMINATION WHETHER VEGETATION IS HYDROPHYTIC.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	SURFACE	(in.)
Depth in Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: SATURATED WETLANDS BORDERING STREAM CHANNEL.

DATA POINT 7
10 FEET SOUTHWEST OF STAKE "WET 42-32"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	2-5% SLOPES	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-20+	B	10YR 5/1	10YR 3/1	STREAKS, <10%	FINE SANDY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- X Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: LOW CHROMA COLORS (DEPLETED MATRIX) ARE A FIELD INDICATOR OF HYDRIC SOILS. SO IS SULFIDIC ODOR.

WETLAND DETERMINATION

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?		No			
Hydric Soils Present?		No			

Remarks: NARROW ZONE OF WETLANDS BORDERING STREAM CHANNEL.

Classification: PALUSTRINE EMERGENT WETLAND (PEM)

SITE 42
WETLAND DELINEATION TRANSECT 3
DATA POINT 8
DATA POINT 9
DATA POINT 10

DATA POINT 8
10 FEET NORTHWEST OF STAKE "WET 42-74"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	OLD FIELD
Is the site significantly disturbed (Atypical Situation)?:	[redacted]	No	Transect ID:	3
Is the area a potential Problem Area?:	Yes	[redacted]	Plot ID:	8
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
LIQUIDAMBAR STYRACIFLUA	SA	FAC	HELIANTHUS TUBEROSUS (?)	H	FAC
LIQUIDAMBAR STYRACIFLUA	SH	FAC	GLECOMA HEDERACEA	H	FACU
POLYGONUM SP.	H	VAR			
RUBUS ALLEGHENIENSIS	H	FACU-			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 67

Remarks: FAC-DOMINATED VEGETATION JUST UPGRADIENT OF WETLAND BOUNDARY.

HYDROLOGY

____ Recorded Data (Described in Remarks):	Wetland Hydrology Indicators:
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
____ Other	X Saturated in Upper 12 inches
X No Recorded Data Available	____ Water Marks
	____ Drift Lines
Field Observations:	____ Sediment Deposits
Depth of Surface Water: NONE (in.)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: 18 (in.)	Secondary Indicators (2 or more required):
Depth in Saturated Soil: 12 (in.)	____ Oxidized Root Channels in Upper 12 inches
	____ Water-Stained Leaves
	____ Local Soil Survey Data
	____ FAC-Neutral Test
	____ Other (Explain in Remarks)

Remarks: VERY MARGINAL EVIDENCE OF WETLAND HYDROLOGY.

DATA POINT 8
10 FEET NORTHWEST OF STAKE "WET 42-74"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	5-12% SLOPES	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-10	N/A	10YR 4/3	NONE	N/A	GRAVELLY LOAM
10-20+	N/A	10YR 4/1	NONE	N/A	GRAVELLY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: NO INDICATORS OF HYDRIC SOIL. THIS APPEARS TO BE FILL ASSOCIATED WITH THE LANDFILL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes	[redacted]		
Hydric Soils Present?	Yes	[redacted]		

Remarks: UPGRADIENT END OF TRANSECT IN OBVIOUS UPLAND.

Classification: UPLAND (U)

DATA POINT 9
AT STAKE "WET 42-74"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND

Do Normal Circumstances exist on the site?:		No	Community ID:	TRANSITION
Is the site significantly disturbed (Atypical Situation)?:		No	Transect ID:	3
Is the area a potential Problem Area?:	Yes		Plot ID:	9
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
RUBUS ALLEGHENIENSIS	H	FACU-	CALYSTEGIA SEPIUM (?)	H	FAC-
GLECOMA HEDERACEA	H	FACU	HELIANTHUS TUBEROSUS (?)	H	FAC
POLYGONUM SP.	H	VAR			
SOLANUM CAROLINENSE	H	UPL			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: PLOT SUPPORTS VEGETATION GENERALLY TYPICAL OF OLD FIELDS BUT MANY OF THE SPECIES, INCLUDING THE ALLEGHENY BLACKBERRY (*RUBUS ALLEGHENIENSIS*) AND GROUND IVY (*GLECOMA HEDERACEA*), APPEAR TO BE SEVERLY DECLINING DUE TO EXPOSURE TO SATURATED SOILS. THUS, THIS VEGETATION CAN BE CONSIDERED TO BE "HYDROPHYTIC".

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	12	(in.)
Depth in Saturated Soil:	8	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH INDICATORS OF WETLAND HYDROLOGY

DATA POINT 9
AT STAKE "WET 42-74"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	5-12% SLOPES	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-8	N/A	10YR 4/3	NONE	N/A	GRAVELLY LOAM
8-20+	N/A	10YR 4/1	NONE	N/A	GRAVELLY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: AT EDGE OF AREA WITH FIELD INDICATORS OF HYDRIC SOIL. THIS APPEARS TO BE FILL ASSOCIATED WITH THE LANDFILL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	[redacted]	No		
Hydric Soils Present?	Yes	[redacted]		

Remarks: AT ABRUPT TRANSITION FROM WETLAND TO UPLAND.

Classification: TRANSITION UPLAND (U) TO PALUSTRINE EMERGENT WETLAND (PEM)

DATA POINT 10
10 FEET SOUTHEAST OF STAKE "WET 42-74"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	IHDIV-NSWC SITE 42	Date:	SEPTEMBER 29, 1999
Applicant:	US NAVY	County:	CHARLES
Investigator:	J. PEYTON DOUB, PWS	State:	MARYLAND
Do Normal Circumstances exist on the site?:	No	Community ID:	HERBACEOUS MARSH
Is the site significantly disturbed (Atypical Situation)?:	No	Transect ID:	3
Is the area a potential Problem Area?:	Yes	Plot ID:	10
(If needed, explain on reverse)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
POLYGONUM PUNCTATUM	H	OBL			
JUNCUS EFFUSUS	H	FACW+			
GLECOMA HEDERACEA	H	FACU			
RUBUS ALLEGHENIENSIS	H	FACU-			
SCIRPUS PUNGENS	H	FACW+			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 60

Remarks: HYDROPHYTIC VEGETATION. UPLAND PLANTS IN THIS AREA, INCLUDING ALLEGHENY BLACKBERRY (*RUBUS ALLEGHENIENSIS*) AND GROUND IVY (*GLECOMA HEDERACEA*), ARE DYING OR DEAD. APPARENTLY DUE TO SOIL SATURATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	0-0.5	(in.)
Depth to Free Water in Pit:	SURFACE	(in.)
Depth in Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: SHALLOW RUNNING WATER IN THIS SWALE APPEARS TO SEEP FROM UNDER THE PARKING LOT FOR BUILDING 1866. THE WATER WAS UNNATURALLY WARM AT THE TIME OF THE DELINEATION.

DATA POINT 10
10 FEET SOUTHEAST OF STAKE "WET 42-74"

SITE 42 (OLSON ROAD LANDFILL)
INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	KEYPORT SILT LOAM	Drainage Class:	MODERATELY WELL
Taxonomy (subgroup):	5-12% SLOPES	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc.
0-20+	N/A	10YR 4/1	NONE	N/A	GRAVELLY LOAM

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: LOW CHROMA COLORS (DEPLETED MATRIX) ARE A FIELD INDICATOR OF HYDRIC SOILS. THIS APPEARS TO BE FILL ASSOCIATED WITH THE LANDFILL.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted] No
Wetland Hydrology Present?		No		
Hydric Soils Present?		No		

Remarks: WETLANDS IN SWALE WHERE SURFACE WATER APPEARS TO ORIGINATE AS SEEPAGE FROM UNDER THE PARKING LOT FOR BUILDING 1866..

Classification: PALUSTRINE EMERGENT WETLAND (PFO)

APPENDIX D

EXCAVATION AND FILL VOLUME REPORTS

D.1 CUT AND FILL REQUIRED TO ESTABLISH INTERIM GRADE

D.2 FILL REQUIRED TO ESTABLISH FINAL GRADE

D.1 CUT AND FILL REQUIRED TO ESTABLISH INTERIM GRADE

Spectra Precision Software, Inc.
5901 Peachtree-Dunwoody Rd., Suite A-300
Atlanta, GA 30328-5548
800-235-4972
Fri Sep 21 09:40:38 2001

PROJECT: C:\Spectra\Terramodel Files\Indian Head\Site 12.pro

DTM TO DTM VOLUME

Cut and Fill Volumes

Volume limited to boundary record 10486
Area within boundary: 53577.2683 Sq. Ft.
Total triangulated area: 53401.1113 Sq. Ft.

Shrinkage/swell factors: Cut 1.0000 Fill 1.0000

Original DTM Layer Name	# of Points	Final DTM Layer Name	# of Points
JM-INT-N	462	EXISTING	7,299

Cut Volume (Cu. Yd.)	Cumulative Cut Volume	Fill Volume (Cu. Yd.)	Cumulative Fill Volume
937.4	937.4	898.3	898.3

Net Difference: 39.1 Cu. Yd. WASTE

Spectra Precision Software, Inc.
5901 Peachtree-Dunwoody Rd., Suite A-300
Atlanta, GA 30328-5548
800-235-4972
Fri Sep 21 09:40:11 2001

PROJECT: C:\Spectra\Terramodel Files\Indian Head\Site 12.pro

DTM TO DTM VOLUME

Cut and Fill Volumes

Volume limited to boundary record 30407
Area within boundary: 135505.5478 Sq. Ft.
Total triangulated area: 43936.9435 Sq. Ft.

Shrinkage/swell factors: Cut 1.0000 Fill 1.0000

Original DTM Layer Name	# of Points	Final DTM Layer Name	# of Points
JM-INT-S-N	404	EXISTING	7,299

Cut Volume (Cu. Yd.)	Cumulative Cut Volume	Fill Volume (Cu. Yd.)	Cumulative Fill Volume
1,043.6	1,043.6	795.8	795.8

Net Difference: 247.8 Cu. Yd. WASTE

Spectra Precision Software, Inc.
5901 Peachtree-Dunwoody Rd., Suite A-300
Atlanta, GA 30328-5548
800-235-4972
Fri Sep 21 09:39:46 2001

PROJECT: C:\Spectra\Terramodel Files\Indian Head\Site 12.pro

DTM TO DTM VOLUME

Cut and Fill Volumes

Volume limited to boundary record 30407
Area within boundary: 135505.5478 Sq. Ft.
Total triangulated area: 84664.5679 Sq. Ft.

Shrinkage/swell factors: Cut 1.0000 Fill 1.0000

Original DTM Layer Name	# of Points	Final DTM Layer Name	# of Points
JM-INT-S-S	584	EXISTING	7,299

Cut Volume (Cu. Yd.)	Cumulative Cut Volume	Fill Volume (Cu. Yd.)	Cumulative Fill Volume
2,016.9	2,016.9	2,085.6	2,085.6

Net Difference: 68.7 Cu. Yd. BORROW

D.2 FILL REQUIRED TO ESTABLISH FINAL GRADE

Spectra Precision Software, Inc.
5901 Peachtree-Dunwoody Rd., Suite A-300
Atlanta, GA 30328-5548
800-235-4972
Fri Sep 21 09:54:25 2001

PROJECT: C:\Spectra\Terramodel Files\Indian Head\Site 12.pro

DTM TO DTM VOLUME

Cut and Fill Volumes

Volume limited to boundary record 10486
Area within boundary: 53577.2683 Sq. Ft.
Total triangulated area: 53401.1113 Sq. Ft.

Shrinkage/swell factors: Cut 1.0000 Fill 1.0000

Original DTM Layer Name	# of Points	Final DTM Layer Name	# of Points
JM-INT-N	462	JM-FIN-N	462

Cut Volume (Cu. Yd.)	Cumulative Cut Volume	Fill Volume (Cu. Yd.)	Cumulative Fill Volume
0.0	0.0	3,955.6	3,955.6

Net Difference: 3955.6 Cu. Yd. BORROW

Spectra Precision Software, Inc.
5901 Peachtree-Dunwoody Rd., Suite A-300
Atlanta, GA 30328-5548
800-235-4972
Fri Sep 21 09:55:09 2001

PROJECT: C:\Spectra\Terramodel Files\Indian Head\Site 12.pro

DTM TO DTM VOLUME

Cut and Fill Volumes

Volume limited to boundary record 30407
Area within boundary: 135505.5478 Sq. Ft.
Total triangulated area: 43936.9434 Sq. Ft.

Shrinkage/swell factors: Cut 1.0000 Fill 1.0000

Original DTM Layer Name	# of Points	Final DTM Layer Name	# of Points
JM-INT-S-N	404	JM-FIN-S-N	404

Cut Volume (Cu. Yd.)	Cumulative Cut Volume	Fill Volume (Cu. Yd.)	Cumulative Fill Volume
0.0	0.0	3,254.6	3,254.6

Net Difference: 3254.6 Cu. Yd. BORROW

Spectra Precision Software, Inc.
5901 Peachtree-Dunwoody Rd., Suite A-300
Atlanta, GA 30328-5548
800-235-4972
Fri Sep 21 09:55:29 2001

PROJECT: C:\Spectra\Terramodel Files\Indian Head\Site 12.pro

DTM TO DTM VOLUME

Cut and Fill Volumes

Volume limited to boundary record 30407
Area within boundary: 135505.5478 Sq. Ft.
Total triangulated area: 84664.5684 Sq. Ft.

Shrinkage/swell factors: Cut 1.0000 Fill 1.0000

Original DTM Layer Name	# of Points	Final DTM Layer Name	# of Points
JM-INT-S-S	584	JM-FIN-S-S	584

Cut Volume (Cu. Yd.)	Cumulative Cut Volume	Fill Volume (Cu. Yd.)	Cumulative Fill Volume
0.0	0.0	6,271.4	6,271.4

Net Difference: 6271.4 Cu. Yd. BORROW

APPENDIX E

ASPHALT PAVEMENT CALCULATION

CLIENT:	INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER		JOB NUMBER: N0525-1920
SUBJECT:	SITE 12 – ASPHALT PAVEMENT CALCULATION		
BASED ON:			DRAWING NUMBER:
DESIGN BY: JLM DATE: 8-28-01		CHECKED BY: NJB DATE: 9-21-01	APPROVED BY: DATE:

PROBLEM STATEMENT:

A 320-foot stretch (approximate) of Atkins Road Extension will be reconstructed during the Remedial Action Design at Site 12. Determine the adequacy of the proposed pavement cross section (geotextile, 6- to 8-inch aggregate subbase, 3-inch bituminous concrete binder (base) course, and 2-inch bituminous concrete wearing (surface) course (refer to Design Drawing C-9). The final product must meet the following criteria:

- H-20 loading
- Maryland Department of Transportation Specifications
- Bituminous section
- Frost protection
- End product must be a road for passenger vehicles

REFERENCES:

1. Department of the Navy, Naval Facilities Engineering Command, October 1979. Civil Engineering Pavements, NAVFAC DM – 5.4, Alexandria, Virginia.

2. Departments of the Army and the Air Force, June 1992. Pavement Design for Roads, Streets, Walks, and Open Storage Areas, AFM 88-7, Washington, D.C.

3. Maryland Department of Transportation, October 1993. Standard Specifications for Construction and Materials, Baltimore, Maryland.

APPROACH / ASSUMPTIONS:

The adequacy of the proposed pavement cross section will be evaluated using the deterministic methods described in the Design Manual for Civil Engineering Pavements by the Department of the Navy (NAVFAC DM-5.4).

The following assumptions have been made:

- Subgrade CBR is 8.
- Subgrade will be compacted to 95% maximum density.
- Based on site visits by TtNUS personnel, traffic level is moderate.

PROPOSED PAVEMENT CROSS SECTION:

The minimum design pavement section as seen on Design Drawing C-9 is:

- Geotextile
- 6-8-inch aggregate subbase
- 3-inch bituminous concrete binder course
- 2-inch bituminous concrete wearing course

CLIENT:	INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER	JOB NUMBER:	N0525-1920
SUBJECT:	SITE 12 – ASPHALT PAVEMENT CALCULATION		
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DESIGN BY: JLM DATE: 8-28-01	CHECKED BY: NJB DATE: 9/21/01	APPROVED BY:	DATE:

DESIGN METHOD

1. Determine the design index (DI) to account for effects of traffic intensity and weight:

A. Vehicle group – Choose Group 1 (passenger cars and panel and pickup trucks) and Group 2 (two-axle trucks) (Table A, page 5 of 10)
B. Design Index (DI) – Choose 3 (medium traffic up to 3,000 VPD, up to 10% Group 2 plus Group 3, 1% Group 3 vehicles) (Table 5, page 5 of 10).

2. Determine the subgrade strength for a flexible pavement:

A. Atkins Road Extension is constructed on a landfill. Assume subgrade soil consists of silt and fine-grained sand to a depth of 4 feet, based on the closest boring, S12WP03.
B. Choose CBR of 8. Approximate CBR range 6 – 12 for low plastic clays, inorganic silts, very fine sands (Table B, page 6 of 10)

3. Determine the required structural thickness of the cross section:

A. CBR = 8
B. DI = 3
C. From Figure 7 (page 6 of 10), total thickness is 12 inches.

4. Determine the structural thickness of each section (Reference 1, page 20):

A. Minimum subbase thickness is 4-inches.
B. Minimum base thickness is 6-inches.
C. Minimum thickness of bituminous concrete is 3-inches for primary roads, 2-inches for secondary and tertiary roads (Table C, page 6 of 10).

Therefore, the minimum acceptable structural thickness for each layer is:
- 4-inches for aggregate subbase
- 6-inches for aggregate base
- 3-inches of bituminous concrete

Considering that the 3-inch bituminous concrete binder course is a part of the surface course, the proposed subbase thickness of 6- to 8-inches does not meet the minimal subbase and base combined thickness requirement of 10-inches.

5. Frost Design (AFM 88-7, Chapter 1, Subchapter 18)

A. Determine the depth of frost penetration using the average frost penetration. Steps:

(1) Assume subgrade soil consists of silt and fine-grained sand. This belongs to Frost Group F4 (Table 18-2, page 7 of 10).
(2) Design Freezing Index for Indian Head, MD is 200 (Figure 18-2, page 8 of 10).
(3) Compute Depth of Frost Penetration.

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SUBJECT:	SITE 12 – ASPHALT PAVEMENT CALCULATION		
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DESIGN BY: JLM DATE: 8-28-01		CHECKED BY: 9/21/01 DATE: NJB	APPROVED BY: DATE:

C = a – p where C = depth of base and subbase material
a = frost penetration depth
p = pavement thickness (Bituminous wearing coarse)

From Figure 18-3 (page 9 of 10):

- Assume subgrade (silt) of 15% moisture 115 lb-ft^3
- Enter design freezing index of 200
- Frost penetration = 20 inches

C = 20" – 2" = 18"

Using the limited subgrade frost penetration method, 18-inches of unbound base is required for zero frost penetration into the subgrade.

(4) Compute ratio r = water content of subgrade / water content of base.

- Assume water content of silt or fine–grained sand subgrade is 15%
- Assume water content of free-draining aggregate is 5%

r = 15/5 = 3

(5) Enter Figure 18-4 using C = 18 and r = 3 (page 10 of 10).

From figure, design base thickness b 10-inches, subgrade frost penetration s = 2.4-inches

Using the reduced subgrade strength method, 10-inches of unbound base is required for a subgrade frost penetration of 2.4-inches.

(6) Consider the Reduced Subgrade Strength Method

From Reference 2 (Section 18-7): "When the reduced subgrade strength method is used for F4 subgrade soils, unusually rigorous control of subgrade must be required." Assume the cost of "unusually rigorous subgrade control" does not outweigh the cost savings of this method. Therefore, use the reduced subgrade strength method value of 10-inches.

The proposed pavement design (6- to 8-inches of subbase, 3-inches of bituminous concrete binder course, and 2-inches of bituminous concrete wearing course does not meet frost requirements.

ALTERNATIVE PAVEMENT CROSS SECTION

With the following conditions and assumptions:
- Subgrade CBR 8
- Subgrade compacted to 95% maximum density
- Use of passenger cars predominant
- H-20 loading

CLIENT: INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER		JOB NUMBER: N0525-1920
SUBJECT: SITE 12 – ASPHALT PAVEMENT CALCULATION		
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DESIGN BY: JLM DATE: 8-28-01	CHECKED BY: NJB DATE: 9/21/01	APPROVED BY: DATE:

- Site is in Indian Head, Maryland

The recommended cross section consists of the minimum acceptable structural thickness mentioned in Part 4 of the Design Method and repeated here:
- Geotextile
- 4-inch aggregate subbase
- 6-inch aggregate base
- 3-inch bituminous concrete (consisting of 2-inches binder course and 1-inch wearing course)

The type of aggregate and bituminous concrete used in this design shall conform to the specifications found in Reference 3.

This cross section meets the required nonfrost total thickness of 12-inches (page 2 of 10, Part 3) as well as the frost design unbound base thickness of 10-inches (page 3 of 10, Part 5).

Upon inspection of the existing pavement, if the existing layers appear to be thicker than the minimum design thickness, it is suggested that the pavement system be replaced in kind. That is, each layer thickness shall, as a minimum, match the layer thickness of the previous pavement. Pavement shall be replaced in kind, as necessary, to minimize cracking and differential settlement at the transition location of the new and existing pavement sections.

CLIENT:	INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER	JOB NUMBER:	N0525-1920
SUBJECT:	SITE 12 – ASPHALT PAVEMENT CALCULATION		
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DESIGN BY: JLM DATE: 8-28-01	CHECKED BY: NJB DATE: 9/14/01	APPROVED BY:	DATE:

TABLE A

a. Vehicle Groups. Where detailed traffic survey and axle load data are not available, spot counts or estimates can be made to ascertain the general characteristics and volume of traffic. As an aid to determining a DI, vehicles should be grouped according to the following categories:

(1) Group 1: Passenger cars and panel and pickup trucks.
(2) Group 2: Two-axle trucks.
(3) Group 3: Trucks having three or more axles.

TABLE 5
Vehicular Traffic Design Index

DI	Traffic Characteristics	Approx. Daily EAL
1	Passenger Vehicles and Light Trucks. No trucks in Groups 2 or 3.	1-5
2	Medium-Light Traffic, less than 1000 VPD. 10% in Group 2 and none in Group 3.	6-20
3	Medium traffic up to 3000 VPD. Up to 10% Group 2 plus Group 3. 1% Group 3 vehicles.	21-75
4	Medium-heavy traffic up to 6000 VPD. Up to 15% Group 2 plus Group 3. 10% Group 3 vehicles.	76-250
5	Heavy traffic to 6000 VPD. Maximum 25% Group 2 plus Group 3 and 15% Group 3.	251-900
6	Very heavy traffic exceeding 6000 VPD. Over 25% Group 2 or Group 3.	901-3000

(REFERENCE 1)

CLIENT:	INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER		JOB NUMBER: N0525-1920
SUBJECT:	SITE 12 – ASPHALT PAVEMENT CALCULATION		
BASED ON:			DRAWING NUMBER:
DESIGN BY: JLM DATE: 8-28-01		CHECKED BY: NJB DATE: 9/14/01	APPROVED BY: DATE:

TABLE B

Subgrade Soil Type	Approx. CBR
Well and poorly graded gravels, well graded sands	>18
Silty and clayey sands	12-18
Low plastic clays, inorganic silts, very fine sands	6-12
Highly plastic and organic clays, micaceous silts	1-6

TABLE C

Type of Surface	Minimum Thickness (inches)
Primary Road	3
Secondary and Tertiary Roads	2
Parking Area	2
Driveway	1.5
Sidewalk	1
Surfacing Used by Tracked Vehicles	4

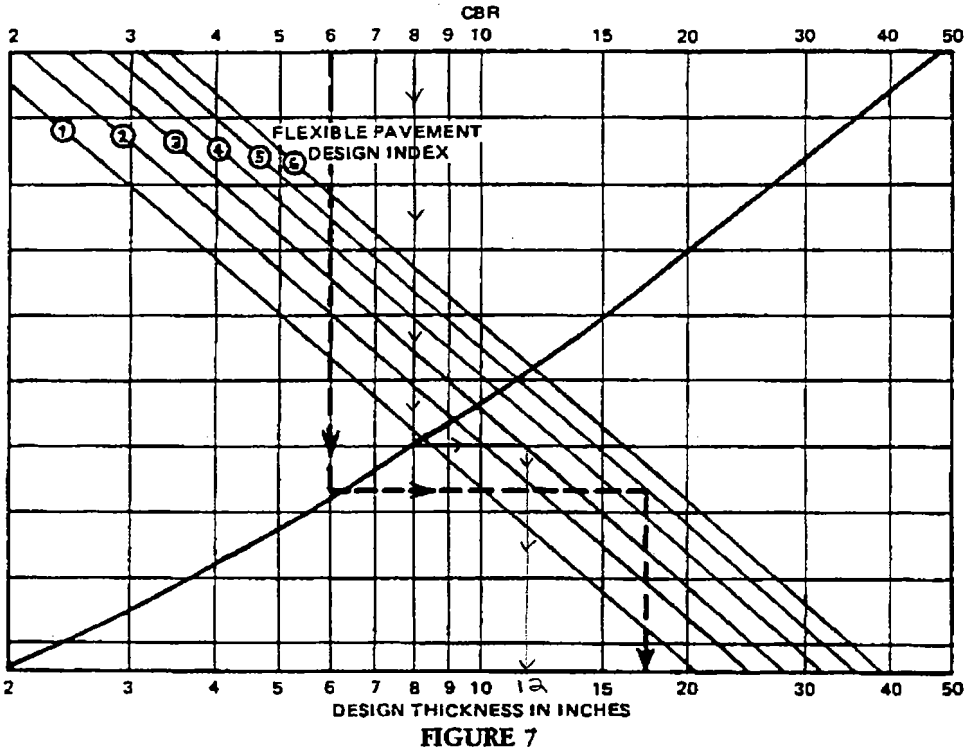

FIGURE 7
CBR Thickness Design Chart—Flexible Pavements

(REFERENCE 1)

CLIENT:	INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER	JOB NUMBER:	N0525-1920
SUBJECT:	SITE 12 – ASPHALT PAVEMENT CALCULATION		
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DESIGN BY: JLM DATE: 8-28-01	CHECKED BY: NJB DATE: 9/14/01	APPROVED BY:	DATE:

Table 18-2. Frost Design Soil Classification.

Frost group	Kind of soil	Percentage finer than 0.02 mm by weight	Typical soil types under Unified Soil Classification system
NFS*	(a) Gravels Crushed stone Crushed rock	0-15	GW, GP
	(b) Sands	0-3	SW, SP
PFS**	(a) Gravels Crushed stone Crushed rock	1.5-3	GW, GP
	(b) Sands	3-10	SW, SP
S1	Gravelly soils	3-6	GW, GP, GW-GM, GP-GM
S2	Sandy soils	3-6	SW, SP, SW-SM, SP-SM
F1	Gravelly soils	6 to 10	GM, GW-GM, GP-GM
F2	(a) Gravelly soils	10 to 20	GM, GW-GM, GP-GM
	(b) Sands	6 to 15	SM, SW-SM, SP-SM
F3	(a) Gravelly soils	Over 20	GM, GC
	(b) Sands, except very fine silty sands	Over 15	SM, SC
	(c) Clays, PI > 12	--	CL, CH
F4	(a) All silts	--	ML, MH
	(b) Very fine silty sands	Over 15	SM
	(c) Clays, PI > 12	--	CL, CL-ML
	(d) Varved clays and other fine-grained, banded sediments	--	CL, CL-ML CL and ML; CL, ML, and SM; CL, CH, and ML; CL, CH, ML and SM

* Non-frost-susceptible.

** Possibly frost-susceptible, but requires laboratory test to determine frost design soils classification.

(REFERENCE 2)

CLIENT:	INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER		JOB NUMBER: N0525-1920
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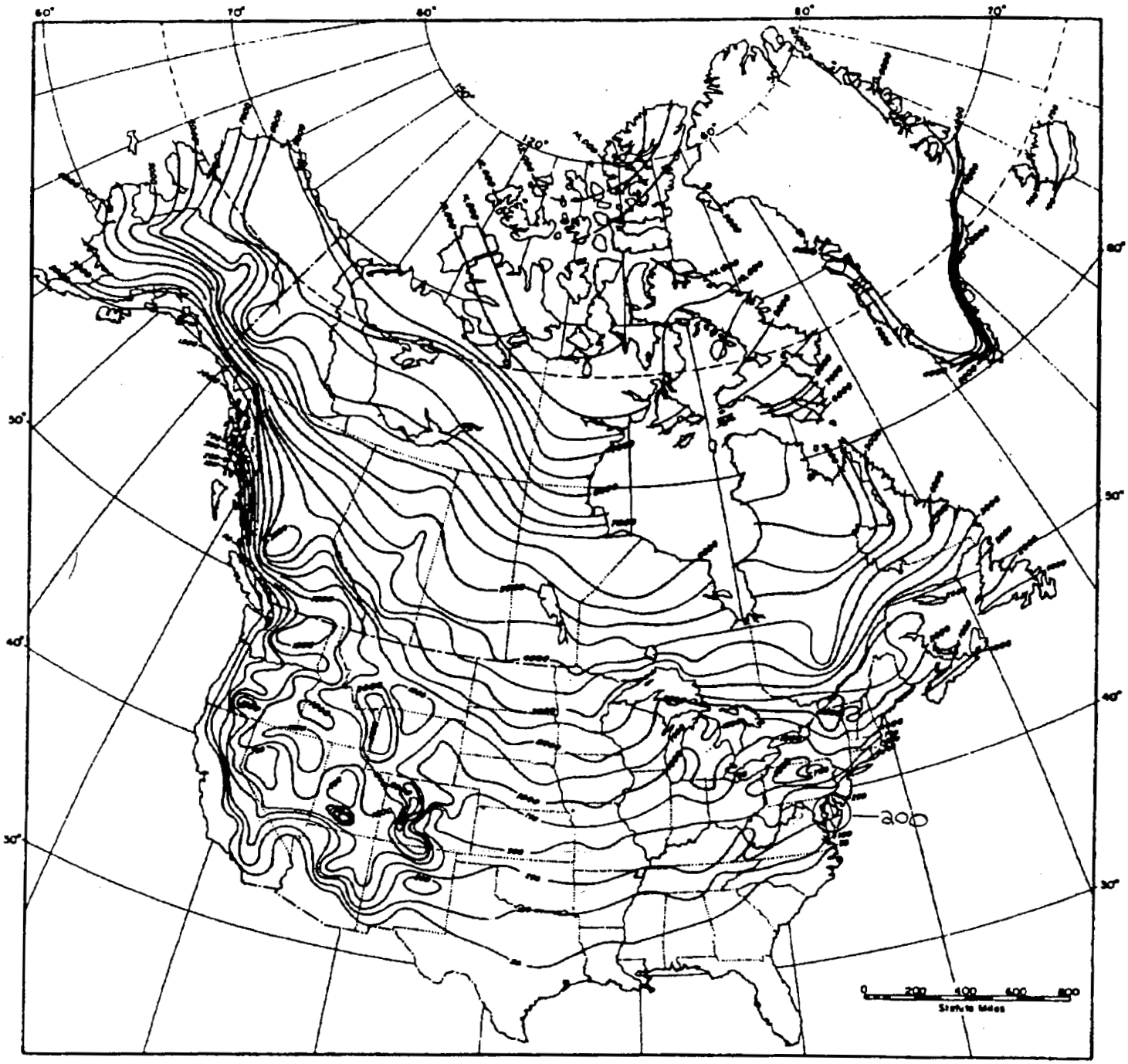

Figure 18-2. Distribution of Design Freezing Index for North America.

(REFERENCE 2)

CLIENT:	INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER		JOB NUMBER: N0525-1920
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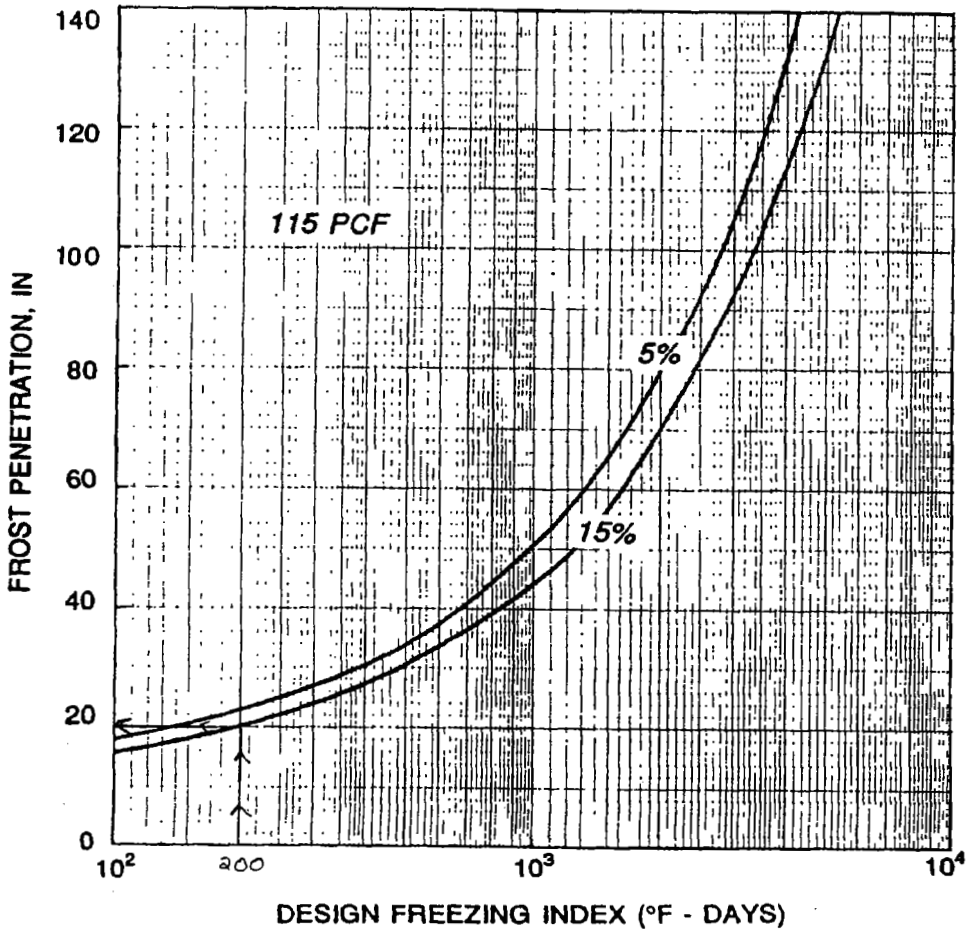

Figure 18-3. Frost Penetration Beneath Pavements. (Sheet 2 of 3)

(REFERENCE 2)

CLIENT:	INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER		JOB NUMBER: N0525-1920
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BASED ON:			DRAWING NUMBER:
DESIGN BY: JLM DATE: 8-28-01		CHECKED BY: NJB DATE: 9/14/01	APPROVED BY: DATE:

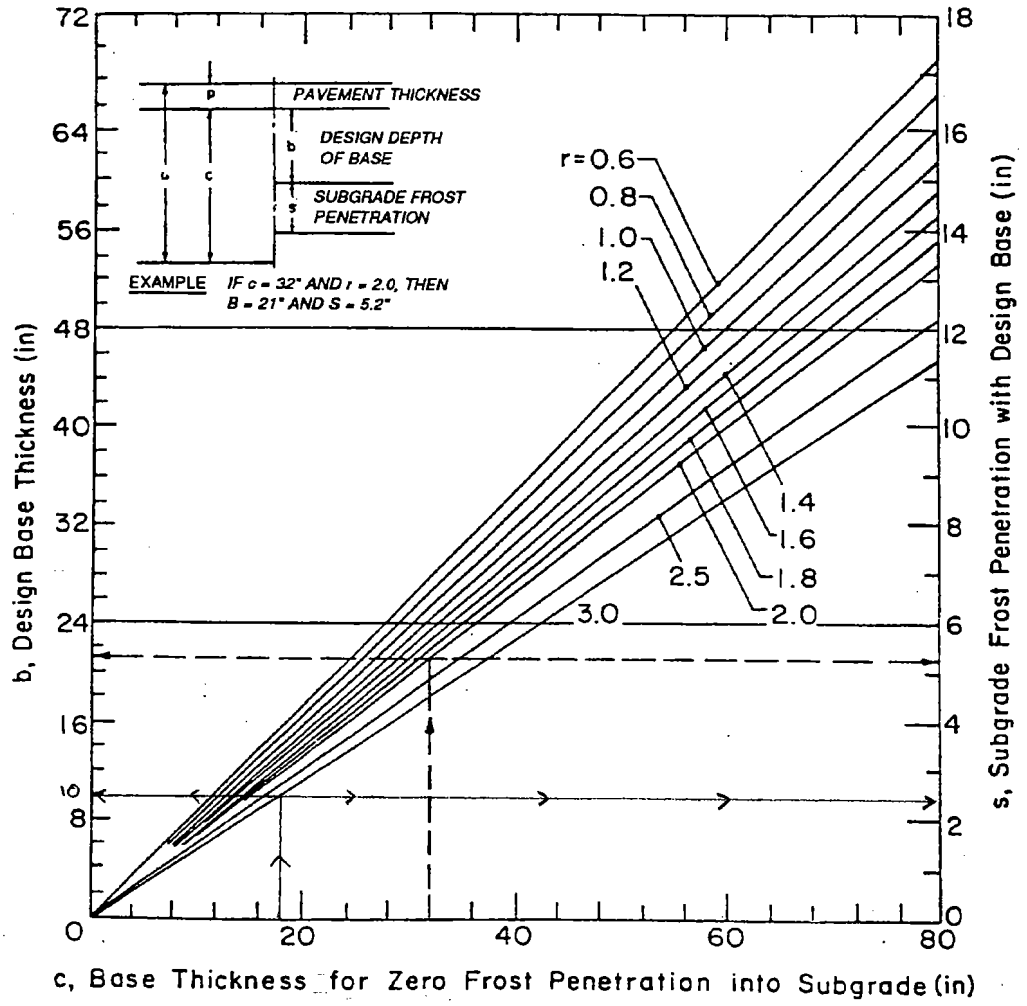

Figure 18-4. Design Depth of Nonfrost-Susceptible Base for Limited Subgrade Frost Penetration.

(REFERENCE 2)

Environmental Permits Report
for
Site 12 - Town Gut Landfill

Indian Head Division
Naval Surface Warfare Center
Indian Head, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298
Contract Task Order 0325

February 2002

REVISION 0
FEBRUARY 2002

ENVIRONMENTAL PERMITS REPORT
FOR
SITE 12 - TOWN GUT LANDFILL

INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity Chesapeake
1314 Harwood Street, SE
Washington Navy Yard, D.C. 20374-5018

Submitted by:
Tetra Tech NUS, Inc.
600 Clark Avenue, Suite 3
King of Prussia, Pennsylvania 19406-1433

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0325

FEBRUARY 2002

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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
COMAR	Code of Maryland Regulations
CTO	Contract Task Order
DOD	Department of Defense
IHDIV-NSWC	Indian Head Division Naval Surface Warfare Center
MDE	Maryland Department of the Environment
NPDES	National Pollutant Discharge Elimination System
POTW	publicly owned treatment works
RAOs	remedial action objectives
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
Site 12	Site 12 – Town Gut Landfill
TtNUS	Tetra Tech NUS, Inc.
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

This Environmental Permits Report was prepared by Tetra Tech NUS, Inc. (TtNUS) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62472-90-D-1298, Contract Task Order (CTO) 0325. Under CTO 0325, TtNUS is performing engineering, design, and construction-phase services for the remedial action at Site 12 - Town Gut Landfill (Site 12) at the Indian Head Division Naval Surface Warfare Center (IHDIV-NSWC) in Indian Head, Maryland. Site 12 is located in the main area of IHDIV-NSWC on the Cornwallis Neck Peninsula. Location and vicinity maps showing the approximate location of IHDIV-NSWC and Site 12 are presented on Figures 1-1 and 1-2, respectively.

1.1 BACKGROUND INFORMATION

Site 12 comprises approximately 4 acres of undeveloped land. The northern and western portions of the site are bounded by ponds. The site is bisected by an arm of the northern pond and traversed by Atkins Road Extension, which is oriented in a northwest-southeast direction (Figure 1-3). There are no buildings, structures, or other development at the site. Ground surface elevations range from approximately sea level at the ponds to 25 feet above mean sea level. The northern portion of the landfill is covered with unmowed turfgrass and some small stands of trees. The southern portion of the landfill is covered with unmowed turfgrass with some small, scattered trees. Some debris is present at the shorelines adjacent to the ponds.

Runoff from the site flows toward the ponds. The ponds are connected by a 78-inch diameter pipe located under Atkins Road Extension. The ponds eventually discharge to Mattawoman Creek, which is located approximately 1,500 feet south of the site. The water flow at the discharge (southern) end of the southern pond is governed by a weir that also inhibits influences on the ponds by tidal changes in Mattawoman Creek located south of the southern pond. Wetlands are located adjacent to the ponds.

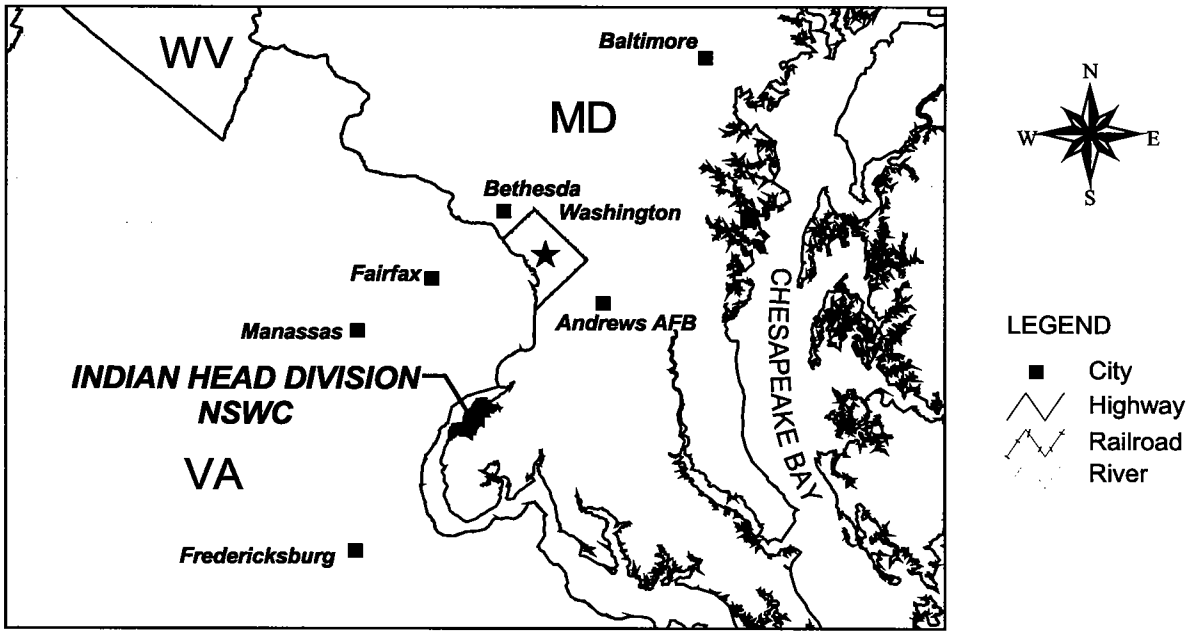
Between 1968 and June 1980, the site was used by IHDIV-NSWC to dispose of landscaping waste, fill material, and rubble. Reportedly, material from outside IHDIV-NSWC was also disposed at the site until 1972. Unauthorized dumping of trash may have occurred. Some of the unauthorized items reportedly disposed include paint, varnish, and other chemical wastes. Past reports estimate that Site 12 contains approximately 70,000 cubic yards of mixed solid waste materials, primarily landscaping waste, tree stumps, and demolition debris. No hazardous wastes, as defined by the Resource Conservation and Recovery Act (RCRA), were identified.

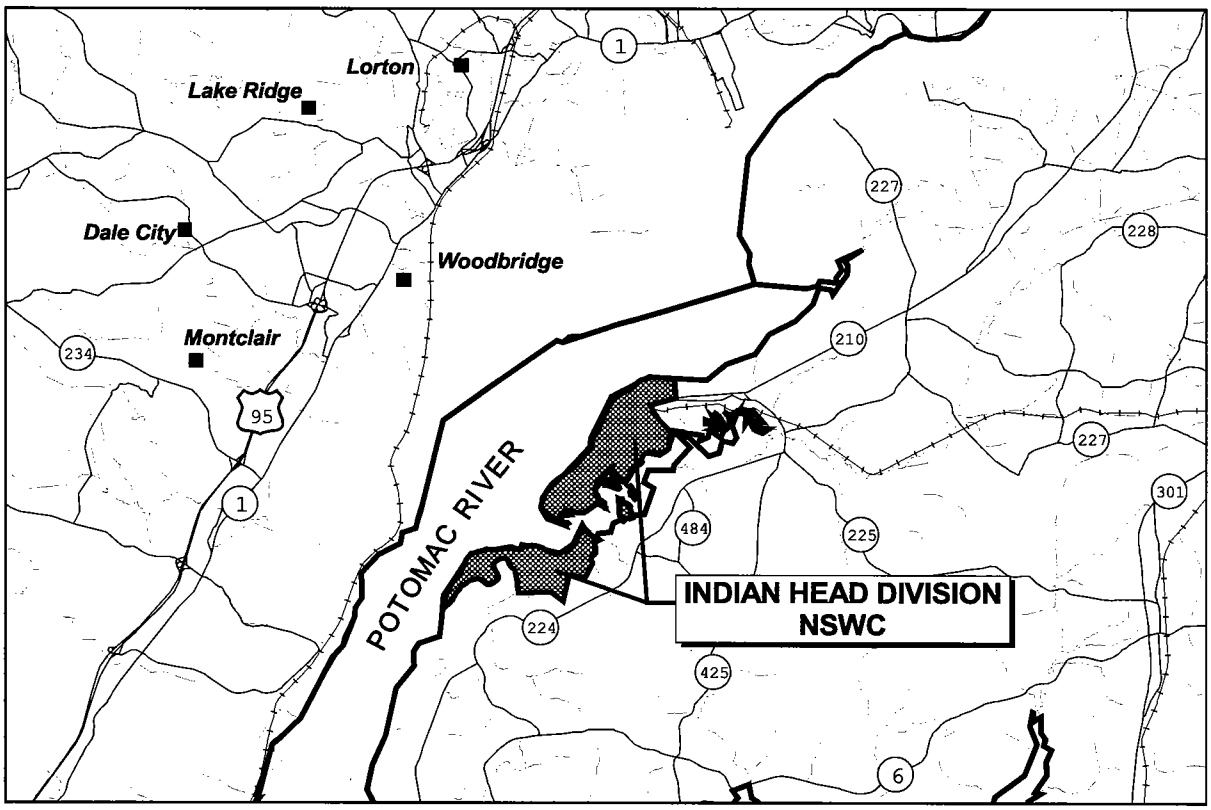
Subsurface materials generally consist of silt, sand, and gravel (fill) overlying landfill material mixed with silt, sand, and gravel and interspersed with void spaces. Landfill material (top of waste) is encountered

on average 1.5- to 2-feet below ground surface (bgs) ranging from just below ground surface to as deep as 8 feet bgs. Generally, the depth to the landfill material ranged from approximately 1 to 2 feet bgs. It is estimated that the top of the waste is 1 foot to 15 feet above the original ground surface. Natural materials beneath the fill consist of silt and gravel. The depth to the water table ranges from 1 foot to 4 feet bgs. Groundwater flows toward the ponds. The landfill was not closed in accordance with state solid waste management regulations.

1.2 PURPOSE

The purpose of an Environmental Permits Report is to identify applicable permits, filing procedures, and filing costs required to complete the remedial action outlined in Section 2.0. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(e) exempts any response action conducted entirely on site from federal, state, and local permit application procedures. On-site actions need only comply with the substantive aspects of environmental regulations, not with the corresponding administrative requirements. Permit applications and other administrative procedures, such as administrative reviews, reporting, and recordkeeping requirements, are not considered for actions conducted entirely on site. For on-site actions, the substantive aspects of permit regulations are also identified in this report. Off-site actions must comply with all legally applicable requirements, both substantive and administrative. According to 40 Code of Federal Regulations (CFR) 300.400(e), the term “on site” means the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the remedial action.





DRAWN BY J. LAMEY DATE 8/2/01	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0525	OWNER NO. 0325
CHECKED BY GJL DATE 8/3/01	FACILITY LOCATION MAP SITE 12 - TOWN GUT LANDFILL INDIV - NSWC, INDIAN HEAD, MARYLAND	APPROVED BY GJL DATE 8/3/01	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 1-1	REV 0

P:\GIS\NSWC_INDIAN_HEAD\SITE_LOCATION.APR FACILITY LOCATION MAP 2/13/02 KMP

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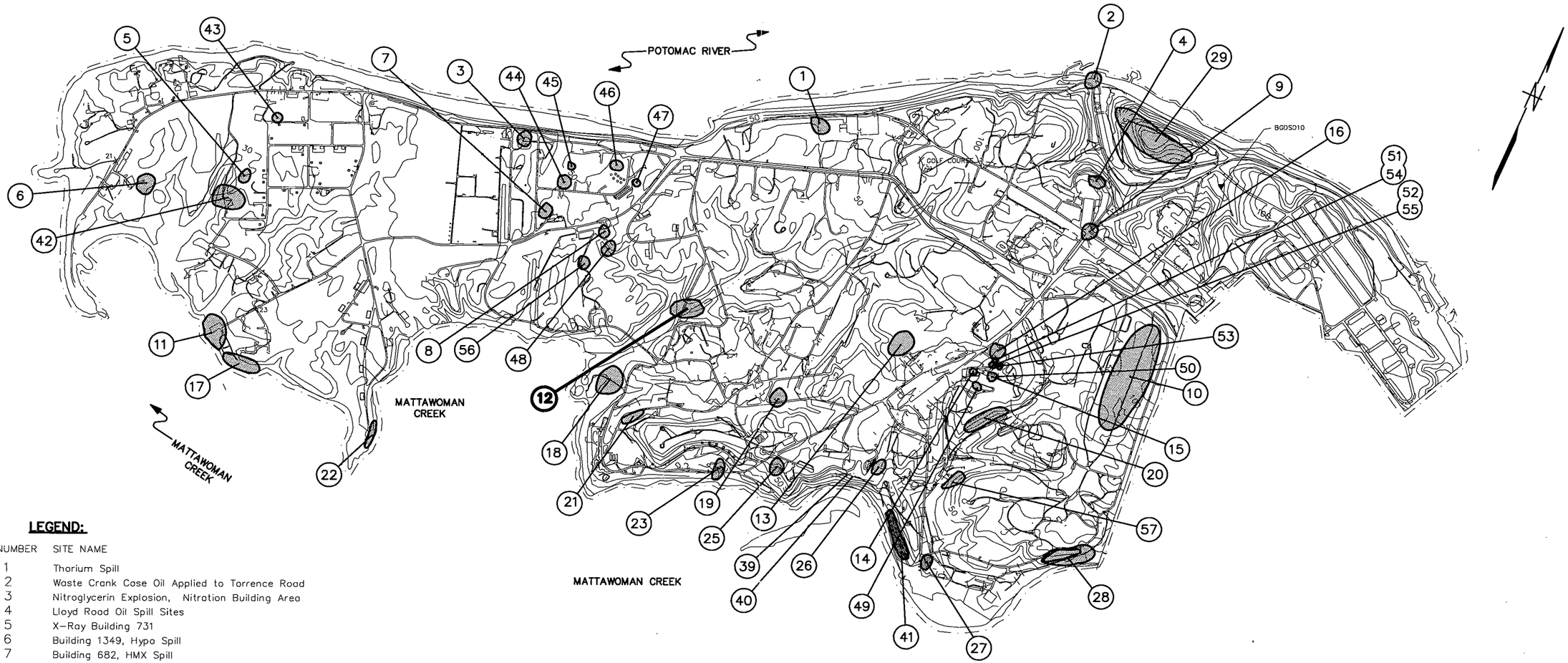

LEGEND:

SITE NUMBER	SITE NAME
1	Thorium Spill
2	Waste Crank Case Oil Applied to Torrence Road
3	Nitroglycerin Explosion, Nitration Building Area
4	Lloyd Road Oil Spill Sites
5	X-Ray Building 731
6	Building 1349, Hypo Spill
7	Building 682, HMX Spill
8	Building 766, Mercury Deposits
9	Patterson Avenue, Oil Spill
10	Single-base Propellant Grains Spill
11	Caffee Road Landfill
12	**Town Gut Landfill**
13	Paint Solvents Disposal Ground
14	Waste Acid Disposal Pit
15	Mercury Deposits in Manhole, Flourine Lab
16	Laboratory Chemical Disposal
17	Disposal Metal Parts Along Shoreline
18	Hog Island
19	Catch Basins at Chip Collection Houses
20	Single-base Powder Facilities
21	Bronson Road Landfill
22	NG Slums Burning Site
23	Hydraulic Oil Spill Discharges From Extrusion Plant
24	Abandoned Drain Lines (Not Shown)
25	Hypo Discharge X-Ray Building No. 2
26	Thermal Destructor 2
27	Thermal Destructor 1
28	Original Burning Ground
29	The Valley
30-38	Stump Neck Annex (Not Shown)
39	Organic Plant Outfall
40	Palladium Catalyst in Sediments
41	Scrap Yard
42	Olsen Road Landfill
43	Toluene Disposal Site
44	Soak Out Area
45	Abandoned Drums
46	Cadmium Sandblast Grit
47	Mercuric Nitrate Disposal Area
48	Nitroglycerine Plant Disposal Area
49	Chemical Disposal Area
50	Building 103, Crawl Space
51	Building 101, Dry Wall
52	Building 102, Dry Wall
53	Mercury Contamination of the Sewage System
54	Building 101
55	Building 102
56	IW87 - Lead Contamination
57	TCE Building 292 Area

APPROXIMATE SITE LOCATION
INTERMITTENT STREAM
NAVAL RESERVE BOUNDARY
100 — CONTOUR INTERVAL 10 FEET
FLOW DIRECTION

0 1600 3200
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/12/01
CHECKED BY TMM DATE 10/4/01
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SITE LOCATION MAP
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CONTRACT NO. 0525
OWNER NO. 0325
APPROVED BY DATE 10/4/01
APPROVED BY DATE
DRAWING NO. FIGURE 1-2
REV. 0

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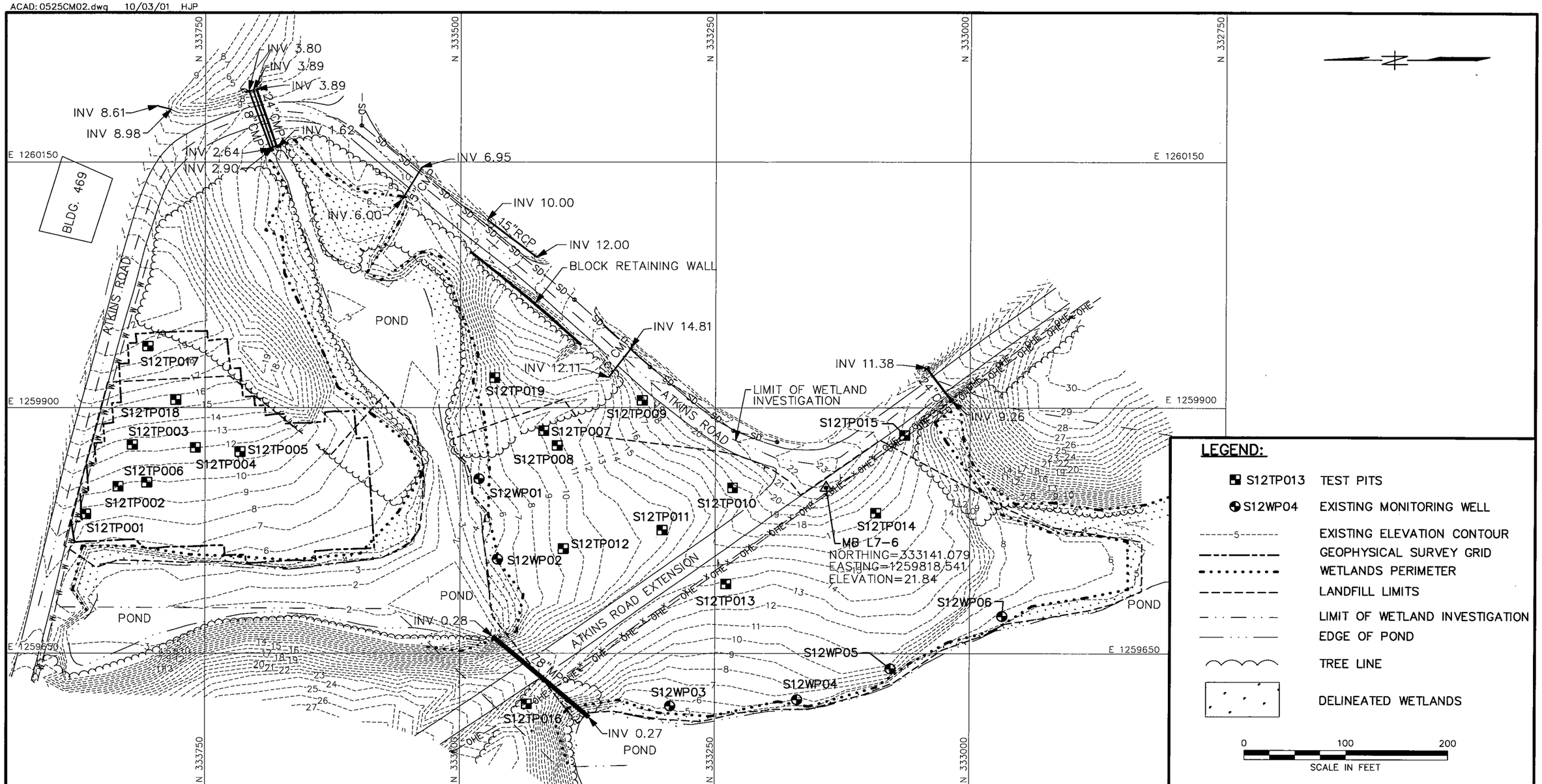

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP	DATE 4/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 0525 / OWNER NO. 0325
CHECKED BY	DATE 10/4/01	SITE LAYOUT SITE 12 – TOWN GUT LANDFILL INDIV–NSWC, INDIAN HEAD, MARYLAND	APPROVED BY / DATE 10/4/01
COST/SCHED–AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1–3 / REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

2.0 PROPOSED REMEDIAL ACTION

2.1 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are based on the contaminated media, potential human health and environmental threats, and regulatory standards, requirements, and guidance. The media of interest at Site 12 are the surface soil on the former landfill and the landfill wastes. Although chemical concentrations in water from the shallow water table were above federal and state drinking water standards, water beneath the site is not a current or potential source of drinking water under the anticipated non-residential future land use. In addition, state regulations prohibit potable water supply wells in unconfined aquifers within 100 feet of identifiable sources of contamination (e.g., landfill).

The only unacceptable risks to human health are from exposure to soil and subsurface water under the hypothetical future residential exposure scenario. Although residential land uses are not anticipated at Site 12 in the future, one of the RAOs is to prevent future residential exposure to contaminants.

The only potentially unacceptable risk to ecological receptors is from exposure to surface soil. The RAO for surface soil is to eliminate receptor exposure pathways by removing the potential for direct contact between ecological receptors and contaminants.

Based on the intent of the state solid waste regulations, one RAO was developed for the landfill. The RAO is to close the landfill in manner that protects human health and the environment and controls air, water, and land pollution.

The RAOs for Site 12 are summarized below:

- Prevent future residential use and use of contaminated shallow subsurface water.
- Remove the potential for direct contact between ecological receptors and surface soil contaminants.
- Close the landfill in a manner that protects human health and the environment and controls air, water, and land pollution.

2.2 REMEDIAL ACTION DESCRIPTION

The remedial action for Site 12 will consist of general site preparation work, excavating landfill material near the edge of the ponds, removing exposed waste and debris from the wetlands adjacent to the ponds, placing excavated materials under the soil cover, backfilling excavated areas, installing a soil

cover over the landfill, replacing wetlands, and restoring the site. Institutional controls will be imposed, and the site will be monitored.

The major items of construction to be performed during this work are summarized below:

General Site Preparation: The areas in which construction activities will be performed will be cleared. In addition, appropriate erosion and sediment control measures will be implemented to minimize the potential for downstream migration of contaminants during activities in the wetlands or near the pond shoreline.

Waste Removal and Off-Site Disposal: This component includes the following activities:

- Landfilled material near the edges of the northern and southern ponds will be removed to a depth of at least 2 feet. The average width of the excavation is estimated to be 5 feet along the length of the shorelines. The excavated soil and landfilled material will be placed beneath the soil cover. The excavation will be backfilled with select clean soil fill.

- Wetlands along the edge of the soil cover will be removed during the removal of waste material. The area of wetlands is estimated to be 0.43 acre. Disturbed wetlands will be backfilled with suitable soil and revegetated to replace the wetland.

- Some of the excavated soil, sediment, and landfilled material will be dewatered prior to placement beneath the soil cover located within the soil cover limits. Excavated materials that contain free liquids will be placed on a materials handling pad(s) and allowed to dewater naturally (i.e. free liquids will be allowed to infiltrate to the shallow water table or run-off to the surrounding ponds). Only the generated water from the decontamination pads will be containerized to determine appropriate disposal methods. Large items of waste and debris excavated from the pond shorelines will be tested to confirm that it is not a hazardous waste.

Soil Cover: Previous investigations indicate that there is an existing soil cover on Site 12. However, the general thickness of the cover is only 1 to 2 feet thick. This cover soil will be regraded to achieve the desired slopes to promote surface water runoff. Following regrading, a 2 feet soil cover consisting of 18 inches of select fill and 6 inches of topsoil will be placed over Site 12. The entire surface within the limits of disturbance will be revegetated.

Land Use Controls and Monitoring: Land use controls will be implemented to further reduce the potential for exposure. Residential development and subsurface water use will not be permitted. Periodic

monitoring of subsurface water and surface water will be conducted after installation of the soil cover. The results of the monitoring will be used to evaluate the effectiveness of the remedial action and to determine whether additional actions are necessary.

3.0 REQUIRED PERMITS

Table 3-1 presents a project permit checklist to assess what permit requirements (if any) will be applicable for specific projects to ensure regulatory compliance. This table lists the type of permit, license, or certification that may be required by governmental agencies for specific types of projects. Based on a review of the permit checklist and federal and state laws and regulations, no permits are required for remedial actions at Site 12-Town Gut Landfill because all actions will be conducted on site. On-site remedial actions at CERCLA sites are exempt from obtaining permits and from compliance with administrative requirements of federal, state, or local environmental laws and regulations. If this was not a CERCLA site, permits would be required for items listed as applicable in Table 3-1. However, on-site remedial actions at CERCLA sites must comply with substantive requirements of environmental laws and regulations. The substantive requirements are summarized below and described in Section 4.0.

3.1 FEDERAL PERMITS AND REQUIREMENTS

No United States Environmental Protection Agency (USEPA) permits are required for this project. Requirements for stormwater discharges and landfill closure are handled by state agencies.

No United States Army Corps of Engineers (USACE) permits are required for this project. Requirements for dredge and fill activities and work within wetlands and streams are handled by state agencies. However, because wetlands will be disturbed/constructed and activities will occur along the edge of an existing wetland, IHDIV-NSWC is required to contact the USACE to receive concurrence on proposed activities.

3.2 STATE PERMITS AND REQUIREMENTS

No Maryland Department of the Environment (MDE) permits are required for this project. However, substantive requirements for wetland mitigation, stormwater discharges, erosion and sediment control, stormwater management, and landfill closure must be met. Additionally, concurrence on proposed activities is required from the state of Maryland since wetlands disturbance/construction is part of the proposed activities.

3.3 LOCAL PERMITS AND REQUIREMENTS

IHDIV-NSWC is a federal facility that is located on land owned by the government; therefore, it is not subject to local codes, permits, or inspection requirements typically required.

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TABLE 3-1

PROJECT PERMITS CHECKLIST
SITE 12 – TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND
PAGE 1 OF 2

Type of Project	Type of Permit, License, Certification	Issuing Agency	Applicability	Reason
Stationary Air Emission Source	-Permit to Construct -Permit to Operate	-State -State	-Not applicable -Not applicable	Construction of an air emission source will not occur.
Construction in Floodplain, Waterway, or Wetland	-Nontidal Wetlands and Waterways Permit -Section 404 Dredge/Fill Permit	-State -Army Corp of Engineers	-Applicable -Applicable	Construction in waterway and wetland will occur. Construction will occur in a floodplain.
Wastewater Discharge to "Waters of the U.S."	-Surface Water Discharge Permit (NPDES)	-State and USEPA	-Not applicable	Discharge of wastewater to surface water will not occur.
Wastewater Discharge to Sewer	-Pretreatment Permit (if to municipal POTW)	-State or local	-Not applicable	Discharge of wastewater to a sewer will not occur.
Dredging/Fill and Filling Wetlands	-Section 404 Dredge/Fill Permit -Nontidal Wetlands and Waterways Permit -Ocean Disposal Permit	-Army Corps of Engineers -State -State or USEPA	-Applicable -Applicable -Not applicable	Excavation, filling, and restoration will occur in wetlands adjacent to site. Ocean disposal will not be performed.
Structure in Navigable Waters	-Section 10 Permit -Nontidal Wetlands and Waterways Permit	-Army Corps of Engineers -State	-Not applicable -Not applicable	No structures are being built (placed) in navigable waters.
Stormwater Discharge to "Waters of the U.S."	-Stormwater General Discharge Permit -General Permit for Construction Activity	-State -State	-Applicable -Not applicable	Stormwater discharge from landfill is "associated with industrial activity." Construction activity covers less than 5 acres.

TABLE 3-1

PROJECT PERMITS CHECKLIST
SITE 12 – TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND
PAGE 2 OF 2

Type of Project	Type of Permit, License, Certification	Issuing Agency	Applicability	Reason
Earth Moving Operations	-Erosion and Sediment Control Plan -Stormwater Management Plan	-State -State	-Applicable -Applicable	Plan approval is required for construction activities and development that cover more than 5,000 square feet.
Solid Waste Landfills	-Permit-to-Operate	-State	-Applicable	No permit required for closure. However, final cover requirements must be met.
Hazardous Waste Generation	-USEPA Identification Number	-State	-Not applicable	Off-site shipment of hazardous waste will not occur. It is assumed all wastes being transported off-site are non-hazardous.
Hazardous Waste Transporting	-State Waste Hauler License/Permit	-State	-Not applicable	Off-site shipment of hazardous waste will not occur.
Hazardous Waste Treatment, Storage, Disposal	-Permit-to-Construct Permit-to-Operate (Part B Permit)	-State or USEPA	-Not applicable	Hazardous waste will not be treated, stored, or disposed on site.
Underground Storage Tanks	-Permit-to-Construct Permit-to-Operate Registration	-State or USEPA	-Not applicable	No underground storage tanks are associated with this project.
Pesticide Application	-Applicator Certification	-DOD	-Applicable	Herbicides may be used.

USEPA - U.S. Environmental Protection Agency
DOD - Department of Defense
NPDES - National Pollutent Discharge Elimination System
POTW - Publicly Owned Treatment Works

4.0 PERMIT APPLICATIONS AND REQUIREMENTS

No permits are required for remedial activities at Site 12-Town Gut Landfill. On-site remedial actions at CERCLA sites are exempt from obtaining permits and other administrative requirements. However, compliance with substantive requirements is necessary. Compliance with substantive requirements is discussed in the following sections.

4.1 CONSTRUCTION IN FLOODPLAIN, WATERWAY, OR WETLAND; DREDGE/FILL AND FILLING WETLANDS

Construction activities will occur in the nontidal wetlands and their 25-foot buffers. The following activities are regulated: grading or filling, excavating or dredging, changing existing drainage patterns, and destroying or removing vegetation. These activities are needed to remove waste and debris from the wetlands and buffers, preserve the shoreline alignment, and allow the soil cover to be constructed near the shoreline. There will be no net loss or permanent disturbance of wetlands associated with this project. Adverse effects on nontidal wetlands will be temporary in nature. The wetland areas that are affected will be replaced as part of this project. These restoration activities meet the requirements and criteria of the Maryland nontidal wetland regulations [Code of Maryland Regulations (COMAR 26.23)]. Wetland monitoring is required and will extend beyond construction of the replacement wetlands.

Construction activities will also occur in and adjacent to the ponds and 100-year floodplain. Excavation, filling, and construction activities are regulated in a nontidal stream or body of water, including the 100-year floodplain. There will be no permanent impacts to public safety and welfare, natural resources, nontidal wetlands, the floodplain, wildlife, or endangered species and their critical habitat. Construction will be temporary in nature. As per COMAR 26.17.04 (Construction on Nontidal Waters and Floodplains), temporary sediment trapping devices will conform to the technical requirements in the latest edition of Maryland Standards and Specifications for Soil Erosion and Sediment Control.

4.2 STORMWATER DISCHARGES

State general permits cover certain point source stormwater discharges. This includes the discharge of stormwater associated with industrial activity (COMAR 26.08.02 through 26.08.04). Landfills, land application sites, and open dumps that receive or have received any industrial wastes are considered to be engaging in industrial activity [40 CFR 122.26(b)]. There are no substantive requirements for effluent limitations or monitoring; however, a Stormwater Pollution Prevention Plan would be required. The elements of this plan are similar to those for earth-moving operations (Section 4.3) and would only need to be considered during construction. Substantive elements of the Stormwater Pollution Prevention Plan

can be incorporated into the Erosion and Sediment Control Plan Report, both of these plans will be prepared for this project. Following the completion of the remedial action, the landfill will be covered and stormwater will not be in contact with pollutants.

4.3 EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLANS

Requirements for earth moving operations are found in the Maryland erosion and sediment control regulations (COMAR 26.17.01). An erosion and sediment control plan is required for clearing and grading activities that disturb more than 5,000 square feet of land and more than 100 cubic yards of earth. According to COMAR 26.17.01.06, a trained and certified "responsible person" must be on site during construction. The purpose of the "responsible person" is to train field personnel on techniques and standards that assist with the field implementation of erosion and sediment controls. Erosion and sediment control plans must meet the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control and adhere to the Erosion and Sediment Control Guidelines issued by MDE in January 1990.

Requirements for stormwater control are found in the Maryland stormwater management regulations (COMAR 26.17.02). A stormwater management plan is required for any development project that disturbs more than 5,000 square feet of land. The intent of the plan and regulations is to prevent stream bank erosion by controlling the rate of stormwater runoff from newly developed areas. Structural and nonstructural stormwater management measures will be designed according to the 2000 Maryland Stormwater Design Manual.

While approval of these plans is an administrative requirement, preparation of an erosion and sediment control plan is part of the scope of work for this project, and stormwater management controls will be incorporated into the design.

4.4 LANDFILL CLOSURE

Site 12 was used primarily for disposal of landscaping wastes, tree stumps, and demolition debris. Paint, varnish, and other chemical wastes may also have been disposed at the site. Maryland Regulations for Solid Waste Management establish standards for disposal of solid waste. The regulations contain minimum design features for caps for nonhazardous waste landfills (COMAR 26.04.07.21). However, the regulations also contain provisions for a variance to design requirements (COMAR 26.04.07.26). The proposed changes must conserve and protect the public health, natural resources, and the environment and control air, water, and land pollution. According to the Record of Decision (ROD) for Site 12, the Navy, USEPA, and MDE have determined that the soil cover included in the design meets the

requirements for a variance; therefore, the cover does not have to attain the specific design features outlined in the regulations.

Erosion and Sediment Control Plan Report

for

Site 12 – Town Gut Landfill

Indian Head Division
Naval Surface Warfare Center
Indian Head, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298
Contract Task Order 0325

February 2002

REVISION 0
FEBRUARY 2002

EROSION AND SEDIMENT CONTROL PLAN FOR SITE 12 – TOWN GUT LANDFILL

INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity Chesapeake
1314 Harwood Street, S.E.
Washington Navy Yard, D.C. 20374-5018

Submitted by:
Tetra Tech NUS, Inc.
600 Clark Avenue, Suite 3
King of Prussia, Pennsylvania 19406-1433

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0325

FEBRUARY 2002

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ACRONYMS

ARARs	applicable or relevant and appropriate requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CTO	Contract Task Order
cy	cubic yards
ECM	erosion control matting
HSG	hydrologic soil group
IAS	initial assessment study
IHDIV-NSWC	Indian Head Division, Naval Surface Warfare Center
IR	Installation Restoration
MDE	Maryland Department of the Environment
NEESA	Naval Energy and Environmental Support Activity
NPL	National Priorities List
RAC	remedial action contractor
ROICC	Resident Officer in Charge of Construction
SCS	Soil Conservation Service
Site 12	Town Gut Landfill
TBC	to be considered
TtNUS	Tetra Tech NUS, Inc.
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance

1.0 INTRODUCTION

This Erosion and Sediment Control Plan Report was prepared under Contract Task Order (CTO) No. 0325 under Comprehensive Long-term Environmental Action Navy (CLEAN) Contract Number N62472-90-D-1298. Under this CTO, Tetra Tech NUS, Inc. (TtNUS) is performing engineering, design, and post construction award services for the remedial action design at the Town Gut Landfill (Site 12) at the Indian Head Division, Naval Surface Warfare Center (IHDIV-NSWC), in Indian Head, Maryland. The remedial action design consists of placing vegetated soil cover over the landfill and implementing land use controls to prohibit residential development or use of contaminated groundwater.

The IHDIV-NSWC is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC, as shown on Figure 1-1. The IHDIV-NSWC is a military facility consisting of the main area on the Cornwallis Neck Peninsula and the Annex on Stump Neck. The main area is bounded by the Potomac River to the northwest, west, and south, Mattawoman Creek to the south and east, and the town of Indian Head to the northeast (Figure 1-2). Stump Neck Annex is located across Mattawoman Creek. The Stump Neck Annex is not contiguous with the main area and is operated by a tenant. The primary mission of IHDIV-NSWC is to provide services in energetics, ordnance devices and components, and other related ordnance engineering standards, including chemicals, propellants and their propulsion systems, explosives, pyrotechnics, warheads, and simulators. IHDIV-NSWC was added to the National Priorities List (NPL) by the United States Environmental Protection Agency (USEPA) in September 1995, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. Site 12 is one of the 48 sites at the main facility currently included in the IHDIV-NSWC Installation Restoration (IR) Program. This remedial action design is limited to Site 12, located in the main area of IHDIV-NSWC.

1.1 SITE HISTORY

Between 1968 and June 1980, Site 12 was used by the IHDIV-NSWC to dispose landscaping waste, fill material, and rubble. Reportedly, material from outside the IHDIV-NSWC (landscaping waste and/or waste rubble) was also deposited at the site until 1972. Based on visual observations and examination of historical maps and aerial photographs, the landfill material appears to have been dumped first on the eastern side of the site in a topographically low area. Dumping then continued in a westward direction. It is estimated that the top of the waste material is currently located 10 to 15 feet above the original ground surface (B&R Environmental, 1997). The total fill area of Site 12 occupies approximately 4 acres.

Past reports estimate that Site 12 contains 70,000 cubic yards (cy) of mixed solid waste materials, primarily landscaping wastes, tree stumps, and demolition debris (Hart, 1983). Interviews conducted

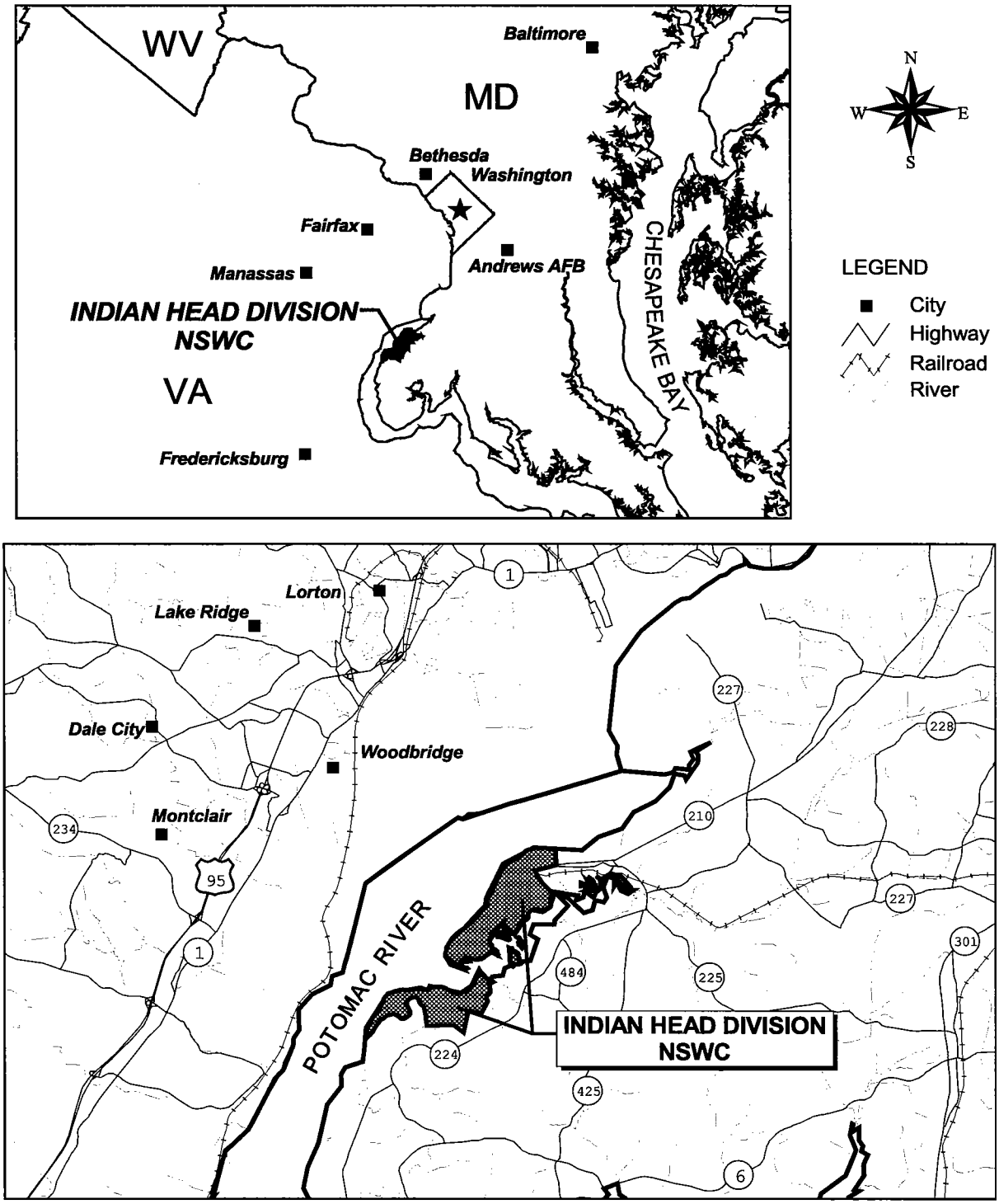
during the initial assessment study (IAS) indicated that unauthorized dumping of trash may have occurred, although quantity estimates for this unauthorized dumping of trash were not available. Some of the unauthorized items reportedly dumped at Site 12 include paints, varnishes, and other chemical wastes.

1.2 REPORT OBJECTIVE

The objective of this report is to describe the project and present the erosion and sediment control measures that will be used during implementation of the remedial action at Site 12.

1.3 REPORT FORMAT

Section 2.0 presents a narrative on the requirements for Erosion and Sediment Control Plans. Section 3.0 presents a generalized sequence of construction. Section 4.0 presents conclusions. Erosion and Sediment Control calculations are presented in Appendix A. Construction drawings including, Design Drawing C-2 "Erosion and Sediment Control Plan," and technical specifications are provided under separate cover.



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P:\GIS\NSWC_INDIAN_HEAD\SITE_LOCATION.APR FACILITY LOCATION MAP 2/13/02 KMP

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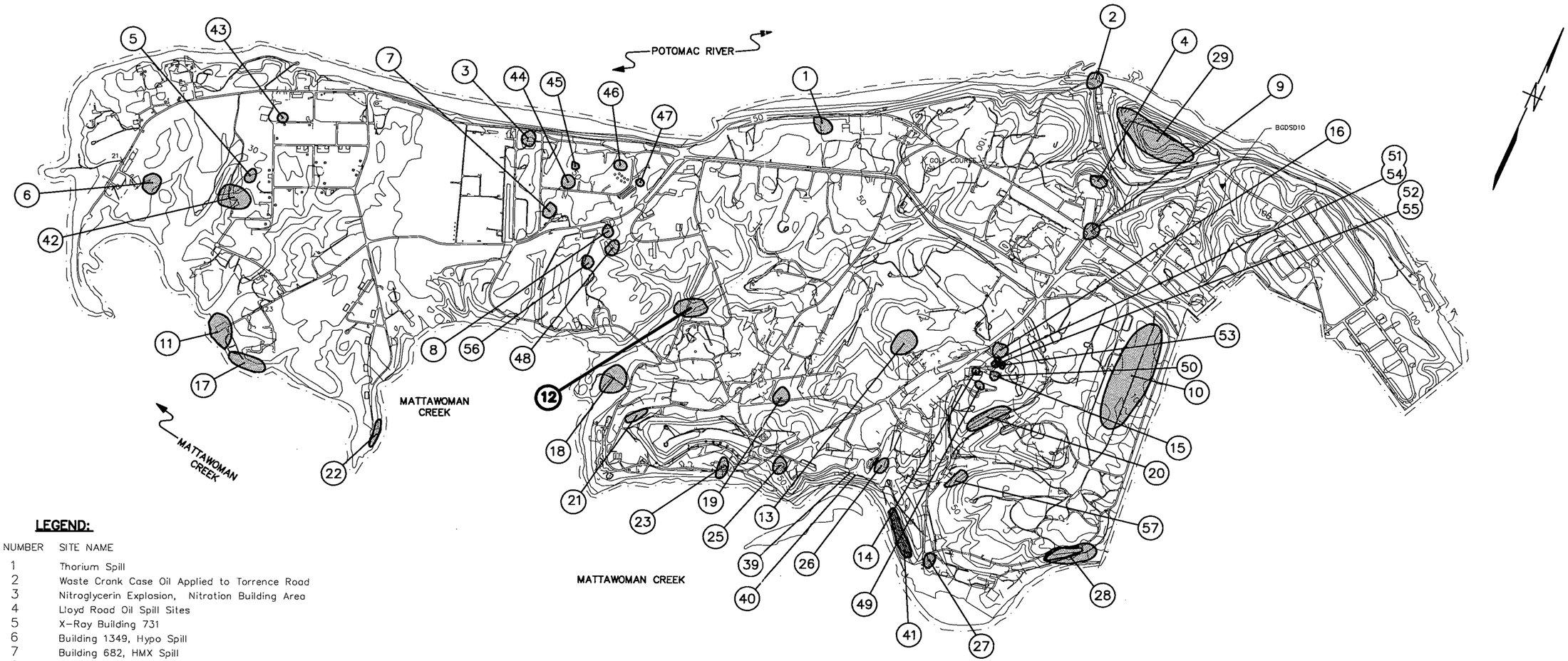

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1	Thorium Spill
2	Waste Crank Case Oil Applied to Torrence Road
3	Nitroglycerin Explosion, Nitration Building Area
4	Lloyd Road Oil Spill Sites
5	X-Ray Building 731
6	Building 1349, Hypo Spill
7	Building 682, HMX Spill
8	Building 766, Mercury Deposits
9	Patterson Avenue, Oil Spill
10	Single-base Propellant Grains Spill
11	Caffee Road Landfill
12	**Town Gut Landfill**
13	Point Solvents Disposal Ground
14	Waste Acid Disposal Pit
15	Mercury Deposits in Manhole, Flourine Lab
16	Laboratory Chemical Disposal
17	Disposal Metal Parts Along Shoreline
18	Hog Island
19	Catch Basins at Chip Collection Houses
20	Single-base Powder Facilities
21	Bronson Road Landfill
22	NG Slums Burning Site
23	Hydraulic Oil Spill Discharges From Extrusion Plant
24	Abandoned Drain Lines (Not Shown)
25	Hypo Discharge X-Ray Building No. 2
26	Thermal Destructor 2
27	Thermal Destructor 1
28	Original Burning Ground
29	The Valley
30-38	Stump Neck Annex (Not Shown)
39	Organic Plant Outfall
40	Palladium Catalyst in Sediments
41	Scrap Yard
42	Olsen Road Landfill
43	Toluene Disposal Site
44	Soak Out Area
45	Abandoned Drums
46	Cadmium Sandblast Grit
47	Mercuric Nitrate Disposal Area
48	Nitroglycerine Plant Disposal Area
49	Chemical Disposal Area
50	Building 103, Crawl Space
51	Building 101, Dry Wall
52	Building 102, Dry Wall
53	Mercury Contamination of the Sewage System
54	Building 101
55	Building 102
56	IW87 - Lead Contamination
57	TCE Building 292 Area

APPROXIMATE SITE LOCATION
INTERMITTENT STREAM
NAVAL RESERVE BOUNDARY
100 CONTOUR INTERVAL 10 FEET
FLOW DIRECTION

0 1600 3200
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/12/01
CHECKED BY DATE 10/4/01
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SITE LOCATION MAP
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CONTRACT NO. 0525
OWNER NO. 0325
APPROVED BY DATE 10/4/01
APPROVED BY DATE
DRAWING NO. FIGURE 1-2
REV. 0

FORM CADD NO. SOUTH_BH.DGN - REV 0 - 02/11/97

2.0 NARRATIVE REQUIREMENTS

Site 12 is an inactive landfill comprising approximately 4 acres of IHDIV-NSWC. The location is illustrated on Figure 1-2 and the site layout is illustrated on Figure 2-1.

2.1 PROJECT DESCRIPTION

The selected remedy consists of removing exposed waste, regrading soil, and placing a 2 foot thick soil cover over the landfill to reduce risks to human health and environment associated with exposure to buried wastes, contaminated soil, and shallow groundwater. The remedial action will include the excavation and placement of approximately 1,350 cy of beneath the soil cover and the regrading approximately 3,900 cy of existing cover soil to establish required interim grades (Design Drawing C-6). The soil cover will consist of 18 inches of select fill and 6 inches of topsoil. Additional activities include raising the vertical alignment of Atkins Road Extension, site restoration, and wetland restoration.

The Navy's goal is to begin remedial actions at IHDIV-NSWC as quickly as possible to protect human health and the environment and to comply with Applicable or Relevant and Appropriate Requirements (ARARs) and to be considered (TBC) criteria.

2.2 EXISTING SITE CONDITIONS

Site 12 comprises approximately 4.3 acres of undeveloped land located on the southwestern side of the IHDIV-NSWC (Figure 2-1). The western and northern edges of Site 12 are bounded by ponds that are connected by a 78-inch diameter metal pipe located under Atkins Road Extension. The site is bisected by an arm of the northern pond and traversed by Atkins Road Extension, which is oriented in a northwest-southeast direction (Figure 2-1). Runoff from the site flows into these two ponds. The flow of water at the discharge (southern) end of the southern pond is governed by a weir that also inhibits influences on the ponds by tidal changes in Mattawoman Creek located south of the southern pond. Site 12 contains narrow bands of wetlands along the perimeter of both ponds. The wetlands west of Atkins Road Extension are generally between 5 and 15 feet wide and east of Atkins Road Extension, the wetlands are generally between 10 and 50 feet wide. These wetlands are classified as Palustrine Emergent and Palustrine Forested wetlands. The waste located within the existing limits of the landfill at Site 12 has been estimated in past reports to be 70,000 cy. The waste consists of mostly mixed solid waste materials, primarily landscaping wastes and demolition debris (NEESA, 1983). Currently, the landfill has a soil cover that generally ranges in thickness from 1 to 2 feet; however, in some places, waste can be found just below ground surface and in others at depths of 8 feet below ground surface. The existing soil cover consists mostly of brown silt and sand and topsoil with plant roots.

2.3 OFF-SITE AREAS

Areas not within the limits of Site 12 include, Atkins Road, the area to the north of Atkins Road, and the borrow area(s) where soils for cover construction and site restoration may be obtained. Each of these areas, with the exception of the borrow area(s), is located within the limits of disturbance for this remedial design. Therefore, the erosion and sediment control devices required to protect these areas are presented on the Erosion and Sediment Control Plan (Design Drawing C-2) and are described in this report.

The borrow area(s) are selected by the Remedial Action Contractor (RAC) and will not be located within the limits of disturbance of this remedial action design. Therefore, the RAC will submit a supplemental erosion and sediment control plan to the Navy addressing any and all off-site source(s) if an approved erosion and sediment control plan for the off-site source(s) does not exist.

2.4 SOILS

A soils map of the site from the Soil Conservation Service (SCS), United States Department of Agriculture (USDA, 1974), is provided as Figure 2-2. The approximate location of the site is indicated on the figure. The soil types present at Site 12 include:

Bo	Bibb Silt Loam
Ms	Matawan Loamy Sand
SaE	Sandy Land, Steep
Tm	Tidal Marsh

Bibb Silt Loam: This soil consists of deep, level or nearly level, and moderately well drained soils of Iuka series. Some of these soils are located on floodplains and are flooded irregularly. The surface layer of these soils is friable sandy loam, fine sandy loam, or silt loam with approximately 18-inches in thickness, underlying material is similar to the surface layer in texture. These soils are moderately permeable and have high available moisture capacity. They are strongly acid to very strongly acid. According to SCS Urban Hydrology for Small Watersheds (USDA, 1986) the hydrologic soil group (HSG) for Bibb Silt Loam is C.

Matawan Loamy Sand: This soil consists of soils that are nearly level to gently sloping, moderately well drained to well drained, and deep. The surface layer is about 20-inches thick and consists of friable loamy sand that is underlain by firm sandy clay loam. This soil has moderate available moisture capacity

and is very strongly acid to extremely acid. According to SCS Urban Hydrology for Small Watersheds (USDA, 1986) the HSG for Matawan Loamy Sand is C.

Sandy Land, Steep: This soil consists of very sandy soils (sand and fine sand containing gravel that is pale yellow to yellowish brown) along steep ravines and/or stream valleys. Most of the sediment is similar to the sandy material that underlies the Evesboro, Galestown, and Westphalia soils. Slopes range from about 12 to 40 percent. These soils are not well suited for farming, are strongly acid to extremely acid, and have a low rating for available moisture and natural fertility (USDA, 1974). According to the SCS Urban Hydrology for Small Watersheds (USDA, 1986), the HSG for Sandy land, Steep (using the Evesboro association) is A.

Tidal Marsh: This soil is found in estuaries along the lower sides of streams and in low areas that border the major rivers. Some areas are flooded daily by tidal waters, and others are flooded less frequently. The soil material generally ranges from sand to clay, but in places it is peaty or mucky. The soil is not suitable for crops, pasture or trees, but is suitable for use as habitat for wetland wildlife and for recreation. According to SCS Urban Hydrology for Small Watersheds (USDA, 1986) the HSG for tidal marsh is D.

2.5 CRITICAL AREAS

Critical areas are those that have potentially serious erosion problems due to the presence of steep slopes, poor vegetative cover, run-off channels, or areas identified as wetlands. The critical areas associated with Site 12 include the slopes approaching the ponds, the run-off channels, the wetlands located along the shoreline of both ponds, and the ponds. The slopes of Site 12 will be regraded and stabilized with vegetation. The run-off channels will contain erosion control matting and rock check dams. Upon approval of final stabilization, the rock check dams will be removed. Because some of the exposed waste that requires excavation is located within the wetlands along the shoreline of both ponds, the wetlands will be disturbed (i.e. removed). Following removal of waste material from the wetlands and installation of the soil cover, the wetlands will be restored. Lastly, the ponds and the wetlands outside the limits of disturbance, will be protected using silt fence and supersilt fence.

No other critical areas have been identified on or adjacent to Site 12. However, during construction, areas may require temporary protection while portions of the site are unvegetated. The RAC will be responsible for identifying these areas in their work plan and for protecting these areas during construction. The protection devices required to protect the critical areas discussed here and other erosion and sediment control devices are described further in Section 2.6.

2.6 EROSION AND SEDIMENT CONTROL MEASURES

Erosion and sediment control measures will be implemented, installed, and maintained according to the standards and specifications of the Maryland Erosion and Sediment Control Handbook unless otherwise noted in this plan and the construction documents. Design specifications for erosion and sediment control structures have been obtained from the Maryland Standards and Specifications for Soil Erosion and Sediment Control.

The required erosion and sediment control measures are shown on Design Drawing C-2 and are as follows.

- Stabilized stone construction entrances will be provided off of Atkins Road Extension (southern landfill area) and Atkins Road (northern landfill area). Construction vehicles will be cleaned at either location before exiting the site.

- Super silt fence will be placed along the shoreline of both ponds to protect the ponds during construction. It is assumed that the water levels in the ponds can be lowered to allow placement of the super silt fence outside the landfill limits.

- Silt fence will be placed along the slopes of the Site 12 landfill, as illustrated in Design Drawing C-2, and will be placed to protect the construction entrance structures, material laydown areas, decontamination pads, and materials handling pad/stockpile areas.

- Permanent and temporary seeding will be used throughout the construction process to stabilize disturbed areas upon achieving final grade.

- Portable sediment tanks will be used to remove the sediment from decontamination water and water generated during excavation dewatering activities.

- Permanent channels will be installed along the eastern sides of both the northern and southern landfill areas. The channels are intended to divert offsite runoff away from the soil cover edge and to collect runoff from the soil cover in order to reduce erosion. The channels will be lined with erosion control matting (ECM), riprap will be placed at critical locations along the channels, and rock check dams will be placed within the channels to collect sediment in the runoff. The rock check dams are considered temporary erosion and sediment control devices and will be removed upon completion of the project.

2.6.1 Structural Practices

The following structural practices will be used during and/or following construction activities at Site 12 to control erosion and sedimentation. The number listed, if any, references the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control [Maryland Department of the Environment (MDE), 1994].

Stone Construction Entrance - F17.0. Temporary stabilized stone construction entrances will be installed to provide access to Site 12 via Atkins Road Extension (southern landfill area) and Atkins Road (northern landfill area). Construction vehicles will be cleaned at either location before exiting the site.

Stormwater Conveyance Channel - H28.0. Permanent channels will be installed along the eastern sides of both the northern and southern landfill areas. The capacity requirements of the conveyance channels are based on Section H28.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. The channels are intended to divert offsite runoff away from the soil cover edge and to collect runoff from the soil cover in order to reduce erosion.

Super Silt Fence - H26.0. Super silt fence will be installed along the shorelines of both ponds. It is assumed that the water levels in the ponds can be lowered to allow placement of the super silt fence outside the landfill limits.

Silt Fence – E15.0. Silt fence will be installed along the side slopes of the landfill limits and along the downslope sides of the stabilized stone construction entrances, material laydown pads, decontamination pads, and material handling pads/stockpiles.

Surface Roughening - NA. The surface of regraded areas will be roughened to reduce run-off velocity and to aid in the establishment of vegetative cover.

Temporary Seeding - G20.0. All regraded areas that will be left dormant for extended periods of time will be seeded with fast germinating temporary vegetation immediately following grading. Seeding will be performed with a 50/50 mixture of annual rye grass and cereal (winter) rye.

Permanent Seeding - G20.0. All regraded areas will be permanently seeded with a seed mixture that will minimize erosion and provide suitable cover for wildlife.

Mulching - G20.0. All areas receiving permanent seeding will be mulched with an organic material to prevent erosion by protecting the soil surface from raindrop impact and reduce the velocity of overland flow.

Sediment Tank – D14.0. Portable sediment tanks will be used to remove sediment from the decontamination water and water generated during de-watering activities. The sediment collected in the sediment tanks will be stockpiled with the large items of waste and debris to be disposed off-site. Water from the decontamination pads and excavations will be stored in temporary holding tanks for characterization and proper disposal at an approved off-site facility. In the event that a determination is made that water collected from dewatering activities can be discharged to the ground surface on-site, the water will be cleaned of sediment and broadcast over an approved vegetated area.

Rock Check Dams - B8.0. Rock check dams will be temporary control devices constructed in the permanent channels to trap sediment and reduce flow rates in the channels. Rock check dams will be removed following final stabilization (establishment of permanent vegetation) of all disturbed areas.

Erosion Control Matting - G22.0. Erosion control matting will be used to temporarily stabilize the channels until vegetation is established. The erosion control matting will be rated to withstand flow rates of 6 feet per second.

2.6.2 Management Strategies

- Unstabilized, disturbed areas will be minimized and construction activities will be staged.
- Seeding or other stabilization measures will follow immediately after grading.
- Areas that are not to be disturbed will be clearly marked by flags, signs, etc.
- The construction superintendent will be responsible for ensuring the correct installation and maintenance of all erosion and sediment control features.
- Erosion and sediment control features will be installed and/or constructed before the start of any earth disturbance activities.
- Erosion and sediment control features will remain in place until permanent vegetation is established over disturbed surfaces, as described in the revegetation notes on Design Drawing C-4.

2.7 PERMANENT STABILIZATION

All areas disturbed by remedial action activities, with the exception of the areas designated for wetland restoration and areas where riprap is placed, will be stabilized with the permanent seed mixture as soon

as possible following final grading, but no later than 7 to 14 days (as noted on the Design Drawings). Permanent seeding mixture will consist of native warm season grasses that will, over the long term, result in lower maintenance costs (requiring only occasional mowing) and more beneficial natural habitat. The mixture will include big bluestem (*Andropogon gerrardi*), little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), indian grass (*Sorghastrum nutans*), canada wild rye (*Elymus canadensis*), partridge pea (*Cassia fasciculata*), and annual rye grass (*Lolium multiflorum*). The rye grass and partridge pea will germinate and become established quickly to provide the necessary erosion control until the warm season grasses can become established. This seed mixture was developed by the Biological Technical Assistance Group through USEPA correspondence dated February 14, 2001, in reference to a separate naval facility located just north of Washington, DC. Both IHDIV-NSWC and the naval facility that this mixture was developed for are located in the same USDA designated Maryland plant hardiness zone.

2.8 STORMWATER RUNOFF CONSIDERATIONS

Following completion of the remedial action, the site will be returned to grassed or natural existing conditions. Therefore, other than the conveyance channels, permanent stormwater management controls are not required for this site.

Run-off calculations were performed using QuickTR-55™ (Haestad Methods, Inc). The software uses procedures outlined in the SCS TR-55 manual. Channel capacity calculations along with pre- and post-development run-off calculations are provided in Appendix A.

2.9 MAINTENANCE

In general, all erosion and sediment control facilities will be checked weekly and after each run-off producing rainfall event to assure that all erosion and sediment controls remain in effective operating conditions. Any required repairs will be made immediately. The following items will be checked:

- The stabilized stone construction entrances will be maintained in a condition that will minimize tracking sediment onto roads, including the addition of stone or other repairs.

- The super silt fence will be checked regularly for undermining or deterioration of the fabric. Sediment will be removed when the level of sediment deposition causes “bulging” or reaches half of the fabric height.

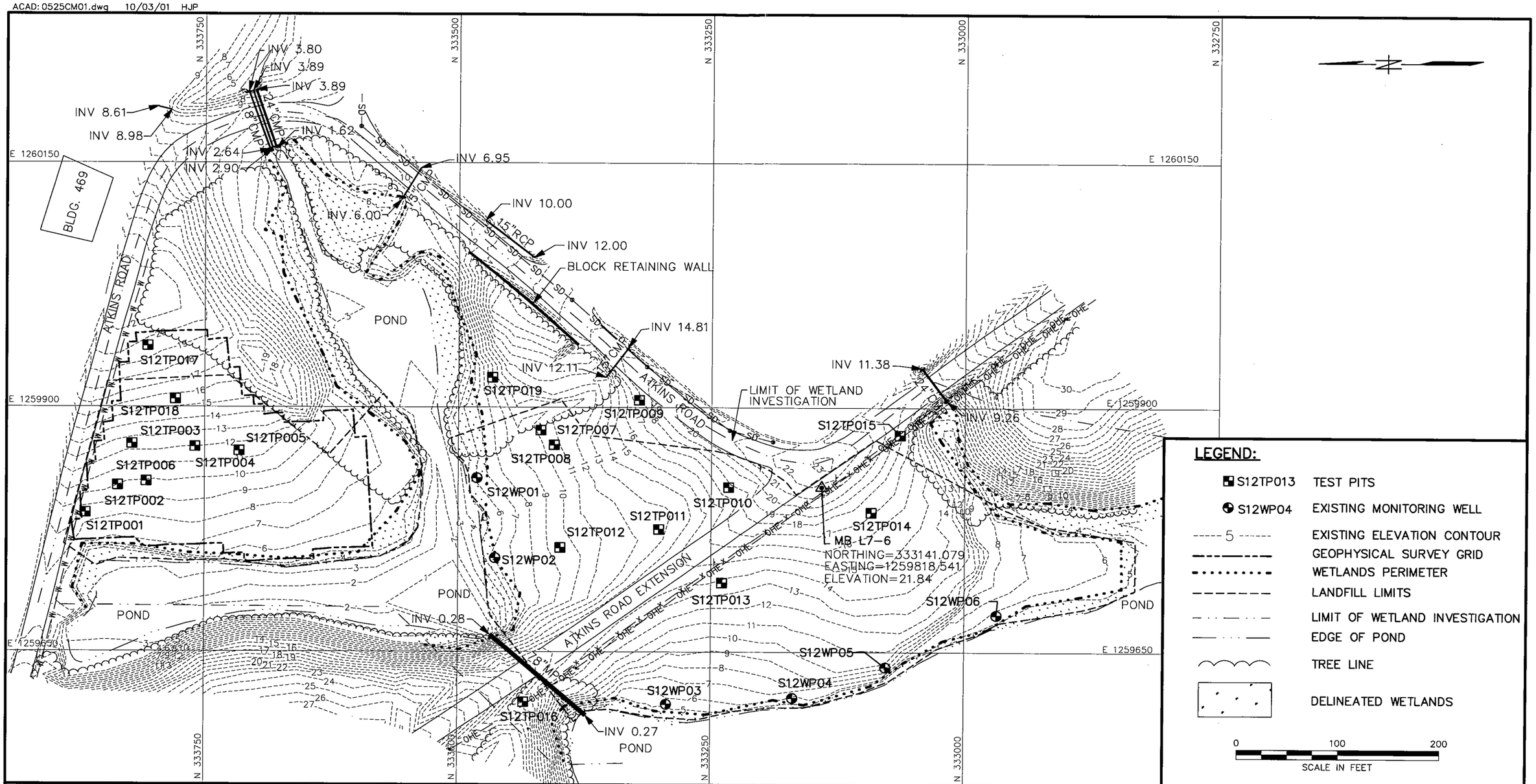
- The silt fence will be checked regularly for undermining or deterioration of the fabric. Sediment will be removed when the level of sediment deposition causes “bulging” or reaches half of the fabric height.

- The seeded areas will be checked regularly to ensure that a good stand of vegetation is maintained. Areas will be fertilized and re-seeded as needed. The RAC is responsible for maintenance until formal acceptance by the Contracting Officer.

- Rock check dams will be checked for sediment accumulation. Sediment will be removed when it reaches half of the original height of the check dam. Regular inspections will be made to ensure that the center of the dam is lower than the edges. Erosion cased by high flows around the edges of the dam will be corrected immediately.

- During the establishment of the channels, repairs will be made immediately and ECM and grass re-established. After grass has been established, the channels will be checked periodically to determine if the grass and associated ECM is withstanding flow velocities without damage.

ACAD: 0525CM01.dwg 10/03/01 HJP

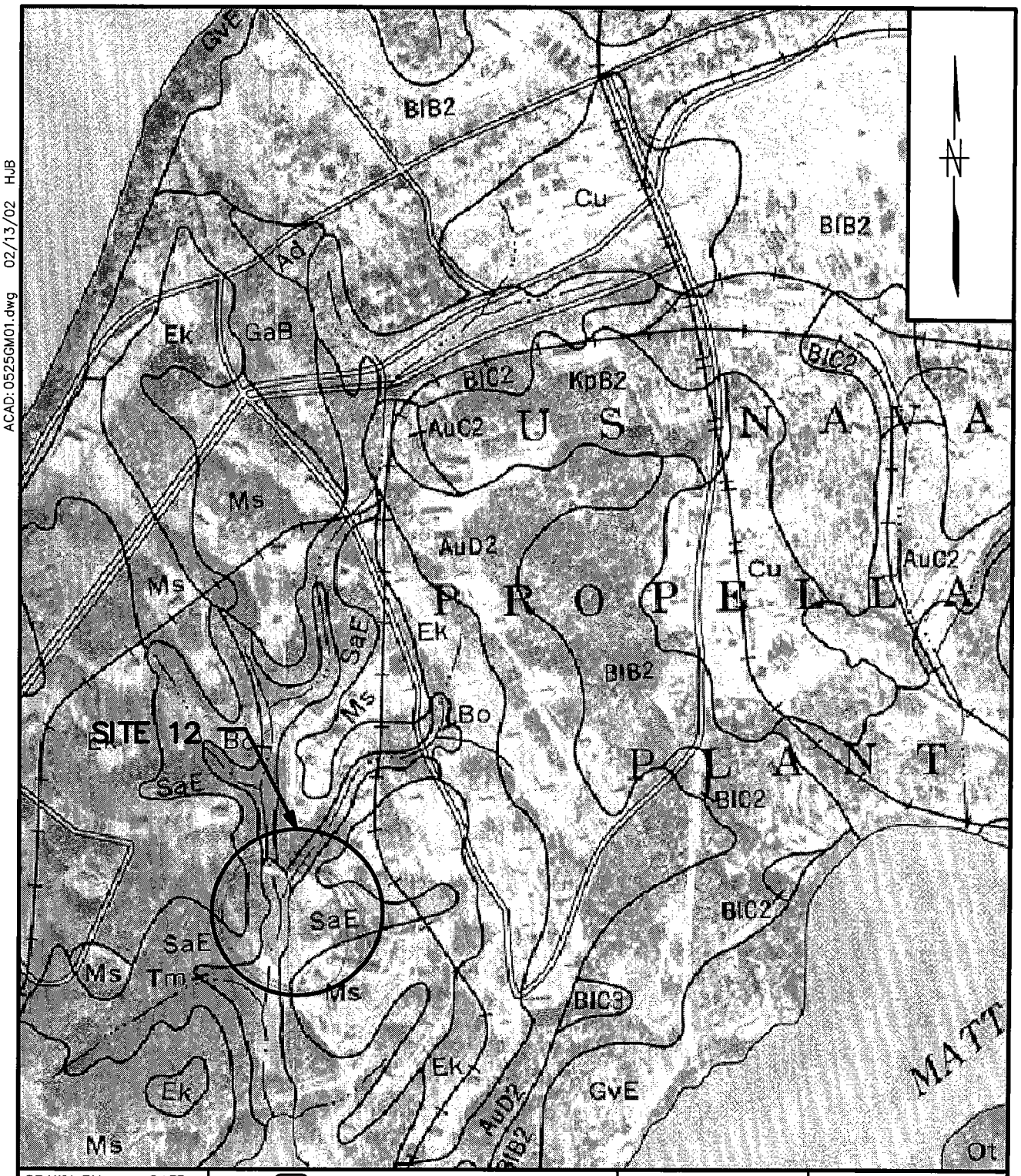


NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 0525	OWNER NO. 0325
CHECKED BY DATE 10/4/01	SITE LAYOUT SITE 12 – TOWN GUT LANDFILL INDIV–NSWC, INDIAN HEAD, MARYLAND	APPROVED BY	DATE 10/4/01
COST/SCHED–AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 2–1	REV. 0

FORM CADD NO. TtNUS_BH.DGN – REV 0 – 1/20/98

ACAD: 0525GM01.dwg 02/13/02 HJB



DRAWN BY HJP DATE 4/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 0525	OWNER NO. 0325
CHECKED BY DATE 2/13/02	SOILS MAP SITE 12 – TOWN GUT LANDFILL INDIV–NSWC, INDIAN HEAD, MARYLAND	APPROVED BY DATE 2/14/02	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE NOT TO SCALE		DRAWING NO. FIGURE 2–2	REV. 0

FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98

3.0 SEQUENCE OF CONSTRUCTION

The time to perform the required construction activities is estimated to be approximately 90 days. The generalized sequence of construction activities is as follows:

1. Hold pre-construction meeting with the Contracting Officer and MDE.

2. Inspect site prior to construction to verify existing site conditions and underground utility locations.

3. Establish horizontal and vertical control for construction. Stake the locations of all areas to be excavated or disturbed prior to actual work.

4. Lower the pool elevation of the ponds to expose existing limits of waste.

5. Install all perimeter controls for stabilized stone construction entrances. Install the stabilized stone construction entrances. Install all remaining perimeter controls, including those required for decontamination pads, and materials handling pads and excavation areas as indicated on Design Drawing C-2. Actual locations will be determined by the RAC and approved by the Resident Officer in Charge of Construction (ROICC) and MDE prior to any earth disturbance activities. All perimeter controls will conform to Standards and Specifications identified in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control Manual unless otherwise specified. The perimeter controls to be installed include, but are not limited to, the following:

   - Silt fence along the toe of slopes of Site 12 as indicated and on the downslope sides of all materials handling pad locations, decontamination pads, and stabilized stone construction entrances.

   - Super silt fence along the shoreline of both ponds as indicated.

   - Additional controls as may be required by the Contracting Officer and/or warranted by site conditions and best construction practices.

6. Clear and grub construction laydown areas, and areas for materials storage and staging areas, materials handling pads, and decontamination pads.

7. Construct decontamination pads, materials handling pads, construction laydown areas, and storage and staging areas.

8. Clear and grub within the remainder of the limits of disturbance.

9. Construct conveyance channels and install ECM, seed channels, and install rock check dams.

10. Abandon existing groundwater monitoring wells.

11. Excavate soils, sediments and landfill material along the shoreline of both ponds as indicated. In the event that the pool elevation cannot be lowered to expose the indicated waste limits, excavate to the edge of water removing large items of exposed waste and debris along the edges of the pond. During excavation, the areas will be screened for unexploded ordnance (UXO) by UXO oversight personnel. Excavated materials will be placed on the materials handling pad for dewatering, if required, prior to placement beneath the soil cover. Large items of waste and debris will be removed and disposed off-site.

12. Commence construction of the Atkins Road Extension.

13. Regrade the remainder of the landfill area (cover soil and waste) to establish the interim grades indicated on Design Drawing C-6. During regrading and prior to placement of the first lift of select fill, any sediment removed from the erosion and sediment control devices will be placed beneath the soil cover.

14. Inspect erosion control devices and replace as necessary.

15. Install select fill and topsoil and complete construction of Atkins Road Extension. Vegetate immediately after topsoil is placed.

16. Plant permanent vegetation including wetland plants on all disturbed areas and allow the pool elevation of the ponds reestablish to pre-construction pool elevations for wetlands survival.

17. Install new groundwater monitoring wells.

18. Install signs along the site perimeter.

19. With the approval of the MDE inspector, remove all temporary facilities (i.e., stabilized stone construction entrances, decontamination pad, materials handling pads, etc.). Restore and revegetate as needed. When all upstream areas have been stabilized and have been accepted

by the ROICC, and with the approval of the MDE inspector, remove all remaining perimeter controls and rock check dams and immediately stabilize all areas disturbed by the remedial action.

4.0 CONCLUSIONS

This remedial action will result in the improvement of the site over the long term. Waste materials will be excavated and disposed off-site or regraded and covered by a 2-feet thick soil cover which will reduce the risks to human health and environment associated with exposure to buried wastes and contaminated soil and shallow groundwater. Appropriate steps will be implemented during construction to control run-off from the site and reduce the impacts of erosion and sedimentation.

Run-off quality during the remedial action will be addressed via temporary erosion and sediment control devices around the perimeter of the disturbed areas.

REFERENCES

B&R Environmental (Brown and Root Environmental), 1997. Project Specific Remedial Investigation (RI) Work Plan for Installation Restoration Program Indian Head Division, Naval Surface Warfare Center Indian Head, Maryland, May.

Hart, Fred C. Associates, Inc. (Hart), 1983. Initial Assessment Study of Naval Ordinance Station, Indian Head, Maryland.

MDE (Maryland Department of the Environment), 1994, Water Management Administration, Maryland Standards and Specifications for Soil Erosion and Sediment Control.

USDA (United States Department of Agriculture, Soil Conservation Service), 1974. Soil Survey of Charles County, Maryland, July.

USDA, 1986. Urban Hydrology for Small Watersheds, Technical Release 55, June.

APPENDIX A

HYDROLOGY CALCULATIONS

A.1 PRE-DEVELOPMENT HYDROLOGY

A.2 POST-DEVELOPMENT HYDROLOGY

A.3 SILT FENCE/SUPER SILT FENCE DESIGN

A.4 CHANNEL CAPACITY CALCULATIONS

A.1 PRE-DEVELOPMENT HYDROLOGY

CLIENT: IHDIV-NSWC		JOB NUMBER: 0525-1920	
SUBJECT: SITE 12 PRE-DEVELOPMENT HYDROLOGY			
BASED ON:		DRAWING NUMBER:	
BY: JLM Date: 9-21-01	CHECKED BY: TMD Date: 9/21/01	APPROVED BY:	DATE:

OBJECTIVE:

To calculate the 25-year pre-development peak discharge at Site 12 (Town Gut Landfill).

APPROACH:

1. Delineate the drainage areas for pre-development conditions and measure the surface area with a planimeter.

2. Use the Haestad Method Quick TR-55 computer program to calculate the weighted runoff curve number (CN), time of concentration (T_C), and peak 2-, 10-, 25-, and 100-year discharge for the drainage areas.

REFERENCES

1) Natural Resources Conservation Service (NRCS), June 1986. Urban Hydrology for Small Watersheds, Technical Release 55 (TR-55).

2) Center for Watershed Protection and the Maryland Department of the Environment (MDE). 2000 Maryland Stormwater Design Manual.

3) Soil Conservation Service (SCS), July 1974. Soil Survey of Charles County, Maryland

CALCULATIONS

1. Drainage Area:

The pre-development drainage areas (DAs) are delineated on page 5 of 36. The drainage area calculations and flowpath slope calculations are provided below. With regard to the land covers in each drainage area, this information is presented in the runoff curve number calculations according to hydrologic soil group (HSG).

2. Runoff Curve Numbers:

The different types of land cover with respect to HSG were measured with a planimeter in each DA. The Quick TR-55 computer program was then used to calculate a weighted runoff curve number for each drainage area. The following tables present the HSGs present in the watershed, the area calculations, and the selected runoff numbers.

Site Soil Types:

Soil Types	Description	Corresponding HSG
Bo	Bibb Silt Loam	C
Ms	Matawan Loamy Sand	C
SaE	Sandy Land, Steep	A
Tm	Tidal Marsh	D

CLIENT: IHDIV-NSWC		JOB NUMBER: 0525-1920
SUBJECT: SITE 12 PRE-DEVELOPMENT HYDROLOGY		
BASED ON:		DRAWING NUMBER:
BY: JLM Date: 9-21-01	CHECKED BY: TWS Date: 9/21/01	APPROVED BY: DATE:

Discharge Area:

Drawing Scale: 1" = 80

Drainage Area	Soil Type[1]	HSG[2]	Surface Description	Planimeter Reading (si)	Area (sf)	Area (ac)	Curve Number[2]
1	Bo	C	Pavement	0.3410	2,182	0.05	92
			Meadow	0.6820	4,365	0.10	71
	Ms	C	Pavement	0.0543	347	0.01	92
			Meadow	0.0388	248	0.01	71
	SaE	A	Pavement	0.3488	2,232	0.05	83
			Meadow	4.7895	30,653	0.70	30
			Woods	1.7903	11,458	0.26	36
	Tm	D	Pavement	0.1473	942	0.02	93
			Meadow	2.8675	18,352	0.42	78
					Total Acres	1.62	
2	Ms	C	Pavement	0.4030	2,579	0.06	92
			Meadow	0.1473	942	0.02	71
			Woods	0.1860	1,190	0.03	73
	SaE	A	Pavement	0.3720	2,381	0.05	83
			Meadow	0.6898	4,414	0.10	30
			Woods	4.7508	30,405	0.70	36
					Total Acres	0.96	
3	Ms	C	Pavement	0.3488	2,232	0.05	92
	SaE	A	Pavement[3]	2.2708	14,533	0.33	83
			Meadow	5.3940	34,522	0.79	30
			Woods	6.6185	42,358	0.97	36
	Tm	D	Pavement	0.2248	1,438	0.03	93
			Meadow	1.9763	12,648	0.29	78
					Total Acres	2.47	
4	Ms	C	Pavement	0.3255	2,083	0.05	92
			Meadow	1.2400	7,936	0.18	71
			Woods	0.5193	3,323	0.08	73
	SaE	A	Pavement	0.3333	2,133	0.05	83
			Meadow	6.0915	38,986	0.89	30
	Tm	D	Pavement	0.2093	1,339	0.03	93
			Meadow	6.1923	39,630	0.91	78
					Total Acres	2.19	

[1] Taken from Reference 3
[2] Taken from Reference 2
[3] Two areas added together

CLIENT: IHDIV-NSWC			JOB NUMBER: 0525-1920
SUBJECT: SITE 12 PRE-DEVELOPMENT HYDROLOGY			
BASED ON:			DRAWING NUMBER:
BY: JLM Date: 9-21-01	CHECKED BY: TMA Date: 9/21/01		APPROVED BY: DATE:

The composite CN for the four drainage areas of Site 12 Town Gut Landfill are as follows: DA-1 = 51, DA-2 = 43, DA-3 = 47, DA-4 = 58. The CN TR-55 printout is provided on pages 8-11 of 36.

3. Time of Concentration:

Two T_C flowpaths were evaluated for both DA-1 and DA-2, while one flowpath each was evaluated for DA-3 and DA-4. The T_C flowpaths for each drainage area are illustrated on page 5 of 36.

The following is a description of the longest T_C flowpath for each drainage area as calculated by TR-55. T_C calculations uses the 2-year 24-hour storm event.

Drainage Area 1

The flowpath with the greatest T_c within DA-1 (Flowpath B) is illustrated on page 5 of 36. Sheet flow shall begin at 22.0 ft msl and extend 10 ft to 21.8 ft msl, resulting in a slope equal to 0.0200 ft/ft. The surface description for sheet flow is pavement. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.011. Sheet flow extends another 40 ft to 20.0 ft msl, resulting in a slope equal to 0.0450 ft/ft. The surface description is woods, and the roughness coefficient is 0.400. Shallow concentrated flow begins at 20.0 ft msl and extends 250 ft to 3.5 ft msl, resulting in a slope equal to 0.0660 ft/ft. The surface for shallow concentrated flow is described as unpaved (meadow). The flowpath within DA-1 ends following the concentrated flow as flow begins to enter the northern pond.

Drainage Area 2

The figure on page 5 of 31 illustrates the flowpath with the greatest T_c within DA-2 (Flowpath C). Sheet flow shall begin at 22.0 ft msl and extend 30 ft to 21.0 ft msl, resulting in a slope equal to 0.0333 ft/ft. The surface description for sheet flow is pavement. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.011. Shallow concentrated flow begins at 21.0 ft msl and extends 200 ft to 3.5 ft msl, resulting in a slope equal to 0.0875 ft/ft. The surface for shallow concentrated flow is described as unpaved (meadow). The flowpath within DA-2 ends following the concentrated flow as flow begins to enter the northern pond.

Drainage Area 3

The flowpath with the greatest T_c within DA-3 is illustrated on page 5 of 31. Sheet flow shall begin at 23.0 ft msl and extend 60 ft to 20.0 ft msl, resulting in a slope equal to 0.0500 ft/ft. The surface description for sheet flow is pavement. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.011. Shallow concentrated flow begins at 20.0 ft msl and extends 290 ft to 5.0 ft msl, resulting in a slope equal to 0.0517 ft/ft. The surface for shallow concentrated flow is described as unpaved (meadow). The flowpath within DA-3 ends following the concentrated flow as flow begins to enter the northern pond.

CLIENT: IHDIV-NSWC			JOB NUMBER: 0525-1920
SUBJECT: SITE 12 PRE-DEVELOPMENT HYDROLOGY			
BASED ON:			DRAWING NUMBER:
BY: JLM Date: 9-21-01	CHECKED BY: TMA Date: 9/21/01		APPROVED BY: DATE:

Drainage Area 4

The figure on page 5 of 36 illustrates the flowpath with the greatest T_c within DA-4. Sheet flow shall begin at 23.5 ft msl and extend 10 ft to 23.0 ft msl, resulting in a slope equal to 0.0500 ft/ft. The surface description for sheet flow is pavement. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.011. Shallow concentrated flow begins at 23.0 ft msl and extends 340 ft to 5.0 ft msl, resulting in a slope equal to 0.0529 ft/ft. The surface for shallow concentrated flow is described as unpaved (meadow). The flowpath within DA-4 ends following the concentrated flow as flow begins to enter the southern pond.

The time of concentrations for the flowpaths described above are equal to 0.14 hr, 0.10 hr, 0.10 hr, and 0.10 hr for DA-1, DA-2, DA-3, and DA-4, respectively. The T_C TR-55 output data is provided on pages 13-16 of 36. The T_C flowpaths for DA-2, DA-3, and DA-4 were entered manually in the TR-55 computer program because the calculated values were less than the minimum requirement of 0.10 hr

4. Peak Discharges:

The peak discharges for the 2-, 10-, 25-, and 100-year 24-hour storm events under pre-development conditions were calculated by TR-55. The inputs include the drainage area size, corresponding weighted runoff curve number, T_C, as well as the 2-, 10-, 25-, and 100-year precipitation equal to 3.3-inches, 5.3-inches, 5.7-inches, and 7.5-inches (refer to precipitation table provided on page 6 of 36). Note that the 25-year precipitation value of 5.7-inches was obtained by interpolation.

CONCLUSIONS

The following is a summary table of the pre-construction runoff associated with the 2-, 10-, 25-, and 100-year 24-hour storm events calculated for the each drainage area at Site 12 Town Gut Landfill. Output of the peak discharges calculated by TR-55 can be found on pages 18-36 of 36.

Storm Event	Precipitation (in)	Runoff (cfs)			
		DA-1	DA-2	DA-3	DA-4
2-Year	3.3	0	0	0	1
10-Year	5.3	2	0	1	4
25-Year	5.7	3	0	2	5
100-Year	7.5	5	2	6	10

The total pre-construction runoff to the northern pond (summation of the runoff from DA-1, DA-2, and DA-3) is 0 cfs, 3 cfs, 5 cfs, and 13 cfs for the 2-, 10-, 25-, and 100-year 24-hour storm, respectively.

The total pre-construction runoff to the southern pond (runoff from DA-4) is 1 cfs, 4 cfs, 5 cfs, and 10 cfs for the 2-, 10-, 25-, and 100-year 24-hour storm, respectively.

5/36

4/30/01

DA-1

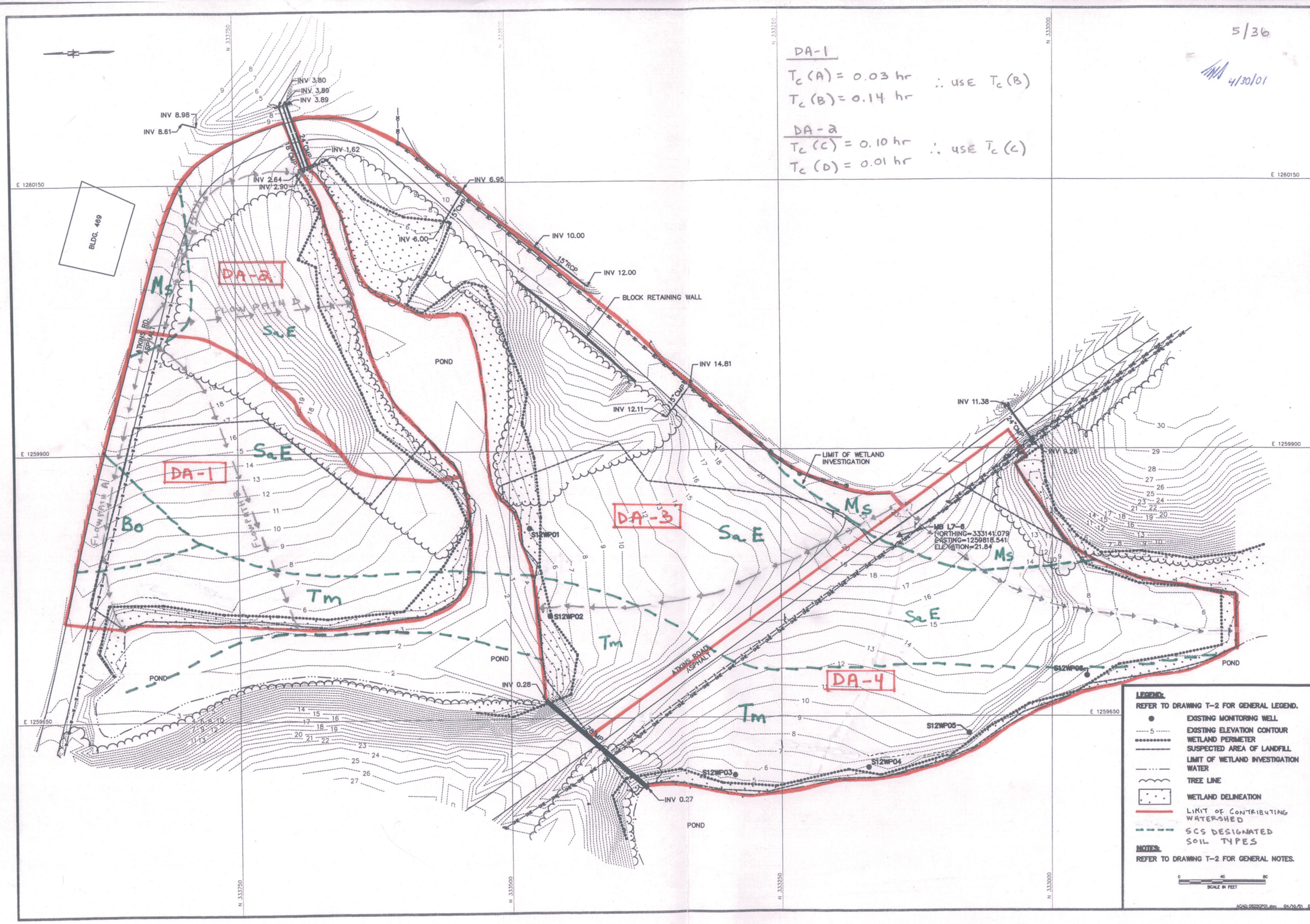
$T_c(A) = 0.03$ hr

$T_c(B) = 0.14$ hr ∴ USE $T_c(B)$

DA-2

$T_c(C) = 0.10$ hr

$T_c(D) = 0.01$ hr ∴ USE $T_c(C)$



SYMBOL	DESCRIPTION	DATE	APPROVED
	REVISIONS		

09A	403		
04	404		
E.I.C.	405		
401	408		
402	048		

DATE RECEIVED BY RODCO

ETD FOR COMMANDER NAVFAC

Tetra Tech NUS, Inc. HOME PLACE 14 Gwynn Oak Ave. Pittsburgh, PA 15207

DR. TBB DA. 6/1 CHK. — E.I.C.

SUBMITTED BY: TITLE DATE

PROGRAM MANAGER DATE

APPROVED DATE

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C.

65% SUBMISSION
SITE 12 – TOWN GUT LANDFILL
REMEDIAL ACTION
EXISTING CONDITIONS PLAN

SEAL AREA

CODE I.D. NO.	80091
DRAWING SIZE:	D
CONST. CONT. NO.	N62470-97-D-0000
SPEC.	21-97-5000-0000
NAVFAC DRAWING NO.	— — —
SHEET 3 OF 11	
	C-1

Table 2.2 Rainfall Depths Associated with the 1,2,10 and 100-year, 24-hour Storm Events

County	Rainfall Depth			
	1 yr - 24 hr	2 yr-24 hr	10 yr-24 hr	100 yr-24 hr
Allegany	2.4 inches	2.9 inches	4.5 inches	6.2 inches
Anne Arundel	2.7	3.3	5.2	7.4
Baltimore	2.6	3.2	5.1	7.1
Calvert	2.8	3.4	5.3	7.6
Caroline	2.8	3.4	5.3	7.6
Carroll	2.5	3.1	5.0	7.1
Cecil	2.7	3.3	5.1	7.3
Charles	2.7	3.3	5.3	7.5
Dorchester	2.8	3.4	5.4	7.8
Frederick	2.5	3.1	5.0	7.0
Garrett	2.4	2.8	4.3	5.9
Harford	2.6	3.2	5.1	7.2
Howard	2.6	3.2	5.1	7.2
Kent	2.7	3.3	5.2	7.4
Montgomery	2.6	3.2	5.1	7.2
Prince George's	2.7	3.3	5.3	7.4
Queen Anne's	2.7	3.3	5.3	7.5
St. Mary's	2.8	3.4	5.4	7.7
Somerset	2.9	3.5	5.6	8.1
Talbot	2.8	3.4	5.3	7.6
Washington	2.5	3.0	4.8	6.7
Wicomico	2.9	3.5	5.6	7.9
Worcester	3.0	3.6	5.6	8.1

25 yr

5.7

PRE-DEVELOPMENT CONDITIONS

RUNOFF CURVE NUMBERS

Quick TR-55 Ver.5.47 S/N:
Executed: 13:16:22 09-21-2001

9/21/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT
DRAINAGE AREA 1

RUNOFF CURVE NUMBER DATA

::

Composite Area: DA-1

SURFACE DESCRIPTION	AREA (acres)	CN	
Bo PAVEMENT (HSG=C)	0.05	92	
Bo MEADOW (HSG=C)	0.10	71	
Ms PAVEMENT (HSG=C)	0.01	92	
Ms MEADOW (HSG=C)	0.01	71	
SaE PAVEMENT (HSG=A)	0.05	83	
SaE MEADOW (HSG=A)	0.70	30	
SaE WOODS (HSG=A)	0.26	36	
Tm PAVEMENT (HSG=D)	0.02	93	
Tm MEADOW (HSG=D)	0.42	78	
COMPOSITE AREA --->	1.62	50.8	(51)

::

9/36

SMA
9/21/01

Quick TR-55 Ver.5.47 S/N:
Executed: 13:16:58 09-21-2001

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

RUNOFF CURVE NUMBER DATA

::

Composite Area: DA-2

SURFACE DESCRIPTION	AREA (acres)	CN	
Ms PAVEMENT (HSG=C)	0.06	92	
Ms MEADOW (HSG=C)	0.02	71	
Ms WOODS (HSG=C)	0.03	73	
SaE PAVEMENT (HSG=A)	0.05	83	
SaE MEADOW (HSG=A)	0.10	30	
SaE WOODS (HSG=A)	0.70	36	
COMPOSITE AREA --->	0.96	43.3	(43)

::

Quick TR-55 Ver.5.47 S/N:
Executed: 13:17:14 09-21-2001

TMA
9/21/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

RUNOFF CURVE NUMBER DATA

::

Composite Area: DA-3

SURFACE DESCRIPTION	AREA (acres)	CN	
Ms PAVEMENT (HSG=C)	0.05	92	
SaE PAVEMENT (HSG=A)	0.33	83	
SaE MEADOW (HSG=A)	0.79	30	
SaE WOODS (HSG=A)	0.97	36	
Tm PAVEMENT (HSG=D)	0.03	93	
Tm MEADOW (HSG=D)	0.29	78	
COMPOSITE AREA --->	2.47	47.3	(47)

::

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9/21/01

Quick TR-55 Ver.5.47 S/N:
Executed: 13:17:28 09-21-2001

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 4

RUNOFF CURVE NUMBER DATA

::

Composite Area: DA-4

SURFACE DESCRIPTION	AREA (acres)	CN	
Ms PAVEMENT (HSG=C)	0.05	92	
Ms MEADOW (HSG=C)	0.18	71	
Ms WOODS (HSG=C)	0.08	73	
SaE PAVEMENT (HSG=A)	0.05	83	
SaE MEADOW (HSG=A)	0.89	30	
Tm PAVEMENT (HSG=D)	0.03	93	
Tm MEADOW (HSG=D)	0.91	78	
COMPOSITE AREA --->	2.19	58.3	(58)

::

PRE-DEVELOPMENT CONDITIONS

TIME OF CONCENTRATIONS

```
Quick TR-55 Ver.5.47   S/N:
Executed: 13:55:46   09-21-2001   IH-12-1B.TCT
```

13/36

TNA 9/21/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 1

Tc COMPUTATIONS FOR: FLOWPATH B

```
SHEET FLOW (Applicable to Tc only)
    Segment ID                                        REACH 1    REACH 2
    Surface description                          PAVEMENT        WOODS
    Manning's roughness coeff., n                      0.0110     0.4000
    Flow length, L (total < or = 300)        ft         10.0       40.0
    Two-yr 24-hr rainfall, P2                in        3.300      3.300
    Land slope, s                         ft/ft       0.0200     0.0450
                        0.8
         .007 * (n*L)
    T = --------------                      hrs         0.00  +    0.12     =  0.13
             0.5    0.4
           P2   *  s

SHALLOW CONCENTRATED FLOW
    Segment ID                                        REACH 3
    Surface (paved or unpaved)?                       Unpaved
    Flow length, L                           ft        250.0
    Watercourse slope, s                  ft/ft       0.0660

                          0.5
    Avg.V =  Csf *   (s)                   ft/s       4.1450
    where:   Unpaved Csf = 16.1345
             Paved   Csf = 20.3282

    T = L / (3600*V)                        hrs         0.02                =  0.02


CHANNEL FLOW
    Segment ID
    Cross Sectional Flow Area, a          sq.ft         0.00
    Wetted perimeter, Pw                     ft         0.00
    Hydraulic radius, r = a/Pw               ft        0.000
    Channel slope, s                      ft/ft       0.0000
    Manning's roughness coeff., n                     0.0000

                      2/3     1/2
         1.49   *   r    *   s
    V = --------------------               ft/s       0.0000
                    n

    Flow length, L                           ft            0

    T = L / (3600*V)                        hrs         0.00                =  0.00

    ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                 TOTAL TIME (hrs)          0.14
```

Quick TR-55 Ver.5.47 S/N:
Executed: 13:56:10 09-21-2001

14/36

9/21/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

Tc or Tt DATA
::

Subarea: DA-2 DESCRIPTION	LENGTH (feet)	VELOCITY (ft/sec)	TIME minutes		hours
PAVEMENT	30	0.10	5.0	=	0.08
MEADOW	200	3.00	1.1	=	0.02
			minutes		hours
		TOTAL Tc --->	6.1	=	0.10

::::::::::::::::::::::::::::::::::::

Quick TR-55 Ver.5.47 S/N:
Executed: 13:56:22 09-21-2001

15/36

9/21/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

Tc or Tt DATA
::

Subarea: DA-3 DESCRIPTION	LENGTH (feet)	VELOCITY (ft/sec)	TIME minutes		TIME hours
PAVEMENT	60	0.23	4.3	=	0.07
MEADOW	290	3.00	1.6	=	0.03
		TOTAL Tc --->	minutes 6.0	=	hours 0.10

::::::::::::::::::::::::::::::::::::

Quick TR-55 Ver.5.47 S/N:
Executed: 13:56:31 09-21-2001

16/36

9/21/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 4

Tc or Tt DATA

::

Subarea: DA-4 DESCRIPTION	LENGTH (feet)	VELOCITY (ft/sec)	TIME minutes		hours
PAVEMENT	10	0.04	4.2	=	0.07
MEADOW	340	3.00	1.9	=	0.03
			minutes		hours
		TOTAL Tc --->	6.1	=	0.10

::::::::::::::::::::::::::::::::::

PRE-DEVELOPMENT CONDITIONS

2-YEAR STORM PEAK DISCHARGES

Return Frequency: 2 years

18/36

9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 13:58:11
Watershed file: --> IH-12-1 .MOP
Hydrograph file: --> IH-12-1A.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT
DRAINAGE AREA 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-1	1.62	51.0	0.10	0.00	3.30	0.17	.58	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 1.62 acres or 0.00253 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-1	0.14	0.00	0.10	0.00	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 2 years

19/36

9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:00:06
Watershed file: --> IH-12-2 .MOP
Hydrograph file: --> IH-12-2A.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-2	0.96	43.0	0.10	0.00	3.30	0.03	.8	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 0.96 acres or 0.00150 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-2	0.10	0.00	**	**	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 2 years

20/36

9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:00:44
Watershed file: --> IH-12-3 .MOP
Hydrograph file: --> IH-12-3A.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-3	2.47	47.0	0.10	0.00	3.30	0.09	.68	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.47 acres or 0.00386 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-3	0.10	0.00	**	**	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 2 years

21/36

9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:01:21
Watershed file: --> IH-12-4 .MOP
Hydrograph file: --> IH-12-4A.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 4

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-4	2.19	58.0	0.10	0.00	3.30	0.38	.44	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.19 acres or 0.00342 sq.mi
Peak discharge = 1 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-4	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

PRE-DEVELOPMENT CONDITIONS

10-YEAR STORM PEAK DISCHARGES

Return Frequency: 10 years

23/36
JMH
9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 13:58:11
Watershed file: --> IH-12-1 .MOP
Hydrograph file: --> IH-12-1B.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT
DRAINAGE AREA 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-1	1.62	51.0	0.10	0.00	5.30	0.88	.36	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 1.62 acres or 0.00253 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-1	0.14	0.00	0.10	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 10 years

24/36

FNH
9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:00:06
Watershed file: --> IH-12-2 .MOP
Hydrograph file: --> IH-12-2B.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-2	0.96	43.0	0.10	0.00	5.30	0.44	.5	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 0.96 acres or 0.00150 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-2	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 10 years

25/36

9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:00:44
Watershed file: --> IH-12-3 .MOP
Hydrograph file: --> IH-12-3B.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-3	2.47	47.0	0.10	0.00	5.30	0.65	.43	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.47 acres or 0.00386 sq.mi
Peak discharge = 1 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-3	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 10 years

26/36

TMA 9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:01:21
Watershed file: --> IH-12-4 .MOP
Hydrograph file: --> IH-12-4B.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 4

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-4	2.19	58.0	0.10	0.00	5.30	1.34	.27	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.19 acres or 0.00342 sq.mi
Peak discharge = 4 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-4	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

PRE-DEVELOPMENT CONDITIONS

25-YEAR STORM PEAK DISCHARGES

Return Frequency: 25 years

28/36

9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 13:58:11
Watershed file: --> IH-12-1 .MOP
Hydrograph file: --> IH-12-1C.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT
DRAINAGE AREA 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-1	1.62	51.0	0.10	0.00	5.70	1.07	.34	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 1.62 acres or 0.00253 sq.mi
Peak discharge = 3 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-1	0.14	0.00	0.10	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 25 years

29/36
TMS
9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:00:06
Watershed file: --> IH-12-2 .MOP
Hydrograph file: --> IH-12-2C.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-2	0.96	43.0	0.10	0.00	5.70	0.57	.47	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 0.96 acres or 0.00150 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-2	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 25 years

30/36

FAWS

9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:00:44
Watershed file: --> IH-12-3 .MOP
Hydrograph file: --> IH-12-3C.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-3	2.47	47.0	0.10	0.00	5.70	0.81	.4	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.47 acres or 0.00386 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-3	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 25 years

31/36

TWA 9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:01:21
Watershed file: --> IH-12-4 .MOP
Hydrograph file: --> IH-12-4C.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 4

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-4	2.19	58.0	0.10	0.00	5.70	1.57	.25	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.19 acres or 0.00342 sq.mi
Peak discharge = 5 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-4	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

PRE-DEVELOPMENT CONDITIONS

100-YEAR STORM PEAK DISCHARGES

Return Frequency: 100 years

33/36

TWA
9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 13:58:11
Watershed file: --> IH-12-1 .MOP
Hydrograph file: --> IH-12-1D.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT
DRAINAGE AREA 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-1	1.62	51.0	0.10	0.00	7.50	2.05	.26	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 1.62 acres or 0.00253 sq.mi
Peak discharge = 5 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-1	0.14	0.00	0.10	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 100 years

34/36

TMJ
9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:00:06
Watershed file: --> IH-12-2 .MOP
Hydrograph file: --> IH-12-2D.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-2	0.96	43.0	0.10	0.00	7.50	1.30	.35	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 0.96 acres or 0.00150 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-2	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 100 years

35/36

FMD
9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:00:44
Watershed file: --> IH-12-3 .MOP
Hydrograph file: --> IH-12-3D.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-3	2.47	47.0	0.10	0.00	7.50	1.66	.3	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.47 acres or 0.00386 sq.mi
Peak discharge = 6 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-3	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 100 years

36/36

TMS
9/21/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 09-21-2001 14:01:21
Watershed file: --> IH-12-4 .MOP
Hydrograph file: --> IH-12-4D.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
PRE-DEVELOPMENT RUNOFF
DRAINAGE AREA 4

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-4	2.19	58.0	0.10	0.00	7.50	2.76	.19	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.19 acres or 0.00342 sq.mi
Peak discharge = 10 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-4	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

A.2 POST-DEVELOPMENT HYDROLOGY

CLIENT: IHDIV-NSWC		JOB NUMBER: 0525-1920
SUBJECT: SITE 12 POST-DEVELOPMENT HYDROLOGY		
BASED ON:		DRAWING NUMBER:
BY: JLM Date: 09-25-01	CHECKED BY: TMS Date: 10-2-01	APPROVED BY: DATE:

OBJECTIVE:

To calculate the 25-year post-development peak discharge at Site 12 (Town Gut Landfill).

The purpose of this calculation is to determine the change in runoff from the Site that is related to the physical changes made to the Site.

APPROACH:

1. Delineate the drainage areas for post-development conditions and measure the surface area with a planimeter.

2. Use the Haestad Method Quick TR-55 computer program to calculate the weighted runoff curve number, time of concentration, and peak 2-, 10-, 25-, and 100-year discharge for the drainage area (DA).

REFERENCES

1) Natural Resource Conservation Service (NRCS), June 1986. Urban Hydrology for Small Watersheds, Technical Release 55 (TR-55).

2) Center for Watershed Protection and the Maryland Department of the Environment (MDE). 2000 Maryland Stormwater Design Manual.

3) Soil Conservation Service (SCS), July 1974. Soil Survey of Charles County, Maryland.

CALCULATIONS

1. Drainage Area:

The post-development drainage areas (DAs) are delineated on page 5 of 30. The drainage area calculations and flowpath slope calculations are provided below. With regard to the land covers in each drainage area, this information is presented in the runoff curve number calculations according to hydrologic soil group (HSG).

2. Runoff Curve Numbers:

The different types of land cover with respect to HSG were measured with a planimeter in each DA. The Quick TR-55 computer program was then used to calculate a weighted runoff curve number (CN) for each drainage area. The following tables present the HSGs present in the watershed, the area calculations, and the selected curve numbers.

Site Soil Types:

Soil Types	Description	Corresponding HSG
Bo	Bibb Silt Loam	C
Ms	Matawan Loamy Sand	C
SaE	Sandy Land, Steep	A
Tm	Tidal Marsh	D

CLIENT: IHDIV-NSWC		JOB NUMBER: 0525-1920
SUBJECT: SITE 12 POST-DEVELOPMENT HYDROLOGY		
BASED ON:		DRAWING NUMBER:
BY: JLM Date: 09-25-01	CHECKED BY: TNA Date: 10/2/01	APPROVED BY: DATE:

Discharge Area:

Drawing Scale: 1" = 80

Drainage Area	Soil Type[1]	HSG[2]	Surface Description	Planimeter Reading (si)	Area (sf)	Area (ac)	Curve Number[2]
1	Bo	C	Pavement	0.3410	2,182	0.05	92
			Meadow	0.6588	4,216	0.10	71
	Ms	C	Pavement	0.5115	3,274	0.08	92
			Meadow	0.1550	992	0.02	71
			Woods	0.0543	347	0.01	73
	SaE	A	Pavement	0.8370	5,357	0.12	83
			Meadow	5.5103	35,266	0.81	30
			Woods	6.5410	41,862	0.96	36
	Tm	D	Pavement	0.1705	1,091	0.03	93
			Meadow	2.7978	17,906	0.41	78
					Total Acres	**2.59**	
2	Ms	C	Pavement	0.3488	2,232	0.05	92
	SaE	A	Pavement	2.2708	14,533	0.33	83
			Meadow	5.3940	34,522	0.79	30
			Woods	6.6185	42,358	0.97	36
	Tm	D	Pavement	0.2248	1,438	0.03	93
			Meadow	1.9763	12,648	0.29	78
					Total Acres	**2.46**	
3	Ms	C	Pavement	0.3255	2,083	0.05	92
			Meadow	1.2400	7,936	0.18	71
			Woods	0.5193	3,323	0.08	73
	SaE	A	Pavement	0.3333	2,133	0.05	83
			Meadow	6.0915	38,986	0.89	30
	Tm	D	Pavement	0.2093	1,339	0.03	93
			Meadow	6.1923	39,630	0.91	78
					Total Acres	**2.19**	

[1] Taken from Reference 3
[2] Taken from Reference 2

The composite CN for the three drainage areas of Site 12 Town Gut Landfill are as follows: DA-1 = 48, DA-2 = 47, DA-3 = 58. The CN TR-55 printout is provided on pages 8-10 of 30.

3. Time of Concentration:

The following is a description of the longest T_C flowpath for each drainage area as calculated by TR-55. T_C calculations uses the 2-year 24-hour storm event.

CLIENT: IHDIV-NSWC			JOB NUMBER: 0525-1920
SUBJECT: SITE 12 POST-DEVELOPMENT HYDROLOGY			
BASED ON:			DRAWING NUMBER:
BY: JLM Date: 09-25-01	CHECKED BY: TMA Date: 10/2/01		APPROVED BY: DATE:

Drainage Area 1

The flowpath with the greatest T_c within DA-1 (Flowpath B) is illustrated on page 5 of 30. Sheet flow shall begin at 22.0 ft msl and extend 10 ft to 21.7 ft msl, resulting in a slope equal to 0.0300 ft/ft. The surface description for sheet flow is pavement. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.011. Sheet flow continues from 21.7 ft msl for 140 ft to 18.0 ft msl, resulting in a slope equal to 0.0264 ft/ft. The surface description for sheet flow is meadow. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.240. Channel flow begins at 18.0 ft msl and extends 200 ft to 3.5 ft msl. The depth of the northern channel is 1.0 ft with 4H:1V sideslopes. Therefore, the cross sectional flow area is equal to 4 sf and the wetted perimeter is equal to 8.25 ft. According to Appendix 19.A in the NRCS TR-55 manual, the roughness coefficient (n) is 0.300. The flowpath within DA-1 ends following the channel flow as flow begins to enter the northern pond.

Drainage Area 2

The figure on page 5 of 30 illustrates the flowpath with the greatest Tc within DA-2. Sheet flow shall begin at 22.5 ft msl and extend 50 ft to 21.0 ft msl, resulting in a slope equal to 0.0300 ft/ft. The surface description for sheet flow is pavement. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.011. Channel flow begins at 21.0 ft msl and extends 300 ft to 3.5 ft msl. The depth of the southern channel is 1.5 ft with 4H:1V sideslopes. Therefore, the cross sectional flow area is equal to 9 sf and the wetted perimeter is equal to 12.37 ft. According to Appendix 19.A in the NRCS TR-55 manual, the roughness coefficient (n) is 0.300. The flowpath within DA-2 ends following the channel flow as flow begins to enter the northern pond.

Drainage Area 3

The figure on page 5 of 30 illustrates the flowpath with the greatest Tc within DA-3. Sheet flow shall begin at 23.0 ft msl and extend 10 ft to 22.6 ft msl, resulting in a slope equal to 0.0400 ft/ft. The surface description for sheet flow is pavement. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.011. Sheet flow continues at 22.6 ft msl and extends 270 ft to 3.5 ft msl, resulting in a slope equal to 0.0707 ft/ft. The surface description for sheet flow is meadow. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.240. The flowpath within DA-3 ends following the sheet flow as flow begins to enter the southern pond.

The time of concentrations for the flowpaths described above are equal to 0.34 hr, 0.10 hr, and 0.35 hr for DA-1, DA-2, and DA-3, respectively. The TC TR-55 output data is provided on pages 12-14 of 30.

CLIENT: IHDIV-NSWC		JOB NUMBER: 0525-1920
SUBJECT: SITE 12 POST-DEVELOPMENT HYDROLOGY		
BASED ON:		DRAWING NUMBER:
BY: JLM Date: 09-25-01	CHECKED BY: [illegible] Date: 10-2-01	APPROVED BY: DATE:

4. Peak Discharges:

The peak discharges for the 2-, 10-, 25-, and 100-year 24-hour storm events under post-development conditions were calculated by TR-55. The inputs include the drainage area size, corresponding weighted runoff curve number, TC, as well as the 2-, 10-, 25-, and 100-year precipitation equal to 3.3-inches, 5.3-inches, 5.7-inches, and 7.5-inches (refer to precipitation table provided on page 6 of 30). Note that the 25-year precipitation value of 5.7-inches was obtained by interpolation.

CONCLUSIONS

The following is a summary table of the post-construction runoff associated with the 2-, 10-, 25-, and 100-year 24-hour storm events calculated for the each drainage area at Site 12 Town Gut Landfill. Output of the peak discharges calculated by TR-55 can be found on pages 16-30 of 30.

Storm Event	Precipitation (in)	Runoff (cfs)		
		DA-1	DA-2	DA-3
2-Year	3.3	0	0	0
10-Year	5.3	1	1	2
25-Year	5.7	2	2	3
100-Year	7.5	4	6	6

The total post-construction runoff to the northern pond (summation of the runoff from DA-1 and DA-2) is 0 cfs, 2 cfs, 4 cfs, and 10 cfs for the 2-, 10-, 25-, and 100-year 24-hour storm, respectively.

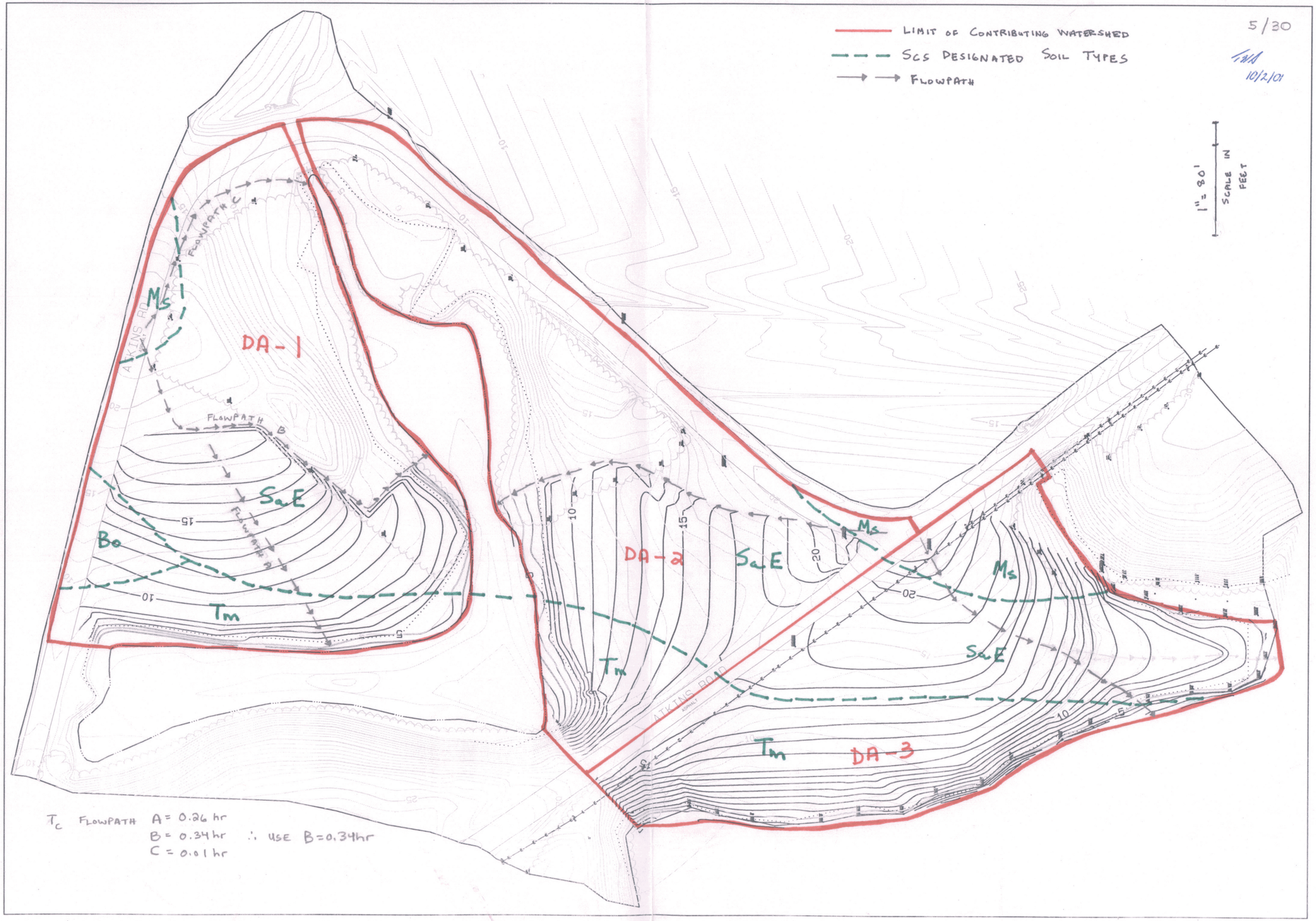
The total post-construction runoff to the southern pond (runoff from DA-3) is 0 cfs, 2 cfs, 3 cfs, and 6 cfs for the 2-, 10-, 25-, and 100-year 24-hour storm, respectively.

The amount of runoff from the Site into the northern and southern ponds has decreased between pre- and post-construction conditions (refer to Pre-development Hydrology Calculation in Appendix A.1.

The total pre-construction runoff to the northern pond (summation of the runoff from DA-1, DA-2, and DA-3) is 0 cfs, 3 cfs, 5 cfs, and 13 cfs for the 2-, 10-, 25-, and 100-year 24-hour storm, respectively.

The total pre-construction runoff to the southern pond (runoff from DA-4) is 1 cfs, 4 cfs, 5 cfs, and 10 cfs for the 2-, 10-, 25-, and 100-year 24-hour storm, respectively.

10/2/01



T_c FLOWPATH A = 0.26 hr
B = 0.34 hr ∴ USE B = 0.34 hr
C = 0.01 hr

Table 2.2 Rainfall Depths Associated with the 1,2,10 and 100-year, 24-hour Storm Events

County	Rainfall Depth				
	1 yr - 24 hr	2 yr-24 hr	10 yr-24 hr	100 yr-24 hr	25 yr-24hr
Allegany	2.4 inches	2.9 inches	4.5 inches	6.2 inches	
Anne Arundel	2.7	3.3	5.2	7.4	
Baltimore	2.6	3.2	5.1	7.1	
Calvert	2.8	3.4	5.3	7.6	
Caroline	2.8	3.4	5.3	7.6	
Carroll	2.5	3.1	5.0	7.1	
Cecil	2.7	3.3	5.1	7.3	
Charles	2.7	3.3	5.3	7.5	5.7
Dorchester	2.8	3.4	5.4	7.8	
Frederick	2.5	3.1	5.0	7.0	
Garrett	2.4	2.8	4.3	5.9	
Harford	2.6	3.2	5.1	7.2	
Howard	2.6	3.2	5.1	7.2	
Kent	2.7	3.3	5.2	7.4	
Montgomery	2.6	3.2	5.1	7.2	
Prince George's	2.7	3.3	5.3	7.4	
Queen Anne's	2.7	3.3	5.3	7.5	
St. Mary's	2.8	3.4	5.4	7.7	
Somerset	2.9	3.5	5.6	8.1	
Talbot	2.8	3.4	5.3	7.6	
Washington	2.5	3.0	4.8	6.7	
Wicomico	2.9	3.5	5.6	7.9	
Worcester	3.0	3.6	5.6	8.1	

POST-DEVELOPMENT CONDITIONS

RUNOFF CURVE NUMBERS

8/30

Quick TR-55 Ver.5.47 S/N:
Executed: 14:02:33 10-01-2001

TWA
10/2/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 1

RUNOFF CURVE NUMBER DATA

::

Composite Area: DA-1

SURFACE DESCRIPTION	AREA (acres)	CN	
Bo PAVEMENT (HSG=C)	0.05	92	
Bo MEADOW (HSG=C)	0.10	71	
Ms PAVEMENT (HSG=C)	0.08	92	
Ms MEADOW (HSG=C)	0.02	71	
Ms WOODS (HSG=C)	0.01	73	
SaE PAVEMENT (HSG=A)	0.12	83	
SaE MEADOW (HSG=A)	0.81	30	
SaE WOODS (HSG=A)	0.96	36	
Tm PAVEMENT (HSG=D)	0.03	93	
Tm MEADOW (HSG=D)	0.41	78	
COMPOSITE AREA --->	2.58	48.0	(48)

::

Quick TR-55 Ver.5.47 S/N:
Executed: 14:02:47 10-01-2001

10/2/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

RUNOFF CURVE NUMBER DATA

::

Composite Area: DA-2

SURFACE DESCRIPTION	AREA (acres)	CN	
Ms PAVEMENT (HSG=C)	0.05	92	
SaE PAVEMENT (HSG=A)	0.33	83	
SaE MEADOW (HSG=A)	0.79	30	
SaE WOODS (HSG=A)	0.97	36	
Tm PAVEMENT (HSG=D)	0.03	93	
Tm MEADOW (HSG=D)	0.29	78	
COMPOSITE AREA --->	2.47	47.3	(47)

::

10/30

Quick TR-55 Ver.5.47 S/N:
Executed: 14:03:02 10-01-2001

10/2/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

RUNOFF CURVE NUMBER DATA

::

Composite Area: DA-3

SURFACE DESCRIPTION	AREA (acres)	CN	
Ms PAVEMENT (HSG=C)	0.05	92	
Ms MEADOW (HSG=C)	0.18	71	
Ms WOODS (HSG=C)	0.08	73	
SaE PAVEMENT (HSG=A)	0.05	83	
SaE MEADOW (HSG=A)	0.89	30	
Tm PAVEMENT (HSG=D)	0.03	93	
Tm MEADOW (HSG=D)	0.91	78	
COMPOSITE AREA --->	2.19	58.3	(58)

::

POST-DEVELOPMENT CONDITIONS

TIME OF CONCENTRATIONS

Quick TR-55 Ver.5.47 S/N:
Executed: 14:03:30 10-01-2001 IH-12-1P.TCT

12/30

FWS
10/2/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 1

Tc COMPUTATIONS FOR: FLOWPATH 1

SHEET FLOW (Applicable to Tc only)

Segment ID		REACH1	REACH 2		
Surface description		PAVEMENT	MEADOW		
Manning's roughness coeff., n		0.0110	0.2400		
Flow length, L (total < or = 300)	ft	10.0	140.0		
Two-yr 24-hr rainfall, P2	in	3.300	3.300		
Land slope, s	ft/ft	0.0300	0.0264		
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.00	+ 0.27	=	0.28

SHALLOW CONCENTRATED FLOW

Segment ID				
Surface (paved or unpaved)?				
Flow length, L	ft	0.0		
Watercourse slope, s	ft/ft	0.0000		
$Avg.V = Csf * (s)^{0.5}$	ft/s	0.0000		
where: Unpaved Csf = 16.1345				
Paved Csf = 20.3282				
T = L / (3600*V)	hrs	0.00	=	0.00

CHANNEL FLOW

Segment ID		REACH 3		
Cross Sectional Flow Area, a	sq.ft	4.00		
Wetted perimeter, Pw	ft	8.25		
Hydraulic radius, r = a/Pw	ft	0.485		
Channel slope, s	ft/ft	0.0725		
Manning's roughness coeff., n		0.3000		
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	0.8253		
Flow length, L	ft	200		
T = L / (3600*V)	hrs	0.07	=	0.07

::

TOTAL TIME (hrs) 0.34

Quick TR-55 Ver.5.47   S/N:
Executed: 14:03:41   10-01-2001   IH-12-2P.TCT

13/30

TMJ 10/2/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

Tc COMPUTATIONS FOR: DRAINAGE AREA 2

SHEET FLOW (Applicable to Tc only)

Segment ID		REACH 1		
Surface description		PAVEMENT		
Manning's roughness coeff., n		0.0110		
Flow length, L (total < or = 300)	ft	50.0		
Two-yr 24-hr rainfall, P2	in	3.300		
Land slope, s	ft/ft	0.0300		
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.01	=	0.01

SHALLOW CONCENTRATED FLOW

Segment ID				
Surface (paved or unpaved)?				
Flow length, L	ft	0.0		
Watercourse slope, s	ft/ft	0.0000		
$Avg.V = Csf * (s)^{0.5}$	ft/s	0.0000		
where: Unpaved Csf = 16.1345				
Paved Csf = 20.3282				
T = L / (3600*V)	hrs	0.00	=	0.00

CHANNEL FLOW

Segment ID		REACH 2		
Cross Sectional Flow Area, a	sq.ft	9.00		
Wetted perimeter, Pw	ft	12.37		
Hydraulic radius, r = a/Pw	ft	0.728		
Channel slope, s	ft/ft	0.0565		
Manning's roughness coeff., n		0.3000		
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	0.9550		
Flow length, L	ft	310		
T = L / (3600*V)	hrs	0.09	=	0.09

::

TOTAL TIME (hrs) 0.10

```
Quick TR-55 Ver.5.47    S/N:
Executed: 14:03:56    10-01-2001    IH-12-3P.TCT
```

14/30
TWD 10/2/01

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

Tc COMPUTATIONS FOR: DRAINAGE AREA 3

```
SHEET FLOW (Applicable to Tc only)
    Segment ID                                        REACH 1    REACH 2
    Surface description                          PAVEMENT       MEADOW
    Manning's roughness coeff., n                     0.0110     0.2400
    Flow length, L (total < or = 300)   ft            10.0       270.0
    Two-yr 24-hr rainfall, P2           in            3.300      3.300
    Land slope, s                       ft/ft         0.0400     0.0531
                            0.8
          .007 * (n*L)
    T =   --------------              hrs            0.00   +   0.35    =   0.35
             0.5    0.4
           P2    *  s

SHALLOW CONCENTRATED FLOW
    Segment ID
    Surface (paved or unpaved)?
    Flow length, L                      ft            0.0
    Watercourse slope, s                ft/ft         0.0000

                               0.5
    Avg.V =  Csf *  (s)                 ft/s          0.0000
    where:   Unpaved Csf = 16.1345
             Paved   Csf = 20.3282

    T = L / (3600*V)                    hrs           0.00                  =   0.00


CHANNEL FLOW
    Segment ID
    Cross Sectional Flow Area, a        sq.ft         0.00
    Wetted perimeter, Pw                ft            0.00
    Hydraulic radius, r = a/Pw          ft            0.000
    Channel slope, s                    ft/ft         0.0000
    Manning's roughness coeff., n                     0.0000

                         2/3     1/2
          1.49   *   r    *   s
    V =   --------------------          ft/s          0.0000
                     n

    Flow length, L                      ft            0

    T = L / (3600*V)                    hrs           0.00                  =   0.00

  ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                               TOTAL TIME (hrs)             0.35
```

POST-DEVELOPMENT CONDITIONS

2-YEAR STORM PEAK DISCHARGES

Return Frequency: 2 years

16/30

10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:08
Watershed file: --> IH-12-1P.MOP
Hydrograph file: --> IH-12-A1.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-1	2.58	48.0	0.30	0.00	3.30	0.11	.66	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.58 acres or 0.00403 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-1	0.34	0.00	0.30	0.00	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 2 years

17/30
10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:24
Watershed file: --> IH-12-2P.MOP
Hydrograph file: --> IH-12-A2.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-2	2.47	47.0	0.10	0.00	3.30	0.09	.68	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.47 acres or 0.00386 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-2	0.10	0.00	**	**	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 2 years

18/30
10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:44
Watershed file: --> IH-12-3P.MOP
Hydrograph file: --> IH-12-A3.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-3	2.19	58.0	0.40	0.00	3.30	0.38	.44	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.19 acres or 0.00342 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-3	0.35	0.00	0.40	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

POST-DEVELOPMENT CONDITIONS

10-YEAR STORM PEAK DISCHARGES

Return Frequency: 10 years

20/30
10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:08
Watershed file: --> IH-12-1P.MOP
Hydrograph file: --> IH-12-B1.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-1	2.58	48.0	0.30	0.00	5.30	0.70	.41	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.58 acres or 0.00403 sq.mi
Peak discharge = 1 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-1	0.34	0.00	0.30	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 10 years

21/30
TMS
10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:24
Watershed file: --> IH-12-2P.MOP
Hydrograph file: --> IH-12-B2.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-2	2.47	47.0	0.10	0.00	5.30	0.65	.43	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.47 acres or 0.00386 sq.mi
Peak discharge = 1 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-2	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 10 years

22/30

TMS
10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:44
Watershed file: --> IH-12-3P.MOP
Hydrograph file: --> IH-12-B3.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-3	2.19	58.0	0.40	0.00	5.30	1.34	.27	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.19 acres or 0.00342 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-3	0.35	0.00	0.40	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

POST-DEVELOPMENT CONDITIONS

25-YEAR STORM PEAK DISCHARGES

Return Frequency: 25 years

24/30

TMD 10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:08
Watershed file: --> IH-12-1P.MOP
Hydrograph file: --> IH-12-C1.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-1	2.58	48.0	0.30	0.00	5.70	0.87	.38	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.58 acres or 0.00403 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-1	0.34	0.00	0.30	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 25 years

25/30

10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:24
Watershed file: --> IH-12-2P.MOP
Hydrograph file: --> IH-12-C2.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-2	2.47	47.0	0.10	0.00	5.70	0.81	.4	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.47 acres or 0.00386 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-2	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 25 years

26/30

FMS
10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:44
Watershed file: --> IH-12-3P.MOP
Hydrograph file: --> IH-12-C3.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-3	2.19	58.0	0.40	0.00	5.70	1.57	.25	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.19 acres or 0.00342 sq.mi
Peak discharge = 3 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-3	0.35	0.00	0.40	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

POST-DEVELOPMENT CONDITIONS

100-YEAR STORM PEAK DISCHARGES

Return Frequency: 100 years

28/30

TMS
10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:08
Watershed file: --> IH-12-1P.MOP
Hydrograph file: --> IH-12-D1.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-1	2.58	48.0	0.30	0.00	7.50	1.76	.29	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.58 acres or 0.00403 sq.mi
Peak discharge = 4 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-1	0.34	0.00	0.30	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 100 years

29/30

10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:24
Watershed file: --> IH-12-2P.MOP
Hydrograph file: --> IH-12-D2.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA-2	2.47	47.0	0.10	0.00	7.50	1.66	.3	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.47 acres or 0.00386 sq.mi
Peak discharge = 6 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-2	0.10	0.00	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Return Frequency: 100 years

30/30

10/2/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:04:44
Watershed file: --> IH-12-3P.MOP
Hydrograph file: --> IH-12-D3.HYD

INDIAN HEAD DIVISION - NSWC
SITE 12 TOWN GUT LANDFILL
POST-DEVELOPMENT RUNOFF
DRAINAGE AREA 3

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA-3	2.19	58.0	0.40	0.00	7.50	2.76	.19	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.19 acres or 0.00342 sq.mi
Peak discharge = 6 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA-3	0.35	0.00	0.40	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

A.3 SILT FENCE/SUPER SILT FENCE DESIGN

CLIENT: IHDIV-NSWC Indian Head, Maryland		JOB NUMBER: N-0525-1910	
SUBJECT: Site 12 - Town Gut Landfill Silt Fence Design			
BASED ON: Maryland Standards and Specifications for Soil Erosion and Sediment Control		DRAWING NUMBER:	
BY: T.W.S. Date: 4/11/01	CHECKED BY: [illegible] Date: 4-11-01	APPROVED BY:	DATE:

OBJECTIVE:

To properly locate and determine the type of silt fence to intercept and detain small amounts of sediment from disturbed areas during earth disturbance activities at Site 12, and provide protection for the adjacent wetlands and ponds.

APPROACH:

1. Locate and determine the type of silt fence required according to Sections E15.0 (Standards and Specifications for Silt Fence) and Section H26.0 (Standards and Specifications for Super Silt Fence), Maryland Standards and Specifications for Soil Erosion and Sediment Control, 1994.

REFERENCES

1) Maryland Standards and Specifications for Soil Erosion and Sediment Control, Maryland Department of Environment, Water Management Administration, 1994.

CALCULATIONS:

According to Sections E15.0 and H26.0 of the Maryland Standards and Specifications for Soil Erosion and Sediment Control, 1994, no formal design is required. However, slope, slope steepness, and slope length affect the size and placement of silt fence. The following is a summary of design recommendations and guidelines for placement of silt fence and super silt fence.

Silt Fence:

1) Silt Fence should be placed on or parallel to contours.
2) Length of silt fence must conform to the design criteria presented on page 4 of 5 of this calculation.
3) Downslope of the silt fence should be undisturbed ground.
4) Construction specifications will conform with those identified in Section E15.0 of the Maryland Standards and Specifications for Soil Erosion and Sediment Control.

Super Silt Fence:

1) Super silt fence should be placed as close to the contour as possible.
2) No section of super silt fence should exceed a grade of 5% for a distance of more than 50-feet.
3) Length of silt fence must conform to the design criteria presented on page 5 of 5 of this calculation.
4) Construction specifications will conform with those identified in Section H26.0 of the Maryland Standards and Specifications for Soil Erosion and Sediment Control.

CLIENT:	IHDIV-NSWC Indian Head, Maryland	JOB NUMBER:	N-0525-1910
SUBJECT:	Site 12 - Town Gut Landfill Silt Fence Design		
BASED ON:	Maryland Standards and Specifications for Soil Erosion and Sediment Control	DRAWING NUMBER:	
BY: T.W.S. Date: 4/11/01	CHECKED BY: [illegible] Date: 4-11-01	APPROVED BY:	DATE:

Slope Measurments:

Area	Slope Length (ft)		Avg. Slope (H:V)		Required Fencing
	Max	Min	Max	Min	
Area A	270	50	5:1	14:1	Super silt fence required.
Area B	305	50	3:1	19:1	Super silt fence required.
Area C	240	80	18:1	24:1	Super silt fence required.

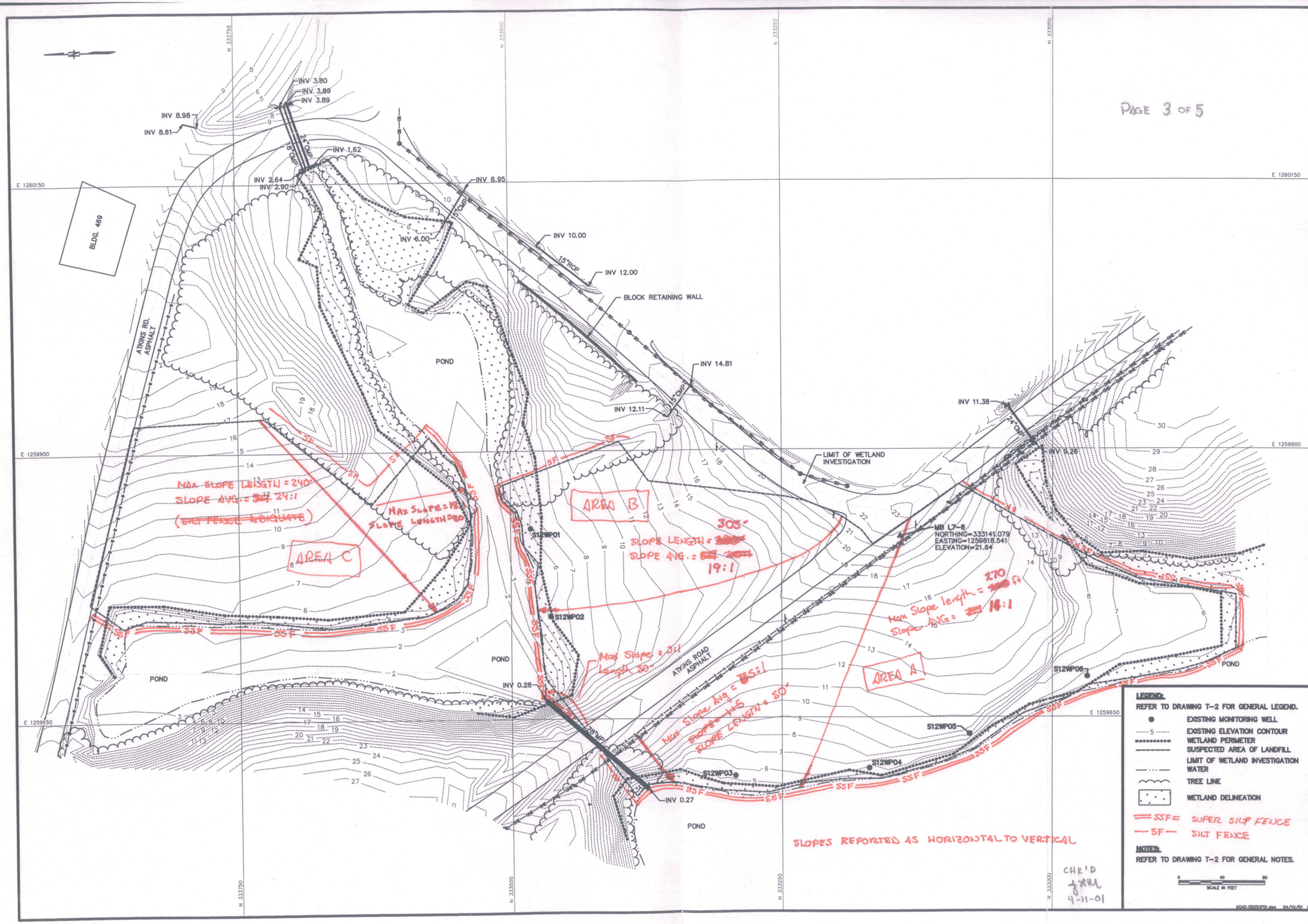
Note: Max slope length occurs with minimum average slope, and minimum slope length occurs with maximum average slope.

Fencing selected to avoid placing fencing parallel to the contours in more than one location along the length of slope.

CONCLUSIONS

Silt Fence and super silt fence shall be utilized at Site 12 to intercept and detain sediment from upgradient disturbed areas. Super silt fence will be used along the shoreline of the adjacent ponds. The use of super silt fence will avoid the need to use various stages of silt fence. Silt fence will be used along the edges of the disturbed areas where slope lengths are minimal. The super silt fence and silt fence will be placed in the locations shown on the map provided on page 3 of 5 of this calculation and on Design Drawing C-2 of the Basis of Design Report.

PAGE 3 OF 5



LEGEND:

REFER TO DRAWING T-2 FOR GENERAL LEGEND.

- EXISTING MONITORING WELL
- EXISTING ELEVATION CONTOUR
- WETLAND PERIMETER
- SUSPECTED AREA OF LANDFILL
- LIMIT OF WETLAND INVESTIGATION
- WATER
- TREE LINE
- WETLAND DELINEATION
- SSF = SUPER SILT FENCE
- SF = SILT FENCE

NOTES:

REFER TO DRAWING T-2 FOR GENERAL NOTES.

0 40 80
SCALE IN FEET

AC4D:05250CP01.dwg 04/19/01 RT

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

09A	403		
04	404		
E.I.C.	405		
401	408		
402	04B	DATE	

REVIEWED BY NOCC

Tetra Tech NUS, Inc.
DESIGNED BY: DRAWN BY: CHK. DATE
SUBMITTED BY: DR. GLT TITLE DATE
PROGRAM MANAGER DATE
APPROVED DATE
EFD FOR COMMANDER NAVFAC

SEAL AREA

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C.

65% SUBMISSION
SITE 12 - TOWN GUT LANDFILL
REMEDIAL ACTION
EXISTING CONDITIONS PLAN

CODE ID. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO.
N62470-97-D-0000
SPEC. 21-97-5000-0000
NAVFAC DRAWING NO.

SHEET 3 OF 11
C-1

SUPER SILT FENCE

Design Criteria

Slope	Slope Steepness	Slope Length (maximum)	Silt Fence Length (maximum)
0 - 10%	0 - 10:1	Unlimited	Unlimited
10 - 20%	10:1 - 5:1	200 feet	1,500 feet
20 - 33%	5:1 - 3:1	100 feet	1,000 feet
33 - 50%	3:1 - 2:1	100 feet	500 feet
50% +	2:1 +	50 feet	250 feet

SILT FENCE

Silt Fence Design Criteria

Slope Steepness	(Maximum) Slope Length	(Maximum) Silt Fence Length
Flatter than 50:1	unlimited	unlimited
50:1 to 10:1	125 feet	1,000 feet
10:1 to 5:1	100 feet	750 feet
5:1 to 3:1	60 feet	500 feet
3:1 to 2:1	40 feet	250 feet
2:1 and steeper	20 feet	125 feet

Note: In areas of less than 2% slope and sandy soils (USDA general classification system, soil Class A) maximum slope length and silt fence length will be unlimited. In these areas a silt fence may be the only perimeter control required.

A.4 CHANNEL CAPACITY CALCULATIONS

CLIENT: IHDIV-NSWC		JOB NUMBER: 0525-1920	
SUBJECT: SITE 12 CONVEYANCE CHANNEL DESIGN			
BASED ON:		DRAWING NUMBER:	
BY: JLM Date: 9-27-01	CHECKED BY: JNS Date: 10/3/01	APPROVED BY:	DATE:

OBJECTIVE:

The objectives of this calculation are the following:

1) To size conveyance channels required for the Site 12 design.
2) To specify the type of erosion control matting (ECM) required in the conveyance channels, if any.
3) To size the riprap to be used for outlet protection for the 15-inch CMP, and to disperse flow into the wetlands.

APPROACH:

1) Delineate the contributing area into the northern and southern conveyance channels and measure the surface area with a planimeter.

2) Use the Haestad Method Quick TR-55 computer program to calculate the peak discharges from the contributing areas.

3) Use the Haestad Method FlowMaster computer program to determine the peak discharge from the 15" corrugated metal pipe (CMP).

4) Using the peak discharge from 2) and 3) above, determine the size of the conveyance channels.

5) Determine the type of ECM required in the conveyance channel, if any, based on the peak discharge from 2) and 3) above.

6) Determine the riprap size and apron length for the 15-inch CMP outlet protection based on 3) above.

7) Determine the riprap apron length and width to be used as a flow dispersion system where channels discharge into the wetlands.

REFERENCES

1. Center for Watershed Protection and the Maryland Department of the Environment (MDE). 2000 Maryland Stormwater Design Manual.

2. Water Management Administration and the 'Maryland Department of the Environment (MDE), 1994. Maryland Standards and Specifications for Soil Erosion and Sediment Control.

3. Natural Resources Conservation Service (NRCS), June 1986. Urban Hydrology for Small Watersheds, Technical Release 55 (TR-55).

4. Soil Conservation Service (SCS), July 1974. Soil Survey of Charles County, Maryland.

CLIENT: IHDIV-NSWC		JOB NUMBER: 0525-1920	
SUBJECT: SITE 12 CONVEYANCE CHANNEL DESIGN			
BASED ON:		DRAWING NUMBER:	
BY: JLM Date: 9-27-01	CHECKED BY: TNA Date: 10/3/01	APPROVED BY:	DATE:

CALCULATIONS

1. Drainage Area:

The northern and southern drainage areas (DAs) are delineated on page 8 of 22. The drainage area calculations and flowpath slope calculations are provided below. With regard to the land covers in each drainage area, this information is presented in the runoff curve number calculations according to hydrologic soil group (HSG).

2. Runoff Curve Numbers:

The different types of land cover with respect to HSG were measured with a planimeter in each DA. The Quick TR-55 computer program was then used to calculate a weighted runoff curve number for each drainage area. The following tables present the HSGs present in the watershed, the area calculations, and the selected runoff numbers.

Site Soil Types:
The main type of soil in the contributing DAs is SaE, with a description of sandy land, steep. The corresponding HSG for SaE is A.

Discharge Area:
Drawing Scale: 1" = 80'

Drainage Area	Soil Type[1]	HSG[2]	Surface Description	Planimeter Reading (si)	Area (sf)	Area (ac)	Curve Number[2]
Northern	SaE	A	Meadow	1.5364	9,833	0.23	30
			Woods	0.4883	3,125	0.07	36
					Total Acres	**0.30**	

Drainage Area	Soil Type[1]	HSG[2]	Surface Description	Planimeter Reading (si)	Area (sf)	Area (ac)	Curve Number[2]
Southern	SaE	A	Meadow	1.0482	6,708	0.15	30
			Woods	1.1393	7,292	0.17	36
					Total Acres	**0.32**	

[1] Taken from Reference 4
[2] Taken from Reference 3

The composite CNs for the nothern and southern DAs are 31 and 33, respectively. The CN TR-55 printout is provided on pages 10-11 of 22.

CLIENT: IHDIV-NSWC		JOB NUMBER: 0525-1920
SUBJECT: SITE 12 CONVEYANCE CHANNEL DESIGN		
BASED ON:		DRAWING NUMBER:
BY: JLM Date: 9-27-01	CHECKED BY: TMS Date: 10/3/01	APPROVED BY: DATE:

3. Time of Concentration:

The following is a description of the longest T_C flowpath for the DAs as calculated by TR-55. T_C calculations uses the 2-year 24-hour storm event (see page 9 of 22).

NORTHERN CHANNEL

The flowpath with the greatest Tc within the northern DA is illustrated on page 8 of 22. Sheet flow shall begin at 22.0 ft msl and extend 95 ft to 18.0 ft msl, resulting in a slope equal to 0.0421 ft/ft. The surface description for sheet flow is meadow. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.024. Channel flow shall then begin at 18.0 ft msl and extend 300 ft to 3.5 ft msl, resulting in a slope equal to 0.0483 ft/ft. The channel will be V-shaped, lined with ECM, and have a 1.0 ft depth with 4H:1V sideslopes. Therefore, the cross sectional flow area equals 4 sf and the wetted perimeter is 8.25 ft. According to Haestad FlowMaster, Manning's "n" for the ECM lined channel is 0.030 (grass maintained).

SOUTHERN CHANNEL

The flowpath with the greatest Tc within the southern DA is illustrated on page 8 of 22. Channel flow shall begin at 20.0 ft msl and extend 290 ft to 3.5 ft msl, resulting in a slope equal to 0.0569 ft/ft. The channel will be V-shaped, lined with ECM, and have a 1.5 ft depth with 4H:1V sideslopes. Therefore, the cross sectional flow area equals 9 sf and the wetted perimeter is 12.4 ft. According to Haestad FlowMaster, Manning's "n" for the ECM lined channel is 0.030 (grass maintained).

The time of concentrations for the flowpaths described above are equal to 0.29 hr and 0.10 hr for the northern and southern channel, respectively. The T_C TR-55 output data is provided on pages 12-13 of 22. The T_C flowpath for the southern DA was entered manually in the TR-55 computer program because the calculated value was less than the minimum requirement of 0.10 hr

4. DA Peak Discharges:

The following is a summary table of the runoff associated with the 25-year 24-hour storm events calculated for each drainage area. Output of the peak discharges calculated by TR-55 can be found on pages 14-15 of 22.

Storm Event	Precipitation (in)	Runoff (cfs)	
		Southern DA	Northern DA
25-Year	5.7	0	0

TR-55 has rounded the runoff values to the nearest whole number. For the purposes of this calculation, it will be assumed that at least 1 cfs of runoff is associated with the 25-year 24-hour storm event.

CLIENT: IHDIV-NSWC			JOB NUMBER: 0525-1920
SUBJECT: SITE 12 CONVEYANCE CHANNEL DESIGN			
BASED ON:			DRAWING NUMBER:
BY: JLM Date: 9-27-01	CHECKED BY: FNA Date: 10/3/01		APPROVED BY: DATE:

4. 15-inch CMP Peak Discharge:

Using Haestad FlowMaster, the peak discharge through the 15-inch CMP in the southern portion of the landfill was calculated as 9.54 cfs. A Manning's Coefficient of 0.024 was assumed based on the pipe material. FlowMaster output is provided on page 16 of 22.

5. Size of Conveyance Channels:

The runoff value from the northern DA (1 cfs) will be used to size the northern conveyance channel. The runoff value from the southern DA (1 cfs) will be added to the pipe discharge flow (9.54 cfs) to design for optimum conditions (10.54 cfs).

The following table summarizes the conveyance channel results from Haestad FlowMaster (pages 17-18 of 22).

Channel	Manning's Coefficient	Minimum Channel Slope (ft/ft)	Left Sideslope (H:V)	Right Sideslope (H:V)	Discharge (cfs)	Channel Depth (ft)	Freeboard (ft)	Total Channel Depth (ft)
Northern	0.030	0.0136	4:1	4:1	1.0	0.37	0.5	0.87
Southern	0.030	0.0333	4:1	4:1	10.54	0.75	0.5	1.25

Rounding the channel depths to the nearest half-foot results in a 1 ft northern channel depth, and a 1.5 ft southern channel depth.

6. Erosion Control Matting

The purpose of this portion of the calculation is to determine whether ECM is needed in the northern and southern channels.

The minimum and maximum slopes and corresponding flow velocities of the northern and southern conveyance channels are as follows (refer to FlowMaster output provided on pages 19-20 of 22):

Channel	Flow (cfs)	Min Slope (ft/ft)	Velocity	Max Slope (ft/ft)	Velocity
Northern	1.00	0.0136	1.84	0.0800	3.57
Southern	10.54	0.0333	4.63	0.0909	6.74

The maximum velocity between the northern and southern channels is 6.74 ft/s. To protect against erosion, temporary erosion control matting able to withstand a maximum flow velocity of 6.74 ft/s is needed and must be placed along the entire length of the northern and southern conveyance channels, except for locations where riprap is to be placed.

CLIENT: IHDIV-NSWC			JOB NUMBER: 0525-1920
SUBJECT: SITE 12 CONVEYANCE CHANNEL DESIGN			
BASED ON:			DRAWING NUMBER:
BY: JLM Date: 9-27-01	CHECKED BY: TNH Date: 10/3/01		APPROVED BY: DATE:

7. Outlet Protection

The purpose of this portion of the calculation is to size riprap to be used as outlet protection for the 15-inch CMP pipe below Atkins Road to the East of the southern landfill area. The riprap size, and apron length and width will be determined using the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control (Reference 2), Section F18.0 "Rock Outlet Protection".

The outlet protection is designed using the following procedure:

1) Determine the maximum flow from the 15-inch CMP.
2) Determine the depth of flow in the down stream southern channel section.
3) Determine whether conditions represent minimum or maximum tailwater conditions.
4) Use the appropriate charts in section F18 of Reference 2.

Flow from 15-inch CMP:

As determined above in the 15-inch peak discharge portion of this calculation (Step 4), the flow from the 15-inch CMP equals 9.54 cfs.

Depth of Flow in Channel Section:

The channel section is V-shaped with a depth of 1.5 feet and sideslopes equal to 4H to 1V.

Conservatively, the depth of flow in the channel will be considered equal to the depth where the channel slope is at its minimum and carrying a flow that equals the flow from the 15-inch CMP and contributing watershed. That flow equals 10.54 cfs, and the associated depth equals 0.75 feet.

Tailwater Conditions:

The depth of flow represents minimum tailwater conditions when the flow depth in the channel is less than 0.5 time the diameter of the CMP. The flow represents maximum tailwater conditions when the flow depth in the channel is greater than or equal to 0.5 times the diameter of the CMP.

Flow Depth =	0.75 feet
0.5 times the CMP Diameter =	0.625 feet

Because the flow depth is greater than 0.5 time the CMP diameter, the flow depth represents maximum tailwater conditions.

Riprap Size and Apron Length:

Using Table 20 (Section F18.0 page F-18-7), determine the required riprap size and apron length. Table 20 is provided in this calculation on page 22 of 22.

CLIENT: IHDIV-NSWC			JOB NUMBER: 0525-1920	
SUBJECT: SITE 12 CONVEYANCE CHANNEL DESIGN				
BASED ON:			DRAWING NUMBER:	
BY: JLM Date: 9-27-01	CHECKED BY: TMA Date: 10/3/01		APPROVED BY:	DATE:

Required Riprap Size = d_{50} of 6-inches
Required Apron Length = 22 feet

Note: Because the riprap is being placed in a channel section, the apron will not be flared. Therefore, an apron width calculation is not required.

8. Flow Dispersion System

The purpose of this portion of the calculation is to determine the length and width required for the flow dispersion system. The flow dispersion system is to be constructed out of riprap and will disperse the channel flow to sheet flow as the channels discharge to the wetlands. The system will be designed using the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control (Reference 2), Section F18.0 "Rock Outlet Protection".

The riprap size is assumed to be equal to the size determined in the outlet protection portion of this calculation. The apron length and width will be based on the appropriate table representing minimum or maximum tailwater conditions.

The dispersion system is designed using the following steps.

1) Determine the maximum flow in the contributing channel.
2) Determine the depth of flow in the downstream of the discharge.
3) Determine whether conditions represent minimum or maximum tailwater conditions.
4) Use the appropriate charts in section F18 of Reference 2.

Flow from Channel:

As determined above in Step 5 of this calculation, the flow in the channel equals 10.54 cfs for the southern channel and 1.0 cfs for the northern channel.

Depth of Flow Downstream of Dispersion System:

The purpose of the dispersion system is to convert channel flow into sheet flow prior to entering the wetlands. Therefore, the flow depth downstream of the dispersion system is considered to be negligible.

Depth downstream of both dispersion systems = 0 feet

Tailwater Conditions:

The depth of flow represents minimum tailwater conditions when the flow depth downstream of the dispersion system is less than 0.5 time the depth of the contributing channel. The flow represents maximum tailwater conditions when the flow depth downstream of the dispersion system is greater than or equal to 0.5 times the depth of the channel.

Tail water conditions for each channel is minimum.

CLIENT: IHDIV-NSWC		JOB NUMBER: 0525-1920	
SUBJECT: SITE 12 CONVEYANCE CHANNEL DESIGN			
BASED ON:		DRAWING NUMBER:	
BY: JLM Date: 9-27-01	CHECKED BY: TWH Date: 10/3/01	APPROVED BY:	DATE:

Apron Length and Width:

Using Table 19 (Section F18.0 page F-18-6), determine the required riprap apron length. Table 19 is provide in this calculation on page 21 of 22.

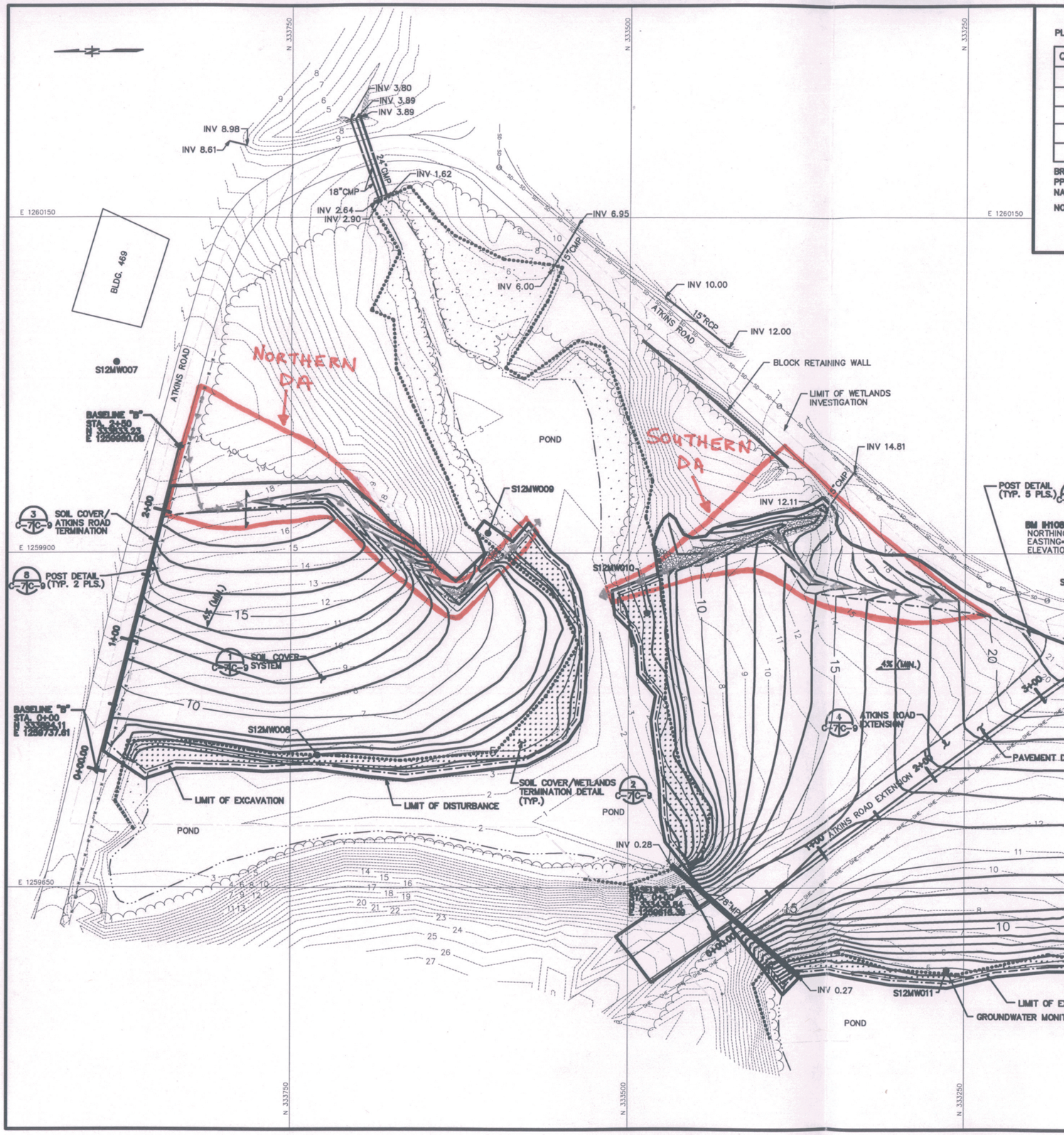
Required Riprap Apron Length for Southern Channel = 10 feet
Required Riprap Apron Length for Northern Channel = 5 feet *

* Length for flow not on charts; use 5 feet as a minimum length.

To determine apron width use the following equation:

Apron width = (Channel width) + (Apron length)

Apron width Southern Channel = 10 feet
Apron width Northern Channel = 5 feet



PLANT SCHEDULE

Smd 10/3/01 8/22

QUANTITY	BOTANICAL NAME	COMMON NAME	FORM	UNIT	SIZE	SPACING
935	PONTEDERIA CORDATA	PICKEREL WEED	HERB	BR OR PP	NA	SPACE HERBS 2 FEET ON CENTER. ALTERNATE SPECIES SO EACH REPRESENTS 20% OF THE TOTAL
935	POLYGANUM PENSYLVANICUM	PENNSYLVANIA SMARTWEED	HERB	BR OR PP	NA	
935	SCIRPUS PUNGENS	COMMON THREE-SQUARE	HERB	BR OR PP	NA	
935	SCIRPUS VALINUS	SOFT-STEM BULRUSH	HERB	BR OR PP	NA	
935	SAURURUS CERNUUS	LIZARDS TAIL	HERB	BR OR PP	NA	

BR: BARE ROOT
PP: PEAT POT
NA: NOT APPLICABLE

NOTE: ALL AREAS OUTSIDE THE WETLANDS RESTORATION AREA BUT WITHIN THE LIMITS OF DISTURBANCE WILL BE SEEDED WITH THE PERMANANT SEED MIX PROVIDED ON DRAWING C-4.

LEGEND:

REFER TO DRAWING T-2 FOR GENERAL LEGEND.

- S12MW012 — REPLACEMENT MONITORING WELL
- 5 — EXISTING ELEVATION CONTOUR
- 51 — FINAL ELEVATION CONTOUR
- LIMIT OF EXCAVATION
- WETLANDS RESTORATION (SEE PLANT SCHEDULE)
- LIMIT OF CONTRIBUTING WATERSHED
- FLOWPATH

NOTES:

1. REFER TO DRAWING T-2 FOR GENERAL NOTES.

0 40 80
SCALE IN FEET
CHECK GRAPHIC SCALE BEFORE USING

ACAD: 09220C02.dwg 10/02/01 HJP

SYMBOL	DESCRIPTION	DATE	APPROVED
	REVISIONS		

09A	403		
04	404		
E.I.C.	405		
401	408		
402	04B	DATE	RENUMBERED BY RODC2

Foster Wheeler Inc. FOSTER PLAZA VI 661 ANDERSON DR., PITTSBURGH, PA 15220

DES.	TMS	DR.	DLT
SUBMITTED BY:		TITLE	
PROGRAM MANAGER		DATE	
APPROVED		DATE	

STD. FOR COMMANDER NAVFAC

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C.
NAVAL STATION ANNAPOLIS, NAVAL SUBMARINE BASE ANNAPOLIS, NAVAL SHIPYARD ANNAPOLIS
WASHINGTON NAVAL TRAINING CENTER ANNAPOLIS
WASHINGTON NAVAL SURFACE WARFARE CENTER ANNAPOLIS
WASHINGTON NAVAL ORDNANCE STATION ANNAPOLIS
WASHINGTON NAVAL RESEARCH LABORATORY ANNAPOLIS
WASHINGTON NAVAL SECURITY GROUP ANNAPOLIS
WASHINGTON NAVAL SHIPYARD ANNAPOLIS

CONTRACT DOCUMENTS (100%) SUBMISSION
SITE 12 - TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
FINAL GRADING PLAN

SEAL AREA

CODE I.D. NO.	80091
DRAWING SIZE:	D
CONST. CONT. NO.	N62470-97-D-5000
SPEC	C21-97-5000-062-01
NAVFAC DRAWING NO.	3458636
SHEET 9 OF 11	
	C-7

9/22

Table 2.2 Rainfall Depths Associated with the 1,2,10 and 100-year, 24-hour Storm Events

County	Rainfall Depth				
	1 yr - 24 hr	2 yr-24 hr	10 yr-24 hr	100 yr-24 hr	25 yr-24h
Allegany	2.4 inches	2.9 inches	4.5 inches	6.2 inches	
Anne Arundel	2.7	3.3	5.2	7.4	
Baltimore	2.6	3.2	5.1	7.1	
Calvert	2.8	3.4	5.3	7.6	
Caroline	2.8	3.4	5.3	7.6	
Carroll	2.5	3.1	5.0	7.1	
Cecil	2.7	3.3	5.1	7.3	
Charles	2.7	3.3	5.3	7.5	5.7
Dorchester	2.8	3.4	5.4	7.8	
Frederick	2.5	3.1	5.0	7.0	
Garrett	2.4	2.8	4.3	5.9	
Harford	2.6	3.2	5.1	7.2	
Howard	2.6	3.2	5.1	7.2	
Kent	2.7	3.3	5.2	7.4	
Montgomery	2.6	3.2	5.1	7.2	
Prince George's	2.7	3.3	5.3	7.4	
Queen Anne's	2.7	3.3	5.3	7.5	
St. Mary's	2.8	3.4	5.4	7.7	
Somerset	2.9	3.5	5.6	8.1	
Talbot	2.8	3.4	5.3	7.6	
Washington	2.5	3.0	4.8	6.7	
Wicomico	2.9	3.5	5.6	7.9	
Worcester	3.0	3.6	5.6	8.1	

REFERENCE 1

10/22

Quick TR-55 Ver.5.47 S/N:
Executed: 14:09:21 10-01-2001

10/3/01

INDIAN HEAD DIVISION NSWC
SITE 12 TOWN GUT LANDFILL
CHANNEL DESIGN
NORTHERN CHANNEL

RUNOFF CURVE NUMBER DATA

::

Composite Area: NORTHERN DA

SURFACE DESCRIPTION	AREA (acres)	CN	
MEADOW (HSG=A)	0.23	30	
WOODS (HSG=A)	0.07	36	
COMPOSITE AREA --->	0.30	31.4	(31)

::

11/2a

FMS
10/3/01

Quick TR-55 Ver.5.47 S/N:
Executed: 14:09:32 10-01-2001

INDIAN HEAD DIVISION NSWC
SITE 12 TOWN GUT LANDFILL
CHANNEL DESIGN
SOUTHERN CHANNEL

RUNOFF CURVE NUMBER DATA

::

Composite Area: SOUTHERN DA

SURFACE DESCRIPTION	AREA (acres)	CN	
MEADOW (HSG=A)	0.15	30	
WOODS (HSG=A)	0.17	36	
COMPOSITE AREA --->	0.32	33.1	(33)

::

Quick TR-55 Ver.5.47 S/N: 12/22
Executed: 15:03:30 10-01-2001 IH-CH-N.TCT

[initials] 10/3/01

INDIAN HEAD DIVISION NSWC
SITE 12 TOWN GUT LANDFILL
CHANNEL DESIGN
NORTHERN CHANNEL

Tc COMPUTATIONS FOR: NORTHERN DA

SHEET FLOW (Applicable to Tc only)

Segment ID		REACH 1	
Surface description		MEADOW	
Manning's roughness coeff., n		0.2400	
Flow length, L (total < or = 300)	ft	95.0	
Two-yr 24-hr rainfall, P2	in	3.300	
Land slope, s	ft/ft	0.0421	
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.17	= 0.17

SHALLOW CONCENTRATED FLOW

Segment ID			
Surface (paved or unpaved)?			
Flow length, L	ft	0.0	
Watercourse slope, s	ft/ft	0.0000	
$Avg.V = Csf * (s)^{0.5}$	ft/s	0.0000	
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.00	= 0.00

CHANNEL FLOW

Segment ID		REACH 2	
Cross Sectional Flow Area, a	sq.ft	4.00	
Wetted perimeter, Pw	ft	8.25	
Hydraulic radius, r = a/Pw	ft	0.485	
Channel slope, s	ft/ft	0.0483	
Manning's roughness coeff., n		0.3000	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	0.6739	
Flow length, L	ft	300	
T = L / (3600*V)	hrs	0.12	= 0.12

::

TOTAL TIME (hrs) 0.29

13/22

TWA 10/3/01

Quick TR-55 Ver.5.47 S/N:
Executed: 14:10:10 10-01-2001

INDIAN HEAD DIVISION NSWC
SITE 12 TOWN GUT LANDFILL
CHANNEL DESIGN
SOUTHERN CHANNEL

Tc or Tt DATA
::

Subarea: SOUTHERN DA DESCRIPTION	LENGTH (feet)	VELOCITY (ft/sec)	TIME minutes		hours
CHANNEL (ECM LINED)	290	0.80	6.0	=	0.10
		TOTAL Tc --->	minutes 6.0	=	hours 0.10

::

Return Frequency: 25 years

14/22
10/3/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:10:27
Watershed file: --> IH-CH-N .MOP
Hydrograph file: --> IH-CH-NA.HYD

INDIAN HEAD DIVISION NSWC
SITE 12 TOWN GUT LANDFILL
CHANNEL DESIGN
NORTHERN CHANNEL

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
NORTHERN DA	0.30	31.0	0.30	0.00	5.70	0.07	.78	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 0.30 acres or 0.00047 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
NORTHERN DA	0.29	0.00	0.30	0.00	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 25 years

15/22

Final

10/3/01

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 10-01-2001 14:10:44
Watershed file: --> IH-CH-S .MOP
Hydrograph file: --> IH-CH-SA.HYD

INDIAN HEAD DIVISION NSWC
SITE 12 TOWN GUT LANDFILL
CHANNEL DESIGN
SOUTHERN CHANNEL

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
SOUTHERN DA	0.32	33.0	0.10	0.00	5.70	0.12	.71	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 0.32 acres or 0.00050 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
SOUTHERN DA	0.10	0.00	**	**	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

IHDIV NSWC - 15" CMP PEAK DISCHARGE
Worksheet for Circular Channel

16|22
FMN
10/3/01

Project Description	
Project File	c:\fmw\ihcmpdis.fm2
Worksheet	IHDIV NSWC - 15" CMP PEAK DISCHARGE
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.024	
Channel Slope	0.064286	ft/ft
Depth	1.17	ft
Diameter	1.25	ft

Results		
Discharge	9.54	ft^3/s
Flow Area	1.19	ft^2
Wetted Perimeter	3.29	ft
Top Width	0.61	ft
Critical Depth	1.17	ft
Percent Full	93.60	%
Critical Slope	0.064281	ft/ft
Velocity	7.99	ft/s
Velocity Head	0.99	ft
Specific Energy	2.16	ft
Froude Number	1.01	
Maximum Discharge	9.54	ft^3/s
Full Flow Capacity	8.87	ft^3/s
Full Flow Slope	0.074383	ft/ft
Flow is supercritical.		

IHDIV NSWC - Northern Channel Depth
Worksheet for Triangular Channel

17/22

TMM
10/3/01

Project Description	
Project File	c:\fmw\ihcmpdis.fm2
Worksheet	IHDIV NSWC - Northern Channel
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.013636	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Discharge	1.00	ft^3/s

Results		
Depth	0.37	ft
Flow Area	0.54	ft^2
Wetted Perimeter	3.04	ft
Top Width	2.95	ft
Critical Depth	0.33	ft
Critical Slope	0.024908	ft/ft
Velocity	1.84	ft/s
Velocity Head	0.05	ft
Specific Energy	0.42	ft
Froude Number	0.75	
Flow is subcritical.		

IHDIV NSWC - Southern Channel Depth
Worksheet for Triangular Channel

18/22

SMA
10/3/01

Project Description	
Project File	c:\fmw\ihcmpdis.fm2
Worksheet	IHDIV NSWC - Southern Channel
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.033333	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Discharge	10.54	ft^3/s

Results		
Depth	0.75	ft
Flow Area	2.28	ft^2
Wetted Perimeter	6.22	ft
Top Width	6.04	ft
Critical Depth	0.85	ft
Critical Slope	0.018196	ft/ft
Velocity	4.63	ft/s
Velocity Head	0.33	ft
Specific Energy	1.09	ft
Froude Number	1.33	
Flow is supercritical.		

IHDIV NSWC - Northern Channel Max Slope
Worksheet for Triangular Channel

19/22

TNB
10/3/01

Project Description	
Project File	c:\fmw\ihcmpdis.fm2
Worksheet	IHDIV NSWC - MIN/MAX SLOPE vs. VELOCITY
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.080000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Discharge	1.00	ft^3/s

Results		
Depth	0.26	ft
Flow Area	0.28	ft^2
Wetted Perimeter	2.18	ft
Top Width	2.12	ft
Critical Depth	0.33	ft
Critical Slope	0.024911	ft/ft
Velocity	3.57	ft/s
Velocity Head	0.20	ft
Specific Energy	0.46	ft
Froude Number	1.73	
Flow is supercritical.		

IHDIV NSWC - Southern Channel Max Slope
Worksheet for Triangular Channel

20/22

FMD
10/3/01

Project Description	
Project File	c:\fmw\ihcmpdis.fm2
Worksheet	IHDIV NSWC - MIN/MAX SLOPE vs. VELOCITY
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

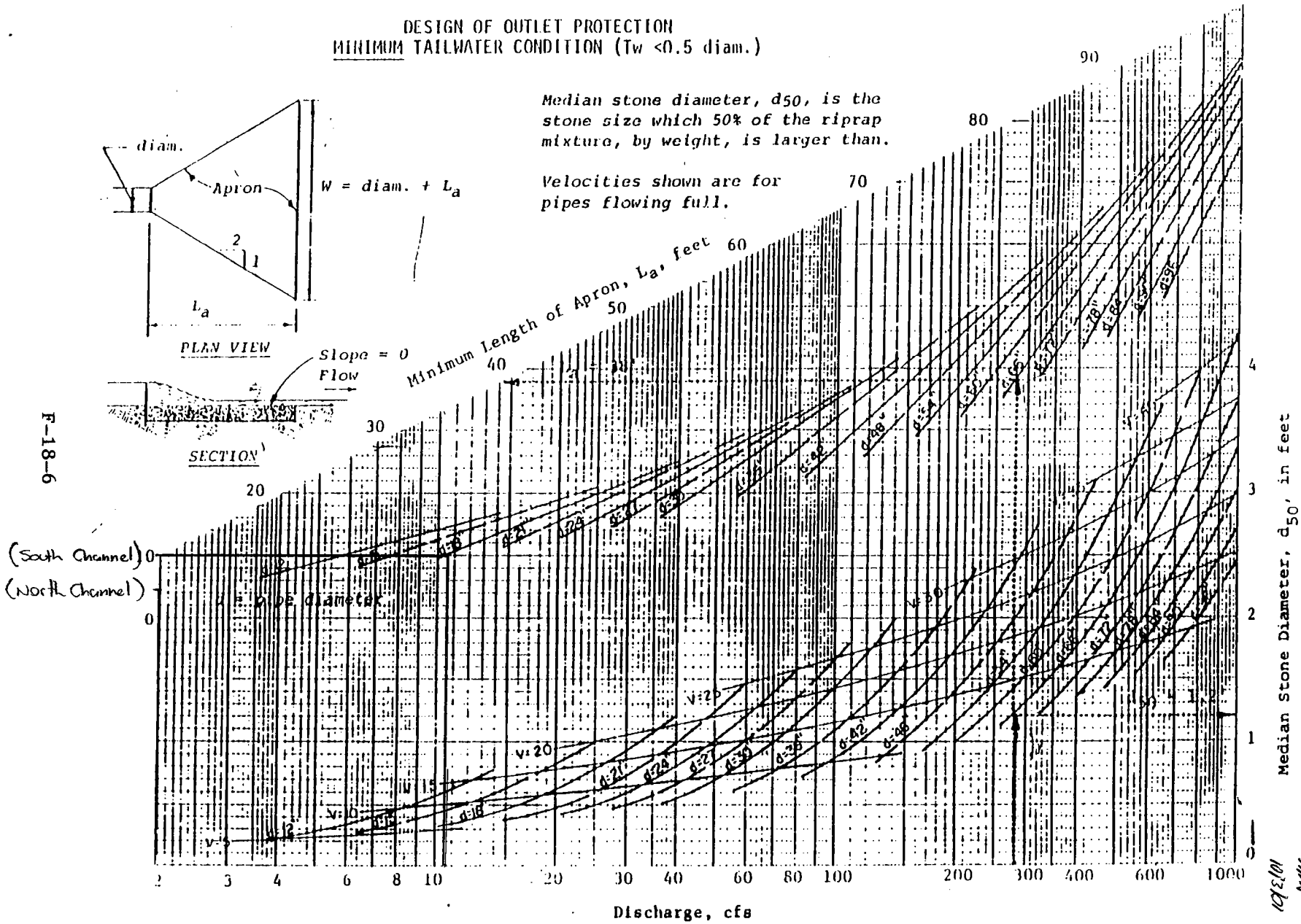
Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.090909	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Discharge	10.54	ft^3/s

Results		
Depth	0.63	ft
Flow Area	1.56	ft^2
Wetted Perimeter	5.16	ft
Top Width	5.00	ft
Critical Depth	0.85	ft
Critical Slope	0.018196	ft/ft
Velocity	6.74	ft/s
Velocity Head	0.71	ft
Specific Energy	1.33	ft
Froude Number	2.13	
Flow is supercritical.		

Channel Dispersion Systems

Table 19

DESIGN OF OUTLET PROTECTION
MINIMUM TAILWATER CONDITION (Tw <0.5 diam.)

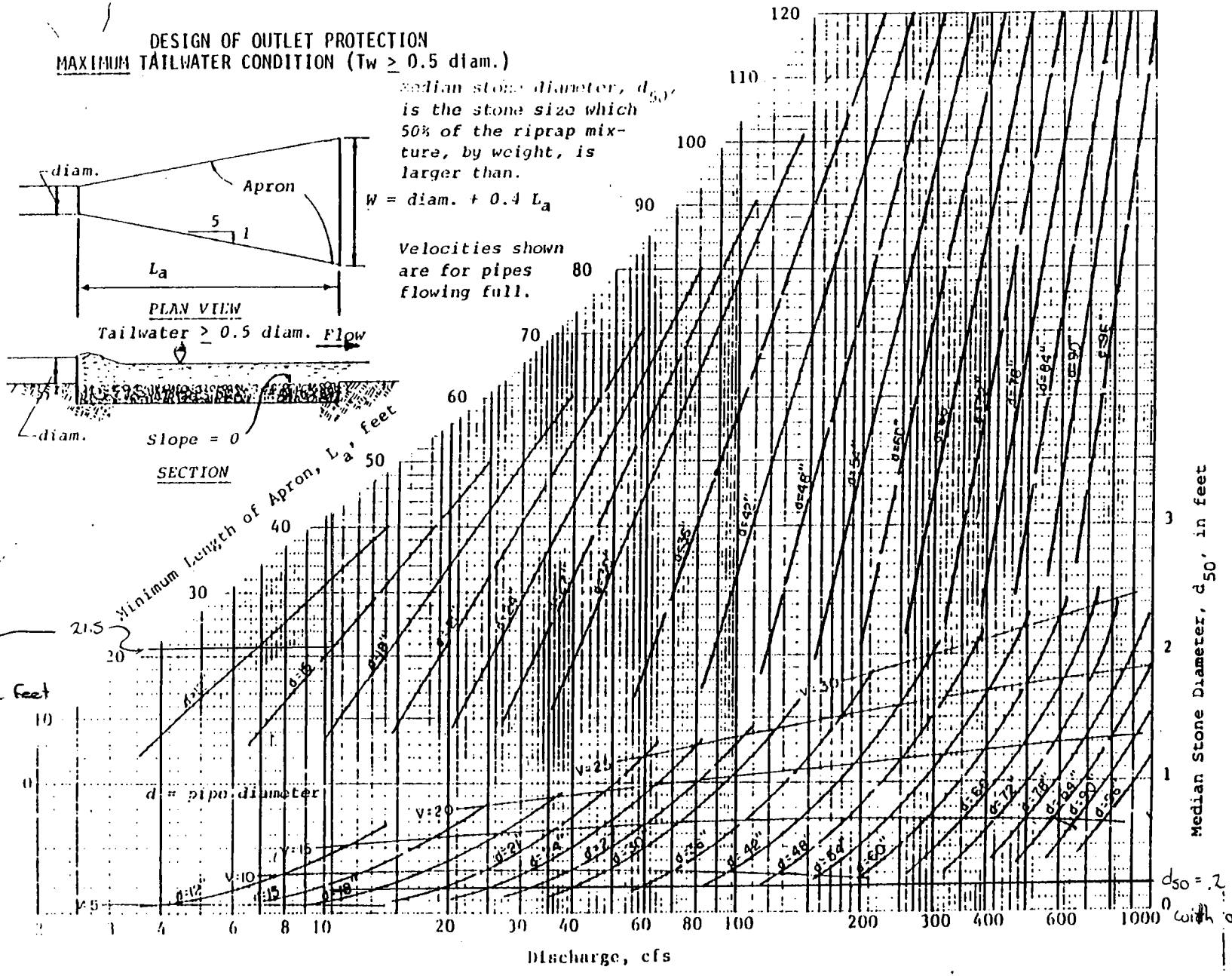


Q= 10.54 Southern Channel & 1 in Northern channel

a1/aa

15-INCH CMP OUTLET PROTECTION

Table 20



Q = 10.54 cfs V = 7.99 (SEE PAGE _ of _)

22/22

Stormwater Pollution Prevention Plan
for
Site 12 - Town Gut Landfill

Indian Head Division
Naval Surface Warfare Center
Indian Head, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298
Contract Task Order 0325

February 2002

REVISION 0
FEBRUARY 2002

STORMWATER POLLUTION PREVENTION PLAN
FOR
SITE 12 - TOWN GUT LANDFILL

INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity Chesapeake
1314 Harwood Street, SE
Washington Navy Yard, D.C. 20374-5018

Submitted by:
Tetra Tech NUS, Inc.
600 Clark Avenue, Suite 3
King of Prussia, Pennsylvania 19406-1433

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0325

FEBRUARY 2002

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APPENDIX

A USEPA CONSTRUCTION GENERAL PERMIT REQUIREMENTS, PRECONSTRUCTION CHECKLIST, USEPA CONSTRUCTION GENERAL PERMIT CHECKLIST

FIGURES

NUMBER **PAGE NO.**

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ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
COMAR	Code of Maryland Regulations
CTO	Contract Task Order
cy	cubic yards
ECM	erosion control matting
IAS	initial assessment study
IHDIV-NSWC	Indian Head Division, Naval Surface Warfare Center
IR	Installation Restoration
MDE	Maryland Department of the Environment
NEESA	Naval Energy and Environmental Support Activity
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
RAC	remedial action contractor
ROICC	Resident Officer in Charge of Construction
SCS	Soil Conservation Service
Site 12	Town Gut Landfill
TBC	to be considered
TtNUS	Tetra Tech NUS, Inc.
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance

1.0 INTRODUCTION

This Stormwater Pollution Prevention Plan was prepared under Contract Task Order (CTO) No. 0325 under Comprehensive Long-term Environmental Action Navy (CLEAN) Contract Number N62472-90-D-1298. Under this CTO, Tetra Tech NUS, Inc. (TtNUS) is performing engineering, design, and post construction award services for the remedial action design at the Town Gut Landfill (Site 12), at the Indian Head Division, Naval Surface Warfare Center (IHDIV-NSWC), in Indian Head, Maryland. This plan was prepared in accordance with the United States Environmental Protection Agency (USEPA) Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practice, Summary Guidance, October 1992 (USEPA, 1992a).

The IHDIV-NSWC is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC, as shown on Figure 1-1. The IHDIV-NSWC is a military facility consisting of the main area on the Cornwallis Neck Peninsula and the Annex on Stump Neck. The main area is bounded by the Potomac River to the northwest, west, and south, Mattawoman Creek to the south and east, and the town of Indian Head to the northeast (Figure 1-2). Stump Neck Annex is located across Mattawoman Creek. The Stump Neck Annex is not contiguous with the main area and is operated by a tenant. The primary mission of IHDIV-NSWC is to provide services in energetics, ordnance devices and components, and other related ordnance engineering standards, including chemicals, propellants and their propulsion systems, explosives, pyrotechnics, warheads, and simulators. IHDIV-NSWC was added to the National Priorities List (NPL) by the USEPA in September 1995, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. Site 12 is one of the 48 sites at the main facility currently included in the IHDIV-NSWC Installation Restoration (IR) Program. This remedial action design is limited to Site 12, located in the main area of IHDIV-NSWC.

1.1 SITE HISTORY

Between 1968 and June 1980, Site 12 was used by the IHDIV-NSWC to dispose landscaping waste, fill material, and rubble. Reportedly, material from outside the IHDIV-NSWC was also deposited at the site until 1972. Based on visual observations and examination of historical maps and aerial photographs, the landfill material appears to have been dumped first on the eastern side of the site in a topographically low area. Dumping then continued in a westward direction. It is estimated that the top of the waste material is currently located 10 to 15 feet above the original ground surface (B&R Environmental, 1997). The total fill area of Site 12 occupies approximately 4 acres.

Past reports estimate that Site 12 contains 70,000 cubic yards (cy) of mixed solid waste materials, primarily landscaping wastes, tree stumps, and demolition debris (Hart, 1983). Interviews conducted

during the initial site assessment (IAS) indicated that unauthorized dumping of trash may have occurred, although quantity estimates for this unauthorized dumping of trash were not available. Some of the unauthorized items reportedly dumped at Site 12 include paints, varnishes, and other chemical wastes.

1.2 PROJECT DESCRIPTION

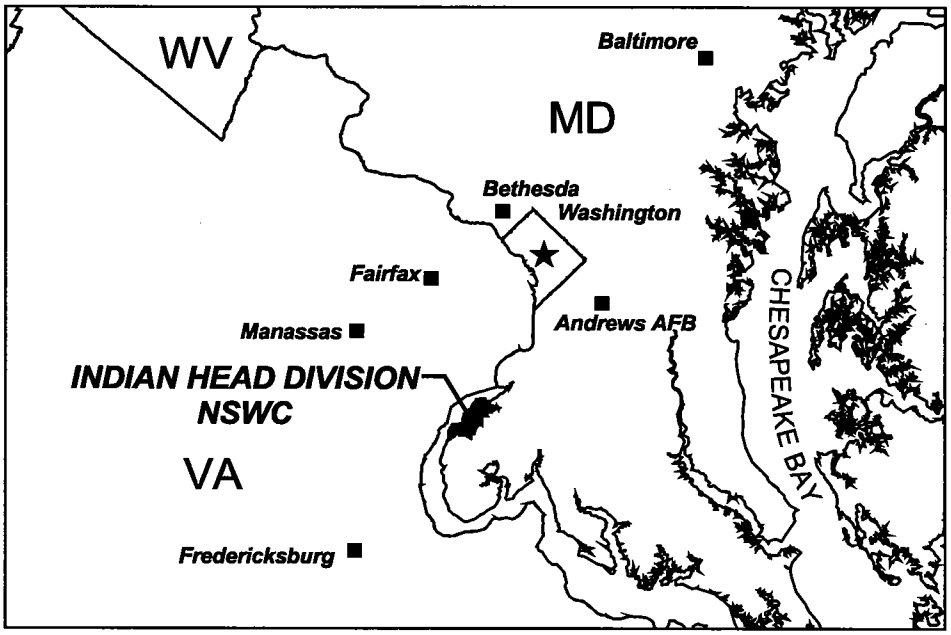
The selected remedy is to place a 2-feet thick soil cover (18-inches of select fill and 6-inches of topsoil) over the landfill to reduce risks to human health and environment associated with exposure to buried wastes and contaminated soil and shallow groundwater. The remedial action will include the disturbance of approximately 4.28 acres, the excavation and placement of approximately 1,350 cy of waste beneath the soil cover and regrading approximately 3,900 cy of soil materials to establish required interim grades (Design Drawing C-6). Additional activities include increasing vertical alignment of Atkins Road Extension, site restoration, and wetlands restoration.

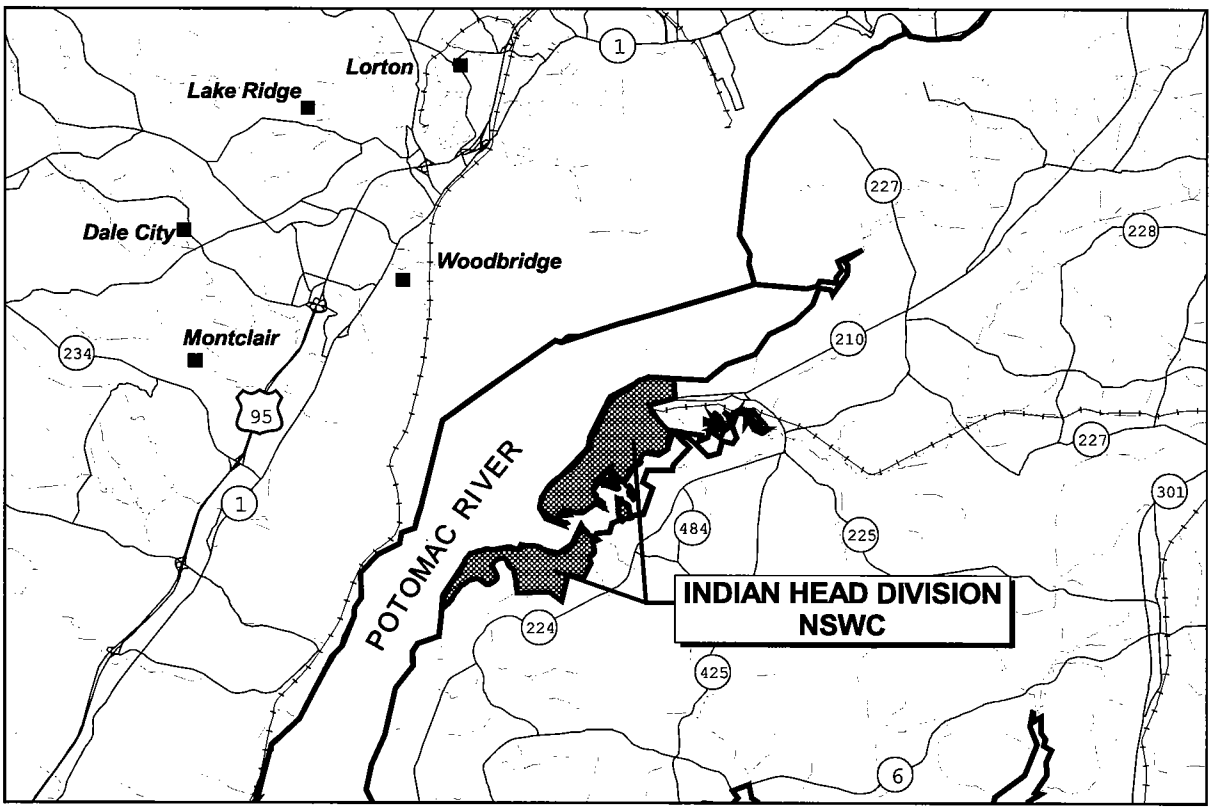
The Navy's goal is to begin remedial actions at IHDIV-NSWC as quickly as possible to protect human health and the environment and to comply with Applicable or Relevant and Appropriate Requirements (ARARs) and to be considered (TBC) criteria.

1.3 REPORT OBJECTIVE AND CONTENT

The objective of this report is to describe the project and present the stormwater pollution prevention measures that will be utilized during implementation of the remedial action at Site 12.

Section 2.0 presents a description of control measures to be implemented during the remedial action and the sequence of proposed construction activities. Section 3.0 presents a generalized summary of state and local requirements for stormwater management. Section 4.0 presents the inspection and maintenance program proposed for the remedial action. Section 5.0 presents a summary of non-stormwater discharges and pollution prevention measures to be employed during the remedial action. Sections 6.0 and 7.0 present the required plan certifications. Copies of the USEPA checklists for Stormwater Pollution Prevention Plans are presented in Appendix A. Design drawings and technical specifications are provided under separate cover.





DRAWN BY J. LAMEY DATE 8/2/01	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0525	OWNER NO. 0325
CHECKED BY GJL DATE 8/3/01	FACILITY LOCATION MAP SITE 12 - TOWN GUT LANDFILL INDIV - NSWC, INDIAN HEAD, MARYLAND	APPROVED BY GJL DATE 8/3/01	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 1-1	REV 0

P:\GIS\NSWC_INDIAN_HEAD\SITE_LOCATION.APR FACILITY LOCATION MAP 2/13/02 KMP

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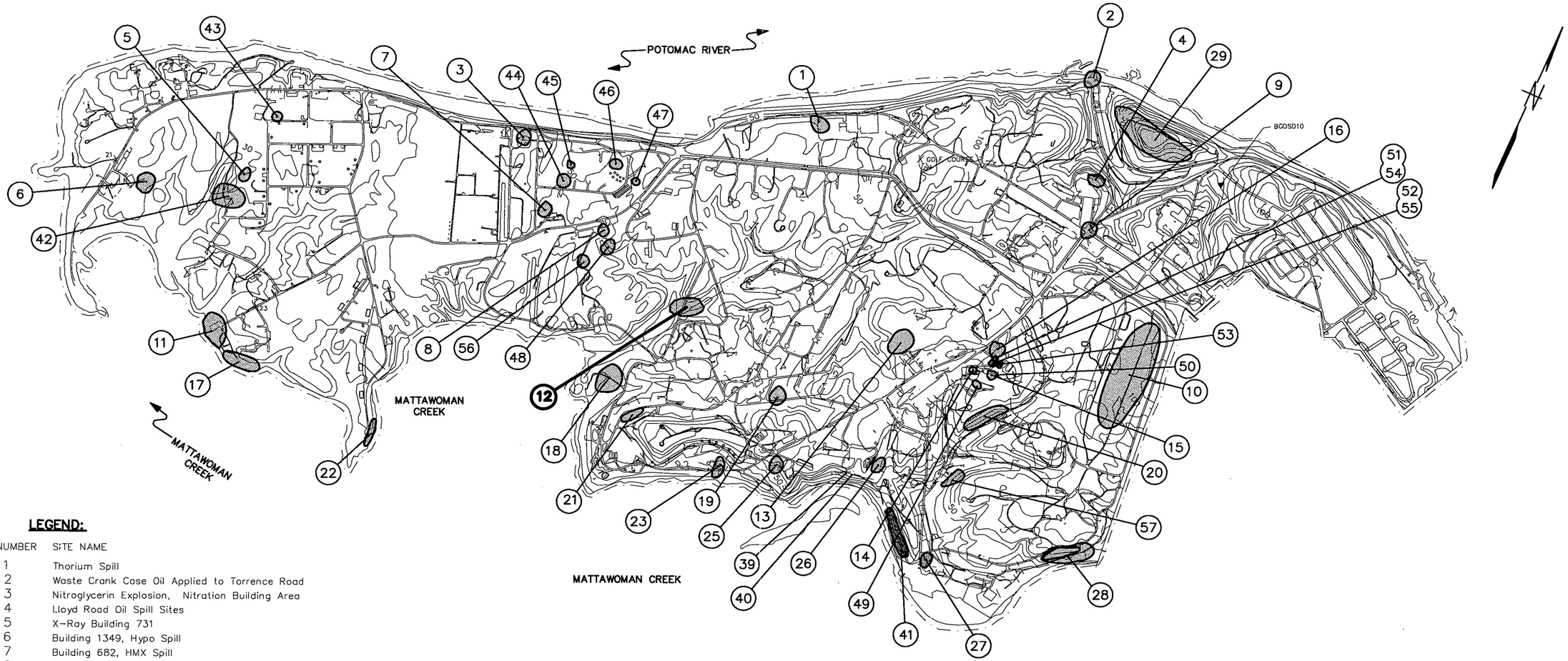

LEGEND:

SITE NUMBER	SITE NAME
1	Thorium Spill
2	Waste Crank Case Oil Applied to Torrence Road
3	Nitroglycerin Explosion, Nitration Building Area
4	Lloyd Road Oil Spill Sites
5	X-Ray Building 731
6	Building 1349, Hypo Spill
7	Building 682, HMX Spill
8	Building 766, Mercury Deposits
9	Patterson Avenue, Oil Spill
10	Single-base Propellant Grains Spill
11	Caffee Road Landfill
12	**Town Gut Landfill**
13	Paint Solvents Disposal Ground
14	Waste Acid Disposal Pit
15	Mercury Deposits in Manhole, Flourine Lab
16	Laboratory Chemical Disposal
17	Disposal Metal Parts Along Shoreline
18	Hog Island
19	Catch Basins at Chip Collection Houses
20	Single-base Powder Facilities
21	Bronson Road Landfill
22	NG Slums Burning Site
23	Hydraulic Oil Spill Discharges From Extrusion Plant
24	Abandoned Drain Lines (Not Shown)
25	Hypo Discharge X-Ray Building No. 2
26	Thermal Destructor 2
27	Thermal Destructor 1
28	Original Burning Ground
29	The Valley
30-38	Stump Neck Annex (Not Shown)
39	Organic Plant Outfall
40	Palladium Catalyst in Sediments
41	Scrap Yard
42	Olsen Road Landfill
43	Toluene Disposal Site
44	Soak Out Area
45	Abandoned Drums
46	Cadmium Sandblast Grit
47	Mercuric Nitrate Disposal Area
48	Nitroglycerine Plant Disposal Area
49	Chemical Disposal Area
50	Building 103, Crawl Space
51	Building 101, Dry Wall
52	Building 102, Dry Wall
53	Mercury Contamination of the Sewage System
54	Building 101
55	Building 102
56	IW87 - Lead Contamination
57	TCE Building 292 Area

APPROXIMATE SITE LOCATION
INTERMITTENT STREAM
NAVAL RESERVE BOUNDARY
100 CONTOUR INTERVAL 10 FEET
FLOW DIRECTION

0 1600 3200
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/12/01
CHECKED BY DATE 10/4/01
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SITE LOCATION MAP
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CONTRACT NO. 0525
OWNER NO. 0325
APPROVED BY
DATE 10/4/01
APPROVED BY
DATE
DRAWING NO. FIGURE 1-2
REV. 0

FORM CADD NO. SOUTH_BH.DGN - REV 0 - 02/11/97

2.0 DESCRIPTION OF CONTROLS

This section presents a description of stormwater controls, including erosion and sedimentation controls proposed for the remedial action. A copy of the complete USEPA pre-construction checklist is provided in Appendix A. The Construction/Implementation and Final Stabilization/Termination Checklists are also provided in Appendix A. These checklists were obtained from the USEPA Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practice, Summary Guidance (USEPA 1992b). Requirements specified in these checklists and documents are incorporated into this Stormwater Pollution Prevention Plan.

2.1 EXISTING SITE CONDITIONS

Site 12 comprises approximately 4 acres of undeveloped land located on the southwestern side of the IHDIV-NSWC. The western and northern edges of Site 12 are bounded by ponds that are connected via a 78-inch diameter metal pipe located under Atkins Road Extension. The site is bisected by an arm of the northeastern pond and traversed by Atkins Road Extension, which is oriented in a northwest-southeast direction (Figure 2-1). Runoff from the site flows into these two ponds. The flow of water at the discharge (southern) end of the southern pond is governed by a weir that also inhibits influences on the ponds by tidal changes in Mattawoman Creek located south of the southern pond. Site 12 contains narrow bands of wetlands along the perimeters of both ponds. The wetlands west of Atkins Road Extension are generally between 5 and 15 feet wide and the wetlands east of Atkins Road Extension are generally between 10 and 50 feet wide. These wetlands are classified as Palustrine Emergent and Palustrine Forested wetlands. The waste located within the existing limits of waste at Site 12 has been estimated in past reports to be 70,000 cy, consisting of mostly mixed solid waste materials, primarily landscaping wastes and demolition debris (Hart, 1983). Currently, the landfill has a soil cover generally ranging in thickness from 1 to 2 feet. However, in some places, waste can be found just below ground surface and in others at depths of 8-feet below ground surface. The existing soil cover consists mostly of brown silt and sand and topsoil with plant roots.

2.2 EROSION AND SEDIMENT CONTROL MEASURES

Erosion and sediment control measures will be implemented, installed, and maintained according to the standards and specifications of the Maryland Erosion and Sediment Control Handbook unless otherwise noted in this plan and the construction documents. Design specifications for erosion and sediment control structures have been obtained from the Maryland Standards and Specifications for Soil Erosion and Sediment Control.

The required erosion and sediment control measures are shown on and Design Drawing C-2 and are as follows.

- Stabilized stone construction entrances will be provided off of Atkins Road Extension (southern landfill area) and Atkins Road (northern landfill area). Construction vehicles will be cleaned at either location before exiting the site.

- Super silt fence will be placed along the shoreline of both ponds to protect the ponds during construction. It is assumed that the water levels in the ponds can be lowered to allow placement of the super silt fence outside the limit of waste.

- Silt fence will be placed along the slopes of the Site 12 landfill as illustrated in Design Drawing C-2, and will be placed to protect the construction entrance structures, materials laydown areas, decontamination pads and materials handling pad/stockpile areas.

- Permanent and temporary seeding will be used throughout the construction process to stabilize disturbed areas upon achieving final grade.

- Portable sediment tanks will be used to remove the sediment from decontamination water and water generated during excavation dewatering activities.

- Permanent channels will be installed along the eastern sides of both the northern and southern landfill areas. The channels are intended to divert offsite runoff away from the soil cover edge and to collect runoff from the soil cover in order to reduce erosion. The channels will be lined with erosion control matting (ECM), riprap will be placed at critical locations along the channels, and rock check dams will be placed within the channels to collect sediment in the runoff. The rock check dams are considered temporary erosion and sediment control devices and will be removed upon completion of the project.

2.2.1 Structural Practices

The following structural practices will be used during and/or following construction activities at Site 12 to control erosion and sedimentation. The number listed, if any, references the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control, [Maryland Department of the Environment (MDE), 1994].

Stone Construction Entrance - F17.0. Temporary stabilization stone construction entrances will be installed to provide access to Site 12 via Atkins Road Extension (southern landfill area) and Atkins Road (northern landfill area). Construction vehicles will be cleaned at either location before exiting the site.

Stormwater Conveyance Channel - H28.0. Permanent channels will be installed along the eastern sides of both the northern and southern landfill areas. The capacity requirements of the conveyance channels are based on Section H28.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. The channels are intended to divert offsite runoff away from the soil cover edge and to collect runoff from the soil cover in order to reduce erosion.

Super Silt Fence - H26.0. Super silt fence will be installed along the shorelines of both ponds. It is assumed that the water levels in the ponds can be lowered to allow placement of the super silt fence outside the landfill limits.

Silt Fence – E15.0. Silt fence will be installed along the side slopes of the landfill limits and along the downslope sides of the stabilized stone construction entrances, material laydown pads, decontamination pads, and materials handling pads/stockpiles.

Surface Roughening - NA. The surface of regraded areas will be roughened to reduce run-off velocity and to aid in the establishment of vegetative cover.

Temporary Seeding - G20.0. All regraded areas that will be left dormant for extended periods of time will be seeded with fast germinating temporary vegetation immediately following grading. Seeding will be performed with a 50/50 mixture of annual rye grass and cereal (winter) rye.

Permanent Seeding - G20.0. All regraded areas will be permanently seeded with a seed mixture that will minimize erosion and provide suitable cover for wildlife.

Mulching - G20.0. All areas receiving permanent seeding will be mulched with an organic material to prevent erosion by protecting the soil surface from raindrop impact and reduce the velocity of overland flow.

Sediment Tank – D14.0. Portable sediment tanks will be used to remove sediment from the decontamination water and water generated during de-watering activities. The sediment collected in the sediment tanks will be stockpiled with the large items of waste and debris to be disposed off-site. Water from the decontamination pads and excavations will be stored in temporary holding tanks for characterization and proper disposal at an approved off-site facility. In the event that a determination is

made that water collected from dewatering activities can be discharged to the ground surface on-site, the water will be cleaned of sediment and broadcast over an approved vegetated area.

Rock Check Dams - B8.0. Rock check dams will be temporary control devices constructed in the permanent channels to trap sediment and reduce flow rates in the channels. Rock check dams will be removed following final stabilization (establishment of permanent vegetation) of all disturbed areas.

Erosion Control Matting - G22.0. Erosion control matting will be sued to temporarily stabilize the channels until vegetation is established. The erosion control matting will be rated to withstand flow rates of 6 feet per second.

2.2.2 Management Strategies

- Unstabilized, disturbed areas will be minimized and construction activities will be staged.
- Seeding or other stabilization measures will follow immediately after grading.
- Areas that are not to be disturbed will be clearly marked by flags, signs, etc.
- The construction superintendent will be responsible for ensuring the correct installation and maintenance of all erosion and sediment control practices.
- Erosion and sediment control structures will be installed and/or constructed before the start of any earth disturbance activities.
- Erosion and sediment control structures will remain in place until permanent vegetation is established over disturbed surfaces, as described in the revegetation notes on Design Drawing C-4.

2.3 SEQUENCE OF CONSTRUCTION

The time to perform the required construction activities is estimated to be approximately 90 days. The generalized sequence of construction activities is as follows:

1. Hold pre-construction meeting with the Contracting Officer and MDE.
2. Inspect site prior to construction to verify existing site conditions and underground utility locations.

3. Establish horizontal and vertical control for construction. Stake the locations of all areas to be excavated or disturbed prior to actual work.

4. Lower the pool elevation of the ponds to expose existing limits of waste.

5. Install all perimeter controls for stabilized stone construction entrances. Install the stabilized stone construction entrances. Install all remaining perimeter controls, including those required for decontamination pads, and materials handling pads and excavation areas as indicated on Design Drawing C-2. Actual locations will be determined by the remedial action contractor (RAC) and approved by the Resident Officer in Charge of Construction (ROICC) and MDE prior to any earth disturbance activities. All perimeter controls will conform to Standards and Specifications identified in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control Manual unless otherwise specified. The perimeter controls to be installed include, but are not limited to, the following:

   - Silt fence along the toe of slopes of Site 12 as indicated and on the downslope sides of all materials handling pad locations, decontamination pads, and stabilized stone construction entrances.

   - Super silt fence along the shoreline of both ponds as indicated.

   - Additional controls as may be required by the Contracting Officer and/or warranted by site conditions and best construction practices.

6. Clear and grub construction laydown areas, and areas for materials storage and staging areas, materials handling pads, and decontamination pads.

7. Construct decontamination pads, materials handling pads, construction laydown areas, and storage and staging areas.

8. Clear and grub within the remainder of the limits of disturbance.

9. Construct conveyance channels and install ECM, seed channels, and install rock check dams.

10. Abandon existing groundwater monitoring wells.

11. Excavate soils, sediments and landfill material along the shoreline of both ponds as indicated. In the event that the pool elevation cannot be lowered to expose the indicated waste limits, excavate to the edge of water removing large items of exposed waste and debris along the edges of the pond. During excavation, the areas will be screened for unexploded ordnance (UXO) by UXO oversight personnel. Excavated materials will be placed on the materials handling pad for dewatering, if required, prior to placement beneath the soil cover. Large items of waste and debris will be removed and disposed off-site.

12. Commence construction of the Atkins Road Extension.

13. Regrade the remainder of the landfill area (cover soil and waste) to establish the interim grades indicated on Design Drawing C-6. During regrading and prior to placement of the first lift of select fill, any sediment removed from the erosion and sediment control devices will be placed beneath the soil cover.

14. Inspect erosion control devices and replace as necessary.

15. Install select fill and topsoil and complete construction of Atkins Road Extension. Vegetate immediately after topsoil is placed.

16. Plant permanent vegetation including wetland plants on all disturbed areas and allow the pool elevation of the ponds reestablish to pre-construction pool elevations for wetlands survival.

17. Install new groundwater monitoring wells.

18. Install signs along the site perimeter.

19. With the approval of the MDE inspector, remove all temporary facilities (i.e., stabilized stone construction entrances, decontamination pad, materials handling pads, etc.). Restore and revegetate as needed. When all upstream areas have been stabilized and have been accepted by the ROICC, and with the approval of the MDE inspector, remove all remaining perimeter controls and rock check dams and immediately stabilize all areas disturbed by the remedial action.

2.4 PERMANENT STABILIZATION

All areas disturbed by remedial action activities, with the exception of the areas designated for wetland restoration and areas where riprap is placed, will be stabilized with the permanent seed mixture as soon

as possible following final grading, but no later than 7 to 14 days (as noted on the Design Drawings). Permanent seeding mixture will consist of native warm season grasses that will, over the long term, result in lower maintenance costs and more beneficial natural habitat. The mix will include big bluestem (*Andropogon gerrardi*), little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), indian grass (*Sorghastrum nutans*), canada wild rye (*Elymus canadensis*), partridge pea (*Cassia fasciculata*), and annual rye grass (*Lolium multiflorum*). The rye grass and partridge pea will germinate and become established quickly to provide the necessary erosion control until the warm season grasses can become established. This seed mixture was developed by the Biological Technical Assistance Group through USEPA correspondence dated February 14, 2001, in reference to a separate naval facility located just north of Washington, DC. Both IHDIV-NSWC and the naval facility that this mixture was developed for are located in the same United States Department of Agriculture (USDA) designated Maryland plant hardiness zones.

2.5 STORMWATER RUNOFF CONSIDERATIONS

Following completion of the remedial action, the site will be returned to grassed or natural existing conditions. Therefore, with the exception of the conveyance channels used for collection of stormwater run-off, permanent stormwater management controls are not required for this site.

Channel capacity calculations along with pre- and post-development run-off calculations were performed using QuickTR-55™ (Haestad Methods, Inc). The software uses procedures outlined in the Soil Conservation Service (SCS) TR-55 manual. These calculations are provided in Appendix A of the Erosion and Sediment Control Plan Report.

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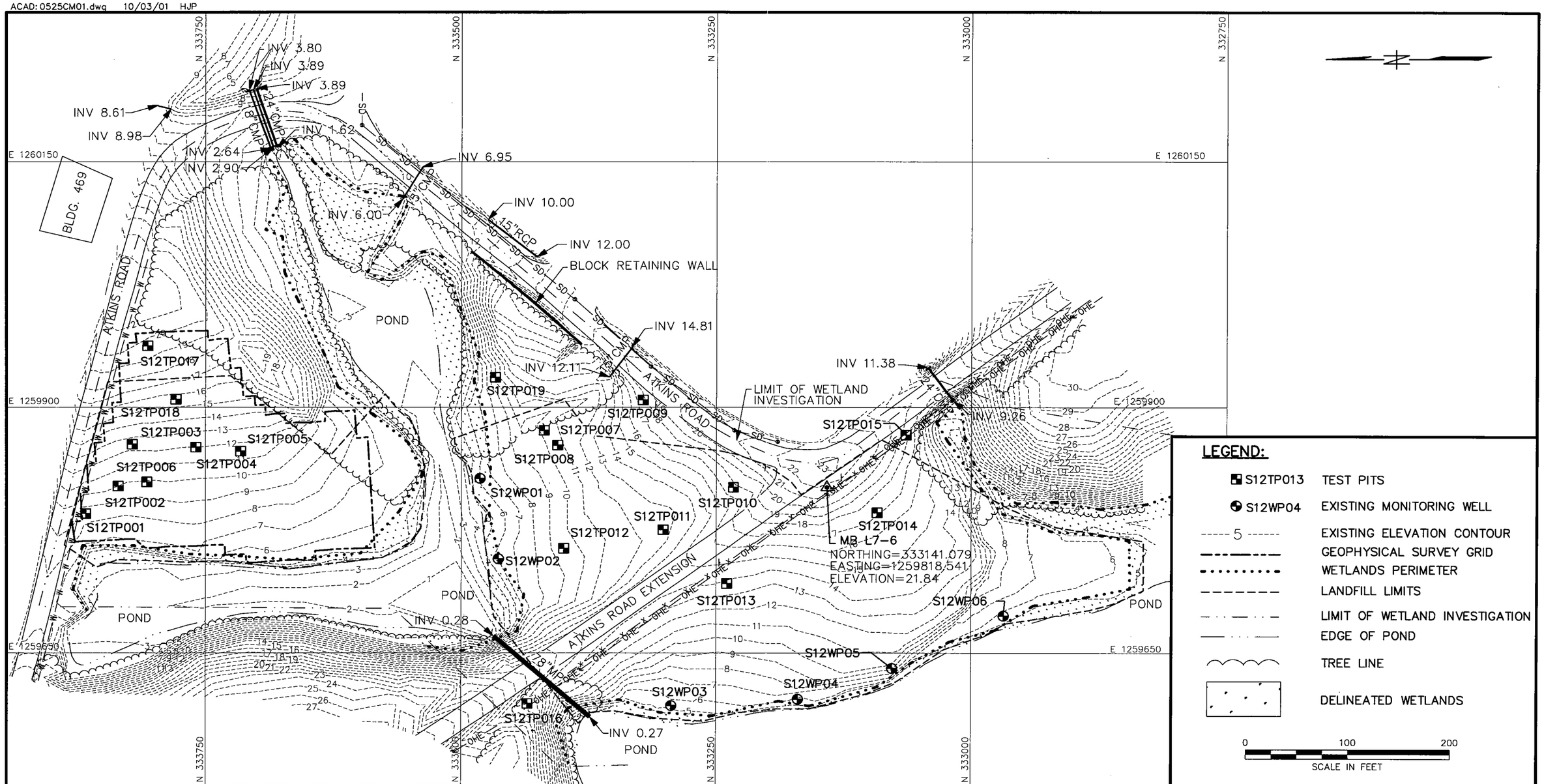

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 0525	OWNER NO. 0325
CHECKED BY TNS DATE 10/4/01	SITE LAYOUT SITE 12 – TOWN GUT LANDFILL INDIV–NSWC, INDIAN HEAD, MARYLAND	APPROVED BY DATE 10/9/01	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 2–1	REV. 0

FORM CADD NO. TtNUS_BH.DGN – REV 0 – 1/20/98

3.0 STATE AND LOCAL REQUIREMENTS

This plan was prepared in accordance with the USEPA Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practice, Summary Guidance, October 1992, and, in part, the Maryland Stormwater Design Manual Volumes I and II.

According to Maryland Environmental Regulations [Code of Maryland Regulation (COMAR) 26.17.01.06], a trained and certified "responsible person" must be on site during construction. The purpose of the "responsible person" is to train field personnel on techniques and standards that assist with the field implementation of erosion and sediment controls.

4.0 INSPECTION AND MAINTENANCE PROCEDURES

In general, all erosion and sediment control measures will be checked weekly and after each runoff producing rainfall event to assure that all erosion and sediment controls remain in effective operating condition. Any required repairs will be made immediately. The following items will be checked:

- The stabilized stone construction entrances will be maintained in a condition that will minimize tracking of sediment onto roads, including the addition of stone or other repairs.

- The super silt fence will be checked regularly for undermining or deterioration of the fabric. Sediment will be removed when the level of sediment deposition causes “bulging” or reaches half the fabric height.

- The silt fence will be checked regularly for undermining or deterioration of the fabric. Sediment will be removed when the level of sediment deposition causes “bulging” or reaches half the fabric height.

- The seeded areas will be checked regularly to ensure that a good stand of vegetation is maintained. Areas will be fertilized and re-seeded as needed. The RAC is responsible for maintenance until formal acceptance by the Contracting Officer.

- The hazardous materials storage area and hazardous materials containers will be inspected regularly for leakage. Any leakage will be addressed immediately.

- Rock check dams will be checked for sediment accumulation. Sediment will be removed when it reaches half of the original height of the check dam. Regular inspections will be made to ensure that the center of the dam is lower than the edges. Erosion caused by high flows around the edges of the dam will be corrected immediately.

- During the establishment of the channels, repairs will be made immediately and ECM and grass re-established. After grass has been established, the channels will be checked periodically to determine if the grass and associated ECM is withstanding flow velocities without damage.

5.0 NON-STORMWATER DISCHARGES AND POLLUTION PREVENTION

This section presents a description of non-stormwater discharges and pollution prevention measures that will be employed during the proposed remedial action.

5.1 NON-STORMWATER DISCHARGES

The non-stormwater discharges anticipated during construction activities will be water resulting from the draining of excavated wastes, soils, and sediments and from dewatering of excavations. The water generated from draining excavated wastes, soils, and sediments will not be collected and will be discharged to the site from the materials handling pads. Water generated from dewatering excavations will be pumped to a potable sediment tank. After the sediment is removed the water will be discharged to the site, and the sediments will be disposed off-site. All decontamination water will be collected and transported to an approved off-site treatment facility. Prior to off-site disposal sediments will be removed from the water.

5.2 POLLUTION PREVENTION MEASURES

The following is a list of materials or substances that are anticipated to be stored on-site during the proposed remedial action.

- Detergents for decontamination efforts.
- Diesel fuel and other vehicle maintenance substances.
- Fertilizer as soil amendment to promote vegetative growth.
- Small quantities of laboratory chemicals, paints, and other flammable substances.

Detergents and small containers or drums of oil, grease, antifreeze, hydraulic fluids, etc., if any, will be stored within an enclosed, lined, and diked area, along with any diesel fuel stored in tanks. The storage area will be bermed and lined with a 60 mil polyethylene geomembrane. It will be designed to contain at least 10 percent of the total contents of all materials stored in the area plus an allowance for precipitation. A small sump or low point will be designed to serve as a monitoring point for any leaks or spills from the containers. Inspection of the area and management of substances collected in this area were addressed previously in Section 4.0.

Small quantities of laboratory chemicals, paints, and other flammable substances may be stored on-site during the remedial action. These materials, when not in use, will be stored in a flammable storage

cabinet located in the decontamination trailer. Practices that will be followed to reduce risks associated with these materials include the following:

- Products will be kept in original containers unless they are not resealable.
- Original labels and material safety data sheets will be retained.
- If surplus product must be disposed, manufacturers' or local and state recommended methods for proper disposal will be followed.

The following paragraphs describe specific spill prevention and material management practices that will be employed during the proposed remedial action.

Good Housekeeping

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

- An effort will be made to store only enough product required to accomplish the task.
- All materials stored on-site will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used before the container is disposed.
- Manufacturers' recommendations for proper use and disposal will be followed.
- The assigned individuals will inspect areas daily to ensure proper use and disposal of materials on-site.

Spill Control Practices

In addition to the good housekeeping and material management practices discussed above, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

- Materials and equipment necessary for spill cleanup will be kept in the material storage area on-site. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, absorbent material, and plastic and metal containers specifically for this purpose.

- All spills will be cleaned up immediately after discovery.

- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

- Spills of toxic or hazardous material will be reported to the appropriate state or local government agency, as necessary, in accordance with state and local ordinances.

- This Stormwater Pollution Prevention Plan will be modified to include measures to prevent this type of spill from reoccurring and measures for cleaning up the spill if there is a recurrence. A description of the spill, the cause, and the cleanup measures will also be included.

- The on-site construction superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage areas and in the decontamination and office trailers located on-site.

6.0 POLLUTION PREVENTION PLAN CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the submitted information. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed:_____

Date:_____

7.0 CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit, if any, that authorizes the stormwater discharges associated with construction activity at the site identified as part of this certification.

Signature	For	Responsible for
_____ Contractor Date:_____	Company Name and Address	Contractor
_____ Contractor Date:_____	Company Name and Address	Contractor
_____ Subcontractor Date:_____	Company Name and Address	Subcontractor

REFERENCES

B&R Environmental (Brown and Root Environmental), 1997. Project Specific Remedial Investigation (RI) Work Plan for Installation Restoration Program, Indian Head Division, Naval Surface Warfare Center Indian Head, Maryland, May.

Hart, Fred C. Associates, Inc. (Hart), 1983. Initial Assessment Study of Naval Ordinance Station, Indian Head, Maryland.

MDE (Maryland Department of the Environment), 1994. Water Management Administration, Maryland Standards and Specifications for Soil Erosion and Sediment Control.

USDA (United States Department of Agriculture) Soil Conservation Service, 1986. Urban Hydrology for Small Watersheds, Technical Release 55, June.

USEPA (United States Environmental Protection Agency), 1992a. Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), September.

USEPA, 1992b. Storm Water Management for Construction Activities Summary Guidance for Developing Pollution Prevention Plans and Best Management Practice EPA 833-R-92-001, October.

APPENDIX A

USEPA CONSTRUCTION GENERAL PERMIT REQUIREMENTS
PRECONSTRUCTION CHECKLIST
USEPA CONSTRUCTION GENERAL PERMIT CHECKLIST

USEPA CONSTRUCTION GENERAL PERMIT REQUIREMENTS
PRECONSTRUCTION CHECKLIST

Storm Water Pollution Prevention Plans

1. A site description, including:

   ☒ The nature of the activity.

   Refer to Section 1.2 of the Stormwater Pollution Prevention Plan.

   ☒ Intended sequence of major construction activities.

   Refer to Section 2.3 of the Stormwater Pollution Prevention Plan.

   ☒ The total area of the site.

   Refer to Section 2.1 of the Stormwater Pollution Prevention Plan.

   ☒ The area of the site that is expected to undergo excavation.

   Refer to Section 1.2 of the Stormwater Pollution Prevention Plan.

   ☒ The runoff coefficient of the site after construction is complete.

   Refer to the Post-Development Runoff Calculation provided in Appendix A of the Erosion and Sediment Control Plan Report.

   ☒ Existing soil or storm water data.

   Refer to the Pre-Development Runoff Calculation provided in Appendix A of the Erosion and Sediment Control Plan Report.

A site map with:

   ☒ Drainage patterns.

   Refer to the Pre-Development Runoff Calculation and the Post-Development Runoff Calculations provided in Appendix A of the Erosion and Sediment Control Plan Report.

   ☒ Approximate slopes after major grading.

   Refer to Design Drawing C-7 of the Basis of Design Report.

   ☒ Area of soil disturbance.

   Refer to Design Drawing C-2 of the Basis of Design Report.

   ☒ Outline of areas which will not be disturbed.

   Refer to Design Drawing C-2 of the Basis of Design Report.

   ☒ Location of major structural and non-structural controls.

   Refer to Design Drawing C-2 of the Basis of Design Report.

☒ Areas where stabilization practices are expected to occur.

Refer to Design Drawing C-2 of the Basis of Design Report.

☒ Surface waters.

Refer to Figures 2-1 of the Stormwater Pollution Prevention Plan.

☒ Storm water discharge locations.

Refer to Figure 2-1 and Section 2.2 of the Stormwater Pollution Prevention Plan.

☒ The name of the receiving water(s).

Refer to Figure 2-1 of the Stormwater Pollution Prevention Plan.

2. A description of controls:

2.1 Erosion and sediment controls, including:

☒ Stabilization practices for all areas disturbed by construction.

Refer to Section 2.2, Section 2.2.1, and Section 2.4 of the Stormwater Pollution Prevention Plan.

☒ Structural practices for all drainage/discharge locations.

Refer to Section 2.2 and Section 2.2.1 of the Stormwater Pollution Prevention Plan.

2.2 Storm water management controls, including:

☒ Measures used to control pollutants occurring in stormwater discharges after construction activities are complete.

Refer to Section 2.2 and 4.0 of the Stormwater Pollution Prevention Plan.

☒ Velocity dissipation devices to provide nonerosive flow conditions from the discharge point along the length of any outfall channel.

Refer to Section 2.4 and Figure 2.1 of the Stormwater Pollution Prevention Plan.

2.3 Other controls including:

☒ Waste disposal practices which prevent discharge of solid materials to waters of the U.S.

Refer to Section 2.2.1 of the Stormwater Pollution Prevention Plan.

☒ Measures to minimize offsite tracking of sediments by construction vehicles.

Refer to Section 2.2.1 of the Stormwater Pollution Prevention Plan.

☒ Measures to ensure compliance with State or local waste disposal, sanitary sewer, or septic system regulations.

N/A.

2.4 ☒ Description of the timing during the construction when measures will be implemented.

Refer to Section 2.3 of the Stormwater Pollution Prevention Plan.

3. ☒ State or local requirements incorporated into the plans.

Refer to Sections 2.0, 2.2.1 and 3.0 of the Stormwater Pollution Prevention Plan.

4. ☒ Inspection and maintenance procedures for control measures identified in the plan.

Refer to Section 4.0 of the Stormwater Pollution Prevention Plan.

5. ☒ Identification of allowable non-stormwater discharges and pollution prevention measures.

Refer to Section 5 of the Stormwater Pollution Prevention Plan.

6. ☒ Contractor certification.

Refer to Section 7 of the Stormwater Pollution Prevention Plan.

7. ☒ Plan certification.

Refer to Section 6 of the Stormwater Pollution Prevention Plan.

EPA CONSTRUCTION GENERAL PERMIT CHECKLIST

Storm Water Pollution Prevention Plan
Construction/Implementation Checklist

1. Maintain Records of Construction Activities, including:

   - ☐ Dates when major grading activities occur
   - ☐ Dates when construction activities temporarily cease on a portion of the site
   - ☐ Dates when construction activities permanently cease on a portion of the site
   - ☐ Dates when stabilization measures are initiated on the site

2. Prepare Inspection Reports summarizing:

   - ☐ Name of inspector
   - ☐ Qualifications of inspector
   - ☐ Measures/areas inspected
   - ☐ Observed conditions
   - ☐ Changes necessary to the SWPPP

3. Report Release of Reportable Quantities of Oil or Hazardous Materials (if they occur);

   - ☐ Notify National Response Center 800/424-8802 immediately
   - ☐ Notify permitting authority in writing within 14 days
   - ☐ Modify the pollution prevention plan to include:
     - The date of release
     - Circumstances leading to the release
     - Steps taken to prevent reoccurrence of the release

4. Modify Pollution Prevention Plan as necessary to:

   - ☐ Comply with minimum permit requirements when notified by EPA that the plan does not comply.
   - ☐ Address a change in design, construction, operation, or maintenance which has an effect on the potential for discharge of pollutants
   - ☐ Prevent reoccurrence of reportable quantity releases of a hazardous material or oil.

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY - CHESAPEAKE
NAVAL FACILITIES ENGINEERING COMMAND
BUILDING 212, WASHINGTON NAVY YARD
WASHINGTON, D.C. 20374

SPECIFICATION NO:
21-97-5000-062-01

CONTRACT NO:
N62470-97-D-5000-062-01

SITE 12

TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN

at the

NAVAL SURFACE WARFARE CENTER, INDIAN HEAD

INDIAN HEAD, MARYLAND

DESIGN BY:

TETRA TECH NUS, INC.
600 CLARK AVENUE, SUITE 3
KING OF PRUSSIA, PENNSYLVANIA 19406-1433

SPECIFICATION PREPARED BY:

Architectural:	Civil:	Structural:
N/A	[illegible]	N/A
Electrical:	**Mechanical:**	**Submitted by:**
N/A	N/A	[signature]

STATE OF MARYLAND
GEORGE JOHN LATUSPPE
No. [illegible]
REGISTERED PROFESSIONAL ENGINEER

FEBRUARY 2002

SPECIFICATION APPROVED BY: _____ DATE: _____

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DIVISION 01 - GENERAL REQUIREMENTS

01115 GENERAL PARAGRAPHS (REMEDIAL ACTION CONTRACTS)
01140N WORK RESTRICTIONS
01450N QUALITY CONTROL
01525 SAFETY REQUIREMENTS
01575N TEMPORARY ENVIRONMENTAL CONTROLS

DIVISION 02 - SITE WORK

02223 TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL
02224 GEOGRAPHIC INFORMATION SYSTEM (GIS) GRADE-B POST-CONSTRUCTION LOCATION
02315 EXCAVATION AND FILL
02525 MONITORING WELLS
02742 PAVEMENT WITH A BITUMINOUS CONCRETE SURFACE
02951 MITIGATED WETLANDS AREA, SHRUBS, PLANTS, AND GRASS

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SECTION 01115

GENERAL PARAGRAPHS (REMEDIAL ACTION CONTRACTS)

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.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926-SUBPART V	Power Transmission and Distribution

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)

COMAR 26.17	Department of the Environment, Water Management

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE EP 1110-1-8	(1997) Construction Equipment Ownership and Operating Expense Schedule
COE EM 385-1-1	(1996) Safety and Health Requirements Manual

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 833/R-92-001	(1992) Storm Water Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practices; Summary Guidance

FEDERAL STANDARDS (FED-STD)

FED-STD-595	(Rev. B) Colors Used in Government Procurement

MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE)

MDE SESC	(1994) Standards and Specifications for Soil Erosion and Sediment Control

U. S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-461	(Rev. D) Control of Electromagnetic Interference Emissions and Susceptibility
MIL-STD-462	(Rev. D) Measurement of Electromagnetic Interference Characteristics

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241 (1996) Safeguarding Construction, Alteration, and Demolition Operations

1.2 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0, of the Basic Contract.

SD-01 Preconstruction Submittals

Work Plan

SD-11 Closeout Submittals

As-Built records

Environmental Conditions Report

Status reports

QC meeting minutes

Test Results Summary Report

Contractor Production Report

QC Report

Rework Items List

Permits

Stormwater Pollution Prevention Plan

Notice of Intent

Notice of Termination

Contractor's Closeout Report

1.3 WORK PLAN

Submit a Work Plan consisting of the following elements:

a. Narrative: Provide a description of the project objectives, scheduling, sampling and analysis requirements, decontamination procedures; removal, excavation and regrading procedures; compaction procedures; wastewater treatment plan (water resulting from decontamination, excavation dewatering, and excavated soil, sediment, and landfill material dewatering); and storage, transportation, and treatment requirements for off-site soil, sediment, and landfill material disposal; and a detailed sequence of events for the construction.

b. Technical Specifications: Provide, in an amendment format, any additional specifications and any modifications to the contract

specifications required to accurately describe the materials and work procedures envisioned to satisfy the requirements of the delivery order. Contact Design Navy Technical Representative (NTR) for availability of guide specification sections for those sections required, but not included in the contract documents.

c. Shop drawings: Shop drawings shall detail and describe components of the project not currently indicated on the contract drawings such that the shop drawings and the contract drawings, when taken together, provide a complete representation of the project requirements. Shop drawings shall be prepared and sealed by a registered professional engineer.

d. Environmental Protection Plan: At the preconstruction conference, meet with the Resident Officer in Charge of Construction's (ROICC's) Navy Technical Representative (NTR) to discuss environmental protection requirements for the project. Prepare and submit an Environmental Protection Plan in accordance with Section C, Part 4.0, of the Basic Contract, and as specified herein.

(1) Hazardous materials (HM) to be brought onto the station: Any hazardous materials planned for use on the station shall be included in the station Hazardous Material Tracking Program maintained by the safety department. To assist in this effort, the Contractor shall submit a list (including quantities) of HM to be brought to the station and copies of the corresponding material safety data sheets (MSDS). This list shall be submitted to the ROICC NTR. At project completion, any hazardous material brought onto the station shall be removed from the site by the Contractor. The Contractor shall account for the quantity of HM brought to the station, the quantity used or expended during the job, and the leftover quantity which (1) may have additional useful life as a HM and shall be removed by the Contractor, or (2) may be a hazardous waste, which shall then be removed as specified herein.

(2) Hazardous waste (HW) generated: The Environmental Protection Plan shall list and quantify any HW to be generated during the project.

(3) Storage of hazardous waste: In accordance with station regulations, HW shall be stored near the point of generation up to a total quantity of one quart of acutely HW or 55 gallons of HW. Any volume exceeding these quantities shall be moved to an HW permitted area within 1 day. Prior to generation of HW, contact the ROICC NTR and IHDIV-NSWC Environmental Office for HW management requirements.

(4) Minimization of hazardous waste: In accordance with station regulations, the Contractor should substitute materials as necessary to reduce the generation of HW and include a statement to that effect in the Environmental Protection Plan.

(5) Environmental conditions likely to be encountered during this project: Contact the ROICC NTR for conditions in the area of the project which may be subject to special environmental procedures. Include this information in the Preconstruction Survey. Describe in the Environmental Protection Plan any permits required prior to working the area, and contingency plans in case an unexpected environmental condition is discovered.

(6) Permitting plans for any transportation and disposal, excavation, or construction of hazardous waste that will require an environmental permit from an issuing agency: The Contractor is responsible for generating the permits and delivering the completed documents to the ROICC NTR. The ROICC NTR will review the permits and the Contractor shall file the documents with the appropriate agency and complete disposal with the approval of the ROICC NTR. Correspondence with the State concerning the environmental permits and completed permits shall be delivered to the ROICC NTR.

(7) Environmental Protection Plan format

ENVIRONMENTAL PROTECTION PLAN

Contracting Organization
Address and Telephone Numbers

1. Hazardous materials to be brought onto the station
2. MSDS package
3. Employee training documentation
4. HW storage plan
5. HW to be generated
6. Preconstruction Survey results
7. Permitting requirements identified

e. Health and Safety Plan: Provide a site specific Health and Safety Plan (HASP) in accordance with Section C, Part 3.0, of the Basic Contract. The HASP shall include, but is not limited to, the following:

(1) Names of the health and safety officer and names of alternates responsible for health and safety.

(2) 29 CFR 1910.

(3) 29 CFR 1926.

(4) 29 CFR 1926-SUBPART V, tagout and lockout procedures.

(5) Contract Clause "FAR 52.236-13, Accident Prevention."

(6) Contract Clause "FAR 52.223-3, Hazardous Material Identification and Material Safety Data."

(7) NFPA 241.

f. QC Plan: Provide a QC Plan in accordance with Section C, Part 6.0, of the Basic Contract, and as specified herein.

(1) Table of Contents

I. QC ORGANIZATION
II. NAMES AND QUALIFICATIONS
III. DUTIES, RESPONSIBILITY, AND AUTHORITY OF QC PERSONNEL
IV. OUTSIDE ORGANIZATIONS
V. APPOINTMENT LETTERS
VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER
VII. TESTING LABORATORY INFORMATION

VIII. TESTING PLAN AND LOG
IX. PROCEDURES TO COMPLETE REWORK ITEMS
X. DOCUMENTATION PROCEDURES

(2) Submittal Register: As part of the QC Plan, submit a completed Submittal Register to document quality control for materials, inspection, and testing in accordance with Section C, Part 7.0 of the Basic Contract. A copy of the Submittal Register is provided at the end of this section.

(3) Testing laboratory qualifications: As part of the QC Plan, submit qualifications for each laboratory which shall be used in accordance with Section C, Part 6.0, of the Basic Contract. Laboratories engaged in hazardous materials testing shall meet the requirements of Section C, Part 6.0 of the Basic Contract.

1.3.1 Forwarding Preconstruction Submittals

Within 30 calendar days of issuance of the delivery order, and before procurement, fabrication, or mobilization, submit to the ROICC NTR, and to distribution as directed by the ROICC NTR, the Work Plan, complete as specified. The Architect-Engineer shall review the Work Plan for the ROICC NTR to determine compliance of the Contractor's Work Plan with the requirements of the contract documents for this delivery order.

1.3.2 Review Comments

The Contractor's Work Plan shall be reviewed. The ROICC NTR shall compile and coordinate Government review comments, and forward consolidated review comments to the Contractor. Review comments on the Work Plan shall be resolved, and Work Plan modified as required. After the correction of the Work Plan, submit one corrected final copy to the ROICC NTR for final review. The Work Plan shall be approved prior to commencement of any other work associated with this delivery order.

1.4 RECORDS

1.4.1 As-Built Records

Maintain two sets of full size contract drawings and two sets of full size approved shop drawings marked to show any deviations which have occurred, including buried or concealed construction and utility features revealed during the course of construction. Record horizontal and vertical locations of buried utilities that differ from the contract drawings. These drawings shall be available for review by the ROICC NTR at any time. At the completion of the work, deliver marked sets of the contract drawings to the ROICC NTR. As-built conditions shall be incorporated onto the drawings electronically. Provide a post-construction survey for final topography, structures, and utilities, and other requirements of Section 02224, "Geographic Information System (GIS) Grade-B Post-Construction Location." The A/E shall supply the CADD files to be used.

1.4.2 Environmental Conditions Report

Prior to starting work, perform a preconstruction survey with the ROICC NTR. Take photographs showing existing environmental conditions on and adjacent to the site. Prior to starting work, submit the results of the survey in an Environmental Condition Report to the ROICC NTR.

1.4.3 Contract Management System (CMS)

The CMS shall be a system able to provide, as a minimum, the activities in sorts or groups as specified in the Basic Contract and any subsequent delivery orders.

a. Status reports: Status reports shall comply with the Basic Contract and any subsequent delivery orders. Submit a Technical Progress Report, Cost Performance Report, modification log, time-scaled logic diagram, and Waste Materials Report. Submit the first delivery order status report approximately 15 days after the end of the month in which the Contractor's Work Plan was approved. Thereafter, submit status reports every 30 days. Status report periods shall be consistent with the invoice reporting periods.

1.4.4 QC Meeting Minutes

The QC representative shall document QC meetings by delivering copies of the minutes to the ROICC NTR within 3 calendar days after each QC meeting. The submittals shall comply with Section C, Part 6.0 of the Basic Contract.

1.4.5 Test Results Summary Report

A summary report of field tests, geotechnical laboratory, and laboratory analytical results shall be submitted to the ROICC NTR within 30 days after laboratory receipt of samples and in accordance with Section C, Part 6.0 of the Basic Contract. A separate report shall be required for each set of analytical data.

1.4.6 Contractor Production Report (CPR)

The CPR shall be prepared and submitted daily to the ROICC NTR in accordance with Section C, Part 6.0, of the Basic Contract.

1.4.7 QC Report

The QC Report shall be submitted by the QC representative to the ROICC NTR every day work is performed, material is delivered, direction is pending, or a labor force is present in accordance with Section C, Part 6.0, of the Basic Contract.

1.4.8 Rework Items List

The QC representative shall deliver a copy of the Rework Items List to the ROICC NTR on a monthly basis in accordance with Section C, Part 6.0, of the Basic Contract.

1.4.9 Permits

Fifteen days prior to beginning on site work, submit draft copies of the following permits required for on site activities:

a. Hot Works Permit; from the Public Works Officer, Utilities Division.

b. Dig Permit; from the Public Works Officer, Utilities Division.

c. Outage Permit; from the Public Works Officer, Utilities Division.

1.4.10 Contractor's Closeout Report

Submit upon completion of the project. This report shall include: introduction, summary of action, final Health and Safety Report, summary of record documents, field changes and contract modification, final documents, complete set of field test and laboratory analytical results, geotechnical laboratory, documentation of off-site transportation and treatment of materials, QC Summary Report, surveyed As-builts, color photographs documenting each major task of the project, and final cost data.

1.5 FORWARDING SUBMITTALS

After approval of the work plan, and before procurement or fabrication, submit, except as specified otherwise, to the ROICC NTR, the shop drawings and technical data required in the technical sections of this specification. As requested by the ROICC NTR, the Architect-Engineer for this project may review and provide surveillance for the ROICC NTR to determine if Contractor-approved submittals comply with the contract requirements, and shall review and approve for the ROICC NTR those submittals not permitted to be Contractor approved to determine if submittals comply with the contract requirements. At each "Submittal" paragraph in the individual specification sections, a notation "G," following a submittal item, indicates the Architect-Engineer, acting as the agent for the ROICC NTR, is the approving authority for that submittal item. One copy of the transmittal form for submittals shall be forwarded to the ROICC NTR.

1.6 PROJECT DESCRIPTION

This work includes the preparation of a work plan as previously described, and the provision of earthworks, site restoration, and other related work.

The remedial action consists of general site preparation work, excavation and placement of waste-contaminated soil and sediment under a soil cover in order to protect potential ecological and human receptors,and site restoration. Specifically, the selected remedy is to excavate along the edge of the wetlands to the approximate limit of waste. The excavated material would then be placed beneath the soil cover. Large items of waste and debris would be disposed off-site at an approved disposal facility. The remedial action will also include regrading of the existing soil cover and waste, followed by the addition of select fill to a depth of at least 18 inches and topsoil to a depth of 6 inches. Wetlands restoration will be performed to restore the wetlands disturbed during excavation activities.

1.7 LOCATION

The work shall be located at the Indian Head Division Naval Surface Warfare Center, Indian Head, Maryland, Site 12.

1.8 DESCRIPTION OF CONTAMINANTS PRESENT

Site 12 - Town Gut Landfill is one of several Installation Restoration (IR) sites located at the IHDIV-NSWC facility. The site was used from 1968 until 1980 for disposal of landscaping waste, fill material, and rubble. Some unauthorized dumping of paints, varnishes, and other chemical waste may be have occurred at Site 12.

1.8.1 Previous Investigations

The first investigation at Site 12 was an Initial Assessment Study (IAS)

(Hart, 1983) that began in 1982. The IAS included the collection of one water sample from a small runoff point along the bank of a stream. The IAS concluded that Site 12 exhibited a potential threat, and a Confirmation Study was warranted.

During the Confirmation Study conducted in 1985 (CH2M Hill, 1985), one surface water sample and one sediment sample were collected from the edge of Site 12, in the same approximate area as the earlier surface water sample. The Confirmation Study concluded that Site 12 had no detectable impact on the surrounding surficial environment.

In 1997, a Remedial Investigation (RI) was performed at Site 12 (TtNUS, 1999). The RI, which included a baseline risk assessment, concluded the following: potential risks to human health do not warrant additional action at this time; additional ecological study in connection with Site 12 is not recommended; an action such as placement of a cap may be necessary at Site 12 to mitigate the surface soil ecological exposure routes and the transport of surface soil chemicals to the ponds in runoff.

1.8.2 Sources of Contamination

The only known source of contamination at the site is the past practice of disposal of landscaping waste, fill material, rubble, and reportedly paint, varnishes, and other chemical wastes.

1.8.3 Description of Contamination

Site 12 is estimated to contain approximately 70,000 cubic yards of mixed solid waste materials, primarily landscaping wastes, tree stumps, and demolition debris. There is indication that paint, varnish, and chemical wastes may also have been disposed at the site. Soil, sediment, and groundwater samples were collected and analyzed to determine the extent of contamination at Site 12. A summary of the frequency of detection and concentration range of surface and subsurface soil COCs is summarized in Table 1.

TABLE 1

CHEMICALS OF CONCERN BY MEDIA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Analyte	Frequency of Detection	Concentration Range
	SOIL	
INORGANICS (mg/kg)		
Arsenic	5/5	5.5 - 14.4
Iron	5/5	20,600 - 23,000
	GROUNDWATER	
VOLATILE ORGANIC COMPOUNDS (ug/L)		
Cis-1,2-Dichloroethene	1/6	306
Trichloroethene	1/6	12
Vinyl Chloride	1/6	317
INORGANICS (mg/kg)		

Arsenic	5/6	3.3 - 32.8
Iron	6/6	30,400 - 83,700
Lead	5/6	1.6 - 34.5
Manganese	6/6	624 - 4,470

1.8.3.1 Surface and Subsurface Soil

Soil COCs based on unacceptable risks to human health are arsenic and iron. Each of these metals was detected in all soil samples collected at the site.

1.8.3.2 Groundwater

Shallow groundwater COCs based on unacceptable risks to human health are cis-1,2-dichloroethene, vinyl chloride, arsenic, iron, and manganese. Additional COCs based on exceedances of federal and state MCLs are trichloroethene and lead. The metals were the most frequently detected COCs. The organics were only detected in one shallow groundwater sample.

1.8.4 Contaminant Migration

It appears that some migration of metals from soil to shallow groundwater has occurred at the site.

1.9 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK

Time for completion includes both the time for construction and the time to obtain an approved Work Plan. The Contractor shall be required to (a) commence work on the Work Plan within 5 calendar days after receiving the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 135 calendar days (45 calendar days to obtain an approved Work Plan and 90 calendar days for time of construction) after receiving the notice to proceed. The time stated for completion shall include final cleanup of the premises and the restoration of the site.

1.10 PROJECT INFORMATION

1.10.1 Contract Drawings

Contract drawings are as follows:

DWG No.	NAVFAC DWG No.	Title
T-1	3458628	Title Sheet
T-2	3458629	General Notes and Legend
C-1	3458630	Existing Conditions Plan
C-2	3458631	Erosion and Sediment Control Plan
C-3	3458632	Erosion and Sediment Control Notes
C-4	3458633	Revegetation Notes
C-5	3458634	Erosion and Sediment Control Details
C-6	3458635	Interim Grading Plan
C-7	3458636	Final Grading Plan
C-8	3458637	Cross Sections
C-9	3458638	Miscellaneous Details

1.10.2 Reference Reports

The following reference reports are available for examination in the office

of the ROICC NTR and are intended only to show the existing conditions. The reports and drawings are the property of the Government and shall not be used for any purpose other than that intended by the specification.

Reports

a. Initial Assessment Study of Naval Ordnance Station, Indian Head, Maryland, (13-021), Naval Energy and Environmental Support Activity (NEESA), Fred C. Hart Associates, Inc., May 1983.

b. Naval Assessment and Control of Installation Pollutants (NACIP) Confirmation Study Naval Ordnance Station, Indian Head, Maryland, CH2M Hill, 1985.

c. Background Investigation Report, Indian Head and Stump Neck Annex, Naval Surface Warfare Center, Indian Head, Maryland, Tetra Tech NUS, Inc., December 1997.

d. Remedial Investigation(RI) Report, Site 12 - Town Gut Landfill, Site 41 - Scrap Yard, Site 42 - Olsen Road Landfill, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, Tetra Tech NUS, Inc., July 1999.

e. Feasibility Study Report, Site 12 - Town Gut Landfill, Site 41 - Scrap Yard, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, Tetra Tech NUS, Inc., January 2001.

f. Draft Final Record of Decision, Site 12 - Town Gut Landfill, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, U.S. Environmental Protection Agency, Maryland Department of the Environment, and Naval Warfare Center, Indian Head Division, November 2001.

1.11 SCHEDULING

The IHDIV-NSWC and Atkins Road will remain in operation during the entire construction period. The Contractor shall schedule the work as to cause the least amount of interference with station operations. Work schedules shall be subject to the approval of the ROICC NTR. Permission to interrupt station roads shall be requested in writing a minimum of 15 calendar days prior to the desired date of interruption. Notify the ROICC NTR 48 hours prior to starting excavation.

1.11.1 Regular Work Hours

Regular working hours shall consist of an 8 1/2 hour daily period established by the ROICC NTR, Monday through Friday, excluding Government holidays.

Working hours are subject to obtaining Department of Defense Explosive Safety Board (DDESB) approval prior to commencing work due to active explosives operating building and magazine near site. The Navy has submitted the application to DDESB.

1.11.2 Work Outside Regular Hours

Work outside regular hours requires ROICC NTR approval. Contractor shall submit an application to the ROICC NTR, 2 regular working days prior to the scheduled working date, to allow ample time to enable satisfactory

arrangements to be made by the Government for inspecting the work in progress. At night, the Contractor shall light the different parts of the work in an approved manner.

1.12 SECURITY REQUIREMENTS

The Contractor shall comply with the general security requirements as stipulated in Section C, Part 2.0, of the Basic Contract.

1.13 STORAGE AND TEMPORARY BUILDINGS

1.13.1 Storage in Existing Buildings

Storage in existing buildings shall not be allowed.

1.13.2 Open Site Storage Size and Location

The open site available for storage, laydown, soil, sediment, and landfill material dewatering, decontamination pads, and stabilized stone construction entrance(s) shall be confined to the areas indicated by the ROICC NTR.

1.13.3 Trailers, Storage, and Temporary Buildings

Locate trailers, storage, and temporary buildings where directed and within the indicated operations area. Trailers or storage buildings shall be permitted where space is available subject to the approval of the ROICC NTR. The trailers or storage buildings shall be suitably painted and kept in a good state of repair. Failure of the Contractor to maintain the trailers or storage buildings in good condition shall be considered sufficient reason to require their removal. Trailers shall be anchored to resist high winds and shall meet applicable State or local standards for anchoring mobile trailers. A sign that conforms to the following requirements and shows the company name, telephone number, and emergency telephone number, shall be mounted on the trailer or building.

Graphic panel: Aluminum, painted blue; FED-STD-595 25053

Copy: Screen painted or vinyl die-cut, white, Univers 65 u/lc typeface.

1.13.4 Contractor Quality Control Field Office

Provide a trailer of sufficient size for an office trailer work area and floor area for the exclusive use of the quality control (QC) representative. Also provide room in the same trailer for the QC records. Provide the QC representative with a 4 by 8 foot plan table, a standard size office desk and chair, and telephone service. QC records shall be filed in the office and available at all times to the Government. QC field office trailer shall comply with the requirements specified above for other Contractor trailers.

1.14 LOCATION OF UNDERGROUND UTILITIES

Contractor shall comply with the requirements specified in Section C, Part 2.0 of the Basic Contract, and with requirements specified herein. Obtain station digging permits prior to the start of excavation activities. Verify elevations of existing underground utilities and obstructions before installing new work closer than the nearest manhole or other structure at which an adjustment can be made.

1.15 UTILITY SERVICES

1.15.1 Temporary Utilities

Contractor shall provide his own utilities.

1.15.2 Utility Cutovers and Interruptions

Make utility cutovers and interruptions outside regular working hours. Conform to procedures specified herein for work outside regular working hours. Ensure that new utilities are complete, except for the connection, before interrupting the existing service.

1.16 RESTRICTIONS ON EQUIPMENT

1.16.1 Radio Transmitter Restrictions

The Contractor shall conform to the restrictions and procedures for the use of radio transmitting equipment, as directed by the ROICC NTR. Do not use transmitters without prior approval.

1.16.2 Electromagnetic Interference Suppression

Electric motors shall comply with MIL-STD-461 relative to radiated and conducted electromagnetic interference. A test for electromagnetic interference will not be required for motors that are identical physically and electrically to those that have previously met the requirements of MIL-STD-461. An electromagnetic interference suppression test will not be required for electric motors without commutation or slip rings having no more than one starting contact and operated at 3600 revolutions per minute or less.

Devices other than electric motors used by the Contractor shall comply with MIL-STD-461 for devices capable of producing radiated or conducted interference.

Conduct tests on electric motors and the Contractor's construction equipment in accordance with MIL-STD-461 and MIL-STD-462. The test location shall be reasonably free from radiated and conducted interference. Furnish the testing equipment, instruments, and personnel for making the tests; a test location; and other necessary facilities.

1.17 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

In conjunction with the Contract Clause "DFARS 252.236-7000, Modification Proposals-Price Breakdown," and where actual ownership and operating costs of construction equipment cannot be determined from Contractor accounting records, equipment use rates shall be based upon the applicable provisions of the COE EP 1110-1-8.

1.18 PUBLIC RELEASE OF INFORMATION

Contractor shall comply with requirements stated in Section C, Part 2.0, of the Basic Contract.

1.19 STORM PROTECTION

Contractor shall conduct storm protection measures in accordance with the

requirements of Section C, Part 2.0, of the Basic Contract, and as specified herein.

1.19.1 Hurricane Condition of Readiness

Unless directed otherwise, comply with:

a. Condition ONE (sustained winds of 50 knots or greater expected within 12 hours): Secure the jobsite, and leave Government premises.

b. Condition TWO (sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear missile hazards and loose equipment from general base areas. Contact ROICC NTR for weather and condition of readiness (COR) updates and completion of required actions.

c. Condition THREE (sustained winds of 50 knots or greater expected within 48 hours): Maintain Condition FOUR requirements and commence securing operations necessary for Condition ONE which cannot be completed within 18 hours. Cease routine activities which might interfere with securing operations. Commence securing and stow gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to Condition TWO and continue action as necessary to attain Condition THREE readiness. Contact ROICC NTR for weather and COR updates and completion of required actions.

d. Condition FOUR (sustained winds of 50 knots or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove debris, trash, or objects that could become missile hazards. Contact ROICC NTR for COR updates and completion of required actions.

1.20 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the delivery order, environmental protection as defined in Section C, Part 4.0, of the Basic Contract, and as specified herein.

1.20.1 Stormwater Pollution Prevention Plan

Prepare a Stormwater Pollution Prevention Plan (SWPPP), a completed Notice of Intent (NOI) form, and a completed Notice of Termination (NOT) form in accordance with the requirements of the State's general permit for storm water discharges from construction sites. The SWPPP shall be prepared in accordance with EPA 833/R-92-001 Storm Water Management Guidances. Submit SWPP, NOI, and the appropriate permit fee to the ROICC NTR a minimum of 14 days prior to ground-disturbing activities. No work will be allowed on site until an approved permit is received from the State. Implement and maintain the measures specified in the SWPPP and periodically review and update the SWPPP.

Within 14 days after substantial completion and acceptance by the ROICC NTR, complete and submit NOT to EPA. Submit a duplicate copy of the NOT to the Contracting Officer.

The Contractor shall keep a copy of the SWPPP and the approved permit on site at the Contractor's trailer at all times. The SWPPP shall be continually updated as necessary to reflect current and changing conditions on site.

1.20.2 Fire Protection

Comply with COE EM 385-1-1, NFPA 241, and activity fire regulations. Post the activity fire poster in conspicuous locations and at telephones in construction trailers.

1.20.3 Responsible Person

In accordance with COMAR 26.17.01.06, a trained and certified "responsible person" must be on site during construction. The purpose of the "responsible person" is to train field personnel on techniques and standards that assist with the field implementation of erosion and sediment controls.

1.21 PRECONSTRUCTION CONFERENCE

After approval of the Work Plan, but prior to commencement of any work at the site, Contractor shall meet with the ROICC NTR to discuss and develop a mutual understanding relative to the administration of the HASP, preparation and submission of submittals, scheduling, programming, and prosecution of the work. Major subcontractors who will be engaged in the work shall also attend.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CLEANING UP

During the progress of the remediation, the work area and adjacent areas shall be kept clean and free of rubbish, surplus materials, and unneeded construction equipment. No material or debris shall be allowed to flow or wash into watercourses, ditches, gutters, drains, or pipes. Upon completion of the work, sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish, and construction facilities from the site.

3.2 EROSION AND SEDIMENT CONTROL

Implement and maintain the approved erosion and sediment control measures shown on the approved Erosion and Sediment Control Plan and in the Stormwater Pollution Prevention Plan. For any Contractor proposed changes to the approved plan, it shall be the sole and complete responsibility of the Contractor to obtain approval of the revised plan by the appropriate reviewing authority with no delay to the Government. Any Erosion and Sediment Control Plan revisions shall be completed in accordance with MDE SESC. Erosion and sediment control measures are only to be removed when

all upstream areas are stabilized as determined by the Contracting Officer unless noted otherwise.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
SITE 12, TOWN GUT LANDFILL, RAD, IHDIV-NSWC, MD

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01115	SD-01 Preconstruction Submittals															
			Work Plan	1.3														
			SD-11 Closeout Submittals															
			As-Built records	1.4.1														
			Environmental Conditions Report	1.4.2														
			Status reports	1.4.3														
			QC meeting minutes	1.4.4														
			Test Results Summary Report	1.4.5														
			Contractor Production Report	1.4.6														
			QC Report	1.4.7														
			Rework Items List	1.4.8														
			Permits	1.4.9														
			Stormwater Pollution Prevention	1.20.1														
			Plan															
			Notice of Intent	1.20.1														
			Notice of Termination	1.20.1														
			Contractor's Closeout Report	1.4.10														
		01450N	SD-01 Preconstruction Submittals															
			(QC) Plan	1.6														
		01525	SD-07 Certificates															
			Accident Prevention Plan	1.4.1														
			Activity Hazard Analysis	1.4.2														
			Health and Safety Plan	1.4.3														
			SD-11 Closeout Submittals															
			Daily Confined Space Entry	3.3.7														
			Permit															

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01525	Reports	1.17														
		01575N	SD-01 Preconstruction Submittals															
			Environmental Protection Plan	1.9														
			Sediment and Erosion Control	1.4														
			Plan															
			SD-06 Test Reports															
			Laboratory analysis	1.5														
			Laboratory analysis	1.6.2														
			SD-11 Closeout Submittals															
			Solid waste disposal permit	1.6.1														
			Waste determination	1.6.2														
			documentation															
			Waste determination	3.5.1														
			documentation															
			Disposal documentation for	1.6.3														
			hazardous and regulated waste															
			Contractor 40 CFR employee	1.6.4														
			training records															
			Regulatory notification	1.6.5														
			Erosion and sediment control	1.6.6														
			inspection reports															
			Solid waste disposal report	1.6.7														
			Contractor Hazardous Material	1.11														
			Inventory Log															
		02223	SD-07 Certificates															
			Treatment facility permits	1.2.1.1														

SUBMITTAL REGISTER

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02223	SD-11 Closeout Submittals															
			Shipment manifests	1.2.2.1														
			Delivery certificates	1.2.2.2														
			Disposal Site Decontamination	1.2.2.3														
			Certificates															
			Work Site Decontamination	1.2.2.4														
			Certificates															
			Treatment and Disposal	1.2.2.5														
			Certificates															
		02224	SD-11 Closeout Submittals															
			Buried Utility Location Plan	2.1														
			Survey Report	2.2														
			GIS CADD file(s)	2.3														
			F-Size plot	2.4														
		02315	SD-06 Test Reports															
			Borrow Site Testing	1.6														
			Common Fill	3.11.2.1														
			Select Fill	3.11.2.2														
			Density tests	3.11.2.3														
			SD-07 Certificates															
			Excavation and handling work	1.3.1														
			plan															
			Dewatering work plan	3.2.1														
		02525	SD-02 Shop Drawings															
			Well construction	1.6.1														
			SD-03 Product Data															

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							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02525	Well riser	2.1														
			Well screen	2.2														
			Filter pack	2.3														
			Cement/bentonite grout	2.4.2														
			Bentonite pellet seal	2.4.1														
			SD-07 Certificates															
			Well Drilling/Development	1.6.2														
			Material Handling Plan															
			Field Sampling and Laboratory	1.6.4														
			Testing Plan															
			Treatment facility permit	1.6.5														
			Installation Survey Report	3.7														
			Well Development Report	1.6.6														
			Well Abandonment Report	1.6.7														
			Borehole Analysis Report	3.2.2														
			SD-11 Closeout Submittals															
			Well Construction Permit	1.6.8														
		02742	SD-06 Test Reports															
			Subbase material density	3.2														
			Shoulder material density	3.6														
			Subbase Course	3.8.1														
			Bituminous Concrete Courses	3.8.2														
			Test															
			SD-07 Certificates															
			Subbase materials	2.1														
			Tack coat	2.4														

SUBMITTAL REGISTER

CONTRACT NO.

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02742	Bituminous concrete	2.2														
		02951	SD-06 Test Reports															
			Erosion control materials	2.11														
			Topsoil	2.2														
			SD-07 Certificates															
			Nursery certifications	2.1.1														

SECTION 01140N

WORK RESTRICTIONS

PART 1 GENERAL

1.1 REFERENCES

The publication listed below forms a part of this specification to the extent referenced. The publication is referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE EM 385-1-1 (1996) Safety and Health Requirements Manual

1.2 SPECIAL SCHEDULING REQUIREMENTS

a. Atkins Road will remain in operation during the entire construction period. The Contractor shall conduct his operations so as to not cause any interference with normal operations of the activity.

1.3 CONTRACTOR ACCESS AND USE OF PREMISES

1.3.1 Station Regulations

Ensure that Contractor personnel employed on the Station become familiar with and obey Station regulations. Keep within the limits of the work and avenues of ingress and egress as directed. Do not enter any 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 calendar days prior to the desired date of interruption. The Contractor's equipment shall be conspicuously marked for identification.

1.3.1.1 Additional Station Regulations

Specific routes to the job sites will be designated for Contractor personnel. No Contractor's employee will be permitted to deviate from these routes, nor will Contractor's employees leave the job site to enter other areas of the Station without permission of the Commanding Officer as granted via the Contracting Officer. Contractor employees shall not bring matches and/or lighters into the restricted area of the Station. All matches and lighters shall be given to the Security Personnel at Building 1665 (Post No. 2) prior to entering this area. Any Contractor's employee who violates the provisions of this paragraph may, at the discretion of the Commanding Officer via the Contracting Officer, be escorted from the Station forthwith and barred from further entry.

1.3.2 Working Hours

In accordance with Section 01115 "General Paragraphs (Remedial Action Contracts)."

1.3.3 Work Outside Regular Hours

In accordance with Section 01115 "General Paragraphs (Remedial Action

Contracts)."

1.3.4 Utility Cutovers and Interruptions

In accordance with Section 01115 "General Paragraphs (Remedial Action Contracts)."

1.4 SECURITY AND SAFETY REQUIREMENTS

Contract Clause "FAR 52.204-2, Security Requirements, Alternate II," "FAC 5252.236-9301, Special Working Conditions and Entry to Work Area."

1.4.1 IHDIV-NSWC Access

No employee or representative of the Contractor will be admitted to the work site unless he furnishes satisfactory proof that he is a citizen of the United States or is specifically authorized admittance by the Contracting Officer.

1.4.2 IHDIV-NSWC Access Information

The station is a secured facility. Furnish to the Contracting Officer a list showing the names and social security numbers of all employees and representatives to be engaged at the site. Update the list with each addition or deletion to such engagement.

1.4.3 Restrictions to Ensure Safety

When the work at IHDIV-NSWC is within a restricted area the work is potentially hazardous due to danger from explosives. Pursuant to the clause of the Basic Contract entitled "Accident Prevention" and the paragraph entitled "Station Regulations," safety shall be given particular emphasis. Paragraph (f) of the clause of the Basic Contract entitled "Accident Prevention" is applicable. It is the Contractor's responsibility to comply with COE EM 385-1-1, additional safety requirements into daily working procedures that will provide safe working conditions for contract duration. Any Contractor's employee who violates these regulations may, at the discretion of the Commanding Officer, be escorted from the Station and barred from further entry.

1.4.4 Restricted Area Safety Regulations

Extraordinary safety regulations for the restricted area include the following:

1. Prior to starting any maintenance, repair, or construction, contract job superintendent must meet with an IHDIV-NSWC Safety Department representative to become familiar with IHDIV-NSWC safety regulations.

2. Authorization (Work Permits) to commence scope of contract will be obtained from the IHDIV-NSWC Safety Department via Contracting Officer.

3. Smoking, carrying matches, lighters, or other flame or spark-producing items on person, in vehicles, or other carriers, is prohibited in the Restricted Area of IHDIV-NSWC. Smoking areas will be designated by the IHDIV-NSWC Safety Department, upon request, via the Contracting Officer. Approval will be based on

the specific operational safety concerns within the area requested.

4. The use of welding equipment, tar pots, gas burners, etc., is prohibited unless authorized by the IHDIV-NSWC Safety Department. Once approved these instruments that may be lighted by use of striker must be done so. If matches are required, they will be provided by the IHDIV-NSWC Safety Department - for use only as authorized - to the contract superintendent. Note: LPG is not allowed within the explosives areas of IHDIV-NSWC.

5. All hot (open-flame) work will be secured 30 minutes prior to leaving work area unless a watchman is on duty for at least 30 minutes after end of work period. At no time will open-flame burning for debris disposal or other purposes be authorized.

6. Prior to any maintenance or repair to explosives-contaminated equipment, such equipment must be inspected by the IHDIV-NSWC Safety Department and by IHDIV-NSWC area supervisor. All explosives-contaminated materials must be decontaminated by IHDIV-NSWC methods and supervision prior to removal from the Restricted Area.

7. All traffic rules, regulations, and control devices must be adhered to. Speed limits as posted prevail, intra-plant area roadways require 15 mph unless posted otherwise, and 10 mph must be maintained on Nobel Road. All other roads 25 mph unless otherwise posted.

8. Only necessary, approved, Contractor vehicles will be allowed in the Restricted Area. These must be equipped with adequate exhaust systems and maintained in good mechanical and physical condition at all times. Spark arrestor devices, where designated, must be provided by Contractor and subjected to inspection by the IHDIV-NSWC Safety Department prior to entering posted hazards. For all vehicles entering into the explosive areas of IHDIV-NSWC, Safety Inspections will be required prior to receiving a vehicle pass from the IHDIV-NSWC Safety Department.

9. Blocking of roadways with equipment will not be allowed at any time. Securing roadways with barricades will be accomplished only upon approval of the IHDIV-NSWC Safety Department and notification of IHDIV-NSWC Security and Fire Departments. Where possible, an adequate fire lane must be provided around approved obstruction(s) for emergency equipment.

10. Securing of plant utilities (air, steam, water, etc.) will be accomplished only upon approval of IHDIV-NSWC Utilities Division, only when written outage has been obtained via contracting office.

11. Securing of Fire Protection devices will be accomplished only on the approval of the Fire Chief, or his designated acting Chief, through the Contracting Officer.

12. All roadways and walkways will be kept clear of debris at all times. Cleaning of same will be accomplished by the Contractor at least daily, or as frequently as conditions necessitate.

13. No powder actuated tools or devices may be used.

14. Contractor employees are restricted from buildings not included in contract with exception of lunchrooms, change houses, etc., agreed to be area Division Head and Contracting Officer.

15. Fuels, oils, and lubricants

a. Refueling of equipment and vehicles with flammable liquids will be done in areas designated by the IHDIV-NSWC Safety Department. All equipment used in flammables handling or operations must be of an approved type, per Underwriters' Laboratory or Factory Mutual certifications. Adequate fire protection devices must be on the scene during refueling operations.

b. Used oil, oil filters, and empty oil cans will be removed from IHDIV-NSWC by the Contractor.

c. The Contractor must inform the IHDIV-NSWC Safety and Public Works Department representatives of all Contractor-owned Hazardous Material that will be used, stored, or handled at IHDIV-NSWC. If IHDIV-NSWC employees are exposed to these materials, or potential for exposure exists, IHDIV-NSWC employees shall:

(1) Be informed and trained as required by IHDIV-NSWC NAVSURFWARCEN 5100.22G.

(2) Have a Material Safety Data Sheet accessible at the workplace for each material used for their review.

d. The Contractor shall ensure that Contractor employees have been informed/trained about the identification and hazards of the hazardous materials used for this project at IHDIV-NSWC.

16. The IDHDIV-NSWC routinely works with electro-explosive devices (EEDs) such as igniters, squibs, detonators, and blasting caps. Radio frequency transmissions can, under certain circumstances, provide enough energy to initiate or degrade performance of these devices. Inadvertent initiation of EEDs can result in injury or death of personnel and damage or destruction of property. Degradation of the EED can result in injury or death of personnel and damage or destruction of property. Degradation of the EED can result in failure of the item to function properly when needed.

BECAUSE OF THESE HAZARDS, USE OF CB RADIOS, CAR TELEPHONES, AND CELLULAR TELEPHONES ARE PROHIBITED IN THE RESTRICTED AREA (AREA BEYOND POST 2).

17. Vehicle and construction equipment inspections include the appropriate factors listed below for safe use and conditions.

a. Steering mechanism; must be free of defects or excessive plan.

b. Horns and warning devices must be operative.

c. Windshield wipers must be provided and operative.

d. Windshield and other window glass must be free of defects. Windshield must be free of defects. Windshield must be provided on standard equipped vehicle.

e. Rearview mirrors; must be provided and free of defects.

f. Lights; all standard lights must be provided, operative, and free of defects - including lens coverings.

g. Exhaust systems must be provided, free of defects, and properly supported.

h. Fuel systems must not indicate evidence of defects.

i. Brakes; operative without drag, including serviceable emergency brakes.

j. Tires; must have ample tread and be free of defects.

k. Electrical wiring must not have exposed surfaces or be loosely supported.

l. Body conditions; must be well maintained, no loose or jagged edges, excessive grease or oil on engine, and all standard features provided and operable.

m. Where applicable, inspection will include other such items as gauges, thermometers, controls, relief valves, piping, mechanical locks, limit switches, connectors, and other safety related devices associated to vehicles and equipment admitted to the Activity.

18. Contract trailers will be equipped with plexiglass windows when spotted within the quantity distance arcs of explosive-operating areas.

19. Additional requirements may be designated on the Work Permit based upon contract scope and IHDIV-NSWC area involved.

_____	_____
Manager, OSH & Explosives Safety Inspection Branch	Date

_____	_____	_____
Firm Principal	Contract #	Date

1.5 RESTRICTIONS ON OPERATIONS

1.5.1 Restrictions Upon Interrupting Utility Services

The clause of the Basic Contract entitled "Schedules for Construction Contract"; the paragraph entitled "Order of Work"; and the following apply:

a. Ensure that new utility lines are complete, except for the connections, before interrupting existing service.

b. Interruption to Water, Sanitary Sewer, Storm Sewer, Telephone Service, Electrical Service, Air Conditioning, Heating, Fire Alarm, and Compressed Air: These shall be considered utility cutovers pursuant to paragraph entitled "Work Outside Regular Hours." This limit includes time for deactivation and reactivation.

c. All requests for utility outages shall be made in writing to the Contracting Officer.

1.5.2 Restrictions Upon Interrupting Station Operations

Reference is made to the paragraph entitled "Order of Work." The work under this contract requires special attention to the scheduling and conduct of the work in connection with existing operating systems. Identify on the project schedule each factor which constitutes a potential interruption of operations.

Notify the Contracting Officer in writing 15 calendar days prior to a necessary shut-down or interruption.

1.5.3 Outages

Outages of utilities shall be obtained during other than normal working hours, except such outages which are more advantageous to the Government shall be obtained during normal working hours.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

01450N

QUALITY CONTROL

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 1077	(1998) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D 3666	(2000) Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 3740	(1999; Rev C.) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2000; Rev. A) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 SUBMITTALS

Submit the following in accordance with Section C of the Basic Contract.

SD-01 Preconstruction Submittals

Quality Control (QC) Plan

Submit a QC Plan within 30 calendar days prior to mobilization.

1.3 INFORMATION FOR THE CONTRACTING OFFICER

Deliver the following to the Contracting Officer:

a. Combined Contractor Production Report/Contractor Quality Control Report (1 sheet): Original and 1 copy, by 10:00 AM the next working day after each day that work is performed.

b. Testing Plan and Log, 1 copy, at the end of each month.

c. Monthly Summary Report of Field Tests: Original and 1 copy attached to the Contractor Quality Control Report at the end of each month.

d. Rework Items List: 1 copy, by the last working day of the month.

e. QC Certifications: As required by the paragraph entitled "QC Certifications."

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. The QC program consists of a QC Manager, a QC Plan, QC meetings, three phases of control, submittal review, submittal approval except for submittals designed for Contracting Officer approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. The QC program shall cover construction operations on-site and off-site and shall be keyed to the proposed construction sequence.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

Provide a QC Manager at the work site to implement and manage the QC program. The QC Manager is required to conduct the QC meetings, perform the three phases of control, perform submittal review, perform submittal approval except for submittals designed for Contracting Officer approval, ensure testing is performed and QC certifications and documentation required in this Contract. In addition to managing and implementing the QC program, the QC Manager may perform the duties of project superintendent.

1.5.1.2 Qualifications

An individual with a minimum of 3 years experience as a foreman, superintendent, inspector, QC Manager, project manager or construction manager on similar size and type construction contracts which included the major trades that are part of this Contract.

1.6 QUALITY CONTROL (QC) PLAN

1.6.1 Requirements

Provide, for approval by the Contracting Officer, a QC Plan that covers both on-site and off-site work and includes the following:

a. A table of contents listing the major sections identified with tabs in the following order:

I. QC ORGANIZATION
II. NAMES AND QUALIFICATIONS
III. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL
IV. OUTSIDE ORGANIZATIONS
V. APPOINTMENT LETTERS
VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER
VII. TESTING LABORATORY INFORMATION
VIII. TESTING PLAN AND LOG
IX. PROCEDURES TO COMPLETE REWORK ITEMS
X. DOCUMENTATION PROCEDURES
XI. LIST OF DEFINABLE FEATURES
XII. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL
XIII. PERSONNEL MATRIX

XIV. PROCEDURES FOR COMPLETION INSPECTION

b. A chart showing the QC organizational structure.

c. Names and qualifications, in resume format, for each person in the QC organization.

d. Duties, responsibilities and authorities of each person in the QC organization.

e. A listing of outside organizations such as, testing laboratories, architectural and consulting engineering firms that will be employed by the Contractor and a description of the services these firms will provide.

f. A letter signed by an officer of the firm appointing the QC Manager and stating that he/she is responsible for implementing the QC program as described in this Contract. Include in this letter the responsibility of the QC Manager to implement and manage the three phases of quality control, and their authority to stop work which is not in compliance with the contract, and their authority to direct the removal and replacement of non-conforming work.

g. Procedures for reviewing, approving and managing submittals. Provide the names of the persons authorized to review and certify submittals prior to approval. Provide the initial submittal of the Submittal Register as specified in Section C of the Basic Contract.

h. Testing laboratory information required by the paragraphs entitled " Accreditation Requirements" or "Construction Materials Testing Laboratory Requirements", as applicable.

i. A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test.

j. Procedures to identify, record, track and complete rework items.

k. Documentation procedures, including proposed report formats.

l. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and requires separate control requirements. As a minimum, if approved by the Contracting Officer, consider each division of the specifications as a definable feature of work. However, at times, there may be more than one definable feature of work in each division of the specifications.

m. Procedures for performing the Three Phases of Control. The Preparatory and Initial Phases and meetings shall be conducted with a view towards obtaining quality construction by planning ahead and identifying potential problems for each definable feature of work.

n. A personnel matrix showing for each section of the specification who will review and approve submittals, who will perform and document the three phases of control, and who will perform and document the testing.

1.6.2 Preliminary Work Authorized Prior to Approval

The only work that is authorized to proceed prior to the approval of the QC Plan is mobilization and surveying.

1.6.3 Approval

Approval of the QC Plan is required prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary to ensure the specified quality of work. The Contracting Officer reserves the right to interview the QC Manager at any time in order to verify his/her submitted qualifications.

1.6.4 Notification of Changes

Notify the Contracting Officer, in writing, of any proposed change, a minimum of seven calendar days prior to a proposed change. Proposed changes must be approved by the Contracting Officer.

1.7 QC MEETINGS

After the start of construction, the QC Manager shall conduct QC meetings once every two weeks at the work site with the project superintendent and foreman responsible for the upcoming work. The QC Manager shall prepare the minutes of the meeting and provide a copy to the Contracting Officer within 2 working days after the meeting. The Contracting Officer may attend these meetings. The QC Manager shall notify the Contracting Officer at least 48 hours in advance of each meeting. As a minimum, the following shall be accomplished at each meeting:

a. Review the minutes of the previous meeting;

b. Review the schedule and the status of work:

(1) Work or testing accomplished since last meeting

(2) Rework items identified since last meeting

(3) Rework items completed since last meeting;

c. Review the status of submittals:

(1) Submittals reviewed and approved since last meeting

(2) Submittals required in the near future;

d. Review the work to be accomplished in the next 2 weeks and documentation required. Schedule the three phases of control and testing:

(1) Establish completion dates for rework items

(2) Preparatory phases required

(3) Initial phases required

(4) Follow-up phases required

(5) Testing required

(6) Status of off-site work or testing

(7) Documentation required

e. Resolve QC and production problems;

f. Address items that may require revising the QC plan:

(1) Changes in procedures.

1.8 THREE PHASES OF CONTROL

The QC Manager shall perform the three phases of control to ensure that work complies with Contract requirements. The three phases of control shall adequately cover both on-site and off-site work and shall include the following for each definable feature of work: A definable feature of work is a task which is separate and distinct from other tasks and requiring separate control requirements.

1.8.1 Preparatory Phase

Notify the Contracting Officer at least 2 work days in advance of each preparatory phase. Conduct the preparatory phase with the superintendent, and the foreman responsible for the definable feature of work. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report. Perform the following prior to beginning work on each definable feature of work:

a. Review each paragraph of the applicable specification sections;

b. Review the Contract drawings;

c. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;

d. Review the testing plan and ensure that provisions have been made to provide the required QC testing;

e. Examine the work area to ensure that the required preliminary work has been completed;

f. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data;

g. Discuss construction methods;

h. Review the Health and Safety Plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.

1.8.2 Initial Phase

Notify the Contracting Officer at least 2 work days in advance of each initial phase. When construction crews are ready to start work on a definable feature of work, conduct the initial phase with the foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies

with Contract requirements. Document the results of the initial phase in the daily Contractor Quality Control Report. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each definable feature of work:

a. Establish the quality of workmanship required;

b. Resolve conflicts;

c. Ensure that testing is performed, and

d. Review the Health and Safety Plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met.

1.8.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary until the completion of each definable feature of work and document in the daily Contractor Quality Control Report:

a. Ensure the work is in compliance with Contract requirements;

b. Maintain the quality of workmanship required;

c. Ensure that testing is performed and

d. Ensure that rework items are being corrected.

1.8.4 Notification of Three Phases of Control for Off-Site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

1.9 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review and approval of submittals are described in Section C of the Basic Contract.

1.10 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this Contract.

1.10.1 Accreditation Requirements

Construction materials testing laboratories performing work for Navy construction contracts will be required to submit the following:

a. A copy of the Certificate of Accreditation and Scope of Accreditation by an acceptable laboratory accreditation authority.

Construction materials testing laboratories performing work for Navy construction contracts must be accredited by one of the laboratory accreditation authorities. The laboratory's scope of accreditation must include the ASTM standards listed in the paragraph titled "Construction Materials Testing Laboratory Requirements" as appropriate to the testing field. The policy applies to the specific laboratory performing the actual

testing, not just the "Corporate Office".

1.10.2 Construction Materials Testing Laboratory Requirements

Provide an independent construction materials testing laboratory accredited by an acceptable laboratory accreditation authority to perform sampling and tests required by this Contract. Testing laboratories that have obtained accreditation by an acceptable laboratory accreditation authority listed in the paragraph entitled "Laboratory Accreditation Authorities" submit to the Contracting Officer, a copy of the Certificate of Accreditation and Scope of Accreditation. The scope of the laboratory's accreditation shall include the test methods required by the Contract. For testing laboratories that have not yet obtained accreditation by an acceptable laboratory accreditation authority listed in the paragraph entitled "Laboratory Accreditation Authorities" submit an acknowledgment letter from one of the laboratory accreditation authorities indicating that the application for accreditation has been received and the accreditation process has started, and submit to the Contracting Officer for approval, certified statements, signed by an official of the testing laboratory attesting that the proposed laboratory, meets or conforms to the ASTM standards listed below as appropriate to the testing field.

a. Laboratories engaged in testing of construction materials shall meet the requirements of ASTM E 329.

b. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077.

c. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D 3666.

d. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740.

e. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA.

f. Sampling and testing shall be under the technical direction of a Registered Professional Engineer (P.E.) with at least 5 years of experience in construction materials handling.

1.10.3 Laboratory Accreditation Authorities

Laboratory Accreditation Authorities are the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology, the American Association of State Highway and Transportation Officials (AASHTO) program, ICBO Evaluation Service, Inc. (ICBO ES), and the American Association for Laboratory Accreditation (A2LA) program and the Washington Association of Building Officials (WABO) (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) (Approval authority by WACEL is limited to projects within the Chesapeake Division and Public Works Center Washington geographical area).

Furnish to the Contracting Officer, a copy of the Certificate of Accreditation and Scope of Accreditation. The scope of the laboratory's accreditation shall include the test methods required by the Contract.

1.10.4 Capability Check

The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

1.10.5 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify Contracting Officer immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month.

1.11 QC CERTIFICATIONS

1.11.1 Contractor Quality Control Report Certification

Each Contractor Quality Control Report shall contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the Contract drawings and specifications to the best of my knowledge, except as noted in this report."

1.11.2 Invoice Certification

Furnish a certificate to the Contracting Officer with each payment request, signed by the QC Manager, attesting that as-built drawings are current and attesting that the work for which payment is requested, including stored material, is in compliance with Contract requirements.

1.11.3 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the Contract."

1.12 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

1.12.1 Contractor Production Report

Reports are required for each day that work is performed and shall be attached to the Contractor Quality Control Report prepared for the same day. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Production Reports are to be prepared, signed and dated by the project superintendent and shall contain

the following information:

a. Date of report, report number, name of contractor, Contract number, title and location of Contract and superintendent present.

b. Weather conditions in the morning and in the afternoon including maximum and minimum temperatures.

c. Identify work performed by corresponding Schedule Activity No., PC#, Modification No., etc.

d. A list of Contractor and subcontractor personnel on the work site, their trades, employer, work location, description of work performed, hours worked by trade, daily total work hours on work site this date (including hours on continuation sheets), and total work hours from start of construction.

e. A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met including the results on the following:

(1) Was a job safety meeting held this date? (If YES, attach a copy of the meeting minutes.)

(2) Were there any lost time accidents this date? (If YES, attach a copy of the completed OSHA report.)

(3) Was crane/manlift/trenching/scaffold/hv electrical/high work/hazmat work done? (If YES, attach a statement or checklist showing inspection performed.)

(4) Was hazardous material/waste released into the environment? (If YES, attach a description of incident and proposed action.)

f. Identify Schedule Activity No. related to safety action and list safety actions taken today and safety inspections conducted.

g. Identify Schedule Activity No., Submittal # and list equipment/material received each day that is incorporated into the job.

h. Identify Schedule Activity No., Owner and list construction and plant equipment on the work site including the number of hours used.

i. Include a "remarks" section in this report which will contain pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site. For each remark given, identify the Schedule Activity No. that is associated with the remark.

1.12.2 Contractor Quality Control Report

Reports are required for each day that work is performed and for every seven consecutive calendar days of no-work and on the last day of a no-work period. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with

the construction schedule. Contractor Quality Control Reports are to be prepared, signed and dated by the QC Manager and shall contain the following information:

a. Date of report, report number, Contract Number, and Contract Title.

b. Indicate if Preparatory Phase work was performed today (Yes/No checkboxes).

c. If Preparatory Phase work was performed today (including on-site and off-site work), identify its Schedule Activity No. and Definable Feature of Work. The Index # is a cross reference to the Preparatory Phase Checklist. An example of the Index # is: 0025-P01, where "0025" is the Contractor Quality Control Report Number, "P" indicates Preparatory Phase, and "01" is the Preparatory Phase Checklist number(s) for this date. Each entry in this section must be accompanied with a corresponding Preparatory Phase Checklist.

d. Indicate if Initial Phase work was performed today (Yes/No checkboxes).

e. If Initial Phase work was performed today (including on-site and off-site work), identify its Schedule Activity No. and Definable Feature of Work. The Index # is a cross reference to the Initial Phase Checklist. An example of the Index # is: 0025-I01, where "0025" is the Contractor Quality Control Report Number, "I" indicates Initial Phase, and "01" is the Initial Phase Checklist number(s) for this date. Each entry in this section must be accompanied with a corresponding Initial Phase Checklist.

f. Results of the Follow-up Phase inspections held today (including on-site and off-site work), including Schedule Activity No., the location of the definable feature of work, Specification Sections, etc. Indicate in the report for this definable feature of work that the work complies with the Contract as approved in the Initial Phase, work complies with safety requirements, and that required testing has been performed and include a list of who performed the tests.

g. List the rework items identified, but not corrected by close of business; along with its associated Schedule Activity Number.

h. List the rework items corrected from the rework items list along with the corrective action taken and its associated Schedule Activity Number.

i. Include a "remarks" section in this report which will contain pertinent information including directions received, quality control problem areas, deviations from the QC plan, construction deficiencies encountered, QC meetings held, acknowledgement that as-built drawings have been updated, corrective direction given by the QC Organization and corrective action taken by the Contractor. For each remark given, identify the Schedule Activity No. that is associated with the remark.

j. Contractor Quality Control Report certification, signature and date.

1.12.3 Testing Plan and Log

As tests are performed, the QC Manager shall record on the "Testing Plan and Log" the date the test was conducted, the date the test results were forwarded to the Contracting Officer, remarks and acknowledgement that an accredited or Contracting Officer approved testing laboratory was used. Attach a copy of the updated "Testing Plan and Log" to the last daily Contractor Quality Control Report of each month.

1.12.4 Rework Items List

The QC Manager shall maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item will be corrected by, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the "Rework Items List" to the last daily Contractor Quality Control Report of each month. The Contractor shall be responsible for including on this list items needing rework including those identified by the Contracting Officer.

1.12.5 As-Built Drawings

The QC Manager is required to ensure the as-built drawings, required by the Basic Contract, are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. Ensure each deviation has been identified with the appropriate modifying documentation (e.g. PC No., Modification No., Request for Information No., etc.). The QC Manager shall initial each deviation and each revision. Upon completion of work, the QC Manager shall furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

1.12.6 Report Forms

The following forms, are acceptable for providing the information required by the paragraph entitled "Documentation." While use of these specific formats are not required, any other format used shall contain the same information:

a. Combined Contractor Production Report and Contractor Quality Control Report (1 sheet) w/ separate continuation sheet(s).

b. Testing Plan and Log.

c. Rework Items List.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

RESPONSIBILITIES/AUTHORITY OF THE QC MANAGER

1. Appointing letter to the QC manager shall detail his/her authority and responsibility to act for the contractor and outline his/her duties, responsibilities and authority. He/she shall have no job-related responsibilities other than QC unless specifically permitted in the specification.

2. He/she shall be on the site at all times during progress of the work, with complete authority to take any action necessary to ensure conformance with the contract requirements. In the event of his/her absence, approved backup shall be on the site.

3. Authority to immediately stop any segment of work which does not comply with the contract plans and specifications and direct the removal and replacement of any defective work.

4. Conduct daily inspection of work performed for compliance with plans and specifications.

5. Certify daily that all materials and equipment delivered/installed in the work comply with contract plans and specifications. Certify daily that all work performed on the construction site and off the construction site conforms to plans and specifications. Report any deficiencies and remedial action planned and taken.

6. Supervise and coordinate the inspection and tests made by the members of the Quality Control Organization, including subcontractors.

7. Assure QC staff is adequate to meet its responsibilities.

8. Maintain a copy of the ROICC approved QC Plan on file at the jobsite complete with up-to-date approved revisions/filled-in log of submittals. Maintain at the jobsite an up-to-date QC Submittal Register (provided in the specification) showing the status of all submittals required by the contract.

9. Maintain at the jobsite a testing plan showing status of all tests required by the contracts. Ensure that all tests required are performed and report the results of same. Indicate whether test results show the item tested conforms to contract requirements or not.

10. Authority to remove any individual from the site who fails to perform his/her work in a skillful and workmanlike manner or his/her work does not comply with the contract plans and specifications.

11. QC manager does not have authority to deviate from plans and specifications without prior approval, in writing, from the ROICC.

12. Ensure that the contractor's Quality Control Organization is adequately staffed with qualified personnel to perform all the detailed inspections and testing specified in the plans and specifications.

13. Maintain at the jobsite the up-to-date QC Rework Items List.

ATTACHMENT A

PREPARATORY PHASE CHECKLIST

(CONTINUED ON SECOND PAGE)

SPEC SECTION	DATE
Enter Spec Section # Here	Enter Date (DD/MMM/YY)

CONTRACT NO	DEFINABLE FEATURE OF WORK	SCHEDULE ACT NO.	INDEX #
Enter Cnt# Here	Enter DFOW Here	Enter Sched Act ID Here	Enter Index# Here

PERSONNEL PRESENT

GOVERNMENT REP NOTIFIED ____ HOURS IN ADVANCE: YES ☐ NO ☐

NAME	POSITION	COMPANY/GOVERNMENT

SUBMITTALS

REVIEW SUBMITTALS AND/OR SUBMITTAL REGISTER. HAVE ALL SUBMITTALS BEEN APPROVED? YES ☐ NO ☐

IF NO, WHAT ITEMS HAVE NOT BEEN SUBMITTED?

ARE ALL MATERIALS ON HAND? YES ☐ NO ☐

IF NO, WHAT ITEMS ARE MISSING?

CHECK APPROVED SUBMITTALS AGAINST DELIVERED MATERIAL. (THIS SHOULD BE DONE AS MATERIAL ARRIVES.)

COMMENTS:

MATERIAL STORAGE

ARE MATERIALS STORED PROPERLY? YES ☐ NO ☐

IF NO, WHAT ACTION IS TAKEN?

SPECIFICATIONS

REVIEW EACH PARAGRAPH OF SPECIFICATIONS.

DISCUSS PROCEDURE FOR ACCOMPLISHING THE WORK.

CLARIFY ANY DIFFERENCES.

PRELIMINARY WORK & PERMITS

ENSURE PRELIMINARY WORK IS CORRECT AND PERMITS ARE ON FILE.

IF NOT, WHAT ACTION IS TAKEN?

TESTING	IDENTIFY TEST TO BE PERFORMED, FREQUENCY, AND BY WHOM. WHEN REQUIRED? WHERE REQUIRED? REVIEW TESTING PLAN. HAS TEST FACILITIES BEEN APPROVED?
SAFETY	ACTIVITY HAZARD ANALYSIS APPROVED? YES ☐ NO ☐ REVIEW APPLICABLE PORTION OF EM 385-1-1.
MEETING COMMENTS	NAVY/ROICC COMMENTS DURING MEETING.
OTHER ITEMS OR REMARKS	OTHER ITEMS OR REMARKS:

QC MANAGER DATE

INITIAL PHASE CHECKLIST

SPEC SECTION	DATE
Enter Spec Section # Here	Enter Date (DD/MMM/YY)

CONTRACT NO	DEFINABLE FEATURE OF WORK	SCHEDULE ACT NO.	INDEX #
Enter Cnt# Here	Enter DFOW Here	Enter Sched Act ID Here	Enter Index# Here

PERSONNEL PRESENT

GOVERNMENT REP NOTIFIED ____ HOURS IN ADVANCE: YES ☐ NO ☐

NAME	POSITION	COMPANY/GOVERNMENT

PROCEDURE COMPLIANCE

IDENTIFIY FULL COMPLIANCE WITH PROCEDURES IDENTIFIED AT PREPARATORY. COORDINATE PLANS, SPECIFICATIONS, AND SUBMITTALS.

COMMENTS:

PRELIMINARY WORK

ENSURE PRELIMINARY WORK IS COMPLETE AND CORRECT. IF NOT, WHAT ACTION IS TAKEN?

WORKMANSHIP

ESTABLISH LEVEL OF WORKMANSHIP.

WHERE IS WORK LOCATED?

IS SAMPLE PANEL REQUIRED? YES ☐ NO ☐

WILL THE INIITAL WORK BE CONSIDERED AS A SAMPLE? YES ☐ NO ☐

(IF YES, MAINTAIN IN PRESENT CONDITION AS LONG AS POSSIBLE AND DESCRIBE LOCATION OF SAMPLE)

RESOLUTION

RESOLVE ANY DIFFERENCES.

COMMENTS:

CHECK SAFETY

REVIEW JOB CONDITIONS USING EM 385-1-1 AND JOB HAZARD ANALYSIS

COMMENTS:

OTHER

OTHER ITEMS OR REMARKS

QC MANAGER DATE

GOVERNMENT QUALITY ASSURANCE (QA) REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE	Enter Date (DD/MMM/YY)
REPORT NO	Enter Report # Here

CONTRACT NO.	TITLE AND LOCATION
Enter Cnt# Here	Enter Title and Location of Construction Contract Here

Status

WORKING?	YES	NO	IF NO, WHY NOT:
	☐	☐	

WEATHER CONDITIONS:

Check Points

	YES	NO	REMARKS:
SUPERINTENDENT ON SITE	☐	☐	
QC MANAGER ON SITE	☐	☐	
QC REPORTS CURRENT	☐	☐	
AS-BUILTS CURRENT	☐	☐	
SUBMITTALS APPROVED FOR FOR ONGOING WORK	☐	☐	
DEFICIENCY LIST REVIEWED	☐	☐	

WORK OBSERVED/DEFICIENCIES NOTED/SAFETY ISSUES DISCUSSED/QA TESTS AND RESULTS:

Schedule Activity No	DESCRIBE OBSERVATIONS

MEETING/CONFERENCE NOTES (INCLUDING PARTICIPANTS):

Schedule Activity No.	NOTES

INSTRUCTIONS GIVEN OR RECEIVED/CONTROVERSIES PENDING:

Schedule Activity No.	INSTRUCTIONS/CONTROVERSIES

QA REPRESENTATIVE DATE

SUPV INITIALS DATE

CONTRACTOR QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE Enter (DD/MMM/YY)

REPORT NO Enter Rpt # Here

PHASE | CONTRACT NO Enter Cnt# Here | CONTRACT TITLE Enter Title and Location of Construction Contract Here

PREPARATORY

WAS PREPARATORY PHASE WORK PREFORMED TODAY? YES ☐ NO ☐

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL PREPARATORY PHASE CHECKLIST.

Schedule Activity No.	Definable Feature of Work	Index #

INITIAL

WAS INITIAL PHASE WORK PREFORMED TODAY? YES ☐ NO ☐

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL INITIAL PHASE CHECKLIST.

Schedule Activity No.	Definable Feature of Work	Index #

FOLLOW-UP

WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE? YES ☐ NO ☐

WORK COMPLIES WITH SAFETY REQUIREMENTS? YES ☐ NO ☐

Schedule Activity No.	Description of Work, Testing Performed & By Whom, Definable Feature of Work, Specification Section, Location and List of Personnel Present

REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)

Schedule Activity No.	Description

REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)

Schedule Activity No.	Description

REMARKS (Also Explain Any Follow-Up Phase Checklist Item From Above That Was Answered "NO"), Manuf. Rep On-Site, etc.

Schedule Activity No.	Description

On behalf of the contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report.

AUTHORIZED QC MANAGER AT SITE DATE

GOVERNMENT QUALITY ASSURANCE REPORT

DATE

QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT

Schedule Activity No.	Description

GOVERNMENT QUALITY ASSURANCE MANAGER DATE

CONTRACTOR PRODUCTION REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE	Enter Date (DD/MMM/YY)	
CONTRACT NO: Enter Cnt# Here	TITLE AND LOCATION: Enter Title and Location of Construction Contract Here	REPORT NO: Enter Report # Here
CONTRACTOR: Enter The Contractor's Company Name Here	SUPERINTENDENT: Enter Superintendent's Name Here	
AM WEATHER: Enter AM Weather Data Here	PM WEATHER: Enter PM Weather Data Here	MAX TEMP (F): Enter Max Temp Here / MIN TEMP (F): Enter Min Temp Here

WORK PERFORMED TODAY

Schedule Activity No.	WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRADE	HRS

JOB SAFETY

WAS A JOB SAFETY MEETING HELD THIS DATE? (If YES attach copy of the meeting minutes)	☐ YES	☐ NO	TOTAL WORK HOURS ON JOB SITE, THIS DATE, INCL CON'T SHEETS
WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (If YES attach copy of completed OSHA report)	☐ YES	☐ NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLD/HV ELEC/HIGH WORK/ HAZMAT WORK DONE? (If YES attach statement or checklist showing inspection performed.)	☐ YES	☐ NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION
WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? (If YES attach description of incident and proposed action.)	☐ YES	☐ NO	

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED	☐ SAFETY REQUIREMENTS HAVE BEEN MET.

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATE SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment/Material Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	Owner	Description of Construction Equipment Used Today (incl Make and Model)	Hours Used

Schedule Activity No.	REMARKS

CONTRACTOR/SUPERINTENDENT _____ DATE _____

REWORK ITEMS LIST

Contract No. and Title: Enter Contract # and Title Here

Contractor: Enter Contractor's Company Name Here

NUMBER	DATE IDENTIFIED	DESCRIPTION	CONTRACT REQUIREMENT (Spec. Section and Par. No., Drawing No. and Detail No., etc.)	ACTION TAKEN BY QC MANAGER	RESOLUTION	DATE COMPLETED

TESTING PLAN AND LOG

CONTRACT NUMBER			PROJECT TITLE AND LOCATION							CONTRACTOR	
Enter Contract # Here			Enter Contract Title and Location Here							Enter Contractor's Company Name Here	
SPECIFICATION SECTION AND PARAGRAPH NUMBER	ITEM OF WORK	TEST REQUIRED	ACCREDITED/ APPROVED LAB		SAMPLED BY	TESTED BY	LOCATION OF TEST		DATE COMPLETED	DATE FORWARDED TO CONTR. OFF.	REMARKS
			YES	NO			ON SITE	OFF SITE			

SECTION 01525

SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Related Sections

a. Section 01115, "General Paragraphs (Remedial Action Contracts)"

b. Section 01140N, "Work Restrictions"

c. Section 01575N, "Temporary Environmental Controls"

d. Section 02223, "Transportation and Disposal of Contaminated Material"

e. Section 02315, "Excavation and Fill"

f. Section 02525, "Monitoring Wells"

1.1.2 Basic Contract

Provide safety requirements in accordance with Section C of the Basic Contract.

1.2 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.14	(1991) Construction and Demolition Operations - Requirements for Safety Belts, Harnesses, Lanyards and Lifelines for Construction and Demolition Use
ANSI Z359.1	(1992) Safety Requirements for Personal Fall Arrest Systems

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.94	Ventilation
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE EM 385-1-1	(1996) Safety and Health Requirements Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1999) National Electric Code
NFPA 241	(1996) Safeguarding Construction, Alteration, and Demolition Operations

1.3 DEFINITIONS

a. Certified Industrial Hygienist. An industrial hygienist is an individual who is certified by the American Board of Industrial Hygiene.

b. Certified Safety Professional. A safety manager, safety specialist, or safety engineer that has passed the CSP exam administered by the Board of Certified Safety Professionals.

c. Confined Space. A space which by design has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy, engulfment or any other recognized safety or health hazard. Confined spaces include, but are not limited to storage tanks, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines.

d. Multi-employer work site (MEWS). The Contractor is the "controlling authority" for all work site safety and health of the subcontractors.

e. Recordable Occupational Injuries or Illness. An occupational injury or illnesses which result in serious injuries, lost workday cases, non-fatal cases or significant mishaps.

f. Serious Injuries and Fatalities. Regardless of the time between the injury and death or the length of the illness; hospitalization of three or more employees; or property damage in excess of $200,000.

g. Lost Workday Cases. Injuries, other than fatalities, that results in lost workdays.

h. Non-Fatal Cases. Cases without lost workdays which result in transfer to another job or termination of employment, or require medical treatment (other than first aid) or involve property damage in excess of $10,000 but less than $200,000 or involve: loss of consciousness or restriction of work or motion. This category also includes any diagnosed occupational illnesses which are reported to the employer but are not classified as facilities or lost workday cases.

i. Health and Safety Plan (HASP). The HASP is the Navy equivalent Army term of SHP or SSHP used in COE EM 385-1-1. "USACE" property and equipment specified in COE EM 385-1-1 should be interpreted as Government property and equipment.

j. Safety Officer. The superintendent or other qualified or competent person who is responsible for the on-site safety required for the project. The Contractor quality control person cannot be the safety officer, even though the QC person has safety inspection

responsibilities as part of the QC duties.

k. Significant Contractor Mishap. A Contractor mishap which involves falls of 4 feet or more, electrical mishaps, confined space mishaps, diving mishaps, equipment mishaps, and fire mishaps which results in a lost time injury, or property damage of $10,000 or more, but less than $200,000; or when fire department or emergency medical treatment (EMT) assistance is required.

l. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment provided by a physician or registered personnel.

m. First Aid. A one-time treatment, and follow-up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care, even though provided by a physician or registered professional personnel.

n. Lost Workdays. The number of days (consecutive or not) after, but not including, the day of injury or illness during which the employee would have worked but could not do so that is, could not perform all or part of his normal assignment during all or any part of the workday or shift; because of the occupational injury or illness.

1.4 SUBMITTALS

Submit the following in accordance with Section C of the Basic Contract. Submittals shall be part of the Work Plan.

SD-07 Certificates

Accident Prevention Plan (APP)

Activity Hazard Analysis (AHA)

Health and Safety Plan (HASP)

1.4.1 Accident Prevention Plan (APP)

Submit at least 15 calendar days prior to start of work at the job site, follow Appendix A of COE EM 385-1-1, make APP site specific, Notice To Proceed will be given after Government finds the APP acceptable.

1.4.2 Activity Hazard Analysis (AHA)

Submit the AHA for the preparatory phase as a part of the APP. Submit subsequent AHA for each major phase of work at least 15 calendar days prior to the start of that phase. Format subsequent AHA as amendments to the APP.

1.4.3 Health and Safety Plan (HASP)

Allow 30 calendar days for review by Naval Environmental Health Center for health hazard review and Naval Facilities Engineering Command, Engineering Field Division (EFD) or Engineering Field Activity (EDA) construction safety manager. The Contracting Officer will act on the HASP only after 30 day NEHC and EFD/EFA safety manager reviews.

SD-11 Closeout Submittals

Daily Confined Space Entry Permit

Submit one copy of each permit attached to each Daily Production Report.

Reports

Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

a. Qualifications of Safety Officer:

(1) Ability to manage the on-site contractor safety program through appropriate management controls,

(2) Ability to identify hazards and have the capability to expend resources necessary to abate the hazards.

(3) Must have worked on similar types of projects that are equal to or exceed the scope of the project assigned with the same responsibilities.

b. Qualifications of Qualified Person, Confined Space Entry. The qualified person shall be capable (by education and specialized training) of anticipating, recognizing, and evaluating employee exposure to hazardous substances or other unsafe conditions in a confined space. This person shall be capable of specifying necessary control and protective action to ensure worker safety.

1.5.2 Qualifications of Qualified Person, Confined Space Entry

The qualified person shall be capable (by education and specialized training) of anticipating, recognizing, and evaluating employee exposure to hazardous substances or other unsafe conditions in a confined space. This person shall be capable of specifying necessary control and protective action to ensure worker safety.

1.5.3 Meetings

1.5.3.1 Preconstruction Conference

The Safety Officer shall attend the preconstruction conference required by Section 01115, "General Paragraphs (Remedial Action Contracts)" and the Basic Contract.

1.5.3.2 Meeting on Work Procedures

Meet with Contracting Officer to discuss work procedures and safety precautions required by the HASP. Ensure the participation of the Contractor's superintendent, the Contractor Quality Control person, and the CSP or CIM.

1.5.3.3 Weekly Safety Meetings

Hold weekly. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the QC Contractor Quality Control daily report.

1.5.4 IHDIV-NSWC, Indian Head Special Safety Requirements

The work at IHDIV-NSWC, is within a restricted area and is potentially hazardous due to danger from explosives. Safety shall be given particular emphasis. Contract Clause "FAR 52.236-13, Accident Prevention, Alternate I" is applicable.

Extraordinary safety regulations for the restricted area include the following:

a. Liquid petroleum gas and explosives are prohibited.

b. Specific routes to the jobsites will be designated. Do not deviate from these routes or leave the jobsite area to enter other areas of the station without permission from the Contracting Officer.

c. Matches and lighters are prohibited in the restricted area. Give matches and lighters to the security personnel at the gate prior to entering the area.

d. Obey all roadblocks, signs, and gates at entrances to the restricted area. Obtain a clearance in Building 307 to enter the restricted area.

e. Do not operate mobile or fixed transmitters of radio frequency in the restricted area identified by road signs.

f. Do not smoke in the restricted area, except at locations designated by the Contracting Officer. Existing road signs identify "No Smoking" areas.

1.5.5 Station Permits

In accordance with Section 01115, "General Paragraphs (Remedial Action Contracts)."

1.5.6 Burning Permit

A burning permit is required for every project that requires the use of open flames or welding to complete the work. Burning Permits are required for the housing and non-restricted areas of the station.

1.5.7 Forms

Submit OSHA Form 101 or 200 or other forms that contain the same information for each recordable occupational injury or illness (first aid cases not recordable), lost time accident or property damage $1,000 or more resulting from jobsite accidents within 6 days of an accident. Notify Contracting Officer immediately by telephone of fatalities, major accidents resulting in five or more disabling injuries, or property damage/material losses over $100,000 for each accident.

1.6 ACCIDENT PREVENTION PLAN (APP)

Prepare the APP in accordance with the required and advisory provisions of

COE EM 385-1-1 including Appendix A, "Minimum Basic Outline for Preparation of Accident Prevention Plan," and as modified herein. Include the associated AHA and other specific plans, programs and procedures listed on Pages A-3 and A-4 of COE EM 385-1-1, some of which are called out below.

1.6.1 Contents of the Accident Prevention Plan

a. Name and safety related qualifications of safety officer (including training and any certifications).

b. Qualifications of competent and of qualified persons.

c. Identify of the individual who will complete exposure data (hours worked); accident investigations, reports and logs; and immediate notification of accidents to include subcontractors.

d. Emergency response plan. Conform to COE EM 385-1-1, paragraph 01.E and include a map denoting the route to the nearest emergency care facility with emergency telephone numbers. Contractor may be required to demonstrate emergency response.

e. Confined Space Entry Plan. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by Contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

f. Hazardous Material Use. Provisions to deal with hazardous materials, pursuant to the Contract Clause "FAR 52.223-3, Hazardous Material Identification and Material Safety Data" and the following:

(1) Inventory of hazardous materials to be introduced to the site with estimated quantities.

(2) Plan for protecting personnel and property during the transport, storage and use of the materials.

(3) Emergency procedures for spill response and disposal, including a site map with approximate quantities on site at any given time. The site map will be attached to the inventory, showing where the hazardous substances are stored.

(4) Material Safety Data Sheets for inventoried materials not required in other section of this specification.

(5) Labeling system to identify contents on all containers on-site.

(6) Plan for communicating high health hazards to employees and adjacent occupants.

g. Hazardous Energy Control Plan. For hazardous energy sources, comply with COE EM 385-1-1, paragraph 12.A.07.

h. Alcohol and Drug Abuse Plan

(1) Describe plan for random checks and testing with

pre-employment screening in accordance with Contract Clause "DFARS 252.223-7004, Drug-Free Work Force."

(2) Description of the on-site prevention program.

i. Fall Protection Plan. The plan shall be site specific and protect all workers above 6 feet.

j. Excavation Plan. The safety and health aspects prepared in accordance with Section 02315, "Excavation and Fill."

1.7 ACTIVITY HAZARD ANALYSIS (AHA)

Prepare for each phase of the work. As a minimum, define activity being performed, sequence of work, specific hazards anticipated, control measures to eliminate or reduce each hazard to acceptable levels, training requirements for all involved, and the competent person in charge of that phase of work. For work with fall hazards, identify the appropriate fall arrest systems. For work with materials handling equipment, address safeguarding measures related to materials handling equipment. For work requiring excavations, include excavation safeguarding requirements. The appropriate AHA shall be reviewed and attendance documented by Contractor at the preparatory, initial, and follow-up phases of Quality Control inspection.

1.8 HEALTH AND SAFETY PLAN (HASP)

Prepare in accordance with Section 01115, "General Paragraphs (Remedial Action Contracts)." Also prepare as required by 29 CFR 1910.120 and COE EM 385-1-1.

1.8.1 Qualified Personnel

Retain a Certified Industrial Hygienist (CIH) or a Certified Safety Professional (CSP) to prepare the HASP, conduct activity hazard analyses, and prepare detailed plan for demolition, removal, and disposal of materials. Retain the CIH or CSP for duration of contract.

1.8.2 Contents

In addition to the requirements of COE EM 385-1-1, Table 28-1, the HASP must include:

a. Location, size, and details of control areas.

b. Location and details of decontamination systems.

c. Interface of trades involved in the construction.

d. Sequencing of work.

e. Disposal plan.

f. Sampling protocols.

g. Testing labs.

h. Protective equipment.

i. Pollution control.

j. Evidence of compliance with 29 CFR 1910.120 and 29 CFR 1926.65.

k. Training and certifications of CIH, CSP or other competent persons.

1.9 DRUG AND ALCOHOL PREVENTION PROGRAM

Conduct a proactive drug and alcohol use prevention program for all workers, prime and subcontractor, on the site. Ensure that no employees either use illegal drugs or consume alcohol during work hours. Ensure no employees are under the influence of drugs or alcohol during work hours. After accidents, collect blood, urine or saliva specimens and test the injured employee for potential drug or alcohol influence. A copy of the test shall be made available to the Contracting Officer upon request.

1.10 FALL HAZARD PREVENTION PROGRAM

1.10.1 Training

Institute a fall protection program. As part of the Fall Protection Program, Contractor shall provide training for each employee who might be exposed to fall hazards.

1.11 DUTIES OF THE SAFETY OFFICER

a. Ensure construction hazards are identified and corrected.

b. Maintain applicable safety reference material on the job site.

c. Maintain a log of safety inspections performed.

d. Attend the pre-construction conference required by Section 01115, "General Paragraphs (Remedial Action Contracts)."

1.12 DISPLAY OF SAFETY INFORMATION

Display the following information in clear view of the on-site construction personnel:

a. Map denoting the route to the nearest emergency care facility with emergency telephone numbers.

b. AHA

c. Confined space entry permit.

d. Sign with number of hours worked since last lost workday accident.

1.13 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the article "References." Maintain applicable equipment manufacturers' manuals.

1.14 HIGH HAZARD WORK AND LONG DURATION

Work under this contract is potentially hazardous. Pursuant to contract clause "FAR 52.236-13, Accident Prevention, Alternate I," submit in writing

additional proposals for effecting accident prevention under hazardous conditions. Meet in conference with Contracting Officer to discuss and develop mutual understanding relative to the administration of the overall safety program.

1.15 EMERGENCY MEDICAL TREATMENT

Contractors shall arrange for their own emergency medical treatment. Government has no responsibility to provide. However, if emergency medical care is rendered by Navy medical services, charges may be billed to Contractor at prevailing rates established in BUMED Instruction 6320.4 series. Reimbursement shall be made by Contractor to Naval Regional Medical Center Collection Agency upon receipt of monthly statement.

1.16 SITE CONDITIONS

1.16.1 Noise

Provide continual noise monitoring during all site activities. Notify the Contracting Officer immediately of noises that are above OSHA standards. Provide hearing protection to all Contractor site personnel and to all Government site visitors.

1.17 REPORTS

1.17.1 Reporting Reports

For OSHA recordable accidents, the Contractor shall conduct a suitable investigation, complete the Navy Contractor Significant Incident Report (CSIR) form and provide to the Contracting Officer within 5 calendar days of the accident.

1.17.2 Notification

Notify Contracting Officer, within 4 hours, of any accident meeting the definition of OSHA recordable occupational injury or illness. Information shall include Contractor name; contract title; type of contract; name of activity, installation or location where mishap occurred; date and time of mishap; names of personnel injured; extent of property damage, if any; and brief description of mishap (to include type of construction equipment used, PPE used, etc.). In addition to OSHA reporting requirements, initial notification shall be made of any accident involving significant mishaps.

1.17.3 Monthly Exposure Report

Monthly exposure reporting, to the Contracting Officer is required to be attached to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor.

1.17.4 OSHA Citations and Violations

Provide the Contracting Officer with a copy of each OSHA citation, OSHA report and Contractor response. Correct violations and citations promptly and provide written corrective actions to the Contracting Officer.

PART 2 PRODUCTS

2.1 FALL PROTECTION ANCHORAGE

Fall protection anchorages, used by contractors to protect their people, will be left in place and so identified for continued customer use.

2.2 CONFINED SPACE SIGNANGE

Provide permanent signs integral to or securely attached to access covers for new confined spaces. Signs wording: "DANGER--PERMIT REQUIRED CONFINED SPACE - DO NOT ENTER -" on bold letters a minimum of one inch in height and constructed to be clearly legible with all paint removed. The signal word "DANGER" and shall be red and readable from 5 feet.

PART 3 EXECUTION

3.1 CONSTRUCTION

Comply with COE EM 385-1-1, NFPA 241, the APP, the AHA and other related submittals and activity fire and safety regulations.

3.1.1 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited. Exceptions to the use of any of the above excluded materials may be considered by Contracting Officer upon written request by Contractor.

3.1.2 Unforeseen Hazardous Material

If hazardous material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to Contract Clauses "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages a minimum of 15 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Once approved and prior to beginning work on the utility system requiring shut down, the Contractor shall attend a pre-outage coordination meeting with the ROICC and the Station Utilities Department to review the scope of work and the lock out/tag out procedures for worker protection.

3.3 PERSONNEL PROTECTION

3.3.1 Hazardous Noise

Provide hazardous noise signs, and hearing protection, where ever equipment and work procedures produce sound-pressure levels greater than 85 dBA steady state of 140 dBA impulse, regardless of the duration of the exposure.

3.3.2 Fall Protection

Enforce use of the fall protection device named for each activity in the AHA all times when an employee is on a surface 6 feet or more above lower levels. Personal fall arrest systems are required when working from an articulating or extendible boom, scissor lifts, swing stages, or suspended platform. Fall protection must comply with ANSI A10.14.

3.3.2.1 Personal Fall Arrest Device

Equipment, subsystems, and components shall meet ANSI Z359.1, Personal Fall Arrest Systems. Only a full-body harness with a shock absorbing lanyard is an acceptable personal fall arrest divide. Body belts may only be used as positioning devices only such as for steel reinforcing assembly. Body belts are not authorized as a personal fall arrest device. Harnesses must have upper middle back "D" rings for proper body suspension during a fall. Lanyard must be fitted with a double locking snap hook attachment. Webbing, straps, and ropes must be of synthetic fiber or wire rope.

3.3.2.2 Safety Nets

Safety nets shall be provided in unguarded workplaces over water, machinery, dangerous operations, or more than 25 feet above surface.

3.3.3 Use of Material Handling Equipment

a. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions. Crane supported work platforms shall only be used in extreme conditions if the Contractor proves that using any other access to the work location would provide a greater hazard to the workers.

b. Christmas-tree lifting (multiple rigged materials) is not allowed.

3.3.4 Excavations

The competent person for excavation shall be on site when work is being performed n excavation, and shall inspect excavations prior to entry by workers. Individual must evaluate for all hazards, including atmospheric, that may be associated with the work, and shall have the resources necessary to correct hazards promptly.

3.3.5 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cable intended to be cut must be positively identified and de-energized prior to performing each cut. Perform all high voltage cutting remotely. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers shall be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personnel protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with

leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. Insulating blankets, hearing protection, and switching suits may be required, depending on the specific job and as delineated in the Contractor AHA.

3.3.6 Work in Manholes

Contractor shall provide mechanical ventilation for all work accomplished in manholes, unless other hazards are present like friable asbestos.

3.3.7 Work in Confined Spaces

Comply with the requirements in Section 06.I of COE EM 385-1-1. Any potential for a hazard in the confined space requires a permit system to be used.

a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 06.I.05 of COE EM 385-1-1 for entry procedures.) All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.

b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained.

c. Ensure the use of rescue and retrieval devices in confined spaces greater than 5 feet in depth. Conform to Sections 06.I.09, 06.I.10 and 06.I.11 of COE EM 385-1-1.

d. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

e. Include training information for employees who will be involved as entrant attendants for the work. Conform to Section 06.I.06 of COE EM 385-1-1.

f. Entry Permit. Use ENGFORM 5044-R or other form with the same minimum information for the Daily Confined Space Entry Permit, completed by the qualified person. Post the permit in a conspicuous place close to the confined space entrance.

3.3.8 Crystalline Silica

Grinding, abrasive blasting, and foundry operations of construction materials containing crystalline silica, shall comply with OSHA regulations, such as 29 CFR 1910.94, and COE EM 385-1-1, (Appendix C). The Contractor shall develop and implement effective exposure control and elimination procedures to include dust control systems, engineering controls, and establishment of work area boundaries, as well as medical surveillance, training, air monitoring, and personal protective equipment.

3.4 ACCIDENT SCENE PRESERVATION

For serious accidents, ensure the accident site is secured and evidence is protected remaining undisturbed until released by the Contracting Officer.

3.5 FIELD QUALITY CONTROL

3.5.1 Inspections

Include safety inspection as a part of the daily Quality Control Inspections required by Section 01450N, "Quality Control."

-- End of Section --

SECTION 01575N

TEMPORARY ENVIRONMENTAL CONTROLS

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.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1200	Hazard Communication
40 CFR 112	Oil Pollution Prevention
40 CFR 173	Procedures Governing the Rescission of State Primary Enforcement Responsibility for Pesticide Use Violations
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management Systems: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administrated Permit Programs: The Hazardous Waste Permit Program
40 CFR 271	Requirements for Authorization of State Hazardous Waste Programs
40 CFR 272	Approved State Hazardous Waste Management

	Programs
40 CFR 273	Universal Waste Management
40 CFR 279	Used Oil Regulations
40 CFR 280	Owners and Operators of Underground Storage Tanks
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 355	Emergency Planning and Notification
40 CFR 372-SUBPART D	EPA Toxic Chemical Release Reporting Regulations
40 CFR 716	Health and Safety Data Reporting
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 173	Shipments and Packagings
49 CFR 178	Packagings

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846	(1996) Evaluating Solid Waste (Physical/Chemical Methods)

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)

COMAR 26.13	Department of the Environment, Disposal of Controlled Hazardous Substances

INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER

IHDIVNSWC 5090.2D	Hazardous Waste Management Plan

1.2 DEFINITIONS

1.2.1 Sediment

Soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.2 Solid Waste

Garbage, refuse, debris, sludge, or other discharged material (except hazardous waste as defined in paragraph entitled "Hazardous Waste" or hazardous debris as defined in paragraph entitled "Hazardous Debris"), including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations. Material not regulated as solid waste are: nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges;

regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

a. Green waste: The vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

b. Surplus soil: Existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included.

c. Inert construction and demolition debris: Broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may be reinforced with or contain ferrous wire, rods, accessories and weldments.

d. Wood: Dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated and/or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included.

e. Scrap metal: Scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe and wire that are recovered or collected and disposed as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

f. Paint cans: Metal cans that are empty of paints, solvents, thinners and adhesives. If permitted by the paint can label, a thin dry film may remain in the can.

g. Recyclables: Materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans may not be included as recyclable if sold to a scrap metal company.

1.2.3 Debris

Non-hazardous solid material generated during the construction, demolition, or renovation of a structure which exceeds 2.5 inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.4 Hazardous Debris

As defined in paragraph entitled "Debris" of this section, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) per 40 CFR 261 or COMAR 26.13; or debris that exhibits a characteristic of hazardous waste per 40 CFR 261 or COMAR 26.13.

1.2.5 Chemical Wastes

This includes salts, acids, alkalies, herbicides, pesticides, and organic chemicals.

1.2.6 Garbage

Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2.7 Hazardous Waste

Hazardous waste as defined in 40 CFR 261, COMAR 26.13 or as defined by applicable State and local regulations.

1.2.8 Oily Waste

Petroleum products and bituminous materials.

1.2.9 Regulated Waste

Those solid waste that have specific additional Federal, state, or local controls for handling, storage, or disposal.

1.2.10 Class I Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of the Clean Air Act and includes the following chemicals:

chlorofluorocarbon-11 (CFC-11)	chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-12 (CFC-12)	chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-13 (CFC-13)	chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-111 (CFC-111)	chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-112 (CFC-112)	chlorofluorocarbon-217 (CFC-217)
chlorofluorocarbon-113 (CFC-113)	halon-1211
chlorofluorocarbon-114 (CFC-114)	halon-1301
chlorofluorocarbon-115 (CFC-115)	halon-2402
chlorofluorocarbon-211 (CFC-211)	carbon tetrachloride
chlorofluorocarbon-212 (CFC-212)	methyl chloroform

1.2.11 Hazardous Materials

Any material that is regulated as a hazardous material in accordance with 49 CFR 173 or COMAR 26.13, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261 or COMAR 26.13. Throughout this specification, hazardous material includes hazardous chemicals.

1.3 SUBMITTALS

Submit the following in accordance with Section C of the Basic Contract.

SD-01 Preconstruction Submittals

Environmental Protection Plan

Sediment and Erosion Control Plan

SD-06 Test Reports

Laboratory analysis

SD-11 Closeout Submittals

Some of the records listed below are also required as part of other submittals. For the "Records" submittal, maintain on-site a separate three-ring Environmental Records binder and submit at the completion of the project. Make separate parts to the binder corresponding to each of the applicable subitems listed below.

Solid waste disposal permit

Waste determination documentation

Disposal documentation for hazardous and regulated waste

Contractor 40 CFR employee training records

Regulatory notification

Erosion and sediment control inspection reports

Solid waste disposal report

Contractor Hazardous Material Inventory Log

1.4 CONTRACTOR PREPARED SEDIMENT AND EROSION CONTROL PLAN

The Contractor shall prepare a sediment and erosion control plan for this project. The plan shall include as a minimum:

(1) An F size graphic plan of the construction site with the location and description of all sediment and erosion control measures proposed.

(2) The sequence of construction to be followed.

(3) Graphic details of all sediment and erosion control measures to be used in this project.

(4) An approval sign-off block.

The approval sign-off block shall contain the following:

Contractors Sediment and Erosion Control Point of Contact:

_____	_____	_____
Date	Printed Name	Signature

IHDIV-NSWC Sediment and Erosion Control Point of Contact:

Signatures below indicates plan approval:

_____	_____	_____
Date	Printed Name	Signature

1.4.1 Contractor Prepared Sediment and Erosion Control Plan

Submit one copy of the proposed Sediment and Erosion Control Plan for approval by the Contracting Officer prior to performing any earth disturbing activities.

1.4.2 Approved Sediment and Erosion Control Plan

Submit three copies of the approved Sediment and Erosion Control Plan to the Contracting Officer prior to performing any earth disturbing activities.

The Contractor shall strictly follow the Sediment and Erosion Control Plan and maintain all measures used during construction.

1.4.3 Modification to Approved Sediment and Erosion Control Plan

The Contractor may propose modifications to the Sediment and Erosion Control Plan at any time. The Contractor shall submit all modifications to the ROICC and to MDE for approval. No modification to the sediment and erosion control plan will be allowed until these changes have been approved by the ROICC and MDE and three copies of the approved modifications have been submitted to the Contracting Officer. The Contractor shall also submit one copy of the proposed modification when the modification are submitted to MDE.

1.5 LABORATORY ANALYSIS

Submit a copy of a laboratory analysis of solid waste and debris with the potential of becoming classified as a hazardous waste (i.e., abrasive/sand blasting debris, etc.). Waste stream determinations are required at the point of generation and must sufficiently document whether the waste will be a solid waste, hazardous waste, or Resource Conservation and Recovery Act (RCRA) exempt waste. Determinations must use EPA approved methods and provide written rational for whether the waste is classified as hazardous or non-hazardous. The Contractor shall bear the cost of the waste stream determinations, and the Contracting Officer reserves the right to request waste stream determinations on questionable waste streams.

1.6 REPORTS

1.6.1 Solid Waste Disposal Permit

Submit one copy of a State and local permit or license showing such agencies' approval of the disposal plan before transporting wastes off Government property.

1.6.2 Waste Determination Documentation

The Contractor shall complete a Waste Determination form (provided at the pre-construction conference) for all Contractor derived wastes to be generated. The waste determination must be based upon either a constituent listing from the manufacturer used in conjunction with consideration of the process by which the waste was generated, EPA approved analytical data, or laboratory analysis (Material Safety Data Sheets (MSDS) by themselves are not adequate). All support documentation must be attached to the Waste Determination form. As a minimum, a Waste Determination form must be provided for the following wastes (this listing is not all inclusive): oil and latex based painting and caulking products, solvents, adhesives,

aerosols, petroleum products, and all containers of the original materials.

1.6.3 Disposal Documentation for Hazardous and Regulated Waste

Submit a copy of the applicable EPA and State permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities.

1.6.4 Contractor 40 CFR Employee Training Records

Prepare and maintain employee training records throughout the term of the contract meeting applicable 40 CFR requirements. The Contractor shall ensure every employee completes a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures compliance with Federal, State and local regulatory requirements for RCRA Large Quantity Generator. The Contractor shall provide a Position Description for each employee, by subcontractor, based on the Davis-Bacon Wage Rate designation or other equivalent method, evaluating the employee's association with hazardous and regulated wastes. This Position Description shall include training requirements as defined in 40 CFR 265 for a Large Quantity Generator facility. Submit these training records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

1.6.5 Regulatory Notification

The Contractor is responsible for all regulatory notification requirements in accordance with Federal, State and local regulations. The Contractor shall forward copies to the Contracting Officer prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all inclusive): demolition, renovation, NPDES defined site work, remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.6.6 Erosion and Sediment Control Inspection Reports

Submit "Erosion and Sediment Control Inspection Reports" (form provided at the pre-construction conference) to the Contracting Officer once every seven calendar days and within 24 hours of a storm event that produces 0.5 inch or more of rain.

1.6.7 Solid Waste Disposal Report

Monthly the Contractor shall submit a solid waste disposal report to the Contracting Officer. For each waste, the report shall state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste. The Contractor shall include copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, the Contractor may submit a statement indicating the disposal location for the solid waste which is signed by an officer of the Contractor firm authorized to legally obligate or bind the firm. The sales documentation or Contractor certification shall include the receiver's tax identification number and business, EPA or State registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained by the Contractor for his own use, the Contractor shall submit on the solid waste disposal report the information previously described in this paragraph. Prices paid or received shall not be reported to the Contracting Officer

unless required by other provisions or specifications of this Contract or public law.

1.7 CLASS I ODS PROHIBITION

Class I ODS as defined and identified herein shall not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition shall be considered to prevail over any other provision, specification, drawing, or referenced documents.

1.8 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Environmental Brief: Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the activity; types and quantities of wastes/wastewater that may be generated during the contract.

1.8.1 Facility Hazardous Waste Generator Status

IHDIV-NSWC is designated as a Large Quantity Generator. All work conducted within the boundaries of IHDIV-NSWC must meet the regulatory requirements of this generator designation. The Contractor shall comply with all provisions of Federal, State and local regulatory requirements applicable to this generator status regarding training and storage, handling, and disposal of all construction derived wastes.

1.8.2 Licenses and Permits

Obtain licenses and permits pursuant to the "Permits and Responsibilities" FAR Clause.

For permits obtained by the Contracting Officer, whether or not required by the permit, the Contractor is responsible to perform quality control inspections of the work in progress, and to submit notifications and certifications to the applicable regulatory agency, via the Contracting Officer, that the work conforms to the contract and permit requirements. The inspections and certifications shall be provided through the services of a Professional Engineer, registered in the State where the work is being performed. As a part of the Quality Control Plan, which is required to be submitted for approval in accordance with Section 01450N, "Quality Control", provide a subitem containing the name, P.E. registration number, address, and telephone number of the professional engineer(s) who will be performing the inspections and certifications for each permit listed above.

1.8.3 Contractor Liabilities for Environmental Protection

The Contractor is advised that this project and IHDIV-NSWC are subject to Federal, State, and local regulatory agency inspections to review

compliance with environmental laws and regulations. The Contractor shall fully cooperate with any representative from any Federal, State or local regulatory agency who may visit the job site and shall provide immediate notification to the Contracting Officer, who shall accompany them on any subsequent site inspections. The Contractor shall complete, maintain, and make available to the Contracting Officer, station, or regulatory agency personnel all documentation relating to environmental compliance under applicable Federal, State and local laws and regulations. The Contractor shall immediately notify the Contracting Officer if a Notice of Violation (NOV), Notice of Deficiency (NOD), or similar regulatory notice is issued to the Contractor.

The Contractor shall be responsible for all damages to persons or property resulting from Contractor fault or negligence as well as for the payment of any civil fines or penalties which may be assessed by any Federal, State or local regulatory agency as a result of the Contractor's or any subcontractor's violation of any applicable Federal, State or local environmental law or regulation. Should a NOV, Notice of Noncompliance (NON), NOD, or similar regulatory agency notice be issued to the Government as facility owner/operator on account of the actions or inactions of the Contractor or one of its subcontractors in the performance of work under this contract, the Contractor shall fully cooperate with the Government in defending against regulatory assessment of any civil fines or penalties arising out of such actions or inactions.

1.9 ENVIRONMENTAL PROTECTION PLAN

Five days after the award of contract, the Contractor shall meet with the Contracting Officer to discuss the proposed Environmental Protection Plan and develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken. The Environmental Protection Plan shall be submitted in the following format and shall, at a minimum, address the following elements (also refer to paragraph entitled "Protection of Natural Resources" in this section):

a. Description of the Environmental Protection Plan

(1) General overview and purpose

(2) General site information

b. Protection of Natural Resources

(1) Land resources

(2) Tree protection

(3) Replacement of damaged landscape features

(4) Temporary construction

(5) Stream crossings

(6) Fish and wildlife resources

(7) Wetland areas

c. Protection of Historical and Archaeological Resources

(1) Objectives

(2) Methods

d. Stormwater Management and Control

(1) Ground cover

(2) Erodible soils

(3) Temporary measures

(a) Mechanical retardation and control of runoff

(b) Vegetation and mulch

(4) Stormwater Pollution Prevention Plan, Section 01115, "General Paragraphs (Remedial Action Contracts)."

e. Prevention of Releases to the Environment

(1) Procedures to prevent releases to the environment

(2) Notifications in the event of a release to the environment

f. Protection of the Environment from Waste Derived from Contractor Operations

(1) Control and disposal of solid and sanitary waste

(2) Control and disposal of hazardous waste (Hazardous Waste Management Section)

This item shall consist of the management procedures for all hazardous waste to be generated. The elements of those procedures shall coincide with the Activity Hazardous Waste Management Plan. A copy of the Activity Hazardous Waste Management Plan will be provided by the Contracting Officer. As a minimum, include the following:

(a) Procedures to be employed to ensure a written waste determination is made for appropriate wastes which are to be generated;

(b) Sampling/analysis plan;

(c) Methods of hazardous waste accumulation/storage (i.e., in tanks and/or containers);

(d) Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted);

(e) Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268);

(f) Management procedures for recyclable hazardous materials such

as lead-acid batteries, used oil, and the like;

(g) Used oil management procedures in accordance with 40 CFR 279 and COMAR 26.13;

(h) Pollution prevention\hazardous waste minimization procedures;

(i) Plans for the disposal of hazardous waste by permitted facilities;

(j) Procedures to be employed to ensure all required employee training records are maintained.

1.9.1 Environmental Protection Plan Review

Fourteen days after the environmental protection meeting, submit the proposed Environmental Protection Plan for further discussion, review, and approval. Commencement of work shall not begin until the Environmental Protection Plan has been approved.

1.10 UNFORESEEN HAZARDOUS OR REGULATED MATERIAL

All known hazardous or regulated materials are indicated in the contract documents. If material that is not indicated in the contract documents is encountered that may be dangerous to human health upon disturbance during construction operations, stop that portion of work and notify the Contracting Officer immediately. Intent is to identify materials such as PCB, lead paint, mercury, petroleum products, and friable and nonfriable asbestos. Within 14 calendar days the Contractor shall determine if the material is hazardous. If the material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If the material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to Contract Clauses "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

1.11 CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG

Submit the "Contractor Hazardous Material Inventory Log" , which provides information required by (EPCRA Sections 312 and 313) along with corresponding MSDS to the Contracting Officer at the start and at the end of construction (30 days from final acceptance), and update no later than January 31 of each calendar year during the life of the contract. Documentation for any spills/releases, environmental reports or off-site transfers may be requested by the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified. Conform to the national permitting requirements of the Clean Water Act.

3.1.1 Land Resources

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor shall be responsible for any resultant damage.

3.1.1.1 Protection of Trees

Protect existing trees which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.

3.1.1.2 Replacement

Remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features. Obtain Contracting Officer's approval before replacement.

3.1.2 Water Resources

3.1.2.1 Stream Crossings

The Contracting Officer's approval is required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain Contracting Officer's approval prior to installation. Remove temporary culverts or bridges upon completion of work, and repair the area to its original condition as indicated or as specified.

3.1.2.2 Oily and Hazardous Substances

Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters. In accordance with 40 CFR 112, surround all temporary fuel oil or petroleum storage tanks with a temporary berm or containment of sufficient size and strength to contain the contents of the tanks, plus 10 percent freeboard for precipitation. The berm shall be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.

3.1.3 Fish and Wildlife Resources

Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.

3.1.4 Temporary Construction

Remove traces of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles or excess or waste materials, and other signs of construction. Grade temporary roads, parking areas, and similar temporarily used areas to conform with surrounding contours.

3.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Carefully protect in-place and report immediately to the Contracting Officer historical and archaeological items or human skeletal remains discovered in the course of work. Upon discovery, notify the Contracting Officer. Stop work in the immediate area of the discovery until directed by the Contracting Officer to resume work. The Government retains ownership and control over historical and archaeological resources.

3.3 EROSION AND SEDIMENT CONTROL MEASURES

3.3.1 Burnoff

Burnoff of the ground cover is not permitted.

3.3.2 Borrow Pit Areas

Manage and control borrow pit areas to prevent sediment from entering nearby streams or lakes. Restore areas, including those outside the borrow pit, disturbed by borrow and haul operations. Restoration includes grading, replacement of topsoil, and establishment of a permanent vegetative cover. Uniformly grade side slopes of borrow pit to not more than a slope of 1 vertical to 2 horizontal. Uniformly grade the bottom of the borrow pits to provide a flat bottom and drain by outfall ditches or other suitable means. Stockpile topsoil remove during the borrow pit operation, and use as part of restoring the borrow pit area.

3.3.3 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

3.3.4 Temporary Protection of Erodible Soils

Use the following methods to prevent erosion and control sedimentation:

3.3.4.1 Mechanical Retardation and Control of Runoff

Mechanically retard and control the rate of runoff from the construction site. This includes construction of diversion ditches, benches, berms, and use of silt fences and straw bales to retard and divert runoff to protected drainage courses.

3.3.4.2 Vegetation and Mulch

Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.

a. Seeding: The seeding operation shall be as specified in Section 02951, "Mitigated Wetlands Area, Shrubs, Plants, and Grass."

3.4 CONTROL AND DISPOSAL OF SOLID WASTES

Pick up solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged and can be coordinated with the Contracting Officer and the activity recycling coordinator. Remove all solid waste (including non-hazardous debris) from Government property and dispose off-site at an approved landfill. Solid waste disposal off-site must comply with most stringent local, State, and Federal requirements including 40 CFR 243, 40 CFR 258, and COMAR 26.13.

3.5 CONTROL AND DISPOSAL OF HAZARDOUS WASTES

3.5.1 Hazardous Waste/Debris Management

The Contractor shall identify all construction activities which will generate hazardous waste/debris. The Contractor must provide a documented waste determination for all resultant waste streams. Hazardous waste/debris shall be identified, labeled, handled, stored, and disposed in accordance with all Federal, State, and local regulations including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, COMAR 26.13, and IHDIVNSWC 5090.2D. Hazardous waste shall also be managed in accordance with the approved Hazardous Waste Management Section of the Environmental Protection Plan. Store hazardous wastes in approved containers in accordance with 49 CFR 173, 49 CFR 178, and COMAR 26.13. Hazardous waste generated within the confines of Government facilities shall be identified as being generated by the Government. The Contractor shall dispose of all hazardous waste unless the Contractor cannot accommodate disposal. If the Contractor cannot accommodate disposal the Government may dispose of hazardous waste subject to ROICC approval. Prior to removal of any hazardous waste from Government property, all hazardous waste manifests must be signed by the Property Disposal Office. No hazardous waste shall be brought onto Government property. Provide to the Contracting Officer a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D or COMAR 26.13. For hazardous wastes spills, verbally notify the Contracting Officer immediately.

3.5.1.1 Hazardous Waste Storage/Satellite Accumulation/90 Day Storage Areas

If the work requires the temporary storage/collection of hazardous wastes, the Contractor shall request the establishment of a less than 90 Day Hazardous Waste Storage Area, or a Satellite Accumulation Area at the point of generation. The Contractor must submit a request in writing to the Contracting Officer providing the following information in advance of generating the hazardous waste:

Contract Number	_____	Contractor	_____
Haz/Waste POC	_____	Telephone Number	_____
Type of Waste	_____	Source of Waste	_____
Emergency POC	_____	Telephone Number	_____

Location of the Site: _____

(Attach Site Plan to the Request)

Attach a waste determination form. Allow ten working days for processing this request.

3.5.1.2 Sampling and Analysis of HW

a. Sampling

The Contractor shall sample waste in accordance with EPA SW-846. Each sampled drum or container shall be clearly marked with the Contractor's identification number and cross referenced to the chemical analysis performed.

b. Analysis

The Contractor shall follow the analytical procedure and methods in accordance with 40 CFR 261 and COMAR 26.13. The Contractor shall provide all analytical results and reports performed to the Contracting Officer

c. Analysis Type

Identification of waste hazardous material/hazardous waste shall be accomplished by analyzing for the following properties as a minimum: ignitability, corrosivity, reactivity, total chlorides, BTU value, PCBs, TCLP for heavy metals, and cyanide.

3.5.1.3 Hazardous Waste Disposal

Control of stored waste, packaging, sampling, analysis, and disposal shall be determined by the details in the Basic Contract. The requirements for jobs in the following paragraphs shall be used as the guidelines for disposal of any hazardous waste generated.

(a) Responsibilities for Contractor's Disposal

Any generation of WHM/HW requiring Contractor disposal of solid waste or liquid.

a. The Contractor agrees to provide all service necessary for the final treatment/disposal of the hazardous material/waste in accordance with all local, State and Federal laws and regulations, and the terms and conditions of the Basic Contract within sixty (60) days after the materials have been generated. These services shall include all necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal, and/or transportation, including manifesting or completing waste profile sheets, equipment, and the compilation of all documentation is required).

b. Contain all waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 272, 40 CFR 273, 40 CFR 279, 40 CFR 280, 40 CFR 761, and COMAR 26.13.

c. Control and turn in all hazardous waste requiring disposal in accordance with paragraph entitled "Contractor Disposal Turn-In Requirements" and as follows:

1. On-site Disposal

All hazardous waste must be turned into the Government (Property Disposal Office, Code 112) by 1530 hours each day. If the hazardous waste cannot be turned into the Government at the end of each shift (by 1530) then the Contractor must establish accumulation sites, assign site managers, and notify Code 044 of the type 1 location of the sites and the name of site manager. Prior to turning in hazardous waste to the Government Property Disposal Office, Code 112 the Contractor/Contracting Officer must:

(a) Provide a DD 1348-1 Form, 3 copies of a profile sheet, and three copies of a laboratory analysis to the Government (Property Disposal Office, Code 112) prior to the initial turn in of hazardous wastes.

(b) Provide a DD 1348-1 Form for each additional lot of hazardous waste turned into the Government (Property Disposal Office, Code 112).

2. Off-Site Disposal

(a) All Contractor credentials (i.e., disposal company's permit to operate, hazardous waste transporter certificate, etc.) must be reviewed by Codes 112 and 044.

(b) The Contractor must also establish hazardous waste accumulation sites, assign site managers, and notify Code 044 of the type/location of the sites and the name of site managers.

(c) All off-site shipments of hazardous wastes must be coordinated through the Property Disposal Office, Code 112. All manifests shall be signed by the Property Disposal Office.

(d) Contract requirements for off-site disposal of wastes must include the following:

1) The amount of time that the Contractor has to dispose of the waste should not be longer than six months; all hazardous waste stored in less than 90 Day Hazardous Waste Storage Areas must be removed in less than 90 days of generation.

2) Payment must be withheld until the Contractor provides a disposal certification to the Government as proof that the waste was properly disposed.

d. Obtaining a representative sample of the material generated for each job done to provide waste stream determination.

e. Analyzing for each sample taken and providing analytical results to the Contracting Officer. Provide two copies of the results.

f. Determine the DOT proper shipping names for all waste (each container requiring disposal) and shall demonstrate how this determination is developed and supported by the sampling and analysis requirements contained herein to the Contracting Officer for Code 044 review.

Government Responsibilities

To review all documentation submitted by the Contractor for accuracy. Provide guidance to the Contractor in reference to environmental compliance.

Interim Waste Generation Site for Contractor Disposal of WHM/HW

The Contractor shall request approval of the Government for an area suitable for packaging WHM/HW requiring disposal. The Contractor shall comply with the requirements of the Maryland Department of Waste Management Regulations. The area will be barricaded and a sign identifying as follows:

Signage- "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

With additional custody sign indicating:

(1) Site # 12
(2) Controlled by Resident Officer in Charge of Construction
(3) Call Ms. Cathy Gardner at (301) 744-4112

Barricade Type: Yellow and black three (3) inch plastic tape. Corner barricades shall be provided by the Government.

Contractor Disposal Turn-In Requirements

For any waste hazardous materials or hazardous waste generated which requires the Contractor to dispose of, the following conditions must be complied with:

a. Notify Code 112 dispatcher, at (301) 744-4343 and provide the following information:

(1) Your name and company

(2) Service/contract number

(3) ROICC/Code 09C1 number

(4) Telephone number where you can be reached

(5) Material requiring disposal

(6) Location of material

(7) Volume of material in each container

b. All material must meet the following conditions in order to be acceptable for disposal

(1) Drums compatible with waste contents and drums meet DOT requirements for 49 CFR 173 and COMAR 26.13 for transportation of materials or as specified by the Property Disposal Office, Code 112.

(2) Drums banded to wooden pallets. No more than three (3) 55 gallon drums to a pallet, or two (2) 85 gallon over packs.

(3) Band using 1-1/4 inch minimum band on upper third of drum.

(4) Recovery materials label (provided by Code 044) located in

middle of drum, filled out to indicate actual volume of material, name of material manufacturer, other vendor information as available.

(5) Always have three (3) to five (5) inches of empty space above volume of material. This space is called 'outage'.

(b) Responsibilities for Government's Disposal

Any generation of WHM/HW requiring Government disposal of solid waste or liquid.

Contractor's Representative

a. Contain all waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 271, 40 CFR 272, 40 CFR 273, 40 CFR 279, 40 CFR 280, 40 CFR 716, and COMAR 26.13.

b. Control and turn-in all hazardous waste requiring disposal in accordance with IHDIV-NSWC Recovery Material Instruction contained in the paragraph entitled "Government Disposal Turn-In Requirements".

c. Providing identification of material requiring disposal to permit safe opening, storage and handling by the Government.

Government Responsibilities

a. Sample material requiring disposal.

b. Analyzing each sample taken.

c. Determine the DOT proper shipping names for all waste (each container requiring disposal) and shall demonstrate how this determination is developed and supported by the sampling and analysis requirements.

d. Accepting and disposing of all WHM/HW properly turned in by the Contractor for disposal.

Acceptance of WHM/HW for Disposal

Upon completion of all above applicable requirements (i.e. sample, analysis, identification, packaging, etc.), the Contractor shall notify the Contracting Officer three (3) working days in advance for review and acceptance by the Environmental Programs Division, Code 112. The Contractor shall correct all discrepancies not conforming to this contract at his expense. Upon acceptance by the Environmental Programs Division, the waste will be removed from the Contractor's work site within three (3) days.

Interim Waste Generation Site for Government Disposal of WHM/HW

The Contractor shall request approval of the Government for an area suitable for packaging WHM/HW requiring disposal. The area will be barricaded and a sign identifying as follows:

Signage- "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

With additional custody sign indicating:

(1) Site # 12
(2) Controlled by Resident Officer in Charge of Construction
(3) Call Ms. Cathy Gardner at (301) 744-4112

Barricade Type: Yellow and black three (3) inch plastic tape. Corner barricades shall be provided by the Government.

Government Disposal Turn-In Requirements

a. Notify Code 112 dispatcher, at (301) 744-4343 and provide the following information:

(1) Your name and company

(2) Service/contract number

(3) ROICC/Code 09C1 contact number

(4) Telephone number where you can be reached

(5) Material requiring disposal

(6) Location of material

(7) Volume of material in each container

b. All material must meet the following conditions in order to be acceptable for disposal:

(1) Drums compatible with waste contents and drums meet DOT requirements for 40 CFR 173 and COMAR 26.13 for transportation of materials.

(2) Drums banded to wooden pallets. No more than three (3) 55 gallon drums to pallet, or two (2) 85 gallon over packs.

(3) Band using 1-1/4 inch minimum band on upper third of drum.

(4) Recovery materials label (provided by Code 106.321) located in middle of drum, filled out to indicate actual volume of material, name of material manufacturer, other vendor information as available.

(5) Always have three (3) to five (5) inches of empty space above volume of material. This space is called 'outage'.

(6) Code 112 must be notified within 24 hours of filling any drum of material requiring disposal. Date on recovery material label shall be Code 112 notification date.

3.5.2 Pollution Prevention/Hazardous Waste Minimization

The Contractor shall actively pursue minimizing the use of hazardous materials and the generation of hazardous waste while on-base. The Hazardous Waste Management Section of the Environmental Protection Plan shall include the Contractor's procedures for pollution prevention/

hazardous waste minimization. For preparing this part of the plan, the Contractor may consult the activity Environmental Office for suggestions and to obtain a copy of the installation's pollution prevention/hazardous waste minimization plan for reference material. If no written plan exists, the Contractor may obtain information by contacting the Contracting Officer. The Contractor shall describe the types of the hazardous materials expected to be used in the construction when requesting information.

3.5.3 Hazardous Material Control

The Contractor shall include hazardous material control procedures in the Health and Safety Plan. The procedures shall address and ensure the proper handling of hazardous materials, including the appropriate transportation requirements. The Contractor shall submit a MSDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on base. Typical materials requiring MSDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. At the end of the project, the Contractor shall provide the Contracting Officer with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used. The Contractor shall also ensure that hazardous materials are utilized in a manner that will minimize the amount of hazardous waste that is generated. The Contractor shall ensure that all containers of hazardous materials have NFPA labels or their equivalent. Copies of the MSDS for hazardous materials shall be kept on site at all times and provided to the Contracting Officer at the end of the project. The Contractor shall certify that all hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste per 40 CFR 261 or COMAR 26.13.

3.5.4 Petroleum Products

Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. All used oil generated on site shall be managed in accordance with 40 CFR 279 and COMAR 26.13. The Contractor shall determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. In addition, used oil containing 1000 parts per million or greater of solvents will be considered a hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste. All hazardous waste will be managed in accordance with the paragraph entitled "Hazardous Waste/Debris Management" and shall be managed in accordance with the approved Environmental Protection Plan.

3.5.5 Releases/Spills of Oil and Hazardous Substances

Take precautions to prevent releases/spills of oil and hazardous substances. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Base or Activity Fire Department (301) 744-4333, the activity's Command Duty Officer, and the Contracting Officer. The Contractor is responsible for verbal and written notifications as required by the 40 CFR 355, COMAR 26.13, State, local regulations and Navy Instructions. A written follow-up report shall be sent to the Contracting Officer within four hours specifying type and amount of material spilled, cleanup action planned or taken to prevent reoccurrence. After initial investigation by its

representatives, the government may require that the spill reporting required by state and federal regulations be done by the Contractor. Spill response shall be in accordance with 40 CFR 300, COMAR 26.13, and applicable State and local regulations. Contain and clean up these spills without cost to the Government. If Government assistance is requested or required, the Contractor shall reimburse the Government for such assistance. Provide copies of the written notification and documentation that a verbal notification was made within 20 days.

The Contractor shall be responsible for all supplemental written reports and corrective actions required by the MDE for spills resulting from Contractor operations of vehicles. Written reports are required by MDE within 10 calendar days of spill clean up.

3.6 DUST CONTROL

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.7 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted without written permission from the Contracting Officer, and then only during the designated times.

-- End of Section --

SECTION 02223

TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with Section C of the Basic Contract.

SD-07, Certificates

Treatment facility permits

SD-11, Closeout Submittals

Shipment manifests

Delivery certificates

Disposal Site Decontamination Certificates

Work Site Decontamination Certificates

Treatment and Disposal Certificates

1.2 QUALITY ASSURANCE

1.2.1 Certificates

1.2.1.1 Treatment Facility Permits

Verification that the proposed treatment facilities are permitted to accept the contaminated materials specified, prior to the start of excavation.

1.2.2 Closeout Submittals

1.2.2.1 Shipment Manifests

Copies of manifests and other documentation required for shipment of waste materials within 24 hours after removal of waste from the site. All shipment manifests, except for hazardous waste manifests, shall be signed by the ROICC NTR. Hazardous waste manifests shall be signed by the Property Disposal Office. The Contractor shall coordinate with the ROICC NTR to obtain these signatures.

1.2.2.2 Delivery Certificates

Verification that the wastes were actually delivered to the approved treatment facility, within 7 days of shipment.

1.2.2.3 Disposal Site Decontamination Certificates

Verification that all vehicles and containers were decontaminated prior to leaving the disposal site, within 7 days of disposal.

1.2.2.4 Work Site Decontamination Certificates

Verification that all vehicles, equipment, and containers were decontaminated prior to leaving the work site shall be submitted within 24 hours of vehicles, equipment, or containers leaving the work site. Verification that all trucks transporting contaminated materials were properly operating, and were covered, shall be submitted within 24 hours after removal of waste from the site.

1.2.2.5 Treatment and Disposal Certificates

Verification that the wastes were successfully treated and remediated to the levels specified herein.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 MATERIALS AND EQUIPMENT

The Contractor shall furnish all labor, materials, and equipment necessary to transport and dispose of Government and Contractor generated wastes in accordance with applicable federal, state, and local requirements.

3.2 SAMPLING

3.2.1 Sampling of Stored Material

Samples of stored material shall be collected at a frequency as required by the disposal facility. Analyses for contaminated material to be taken to an off-site treatment facility shall conform to local, state, and federal criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the ROICC NTR. Additional sampling and analyses to the extent required by the approved off-site treatment, storage or disposal TSD facility shall be the responsibility of the Contractor and shall be subject to approval by the ROICC NTR.

3.2.2 Sampling Liquid

Liquid collected from excavations, storage areas and decontamination facilities shall be sampled at a frequency as required by the disposal facility if disposed off-site. On-site treatment shall be the preferred method if economics prove on-site treatment is more cost effective than off-site disposal. Analyses for contaminated liquid to be taken to an off-site treatment facility shall conform to local, state, and federal criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the ROICC NTR. Additional sampling and analysis to the extent required by the approved off-site TSD facility receiving the material shall be the responsibility of the Contractor and shall be subject to approval by the ROICC NTR.

3.3 RECORDS

The Contractor shall originate, use, and maintain the waste shipment records/manifests as required by the Maryland Department of the Environment.

3.4 DECONTAMINATION

The Contractor shall be solely responsible for complying with all federal, state, and local requirements for decontamination of vehicles, equipment, and containers and shall bear all responsibility and cost for any noncompliance. In addition to those requirements, the Contractor shall perform the following.

a. Visually inspect all vehicles, equipment, and containers leaving the work site for proper decontamination.

b. Prepare and maintain a written decontamination log.

c. Decontamination log shall remain on site at all times for inspection purposes.

3.5 TRANSPORTATION

The Contractor shall be solely responsible for complying with all federal, state, and local requirements for transporting petroleum and volatile organic compound contaminated materials through the applicable jurisdictions and shall bear all responsibility and cost for any noncompliance. In addition to those requirements, the Contractor shall perform the following:

a. Inspect and document all vehicles and containers for proper operation and covering.

b. Inspect all vehicles and containers for proper markings, manifest documents, and other requirements for waste shipment.

c. Perform and document decontamination procedures prior to leaving the worksite and again before leaving the disposal site.

3.6 DISPOSAL

All contaminated materials removed from the site shall be disposed in a treatment/disposal facility permitted to accept such materials.

-- End of Section --

SECTION 02224

GEOGRAPHIC INFORMATION SYSTEM (GIS) GRADE-B POST-CONSTRUCTION LOCATION

PART 1 GENERAL

1.1 REFERENCES

The publication listed below forms a part of this specification to the extent referenced. The publication is referenced to the text by the basic designation only. This publication is provided as Appendix A at the end of this specification section.

INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER

IHDIVNSWC-GIS-DG	Geographic Information System, Drafting Guidelines

1.2 SYSTEM DESCRIPTION

Provide a survey to locate all new and altered existing surface and subsurface items, including buried utilities, as required by this Contract including all addendums, change orders, and modifications. Using the data from this GIS survey, provide a CADD file and an F-size mylar reproducible and print which shows these new items including buried utilities. The work required by this specification is a separate item required by the basic contract. It can be used to help update the construction AS-BUILTS drawings, but is not to be considered as such.

1.3 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0, of the Basic Contract.

SD-11 Closeout Submittals

Buried Utility Location Plan

Survey Report

GIS CADD file(s)

F-Size plot of the CADD file(s)

PART 2 PRODUCTS

2.1 BURIED UTILITY LOCATION PLAN

2.1.1 Description

The plan shall indicate the method that the Contractor and his surveyor will use to horizontally and vertically locate all new and altered existing surface and subsurface utilities and lines provided as a result of this contract including all change orders, addendums, and modifications. This shall include, but not be limited to, fresh and river water pipelines, sanitary and storm sewer pipelines, electrical conduits and lines,

grounding rods and cables, telephone lines, cable television and fiber optic lines, various process pipelines, etc. The plan shall be composed on 8 1/2 inch x 11 inch sheets only. No legal sheets are allowed.

2.1.2 Contents

The plan shall contain as a minimum:

- A cover sheet with the contract title and contract number.
- The company name, address, and telephone number of the Contractor and Project Manager as well as a point of contact for this GIS work.
- The company name, address, and telephone number of the firm performing the survey with the names of the personnel performing the survey.
- A full description of the method to be used for locating all new and altered existing surface and subsurface utilities for the GIS survey.
- The typed or neatly printed name and signature of the Contractor's Project Manager and the Registered Land Surveyor who will be stamping the GIS work.

2.2 SURVEY REPORT

2.2.1 Physical Description

The report shall describe the companies and persons involved with the GIS work required by this specification section as well as providing information on what equipment was used to perform the survey. The report shall be compiled such that it is in one bound unit that may be filed in a standard file cabinet. The report shall be composed on 8 1/2 inch x 11 inch sheets only. No legal sheets are allowed.

2.2.2 Contents

The report shall include as a minimum:

- A cover sheet with the contract title and contract number.
- The company name, address, and telephone number of the firm performing the survey with the names of the personnel performing the GIS survey.
- The date(s) that the GIS survey was performed.
- The make and model of the hardware used to perform the survey.
- The method of data collection with the name and version of the data collection software.
- A hard copy of the field data.
- The company name, address, and telephone number of the firm providing the CADD file with the names of persons creating the file.
- A copy of the Buried Utility Location Plan.

2.3 GIS CADD FILE(S)

2.3.1 Drafting Standards

All CADD files shall be prepared in accordance with IHDIVNSWC-GIS-DG DRAFTING GUIDELINES provided as Appendix A at the end of this specification section.

2.3.2 Media

The CADD file(s) shall be submitted on 3 1/2 inch HD diskettes (1.44 MB formatted). The diskettes shall become the property of the government (IHDIV-NSWC) at each submission.

2.3.3 Format

The CADD files shall be provided in the AutoCad (.DWG) R-12 or later version format only. The files shall be read and utilized without conversion or reprocessing with the exception of archiving.

2.3.4 Archiving

The CADD files may be archived for convenience and for space limitations. The files shall be archived using PKZIP software, and shall be able to be unarchived using PKUNZIP. No other means of archival is allowed. A copy of the same version of PKZIP and PKUNZIP used to zip the files shall be included with the zipped files.

2.3.5 Scale

The CADD files shall all be done at FULL scale. The scale is 1.0 (1'-0" = 1'-0").

2.3.6 Orientation

Each CADD file shall be oriented such that all items are located at their true SPCS coordinates. The coordinates shall be in the U.S. Foot measurement using Northing and Easting Coordinates consistent with the State Plane Coordinate System (SPCS) for the State of Maryland (NAD 83). The files shall be oriented such that North is at the top of the screen.

2.3.7 Vector Graphics

The CADD files shall be in vector form only. The files shall be created using vector entities. The use of scanned or digitized files is not allowed. The use of files that have been vectorized from hand drawn, scanned, or digitized drawings is not allowed.

2.3.8 Plot Files

The plot file shall be provided on a 3 1/2 inch HD diskette for each F-Size plot, and shall be identical to the plot of each CADD files submitted.

2.3.9 Multiple Sites

If the project has multiple sites, a separate CADD files shall be made for each site.

2.3.10 Drawing Border and Title Block

The border and title block will be provided by the government on a 3 1/2 inch diskette.

2.4 F-SIZE PLOT

2.4.1 Description

The Contractor shall provide one mylar reproducible hard copy F-Size plot and four (4) blueprint copies of all new and altered existing surface and subsurface items as a result of this project including all addendums, change orders, and modifications. The plot shall be oriented such that North is at the top of the sheet. All copies required by submittal shall be made from the mylar reproducible from the same submission. The border and title block will be provided by the government on a 3 1/2 inch diskette.

2.4.2 Items Required on the Plot

The following items shall be included on the plan in addition to the GIS plan:

- The border and title block as provided by the government.
- The contract number and title.
- The date the CADD file was plotted.
- The scale of the plot and a graphic scale of the scale used to plot the drawing.
- A North arrow.
- A legend of items indicated on the GIS plan.
- The control points used for the survey and their Northing and Easting coordinates and elevations (each point shall be located at its true SPCS location).
- The name and address of the Contractor's firm.
- The name and address of the firm performing the post-construction survey.
- The name and address of the firm producing the GIS CADD file.
- The name and signature of the person preparing the CADD file and plot.
- The stamp and signature of the Registered Land Surveyor (physical imprint on the mylar reproducible only).

2.4.3 Multiple Sites

If the project has multiple sites, a separate F-size sheet shall be made for each site.

PART 3 EXECUTION

3.1 BURIED UTILITY LOCATION PLAN

3.1.1 Procedure

The Buried Utility Location Plan shall be prepared by the Contractor with input from the Contractor's surveyor. The Contractor shall prepare and submit the Buried Utility Location Plan prior to performing any construction work.

3.2 GIS SURVEY

3.2.1 Description

A survey shall be performed by the Contractor to horizontally and vertically locate all new and altered existing surface and subsurface items installed as a result of this contract. The Contractor shall locate all items required by all disciplines of the contract and as required by all change orders, addendums, and modifications. This includes all new and altered underground utilities including, but not limited to, fresh and river water pipelines, sanitary and storm sewer pipelines, electrical conduits and lines, grounding rods and cables, telephone lines, cable television and fiber optic lines, and various process pipelines, etc.

3.2.2 Procedure

The survey shall be performed with a total station. The survey shall initiate at any primary or secondary combined (horizontal and vertical) control point near the construction site and backside one other primary or secondary combined control point in order to provide the correct coordinates, elevations, and orientation. Available control points in the area will be indicated to the surveyor prior to the survey. Should additional turning points be required to complete the survey, a set-up on any other secondary combined control point may be used, or single turning points may be set from these primary or secondary control points. Any number of single turning points, that have been established from a primary or secondary combined control point, may be used to complete the survey. Should it be necessary to set additional turning points due to inaccessible areas, an open and traverse and level run shall be performed that extends from one existing primary or secondary control point to another with a minimum error of closure of 1/5000. Documentation of the open-end traverse and level run shall be included in the survey report.

3.2.3 Horizontal Location Standards

3.2.3.1 Surface and Subsurface Items

Horizontally locate all new and altered existing surface and subsurface items to 0.10 foot of their true SPCS coordinates.

3.2.4 Typical Horizontal Items

The survey shall include, but not be limited to:

3.2.4.1 Corners and Edges

Buildings, pads, dikes, tanks, structures, pavements, roads, parking areas, walks, woodlines, piers, walls, ponds, marshes, rivers, exposed portions of footings. Buildings shall be located at the corners of the building, not the corners of rooflines. Items indicated with edges such as woodlines,

roads, ponds, and shorelines, shall be surveyed such that they provide a reasonable degree of accuracy, to meet the intent of this specification. Woodlines shall be surveyed at the tree-dripline. When shorelines subject to tidal action are required to be surveyed, the shoreline shall be indicated at the Mean High Water (MHW) elevation of 1.42 feet.

3.2.4.2 Lines and Centerlines

Utility lines and pipelines, ditches, fences, overhead transmission lines, steam and air lines, cable trays.

3.2.4.3 Point Entities

Identify the following using symbols: valves, hydrants, poles, ground test pockets, stanchions, signs, trees.

3.2.5 Vertical Location Standards

The survey shall include, but not be limited to:

3.2.5.1 Elevated Items

The elevation of platform decks, top of masts, top of roofs, top of exhaust stacks. The elevation of overhead transmission lines, steam and air lines, and cable trays is not required.

3.2.5.2 Surface Items

The Contractor shall indicate the elevation of all new and altered existing surface and subsurface items to 0.10 foot of their true elevation as determined from the IHDIV-NSWC vertical control. Indicate the top and invert elevations of all manholes, catch basin, headwalls, finished floor(s) of buildings, top of slabs, top of curbs, invert of dikes, etc. Indicate the elevation of the top of buried lines at a maximum of 50 feet intervals. Indicate the elevations at all connections to existing utilities, thrust blocks, reducers, changes in direction both horizontally and vertically and terminations.

3.2.5.3 Subsurface Items

The Contractor shall indicate the elevation of all new and altered existing surface and subsurface items to 0.50 feet of their true elevation as determined from the IHDIV-NSWC vertical control.

3.2.6 Topography

The survey shall be performed such that the contours can be indicated in one foot increments with no more than one half contour error at any location. Indicate high and low points with spot elevations.

3.2.7 Submerged Items

The bottom of the new ponds shall be surveyed near the conclusion of the project such that they provide adequate topographic contours at the bottom of the pond. Simply indicating the design contours and elevations is not acceptable.

3.2.8 Utility Material and Sizes

The line size and material type of all new and altered existing subsurface piped utilities shall be indicated on the CADD file and on the F-size plot according to the IHDIVNSWC-GIS-DG DRAFTING GUIDELINES.

3.3 GIS CADD FILE

At the completion of the survey the CADD file(s) for each site shall be created. The survey points shall be input into the file at their true SPCS coordinates and all items shall be drawn in at their true SPCS horizontal IHDIVNSWC-GIS-DG DRAFTING GUIDELINES.

3.4 F-SIZE PLOT

Upon completion of the CADD file, a mylar reproducible F-size plot shall be made to show the contents of each site. The file shall be plotted at full scale 1"=1" (scale = 1.0). Each site may be shown at any of the following scales: 1" = 10', 20', 30', 40', 50', 100', 200', 300', 400', 1000', 2000'. The plot shall be made such that the GIS plan occupies as much of the page as possible. If extensive GIS plans are required, the use of match lines may be used while maintaining true SPCS coordinates.

3.5 SUBMISSIONS

3.5.1 Buried Utility Location Plan

The Contractor shall prepare and submit four (4) copies of the Buried Utility Location Plan prior to performing any construction work. The plan shall not be considered as an acceptable means of location until approved by the Contracting Officer.

3.5.2 CADD Files and F-Size Plot

3.5.2.1 First Submission

Prepare and submit four (4) copies of the CADD files and F-size plots. Only one mylar reproducible is required per submission. The Contractor shall make the required submission within four weeks after the completion of the post-construction survey.

3.5.2.2 Government Review

The Government shall have two (2) weeks to perform a review of the GIS submissions for compliance with this specification and the IHDIVNSWC-GIS-DG DRAFTING GUIDELINES. At the end of two weeks the Contractor shall receive a set of comments detailing the modifications required to be made to the GIS submittals.

3.5.2.3 Government Accuracy Testing

The Government may elect to perform tests to check the accuracy of the post-construction location plan. If the Contractor's plan does not produce results within the indicated accuracy requirements, the Contractor shall perform another survey, correct all errors, and/or make all necessary changes to reflect the true locations of the individual items at no cost to the Government.

3.5.2.4 Following Submissions

The Contractor shall address all comments indicated by the government. The review process indicated above shall continue until all GIS, Grade-B Post Construction Location submittals are approved by the government. Only when the government approves the GIS submittals shall authorization be made for final payment of the construction contract, notwithstanding other items required by the construction contract.

-- End of Section --

APPENDIX A

INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
GEOGRAPHIC INFORMATION SYSTEM/DRAFTING GUIDELINES

ORIGINAL

INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER

ENGINEERING DESIGN DIVISION
GEOGRAPHIC INFORMATION SYSTEM / DRAFTING GUIDELINES

REVISION 4-3-97 SUPERSEDES ALL PREVIOUS REVISION

NOTE TO USER : *THESE BASIC CADD DRAFTING CRITERIA WERE CREATED TO ELIMINATE THE NEED FOR MULTIPLE REVIEWS DUE TO NON COMPLIANT SUBMISSIONS. THE INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER (IHD, NSWC) IS ALSO DEDICATED TO IMPLEMENTATION OF THE TRI-SERVICE CADD STANDARDS THAT ARE BEING DEVELOPED AT THIS TIME.*

THESE STANDARDS WILL BE REVIEWED AND MODIFIED AS DEEMED NECESSARY, BY PW ENGINEERING DESIGN DIV. (IHD, NSWC). ALL DRAFTING AND SPECIFICATION PREPARATION SHALL BE IN ACCORDANCE WITH MIL-HANDBOOK "MIL-HDBK-1006/1" ITEMS LISTED IN THIS ENCLOSURE SHALL SUPERSEDE CADD REQUIREMENTS

1. DRAWINGS WILL BE SPOT CHECKED TO ENSURE COMPLIANCE BY CODE 092 PERSONNEL AT SUBMISSION INTERVALS.

2. ALL DRAWINGS SHALL BE DONE IN CADD FORMAT (.DWG) OR (.DGN) FILES

3. ALL DRAWINGS SHALL BE DONE AT FULL SCALE I.E. 1=1, 1.0 .

4. NEW WORK SHALL STAND OUT FROM EXIST BY LINE WEIGHT AS WELL AS BY DESCRIPTION, LINE TYPES SHALL MATCH EXISTING WHERE APPLICABLE.

5. PLOTTED SIZE OF TEXT SHALL BE MIN. OF 1/8 INCH HIGH

6. ALL DRAWINGS , INCLUDING DETAILS SHOULD BE DRAFTED AND PLOTTED AT 1=1.

7. SUBMIT CADD FILES IN DIGITAL FORMAT ON HD DISKETTES AND PLOTS FOR ALL DESIGNS DURING NORMAL REVIEW PROCESS.

8. USE *(IHD, NSWC)* TITLE SHEETS WHICH ARE AVAILABLE IN (.DWG) OR (.DGN) FORMAT

9. USE C2 TERMINOLOGY RATHER THAN SHEET 2 OF 17

ALL SITE PLANS

1. ALL SITE PLANS SHALL MAINTAIN SPCS, NAD83, USFOOT, ZONE 1900 COORDINATES AS PROVIDED ON ORIGINAL TOPO AND PLANIMETRIC FILES, NOTE: IMPROPER MANIPULATION OF ORIGIN WILL DESTROY ORIGINAL COORDINATES.

2. SITE PLANS SHALL BE DONE BY COMBINING GIS FILES WITH NEW AND EXIST UTILITY FILES; SEE ENCLOSURE (1) LAYER FORMAT .

3. MULTIPLE/ INTERDISCIPLINE SITE PLANS MAY BE USED FOR EASE OF DRAFTING BUT MUST BE COMBINED TO FORM A SINGLE FILE FOR GIS PURPOSES.

4. SITE PLANS SHALL BE PLOTTED TO SCALE USING STANDARD CIVIL ENGINEERING SCALES 1"=10', 20', 30', 40', 50', 60', 100', 200', AND 400'

5. GIS PLANIMETRIC, TOPO, REAL ESTATE AND STORM WATER CADD FILES ARE AVAILABLE AND MAY BE USED FOR STORM WATER WAVIER/DESIGN PURPOSES ONLY. IF PLANIMETRIC FILES ARE USED FOR DESIGN PURPOSES THERE ACCURACY SHALL BE VERIFIED BY SURVEY OR FIELD TAPE. (I.E. APPROXIMATELY TO TRUE LOCATION + OR - 15" ,ROOF OVER HANGS WERE USED FOR BUILDING CORNERS.) IF TOPO IS NEEDED FOR DESIGN PURPOSES, A SURVEY SHOULD BE DONE.

6. ALL ITEMS THAT ARE FOUND TO BE INCORRECTLY SHOWN ON GIS PLANIMETRIC OR TOPO FILES SHALL HAVE THIER LOCATION VERIFIED I.E. SURVEYED OR FIELD TAPED, AND SHALL BE NOTED ON THE EXISTING UTILITY FILE WHERE DESCREPENCIES ARE FOUND.

7. GIS FILES SHALL BE CLEANED UP WHEN USED, I.E. DELETE ROOF ELEVATIONS, STORM DRAIN IDENTIFIERS, CHANGE SIZE OF TEXT TO MATCH PLOT SCALE ETC.

SITE PLANS GIS GRADE A

1. DESIGN DRAWINGS MUST SHOW TEMPORARY CONSTRUCTION BASE LINE THAT IS PART OF TRAVERSE. INDICATE COORDINATES AND ELEVATION.

2. LOCATE ALL BUILDING CORNERS AND STRUCTURES.

3. UTILITIES AND MINOR PLANIMETRIC FEATURES DO NOT NEED TO BE LOCATED DURING THE DESIGN PHASE.

4. PROVIDE NOTE ON DRAWINGS THAT CONSTRUCTION CONTRACTOR MUST LOCATE ALL NEW AND EXISTING WORK WITHIN INDICATED GIS LIMITS; SEE *(IHD, NSWC)* GUIDE SPEC. SECTION 02223.

5. INDICATE LIMITS OF GIS GRADE A ACCURACY ON DRAWINGS FOR POST CONSTRUCTION SURVEY.

SITE PLANS GRADE B

1. DESIGN DRAWINGS MUST SHOW TEMPORARY CONSTRUCTION BASE LINE AND INDICATE COORDINATES AND ELEVATIONS. BASE LINE MAY BE TAKEN FROM EXISTING PLANIMETRIC FEATURES IDENTIFIED BY " A & E GEOGRAPHIC INFORMATION SYSTEM GUIDELINES". ELEVATIONS MAY BE TAKEN FROM BUILDING PLANT ACCOUNT DATA OR REAL ESTATE FILE.

2. LOCATE (BY DIMENSIONS) ALL NEW BLDGS, STRUCTURE CORNERS AND ANY ITEMS THAT APPEAR IN THE NEW PLANIMETRIC AND UTILITY FILE.

3. PROVIDE NOTE ON DRAWINGS THAT CONSTRUCTION CONTRACTOR MUST LOCATE ALL NEW WORK . SEE *(IHD, NSWC)* GUIDE SPEC SECTION 02224.

4. AFTER RECEIVING SITE PLAN CONSTRUCTION ASBUILT FROM PROJECT ENGINEER, REDRAW SITE PLAN TO REFLECT PROPER COORDINATES FOR NEW AND EXISTING UTILITY FILES.

5. IF CODE 092 PERSONNEL FIND INCORRECT ITEMS ON PLANIMETRIC OR OTHER ORIGINAL GIS FILES THE ITEM SHOULD BE CORRECTED IN THE EXISTING PLANIMETRIC LAYER OF THE EXISTING UTILITY . IF THESE CORRECTIONS INFLUENCE A&E DESIGNS PRESENTLY UNDER CONTRACT 092 EIC WILL BE NOTIFIED.

FLOOR PLANS AND SECTIONS

1. BUILDING FLOOR PLANS SHOULD BE CONSISTENT BETWEEN ENGINEERING DISCIPLINES AND THE FLOOR PLAN SHALL BE ORIENTED SUCH THAT THE MAIN ENTRANCE IS LOCATED AT THE BOTTOM OF THE SHEET.

2. IF SYMBOLS ARE USED TO REFERENCE NOTES FOR WORK TO BE DONE; THEY SHOULD BE SHOWN ON THE SAME SHEET AS THEY ARE USED.

DETAILS.

1. NEW DETAILS SHALL MEET TRI-SERVICE CADD/GIS TECHNOLOGY CENTERS "GENERIC CADD DETAILS LIBRARY" FORMAT. (SEE ENCLOSURE (2)).

2. NEW DETAILS; IF LARGER THAN 7.36" BY 7.48" SHALL BE IN MULTIPLES OF THIS SIZE.

3. NEW PW STANDARDS SHALL MEET THE REQUIREMENTS OF 1 AND 2 ABOVE.

4. OLD PW STANDARDS SHALL BE RE DRAWN TO MEET THE REQUIREMENTS OF 1 AND 2 ABOVE.CODE 092 PERSONNEL MAY USE PW STANDARDS IN PRESENT FORMAT.

5. AFTER ACCEPTANCE OF FINAL DESIGN, A CADD FILE OF ALL NEW AND CONVERTED PW STANDARDS SHALL BE GIVEN TO CODE 0921 OR 092

DEMOLITION

ALL DEMOLITION WORK SHALL BE IDENTIFIED BY CROSS HATCHING OF THE ITEM TO BE DEMOLISHED, A DEMOLITION LAYER SHALL ALSO BE ADDED TO THE NEW UTILITY FILE.

ABANDONMENT

ALL ABANDONED WORK SHALL BE IDENTIFIED BY PLACING THE ITEM TO BE ABANDONED ON A **ABANDONED** LAYER IN THE EXISTING UTILITY FILE, (ABANDONED —FW—, ETC)

END OF GUIDELINES —— SEE FILE SYSTEM ATTACHED (2 SHEETS

NEW UTILITY FILE NEWUTIL 11/2/94

Description	Layer #	Line Style	style	thickness	color	COMMENTS
AIR	1	—A—	0	4	5	
ELEC PRIMARY LINE	2	—EPL—	0	4	4	
ELEC SECONDARY LINE	3	—ESL—	0	4	5	
FIRE LOOP LINE	4	—FA—	0	4	7	
FRESH WATER	5	—FW—	0	4	3	
FUEL SUPPLY	6	—FS—	0	4	2	oil tanks /piping
GROUNDING	7	—G—	0	4	2	
HYDROGRAPHY	8		0	4	4	sww structures,erosion control
INDUSTRIAL PROCESS	9		0	4	10	process piping tanks
INDUSTRIAL WASTE	10	—IW—	0	4	2	
LAN LINE	11	—LAN—	0	4	8	
OTHER BURIED ITEMS	12		0	4	7	other buried items not listed
PAD MOUNTED XFMER	13		0	4	3	
PLANIMETERIC FEATURES	14		0	4	7	new items shown on gis planimeteric file
POLE INCL GUY	15		0	4	1	
POLE MOUNTED XFMER	16		0	4	1	pole mounted transformers
REAL ESTATE/SURVEY	17		0	4	2	control points ,. data collector
RIVER WATER	18	—RW—	0	4	1	
SANITARY SEWER	19	—S—	0	4	4	
SOILS	20		0	4	1	soil borings
STEAM	21	—ST—	0	4	6	
STORM SEWER	22	—SW—	0	4	5	
TELEPHONE LINE	23	—T—	0	4	6	
TEXT CIVIL	24		0	2	3	general text
TEXT ELEC.	25		0	2	3	
TEXT MECH.	26		0	2	3	
TOPOGRAPHY	27		0	4	6	contours, spot elev,
UG PRIMARY	28	—UGP—	3	4	4	
UG. SECONDARY	29	—UGS—	3	4	5	

EXISTING UTILITY FILE

EXSTUTIL

description	layer #	Line Style	style	thickness	color	COMMENTS
AIR	1	—A—	0	2	5	
LEC PRIMARY LINE	2	—EPL—	0	2	4	
ELEC SECONDARY LINE	3	—ESL—	0	2	5	
FIRE LOOP LINE	4	—FA—	0	2	7	
FRESH WATER	5	—FW—	0	2	3	
FUEL SUPPLY	6	—FS—	0	2	2	oil tanks /piping
GROUNDING	7	—G—	0	2	2	
HYDROGRAPHY	8		0	2	4	sww structures,erosion control
INDUSTRIAL PROCESS	9		0	2	10	process piping tanks
INDUSTRIAL WASTE	10	—IW—	0	2	2	
LAN LINE	11	—LAN—	0	2	8	
OTHER BURIED ITEMS	12		0	2	7	other buried items not listed
PAD MOUNTED XFMER	13		0	2	3	
PLANIMETRIC FEATURES	14		0	2	7	new location items on gis planimetric files
POLE INCL GUY	15		0	2	1	
POLE MOUNTED XFMER	16		0	2	1	pole mounted transformers
REAL ESTATE/SURVEY	17		0	2	2	control points „ data collector
RIVER WATER	18	—RW—	0	2	1	
SANITARY SEWER	19	—S—	0	2	4	
SOILS	20		0	2	1	soil borings
STEAM	21	—ST—	0	2	6	
STORM SEWER	22	—SW—	0	2	5	
TELEPHONE LINE	23	—T—	0	2	6	
TEXT CIVIL	24		0	2	3	
TEXT ELEC.	25		0	2	3	
TEXT MECH.	26		0	2	3	
TOPOGRAPHY	27		0	2	6	contours, spot elev,
UG PRIMARY	28	—UGP—	3	2	4	
UG. SECONDARY	29	—UGS—	3	2	5	

2 Generic Details Library

Library Creation

"Evolution" is the best description of the process for incorporating the suggested format for creating generic details. Agencies currently developing detail libraries are encouraged to begin incorporating the format into their daily design efforts, not to attempt a complete revamping of their existing detail libraries. As project-specific details are created, they should be included into the agencies' detail library and submitted to the TSTC for inclusion into the DoD-wide master set. By no means should the Generic Details Library ever be considered a completed product. It is only the beginning of what should be a daily routine of adding and revising details for all design disciplines within the Tri-Services.

As more agencies begin developing details in the suggested format, the TSTC will formally request that details be submitted for inclusion into the master set. Once the TSTC has compiled the details, the appropriate Field Working Group will meet to review the submitted details for proper format and applicability prior to field distribution.

Detail Integrity

Although a liability disclaimer covering all the details is included as part of the Generic Details Library, each detail submitted for inclusion into the library should be reviewed by the submitting agency for integrity and compliance with current design criteria. It will be extremely helpful to the TSTC and the Field Working Groups if each detail is properly reviewed prior to submitting it for placement into the Library.

Creating a Detail

Step 1

When developing a detail, draw the detail at full size (1 in. = 1 in.) first. After the detail is graphically complete, but prior to placing text, dimensions, patterning, leader lines, and terminators, the detail should be scaled to the appropriate final size, such as 3 in. = 1 ft - 0 in. (Figure 1). Table 1 lists the common scales, the type of detail to be drawn for each scale, and the factor by which details drawn at full size should be scaled.

Step 2

After scaling, any hatching or patterning should be placed on the detail (Figure 2). This method ensures that the hatching and patterning for all details, regardless of their scale, will be consistent. (Note for MicroStation users: When dimensioning a scaled detail be sure to set "scale dimension"

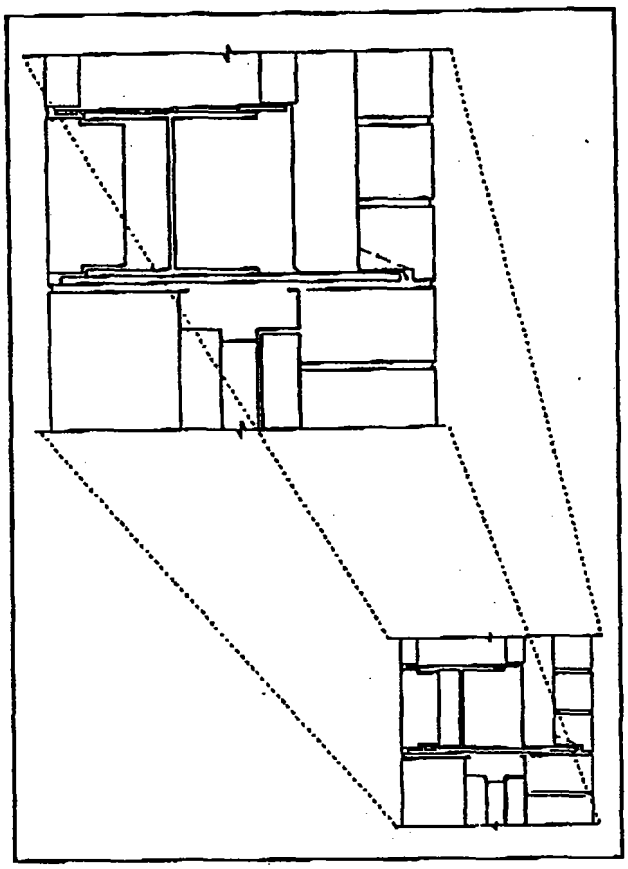


Figure 1. Step 1: draw the detail at full size, then scale per Table 1

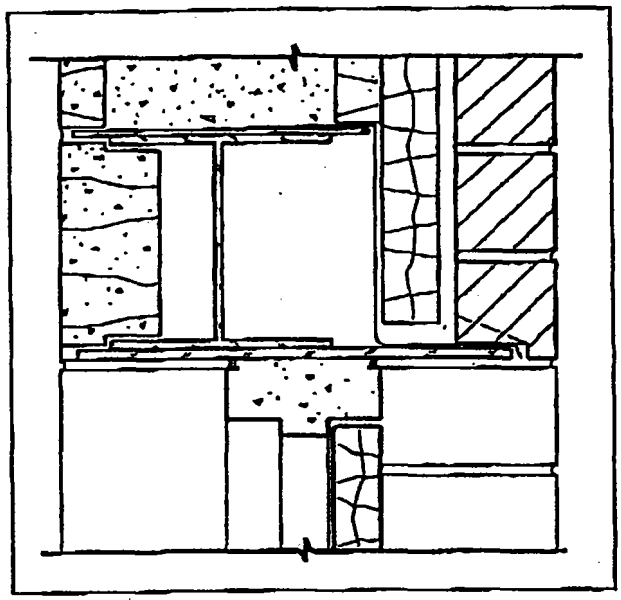


Figure 2. Step 2: add any hatching and patterning to detail

to ensure that the detail will dimension correctly.)

Step 3

To help ensure a consistent visual clarity to the details, the AAFWG has provided the

Table 1
Scaling Factors

Detail Type	Common Scales for Details	Factor by Which a Full-Size Detail Should be Scaled
Details	6 in. = 1 ft - 0 in.	6.00
Details	3 in. = 1 ft - 0 in.	3.00
Details	1-1/2 in. = 1 ft - 0 in.	1.50
Details	1 in. = 1 ft - 0 in.	~~1.00~~ 12.00
Wall Sections	3/4 in. = 1 ft - 0 in.	0.75
Wall Types	1/2 in. = 1 ft - 0 in.	0.50
Large-Scale Plans	1/4 in. = 1 ft - 0 in.	0.25
Floor/Ceiling Plans	1/8 in. = 1 ft - 0 in.	0.125
Composite/Roof Plans	1/16 in. = 1 ft - 0 in.	0.0625

standard detail layout (provided as a cell or block) shown in Figure 3. To utilize the layout form when creating a detail, the designer should place the layout form over the detail at the active scale "as = 1." Once properly positioned and placed over the detail, add the text, leaders, line terminators, and title to the detail as noted on the layout form. Level/layer assignments are listed in Table 2.

Step 4

Once the detail is complete, delete the layout cell/block (Figure 4). The completed detail will then conform to the AAFWG's standard detail size of 187 mm (7.36 in.) by 190 mm (7.48 in.). It is understood that not all details will fit into this typical detail layout (at the scale intended), but this format should be used to the extent possible. For those exceptions, the use of multiple 187-mm by 190-mm grids is encouraged.

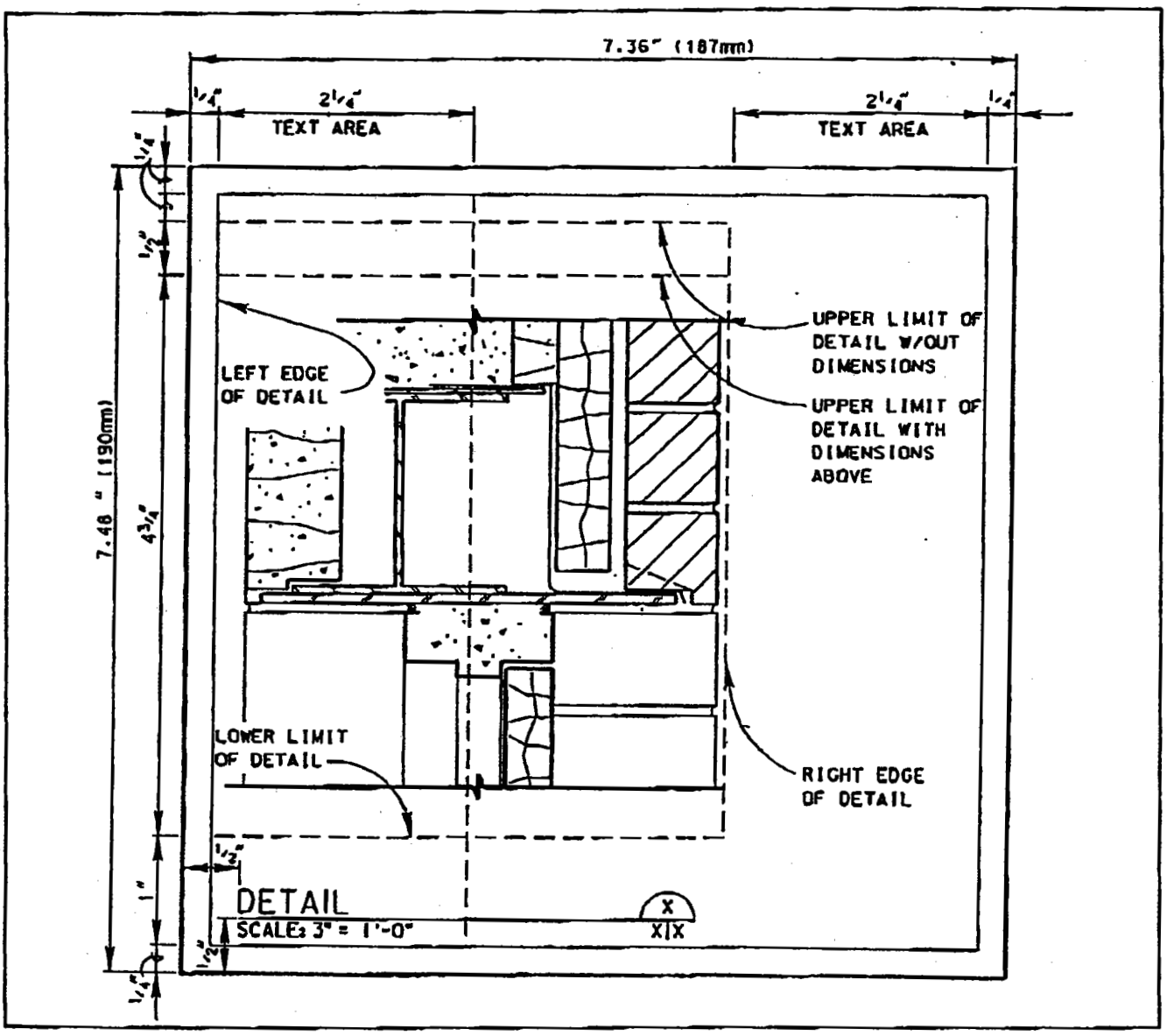


Figure 3. Step 3: position the layout.cel/dwg over the detail and add text, dimensions, leader lines, titles, and line terminators

Table 2
Layer Assignments

Level/Layer	Description
A-DETL-TEXT	Notes, Text, & Dimension Text
A-DETL-SYMB	Symbols, Bubbles, etc.
A-DETL-DIMS	Dimension Linework
A-DETL-NPLT	Sheet Grid
A-DETL-LW10	Detail Linework
A-DETL-LW25	Detail Linework
A-DETL-LW35	Detail Linework
A-DETL-LW50	Detail Linework
A-DETL-LW70	Detail Linework
A-DETL-PATT	Pattern/Hatch

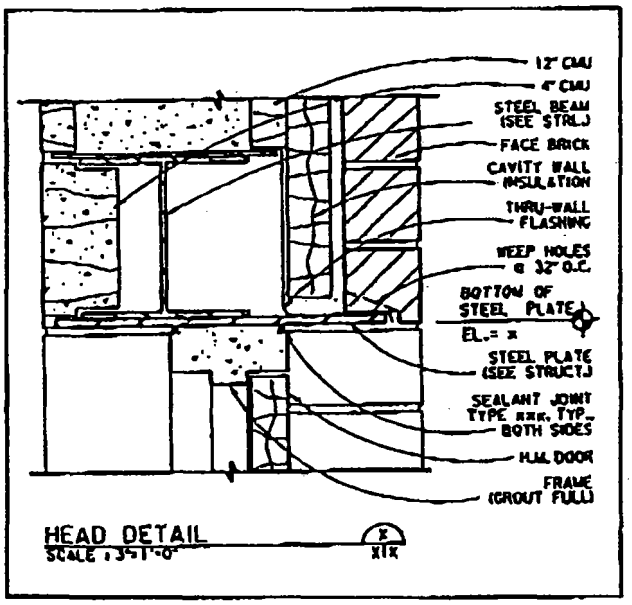


Figure 4. Step 4: remove layout.cel/block to complete

Standard Graphics/Terminology

All graphics and detail terminology should be represented in a consistent manner for detail uniformity and graphic quality. Graphic symbology conventions (including line styles and patterning) used in creating generic details should conform to the material representations as shown in the Architectural Engineering Instructions (AEI) manual *Design Criteria* and/or Engineer Manual EM 1110-1-1807.

Abbreviations

Abbreviations for words or phrases frequently used on the details should be as noted in Appendix A. When possible, abbreviations should be kept to a minimum. Other abbreviations, particularly discipline-unique abbreviations, may be used but must not conflict with those in Appendix A.

Levels/layers

Level/layer separation of the various graphic elements within a detail is necessary to ensure the easy manipulation of details by subsequent users. All details should adhere to the layer assignments in Table 2.

Line widths/weights

The primary purpose of line widths/weights is to provide a drawing with visual depth and clarity or, in some CADD systems, to determine plotted line widths. To accommodate both MicroStation and AutoCAD and to ensure easy translations between systems, line widths (weights) will be determined as specified in the next section, "Color."

Color

Although final drawings are most often plotted in black and white, colors are prescribed for details to aid the designer in drawing and/or manipulating the details on a computer monitor. To accommodate CADD systems where line color dictates plotted line widths, colors should adhere to Table 3.

Text

The text style for generic details shall be Intergraph's Font 1 as supplied with MicroStation. For AutoCAD users, the "Romans" text style should be used to ensure easy translation between systems. Text for detail notes should be placed at a height of 1-1/2 in. Detail titles should be placed at 2-1/2 in.

Detail naming

For the master set of details, the Construction Specification Institute/Construction Specifications Canada (CSI/CSC) UniFormat-based naming system has been developed. The format for naming individual detail drawing files should follow the eight-character format shown in Figure 5.

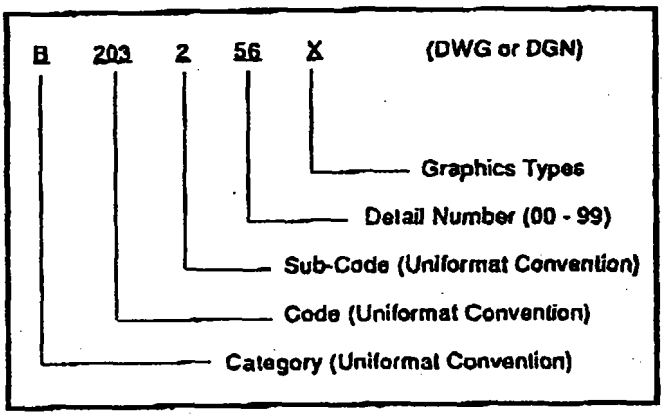


Figure 5. Naming convention. Note: A full listing of Uniformat catagories and codes is outlined in Section 5, Index of Details

Table 3
Color/Line Width Guidelines

Layer Name	Color	AutoCAD Color #	MicroStation Color #	Line/Pen Width
A-DETL-LW10	Cyan	4	7	0.10 mm/0.004 in.
A-DETL-LW25	White	7	0	0.25 mm/0.010 in.
A-DETL-LW35	Yellow	2	4	0.35 mm/0.014 in.
A-DETL-LW50	Magenta	6	5	0.50 mm/0.020 in.
A-DETL-LW70	Blue	5	1	0.70 mm/0.028 in.
A-DETL-TEXT	Green	3	2	0.35 mm/0.014 in.
A-DETL-SYMB	Yellow	2	4	0.35 mm/0.014 in.
A-DETL-DIMS	Cyan	4	7	0.10 mm/0.004 in.
A-DETL-NPLT	Red	1	3	0.10 mm/0.004 in.
A-DETL-PATT	Cyan	4	7	0.10 mm/0.004 in.

SECTION 02315

EXCAVATION AND FILL

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 136	(1996; Rev. A) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 698	(1991) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft (600 kN-m/m))
ASTM D 1140	(1997) Amount of Material in Soils Finer Than the No. 200 (75-Micrometer) Sieve
ASTM D 1556	(1990; R 1996) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1996) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846	(1996) Evaluating Solid Waste (Physical/Chemical Methods)
EPA 600/4-79-020	(1983) Methods for the Chemical Analysis of Water and Wastes

MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE)

MDE SESC	(1994) Standards and Specifications for Soil Erosion and Sediment Control

MARYLAND STATE HIGHWAY ADMINISTRATION (MD SHA)

MD SHA CM	(1993) Construction and Materials

1.2 DEFINITIONS

1.2.1 Regulatory Requirements

Provide work and materials in accordance with applicable requirements of MD SHA CM. Divisions and sections mentioned herein refer to those specifications. Paragraphs in MD SHA CM entitled "Measurement and Payment," shall not apply.

1.2.2 Modification of Reference

Where term "Engineer" is used in MD SHA CM it shall be construed to mean ROICC NTR. Where term "Administration" is used, it shall mean Government.

1.2.3 Waste Removal

Soil, sediment and waste located in the indicated areas may contain ("be impacted with") landscaping waste, fill material, rubble, paint, varnishes, and other chemical waste. The Government has requested the removal of the impacted soil and sediment, including all waste, as indicated for placement beneath the soil cover. Excavated impacted soil, sediment and waste are to be dewatered on-site, when required, for subsequent placement beneath the soil cover. Large items of waste and debris shall be disposed off-site at an approved disposal facility.

1.2.4 Cohesive Materials

Materials ASTM D 2487 classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when the fines have a plasticity index greater than zero.

1.2.5 Cohesionless Materials

Materials ASTM D 2487 classified as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.

1.3 SUBMITTALS

Submit the following in accordance with Section C of the Basic Contract.

SD-06 Test Reports

Borrow Site Testing

Common Fill Test

Select Fill Test

Density tests

SD-07 Certificates

Excavation and handling work plan

Dewatering work plan

1.3.1 Excavation and Handling Work Plan

Provide within 15 calendar days of issuance of the delivery order, and before procurement, fabrication, or mobilization. No work at the site, with the exception of site inspections, clearing and grubbing, and surveys, shall be performed until this Work Plan is approved. Allow 15 calendar days in the schedule for the Government's review. At a minimum, the Work Plan shall include the following elements as specified in Section 01115, "General Paragraphs (Remedial Action Contracts)."

a. Schedule of activities.
b. Method of excavation and equipment to be used.
c. Method of compaction and equipment to be used.
d. Excavation dewatering plan.
e. Dewatering of excavated impacted soil for placement beneath the soil cover.
f. Storage methods and locations for liquid and solid contaminated material.
g. Decontamination procedures.
h. Spill contingency plan.

1.4 DELIVERY, STORAGE, AND HANDLING

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

1.5 CRITERIA FOR PROPOSAL

Base proposals on the following criteria:

a. Surface elevations are as indicated.

b. Pipes or other artificial obstructions, except those indicated, will not be encountered.

c. Ground water elevations indicated by the boring logs and groundwater monitoring well installation logs were those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction. Logs are located in Appendix A of the Basis of Design Report. Drawing elevations reference National Geodetic Vertical Datum, 1929 (NGVD1929).

d. Blasting will not be permitted. Remove material in an approved manner.

1.6 REQUIREMENTS FOR OFF SITE SOIL

Soil and aggregate brought in from off-site shall be tested for full TCLP including ignitability, corrosivity and reactivity and shall contain less than 100 parts per million (ppm) of total petroleum hydrocarbons (TPH) and less than 10 ppm of the sum of Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) and shall not fail the TCLP test. TPH concentrations shall be determined by using EPA 600/4-79-020 Method 418.1. BTEX concentrations shall be determined by using EPA SW-846 Method 5030/8020. TCLP shall be performed in accordance with EPA SW-846 Method 1311. Provide Borrow Site Testing for TPH, BTEX and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. Material shall not be brought on site until tests have been approved by the ROICC NTR.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

Free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and frozen, deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

2.1.1 Common Fill Material

Off-site borrow. ASTM D 2487, classification GW, GP, GM, GC, SW, SP, SM, SC with a maximum ASTM D 4318 liquid limit of 35, maximum ASTM D 4318 plasticity index of 12, and a maximum of 25 percent by weight passing ASTM D 1140, No. 200 sieve.

2.1.2 Topsoil

Provide as specified in Section 02951, "Mitigated Wetlands Area, Shrubs, Plants, and Grass."

2.1.3 Select Fill

ASTM D 2487, classification SM, SC or ML with a maximum particle size of 3 inches.

2.2 BORROW

Obtain borrow materials required in excess of those furnished from excavations from sources outside of Government property.

2.3 BURIED WARNING AND IDENTIFICATION TAPE

Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Yellow:	Electric
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems

2.3.1 Warning Tape for Metallic Piping

Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.3.2 Detectable Warning Tape for Non-Metallic Piping

Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.4 DETECTION WIRE FOR NON-METALLIC PIPING

Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

3.1.1 Clearing and Grubbing

Unless indicated otherwise, remove trees, stumps, logs, shrubs, and brush within the area of construction. Remove stumps entirely. Grub out matted roots and roots over 2 inches in diameter to at least 18 inches below existing surface unless otherwise indicated. Chip and dispose of grubbed materials in uniform layer thoroughly mixed with existing cover soil and waste during regrading activity prior to placement of soil cover.

3.1.2 Proof Rolling

Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. Proof roll the landfill surface after clearing and grubbing and prior to placement of consolidation material with a 40,000 pound (minimum) track type tractor with a minimum ground contact pressure of 8 psi. Operate the equipment in a systematic manner to ensure 150 percent coverage is provided over all areas, and at speeds between 2 1/2 to 3 1/2 miles per hour. Notify the ROICC NTR a minimum of 3 days prior to proof rolling. Proof rolling shall be performed in the presence of the ROICC NTR. Rutting or pumping material for road subgrade shall be undercut as directed by the ROICC NTR and replaced with common fill.

3.2 PROTECTION

3.2.1 Drainage and Dewatering

Provide for the collection, treatment, and disposal when required of surface and subsurface water encountered during construction. Submit a dewatering work plan. On-site treatment, when required, shall be the preferred method if economics prove on-site treatment is more cost effective than off-site disposal.

3.2.1.1 Drainage

So that construction operations progress successfully, completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/construct storm drainage features at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to

maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.2.1.2 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval by the ROICC NTR, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in-situ material. While the excavation is open, the water level shall be maintained continuously, at least one foot below the working level or to the depth required to provide a safe excavation, stable working surface, and stable sideslopes. Perform all dewatering and activities in accordance with MDE SESC.

Operate dewatering system continuously until construction work below existing water levels is complete. All water shall be containerized and tested to determine proper disposal requirements, when required.

3.2.2 Underground Utilities

Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor shall contact the ROICC NTR to arrange for location of base utilities. The Contractor shall scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered.

3.2.3 Machinery and Equipment

Movement of construction machinery and equipment over pipes during construction shall be at the Contractor's risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged.

3.3 EXCAVATION

Excavate to contours, elevation, and dimensions indicated. Reuse excavated materials that meet the specified requirements for the material type required at the intended location. Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather. Refill with common fill and compact to 95 percent of ASTM D 698 maximum density unless indicated otherwise. Unless specified otherwise, refill excavations cut below indicated depth with common fill and compact to 95 percent of ASTM D 698 maximum density unless indicated otherwise.

3.4 FILLING AND BACKFILLING

Fill and backfill to contours, elevations, and dimensions indicated.

Compact each lift before placing overlaying lift.

3.4.1 Common Fill Placement

Provide for general site as indicated. Place in 6 inch loose lifts. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to a satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller, or both.

3.4.2 Select Fill Placement

Place in 8 inch loose lifts. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to a satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller, or both.

3.5 BURIED WARNING AND IDENTIFICATION TAPE

Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade.

3.6 BURIED DETECTION WIRE

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inches above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over it's entire length. The wire shall enter manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, the wire shall terminate in the valve pit at the pump station end of the pipe.

3.7 SAMPLING

Sampling and analysis of stored material and liquid in accordance with Section 02223, "Transportation and Disposal of Contaminated Material."

3.8 COMPACTION

Expressed as a percentage of maximum density. Determine in-place density of existing subgrade; if required density exists, no compaction or proof-rolling of existing subgrade will be required.

3.8.1 General Site

Compact underneath areas designated for vegetation to 85 percent of ASTM D 698 unless indicated otherwise.

3.8.2 Common Fill

Compact common fill to 95 percent of ASTM D 698 unless otherwise indicated.

3.8.3 Regraded Cover Soil and Waste

Regraded cover soil and waste shall be placed in 8 inch loose lifts or as directed by the ROICC as required to achieve acceptable compaction. Regraded cover soil and waste shall be compacted with a minimum of four

complete passes (400 percent coverage) with ROICC approved compaction equipment. Equipment used for compaction of regraded cover soil and waste shall be a 40,000 lb (minimum) track-type tractor with a minimum ground contact pressure of 8 psi or equipment as appropriate for materials encountered.

3.8.4 Paved Areas

Compact common fill materials to 95 percent of ASTM D 698. Compact pavement materials in accordance with Section 02742, "Pavement With A Bituminous Concrete Surface."

3.9 FINISH OPERATIONS

3.9.1 Grading

Finish grades as indicated within one-tenth of one foot. Grade areas to drain water away from structures. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed by the ROICC NTR.

3.9.2 Seed and Other Types of Vegetation

Provide as specified in Section 02951, "Mitigated Wetlands Area, Shrubs, Plants, and Grass."

3.9.3 Protection of Surfaces

Protect newly graded areas from traffic, erosion, and settlement that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.10 DISPOSITION OF SURPLUS REGRADED COVER SOIL AND WASTE MATERIAL

Remove and dispose in accordance with Section 02223, "Transportation and Disposal of Contaminated Material."

3.11 FIELD QUALITY CONTROL

3.11.1 Sampling

Take the number and size of samples required to perform the following tests.

3.11.2 Testing

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

3.11.2.1 Common Fill Material Testing

Test common fill in accordance with ASTM D 698 for moisture density relationship, as applicable.

3.11.2.2 Select Fill Material Testing

Test select fill material in accordance with ASTM C 136 for conformance to ASTM D 2487 gradation limits; ASTM D 1140 for material finer than the No. 200 sieve; ASTM D 4318 for liquid limit and for plastic limit, as applicable.

3.11.2.3 Density Tests

Test density in accordance with ASTM D 1556, or ASTM D 2922 and ASTM D 3017. When ASTM D 2922 and ASTM D 3017 density tests are used, verify density test results by performing an ASTM D 1556 density test at a location already ASTM D 2922 and ASTM D 3017 tested as specified herein. Perform an ASTM D 1556 density test at the start of the job, and for every 10 ASTM D 2922 and ASTM D 3017 density tests thereafter. Test subgrade each lift at randomly selected locations every 2500 square feet of subgrade. Test common fill each lift at randomly selected locations every 2500 square feet and a minimum of 3 tests per lift.

-- End of Section --

SECTION 02525

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 within the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53	(1996) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 312/A 312M	(1995; Rev. A) Seamless and Welded Austenitic Stainless Steel Pipes
ASTM C 150	(1997) Portland Cement
ASTM D 1586	(1984; R 1992) Penetration Test and Split-Barrel Sampling of Soils
ASTM D 1587	(1994) Thin-Walled Tube Geotechnical Sampling of Soils
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2488	(1993) Description and Identification of Soils (Visual-Manual Procedure)
ASTM D 4397	(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM D 5088	(1990) Decontamination of Field Equipment Used at Nonradioactive Waste Sites
ASTM D 5092	(1990; R 1995) Design and Installation of Ground Water Monitoring Wells in Aquifers
ASTM F 480	(1995) Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80
ASTM F 883	(1997) Padlocks

STATE OF MARYLAND CODE OF MARYLAND REGULATION (COMAR)

COMAR 26.04.04	Department of Environment; Regulation of Water Supply, Sewage Disposal, and Solid Waste; Well Construction

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 600/4-89-034	(1989) Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells
EPA 600/4-79-020	(1983) Methods for the Chemical Analysis of Water and Wastes

1.2 DESCRIPTION OF WORK

Abandon existing and provide new monitoring wells including drilling, casing, well screen, gravel packing, grouting, development, monitoring device, and incidental related work complete and ready for operation.

1.3 GENERAL REQUIREMENTS

Each system, including equipment, materials, installation, and performance, shall be in accordance with local, State, and Federal regulations, ASTM D 5092, and EPA 600/4-89-034 except as modified herein. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" has been substituted for the word "should" wherever it appears. Reference to the "Project Representative" and the "Owner" shall be interpreted to mean the ROICC NTR. Mark and secure monitoring wells to avoid unauthorized access and tampering.

1.4 SUBMITTALS

Submit the following in accordance with Section C of the Basic Contract.

SD-02 Shop Drawings

Well construction

SD-03 Product Data

Well riser

Well screen

Filter pack

Cement/bentonite grout

Bentonite pellet seal

SD-07 Certificates

Well Drilling/Development Material Handling Plan

Field Sampling and Laboratory Testing Plan

Treatment facility permit

Installation Survey Report

Well Development Report

Well Abandonment Report

Borehole Analysis Report

SD-11 Closeout Submittals

Well Construction Permit

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials in an undamaged condition. Unload and store with minimal handling. Store materials in on-site enclosures or under protective coverings. Store plastic piping and jointing materials under cover, out of direct sunlight. Store materials off the ground. Keep insides of pipes and fittings free of dirt and debris. Replace defective or damaged materials with new materials.

1.6 QUALITY ASSURANCE

1.6.1 Required Drawings

Submit well construction drawings showing components and details of well casing, well screen, filter pack, annular seal, and associated items. Drawings shall be prepared by a State certified professional geologist or hydrogeologist, or by a State registered professional civil engineer, hereafter referred to as the Contractor's Professional Consultant (CPC). Drawings shall be sealed.

1.6.2 Well Drilling/Development Material Handling Plan

A material handling plan shall be furnished by the Contractor 15 days prior to initiation of the work that describes phases of dealing with the potentially contaminated soil and groundwater, including the following: a schedule to be employed in the well drilling and development stages, a sequence of operations, the method of drilling and development, material hauling, proposed equipment, handling of the contaminated materials, soil and water testing requirements, and safety precautions and requirements.

1.6.3 Health and Safety Plan (HASP)

Provide in accordance with Section 01115, "General Paragraphs (Remedial Action Contracts)."

1.6.4 Field Sampling and Laboratory Testing Plan

Describe field sampling methods and quality control procedures. Identify laboratory and laboratory methods to be used for contamination testing. Sample reports shall show sample identification for location, date, time, sample method, contamination level, name of individual sampler, identification of laboratory, and quality control procedures.

1.6.5 Treatment Facility Permit

Verification that the proposed treatment facility is permitted to accept the contaminated materials specified, prior to the start of excavation.

1.6.6 Well Development Report

Provide report, containing the following data for each well: project name and location, well designation, date and time of well installation, date

and time of well development, static water level from top of well casing before development and 24 hours after development, field measurements of pH, temperature, and specific conductivity, depth of well from top of casing to bottom of well, screen length, description of development methodology size/capacity of pump or bailer, pumping rate, and recharge rate.

1.6.7 Well Abandonment Report

Submit a completed well abandonment report to the appropriate state agency after abandonment.

1.6.8 Well Construction Permit

Submit a completed permit application and a proposed method of construction to the appropriate state agency prior to construction of the well. Construction of the wells will not be allowed until an approved Well Construction Permit has been submitted to the ROICC NTR.

PART 2 PRODUCTS

2.1 WELL RISER

2.1.1 PVC Piping

ASTM F 480, Type 1, Grade 1, PVC 12454, NSF wc or NSF pw, Schedule 40, with flush threaded joint fittings. Threaded joints shall be wrapped with flouropolymer tape, and provided with nitrile O-ring gaskets.

2.1.2 Well Riser Cap

Provide cap on top of the well riser. Cap shall be a flush threaded cap and of the same material as the well riser.

2.2 WELL SCREEN

Well screens shall be located as indicated. The length of each screen shall be as indicated. Slot size shall be 0.010 inch. Slotted openings shall be distributed uniformly around the circumference of the screen. Open area shall approach the formation's natural porosity.

2.2.1 Stainless Steel Screens

ASTM A 312/A 312M, Type 304, 2-inch ID Schedule 40S, continuous slot construction, wire wound, with flush threaded joint ends.

2.3 PRIMARY FILTER PACK

Provide clean, durable, well-rounded, and washed quartz or granite, with less than 5 percent non-siliceous material. The filter pack shall not contain organic matter or friable materials. The filter pack shall allow free flow of water in the well, and shall prevent the infiltration of aquifer materials. Filter pack shall have 100 percent passing the U.S. Standard Number 20 sieve and 100 percent retained on the U.S. Standard Number 30 sieve.

2.4 ANNULAR SEALANTS

2.4.1 Bentonite Pellet Seal

Provide pelletized sodium montmorillonite in sealed containers from a commercial source, free of impurities. Diameter of pellets shall be less than one fifth the diameter of the borehole annular space to prevent bridging.

2.4.2 Cement/Bentonite Grout

Provide cement/bentonite grout in accordance with ASTM D 5092, typical cement base grout with 4 percent bentonite by weight. Cement shall be in accordance with ASTM C 150. Quick setting admixtures shall not be allowed. Drilling mud or cuttings shall not be used as a sealing material.

2.5 BOTTOM PLUGS

Provide flush threaded solid plug at the bottom of the well. Plug shall be the same material as the well screen to which it is attached. Joints shall be provided with nitrile O-ring gaskets.

2.6 LOCKING WELL CAP

Provide flush threaded, weatherproof, and non-removable locking well cap on the top of the well. Well cap shall be of the same material as the well casing to which it is attached. Well cap shall accommodate padlock. Provide a long shackled padlock in accordance with ASTM F 883. Provide two keys for the padlock, and turn them over to the ROICC NTR. Locks at the site shall be keyed alike.

2.7 WELL HEAD COMPLETIONS

Clearly mark and secure the well to avoid unauthorized access and tampering. Cast the words "MONITORING WELL" on the well head cover. Provide a sign reading, "WELL IS FOR MONITORING AND IS NOT SAFE FOR DRINKING." Provide stamped metal identification tag as follows:

DO NOT DISTURB
ID #: Date:
Installed By:
Total Depth:
Screened Interval:
TOC Elevation:
Other:
For Information, Call:

2.7.1 Aboveground Completions

Provide protective outer casing around the well riser extending above grade. The diameter of the protective outer casing shall be a minimum of 4 inches larger than the well riser diameter. The top of the protective outer casing shall extend a minimum of 6 inches above the top of the well riser cap. The protective outer casing shall be set in cement/bentonite grout and the bottom of the protective well casing shall extend to the depth indicated. A 1/4 inch diameter weep hole shall be drilled in the protective outer casing 3 inches above the ground surface. The annular space between the protective outer casing and the well riser shall be filled with pea gravel or coarse sand to just below the level of the cap on the well riser. The locking well cap shall be provided on top of the protective outer casing. Provide 6 inch diameter steel pipe bollards, filled with concrete as indicated to protect the exposed well head.

2.7.1.1 Protective Outer Casing and Bollards

ASTM A 53, Type E or S, Grade B.

2.7.1.2 Well Casing Cap

Provide cap on top of the protective outer casing. Cap shall be flush threaded and of the same material as the protective outer casing. Threaded joints shall be provided with nitrile O-ring gaskets.

2.8 POLYETHYLENE SHEETING

ASTM D 4397.

PART 3 EXECUTION

3.1 GENERAL

Notify the ROICC NTR at least 15 days prior to commencement of work. Locations of wells shall be as indicated. Abandonment of existing and d rilling, installation, and development of the proposed monitoring wells shall be supervised, directed, and monitored by the CPC. Drilling, sampling, and well development equipment introduced to the well shall be decontaminated before and after each use in accordance with ASTM D 5088.

3.2 DRILLING

Borehole shall be advanced using conventional 4-1/4 inch ID hollow-stem auger drilling methods. If it is the opinion of the CPC that an alternate drilling method is required, justification for a boring method change shall be submitted to the ROICC NTR, and approval for the change granted prior to drilling. Drill crew shall be experienced and trained in drilling and safety requirements for contaminated sites.

3.2.1 Sampling

Obtain samples in accordance with ASTM D 1586 or ASTM D 1587. Perform standard penetration tests at the following depths: 0.0 to 2.0 feet; 2.0 to 4.0 feet; 4.0 to 6.0 feet; and continuing for the total depth of boring. Each soil sample shall be screened in the field with an organic vapor analyzer/flame ionization device (OVA/FID) capable of detecting vapors to a minimum of one ppm. Log boring in accordance with ASTM D 2487 and ASTM D 2488. Groundwater elevation shall be indicated.

3.2.2 Analysis

The CPC shall review the log data from each borehole and compare the data with the well design requirements. The CPC shall verify the adequacy of the well design, or shall offer a proposed modification to the design based on the geologic and hydrogeologic data obtained from the borehole. This review and analysis shall be conducted for one borehole considered representative of the entire project. The CPC shall submit the borehole boring logs, the analysis of the well design, and any proposed design modifications to the ROICC NTR in a Borehole Analysis Report. Any modifications to the well design approved by the ROICC NTR shall be considered a change to the contract documents and shall be negotiated in accordance with the "CHANGES" clause.

3.2.3 Alignment

Verify that the well is straight by lowering a 10 foot section of 1 inch diameter steel pipe into the well.

3.3 SOIL REMOVED FROM THE BOREHOLE

3.3.1 Temporary Containment of Soil Removed from the Borehole

Soil removed from the borehole shall be placed beneath the soil cover or in a temporary containment area. Provide a temporary containment area near the well site. Cover containment area with 10 mil reinforced polyethylene sheeting. Place soil removed from the boreholes on the impervious barrier and cover with 6 mil reinforced polyethylene sheeting. Provide a straw bale berm around the outer limits of the containment area and cover with polyethylene sheets. Secure edges of sheets with weights to keep the polyethylene sheeting in place. Water runoff shall be diverted from the stockpiled material. As an option, soil may be stockpiled in trucks suitable for transporting contaminated soils as specified herein.

3.3.2 Testing and Disposal Requirements for Stockpiled Soils

In accordance with Section 02223, "Transportation and Disposal of Contaminated Material".

3.4 WELL INSTALLATION

Well installation shall be in accordance with ASTM D 5092 and EPA 600/4-89-034, and as indicated on the well construction drawings submitted by the CPC and approved by the ROICC NTR. Borehole shall be stable and shall be verified straight before beginning installation.

3.4.1 Casings and Screens

Well casings, screens, plugs, and caps shall be decontaminated prior to delivery by the manufacturer and shall be certified clean. Materials shall be delivered, stored, and handled in such manner as to ensure that grease, oil, or other contaminants do not contact any portion of the well screen and casing assembly prior to installation. If directed by the ROICC NTR, the well screen and casing assembly shall be cleaned with high pressure water prior to installation. Personnel shall wear clean cotton or surgical gloves while handling the assembly. If directed by the ROICC NTR, c entralizers shall be used to ensure that the well screen and casing assembly is installed concentrically in the borehole. When the assembly has been installed at the appropriate elevation, it shall be adequately secured to preclude movement during placement of the filter packs and annular seals. The top of the well casing shall be capped during filter pack placement.

3.4.2 Primary Filter Pack

Primary filter pack shall be placed as indicated on the approved well construction drawings to fill the entire annular space between the screen and casing assembly and the outside wall of the borehole. Place the primary filter pack material with a tremie pipe in accordance with EPA 600/4-89-034 and ASTM D 5092. Placement of the primary filter by gravity or free fall methods is not allowed. Control speed of filter placement to prevent bridging and to allow for settlement. Prior to commencement of work, equipment and methods required to place filters shall be approved by

the ROICC NTR.

3.4.3 Bentonite Seal

Bentonite pellets shall be placed through a tremie pipe. Control speed of bentonite pellet placement to prevent bridging. Additional water shall be added to the annular space as directed by the CPC to ensure complete hydration of the bentonite. Bentonite pellets shall cure a minimum of 48 hours before the placement of cement/bentonite grout to ensure complete hydration and expansion of the bentonite pellets.

3.4.4 Cement/Bentonite Grout

Cement/bentonite grout shall be placed in the annular space above the bentonite seal as indicated on the well construction drawings. Grout shall be placed as a slurry through a tremie pipe, and injected under pressure to reduce chance of voids. Grout shall be injected in one continuous operation until full strength grout flows out at the ground surface without evidence of drilling cuttings or fluid. Cement/bentonite grout shall cure a minimum of 48 hours before beginning well development operations.

3.4.5 Well Head Completions

Well head completions shall be as indicated and as specified herein.

3.5 WELL DEVELOPMENT

Well development shall be in accordance with EPA 600/4-89-034 and ASTM D 5092 except as modified herein. Bailing, surging, and pumping/overpumping/backwashing are acceptable development methods. Air surging and jetting are prohibited. Method of development shall be chosen by the CPC and approved by the ROICC NTR. Well development shall not begin until the well installation is complete and accepted by the ROICC NTR. Well development operations shall be conducted continuously until development water flows clear and free of drilling fluids, cuttings, or other materials. At such time representative water samples shall be tested for pH, temperature, and specific conductivity in accordance with EPA 600/4-79-020. Samples shall be taken every 5 minutes. When stabilized readings of these parameters, as accepted by the ROICC NTR, have been achieved for 3 consecutive sets of readings well development operations shall cease.

3.6 WATER FROM WELL DEVELOPMENT OPERATIONS

Water from the well development operations shall be containerized in accordance with State and local regulations and transported and disposed in accordance with Section 02223, "Transportation and Disposal of Contaminated Material."

3.7 INSTALLATION SURVEY

Upon completion of well installation and development and acceptance by the ROICC NTR therefor, the Contractor vertical and horizontal position of each well shall be determined by a registered land surveyor licensed in the State of Maryland. The survey shall document the vertical elevations (NGVD29) of the top of the casing pipe, top of the riser pipe, and the ground surface elevation adjacent to each well. The survey shall also determine the horizontal location of each well based on the NAD83 coordinate system. Survey shall be accurate to the nearest 0.01 foot.

This data shall be submitted with a well location map as the Installation Survey Report.

3.8 CLEANUP

Upon completion of the well construction, remove debris and surplus materials from the jobsite.

3.9 WELL ABANDONMENT

COMAR 26.04.04.

-- End of Section --

SECTION 02742

PAVEMENT WITH A BITUMINOUS CONCRETE SURFACE

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1188	(1996) Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D 1557	(1991; R 1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft (2,700 kN-m/m))
ASTM D 2950	(1997) Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D 4253	(2000) Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D 4254	(2000) Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density

FEDERAL SPECIFICATIONS (FS)

FS TT-P-115	(Rev. F) Paint, Traffic (Highway, White and Yellow)

MARYLAND STATE HIGHWAY ADMINISTRATION (MD SHA)

MD SHA CM	(1993) Construction and Materials

1.2 SUBMITTALS

Submit the following in accordance with Section C of the Basic Contract.

SD-06 Test Reports

Subbase material density

Shoulder material density

Subbase Course

Bituminous Concrete Courses Test

SD-07 Certificates

Subbase materials

Tack coat

Bituminous concrete mix

1.3 DESCRIPTION

This section includes a provision for the construction upon a prepared subgrade surface, subbase, bituminous concrete binder (base) course, bituminous concrete wearing (surface) course, and paint striping. Work shall be performed in accordance with the applicable requirements of the MD SHA CM specifications, except that the contractual and payment provisions do not apply. Articles and sections listed herein refer to these specifications. Where the term "Engineer" is used, it will equate to "ROICC NTR"; where the term "Administration" is used, it will equate to the "Federal Government" or "Government."

1.4 DEFINITION OF TERMS

1.4.1 Subgrade

An existing or borrow earth foundation upon which the pavement is constructed.

1.4.2 Subbase

A graded aggregate material having greater stability than the underlying subgrade material, used to reduce the thickness requirements of the bituminous concrete pavement section.

1.4.3 Bituminous Concrete Binder Course

A bituminous concrete layer immediately below the bituminous concrete wearing course. It is referred to as a base course in the specified reference documents.

1.4.4 Bituminous Concrete Wearing Course

The top traffic-bearing layer of pavement. It is referred to as a surface course in the specified reference documents.

1.4.5 Tack Coat

A light application of bituminous material applied to an existing bituminous surface, or the vertical cut surfaces of an existing pavement section to ensure bonding between the surfaces being paved and the new bituminous concrete material.

PART 2 PRODUCTS

2.1 SUBBASE MATERIALS

MD SHA CM Section 901, Table 901A Crusher Run Aggregate CR-6.

2.2 BITUMINOUS CONCRETE BINDER (BASE) COURSE MATERIALS

MD SHA CM Section 901, Table 901C BF or current approved MD SHA CM equivalent subject to approval of the ROICC NTR. MD SHA CM Section 904.

2.3 BITUMINOUS CONCRETE WEARING (SURFACE) COURSE MATERIALS

MD SHA CM Section 901, Table 901C SF or current approved MD SHA CM equivalent subject to approval of the ROICC NTR. MD SHA CM Section 904.

2.4 TACK COAT MATERIALS

MD SHA CM Section 904.05, emulsified asphalt.

2.5 SHOULDER MATERIAL

MD SHA CM Section 901, Table 901A Graded Aggregate.

2.6 STRIPING MATERIALS

FS TT-P-115, Type I or Type II, color to match existing.

2.7 WOVEN GEOTEXTILE

MD SHA CM Section 921.09, Maryland application class ST.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

Size reduce and compact existing pavement section prior to common fill placement to provide adequate layer bonding, drainage, and bearing capacity. Prepare subgrade in accordance with Section 02315, "Excavation and Fill."

3.2 SUBBASE CONSTRUCTION

Construct in accordance with MD SHA CM Section 501.03. Subbase material density shall be compacted to 97 percent of ASTM D 1557 or 70 percent relative density in accordance with ASTM D 4253 and ASTM D 4254.

Place woven geotextile in a loose and unstretched condition. Overlap edges a minimum of 12 inches.

3.3 BITUMINOUS CONCRETE BINDER (BASE) COURSE CONSTRUCTION

MD SHA CM Section 504.

3.4 BITUMINOUS CONCRETE WEARING (SURFACE) COURSE CONSTRUCTION

MD SHA CM Section 504.

3.5 TACK COAT APPLICATION

MD SHA CM Section 504.03.04. Apply to the vertical cut surfaces of the pavement as well as the top of the bituminous concrete binder (base) course.

Clean and fill transverse joints between old and new pavement as directed by the ROICC NTR with tack coat material insuring that it fully penetrates and completely fills the joint. Remove excess tack coat material along the joint. Immediately cover with a light application of clean sand.

3.6 SHOULDER CONSTRUCTION

MD SHA CM Section 601. Shoulder material density shall be compacted to 97 percent of ASTM D 1557.

3.7 STRIPING APPLICATION

Allow the bituminous pavement to cure for at least 21 days before applying paint. Clean the pavement to remove loose sand, stones, dust, oil, grease, water, and other substances that are harmful to paint or adversely affect the adhesion of paint. Do not apply paint if conditions prevent neat, uniform application.

Apply by means of conventional traffic line striping equipment; the striping shall have a wet film thickness of 0.38 inch. Follow the striping paint manufacturer's recommendations.

3.7.1 Protection

Do not permit traffic on the painted areas until the paint is thoroughly dry.

3.8 FIELD TESTING

3.8.1 Subbase Course

3.8.1.1 Smoothness Tests

Correct deviations on the surface in excess of 3/8 inch when tested with a 10 foot straightedge applied parallel with and at right angles to the center line of the paved area by loosening, adding or removing material, reshaping, watering, and compacting. The smoothness requirements specified herein apply only to the top layer when the subbase is constructed in more than one layer.

3.8.1.2 Density Tests

One field test for each 100 square yards of bituminous concrete binder course and wearing course, with a minimum of three tests each course, in accordance with ASTM D 2950. Thin layer nuclear density gauge readings shall be taken on a control strip to determine the number of coverages to obtain optimum density. Optimum density is defined when the average density does not change by more than 1.0 percent between successive coverages.

3.8.1.3 Thickness Tests

Measure the thickness of the subbase at intervals such that there will be a depth measurement for at least each 100 square yards of a complete subbase course, with a minimum of three tests. Make a depth measurement with test holes at least 3 inches in diameter through the subbase course. Where there is a deficiency greater than 1/2 inch, correct by scarifying, adding the mixture of proper gradation, reblading, and recompacting. Where the measured thickness is more than 1/2 inch thicker than indicated, consider it as the indicated thickness plus 1/2 inch for determining the average. The average thickness is the average of the depth measurements; the average thickness shall have a maximum underrun of the thickness indicated of 1/4 inch.

3.8.2 Bituminous Concrete Courses Test

3.8.2.1 Smoothness

Test the compacted surface of the bituminous concrete binder and wearing courses with a straightedge as the work progresses. Apply the straightedge parallel with and at right angles to the centerline after the final rolling. The evenness of the binder course shall have a maximum variance of plus or minus 1/4 inch for every 10 feet. The maximum variance in the wearing course shall be plus or minus 1/8 inch for every 10 feet. Correct any portion of the pavement showing irregularities greater than those specified.

3.8.2.2 Density

This test shall be performed with one ASTM D 1188 laboratory test for the project and one ASTM D 2950 field test for each 100 square yards of bituminous concrete binder and wearing courses, with a minimum of three tests. The minimum field density shall be 96 percent of the density obtained in the laboratory test.

3.8.2.3 Thickness

The maximum allowable deficiency at any point shall be 1/4 inch less than the indicated thickness for any course. The minimum average thickness of the course shall be equal to the indicated thickness. Where the deficiency exceeds the specified tolerances, the Contractor shall correct such area or areas by removing the pavement in question and replacing with new pavement.

-- End of Section --

SECTION 02951

MITIGATED WETLANDS AREA, SHRUBS, PLANTS, AND GRASS

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z60.1	(1990) Nursery Stock

U.S. DEPARTMENT OF AGRICULTURE (USDA)

USDA FSA	(January 1985) Federal Seed Act Rules and Regulations of the Secretary of Agriculture
USDA SCS List	(1982) Soil Conservation Service, National List of Scientific Plant Names, (Volume 1-List of Plant Names), Report Number SCS-TP-159

U.S. DEPARTMENT OF INTERIOR (DOI)

DOI List	(1988) National List of Plants Species that Occur in Wetlands: National Summary, Biological Report 88(24), Fish and Wildlife Service

MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE)

MDE SESC	(1994) Standards and Specifications for Soil Erosion and Sediment Control

1.2 DEFINITION

1.2.1 Stand of Turf

95 percent ground cover of the established species.

1.2.2 Pesticide

Pesticide means soil fumigants, herbicides, insecticides, and fungicides.

1.2.3 Wetlands Restoration Areas

Refers to all areas designated for establishment of indigenous vegetation as indicated.

1.3 SUBMITTALS

Submit the following in accordance with Section C of the Basic Contract.

SD-06 Test Reports

Erosion control materials

Topsoil

SD-07 Certificates

Nursery certifications

Indicate names of plants in accordance with the DOI List or USDA SCS List, including type, quality, and size.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Arrange for delivery of plant material as close as possible to planting. Small deliveries of only that plant material which can be installed the same day are recommended.

1.4.1.1 Seed Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.4.1.2 Branched Plant Delivery

Deliver with branches tied and exposed branches covered with material which allows air circulation. Prevent damage to root balls and desiccation of leaves.

1.4.1.3 Fertilizer and Lime Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and Federal laws. Fertilizer and lime may be furnished in bulk with a certificate indicating the above information.

1.4.1.4 Plant Labels

Deliver plants with durable waterproof labels in weather-resistant ink. Provide labels stating the correct plant name and size as specified in the list of required plants. Attach to plants, bundles, and containers of plants. Groups of plants may be labeled by tagging one plant. Labels shall be legible for a minimum of 60 days after delivery to the planting site.

1.4.1.5 Pesticide Delivery

Deliver to the site in original unopened containers with legible label indicating EPA registration number and manufacturer's registered uses.

1.4.2 Storage

1.4.2.1 Plant Storage and Protection

Store and protect plants not planted on the day of arrival at the site as follows:

a. Shade and protect plants in outside storage areas from the wind and direct sunlight until planted.

b. Heel-in bare root plants.

c. Protect balled and burlapped plants from freezing or drying out by covering the balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering which allows air circulation.

d. Keep plants in a moist condition until planted by watering with a fine mist spray.

1.4.2.2 Lime, Fertilizer, and Mulch Storage

Store in dry locations away from contaminants.

1.4.2.3 Pesticides and Antidesiccants Storage

Do not store with other landscape materials.

1.4.2.4 Seed, Fertilizer and Lime Storage

Store in cool, dry locations away from contaminants.

1.4.2.5 Topsoil

Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective postemergence herbicide. Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

1.4.3 Handling

Do not drop or dump materials from vehicles. Avoid damaging plants being moved from nursery or storage area to planting site. Handle balled and burlapped plants carefully to avoid cracking or breaking the earth ball. Do not handle plants by the trunk or stem. Puddle bare-root plants after removal from the heeling-in bed to protect roots from drying out. Remove damaged plants from the site.

1.5 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.5.1 Planting Dates

Planting dates as indicated. Planting outside these time periods may be acceptable depending on specific conditions at the site. However, planting outside these periods shall be conducted only after the approval by the Contracting Officer.

1.5.2 Restrictions

Do not plant when ground is frozen, snow covered, or when air temperature exceeds 95 degrees F.

1.5.3 Seed

Apply seed within twenty four hours after seed bed preparation.

1.6 GUARANTEE

All plants shall be guaranteed for one year beginning on the dates of inspection by the Contracting Officer to commence the plant establishment period.

1.7 SUBSTITUTIONS

Authorization shall be obtained from the Contracting Officer before performing work in variance to these specifications including substitutions of plant material in terms of species, size, or form.

1.8 REQUIREMENTS FOR OFF SITE SOIL

Provide in accordance with Section 02315, "Excavation and Fill."

PART 2 PRODUCTS

2.1 PLANTS

2.1.1 Varieties

Botanical names indicated are listed in DOI List or USDA SCS List. Furnish nursery stock in accordance with ANSI Z60.1, except as otherwise specified or indicated. Each plant or group of planting shall have a "key" number indicated on the nursery certifications of the plant schedule. Furnish plants grown under climatic conditions similar to those in the locality of the project. Spray plants budding into leaf or having soft growth with an antidesiccant before digging. Plants of the same specified size shall be of uniform size and character of growth.

2.1.2 Plant Regulations

ANSI Z60.1, and the following additional requirements.

2.1.2.1 Shape and Condition

Well-branched, well-formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and having a healthy, normal, and unbroken root system.

2.1.2.2 Source and Plant Material

All plant material shall be nursery-grown specifically for use in USDA Hardiness Zone 7. Plant material collected from wild settings shall not be used.

2.1.2.3 Plant Material Used in the Wetlands Restoration Areas

As indicated.

2.1.2.4 Size

Minimum sizes shall be those available from the nursery stock, based on the average width or height of the plant for the species as specified in ANSI Z60.1.

2.1.3 Plant Material Standards

All plant material shall meet applicable standards set in ANSI Z60.1.

2.1.3.1 Bareroot Herbaceous Material

Display new roots that are clean and white in coloration, and the plants shall appear healthy with no significant foliage spots, discolorations, wilting, or other evidence of disease or insect damage.

2.1.3.2 Bareroot Trees and Shrubs

Show good form; be sound and vigorous; be free of disease and insect damage, sunscald, windburn, and abrasion; and have a well-developed fibrous root system. Have an abundance of well-developed terminal buds on the leaders and branches, and the stems and branches shall be turgid and have a healthy cambium. Plants shall not be leafed out at the time of delivery.

a. Container Grown Trees and Shrubs

(1) The root system shall be well distributed throughout the container, but not potbound.

b. Balled and Burlapped Trees and Shrubs

(1) Balls shall be firm natural soil meeting the size criteria in ANSI Z60.1. Balls shall be securely tied using burlap or other strong, biodegradable cloth.

2.1.3.3 Rhizomes

Be firm and of normal coloration and size.

2.2 TOPSOIL

Test for USDA classification, organic content, pH, soluble salts, nitrogen, phosphorous, and potassium by a recognized commercial laboratory.

2.2.1 Existing Topsoil

Modify existing soil to conform to the requirements specified in paragraph entitled "Topsoil Composition." Do not use soils from areas where the invasive species Phragmites (Phragmites australis) is known to occur.

2.2.2 Off-Site Topsoil

Conform to requirements specified in paragraph entitled "Topsoil Composition." Additional topsoil shall be furnished by the Contractor. Do not use soils from areas where invasive species Phragmites (Phragmites australis) is known to occur.

2.2.3 Topsoil Composition

Soil for use in the upper 6 inches of the wetland and site restoration areas shall be of medium texture (loam, sandy loam, loamy sand, silt loam, or silt); contain from 5.0 to 8.0 percent organic matter; have pH between 6.0 and 7.5; and soluble salts less than or equal to 500 ppm.

2.3 pH ADJUSTERS

2.3.1 Lime

As indicated.

2.4 FERTILIZER

Requirements for temporary and permanent seeding as indicated.

2.5 SOIL CONDITIONERS

MDE SESC, Section 21 for permissible soil conditioners or as otherwise specified.

2.6 SURFACE TOPDRESSING

Mulches as indicated.

2.7 SEEDS

2.7.1 Classification

Provide State-certified seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weed and seed content, and inert material. Label in conformance with USDA FSA and MDE SESC. Wet, moldy, or otherwise damaged seed will be rejected. Field mixes will be acceptable when field mix is performed on site in the presence of the Contracting Officer.

2.7.2 Composition

MDE SESC Section 20 or as otherwise specified.

2.7.3 Seed Mixture

2.7.3.1 Permanent Seed Mixture

As indicated.

2.7.3.2 Temporary Seed Mixture

As indicated.

2.8 PESTICIDES AND FERTILIZERS

All pesticides and fertilizers proposed for use must be approved by the Contracting Officer prior to application.

2.8.1 Pesticide Ingredients

Only use herbicides containing the only active ingredient of glyphosate.

2.9 WATER

Suitable quality for irrigation.

2.10 MULCH

All mulch used shall be approved by the Contracting Officer prior to application and shall comprise shredded woody material free of stones and other foreign material.

2.11 EROSION CONTROL MATERIALS

2.11.1 Matting for Erosion Control

MDE SESC, Section 22. Material shall contain ultraviolet (UV) inhibiting stabilizers to ensure endurance and provide permanent root reinforcement.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Extent of Work

Provide soil preparation, fertilizing, seeding, and topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.1.2 Soil Preparation

After areas have been brought to finish subgrade elevation, thoroughly till to minimum depth of 6 inches by scarifying, discing, harrowing, or other methods approved by the Contracting Officer. Remove debris and stones larger than one inch in any dimension remaining on surface after tillage. Spread stockpiled topsoil evenly to provide positive drainage. Provide off-site topsoil to meet indicated finish grade. Do not spread topsoil when frozen or excessively wet or dry. Correct irregularities in finished surfaces to eliminate depressions. Protect finished prepared topsoil areas from damage by vehicular or pedestrian traffic.

After areas have been brought to indicated finish grade, incorporate fertilizer, pH adjusters and topsoil conditioners as indicated by discing, harrowing, tilling or other method approved by the Contracting Officer. Remove debris and stones larger than one inch in any dimension remaining on the surface after tillage. Correct irregularities in finish surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.1.2.1 pH Adjuster Application Rates

Apply pH adjuster at rates as determined by laboratory soil analysis of the topsoil as indicated.

3.1.2.2 Soil Conditioner Application Rates

Apply topsoil conditioners at rates as determined by laboratory soil analysis of the topsoil as indicated.

3.1.2.3 Fertilizer Application Rates

Apply fertilizer at rates as determined by laboratory soil analysis of the topsoil as indicated.

3.2 SEEDING

3.2.1 Seed Application Seasons and Conditions

Immediately before seeding, restore topsoil to proper grade and thoroughly moisten topsoil. Do not seed when ground is muddy, frozen, snow covered or in an unsatisfactory condition for seeding. If special conditions exist that may warrant a variance in the above seeding dates or conditions, submit a written request to the Contracting Officer stating the special conditions and proposed variance. Apply seed within twenty four hours after seedbed preparation. Sow seed by approved sowing equipment as indicated.

3.2.2 Seed Application Method

As indicated.

3.2.3 Surface Topdressing

For seeding methods other than hydroseeding, spread straw over seed bed area as indicated. Take precautionary measures to prevent topdressing materials from spilling onto pavements, utilities structures, or planter beds. Wood cellulose fiber mulch shall be utilized in conjunction with hydroseeding.

3.2.4 Rolling

Immediately after seeding, firm entire area except for slopes in excess of 3H to 1V with a roller not exceeding 90 pounds for each foot of roller width. If seeding is performed with cultipacker-type seeder or by hydroseeding, rolling may be eliminated.

3.2.5 Erosion Control Matting

Install in accordance with MDE SESC Section G22 and the manufacturer's instructions.

3.2.6 Watering

Start watering areas seeded as required by temperature and wind conditions. Apply water for duration and at a rate sufficient to insure topsoil is moist to a depth of 6 inches and topsoil surface is thoroughly wet without run-off. During the germination process, seed is to be kept actively growing and not allowed to dry out.

3.3 PROTECTION OF TURF AREAS

Immediately after turfing, protect area against traffic and other use.

3.4 RESTORATION

Restore to original condition existing turf areas which have been damaged during turf installation operations.

3.5 MAINTENANCE

Maintenance shall begin immediately after planting. Seeded areas shall be protected and maintained until formal acceptance by the Contracting Officer. Maintenance shall consist of watering activities and other necessary operations adequate to insure the survival of the planted materials and seeded areas for the duration of the maintenance period, as

specified in MDE SESC Section 20.

3.6 PREPARATION - WETLANDS RESTORATION AREA

3.6.1 Site Preparation

The areas designated for wetlands restoration shall be free of live hervaceous vegetation prior to planting. Any live herbaceous vegetation on the site at the time of planting shall be killed by a ground application of an herbicide. Killed herbaceous vegetation shall not be physically removed.

3.6.2 Layout

Approved plant material locations and bed outlines on the project site will be staked and flagged before digging plant pits or beds. The Contracting Officer reserves the right to adjust plant material locations to meet field conditions.

3.6.3 Transportation

Provide adequate protection, packaging and handling of all plant materials during their transportation to the site to guard against injury or desiccation. All plants injured and plants with root balls broken during planting operation will be rejected. All plant material is to be planted as soon as possible after its arrival on the site. All bare-root plants shall be planted or heeled-in immediately upon delivery to the site. All other plant material that can not be planted immediately upon delivery shall be covered with moist topsoil, mulch, or other material to provide protection from drying winds and sun. All plants shall be watered as necessary until planted.

3.6.4 Excavation, Topsoiling and Planting

Provide minimum of 6 inches of topsoil over the wetlands restoration areas or as otherwise indicated. Protect existing adjacent vegetation before excavations are made. Measure depth of pits from finished grade. Depth of excavation shall provide proper relation between top of ball and finished grade as specified in paragraph entitled "Handling."

3.6.5 Root Pruning

Cleanly prune any damaged roots from the bare root seedlings.

3.7 PLANTING

3.7.1 Planting Pits

3.7.1.1 Planting Pits for Bare Root Plants

Planting pits shall be excavated to a depth such that the root system will be just below grade, and to a width accommodating the root system in a natural position.

For rhizomes, no pit shall be excavated, but soil shall be loose and friable to depth that the rhizome may be planted and covered with one inch of soil.

3.7.1.2 Planting Pits for Balled and Burlapped and Container Grown Plants

Planting pits shall be excavated, to a depth that the top of the rootball (removed from the container, if container grown) will sit approximately 1 to 2 inches above the surrounding grade, and to a width that will leave approximately 9 additional inches on each side of the rootball.

3.7.1.3 Planting Pits for Peat Pot Stock

Planting pits shall be excavated so that the top of the peat pot shall be between 1 and 2 inches below the topsoil surface.

3.7.2 Setting and Planting

3.7.2.1 Setting Bare Root Plants

Each plant shall be set vertically in its pit such that the uppermost roots are just below grade and that the extended root system does not touch the edge of the pit. All visible damaged roots shall be cleanly pruned above the area of damage prior to setting the plants.

3.7.2.2 Setting Balled and Burlapped and Container Grown Plants

The rootball shall be placed in the center of the pit and backfilled. Tree and shrubs shall not have more than a 10 percent lean following backfilling.

3.7.2.3 Setting Peat Pots

Peat pots shall be set so that the top of the peat pot is between 1 and 2 inches below the topsoil surface.

3.7.3 Backfilling and Tamping

3.7.3.1 Backfilling Bare Root Plants

Backfill shall comprise the soil originally removed from the pit, loose and without clods, but not amended. Backfill shall be loosely added to the pit so as to not crush or compress the roots. Once placed, the backfill shall be gently tamped to pack topsoil around the roots.

Rhizomes shall be gently pressed into loose and friable soil such that the rhizomes are covered by one inch of soil.

3.7.3.2 Backfilling Balled, Container Grown Plants and Peat Pots

Backfill shall be comprised of topsoil originally removed from the pit, loose and without clods, but not amended. Once placed, the backfill shall be gently tamped. Excess backfill shall be loosely raked across the land surface surrounding the pit, but not used to create and saucer to trap rainwater.

3.7.4 Watering

Topsoil around each plant shall be thoroughly watered immediately following planting.

3.7.5 Mulching

After watering, a circular area 30 inches in diameter surrounding each tree shall be mulched to a depth of 2 inches.

3.7.6 Other

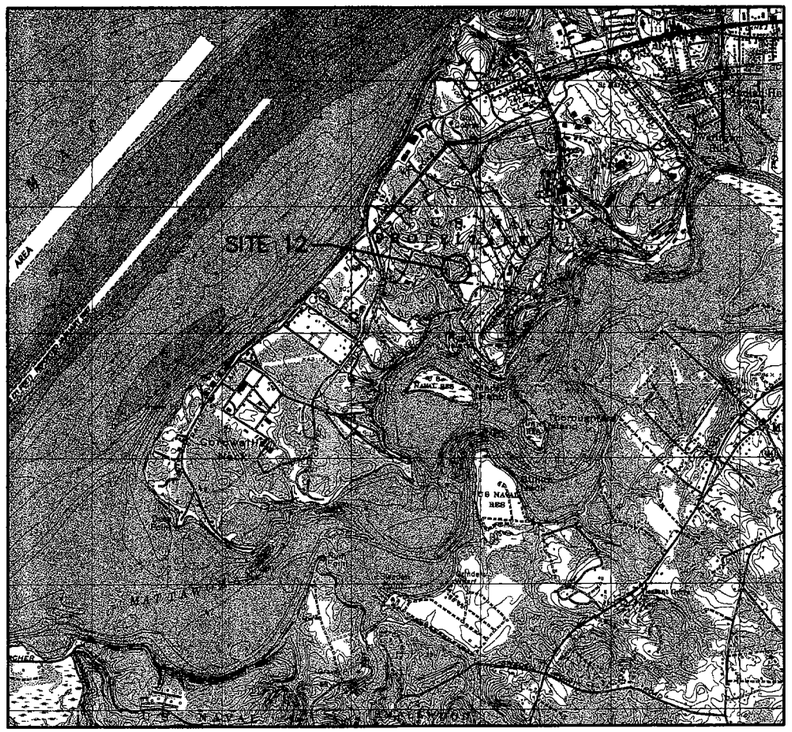
Newly graded areas outside of the limits of the wetland restoration areas shall be topsoiled and seeded as indicated.

3.8 MAINTENANCE PERIOD

Maintenance shall begin immediately after planting and shall be provided for either the replicated fresh water marsh or new shrubs and grasses. New planting and seeded areas shall be protected and maintained for a period of ten (10) weeks after formal acceptance by the Contracting Officer. Maintenance shall consist of watering activities and other necessary operations adequate to insure the survival of the planted materials and seeded areas for the duration of the maintenance period. Remove and replace all dead plants.

-- End of Section --

FINAL SUBMISSION
SITE 12 - TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND
RAC CONTRACT NO. N62470-97-D-5000 D.O. 062-01

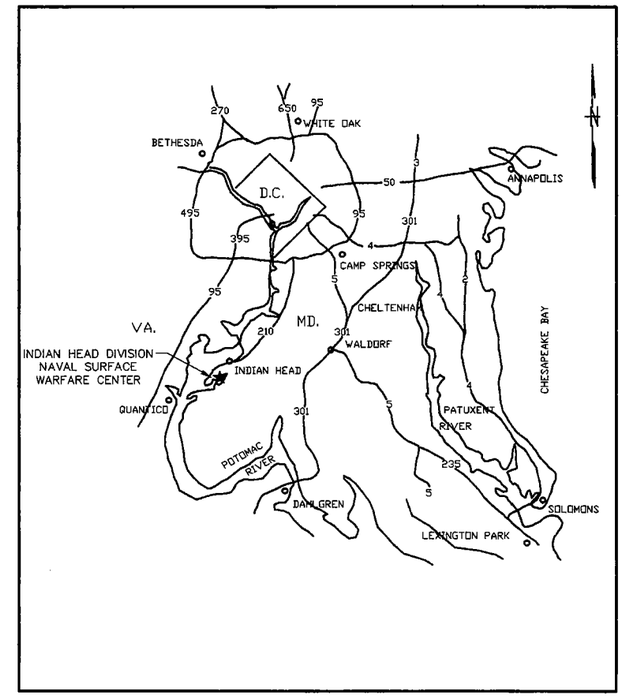


PROJECT LOCATION MAP

NOT TO SCALE

DRAWING INDEX

NAVFAC DWG. No.	SHEET No.	SHEET TITLE
3458628	T-1	TITLE SHEET
3458629	T-2	GENERAL NOTES AND LEGEND
3458630	C-1	EXISTING CONDITIONS PLAN
3458631	C-2	EROSION AND SEDIMENT CONTROL PLAN
3458632	C-3	EROSION AND SEDIMENT CONTROL NOTES
3458633	C-4	REVEGETATION NOTES
3458634	C-5	EROSION AND SEDIMENT CONTROL DETAILS
3458635	C-6	INTERIM GRADING PLAN
3458636	C-7	FINAL GRADING PLAN
3458637	C-8	CROSS SECTIONS
3458638	C-9	MISCELLANEOUS DETAILS



VICINITY MAP

10 0 10 20

SCALE IN MILES

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

D9A	403	
04	404	
E.I.C.	405	
201	406	
402	D4B	

REVIEWED BY ROCC DATE

Tetra Tech NUS, Inc. PETER PLAGA, M. REY ANDERSON, JR. PE, PG, CGD

DES. TNG | DR. D.T. | CHK. RGV | TITLE | DATE

SUBMITTED BY: 4/19/02

APPROVED DATE

EFD FOR COMMANDER NAVFAC

SEAL AREA

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
WASHINGTON, D.C.

NAVAL FACILITIES ENGINEERING COMMAND

INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER

INDIAN HEAD, MARYLAND

FINAL SUBMISSION
SITE 12 – TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
TITLE SHEET

CODE I.D. NO. 80091

DRAWING SIZE: D

CONST. CONT. NO.
N62470-97-D-5000

SPEC. 21-97-5000-062-01

NAVFAC DRAWING NO.
3458628

SHEET 1 OF 11

T-1

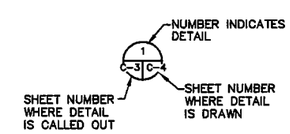
ACAD:0525T001.dwg 10/01/01 HJP

GENERAL NOTES

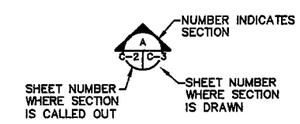
1. GRID COORDINATES REFERENCE MARYLAND STATE PLANE COORDINATE SYSTEM, NORTH ZONE, NORTH AMERICAN DATUM, 1983 (NAD83).
2. ELEVATIONS REFERENCE NATIONAL GEODETIC VERTICAL DATUM, 1929 (NGVD29).
3. EXISTING TOPOGRAPHY AND FEATURES WERE PREPARED BY MURPHY HOBSON SACKS OF RALEIGH, NORTH CAROLINA VIA FIELD SURVEY PERFORMED NOVEMBER 1997.
4. ONE FOOT CONTOUR INTERVAL UNLESS OTHERWISE INDICATED.
5. FIGURED DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS. CHECK GRAPHIC SCALE BEFORE SCALING DRAWINGS.
6. ALL WORK FOR THIS PROJECT SHALL BE IN STRICT ACCORDANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS. ALL METHODS OF WORK FOR THIS PROJECT SHALL ALSO COMPLY WITH FEDERAL, STATE OF MARYLAND, AND LOCAL ORDINANCES.
7. THIS PROJECT REQUIRES GRADE-B GEOGRAPHIC INFORMATION SYSTEM (GIS) COORDINATE ACCURACY. THE CONTRACTOR SHALL PERFORM A POST-CONSTRUCTION SURVEY OF ALL NEW AND/OR ALTERED EXISTING ITEMS PROVIDED AS A RESULT OF THIS CONTRACT. SEE SPECIFICATION SECTION 02224 - GEOGRAPHIC INFORMATION SYSTEM GRADE-B POST-CONSTRUCTION LOCATION.
8. PRIOR TO COMMENCING WORK, ALLOW FOR COORDINATION WITH THE RESIDENT OFFICER IN CHARGE OF CONSTRUCTION (ROICC) TO ENSURE THAT ALL DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD PROCEDURES ARE COMPLIED WITH.
9. UNDERGROUND UTILITY LOCATIONS WERE OBTAINED FROM IHDIV-NSWC BASEWIDE MAP. LOCATIONS SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY UTILITY LOCATIONS PRIOR TO THE BEGINNING OF ANY SITE WORK USING A MINIMUM OF TWO PASSIVE DETECTION METHODS (E.G. ELECTROMAGNETIC INDUCTION, GROUND PENETRATING RADAR, MAGNETIC LOCATORS, ACOUSTIC SURVEY, ETC.) SUBJECT TO APPROVAL OF THE ROICC.
10. THE CONTRACTOR SHALL THOROUGHLY INSPECT THE SITE PRIOR TO CONSTRUCTION TO VERIFY EXISTING SITE CONDITIONS.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING HORIZONTAL AND VERTICAL CONTROL FOR CONSTRUCTION. SEE DRAWING C-1 FOR EXISTING MONUMENTS.
12. THE CONTRACTOR SHALL STAKE THE LOCATION OF ALL AREAS TO BE EXCAVATED OR DISTURBED PRIOR TO ACTUAL WORK. THE FIELD LOCATIONS MUST BE REVIEWED AND APPROVED BY THE ROICC.
13. THE LOCATION(S) FOR CONTRACTOR STAGING AREA(S) ARE TO BE APPROVED BY THE ROICC AND SHALL BE OUT OF THE WAY OF TRAFFIC AND/OR PEDESTRIAN FLOW. ALL TO-BE-DETERMINED STAGING AREAS OUTSIDE APPROVED LIMITS OF DISTURBANCE SHALL, AT A MINIMUM, BE RINGED WITH SILT FENCE AND HAVE ONLY ONE POINT OF INGRESS/EGRESS OVER APPROVED STABILIZED STONE CONSTRUCTION ENTRANCE(S).
14. THE SOLE POINT FOR INGRESS AND EGRESS OF THE SITE WILL BE VIA STABILIZED STONE CONSTRUCTION ENTRANCE(S) WHICH WILL BE CONSTRUCTED ACCORDING TO THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
15. THE CONTRACTOR WILL PROVIDE INGRESS/EGRESS CONTROL INTO THE SITE AS PART OF MOBILIZATION ACTIVITIES.
16. THE CONTRACTOR WILL PROVIDE MAXIMUM PROTECTION FOR EXISTING UTILITIES WHICH ARE TO REMAIN IN SERVICE. THE CONTRACTOR WILL PROVIDE ALL TEMPORARY SERVICES.
17. EXISTING GROUNDWATER MONITORING WELLS S12WP01 THROUGH S12WP06 WILL BE IMPACTED BY EXCAVATION, GRADING, AND SOIL COVER PLACEMENT EFFORTS AND WILL THEREFORE BE ABANDONED. NEW GROUNDWATER MONITORING WELLS S12MW007 THROUGH S12MW013 SHALL BE INSTALLED DURING THE REMEDIAL ACTION AS INDICATED. ABANDON AND INSTALL MONITORING WELLS IN ACCORDANCE WITH COMAR 26.04.04.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIMITING ALL WORK TO THE IMMEDIATE PROJECT AREA WITHIN THE APPROVED LIMITS OF DISTURBANCE. ALL AREAS DISTURBED BY THE CONTRACTOR THAT ARE OUTSIDE THE LIMITS OF DISTURBANCE SHALL BE RESTORED BY THE CONTRACTOR TO LIKE OR BETTER CONDITION.
19. THE CONTRACTOR SHALL MAINTAIN ALL WORK AREAS FREE FROM DUST AND ODORS IN A MANNER APPROVED BY THE ROICC.
20. ALL DISTURBED AREAS SHALL BE GRADED TO MAINTAIN POSITIVE DRAINAGE.
21. ALL DISTURBED AREAS SHALL BE STABILIZED (SEEDED AND MULCHED, RIPRAPPED, PAVED OR COVERED WITH STONE) IMMEDIATELY UPON ESTABLISHING FINAL GRADE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING THE MEASURES INDICATED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
22. REMOVE EXISTING FENCE ALONG ATKINS ROAD EXTENSION.
23. THE CONTRACTOR SHALL PREPARE A UXO HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) SUPPORT WORKPLAN (UXO HTRW SUPPORT WORKPLAN) AS REQUIRED BY NAVSEA OP 5 VOLUME 1 "AMMUNITION AND EXPLOSIVES ASHORE, SAFETY REGULATIONS FOR HANDLING, STORING, PRODUCTION, RENOVATION, AND SHIPPING" (SIXTH EDITION). THE UXO HTRW SUPPORT WORKPLAN SHALL BE SUBMITTED TO THE ORDNANCE ENVIRONMENTAL SUPPORT OFFICE FOR APPROVAL. SITE WORK SHALL NOT COMMENCE UNTIL THE UXO HTRW SUPPORT WORKPLAN IS APPROVED. THE UXO HTRW SUPPORT WORKPLAN SHALL BE PREPARED IN ACCORDANCE WITH NAVSEAINST 8023.11 "STANDARD OPERATING PROCEDURES FOR MANUFACTURE, HANDLING, AND STORAGE OF EXPENDABLE ORDNANCE AT NAVY AND MARINE CORPS ACTIVITIES" AND USACE EP 75-1-2 "UNEXPLODED ORDNANCE (UXO) SUPPORT DURING HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND CONSTRUCTION ACTIVITIES".

GENERAL LEGEND

BM IH1080 L7-6	BENCHMARK
	SIGN
	STORM DRAIN MANHOLE
	HAUL ROUTE
	ROCK CHECK DAM
	CULVERT
	TREELINE
—SF—SF—SF—SF—SF—	SILT FENCE
—SSF—SSF—SSF—SSF—	SUPER SILT FENCE
—x—x—x—x—x—	FENCE
—SD—SD—SD—SD—SD—	STORM DRAIN
—OHE—OHE—OHE—OHE—	OVERHEAD POWER LINE (WITH UTILITY POLE)
—V—V—V—V—V—	WATER LINE
	EDGE OF POND
	LIMIT OF WETLANDS INVESTIGATION
	LIMIT OF DISTURBANCE
	LIMIT OF WASTE (APPROXIMATE)
	WETLANDS PERIMETER
	LIMIT OF EXCAVATION
	BREAK IN GRADE
10	EXISTING SURFACE ELEVATION CONTOUR
10	INTERIM GRADE ELEVATION CONTOUR
10	FINAL GRADE ELEVATION CONTOUR
1+00	CONSTRUCTION BASELINE
	DELINEATED WETLANDS
	WETLANDS RESTORATION
	RIPRAP (d_{50} = 6")



DETAIL IDENTIFIER



SECTION IDENTIFIER

SYMBOL	DESCRIPTION	DATE	APPROVED
	REVISIONS		

09A	403		
04	404		
E.I.C.	405		
401	408		
402	D4B		
REVIEWED BY ROICC	DATE		

Tetra Tech NUS, Inc. 661 ANDERSON DRIVE PITTSBURGH, PA 15220

DES. TWS DR. DLT CHK. RGM TITLE E.I.C. DATE 2/13/02

APPROVED 2/13/02

ETD FOR COMMANDER NAVFAC

SEAL AREA

NAVAL FACILITIES ENGINEERING COMMAND

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
WASHINGTON, D.C.

NIGHT HEAD, MARYLAND

NIGHT HEAD DIVISION, NAVAL SURFACE WARFARE CENTER

FINAL SUBMISSION
SITE 12 - TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
GENERAL NOTES AND LEGEND

CODE I.D. NO. 80091

DRAWING SIZE: D

CONST. CONT. NO. N62470-97-D-5000

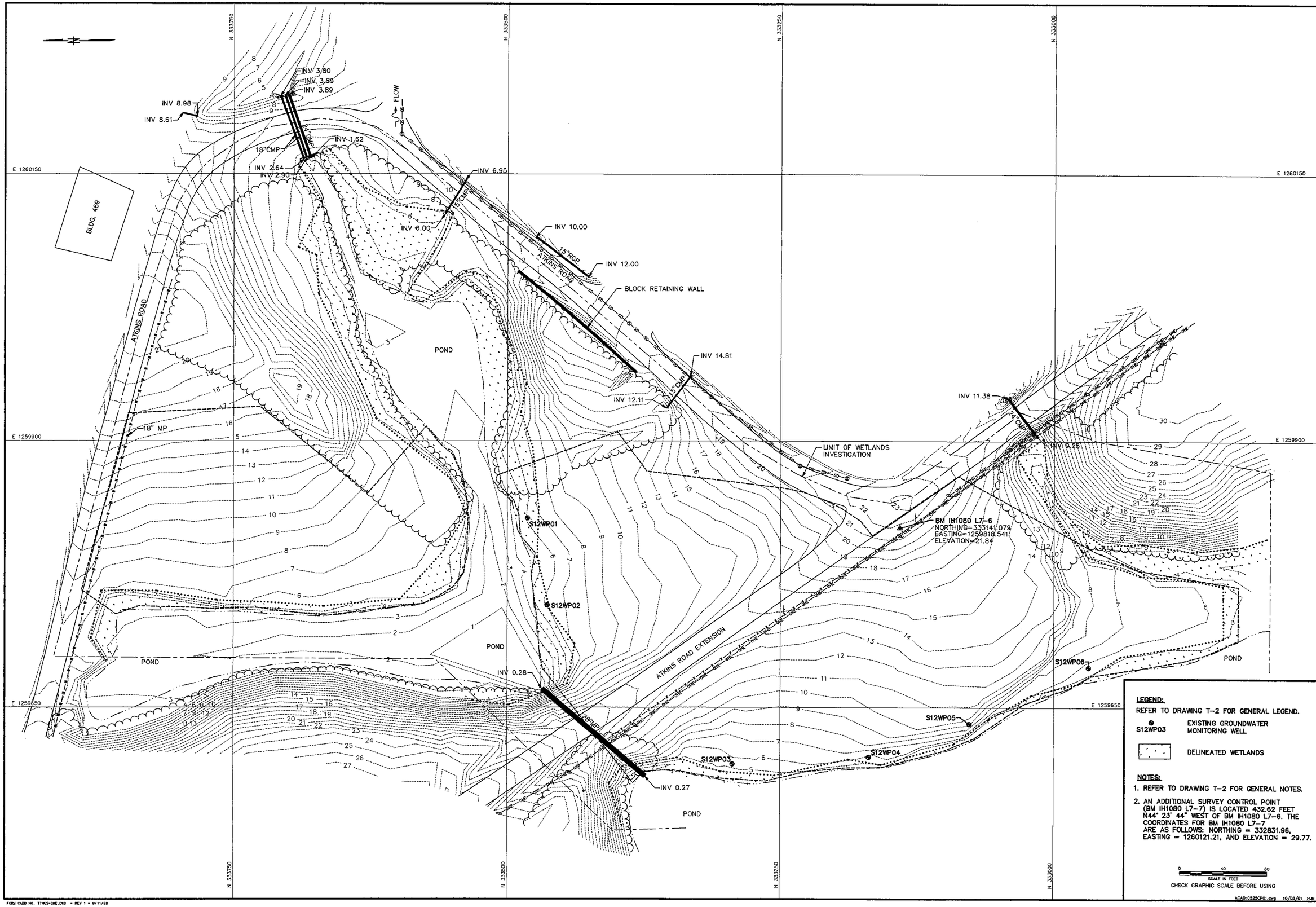
SPEC. 21-97-5000-062-01

NAVFAC DRAWING NO. 3458629

SHEET 2 OF 11

T-2

ACAD:0525CH03.dwg 10/03/01 HJB



LEGEND:

REFER TO DRAWING T-2 FOR GENERAL LEGEND.

S12WP03 — EXISTING GROUNDWATER MONITORING WELL

DELINEATED WETLANDS

NOTES:

1. REFER TO DRAWING T-2 FOR GENERAL NOTES.
2. AN ADDITIONAL SURVEY CONTROL POINT (BM IH1080 L7-7) IS LOCATED 432.62 FEET N44° 23' 44" WEST OF BM IH1080 L7-6. THE COORDINATES FOR BM IH1080 L7-7 ARE AS FOLLOWS: NORTHING = 332831.96, EASTING = 1260121.21, AND ELEVATION = 29.77.

0 40 80
SCALE IN FEET
CHECK GRAPHIC SCALE BEFORE USING

AC4D:05250P01.dwg 10/03/01 HJB

SYMBOL	DESCRIPTION	DATE	APPROVED
	REVISIONS		

09A	403		
04	404		
E.I.C.	405		
401	406		
402	04B		
REVIEWED BY NGOC		DATE	

Tetra Tech NUS, Inc. — FOSTER PLAZA 10, 661 ANDERSON DRIVE, PITTSBURGH, PA 15220

DES. TWG | DR. DLT | TITLE E.I.C. | DATE 10/01 | CHK. RCM | DATE 10/01

Prepared by: [signature]
Approved by: [signature]
APPROVED: [signature] 2/01/02

STD FOR COMMANDER NAVFAC

STATE OF MARYLAND — GEORGE ANNAPOLIS PHILIPPE — No. 11079 — PROFESSIONAL ENGINEER

SEAL AREA

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.

NAVAL ENGINEERING FIELD ACTIVITY-CHESAPEAKE — NORFOLK, VIRGINIA

NORFOLK NAVAL SHIPYARD, NAVAL SURFACE WARFARE CENTER — NORFOLK NAVAL, MARYLAND

FINAL SUBMISSION
SITE 12 - TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
EXISTING CONDITIONS PLAN

CODE I.D. NO. 80091

DRAWING SIZE: D

CONST. CONT. NO. N62470-97-D-5000

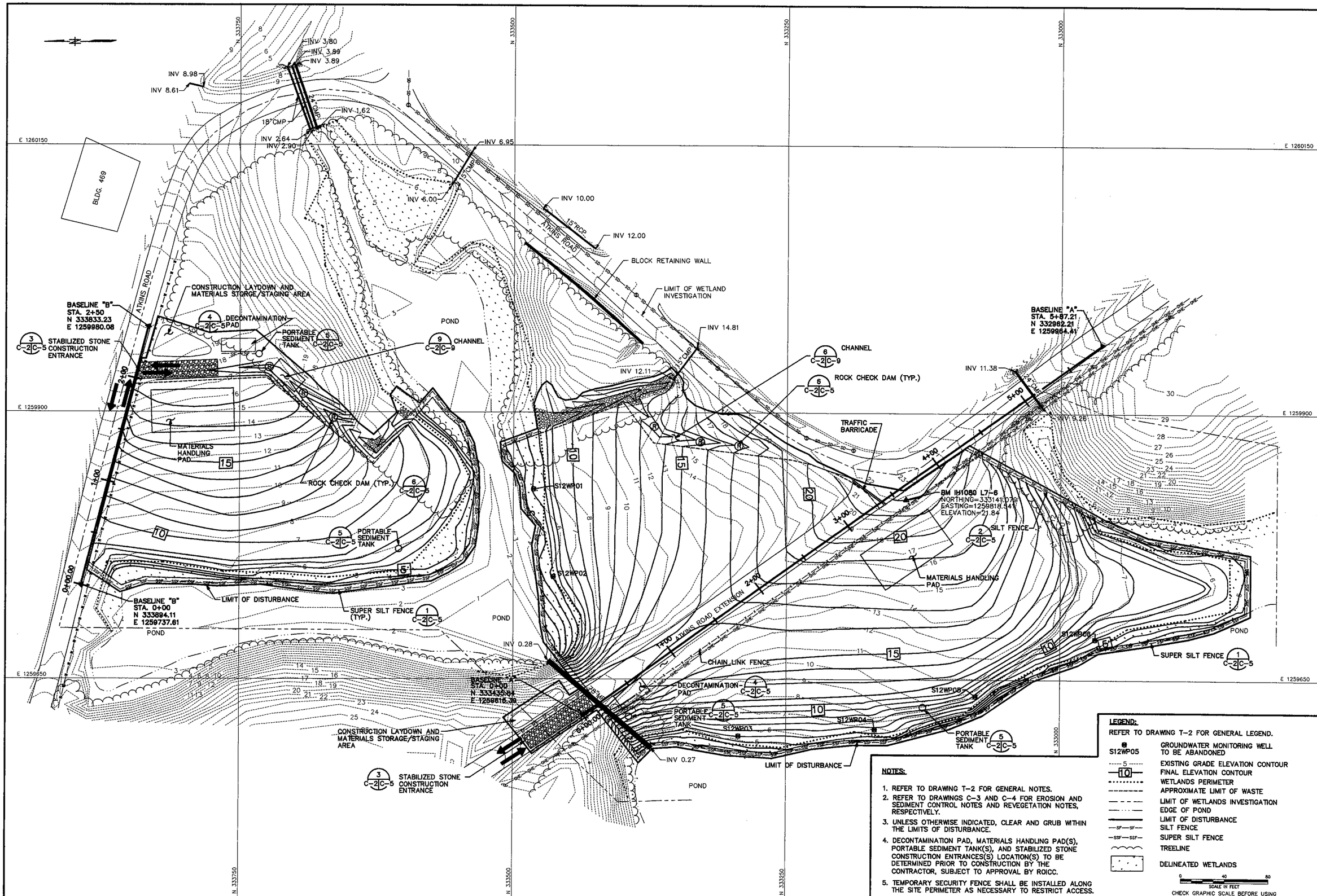
SPEC-21-97-5000-062-01

NAVFAC DRAWING NO. 3458630

SHEET 3 OF 11

C-1

FORM CADD NO. TTNUS-DWG.DWG - REV 1 - 8/11/98



LEGEND:

REFER TO DRAWING T-2 FOR GENERAL LEGEND.

S12WP05	GROUNDWATER MONITORING WELL TO BE ABANDONED
5	EXISTING GRADE ELEVATION CONTOUR
10	FINAL ELEVATION CONTOUR
	WETLANDS PERIMETER
	APPROXIMATE LIMIT OF WASTE
	LIMIT OF WETLANDS INVESTIGATION
	EDGE OF POND
	LIMIT OF DISTURBANCE
SF	SILT FENCE
SSF	SUPER SILT FENCE
	TREELINE
	DELINEATED WETLANDS

0 40 80
SCALE IN FEET
CHECK GRAPHIC SCALE BEFORE USING

NOTES:

1. REFER TO DRAWING T-2 FOR GENERAL NOTES.
2. REFER TO DRAWINGS C-3 AND C-4 FOR EROSION AND SEDIMENT CONTROL NOTES AND REVEGETATION NOTES, RESPECTIVELY.
3. UNLESS OTHERWISE INDICATED, CLEAR AND GRUB WITHIN THE LIMITS OF DISTURBANCE.
4. DECONTAMINATION PAD, MATERIALS HANDLING PAD(S), PORTABLE SEDIMENT TANK(S), AND STABILIZED STONE CONSTRUCTION ENTRANCES(S) LOCATION(S) TO BE DETERMINED PRIOR TO CONSTRUCTION BY THE CONTRACTOR, SUBJECT TO APPROVAL BY ROICC.
5. TEMPORARY SECURITY FENCE SHALL BE INSTALLED ALONG THE SITE PERIMETER AS NECESSARY TO RESTRICT ACCESS.

SYMBOL	DESCRIPTION	DATE	APPROVED
03A			
04			
401			
402			
04B			

REVISIONS

REVIEWED BY ROICC DATE

Tetra Tech NUS, Inc.
FOSTER PLAZA 7, 661 ANDERSON DR., PITTSBURGH, PA 15220

DES. TWC DR. DLT CHK. PCM
SCALE 1"=50' TITLE E.I.C. DATE 4/26/01
APPROVED DATE

DTD FOR COMMANDER, NAVFAC

SEAL AREA

NAVAL FACILITIES ENGINEERING COMMAND
NAVAL AIR ENGINEERING STATION LAKEHURST
NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION
NAVAL AIR WARFARE CENTER WEAPONS DIVISION
NAVAL WEAPONS STATION YORKTOWN
NAVAL WEAPONS STATION CHARLESTON
NAVAL WEAPONS STATION EARLE
NAVAL SURFACE WARFARE CENTER
NAVAL HOSPITAL BETHESDA
NAVAL HOSPITAL PENSACOLA
NAVAL HOSPITAL CAMP LEJEUNE
NAVAL HOSPITAL CAMP PENDLETON
NAVAL HOSPITAL JACKSONVILLE
NAVAL HOSPITAL PORTSMOUTH
NAVAL HOSPITAL BEAUFORT
NAVAL HOSPITAL CHARLESTON
NAVAL HOSPITAL GUAM
NAVAL HOSPITAL OKINAWA
NAVAL HOSPITAL ROTA
NAVAL HOSPITAL SAN DIEGO
NAVAL HOSPITAL TWENTY NINE PALMS
NAVAL HOSPITAL YOKOSUKA
NAVAL HOSPITAL NAPLES
NAVAL HOSPITAL SIGONELLA
NAVAL HOSPITAL ROSAMAR
NAVAL HOSPITAL KEY WEST
NAVAL HOSPITAL GUANTANAMO BAY
NAVAL HOSPITAL ROOSEVELT ROADS
NAVAL HOSPITAL SAN JUAN
NAVAL HOSPITAL BAHRAIN
NAVAL HOSPITAL ROTA
NAVAL HOSPITAL SIGONELLA
NAVAL HOSPITAL ROSAMAR
NAVAL HOSPITAL KEY WEST
NAVAL HOSPITAL GUANTANAMO BAY
NAVAL HOSPITAL ROOSEVELT ROADS
NAVAL HOSPITAL SAN JUAN
NAVAL HOSPITAL BAHRAIN

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
NAVAL AIR ENGINEERING STATION, LAKEHURST
NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION
NAVAL AIR WARFARE CENTER WEAPONS DIVISION
NAVAL WEAPONS STATION YORKTOWN
NAVAL WEAPONS STATION CHARLESTON
NAVAL WEAPONS STATION EARLE
NAVAL SURFACE WARFARE CENTER
NAVAL HOSPITAL BETHESDA
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NAVAL HOSPITAL SIGONELLA
NAVAL HOSPITAL ROSAMAR
NAVAL HOSPITAL KEY WEST
NAVAL HOSPITAL GUANTANAMO BAY
NAVAL HOSPITAL ROOSEVELT ROADS
NAVAL HOSPITAL SAN JUAN
NAVAL HOSPITAL BAHRAIN

FINAL SUBMISSION
SITE 12 – TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
EROSION AND SEDIMENT CONTROL PLAN

CODE I.D. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO. N62470-97-D-5000
SPEC 21-97-5000-052-01
NAVFAC DRAWING NO. 3458631
SHEET 4 OF 11
C-2

ACAD:05250P03.dwg 10/03/01 HJB

FORM CADD NO. TTNUS-CHE.DWG - REV 1 - 9/11/98

EROSION AND SEDIMENT CONTROL PLAN NOTES

1. UNLESS OTHERWISE INDICATED, ALL VEGETATION AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE 1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL MANUAL.

2. THE CONTRACTOR SHALL NOTIFY THE ROICC AND MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE) BOTH IN WRITING AND BY TELEPHONE (MDE AT (410) 631-3510):
   A. 7 DAYS PRIOR TO THE REQUIRED PRE-CONSTRUCTION MEETING
   B. FOLLOWING INSTALLATION OF EROSION AND SEDIMENT CONTROL DEVICES AND PRIOR TO COMMENCEMENT OF LAND DISTURBING ACTIVITIES.
   C. 7 DAYS PRIOR TO FINAL INSPECTION

3. CONSTRUCT ALL EROSION AND SEDIMENT CONTROL MEASURES PER THE APPROVED PLAN AND SEQUENCE OF CONSTRUCTION CONTAINED IN THE EROSION AND SEDIMENT CONTROL PLAN REPORT AND DRAWINGS, AND HAVE THEM INSPECTED AND APPROVED BY THE ROICC PRIOR TO BEGINNING ANY OTHER LAND DISTURBANCES. MINOR SEDIMENT CONTROL DEVICE LOCATION ADJUSTMENTS MAY BE MADE IN THE FIELD WITH THE APPROVAL OF THE ROICC. ENSURE THAT ALL RUNOFF FROM DISTURBED AREAS IS DIRECTED TO THE SEDIMENT CONTROL DEVICES AND DO NOT REMOVE ANY EROSION OR SEDIMENT CONTROL MEASURE WITHOUT PRIOR APPROVAL FROM THE ROICC. THE CONTRACTOR MUST OBTAIN PRIOR APPROVAL FROM THE ROICC AND MDE FOR CHANGES TO EROSION AND SEDIMENT CONTROL PLAN AND/OR THE SEQUENCE OF CONSTRUCTION.

4. ALL INGRESS TO, AND EGRESS FROM THE SITE SHALL BE AT LOCATIONS PROTECTED BY AN APPROVED STABILIZED STONE CONSTRUCTION ENTRANCE.

5. THE CONTRACTOR SHALL INSPECT DAILY AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES IN A CONTINUOUSLY EFFECTIVE OPERATING CONDITION UNTIL SUCH TIME AS THEY ARE REMOVED WITH PRIOR APPROVAL FROM THE ROICC AND MDE.

6. THE CONTRACTOR SHALL APPLY SEED AND ANCHORED STRAW MULCH, OR APPROVED STABILIZATION MEASURES, TO ALL DISTURBED AREAS AND STOCKPILES WITHIN 14 CALENDAR DAYS AFTER STRIPPING AND GRADING ACTIVITIES HAVE CEASED IN THE AREA (7 DAYS FOR SENSITIVE AREAS). MAINTENANCE SHALL BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION.

7. ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED EROSION AND SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBANCE ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED. ALL ACCUMULATED WATER IN EXCAVATIONS WILL BE COLLECTED AND TESTED TO DETERMINE THE APPROPRIATE DISPOSAL METHOD.

8. IN THE EVENT THAT A DETERMINATION IS MADE TO ALLOW SURFACE DISCHARGE OF WATER GENERATED BY THE MATERIALS HANDLING PADS AND WATER COLLECTED IN EXCAVATIONS, ALL WATER WILL BE BROADCAST UPON AN APPROVED VEGETATED AREA. WATER RESULTING FROM EXCAVATION DEWATERING OPERATIONS SHALL PASS THROUGH AN APPROVED FILTRATION DEVICE PRIOR TO DISCHARGE. DECONTAMINATION WATER WILL BE CONTAINERIZED AND CHARACTERIZED PRIOR TO OFF-SITE DISPOSAL.

9. THE CONTRACTOR SHALL INSPECT ALL EROSION AND SEDIMENT CONTROL MEASURES WEEKLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. THE STABILIZED STONE CONSTRUCTION ENTRANCES SHALL BE INSPECTED DAILY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION AND SEDIMENT CONTROL DEVICES AND THE STABILIZED STONE CONSTRUCTION ENTRANCES SHALL BE MADE IMMEDIATELY. ANY SEDIMENT REMOVED FROM THE EROSION AND SEDIMENT CONTROL DEVICES DURING MAINTENANCE ACTIVITIES PRIOR TO COMPLETING PLACEMENT OF THE FIRST LIFT OF THE SOIL COVER SHALL BE STOCKPILED FOR OFF-SITE DISPOSAL.

10. PRIOR TO REMOVAL OF EROSION AND SEDIMENT CONTROL MEASURES, THE CONTRACTOR SHALL STABILIZE AND ESTABLISH PERMANENT STABILIZATION FOR ALL CONTRIBUTORY DISTURBED AREAS USING THE PERMANENT SEED MIXTURE INDICATED ON DRAWING C-4 WITH REQUIRED SOIL AMENDMENTS AND AN APPROVED ANCHORED MULCH. WOOD FIBER MULCH MAY ONLY BE USED IN SEEDING SEASON WHERE THE SLOPE DOES NOT EXCEED 10% AND GRADING HAS BEEN DONE TO PROMOTE SHEET FLOW DRAINAGE. AREAS BROUGHT TO FINISHED GRADE DURING THE SEEDING SEASON SHALL BE PERMANENTLY STABILIZED AS SOON AS POSSIBLE, BUT NO LATER THAN 14 CALENDAR DAYS AFTER ESTABLISHMENT. WHEN PROPERTY IS BROUGHT TO FINISHED GRADE DURING THE MONTHS OF NOVEMBER THROUGH FEBRUARY, AND PERMANENT STABILIZATION IS FOUND TO BE IMPRACTICAL, TEMPORARY SEED AND ANCHORED STRAW MULCH SHALL BE APPLIED TO DISTURBED AREAS. THE FINAL PERMANENT STABILIZATION OF SUCH PROPERTY SHALL BE APPLIED BY MARCH 15 OR EARLIER IF GROUND AND WEATHER CONDITIONS ALLOW.

11. THE SITE'S APPROVAL LETTER, APPROVED EROSION AND SEDIMENT CONTROL PLAN, TEST REPORTS, AND LOG OF ALL EROSION AND SEDIMENT CONTROL FEATURES INSPECTIONS SHALL BE MAINTAINED BY THE CONTRACTOR, AND THE LOGS SHALL BE AVAILABLE AT THE SITE AT ALL TIMES FOR INSPECTION BY DULY AUTHORIZED OFFICIALS.

12. SURFACE DRAINAGE FLOWS OVER UNSTABILIZED CUT AND FILL SLOPES SHALL BE CONTROLLED BY EITHER PREVENTING DRAINAGE FLOWS FROM TRAVERSING THE SLOPES OR BY INSTALLING PROTECTIVE DEVICES TO MINIMIZE DOWNSLOPE EROSION. PROTECTIVE METHODS, SUCH AS EROSION CONTROL MATTING AND RIPRAP MUST BE PROVIDED AT POINTS OF CONCENTRATED FLOW WHERE EROSION IS LIKELY TO OCCUR.

13. TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES SHALL BE REMOVED, WITH APPROVAL OF THE ROICC, AND MDE WITHIN 30 CALENDAR DAYS FOLLOWING ESTABLISHMENT OF PERMANENT STABILIZATION IN ALL CONTRIBUTORY DRAINAGE AREAS.

14. FOR FINISHED GRADING, THE CONTRACTOR SHALL PROVIDE ADEQUATE GRADIENTS TO PREVENT WATER FROM STANDING ON THE SURFACE FOR MORE THAN 24 HOURS AFTER THE END OF A RAINFALL EVENT EXCEPT IN DESIGNATED DRAINAGE COURSES AND CHANNEL FLOW AREAS WHICH MAY DRAIN AS LONG AS 48 HOURS AFTER THE END OF A RAINFALL EVENT. AREAS DESIGNED TO HAVE STANDING WATER SHALL NOT BE REQUIRED TO MEET THIS REQUIREMENT.

15. THE ROICC AND THE MDE INSPECTOR HAVE THE OPTION OF REQUIRING ADDITIONAL SAFETY OR SEDIMENT CONTROL MEASURES IF DEEMED NECESSARY.

16. VEGETATIVE STABILIZATION SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL. REFER TO APPROPRIATE SPECIFICATIONS FOR TEMPORARY SEEDING, PERMANENT SEEDING, MULCHING, AND GROUND COVER.

17. OFF-SITE BORROW AREAS ON STATE OR FEDERAL PROPERTY MUST HAVE PRIOR APPROVAL FROM THE ROICC AND MDE. ALL BORROW AREAS OFF-SITE MUST BE PROTECTED BY SEDIMENT CONTROL MEASURES AND STABILIZED.

18. PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THE PLANS (INCLUDING, BUT NOT LIMITED TO OFF-SITE BORROW), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTAL EROSION CONTROL PLAN TO THE ROICC FOR SUBMISSION TO THE STATE OF MARYLAND FOR REVIEW AND CONCURRENCE. THE SUPPLEMENTAL PLAN IS NOT TO BE IMPLEMENTED UNTIL APPROVAL IS RECEIVED FROM THE ROICC AND MDE.

EROSION AND SEDIMENT CONTROL PLAN NOTES (CONTINUED)

19. ALL UNDISTURBED AREAS SHALL BE PROTECTED AT ALL TIMES DURING CONSTRUCTION ACTIVITIES AND UNTIL PERMANENT VEGETATION IN THE DISTURBED AREAS HAS BEEN ESTABLISHED.

20. DEWATERING DEVICE(S) SHALL BE CONSTRUCTED IN SUCH A WAY THAT PREVENTS WATER REMOVED FROM SOILS FROM INFILTRATING TO THE GROUNDWATER. RATHER THE STRUCTURE SHALL ALLOW FOR THE COLLECTION AND TEMPORARY STORAGE OF ALL WATER GENERATED BY DEWATERING PROCEDURES.

21. DURING CLEARING ACTIVITIES, ABOVE GROUND TREE MATERIAL WITHIN LIMITS OF THE LANDFILL WILL BE CHIPPED AND SPREAD OVER THE AREA PRIOR TO INSTALLATION OF SOIL COVER.

22. FINAL STABILIZATION OF ALL DISTURBED AREAS SHALL BE APPROVED BY THE ROICC AND MDE BEFORE EROSION AND SEDIMENT CONTROLS ARE REMOVED.

23. PERMANENT CHANNELS OR OTHER POINTS OF CONCENTRATED WATER FLOW SHALL BE STABILIZED WITH THE PERMANENT SEED MIXTURE, WITH AN APPROVED EROSION CONTROL MATTING, RIPRAP, OR BY OTHER MEASURES APPROVED BY THE ROICC IMEDIATELY FOLLOWING THE ESTABLISHMENT OF THE CHANNELS.

24. SITE INFORMATION:
TOTAL AREA OF SITE 4.28 ACRES
AREA DISTURBED 4.73 ACRES
TOTAL CUT 3900 CUBIC YARDS
TOTAL FILL 3780 CUBIC YARDS
OFF-SITE BORROW 13,480 CUBIC YARDS
OFF-SITE DISPOSAL TO BE DETERMINED CUBIC YARDS

OWNER'S/DEVELOPERS CERTIFICATION:

"I/WE HEREBY CERTIFY THAT I HAVE REVIEWED THIS EROSION AND SEDIMENT CONTROL PLAN AND THAT ALL CLEARING, GRADING, CONSTRUCTION AND/OR DEVELOPEMENT WILL BE ACCOMPLISHED STRICTLY IN ACCORDANCE WITH THIS PLAN AND THAT ANY RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A DEPARTMENT OF NATURAL RESOURCES APPROVED TRAINING PROGRAM FOR THE CONTROL OF SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT."

(PRINT NAME & TITLE) (SIGNATURE) (DATE)

SEQUENCE OF CONSTRUCTION

1. HOLD PRE-CONSTRUCTION MEETING WITH THE CONTRACTING OFFICER AND MDE.
2. INSPECT SITE PRIOR TO CONSTRUCTION TO VERIFY EXISTING SITE CONDITIONS AND UNDERGROUND UTILITY LOCATIONS.
3. ESTABLISH HORIZONTAL AND VERTICAL CONTROL FOR CONSTRUCTION. STAKE THE LOCATION OF ALL AREAS TO BE EXCAVATED OR DISTURBED PRIOR TO ACTUAL WORK.
4. LOWER POOL ELEVATION OF THE PONDS TO EXPOSE INDICATED WASTE LIMITS.
5. INSTALL PERIMETER CONTROLS FOR STABILIZED STONE CONSTRUCTION ENTRANCES. INSTALL THE STABILIZED STONE CONSTRUCTION ENTRANCES. INSTALL ALL REMAINING PERIMETER CONTROLS, INCLUDING THOSE REQUIRED FOR DECONTAMINATION PADS, MATERIALS HANDLING PADS AND EXCAVATION AREAS AS INDICATED ON DRAWING C-2. ACTUAL LOCATIONS TO BE DETERMINED BY THE RAC AND APPROVED BY THE RESIDENT OFFICER IN CHARGE OF CONSTRUCTION (ROICC) AND MDE PRIOR TO ANY EARTH DISTURBANCE ACTIVITIES. ALL PERIMETER CONTROLS SHALL CONFORM TO STANDARDS AND SPECIFICATIONS IDENTIFIED IN THE 1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL MANUAL UNLESS OTHERWISE SPECIFIED. THE PERIMETER CONTROLS TO BE INSTALLED INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
   - SILT FENCE ALONG THE TOE OF SLOPES OF SITE 12 AS INDICATED AND ON THE DOWNSLOPE SIDES OF ALL MATERIALS HANDLING PAD LOCATIONS, DECONTAMINATION PADS, AND STABILIZED STONE CONSTRUCTION ENTRANCES;
   - SUPER SILT FENCE ALONG THE SHORELINE OF BOTH PONDS AS INDICATED; AND
   - ADDITIONAL CONTROLS AS MAY BE REQUIRED BY THE CONTRACTING OFFICER AND/OR WARRANTED BY SITE CONDITIONS AND BEST CONSTRUCTION PRACTICES.
6. CLEAR AND GRUB CONSTRUCTION LAYDOWN AREAS, AND AREAS FOR MATERIALS STORAGE AND STAGING AREAS, MATERIALS HANDLING PADS, AND DECONTAMINATION PADS.
7. CONSTRUCT DECONTAMINATION PADS, MATERIALS HANDLING PADS, CONSTRUCTION LAYDOWN AREAS, AND STORAGE AND STAGING AREAS.
8. CLEAR AND GRUB WITHIN REMAINDER OF LIMITS OF DISTURBANCE.
9. CONSTRUCT CONVEYANCE CHANNELS, INSTALL EROSION CONTROL MATTING (ECM), SEED CHANNELS, AND INSTALL ROCK CHECK DAMS.
10. ABANDON EXISTING GROUNDWATER MONITORING WELLS.
11. EXCAVATE SOILS, SEDIMENTS AND LANDFILL MATERIAL ALONG THE SHORELINE OF BOTH PONDS AS INDICATED. IN THE EVENT THAT THE POOL ELEVATION CAN NOT BE LOWERED TO EXPOSE THE INDICATED WASTE LIMITS, EXCAVATE TO THE EDGE OF WATER REMOVING LARGE ITEMS OF EXPOSED WASTE AND DEBRIS ALONG THE EDGES OF THE POND. DURING EXCAVATION, THE AREAS WILL BE SCREENED FOR UNEXPLODED ORDNANCE (UXO) BY UXO OVERSIGHT PERSONNEL. EXCAVATED MATERIALS SHALL BE PLACED ON THE MATERIALS HANDLING PAD FOR DEWATERING, IF REQUIRED, PRIOR TO PLACEMENT BENEATH THE SOIL COVER. LARGE ITEMS OF WASTE AND DEBRIS WILL BE REMOVED AND DISPOSED OFF-SITE.
12. COMMENCE CONSTRUCTION OF THE ATKINS ROAD EXTENSION.
13. REGRADE REMAINDER OF LANDFILL AREA (COVER SOIL AND WASTE) TO ESTABLISH THE INTERIM GRADES INDICATED ON DRAWING C-6. DURING REGRADING AND PRIOR TO PLACING THE FIRST LIFT OF SELECT FILL, ANY SEDIMENT REMOVED FROM THE EROSION AND SEDIMENT CONTROL DEVICES WILL BE PLACED BENEATH THE SOIL COVER.
14. INSPECT EROSION CONTROL DEVICES AND REPLACE AS NECESSARY.
15. INSTALL SELECT FILL AND TOPSOIL AND COMPLETE CONSTRUCTION OF ATKINS ROAD EXTENSION. VEGETATE IMMEDIATELY AFTER TOPSOIL IS PLACED.
16. PLANT PERMANENT VEGETATION INCLUDING WETLAND PLANTS ON ALL DISTURBED AREAS AND ALLOW THE POOL ELEVATION OF THE PONDS TO REESTABLISH TO PRE-CONSTRUCTION POOL ELEVATION FOR WETLANDS SURVIVAL.
17. INSTALL NEW GROUNDWATER MONITORING WELLS.
18. INSTALL SIGNS ALONG THE SITE PERIMETER.
19. WITH THE APPROVAL OF THE MDE INSPECTOR REMOVE ALL TEMPORARY FACILITIES (I.E. STABILIZED STONE CONSTRUCTION ENTRANCES, DECONTAMINATION PAD, MATERIALS HANDLING PADS, ETC.). RESTORE AND REVEGETATE AS NEEDED. WHEN ALL UPSTREAM AREAS HAVE BEEN STABILIZED AND HAVE BEEN ACCEPTED BY THE ROICC AND WITH THE APPROVAL OF THE MDE INSPECTOR, REMOVE ALL REMAINING PERIMETER CONTROLS AND ROCK CHECK DAMS AND IMMEDIATELY STABILIZE ALL AREAS DISTURBED BY THE REMEDIAL ACTION.

DESIGN CERTIFICATION:

"I HEREBY CERTIFY THAT THIS PLAN HAS BEEN DESIGNED IN ACCORDANCE WITH THE 1994 STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL OR CURRENT REVISIONS THEREOF, AND DEPARTMENT OF THE ENVIRONMENT STORMWATER MANAGEMENT REGULATIONS."

DATE

MD. REGISTRATION NO. ____ P.E., R.L.S., OR R.L.A.

REVISIONS

SYMBOL	DESCRIPTION	DATE	APPROVED

Tetra Tech NUS, Inc. FOSTER PLAZA VII 661 ANDERSEN DRIVE PITTSBURGH, PA 15220

D9A 04 E.I.C. 401 402 403 404 405 408 04B

DES. TWS DR. DLT CHK. RCM TITLE

SUBMITTED BY: DATE

PROJECT MANAGER DATE

APPROVED DATE

REVIEWED BY ROICC DATE

EFD FOR COMMANDER NAVFAC

STATE OF MARYLAND GEORGE JOHN LATULIPPE No. 11079 REGISTERED PROFESSIONAL ENGINEER

SEAL AREA

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
WASHINGTON, D.C.

INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER INDIAN HEAD, MARYLAND

FINAL SUBMISSION
SITE 12 – TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
EROSION AND SEDIMENT CONTROL NOTES

CODE I.D. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO. N62470-97-D-5000
SPEC. 21-97-5000-062-01
NAVFAC DRAWING NO. 3458632
SHEET 5 OF 11
C-3

ACAD: 0525CN02.dwg 10/03/01 HJB

REVEGETATION NOTES

SECTION I – VEGETATIVE STABILIZATION METHODS AND MATERIALS

A. SITE PREPARATION

I. INSTALL EROSION AND SEDIMENT CONTROL STRUCTURES (EITHER TEMPORARY OR PERMANENT) SUCH AS SUPER SILT FENCE AND SILT FENCE PRIOR TO OTHER SITE DISTURBANCE.

II. PERFORM ALL GRADING OPERATIONS AT RIGHT ANGLES TO THE SLOPE. FINAL GRADING AND SHAPING IS NOT NECESSARY FOR TEMPORARY SEEDING.

III. SCHEDULE REQUIRED SOIL TESTS TO DETERMINE SOIL AMENDMENT COMPOSITION AND APPLICATION RATES. SUBMIT TEST RESULTS AND RECOMMENDATIONS FOR SEED MIXTURE AND FERTILIZER RATES FOR APPROVAL BY ROICC.

B. SOIL AMENDMENTS (FERTILIZER AND LIME SPECIFICATIONS)

I. SOIL TESTS MUST BE PERFORMED TO DETERMINE THE EXACT RATIOS AND APPLICATION RATES FOR BOTH LIME AND FERTILIZER. SOIL ANALYSIS WILL BE PERFORMED BY A RECOGNIZED COMMERCIAL LABORATORY. SOIL SAMPLES TAKEN FOR ENGINEERING PURPOSES MAY ALSO BE USED FOR CHEMICAL ANALYSIS.

II. FERTILIZERS SHALL BE UNIFORM IN COMPOSITION, FREE FLOWING, AND SUITABLE FOR ACCURATE APPLICATION BY APPROVED EQUIPMENT. MANURE MAY BE SUBSTITUTED FOR FERTILIZER WITH PRIOR APPROVAL FROM THE ROICC. FERTILIZERS SHALL BE DELIVERED TO THE SITE, FULLY LABELED ACCORDING TO APPLICABLE STATE FERTILIZER LAWS AND SHALL BEAR THE NAME, TRADE NAME OR TRADEMARK, AND WARRANTY OF THE PRODUCER.

III. LIME MATERIALS SHALL BE GROUND LIMESTONE (HYDRATED OR BURNT LIME MAY BE SUBSTITUTED) WHICH CONTAINS AT LEAST 50% TOTAL OXIDES (CALCIUM OXIDE PLUS MAGNESIUM OXIDE). LIMESTONE SHALL BE GROUND TO SUCH FINENESS THAT AT LEAST 50% WILL PASS THROUGH A #100 MESH SIEVE, AND 98 TO 100% WILL PASS THROUGH A #20 MESH SIEVE.

IV. INCORPORATE LIME AND FERTILIZER INTO THE TOP 4 TO 6 INCHES OF SOIL BY DISCING OR OTHER SUITABLE MEANS. REFER TO 1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, SECTION 20.0

C. SEEDBED PREPARATION

I. TEMPORARY SEEDING

a. SEEDBED PREPARATION SHALL CONSIST OF LOOSENING SOIL TO A DEPTH OF 4 INCHES BY MEANS OF SUITABLE AGRICULTURAL OR CONSTRUCTION EQUIPMENT, SUCH AS DISC HARROWS, CHISEL PLOWS, OR RIPPERS MOUNTED ON CONSTRUCTION EQUIPMENT. AFTER THE SOIL IS LOOSENED, IT SHOULD NOT BE ROLLED OR DRAGGED SMOOTH, BUT LEFT IN THE ROUGHENED CONDITION. SLOPED AREAS (GREATER THAN 3H:1V) SHOULD BE TRACKED BY A DOZER LEAVING THE SURFACE IN AN IRREGULAR CONDITION WITH RIDGES RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE.

b. APPLY SOIL AMENDMENTS AS PER SOIL TEST AND AS PRESCRIBED ON THE SEEDING SUMMARY.

c. INCORPORATE LIME AND FERTILIZER INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISCING OR OTHER SUITABLE MEANS.

II. PERMANENT SEEDING

a. MINIMUM SOIL CONDITIONS REQUIRED FOR PERMANENT VEGETATIVE ESTABLISHMENT:

1. SOIL pH SHALL BE BETWEEN 6.0 AND 7.0.
2. SOLUBLE SALTS SHALL BE LESS THAN 500 PARTS PER MILLION (PPM).
3. TOPSOIL SHALL CONTAIN 5.0 TO 8.0% MINIMUM ORGANIC MATTER BY WEIGHT.
4. SOIL MUST CONTAIN SUFFICIENT PORE SPACE TO PERMIT ADEQUATE ROOT PENETRATION.
5. IF THESE CONDITIONS CANNOT BE MET BY SOILS ON-SITE, ADDING TOPSOIL AMENDMENTS IS REQUIRED IN ACCORDANCE WITH SECTION 21.0 FOR TOPSOIL FROM THE 1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL.

b. AREAS PREVIOUSLY GRADED IN CONFORMANCE WITH THE DRAWINGS SHALL BE MAINTAINED IN A TRUE AND EVEN GRADE, THEN SCARIFIED OR OTHERWISE LOOSENED TO A DEPTH OF 4 INCHES TO PERMIT BONDING OF THE SOIL TO THE SURFACE AREA AND TO CREATE HORIZONTAL EROSION CHECK SLOTS TO PREVENT SOIL FROM SLIDING DOWN A SLOPE.

c. APPLY SOIL AMENDMENTS AS PER SOIL TEST, AND AS PRESCRIBED ON THE SEEDING SUMMARY.

d. MIX SOIL AMENDMENTS INTO THE TOP 4 TO 6 INCHES OF SOIL BY DISCING OR OTHER SUITABLE MEANS. LAWN AREAS SHOULD BE RAKED TO SMOOTH THE SURFACE; REMOVE LARGE OBJECTS LIKE STONES AND BRANCHES, AND READY THE AREA FOR SEED APPLICATION. WHERE SITE CONDITIONS WILL NOT PERMIT NORMAL SEEDBED PREPARATION, LOOSEN SURFACE SOIL BY DRAGGING WITH A HEAVY CHAIN OR OTHER EQUIPMENT TO ROUGHEN THE SURFACE. STEEP SLOPES (STEEPER THAN 3H:1V) SHOULD BE TRACKED BY A DOZER LEAVING THE SOIL IN AN IRREGULAR CONDITION WITH RIDGES RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE. THE TOP 1 TO 3 INCHES OF SOIL SHOULD BE LOOSE AND FRIABLE. SEEDBED LOOSENING MAY NOT BE NECESSARY ON NEWLY DISTURBED AREAS.

D. SEED SPECIFICATIONS

I. ALL SEED USED SHALL HAVE BEEN TESTED WITHIN 12 MONTHS IMMEDIATELY PRECEDING THE DATE OF SOWING SUCH MATERIAL ON THIS JOB. ALL SEED SHALL BE SUBJECT TO RE-TESTING BY A RECOGNIZED SEED LABORATORY. ALL SEED SHALL MEET THE REQUIREMENTS OF THE MARYLAND STATE SEED LAW.

NOTE: SEED TAGS SHALL BE MADE AVAILABLE TO ROICC TO VERIFY TYPE AND RATE OF SEED USED.

E. METHODS OF SEEDING

I. HYDROSEEDING: APPLY SEED UNIFORMLY WITH HYDROSEEDER (SLURRY INCLUDES SEED AND FERTILIZER), BROADCAST OR DROP SEEDER, OR A CULTIPACKER SEEDER.

a. IF FERTILIZER IS BEING APPLIED AT THE TIME OF SEEDING, THE APPLICATION RATES WILL NOT EXCEED THE FOLLOWING:
NITROGEN: 100 POUNDS/ACRE OF SOLUBLE NITROGEN
PHOSPHOROUS: 200 POUNDS/ACRE
POTASSIUM: 200 POUNDS/ACRE

b. LIME – USE ONLY GROUND AGRICULTURAL LIMESTONE. NORMALLY NOT MORE THAN 2 TONS ARE APPLIED BY HYDROSEEDING AT ANY ONE TIME. DO NOT USE BURNT OR HYDRATED LIME WHEN HYDROSEEDING.

c. SEED AND FERTILIZER SHALL BE MIXED ON SITE, AND SEEDING SHALL BE DONE IMMEDIATELY WITHOUT INTERRUPTION.

d. IF SOIL AMENDMENTS ARE BEING APPLIED DURING HYDROSEEDING, APPLICATION BY DISCING AS DISCUSSED IN REVEGETATION NOTE (SECTION I, B, IV) NEED NOT BE PERFORMED.

II. DRY SEEDING: THIS INCLUDES USE OF CONVENTIONAL DROP OR BROADCAST SPREADERS.

a. SEED SPREAD SHALL BE INCORPORATED INTO THE SOIL AT THE RATES PRESCRIBED ON THE TEMPORARY OR PERMANENT SEEDING SUMMARIES. THE SEEDED AREA SHALL THEN BE ROLLED WITH A WEIGHTED ROLLER TO PROVIDE GOOD SEED TO SOIL CONTACT.

b. WHERE PRACTICAL, SEED SHOULD BE APPLIED IN TWO DIRECTIONS PERPENDICULAR TO EACH OTHER. APPLY HALF THE SEEDING RATE IN EACH DIRECTION.

III. DRILL OR CULTIPACKER SEEDING: MECHANIZED SEEDERS THAT APPLY AND COVER SEED WITH SOIL.

a. CULTIPACKING SEEDERS ARE REQUIRED TO BURY THE SEED IN SUCH A FASHION AS TO PROVIDE AT LEAST 1/4 INCH OF SOIL COVERING. SEEDBED MUST BE FIRM AFTER PLANTING.

b. WHERE PRACTICAL, SEED SHOULD BE APPLIED IN TWO DIRECTIONS PERPENDICULAR TO EACH OTHER. APPLY HALF THE SEEDING RATE IN EACH DIRECTION.

F. MULCH SPECIFICATIONS

I. STERILE STRAW SHALL CONSIST OF THOROUGHLY THRESHED WHEAT OR OAT STRAW, REASONABLY BRIGHT IN COLOR, AND SHALL NOT BE MUSTY, MOLDY, CAKED, DECAYED, OR EXCESSIVELY DUSTY, AND SHALL BE FREE OF NOXIOUS WEED SEEDS.

II. WOOD CELLULOSE FIBER MULCH (WCFM)

a. WCFM SHALL CONSIST OF SPECIALLY PREPARED WOOD CELLULOSE PROCESSED INTO A UNIFORM FIBROUS PHYSICAL STATE.

b. WCFM SHALL BE DYED GREEN OR CONTAIN A GREEN DYE IN THE PACKAGE THAT WILL PROVIDE AN APPROPRIATE COLOR TO FACILITATE VISUAL INSPECTION OF THE UNIFORMLY SPREAD SLURRY.

c. WCFM, INCLUDING DYE, SHALL CONTAIN NO GERMINATION OR GROWTH INHIBITING FACTORS.

d. WCFM SHALL BE MANUFACTURED AND PROCESSED IN SUCH A MANNER THAT THE WOOD CELLULOSE FIBER MULCH WILL REMAIN IN UNIFORM SUSPENSION IN WATER UNDER AGITATION AND WILL BLEND WITH SEED, FERTILIZER, AND OTHER ADDITIVES TO FORM A HOMOGENOUS SLURRY. THE MULCH MATERIAL SHALL FORM A BLOTTER-LIKE GROUND COVER, ON APPLICATION, HAVING MOISTURE ABSORPTION AND PERCOLATION PROPERTIES AND SHALL COVER AND HOLD GRASS SEED IN CONTACT WITH THE SOIL WITHOUT INHIBITING THE GROWTH OF THE GRASS SEEDINGS.

e. WCFM SHALL CONTAIN NO ELEMENTS OR COMPOUNDS AT CONCENTRATION LEVELS THAT WILL BE PHYTO-TOXIC.

f. WOOD CELLULOSE FIBER MUST CONFORM TO THE FOLLOWING PHYSICAL REQUIREMENTS: FIBER LENGTH TO APPROXIMATELY 10 mm., DIAMETER APPROXIMATELY 1 mm., pH RANGE OF 4.0 TO 8.5, ASH CONTENT OF 1.6% MAXIMUM, AND WATER HOLDING CAPACITY OF 90% MINIMUM.

NOTE: ONLY STERILE STRAW MULCH SHOULD BE USED IN AREAS WHERE A STAND OF ONE SPECIES OF GRASS IS DESIRED.

G. MULCHING SEEDED AREAS – MULCH SHALL BE APPLIED TO ALL SEEDED AREAS IMMEDIATELY AFTER SEEDING.

I. IF GRADING IS COMPLETED OUTSIDE OF THE SEEDING SEASON, AN APPROPRIATE NURSERY CROP ALONG WITH MULCH SHALL BE APPLIED TO THE GRADED AREAS.

II. WHEN STERILE STRAW MULCH IS USED, IT SHALL BE SPREAD OVER ALL SEEDED AREAS AT THE RATE OF 2 TONS/ACRE. MULCH SHALL BE APPLIED TO A UNIFORM LOOSE DEPTH OF BETWEEN 1 AND 2 INCHES. MULCH APPLIED SHALL ACHIEVE A UNIFORM DISTRIBUTION AND DEPTH SO THAT THE SOIL SURFACE IS NOT EXPOSED, AND MUST BE ANCHORED.

III. WOOD CELLULOSE FIBER USED AS A MULCH SHALL BE APPLIED AT A NET DRY WEIGHT OF 1,500 LBS. PER ACRE. THE WOOD CELLULOSE FIBER SHALL BE MIXED WITH WATER, AND THE MIXTURE SHALL CONTAIN A MAXIMUM OF 50 LBS. OF WOOD CELLULOSE FIBER PER 100 GALLONS OF WATER.

H. SECURING STRAW MULCH (MULCH ANCHORING): MULCH ANCHORING SHALL BE PERFORMED IMMEDIATELY FOLLOWING MULCH APPLICATION TO MINIMIZE LOSS BY WIND OR WATER. THIS MAY BE DONE BY ONE OF THE FOLLOWING METHODS, DEPENDING UPON SIZE OF AREA AND EROSION HAZARD:

I. A MULCH ANCHORING TOOL IS A TRACTOR DRAWN IMPLEMENT DESIGNED TO PUNCH AND ANCHOR MULCH INTO THE SOIL SURFACE A MINIMUM OF 2 INCHES. THIS IS THE MOST EFFECTIVE ON LARGE AREAS, BUT IS LIMITED TO FLATTER SLOPES WHERE EQUIPMENT CAN OPERATE SAFELY. IF USED ON SLOPING LAND, THIS PRACTICE SHOULD BE USED ON THE CONTOUR.

II. WOOD CELLULOSE FIBER MAY BE USED FOR ANCHORING STRAW. THE FIBER BINDER SHALL BE APPLIED AT A NET DRY WEIGHT OF 750 LBS/ACRE.

III. APPLICATIONS OF LIQUID BINDERS SHOULD BE APPLIED HEAVIER AT EDGES WHERE WIND CATCHES MULCH, SUCH AS IN VALLEYS AND ON CRESTS OF BANKS. THE REMAINDER OF AREA SHOULD BE UNIFORM AFTER BINDER APPLICATION.

IV. LIGHTWEIGHT PLASTIC NETTING MAY BE STAPLED OVER THE MULCH ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. NETTING IS USUALLY AVAILABLE IN ROLLS 4 TO 15 FEET WIDE AND 300 TO 3,000 FEET LONG.

V. PEG AND TWINE: SECURE MULCH BY STRETCHING TWINE BETWEEN 8 TO 10 INCH PEGS DRIVEN TO WITHIN 3 INCHES OF THE SOIL SURFACE IN A CRISS-CROSS WITHIN A SQUARE PATTERN.

I. REPAIRS AND MAINTENANCE

INSPECT ALL SEEDED AREAS FOR FAILURES AND MAKE NECESSARY REPAIRS, REPLACEMENTS, AND RESEEDINGS WITHIN THE PLANTING SEASON.

I. ONCE THE VEGETATION IS ESTABLISHED, THE SITE SHALL HAVE 90% GROUND COVER TO BE CONSIDERED ADEQUATELY STABILIZED, AS DETERMINED BY THE ROICC.

II. IF THE STAND PROVIDES LESS THAN 40% GROUND COVERAGE, REESTABLISH FOLLOWING ORIGINAL LIME, FERTILIZER, SEEDBED PREPARATION, AND SEEDING RECOMMENDATIONS.

III. IF THE STAND PROVIDES BETWEEN 40% AND 90% GROUND COVERAGE, OVERSEEDING AND FERTILIZING USING HALF OF THE RATES ORIGINALLY APPLIED MAY BE NECESSARY, AS DETERMINED AND DIRECTED BY THE ROICC.

TEMPORARY SEEDING

VEGETATION – ANNUAL GRASS OR GRAIN USED TO PROVIDE COVER ON DISTURBED AREAS FOR UP TO TWELVE MONTHS. FOR LONGER DURATION OF VEGETATIVE COVER, PERMANENT SEEDING IS REQUIRED.

TEMPORARY SEEDING SUMMARY

SEED MIXTURE				FERTILIZER RATE (10–10–10)	LIME RATE
SPECIES	APPLICATION RATE (lb/ac)	SEEDING DATES	SEEDING DEPTHS		
ANNUAL RYE GRASS	50	2/1–4/30 AND 8/15–11/1	1/4–1/2 INCHES	600 lb/ac (15 lb/1000 sf)	4000 lb/ac (100 lb/1000 sf)

NOTES:
1) IN LIEU OF PROVIDING MARYLAND STANDARD FERTILIZER AND LIME, PERFORM SOIL TEST TO DETERMINE THE EXACT RATIOS AND APPLICATION RATES.
2) THE FERTILIZATION RATE (10–10–10) REFERS TO THE PERCENT N, P_2O_5, AND K_2O PROVIDED IN THE FERTILIZER.

PERMANENT SEEDING

SEEDING GRASS AND LEGUMES TO ESTABLISH GROUND COVER FOR A MINIMUM PERIOD OF ONE YEAR ON DISTURBED AREAS GENERALLY RECEIVING LOW MAINTENANCE.

PERMANENT SEEDING SUMMARY

SEED MIXTURE				FERTILIZER RATE (10–20–20)	LIME RATE
SPECIES	APPLICATION RATE (lb/ac)	SEEDING DATES	SEEDING DEPTHS		
SWITCHGRASS	7	3/1–5/15 AND 8/15–11/15	1/4–1/2 INCHES	900 lb/ac (20 lb/1000 sf)	4000 lb/ac (100 lb/1000 sf)
PARTRIDGE PEA	20	3/1–5/15 AND 8/15–11/15	1/4–1/2 INCHES		
LITTLE BLUESTEM	7	3/1–5/15 AND 8/15–11/15	1/4–1/2 INCHES		
ANNUAL RYE GRASS	10	3/1–5/15 AND 8/15–11/15	1/4–1/2 INCHES		
CANADIAN WILD RYE	6	3/1–5/15 AND 8/15–11/15	1/4–1/2 INCHES		
INDIAN GRASS	7	3/1–5/15 AND 8/15–11/15	1/4–1/2 INCHES		
BIG BLUESTEM	7	3/1–5/15 AND 8/15–11/15	1/4–1/2 INCHES		

NOTES:
1) IN LIEU OF PROVIDING MARYLAND STANDARD FERTILIZER AND LIME, PERFORM SOIL TEST TO DETERMINE THE EXACT RATIOS AND APPLICATION RATES.
2) THE FERTILIZATION RATE (10–20–20) REFERS TO THE PERCENT N, P_2O_5, AND K_2O PROVIDED IN THE FERTILIZER.

ACAD:0525CN01.dwg 02/08/02 HJB

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

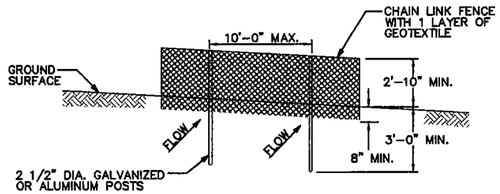
Tetra Tech NUS, Inc. FOSTER PLAZA VII, 661 ANDERSEN DRIVE, PITTSBURGH, PA 15220
DES. TWS | DR. DLT | CHK. RCM
SUBMITTED BY: | TITLE | DATE
PROGRAM MANAGER | DATE 2/4/02
APPROVED | DATE
EFD FOR COMMANDER NAVFAC
D9A 403 | 04 404 | E.I.C. 405 | 401 408 | 402 D4B | REVIEWED BY ROICC | DATE

SEAL AREA

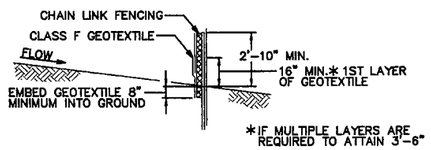
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY–CHESAPEAKE
WASHINGTON, D.C.
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

FINAL SUBMISSION
SITE 12 – TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
REVEGETATION NOTES

CODE I.D. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO. N62470-97-D-5000
SPEC. 21-97-5000-062-01
NAVFAC DRAWING NO. 3458633
SHEET 6 OF 11
C–4



PERSPECTIVE VIEW



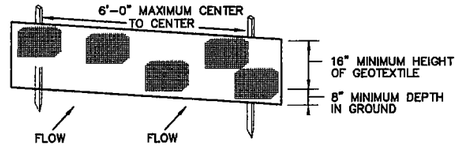
CROSS SECTION

NOTES:

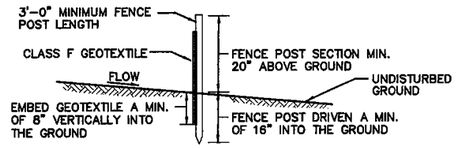
1. FENCE POST SPACING SHALL NOT EXCEED 10'-0" CENTER TO CENTER. WHEN GEOTEXTILE SECTIONS ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6" AND FOLDED.
2. FENCING SHALL BE 42" IN HEIGHT AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST MARYLAND STATE HIGHWAY DETAILS FOR CHAIN LINK FENCING.
3. CHAIN LINK FENCE SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES. THE LOWER TENSION WIRE, BRACE AND TRUSS RODS, DRIVE ANCHORS, AND POST CAPS ARE NOT REQUIRED EXCEPT ON THE ENDS OF THE FENCE.
4. GEOTEXTILE SHALL BE FASTENED SECURELY TO THE CHAIN LINK FENCE WITH TIES SPACED 24" AT THE TOP AND MID-SECTION AND SHALL MEET THE REQUIREMENTS OF CLASS F GEOTEXTILE. CHAIN LINK FENCE AND GEOTEXTILE WILL BE EMBEDDED A MINIMUM OF 8" INTO THE GROUND.

SUPER SILT FENCE DETAIL (1 / C-2 | C-5)

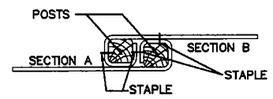
NTS



PERSPECTIVE VIEW



CROSS SECTION



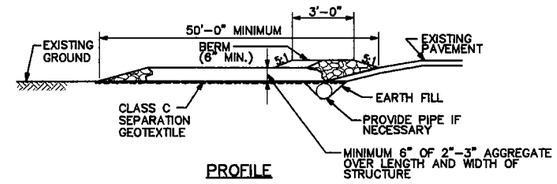
TOP VIEW – JOINING TWO ADJACENT SILT FENCE SECTIONS

NOTES:

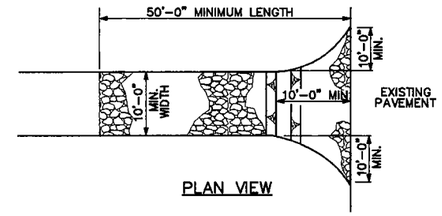
1. FENCE POSTS SHALL BE A MINIMUM OF 36" LONG DRIVEN 16" MINIMUM INTO THE GROUND. WOOD POSTS SHALL BE 1.5" BY 1.5" SQUARE (MIN) CUT OR 1.75" DIAMETER (MIN) ROUND AND SHALL BE OF SOUND HARDWOOD. STEEL POSTS WILL BE STANDARD T OR U SECTION WEIGHING NOT LESS THAN 1 POUND PER LINEAR FOOT.
2. GEOTEXTILE SHALL BE FASTENED SECURELY TO EACH FENCE POST WITH WIRE TIES OR STAPLES AT TOP AND MID-SECTION AND SHALL MEET THE REQUIREMENTS OF CLASS F GEOTEXTILE.

SILT FENCE DETAIL (2 / C-2 | C-5)

NTS



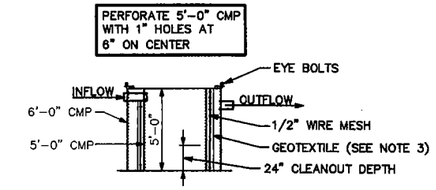
PROFILE



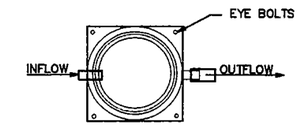
PLAN VIEW

STABILIZED STONE CONSTRUCTION ENTRANCE DETAIL (3 / C-2 | C-5)

NTS



ELEVATION



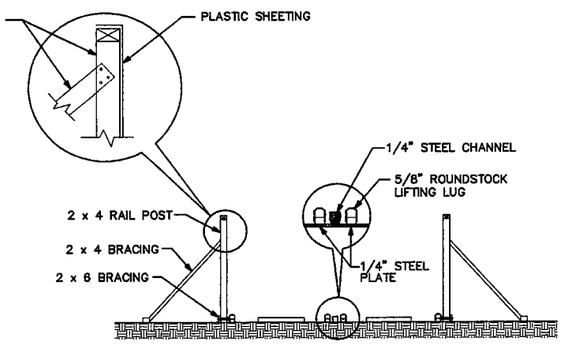
PLAN VIEW

NOTES:

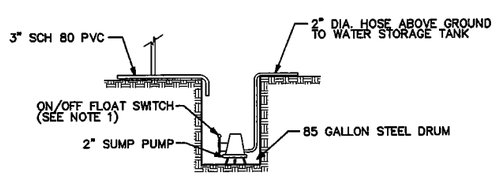
1. AN EXAMPLE OF A TYPICAL SEDIMENT TANK IS SHOWN. OTHER CONTAINER DESIGNS CAN BE USED IF THE STORAGE VOLUME IS ADEQUATE AND APPROVAL IS OBTAINED FROM THE ROICC AND MDE.
2. PORTABLE SEDIMENT TANKS SHALL BE PLACED IN SERIES IF ADDITIONAL RETENTION TIME OR CAPACITY IS REQUIRED. ONE CUBIC FOOT OF STORAGE SHALL BE PROVIDED FOR EACH GALLON PER MINUTE OF PUMP DISCHARGE CAPACITY.
3. GEOTEXTILE MESH SIDE MAY VARY FROM TANK TO TANK IF TANKS ARE INSTALLED IN SERIES. ALL GEOTEXTILES SHALL HAVE AOS LESS THAN 0.3 MM, PERMEABILITY GREATER THAN 0.01 CM/SEC, GRAB TENSILE GREATER THAN 90 LBS AND BURST STRENGTH GREATER THAN 145 PSI. THE DOWNSTREAM-MOST GEOTEXTILE SHALL HAVE BURST STRENGTH GREATER THAN 320 PSI.
4. DISCHARGE FROM PORTABLE SEDIMENT TANKS SHALL BE CONTROLLED TO PROTECT DOWNSLOPE AREAS FROM EROSION. EROSION CONTROLS (E.G. EROSION CONTROL MATTING, RIPRAP, ETC.) SHALL BE SUBJECT TO ROICC AND MDE APPROVAL.

PORTABLE SEDIMENT TANK DETAIL (5 / C-2 | C-5)

NOT TO SCALE



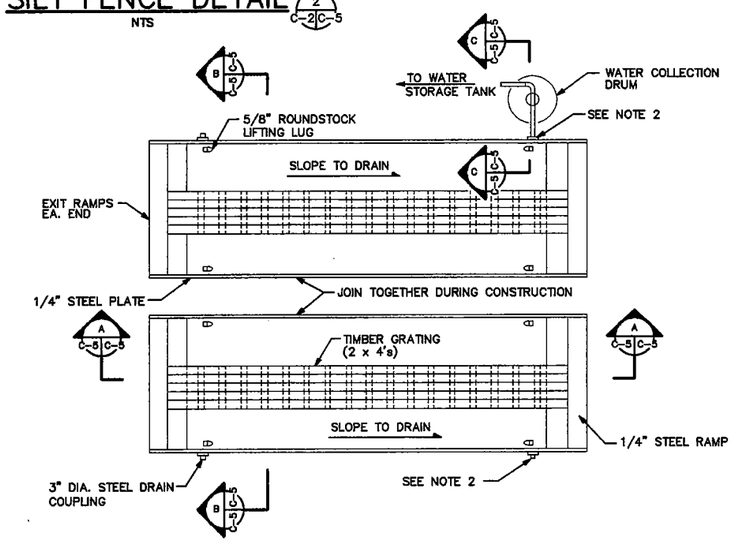
SECTION (B / C-5 | C-5)



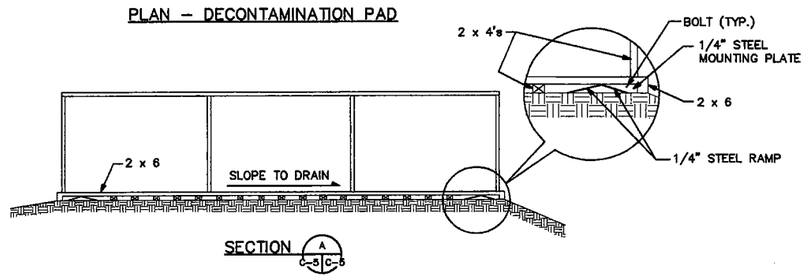
SECTION (C / C-5 | C-5)

NOTES:

1. ON/OFF OPERATION OF PUMP IS CONTROLLED BY FLOAT SO THAT PUMP STARTS WHEN SUMP WATER LEVEL REACHES 4" BELOW SUMP INLET AND SHUTS OFF WHEN WATER LEVEL DROPS TO PUMP DISCHARGE LEVEL.
2. DRAIN COUPLING IS TO BE FITTED WITH QUICK DISCONNECT AND 3" DIA. SCH 80 PVC (INNER COUPLING) OR 3" DIA. RUBBER DISCHARGE HOSE (OUTER COUPLING) TO SUMP. THE OUTER DRAIN COUPLING IS TO BE USED ONLY AFTER VEHICLE HAS LEFT THE PAD. PLUG ALL DRAINS NOT BEING USED.



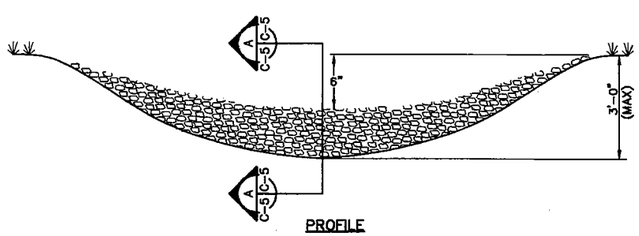
PLAN – DECONTAMINATION PAD



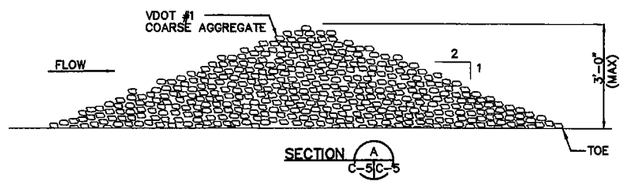
SECTION (A / C-5 | C-5)

DECONTAMINATION PAD DETAIL (4 / C-2 | C-5)

NTS



PROFILE



SECTION (A / C-5 | C-5)

NOTES:

1) ROCK CHECK DAMS WILL BE REMOVED FOLLOWING FINAL STABILIZATION.
2) ROCK CHECK DAMS TO BE PLACED WHERE INDICATED ON DRAWING C-2 SO THAT THE TOE OF THE UPSTREAM DAM (CHANNEL INVERT) IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM ROCK CHECK DAM.
3) SEDIMENT SHALL BE REMOVED FROM BEHIND ROCK CHECK DAM WHEN IT HAS ACCUMULATED TO ONE HALF OF THE ORIGINAL HEIGHT OF THE ROCK CHECK DAM.

ROCK CHECK DAM DETAIL (6 / C-2 | C-8)

NTS

SYMBOL	DESCRIPTION	DATE	APPROVED
09A	403		
04	404		
E.I.C.	405		
401	408		
402	04B		

REVISIONS

REVIEWED BY ROICC — DATE

Tetra Tech NUS, Inc. — DES. TRC, DR. JJF, CHK. RGM, TITLE, DATE — SUBMITTED BY, DATE — APPROVED

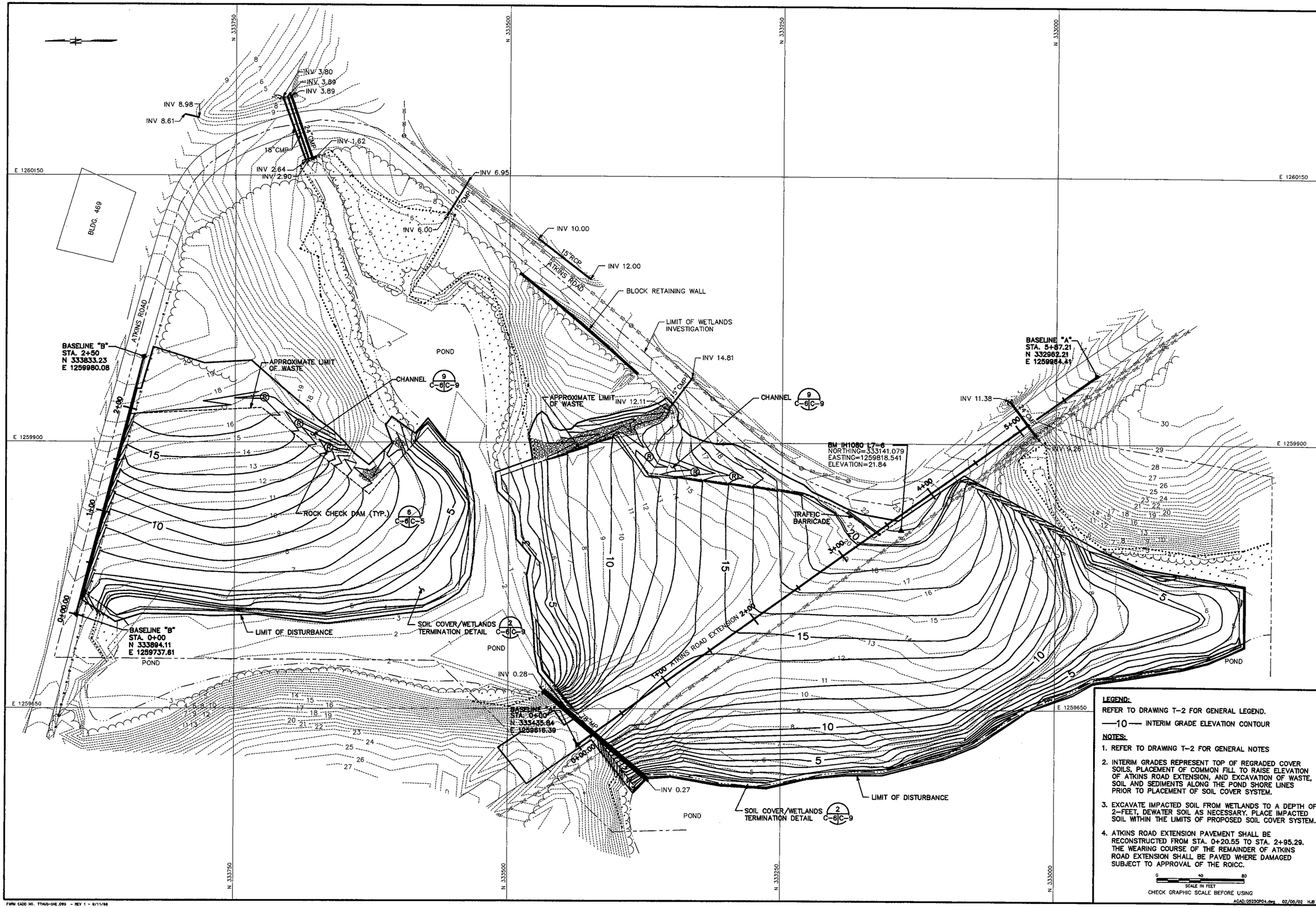
FOR COMMANDER NAVFAC

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
WASHINGTON, D.C.
NAVAL AIR ENGINEERING STATION, LAKEHURST, NEW JERSEY
NAVAL SURFACE WARFARE CENTER, INDIAN HEAD DIVISION, INDIAN HEAD, MARYLAND

FINAL SUBMISSION
SITE 12 – TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
EROSION AND SEDIMENT CONTROL DETAILS

CODE I.D. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO. N62470-97-D-5000
SPEC. 21-97-5000-062-01
NAVFAC DRAWING NO. 3458634
SHEET 7 OF 11
C-5

AC&D: 0525CD02.dwg 02/05/02 DH



LEGEND:

REFER TO DRAWING T-2 FOR GENERAL LEGEND.

—10— INTERIM GRADE ELEVATION CONTOUR

NOTES:

1. REFER TO DRAWING T-2 FOR GENERAL NOTES
2. INTERIM GRADES REPRESENT TOP OF REGRADED COVER SOILS, PLACEMENT OF COMMON FILL TO RAISE ELEVATION OF ATKINS ROAD EXTENSION, AND EXCAVATION OF WASTE, SOIL AND SEDIMENTS ALONG THE POND SHORE LINES PRIOR TO PLACEMENT OF SOIL COVER SYSTEM.
3. EXCAVATE IMPACTED SOIL FROM WETLANDS TO A DEPTH OF 2-FEET, DEWATER SOIL AS NECESSARY. PLACE IMPACTED SOIL WITHIN THE LIMITS OF PROPOSED SOIL COVER SYSTEM.
4. ATKINS ROAD EXTENSION PAVEMENT SHALL BE RECONSTRUCTED FROM STA. 0+20.55 TO STA. 2+95.29. THE WEARING COURSE OF THE REMAINDER OF ATKINS ROAD EXTENSION SHALL BE PAVED WHERE DAMAGED SUBJECT TO APPROVAL OF THE ROICC.

0 40 80
SCALE IN FEET
CHECK GRAPHIC SCALE BEFORE USING

AGAD:05250P04.dwg 02/05/02 HJB

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

09A	403		
04	404		
E.I.C.	405		
401	408		
402	04B		
REVIEWED BY ROICC	DATE		

Tetra Tech NUS, Inc.
DES. | DR. | CHK. | DATE
DWG. | DLT | TITLE | DATE
APPROVED
EFD FOR COMMANDER NAVFAC

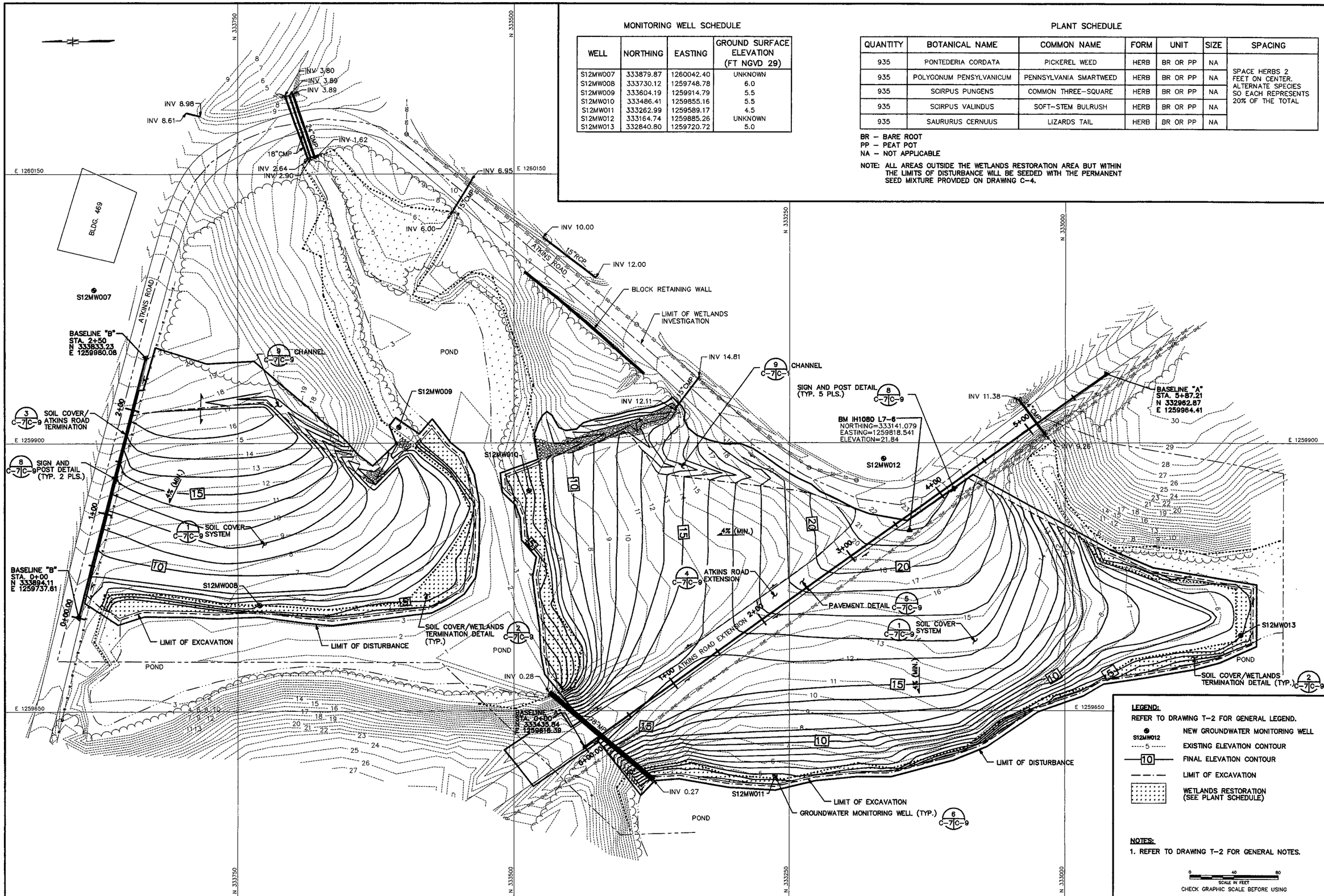
SEAL AREA

NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C.
NAVAL ENGINEERING FIELD ACTIVITY-CHESAPEAKE
DEPARTMENT OF THE NAVY
NIGHT HEAD, MARYLAND
NIGHT HEAD DIVISION, NAVAL SURFACE WARFARE CENTER

FINAL SUBMISSION
SITE 12 - TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
INTERIM GRADING PLAN

CODE I.D. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO. N62470-97-D-5000
SPEC C21-97-5000-062-01
NAVFAC DRAWING NO. 3458635
SHEET 8 OF 11
C-6

FORM CADD NO. TTNUS-ONE.DRG - REV 1 - 9/11/96



MONITORING WELL SCHEDULE

WELL	NORTHING	EASTING	GROUND SURFACE ELEVATION (FT NGVD 29)
S12MW007	333879.87	1260042.40	UNKNOWN
S12MW008	333730.12	1259748.78	6.0
S12MW009	333604.19	1259914.79	5.5
S12MW010	333486.41	1259855.16	5.5
S12MW011	333262.99	1259589.17	4.5
S12MW012	333164.74	1259885.26	UNKNOWN
S12MW013	332840.80	1259720.72	5.0

PLANT SCHEDULE

QUANTITY	BOTANICAL NAME	COMMON NAME	FORM	UNIT	SIZE	SPACING
935	PONTEDERIA CORDATA	PICKEREL WEED	HERB	BR OR PP	NA	SPACE HERBS 2 FEET ON CENTER. ALTERNATE SPECIES SO EACH REPRESENTS 20% OF THE TOTAL
935	POLYGONUM PENSYLVANICUM	PENNSYLVANIA SMARTWEED	HERB	BR OR PP	NA	
935	SCIRPUS PUNGENS	COMMON THREE-SQUARE	HERB	BR OR PP	NA	
935	SCIRPUS VALINDUS	SOFT-STEM BULRUSH	HERB	BR OR PP	NA	
935	SAURURUS CERNUUS	LIZARDS TAIL	HERB	BR OR PP	NA	

BR – BARE ROOT
PP – PEAT POT
NA – NOT APPLICABLE

NOTE: ALL AREAS OUTSIDE THE WETLANDS RESTORATION AREA BUT WITHIN THE LIMITS OF DISTURBANCE WILL BE SEEDED WITH THE PERMANENT SEED MIXTURE PROVIDED ON DRAWING C-4.

LEGEND:

REFER TO DRAWING T-2 FOR GENERAL LEGEND.

- S12MW012 — NEW GROUNDWATER MONITORING WELL
- 5 — EXISTING ELEVATION CONTOUR
- 10 — FINAL ELEVATION CONTOUR
- LIMIT OF EXCAVATION
- WETLANDS RESTORATION (SEE PLANT SCHEDULE)

NOTES:

1. REFER TO DRAWING T-2 FOR GENERAL NOTES.

0 40 80
SCALE IN FEET
CHECK GRAPHIC SCALE BEFORE USING

ACAD:05250P02.dwg 02/06/02 HJB

SYMBOL	DESCRIPTION	DATE	APPROVED
09A	403		
04	404		
402	405		
04B	408		
	401		

REVISIONS

REVIEWED BY RGCC

DATE

Tetra Tech NUS, Inc.
TRIPLE PLAZA IV
1000 CORPORATE BLVD.
PITTSBURGH, PA. 15230

DES. TNG DR. DLT TITLE DATE
CHK. RGM E.I.C. 405 DATE
APPROVED

ISD FOR COMMANDER NAVFAC

SEAL AREA

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C.

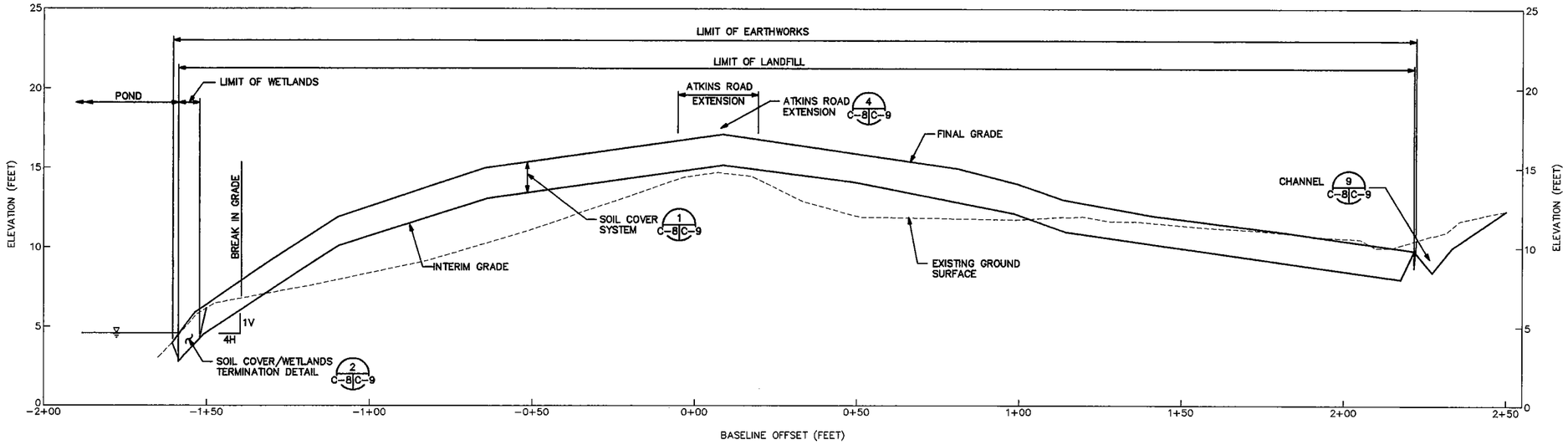
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON NAVY YARD, SERVICE CENTER

WASHINGTON NAVY YARD, MARYLAND

FINAL SUBMISSION
SITE 12 – TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
FINAL GRADING PLAN

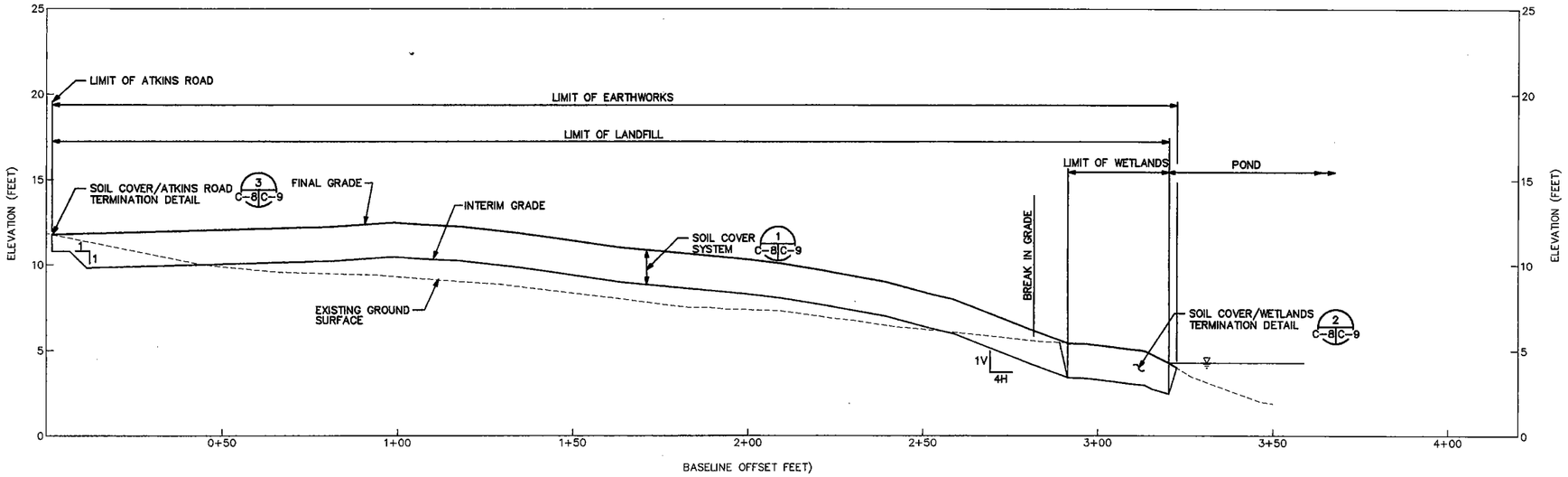
CODE I.D. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO.
N62470-97-D-5000
SPEC-21-97-5000-062-01
NAVFAC DRAWING NO.
3458636
SHEET 9 OF 11
C-7

FORM CADD NO. TTNUS-GHE.DRD – REV 1 – 9/11/96



BASELINE A STA. 1+75

0 20 40
HORIZONTAL SCALE IN FEET
0 4 8
VERTICAL SCALE IN FEET
CHECK GRAPHIC SCALE BEFORE USING



BASELINE B STA. 1+00

0 20 40
HORIZONTAL SCALE IN FEET
0 4 8
VERTICAL SCALE IN FEET
CHECK GRAPHIC SCALE BEFORE USING

LEGEND:
REFER TO DRAWING T-2 FOR GENERAL LEGEND.

NOTES:
REFER TO DRAWING T-2 FOR GENERAL NOTES.

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

403		
404		
405		
408		
048		DATE

REVIEWED BY RDCC

09A		
04		
E.I.C.		
401		
402		

Tetra Tech NUS, Inc. — FOSTER PLAZA VI, 661 ANDERSON DRIVE, PITTSBURGH, PA 15220

DES. TNS | DR. DLT | CHK. RCM | TITLE | DATE

SUBMITTED BY | DATE

APPROVED | DATE

EFD FOR COMMANDER NAVFAC

SEAL AREA

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY-CHESAPEAKE
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C.
NAVAL BASE DIVISION, NAVAL SURFACE WARFARE CENTER
NORFOLK NAVAL SHIPYARD, NORFOLK, VIRGINIA

FINAL SUBMISSION
SITE 12 - TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
CROSS SECTIONS

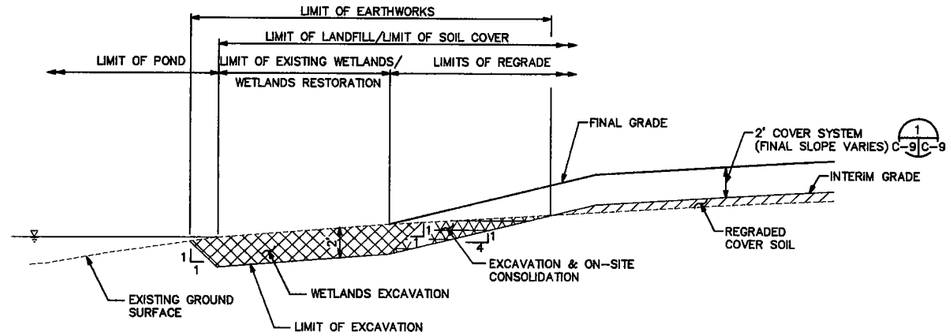
CODE I.D. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO.
N62470-97-D-5000
SPEC-21-97-5000-062-01
NAVFAC DRAWING NO.
3458637
SHEET 10 OF 11
C-8

ACAD:0325CX01.dwg 02/05/02 HJB

FORM CADD NO. TTNUS-CHE.DBG - REV 1 - 9/11/98

SOIL COVER SYSTEM (1 / C-7, C-8, C-9)

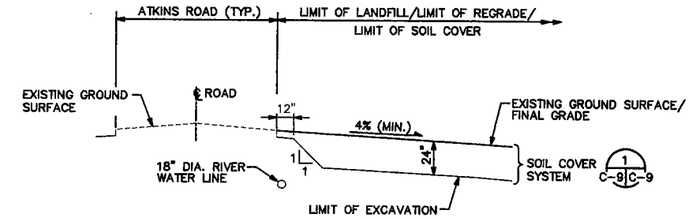
NOT TO SCALE



1. WETLANDS RESTORATION AREA TO BE RETURNED TO EXISTING GRADE.
2. LIMITS OF POND, EXCAVATION, SOIL COVER, AND WETLANDS VARY WITH RESPECT TO ONE ANOTHER ALONG SHORELINE.

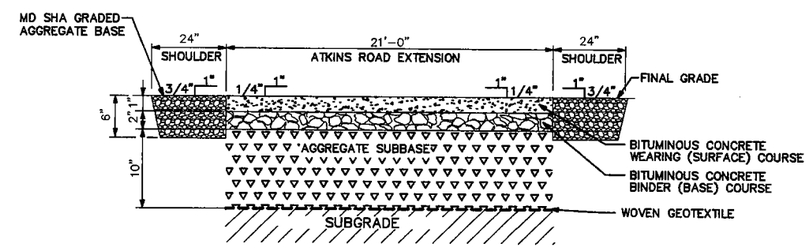
SOIL COVER/WETLANDS TERMINATION DETAIL (TYP.) (2 / C-6, C-7, C-8)

NOT TO SCALE



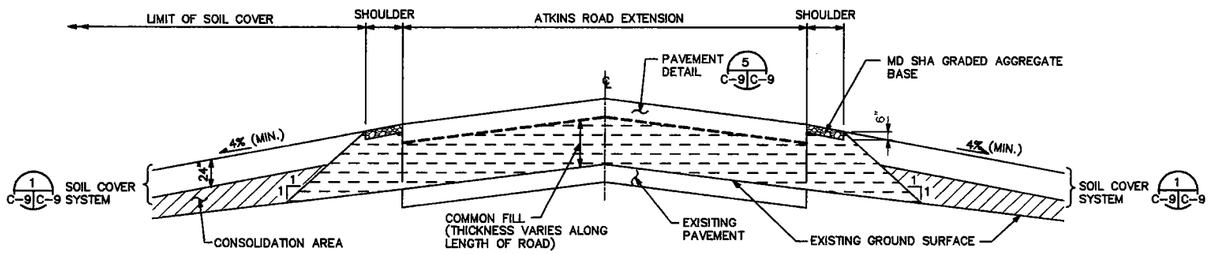
SOIL COVER/ATKINS ROAD TERMINATION DETAIL (3 / C-7, C-8, C-9)

NOT TO SCALE



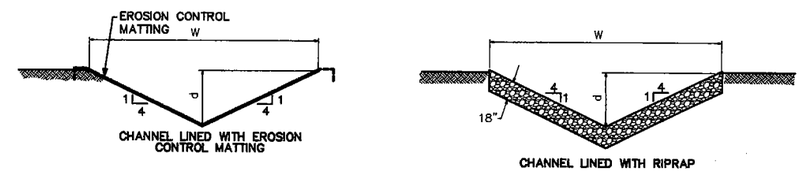
PAVEMENT DETAIL (5 / C-7, C-9)

NOT TO SCALE



ATKINS ROAD EXTENSION (4 / C-7, C-8, C-9)

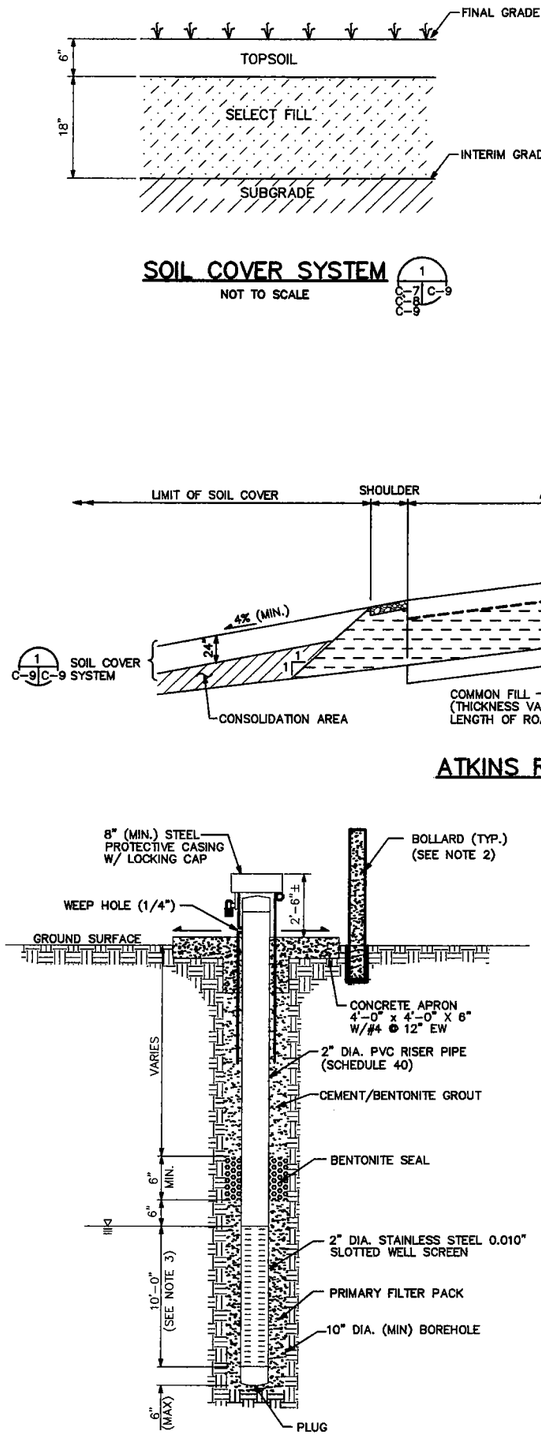
NOT TO SCALE



1. EROSION CONTROL MATTING SHALL WITHSTAND FLOWS EQUAL TO 6.74 FPS.
2. FOR NORTHERN CHANNEL d = 1 FOOT AND W = 8 FOOT
3. FOR SOUTHERN CHANNEL d = 1.5 FEET AND W = 12 FEET
4. PROVIDE d_{50} RIPRAP = TO 6" WHERE INDICATED ON DESIGN DRAWING C-2.

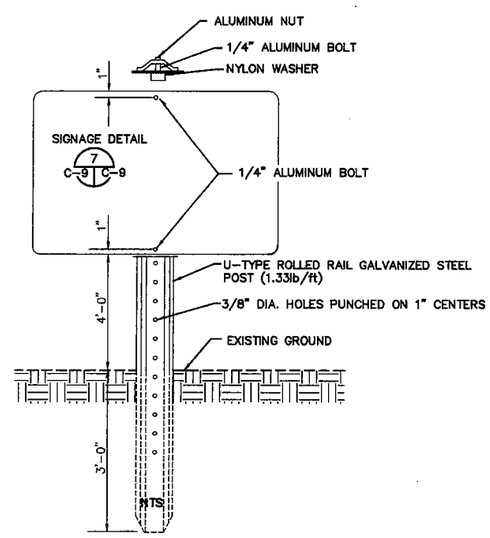
CHANNEL DETAIL (9 / C-2, C-6, C-7, C-8)

NOT TO SCALE



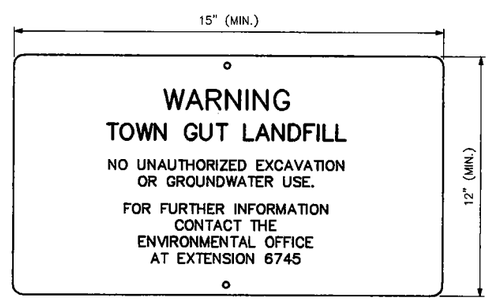
GROUNDWATER MONITORING WELL DETAIL (6 / C-7, C-9)

NOT TO SCALE



1. DRIVING CAP TO BE USED WHEN DRIVING POST.
2. PANEL TO BE FABRICATED OF ASTM B209 ALLOY 6061-T6 OR 5052-H38, 0.080" THICK.
3. TOP OF PANEL TO BE FLUSH WITH TOP OF POST.

SIGN AND POST DETAIL (8 / C-7, C-9)



1. THE RAC SHALL FURNISH AND INSTALL WEATHER PROOF SIGNAGE AND POSTS AT 100 FOOT INTERVALS ALONG THE SITE PERIMETER AT THE LOCATIONS DESIGNATED BY THE ROICC.

SIGNAGE DETAIL (7 / C-9, C-9)

NOT TO SCALE

LEGEND:

REFER TO DRAWING T-2 FOR GENERAL LEGEND.

NOTES:

1. REFER TO DRAWING T-2 FOR GENERAL NOTES.
2. PROVIDE 4 BOLLARDS FOR EACH PROPOSED MONITORING WELL AT EACH CORNER OF THE CONCRETE APRON.
3. MONITORING WELL SCREEN INTERVALS SHALL EXTEND FROM THE WATER TABLE DOWN 10-FEET.

SYMBOL	DESCRIPTION	DATE	APPROVED
	REVISIONS		

DATE	REVIEWED BY RAOC
09A	403
04	404
E.I.C.	405
401	408
402	048

Tetra Tech NUS, Inc. — DES. TNG DR. DLT CHK. RCM — TITLE — DATE — APPROVED — ETD FOR COMMANDER NAVFAC

STATE OF MARYLAND — JOHN LAFAYETTE — REGISTERED PROFESSIONAL ENGINEER — SEAL AREA

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND — WASHINGTON, D.C.

ENGINEERING FIELD ACTIVITY-CHESAPEAKE

NAVAL EXPEDITIONARY COMBAT COMMAND — NAVAL EXPEDITIONARY COMBAT DIVISION — NAVAL SURFACE WARFARE CENTER — INDIAN HEAD, MARYLAND

FINAL SUBMISSION
SITE 12 - TOWN GUT LANDFILL
REMEDIAL ACTION DESIGN
MISCELLANEOUS DETAILS

CODE I.D. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO. N62470-97-D-5000
SPEC. 21-97-5000-062-01
NAVFAC DRAWING NO. 3458638
SHEET 11 OF 11
C-9

ACAD:0525CD01.dwg 02/05/02 H.B

FORM CADD NO. TTNUS-DWG.DBD - REV 1 - 9/11/98