DRAFT FINAL
REMEDIAL ACTION -COMPLETION REPORT
Operable Unit 3, Installation Restoration Site 7
Box Canyon Landfill
Marine Corps Base
Camp Pendleton, California

Environmental Remedial Action
Contract Number N62474-98-D-2076
Contract Task Order 0080

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Acronyms and Abbreviations

µg/kg	micrograms per kilogram
1,2-DCA	1,2-dichloroethane
AM	Action Memorandum
ARAR	applicable or relevant and appropriate requirements
ASTM	American Society for Testing and Materials
CAMU	corrective action management unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CQC	construction quality control
CTO	Contract Task Order
cy	cubic yards
DON	U.S. Department of the Navy
DTSC	Department of Toxic Substances Control
EcoRA	ecological risk assessment
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ET	evapotranspiration
FFA	Federal Facility Agreement
HDPE	high-density polyethylene
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IR	Installation Restoration
IRP	Installation Restoration Program
LFG	landfill gas
MCB	Marine Corps Base
MCLs	maximum contaminant levels
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&F	operational and functional
OU-3	Operable Unit 3
PA/SI	preliminary assessment/site inspection
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
PM10	particulate less than 10 micrometers
POLs	petroleum, oils, and lubricants
QC	quality control
RA	remedial action
RAWP	Remedial Action Work Plan
RD	remedial design
RD/RA	remedial design/remedial action
RFI	Request for Information
RI/FS	Remedial Investigation/Feasibility Study

Acronyms and Abbreviations (continued)

ROD	Record of Decision
ROICC	Resident Officer in Charge of Construction
RWQCB	California Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act of 1986
SDRI	sealed double-ring infiltrometer
SVOCs	semivolatile organic compounds
SWDIV	Southwest Division Naval Facilities Engineering Command
TCA	trichloroethane
TSP	total suspended particulates
USACE	U.S. Army Corps of Engineers
VOCs	volatile organic compounds

Executive Summary

A remedial action was implemented pursuant to the Record of Decision (ROD) for Operable Unit (OU) 3 (OU-3 ROD) dated January 11, 1999 (Southwest Division Naval Facilities Engineering Command [SWDIV], 1999), for the remediation of Installation Restoration (IR) Site 7 (the Site), Box Canyon Landfill, at Marine Corps Base (MCB) Camp Pendleton (Base) in San Diego County, California.

IR Site 7 was a former landfill used by the Base between May 1974 and May 1984, for the disposal of municipal wastes generated by various base operations. Before the Less became a landfill, the Base used it as a quarry site between 1946 and early 1970s. The landfill operation ceased in 1984. An estimated 1,093,000 cubic yards (cy) of waste were disposed of at the Site. The Site was used as a Corrective Action Management Unit (CAMU) in 1996 and 1999 for the disposal of abut 273,400 cubic yards of waste materials imported from six other IR sites (IR Sites 3, 6, 1A, 2A, 1F, and 1E) as a result of various soil remedial actions implemented at these sites. IR Site 7 was designated under the MCB Camp Pendleton Installation Restoration Program (IRP) as a Group B site for conducting the remedial investigation and feasibility study (RI/FS) pursuant to the process mandated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. The RI work performed for Group B sites recommended, based on the nature and volume of wastes disposed at the Site, the application of presumptive remedy per the U.S. Environmental Protection Agency (EPA) guidance for the remediation of a municipal landfill. The EPA presumptive remedy for a landfill is to contain the landfill waste with a final closure cover system for the protection of human health and the environment. In lieu of a FS, an engineering evaluation/cost analysis (EE/CA) was performed following the EPA presumptive remedy guidance and was used as the basis in OU-3 ROD for the selection of the final remedy for IR Site 7.

Remedial actions to be implemented at IR Site 7, as stipulated in OU-3 ROD, included the following:

- Installation of an evapotranspiration (ET) cover consisting of a vegetated topsoil layer, a minimally compacted soil layer, and a compacted low-permeability bottom layer
- Installation of lined ditches between the landfill benches on the north face of the landfill
- Long-term monitoring
- Land use restrictions

The exposure risks posed by the contaminants at IR Site 7 would be addressed by the ET cover that would provide a containment to the waste and eliminate the exposure pathways. A site-specific remedial design (RD) and a remedial action work plan (RAWP) were developed to meet the OU-3 ROD requirements. The RD provided detailed engineering design and analysis of the ET cover system and the RAWP provided detailed procedures for the construction of the ET cover system. The final remedial action for IR Site 7 was implemented in accordance with the RD and RAWP in 2001 (ET cover construction) and 2002 (drainage system, appurtenant structures, and final site revegetation).

This report was prepared to document the RA details in accordance with EPA guidance for preparing final RA reports. The report provides an overview of the site-specific background and the decisions pertinent to the development of the final RA, chronology of the RA and construction activities, evaluation of the performance standards and construction quality control, site inspection and certification, post-RA operation and maintenance, and summary of project costs.

The report is supported by seven appendices that provide information on the preconstruction test fill construction and full-scale field infiltration test, photographs of construction activities, cover construction quality control documentation, site revegetation seed mix, as-built survey and documentation, and as-built report review comments.

In summary, the RA at IR Site 7 was conducted in accordance with the approved RD and RAWP. A 6-foot-thick (minimum thickness) ET cover system and 24 perimeter landfill gas (LFG) monitoring probes were installed between August and December 2001. Additionally, over 2,000 feet of grouted-riprap-lined drainage channels and over 25,000 square yards of erosion-control-blanket-lined drainage ditches were installed between September and December 2002. The Site was revegetated in December 2002 with seeds of native plants. The construction efforts were evaluated in accordance with the RD and RAWP, and were found to meet all of the quality control requirements. The post-closure monitoring activities were initiated in January 2003. The total cost for conducting the RA was approximately $5.01 million (originally estimated at $3.1 million in the ROD) in 2001/2002 dollars.

IR Site 7 is considered a closed site and will be monitored and maintained in accordance with the OU-3 ROD requirements. The effectiveness of the RA will be reviewed every 5 years as part of the OU-3 ROD 5-year review process. In addition, the post-closure monitoring results will be used for evaluating whether the remedial action is operational and functional (O&F) as designed. Depending on the O&F evaluation, which will be provided on an as-needed basis and supplement to the 5-year review report, additional response action will be taken as required.

1.0 Introduction

This report was prepared by Shaw Environmental, Inc. in partial fulfillment of the work scope for Contract Task Order (CTO) 0080 issued under Southwest Division Naval Facilities Engineering Command (SWDIV) Remedial Action Contract Number N62474-98-D-2076. This report summarizes the remedial action activities implemented at Installation Restoration (IR) Site 7, Box Canyon Landfill (the Site), located at Marine Corps Base (MCB) Camp Pendleton in San Diego County, California.

1.1 Project Background

MCB Camp Pendleton (Base) is the primary amphibious training center for the west coast. Located between the Cities of Los Angeles and San Diego, California, MCB Camp Pendleton covers approximately 125,000 acres, almost entirely in San Diego County (Figure 1-1). The surrounding communities include San Clemente to the northwest, Fallbrook to the east, and Oceanside to the south. The Base is bordered to the west by the Pacific Ocean and encompasses 17 miles of undisturbed coastal area; rolling hills and valleys range inland an average of 10 to 12 miles.

MCB Camp Pendleton and the U.S. Department of the Navy (DON) have been actively engaged in the Installation Restoration Program (IRP) since 1980. The IRP is designed pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by Superfund Amendment and Reauthorization Act (SARA) of 1986, to provide investigation and remediation, if necessary, of environmental impact caused by hazardous substances, pollutants, or contaminants. In general, the IRP consists of the following phases:

- Preliminary assessment/site inspection (PA/SI): The PA/SI process involves records reviews, site inspections, and preliminary sampling and data collection to identify sites that could require further investigation or remediation.
- Remedial investigation/feasibility study (RI/FS): The RI process involves assessing the nature and extent of contamination to a level of detail sufficient to support the development of remedial alternatives, which are then evaluated and finalized through the FS process.
- Remedial design/remedial action (RD/RA): The remedial design (RD) process involves developing technical designs and analyses for the remedial alternative selected through the FS process. The detailed design plans and specifications from the RD phase are implemented during the final remedial action (RA) process.

A Federal Facility Agreement (FFA) for the Base was signed on October 24, 1990, and constitutes a legally binding agreement between the U.S. Environmental Protection Agency (EPA), the California State Department of Toxic Substances Control (DTSC), the California Regional Water Quality Control Board (RWQCB), and the DON. The FFA outlines the working relationship between the parties to the agreement and clearly defines the mutual obligations of the parties as structured to attain efficient remedial response throughout the process. In addition, the FFA establishes a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at the Base in accordance with the IRP.

The FFA segregated the IRP sites into four groups based on the PA/SI data:

- **Group A** – Sites with previous investigations prior to the RI/FS
- **Group B** – Landfills and surface impoundments
- **Group C** – Remaining sites in the Santa Margarita river basin
- **Group D** – Remaining sites outside the Santa Margarita river basin

Box Canyon Landfill, located near the south entrance to the Base (Figure 1-2), was used by the Base between May 1974 and May 1984 for the disposal of municipal wastes generated by various base operations. Prior to the landfill operation, the Site was used as a quarry by the Base between 1947 and early 1970s. The landfill operation ceased in 1984. An estimated 1,093,000 cubic yards (cy) of waste were disposed of at the Site. In the above grouping process, Box Canyon Landfill was identified as IR Site 7 and placed in Group B. The RI phase for Group B sites was performed between March 1993 and March 1994 (SWDIV, 1995a). The RI recommended the application of presumptive remedy developed by EPA (EPA, 1993a and b) for the remediation of CERCLA municipal landfill sites. Following the EPA presumptive remedy guidance (EPA, 1993b), an engineering evaluation/cost analysis (EE/CA) was conducted to study the presumptive remedy consisting of three closure cap alternatives in 1995 (SWDIV, 1995b). The 1995 EE/CA was amended in 1997 (SWDIV, 1997a) by adding one additional cap design. An action memorandum (AM) for a non-time-critical removal action was issued in September 1997 (SWDIV, 1997b) for the construction of an evapotranspiration (ET) cap system at IR Site 7.

IR Site 7 was used, during the same time frame, for the disposal of stabilized/treated remediation waste generated from the non-time-critical removal actions conducted at IR Sites 3 and 6 (Figure 1-2) between May and December 1996 (SWDIV, 1997c and 1997d). The Site was also studied as part of the FS of Operable Unit 3 (OU-3) sites (SWDIV, 1998) as the location of an on-base Corrective Action Management Unit (CAMU) for the disposal of burn debris to be excavated from other OU-3 sites. As a result of this approach, the proposed non-time-critical removal action was cancelled and the proposed presumptive remedy was integrated into the remedial actions for OU-3 sites. The IR Site 7 EE/CA and AM were used as the basis, in lieu of

an FS and proposed plan, for incorporating the final remedy selected for IR Site 7 into the OU-3 ROD. The OU-3 ROD was issued in January 1999 (SWDIV, 1999) and signed by the parties to the FFA during February and March 1999.

The OU-3 ROD required that burn debris and contaminated soil excavated from five other OU-3 sites (i.e., IR Sites 1A, 2A, 1D, 1E, 1F in Figure 1-2) be consolidated into a CAMU built on top of the existing landfill at IR Site 7. A total of 236,000 cy of burn debris and soil was excavated from IR Sites 1A, 2A, 1E, and 1F between June and November 1999, and imported and consolidated into the CAMU built at IR Site 7 (SWDIV, 2000a, 2003a, 2003b, and 2003c). Remedial action at IR Site 1D was not initiated because the Base decided that the CAMU should be closed as part of the IR Site 7 closure activities (SWDIV, 2000b). The CAMU was subsequently closed in October/November 2000 with a 1-foot-thick interim cover while the U.S. Army Corps of Engineers (USACE) – Omaha District developed the final RD.

The final RD (USACE, 2000a and 2000b) and the RA work plan (SWDIV, 2001) were completed and approved in August 2000 and June 2001, respectively. IT Corporation started the remedial construction in August 2001. A 6-foot-thick ET cap was installed between June and December 2001 to close the CAMU and the landfill. A perimeter landfill monitoring network consisting of 24 monitoring probes was installed in 10 well locations along the perimeter of the landfill in August 2001 and monitored weekly during the construction. Post-closure landfill gas (LFG) migration monitoring has been conducted on bimonthly basis since January 2002. The final drainage and vegetation restoration efforts were implemented between September and December 2002. Post-closure groundwater monitoring began February 2003.

A chronology of the above events is summarized in Table 1-1.

1.2 Report Objectives

The primary objective of this report is to summarize the RA activities performed between 2001 and 2003. Chronological events related to the development of the RA, such as the RI, EE/CA, ROD, and RD, are also summarized. This report serves as documentation for the completion of remedial action at IR Site as mandated by OU-3 ROD.

1.3 Report Organization

This report was prepared in accordance with the EPA guidance for preparing an RA report (EPA, 2000). The report was organized to include the following information:

- **Section 1.0** – Introduction
- **Section 2.0** – Site Description and Background
- **Section 3.0** – Construction Activities and Chronology of Events
- **Section 4.0** – Performance Standards and Construction Quality Control

- **Section 5.0** – Final Inspection and Certification
- **Section 6.0** – Monitoring and Maintenance Activities
- **Section 7.0** – Summary of Project Costs
- **Section 8.0** – References

In addition to general discussions provided in each section, supporting documents include the following:

- **Appendix A** – Photographs of Remedial Construction
- **Appendix B** – Test Pad Construction and Field Infiltrameter Test Report
- **Appendix C** – Design Variance Documentation
- **Appendix D** – Site Revegetation Seed Mix
- **Appendix E** – Construction Variance Record Drawings
- **Appendix F** – Transmittals of CQC Submittals and RFIs
- **Appendix G** – Review Comments and Responses.

2.0 Site Description and Background

This section summarizes the conditions and operational background of IR Site 7, as well as the RI and EE/CA results, ROD requirements, RD, and the RA Work Plan that led to the final RA.

2.1 Site Description

This section summarizes the location, operational background, and environmental setting of IR Site 7. The summary information in the following sections was obtained from the Group B RI Report (SWDIV, 1995a) and OU-3 ROD (SWDIV, 1999).

2.1.1 Location

IR Site 7, Box Canyon Landfill, is located in the 20 Area about 1 mile east to the intersection of Vandegrift Boulevard and Stuart Mesa Road (Figure 1-2). The landfill site occupied about 28 acres of a narrow canyon that drains into Santa Margarita River located approximately 500 feet to the north of Vandegrift Boulevard. A military housing and an elementary school are located to the southwest of the Site (Figure 2-1) and separated by a chain-link security fence from the landfill site. The nearest housing unit and school building to the security fence are about 50 feet and 250 feet, respectively. The footprint of the landfill to the security fence is about 50 to 70 feet.

2.1.2 Operational Background

The Site was used as a quarry between 1946 and 1970 before the Site became a landfill. The Site became a landfill and was used by the Base between May 1974 and May 1984 for the disposal of nonhazardous municipal wastes generated by various base operations. The landfill had no bottom liner system. The Site was operated under Solid Waste Facility Permit No. 37-aa-091, issued on July 16, 1981. Waste disposal operations were conducted on the canyon floor, where refuse was mixed with alluvial soil excavated from the canyon wall. The landfilling sequence began in the northern portion of the canyon and progressed into the southern and southeastern portions of the canyon (Figure 2-2). The Site received approximately 1,093,000 cy of fill during the 10 years of landfill operation. Typical wastes accepted for landfilling reportedly included household and construction refuses consisting of tree and lawn clippings, scrap lumber and metal, appliances, furniture, paper, fill, dirt, asphalt, concrete, tiles, cans, containers, magazines, and boxes. The Site also reportedly received dry cleaning sludges containing Stoddard solvent, contaminated soil and dumpster waste containing fuels, petroleum, oils, and lubricants (POLs), solvents, thinners, strippers, epoxies, sealants, paint wastes, and chemical cleaners. The landfill operation ceased in May 1984.

In 1996 and 1999, two CAMUs were built within the landfill (Figure 2-2) as a result of the remedial actions of six other IR sites. The 1996 CAMU contains about 39,400 cy of chemically stabilized contaminated soil excavated from IR Sites 3 and 6 (Figure 1-2) as a result of the non-time-critical removal actions conducted at these two sites (SWDIV, 1997c and 1997d). The 1999 CAMU contains about 234,000 cy of burn debris and soil excavated from IR Sites 1A, 2A, 1E, and 1F (Figure 1-2) as a result of the remedial action taken at these sites (SWDIV, 2000a, 2003a, 2003b, and 2003c). Both CAMUs contained little to no decomposable organic matters. The CAMUs were constructed in cells that were compacted with heavy earthmoving equipment to maximize the disposal capacity. The thickness of the CAMU varied from 5 feet near the perimeter to more than 20 feet near the center of the CAMU. Both CAMUs were constructed directly on top of the existing landfill without a bottom liner material.

2.1.3 Environmental Setting

This section summarizes the topography, surface water hydrology, geology, hydrogeology, ecology, and land use in the vicinity of IR Site 7 prior to the final remedial action.

Topography (Pre-Closure) – The Site is located in a small and narrow canyon that originally discharged northward into the Santa Margarita River basin (Figure 2-1). The majority of the quarried canyon was backfilled with the landfill materials to the level of the surrounding marine terrace, which is elevated at an elevation approximately 150 feet above the Santa Margarita River basin. The upper portion of the landfill is relatively flat and sloped at about a 5-percent slope toward the front of the canyon. The front portion of the landfill forms the face of the landfill that has a 2H:1V slope with two narrow benches, which equally divide the face slope. The front face, or the limit of landfill, is terminated about 200 feet to the intersection of Vandegrift Boulevard.

Surface Water Hydrology (Pre-Closure) – The only perennial surface water in the vicinity of the IR Site 7 is Santa Margarita River. The Site is bordered on the south and southeast sides by the military housing and the elementary school. The surface water from these areas drains away from the Site (Figure 2-1). Ephemeral water can be found in the vernal pools to the west of the Site during the wet season of the year. Before the final closure cap was constructed, the top portion of the landfill drained toward north in sheet flow that was collected by two perimeter drainage channels. These perimeter channels were then collected at the northeast corner of the landfill by a 48-inch-diameter corrugated metal pipe that drained to the bottom of the landfill, crossing Vandegrift Boulevard through a culvert, and into Santa Margarita River. The overall drainage pattern was maintained during the final cap construction. The channels were now lined with riprap revetment, shotcrete, and erosion control blanket for better erosion control.

Geology – Five distinct lithologic units were found during the RI study. They are, from youngest to oldest in time, the younger alluvium of Santa Margarita River, Pleistocene marine terrace deposits, the Plio-Pleistocene San Mateo Formation, post-mid-Miocene/pre-Pleistocene sandy and gravelly alluvial deposits, and the mid-Miocene San Onofre Breccia. The San Onofre Breccia forms the walls of the Santa Margarita River basin and the base upon which the majority of the Box Canyon Landfill was built. Two distinctive San Onofre Breccia members are observable at the Site. The upper member consists of reddish-brown to brown, massively bedded fine to coarse-grained sandstone, claystone, breccia, and conglomerate. The lower member consists of gray to greenish-gray, thickly bedded, fine to medium-grained sandstone, siltstone, claystone, breccia, and cobble conglomerate. Graded bedding and reversed graded bedding are observable in the outcrops adjacent to Vandegrift Boulevard. The San Onofre Breccia was generally encountered between 25 and 60 feet below ground surface along the west and south boundary of the Site.

The San Onofre Breccia is unconformably overlain by Pleistocene terrace deposits on the west and south sides of the landfill, and by a sandy and gravelly alluvial deposit on the north and east side of the landfill. The younger alluvium is encountered in the front of the landfill and thickens northward and westward toward the Santa Margarita River.

During the RI (SWDIV, 1995a), evidence of at least two sets of faults was observed in the vicinity of the Site (Figure 2-3). One set strikes northeast, and the other strikes northwest. The evidence of faulting includes offset bedding, drag folding, slickensides, fault gouge, and lineations in aerial photographs.

The San Mateo Formation is exposed in cliffs along Ash Road, approximately 1,500 feet southwest of the Site, and unconformably overlies the San Onofre Breccia. The contact between the two units is concealed. This unit was not encountered during the well drilling or soil sampling activities performed during the RI. It is offset by a normal fault that may be related to other faults in the vicinity of the Site.

Groundwater Hydrology – Twenty groundwater monitoring wells were installed throughout the RI/FS process in 10 locations around the landfill (Figure 2-3). In general the groundwater in all the geologic units discussed above flows toward the Santa Margarita River basin. The San Onofre Breccia is considered an aquitard because of its poor sorting and high percentage of fine-grained materials (SWDIV, 1995a). Eight monitoring wells were installed in the San Onofre Breccia formation along the west side of the landfill (i.e., well No. 7W-1A, 7W-1B, 7W-2A, 7W-2B,7W-4A, 7W-4B, 7W-5A, 7W-5B) to monitor both the upper and lower members of the formation. The two members appear to be separated by an aquitard of variable thickness. The sand and gravel alluvium is found along the east and northwest corner of the landfill. It has several characteristics that make it a potential pathway for leachate or LFG

migration. The sand and gravel alluvium appears to be one continuous aquifer and highly permeable. Two well clusters (7W-3A and 3B, and 7W-6A and 6B) were installed to monitor this formation. The front of the landfill is where the above two formations meet the younger alluvium in the Santa Margarita River basin. The groundwater from the two formations is mixed with the groundwater in the younger alluvium of Santa Margarita River, which are monitored by nine monitoring wells (7W-09A, 7W-09B, 7W-08A, 7W-08B, 7W-08C, 7W-7, MW-1, 7W-11B, and 7W-11C) along Vandegrift Boulevard.

Ecology – An ecological survey was conducted to identify potential special-status species habitats, and trappings were performed to identify the presence of Pacific Pocket Mouse (SWDIV, 1995a). No ecological risk assessment was conducted for IR Site 7 because no special-status species or habitats were identified.

Surrounding Land Use – The Site is bordered with the Santa Margarita Elementary School to the south and the military housing units to the southeast of the Site. A water reservoir is located about 300 feet northeast of the Site.

2.2 Summary of RI/FS Results

This section provides a summary of the RI/FS results. The milestone investigations performed for IR Site 7 include the following:

- RI for Group B Sites was conducted and documented in the Draft Final RI Report for Group B Sites, Remedial Investigation/Feasibility Study (SWDIV, 1995a).
- Two EE/CAs were performed and documented in the *Draft Final Engineering Evaluation/Cost Analysis for IR Site 7* (SWDIV, 1995b and 1997c), and a Technical Addendum (SWDIV, 1997d).
- FS for OU-3 sites was performed and in the Draft Final Remedial Investigation and Feasibility Study for Operable Unit-3 (SWDIV, 1998).

Information extracted from the above reports is summarized with regard to the following:

- Nature and extent of contamination
- Environmental impact
- Development and selection of remedial goals
- Development and selection of remedial alternatives

It should be noted that the following sections contain citations of regulatory criteria, goals, levels, and standards that may have changed over time. The current regulations may not be consistent with the ones cited in the study summarized in this section.

2.2.1 Nature and Extent of Contamination

RI work at IR Site 7 involved surface and subsurface soil and groundwater sampling to evaluate potential contamination from the landfill operation and its potential impact to human health and ecological receptors. An ecological survey was conducted to identify potential special-status species habitats and trappings were conducted to determine presence of the Pacific Pocket Mouse. In addition, a 24-hour meteorological survey was conducted in September 1993. Ambient air and air traps (i.e., stairwells, crawl spaces, confined spaces, vents and vaults) were sampled for methane and hydrogen sulfide. Four soil gas samples were also collected from the school and housing area. The sampling results are summarized as follows.

Soil Sampling – Soil sampling locations are shown in Figure 2-4. Low concentrations (10 to 100 micrograms per kilogram [µg/kg]) of several polycyclic aromatic hydrocarbon (PAH) compounds were detected in sample 07SD004. Two other organics, toluene and bis(2-ethylhexyl)phthalate were detected in four of the five surface soil samples. Toluene was detected at a concentration of 1J µg/kg in samples 07SD002-LABQC and 07SD005. Bis(2-ethylhexyl)phthalate concentrations ranged from 105J to 1,800B µg/kg.

Groundwater Sampling – Twenty new groundwater monitoring wells were installed at IR Site 7 and sampled during the RI phase. Three additional wells that were installed in previous investigations at the Site were also sampled on quarterly basis between March 1993 and July 1995. Groundwater samples were analyzed for metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), gasoline, diesel, pesticides, polychlorinated biphenyls (PCBs), herbicides, and general water chemistry. In general, impacts were found in wells downgradient of the Site. However, the impacts were mostly at or below the maximum contaminant levels (MCLs). The detections at or above the MCLs are summarized in Figure 2-4.

Ambient Air and Soil Gas Results – The ambient and soil gas sampling locations are shown in Figure 2-5. The ambient air samples contained low levels (1.2 to 2.0 parts per billion) of 1,1,1-trichloroethane (TCA) both in upwind and downwind locations. Therefore, it was determined that 1,1,1-TCA was probably not Site-related. Hydrogen sulfide and methane were not detected in any samples. Four soil-gas samples were collected, in duplicate, at the Santa Margarita School and the Wire Mountain Housing Area. The presence of marine terrace deposits limited sampling depths to 1½ feet. The terrace-deposits layer was deemed a barrier layer for upward migration of soil vapor, if any. No halogenated volatile compounds were detected in the soil gas samples.

Ecological Survey – The ecological survey conducted during the RI phase did not identify any special-status species at IR Site 7.

2.2.2 Environmental Impact

The environmental impact as a result of the Site contamination was evaluated by performing a human health risk assessment (HHRA) and an ecological risk assessment (EcoRA). A detailed discussion of the assessments is presented in the RI for Group B sites (SWDIV, 1995a). The summary information in the following sections was obtained from the RI/FS for OU-3 (SWDIV, 1998).

Human Health Risk Assessment - The HHRA for IR Site 7 soil was an interim screening assessment because the landfill would be capped through the application of presumptive remedy per EPA guidance (see further discussions in Section 2.3). The landfill material was assumed to be contaminated and an HHRA on the fill material was not performed. The total maximum hazard index (HI) for soil was less than the target criterion of 1.0. No further risk assessment evaluation was conducted because the landfill would be capped, eliminating any potential exposure pathways.

The Site was investigated to determine the potential for off-site gas migration and the potential impact to groundwater. The potential for gas migration was determined not to be a concern based on results of air sampling at the Site and the neighboring residential area and school.

Groundwater contaminants were detected intermittently in some of the 23 monitoring wells at the Site. The noncancer hazard index was 3.2 because of antimony (1.7 hazard quotient [HQ]) and thallium (1.4 HQ). Neither thallium nor antimony was detected during the last two rounds of the quarterly sampling conducted in 1995. The main contributors to the groundwater cancer risk were 1,2-dichloroethane (1,2-DCA), tetrachloroethene, and trichloroethene. The calculated cancer risk of 1×10^{-5} was within the acceptable risk management range of 1×10^{-4} and 1×10^{-6}. The results of the last two rounds of groundwater samplings (conducted in the first two quarters of 1995) had not detected 1,2-DCA and other risk contributors above the MCLs. The exposure risk for groundwater was within the risk management range of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and was determined acceptable.

Ecological Risk Assessment – No ecological risk assessment was conducted for IR Site 7 because no special-status species or habitat were identified during the ecological survey and the Site would be capped with a closure cover system following the presumptive remedy approach to eliminate any potential exposure pathways.

2.3 Development and Selection of Remedial Alternatives

The remedial alternatives for IR Site 7 were all based on the EPA presumptive remedy (EPA, 1993b). The EPA presumptive remedy for landfill includes drainage controls, gas monitoring, groundwater monitoring, and land use restrictions. Four remedial alternatives were developed and evaluated through the EE/CA process. The first three alternatives were proposed

in the 1995 EE/CA that were all based on the prescriptive landfill closure cover per the EPA guidance (EPA, 1993b). Each consisted of a four-layer system with a different hydraulic barrier material. The prescriptive closure cover system is as follows (from the bottom to the top):

- Foundation Layer: a minimum of 2-foot-thick foundation compacted to provide adequate structural support of the upper components of the cover system
- Hydraulic Barrier Layer: a low-permeability material to minimize surface infiltration
- Drainage Layer: a high-permeability layer to permit drainage of infiltration from the topmost protective soil layer
- Protective Soil Layer: a minimum 12-inch-thick soil layer to protect the barrier layer, control surface drainage and erosion, and support surface vegetation

The following hydraulic barrier was proposed for each of the first three alternatives:

- **Alternative 1** – Low-permeability clay layer
- **Alternative 2** – Native soil mixed with bentonite to reduce hydraulic conductivity
- **Alternative 3** – A textured high-density polyethylene (HDPE) flexible membrane liner

One additional cap alternative, an ET cover, was added as the fourth alternative in 1997 through an addendum EE/CA (SWDIV, 1997). This alternative required less long-term maintenance because of its self-renewing vegetative cover protection; no synthetic component that would be prone to deterioration; least amount of time to construct; minimized exposure to the neighboring communities; and is less costly to implement and construct. The ET cover consisted of a minimum 6-foot-thick earthen cover that has a 1-foot-thick compacted low-permeability layer at the bottom and 5 feet of vegetative cover above the low-permeability layer to support the native vegetation. The four cap alternatives were assessed based on the following evaluation criteria:

- Overall protection of human health and the environment
- Compliance with applicable or relevant and appropriate requirements (ARARs)
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Short-term effectiveness
- Implementability
- Cost

Alternative 4 was selected as the most effective remedy for IR Site 7 based on the comparative analysis detailed in the RI/FS for OU-3 (SWDIV, 1998). The exposure risks posed by the contaminants at IR Site 7 are addressed through containment of the wastes, elimination of exposure pathways, and continued monitoring and maintenance.

Implementation of Alternative 4 minimizes infiltration into the landfill and reduces potential impact to groundwater. Future exposure pathways, if any, are eliminated by capping the landfill waste and through restriction on future land use.

2.4 Record of Decision

The final remedy for IR Site 7 was stipulated in the ROD for OU-3 sites that was issued in January 1999. The ROD was subsequently approved and signed by parties to the FFA during February and March 1999. RA activities, based on the OU-3 ROD, to be taken at IR Site 7 must consist of the following:

- Installation of a 6-foot-thick ET cover consisting of a vegetated topsoil layer, a minimally compacted soil layer, and a compacted low-permeability bottom layer
- Installation of lined ditches between the landfill benches on the north face of the landfill
- Long-term monitoring
- Landfill use restriction

2.5 Remedial Design and Remedial Action Work Plan

According to the ROD, the remedial design was developed by the U.S. Army Corps of Engineers Omaha District, reviewed by the parties to the FFA, and finalized in August 2000 (USACE, 2000a and 2000b). The RD provided detailed engineering analyses and construction designs for the ET cover system. In accordance with the RD, a remedial action work plan (RAWP) was developed by IT Corporation, reviewed by the parties to the FFA, and finalized in June 2001 (SWDIV, 2001). The RAWP provided detailed procedures for implementing the design plans and specifications provided in the RD. The final remedial action for IR Site 7 was implemented in 2001 (ET cover construction) and 2002 (installation of drainage system, appurtenant structures, and final site revegetation).

3.0 Construction Activities and Chronology of Events

In accordance with the RAWP (SWDIV, 2001), the remedial construction at IR Site 7 consisted of the following major tasks:

- Installation of an ET cover consisting of a vegetated topsoil layer (minimum thickness of 12 inches), a minimally compacted select fill layer (minimum thickness of 48 inches), and a compacted low-permeability bottom layer (minimum thickness of 12 inches) to close the CAMU and the landfill
- Installation of lined drainage structures and erosion control devices
- Construction of an access road
- Implementation of postconstruction monitoring and maintenance plan
- Documentation of the remedial action process, quality control (QC) confirmation test data, and final as-built conditions.

This section provides a chronology of events associated with each of the above construction activities. A photographic documentation of the construction process is provided in Appendix A.

3.1 Installation of ET Cover

The ET cover consists of a three-layer earthen system as described above. The total earthwork, including the subgrade and the 6-foot cover, was about 329,000 cy. The soils used for the cover construction were from four borrow sources (Figure 1-2): the low-permeability layer was from the Lemon Grove borrow site (about 42,000 cy); and the rest of the cover soils were from on-site overexcavation (about 65,000 cy), Ysidora Flat borrow site (110,000 cy), and 22 Area borrow site (112,000 cy).

The Ysidora Flat soils were imported in 1997, and partially used for covering the 1996 CAMU. The on-site overexcavation was performed in 1999, during the 1999 CAMU construction to create additional fill capacity. These two soils were already stockpiled on site (Figure 3-1) prior to the start of cover construction. Soils from the Lemon Grove and 22 Area borrow sites (Figure 1-2) were imported (importation log summarized in Tables 3-1 and 3-2) and placed on real-time basis during actual cover placement.

All soils were borrowed from undeveloped areas that were not known to have been associated with any type of operation, storage, or disposal activities. For verification purposes, each source of soils was sampled and analyzed for heavy metals and pesticides. The results are summarized in Table 3-3. None of the detected constituents exceeded the risk-based residential soil preliminary remediation goals published in 2002 by EPA Region IX.

A 4-foot-thick, 40-foot by 60-foot full-scale test pad was constructed in September 2000 to verify the cover placement methodology and the viability of the clayey soil from the Lemon Grove borrow source to achieve the low-permeability criterion specified in the remedial design (1 x 10^{-5} centimeter per second). The permeability of the test pad was verified through the performance of a sealed double-ring infiltrometer (SDRI) test per American Society of Testing and Materials (ASTM) Method D5585. The test pad construction and SDRI test report is presented in Appendix B. The SDRI test indicated that the field permeability of the test pad met and exceeded the design criteria by about two orders of magnitude. Therefore, the Lemon Grove borrow source was approved to be used for the low-permeability layer construction.

The construction activities associated with the ET cover placement can be divided into the following tasks based on the chronological order of the events:

- Preconstruction survey
- Perimeter air and noise monitoring
- Subgrade preparation
- Low-permeability layer construction
- Select fill layer construction
- Vegetative layer construction
- Final revegetation

Preconstruction Survey. The field activities for cover construction were mobilized on June 18, 2001. The cover area was surveyed and staked with a grid system (Figure 3-2) consisting of 80-foot by 80-foot squares. The elevation at the center of each square would be used for controlling and verifying the final as-built thickness of each layer of the cover system. The topographic map generated by the March 8, 2003 aerial survey was used as the Base map for such calculation. The grids system was also used for referencing geotechnical QC testing and sampling conducted during cover placement to verify the compaction effort and other soil properties.

Perimeter Air and Noise Monitoring. Ambient air monitoring devices were installed along the Site perimeter (Figure 3-3) prior to the start of any earthwork and baseline air monitoring was conducted between July 10 and July 16. The devices included three meteorological stations, three integrated air sampling stations (excluding one duplicate station) for collecting total suspended particulates (TSP) and particulate less than 10 micrometers (PM10) in the air, and nine real-time PM10 monitors. The air monitoring devices were used for monitoring dust level at the perimeter so that appropriate dust control effort could be implemented and enforced. Additionally, the noise level along the Site perimeter was monitored manually whenever the construction activities were conducted within 150 feet of the perimeter fence.

Subgrade Preparation. The subgrade preparation started on July 17, 2001 after the baseline air monitoring was completed. The subgrade preparation consisted of cut-and-fill of about 50,000 cy existing grade so that the low-permeability layer could be placed. The majority of the subgrade preparation was to fill the existing grade to create the required 3-percent drainage grade. The existing CAMU cells were not disturbed during the subgrade preparation. The majority of the subgrade was constructed of material hauled from the on-site overexcavation stockpile (Figure 3-1) with three scrapers. The subgrade fill was compacted to a minimum of 90-percent relative density as determined by ASTM Method D1557.

Low-Permeability Layer. The placement of low-permeability layer started on August 6. The 1-foot-thick, low-permeability layer had to be covered with protective soil immediately after passing the QC testing to minimize potential desiccation cracks after the placement. The construction was implemented in three phases to accommodate the availability of protective soil. Phase I was constructed between August 6 and August 24, 2001. About 36,500 cy of soils were imported from the Lemon Grove borrow site to construct areas considered as the flat "top deck" of the landfill. Soils from the on-site Ysidora Flat stockpile (Figure 3-1) were used as the protective soil cover that would subsequently become the overlying select fill layer. Phase II was constructed between September 10 and September 15 using about 5,400 cy of soils imported from the Lemon Grove borrow site to construct the south and west slopes. At this time, the clayey soil in the approved Lemon Grove borrow source was depleted. A variance request for using the existing Ysidora Flat stockpile for constructing the front (north) and a portion of the western slopes was submitted to and subsequently approved by the USACE designer on October 4, 2001 (variance request and approval presented in Appendix C). Soils from the on-site Ysidora Flat stockpile was first transported to the Lemon Grove borrow site for screening out the excessive gravels and rocks between October 22 and October 26, 2001. Phase III was constructed between October 24 and November 2, 2001, using about 5,500 cy of the screened Ysidora Flat soil for the front slopes. The completed low-permeability layer was covered on a daily basis with the select fill soil layer throughout the construction process to prevent desiccation of the soil that may cause surface crack. The low-permeability layer was compacted to a minimum of 90-percent maximum density as determined by ASTM Method D1557.

Select Fill Layer. The 4-foot-thick select fill was constructed concurrently with the low-permeability layer and the final vegetative cover. The majority of the 168,000 cy select fill layer was constructed of soils imported from the 22 Area borrow site (112,000 cy), with the rest from the existing on-site soil stockpiles. The construction was performed between August 6 and November 9, 2001. The 4-foot-thick select fill layer was installed in five 10-inch lifts with moderate compaction effort in accordance with remedial design. The select fill layer was compacted to between 85 percent and 88 percent of the maximum density as determined by ASTM Method D1557.

Vegetative Cover Layer. The top 1 foot of the ET cover was constructed between November 6 and December 7, 2001, concurrently with the installation of various drainage structures and erosion control devices. The 48,000-cy layer was constructed of the on-site Ysidora Flat stockpile soils. The Ysidora Flat borrow site (Figure 1-2) was in a flood plain, and, therefore, more fertile soil than other borrow sources for supporting vegetative growth.

Final Vegetation. The final cover surface was vegetated with a native-plant seed mix approved by the Base biologist and the U.S. Natural Resources Conservation Service. The seed mix specification is presented in Appendix D. The majority of the seeds were planted with a seed drill. All side slopes and a small portion of areas disturbed by the construction were seeded by hydroseeding. The top deck of the ET cover was seeded in early January 2002. The rest of the landfill was seeded in December 2002, after all components of the cover drainage system were completed.

3.2 Installation of Drainage Structures and Erosion Control Devices

The majority of the final drainage structures and erosion control devices (Figure 3-4) were constructed between August and November 2002. The fieldwork was mobilized on August 19. The perimeter channels were excavated or filled to the design grade. The majority of the 4,500-foot perimeter channels were lined with a pre-manufactured erosion control blanket. About 1,455 feet of the discharging end of western perimeter channels and all of the slope downdrains (Figure 3-4) were lined with grouted riprap. Design variances were approved for three drainage structures: replacement of about 175 feet of buried drainage pipe connecting the western drainage to the existing 48-inch corrugated metal pipe downdrain with grouted riprap surface channel; addition of about 220 feet of surface ditch to extend the south perimeter channel to drain excessive runoff from the Santa Margarita Elementary School to the western hill area; deletion of the terrace drainage channel reconstruction because the existing channel has been functioning well; and replacement of about 300 feet of open channels at the discharging end of the eastern perimeter channels with a buried 18-inch-diameter, corrugated high-density polyethylene pipes. The record drawings of drainage construction and design variance as approved are provided in Appendix E.

3.3 Construction of an Access Road

The perimeter access road was installed after the perimeter channels were completed in November 2002. The majority of the 4,600-foot perimeter road and the 1,600-foot access road on the top deck (Figure 3-4) were constructed of Class B gravel pavement. A portion of the northeast corner slopes and the northwest corner slopes were installed with asphalt pavement because of the steepness of the slope. The final road alignment was also approved as a design variance. The record drawings of road design variance as approved are provided in Appendix E.

3.4 Postconstruction Monitoring and Maintenance

The ROD required that the Site be monitored long term. The RD provided a preliminary groundwater and LFG monitoring plan that would be finalized when the remedial construction was completed. The postconstruction long-term monitoring and maintenance plan is currently being developed and will be submitted as a separate report. This section summarizes the monitoring and maintenance activities that have taken place during the remedial construction process.

Landfill Gas Monitoring. The RD (USACE, 2000a) required a total of nine LFG monitoring wells be installed to monitor the LFG migration along the Site perimeter. However, during the review of the LFG monitoring and sampling plan (SWDIV, 2001), one well was added to monitor the perimeter along the military housing area. As a result, a total of 10 LFG monitoring wells (Figure 3-5) were installed between August 1 and August 9 in 2001. Each well may contain up to three monitoring probes located at a discrete depth to monitor LFG from the top, middle, and bottom level of the landfill. Twenty-four monitoring probes were installed in the wells. The as-built descriptions of the monitoring probes are provided in Table 3-4. Following the completion of the LFG monitoring wells, a 4-week-long baseline LFG monitoring event was performed between August 22 and September 13, 2001. The baseline LFG monitoring results and the as-built conditions of the monitoring wells were provided in a draft report submitted to and reviewed by the parties to the FFA in October 2001. The draft baseline monitoring report was finalized in June 2002 (SWDIV, 2002a). The perimeter monitoring wells were monitored on a weekly basis throughout the cover construction in 2001, until the cover placement was completed in early January 2002. The LFG wells have been monitored bimonthly since January 2002. The LFG monitoring results were updated in a report submitted in July 2002 (SWDIV, 2002b). The LFG monitoring will be continued in accordance with the Postconstruction Monitoring Plan.

Groundwater Monitoring. Twenty groundwater monitoring wells (Figure 2-3) were installed during the RI phase and used for monitoring the groundwater quality at the Site. Between March 1993 and July 1995, these 20 RI wells and 3 other monitoring wells were sampled on quarterly basis. Groundwater samples were analyzed for metals, VOCs, SVOCs, gasoline, diesel, pesticides, PCBs, herbicides, and general water chemistry. The RI results are summarized in Section 2.2.1 and in Figure 2-4. The first postconstruction groundwater sampling was resumed in February 2003. In order to compare the current groundwater quality with the RI database, a baseline sampling event was performed to include all 20 RI wells and two other wells that were sampled during the RI phase. The purpose of the baseline event was to assess the overall groundwater quality so that a site-specific long-term groundwater monitoring plan could be developed. The baseline sampling results will be submitted as part of the postconstruction monitoring plan under a separate report. The groundwater monitoring activities will be

continued on a quarterly basis for the next 5 years. The long-term groundwater monitoring frequency will then be evaluated on the basis of the monitoring results accumulated in the first 5-year period.

Settlement Monitoring. At the completion of the closure cover grading work, two survey monuments (Figure 3-6) were installed to monitor the settlement of the newly installed closure cover. The monuments were installed and surveyed on January 3, 2002, and every 6 months thereafter. The most recent survey was performed on June 12, 2003. The total settlement (shown in Figure 3-6) is about 1/10 of a foot. These monuments will continue to be monitored as part of the postclosure monitoring activities.

Winterization and Maintenance. At the completion of the cover construction in 2001 and 2002, the Site was winterized, respectively, to protect the Site from potential damages by adverse weather conditions. During the winter of 2001, the Site grade was restored to maintain positive drainage and the majority of the Site was protected with crimped straw mulch. The Site was inspected after major storms (precipitation over 1 inches in a 24-hour period). Subsequent maintenance activities were performed in February and March 2002, for repairing erosion damages mainly in the unlined surface channels. In the winter of 2002, the drainage channels were fully completed with grouted riprap or erosion control blankets and all slopes were protected with crimped straw mulch. The final site grading work was completed in December 2002. The Site vegetation was in full growth after a relatively wet February in 2003 (see photograph in Appendix A). The Site was last inspected in April 2003 as of this report.

3.5 Documentation of the Remedial Action Process, Quality Control Confirmation Test Data, and Final As-Built Conditions

The remedial action process was documented through a daily production report to the SWDIV resident engineer in charge of construction (ROICC), weekly construction quality control (CQC) meeting with the SWDIV remedial project manager, and CQC submittals as required by the construction specifications. A more detailed discussion on the CQC submittals and final as-built conditions is provided in Section 4.0.

Independent subcontractors including surveying, geotechnical field control, geotechnical laboratory testing, and manufacturer's field representatives performed the field QC testing and documentation. Representatives from USACE were on site to observe the soil placement process and collect duplicate field samples to verify the field QC test results from the subcontractors.

4.0 Performance Standards and Construction Quality Control

The remedial action for IR Site 7 was based on the EPA presumptive remedy approach (EPA, 1993a). A 6-foot-thick earthen cover system was used to cap the Site so that the low-level threat posed by the contaminants at IR Site 7 would be contained and exposure pathways eliminated. The closure cap would also minimize infiltration into the landfill and reduce potential impact to groundwater. The performance of the closure cap would be evaluated through long-term postconstruction monitoring and maintenance to ensure that the remedial action would be effective in providing its design function and protection to the surrounding environment.

The thickness of various layers of the closure cap was surveyed throughout the cap construction process to ensure that the minimum thickness was achieved. The final site as-built survey was performed on January 28, 2003. The thickness for each layer of the top of the low-permeability layer, the top of the select fill, and the final vegetative cover grade (the final as-built survey) was calculated and presented as part of final as-built topographic map shown in Figure 4-1. This was based on the as-built survey data for the subgrade.

A CQC program was implemented during the closure cap construction. Various CQC data and documentation were produced in accordance with the CQC program for verifying the construction quality. These CQC data were submitted on a daily basis primarily through the daily production report to the SWDIV ROICC. They were also discussed in the weekly on-site CQC meeting with the SWDIV remedial project manager and USACE designer representatives. These CQC data were then compiled into formal CQC submittals in accordance with submittal requirements of the construction specifications (USACE, 2000b). The CQC submittals provided information and QC data that were required by the specifications to verify that each specific construction item was built to meet the design specifications. The CQC data were formally submitted through a total of 37 CQC submittals to the USACE designers and ROICC for review and approval. A copy of the submittal register forms summarizing the type and content of submittal requirements (and the approved transmittal sheets after the submittal was reviewed by the USACE designers) are provided in Appendix F. The USACE designer had representatives on site to observe the soil placement effort and collected duplicate geotechnical samples to verify the field QC test results.

When field conditions were changed or material variations were required, a request for information (RFI) was submitted to the USACE designer for review and approval. The response to RFI would clarify the issue and provide documentation to any design variance. Sixteen RFI were submitted to the USACE designer for review. A copy of the RFI cover sheet, which summarizes the request and response to the request, is provided in Appendix F.

Based on review and approval of the CQC submittals and RFI resolutions, the remedial action at IR Site 7 was implemented in accordance with the design, and, therefore, will meet the performance standards as designed.

5.0 Final Inspection and Certification

The remedial construction at IR Site 7 was implemented in accordance with the RA Work Plan (SWDIV, 2001), which was specifically developed in accordance with the Remedial Design Plans and Specifications (USACE, 2000a and 2000b) to meet the OU-3 ROD (SWDIV, 1999). The remedial construction were performed in the following sequence:

- Mobilization and site preparation: June 21 through July 16, 2001
- Subgrade preparation and construction: July 17 through August 17, 2001
- Perimeter LFG monitoring well installation: August 1 through August 9, 2001
- Low-permeability layer placement: August 6 through November 2, 2001
- Perimeter LFG monitoring: Started August 22, 2001
- Select fill layer placement: August 27 through November 9, 2001
- Vegetative layer placement: November 6 through December 7, 2001
- Drainage channel construction: August through November, 2002
- Access road construction: November 2002
- Site revegetation (hydroseeding): December 2002
- Demobilization of remedial construction: January 2003
- Postconstruction monitoring and maintenance: Started February 2003

Parties to the FFA visited the Site on July 25, 2001; January 17, 2002; July 17, 2002; and January 15, 2003 as part of 65th, 67th, 69th, and 71st FFA meeting, respectively, and observed various remedial construction activities. The status of the RA were presented and discussed in all FFA meetings subsequent to the start of the fieldwork in July 2001. This included interim QC data, significant design variances, LFG monitoring data, construction progress, and various production quantities associated with the construction (e.g., earthwork importation source and rate).

A draft version of this report (SWDIV, 2003d) was reviewed by the parties to the FFA for final concurrence on the effectiveness of the remedial construction. A copy of the review comments, as well as the responses to these comments, is provided in Appendix G. It serves as the final inspection and certification that the RA at IR Site 7 was implemented in accordance with the OU-3 ROD (SWDIV, 1999) and the Remedial Action Work Plan (SWDIV, 2001).

6.0 Monitoring and Maintenance Activities

The postconstruction monitoring and maintenance activities at IR Site 7 have been started in February 2003. A long-term postconstruction monitoring and maintenance plan is currently being developed. It is projected that the perimeter LFG and the groundwater will be monitored on a quarterly basis for the first 5 years. The Site will be winterized prior to the winter and maintained during the winter season so that erosion damages, if any, would be repaired. The principle of the ET cover design will require less long-term maintenance because of its self-renewing vegetative cover protection. Therefore, depending on the pace of vegetation restoration, the Site would be maintained manually until the self-renewing function is fully established.

IR Site 7 is considered a closed site and will be monitored and maintained in accordance with the OU-3 ROD requirements. The effectiveness of the RA will be reviewed every 5 years as part of the OU-3 ROD 5-year review process. In addition, the postclosure monitoring results will be used for evaluating whether the remedial action is operational and functional (O&F) as designed. Depending on the O&F evaluation, which will be provided on an as-needed basis and supplement to the 5-year review report, additional response action will be taken as required.

7.0 Summary of Project Costs

The project cost was estimated to be $3.1 million in the OU-3 ROD. The actual cost was about $5,010,000. The breakdown of the actual cost is as follows:

Remedial Action Activities	Total Cost
RD/RA work plan, study, engineering planning	$150,000
Preconstruction test pad testing and study	$64,000
Perimeter landfill gas monitoring well installation	$105,000
Perimeter landfill gas monitoring during RA	$90,000
Ambient air monitoring during RA	$337,000
Soil screening and processing (low-permeability soil)	$281,000
Importation of cover materials	$1,232,000
Cover placement and grading	$1,252,000
Installation of perimeter drainage structures	$405,000
Installation of final access road	$159,000
Site revegetation and erosion control	$110,000
Construction QC testing and monitoring	$185,000
Winterization (2000 through 2002)	$45,000
Construction management (2001 through 2003)	$345,000
Postconstruction documentation and report	$110,000
Miscellaneous costs (5%)	$239,000
Subtotal:	**$5,010,000**

It should be noted that the above total cost does not include the cost associated with the construction of the CAMU at IR Site 7.

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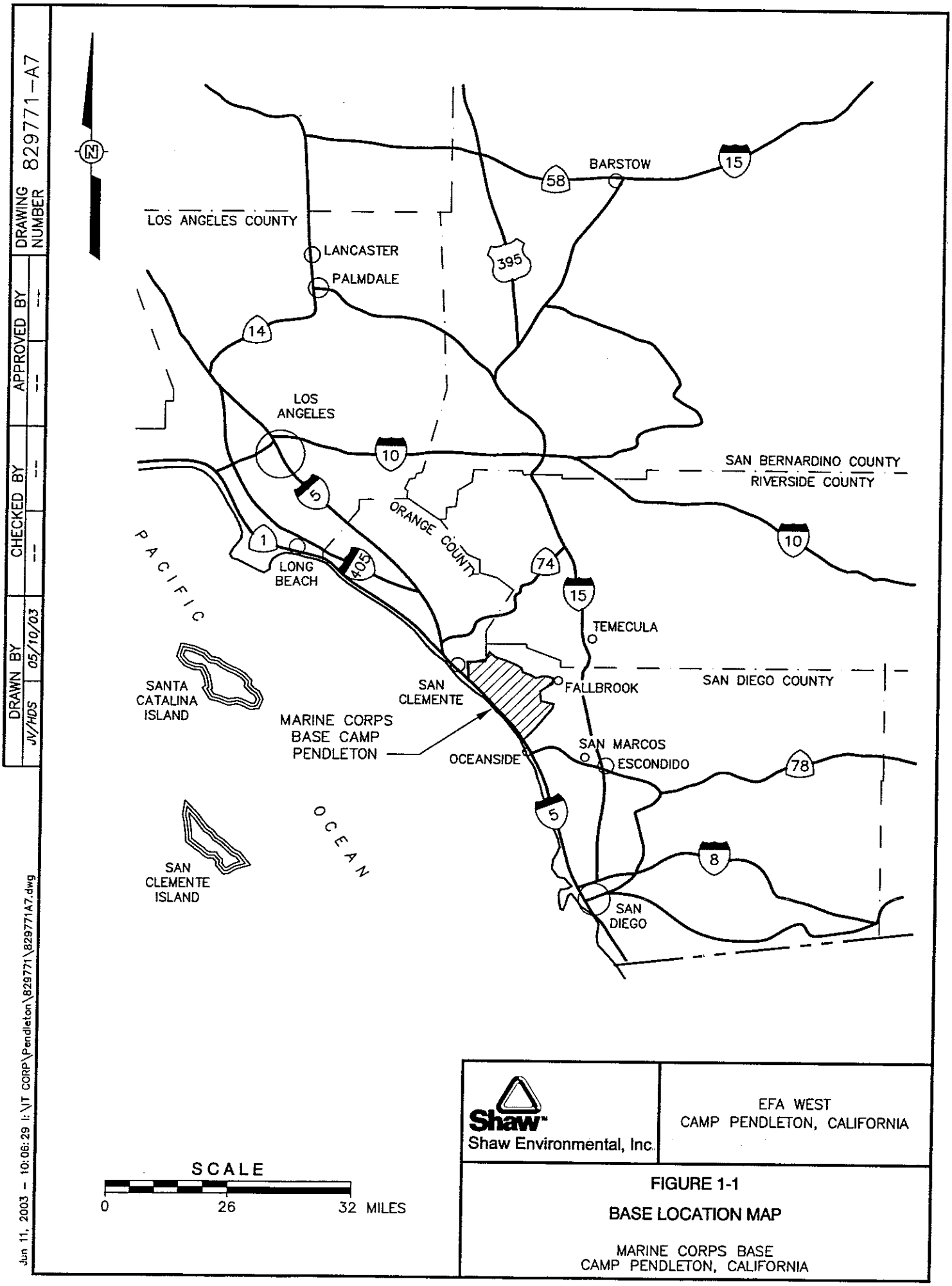
USACE, see U.S. Army Corps of Engineers.

Figures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N
BARSTOW
58
15
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LANCASTER
PALMDALE
395
14
LOS ANGELES
10
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
5
ORANGE COUNTY
1
LONG BEACH
405
74
15
TEMECULA
PACIFIC
SANTA CATALINA ISLAND
SAN CLEMENTE
FALLBROOK
SAN DIEGO COUNTY
MARINE CORPS BASE CAMP PENDLETON
OCEANSIDE
SAN MARCOS
ESCONDIDO
78
5
OCEAN
8
SAN CLEMENTE ISLAND
SAN DIEGO
SCALE
0
26
32 MILES
Shaw
Shaw Environmental, Inc.
EFA WEST
CAMP PENDLETON, CALIFORNIA
FIGURE 1-1
BASE LOCATION MAP
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA
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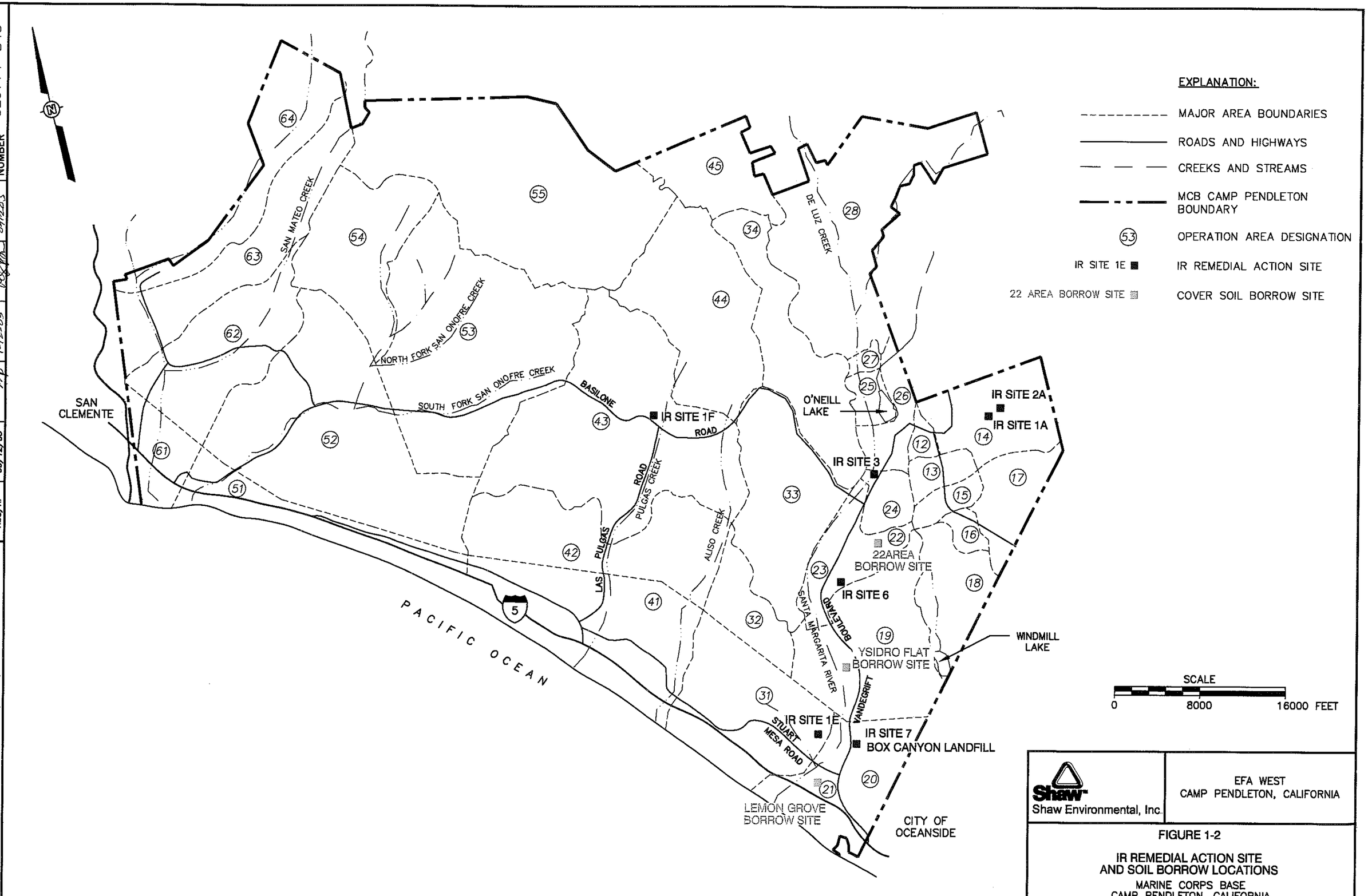

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EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 1-2

IR REMEDIAL ACTION SITE
AND SOIL BORROW LOCATIONS
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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HDS/RP 08/12/03	RP 9-12-03	9/12/03	829771-B45

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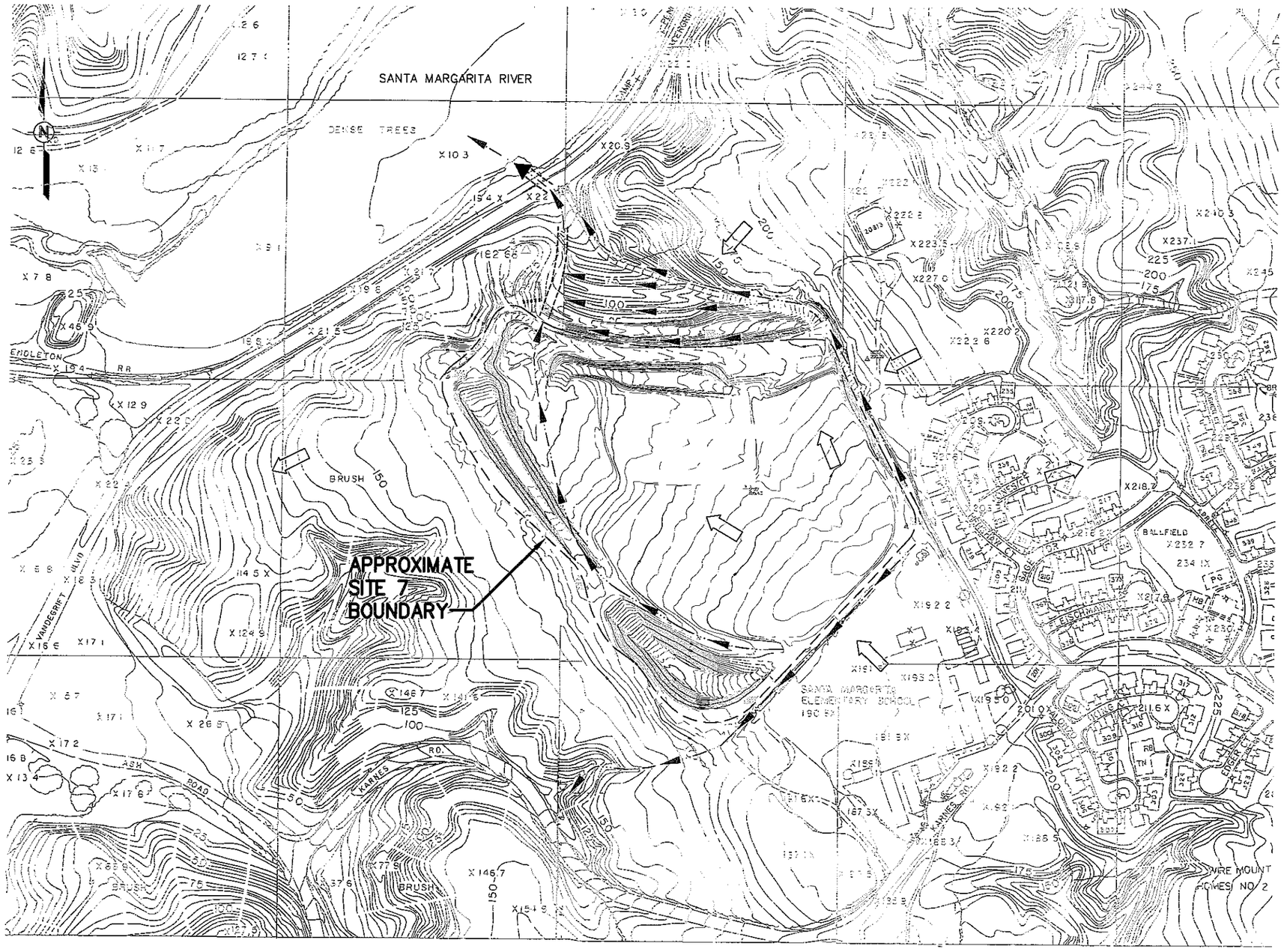

LEGEND:

- OVERLAND FLOW DIRECTION
- RUNOFF COLLECTION DITCH
- BURIED CULVERT OR PIPES
- POINT OF DISCHARGE
- SITE BOUNDARY

SCALE

0 400 800 FEET

TOPOGRAPHIC REFERENCE:
VICINITY MAP:
MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAPS 6A AND 6B
DATE: DECEMBER 1987

SITE MAP:
CAL VADA SURVEYING INC.
108 BUSINESS CENTER DRIVE
CORONA, CA 92880-1782
FIELD SURVEY: AERIAL TOPO - MARCH 09, 2000

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 2-1

IR SITE 7 AND VICINITY MAP

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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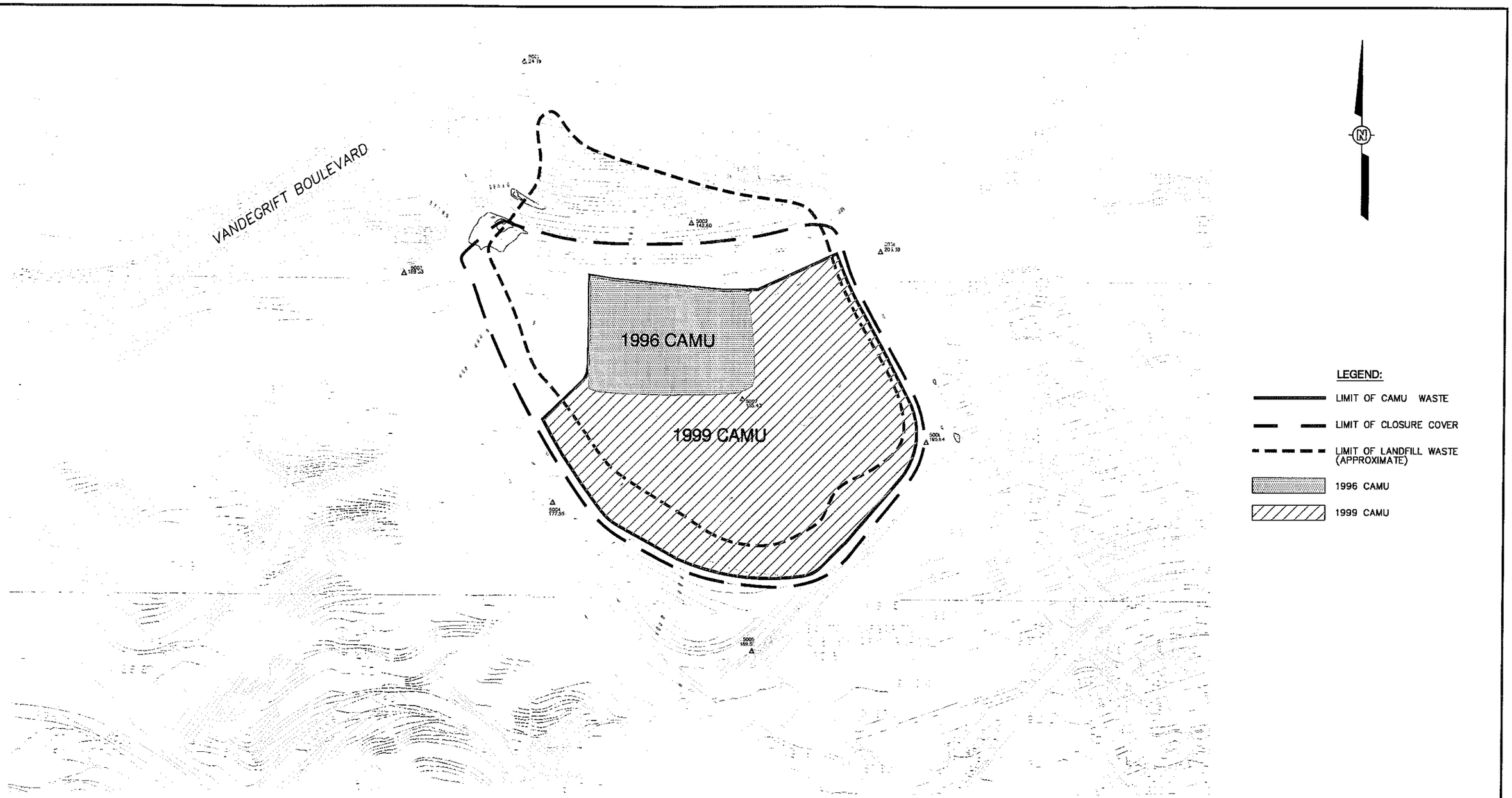

TOPOGRAPHIC REFERENCE:
VICINITY MAP:
MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAPS 6A AND 6B
DATE: DECEMBER 1987

SITE MAP:
CAL VADA SURVEYING INC.
108 BUSINESS CENTER DRIVE
CORONA, CA 92880-1782
FIELD SURVEY: AERIAL TOPO - MARCH 09, 2000

SCALE
0 300 600 FEET

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 2-2
LANDFILL AND CAMU WASTE BOUNDARY MAP
BOX CANYON LANDFILL
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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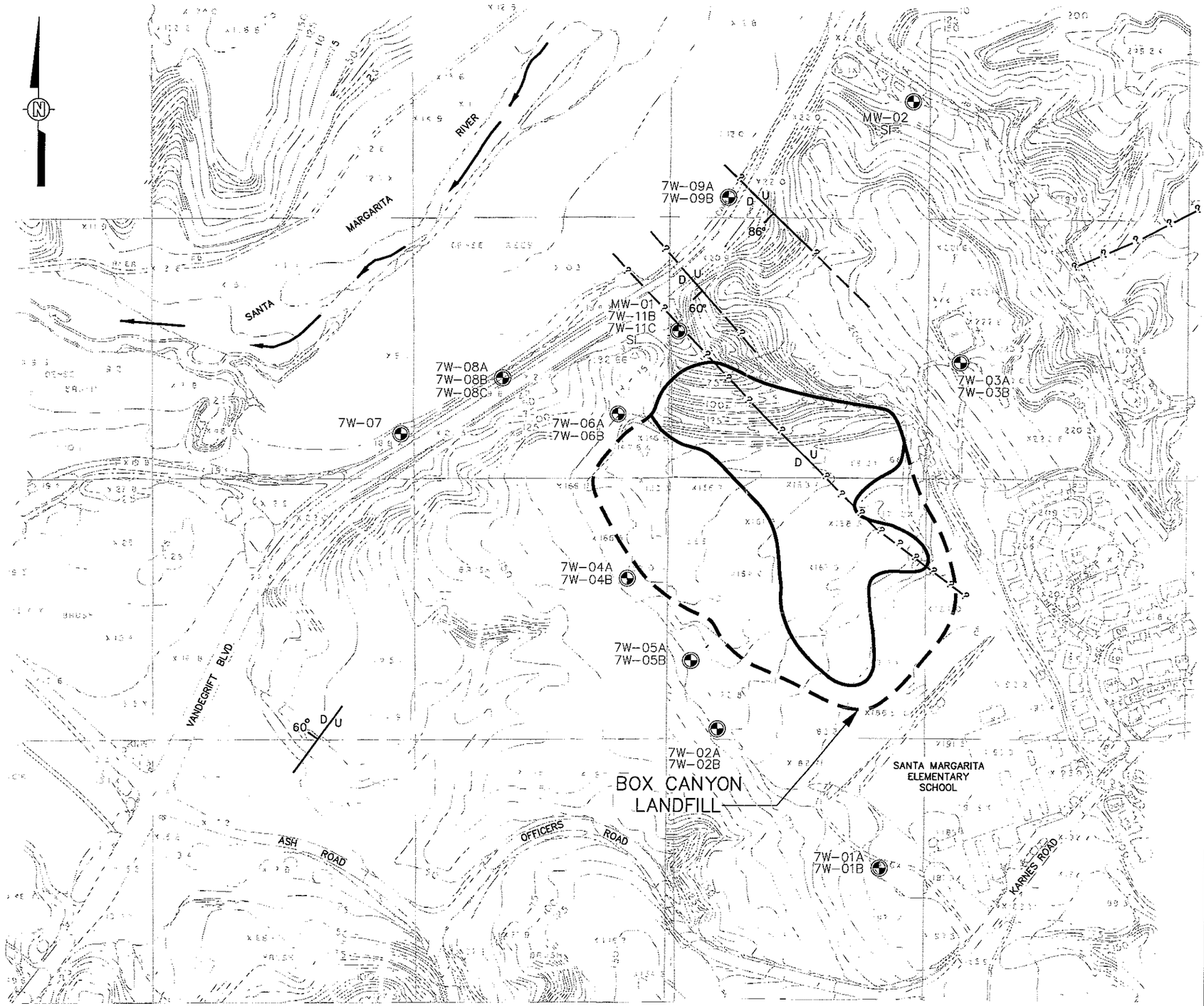


LEGEND

- 7W-06A — GROUNDWATER MONITORING WELL LOCATION
- MW-01 SI — GROUNDWATER MONITORING WELL INSTALLED OR MONITORED DURING PREVIOUS SITE INSPECTION (SI)
- SURFACE-WATER FLOW DIRECTION
- ESTIMATED SHAPE OF ORIGINAL CANYON (FROM 1963 AND 1970 AERIAL PHOTOS)
- ESTIMATED EXTENT OF DISTURBED VEGETATION (FROM 1984 AERIAL PHOTOS); REPRESENTS AREA WHERE COVER MATERIAL WAS DEPOSITED
- FAULT, U ON UPTHROWN SIDE, D ON DOWNTHROWN SIDE, DIP DIRECTION OF FAULT PLANE, QUERIED WHERE UNCERTAIN (U, D, 60°)

FIGURE REFERENCE:

"DRAFT FINAL REMEDIAL INVESTIGATION REPORT FOR GROUP B SITES, RI/FS, MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA", PREPARED BY JACOBS ENGINEERING GROUP, MARCH 17, 1995

TOPOGRAPHIC REFERENCE:

MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAPS 6A AND 6B

DATE: DECEMBER 1987

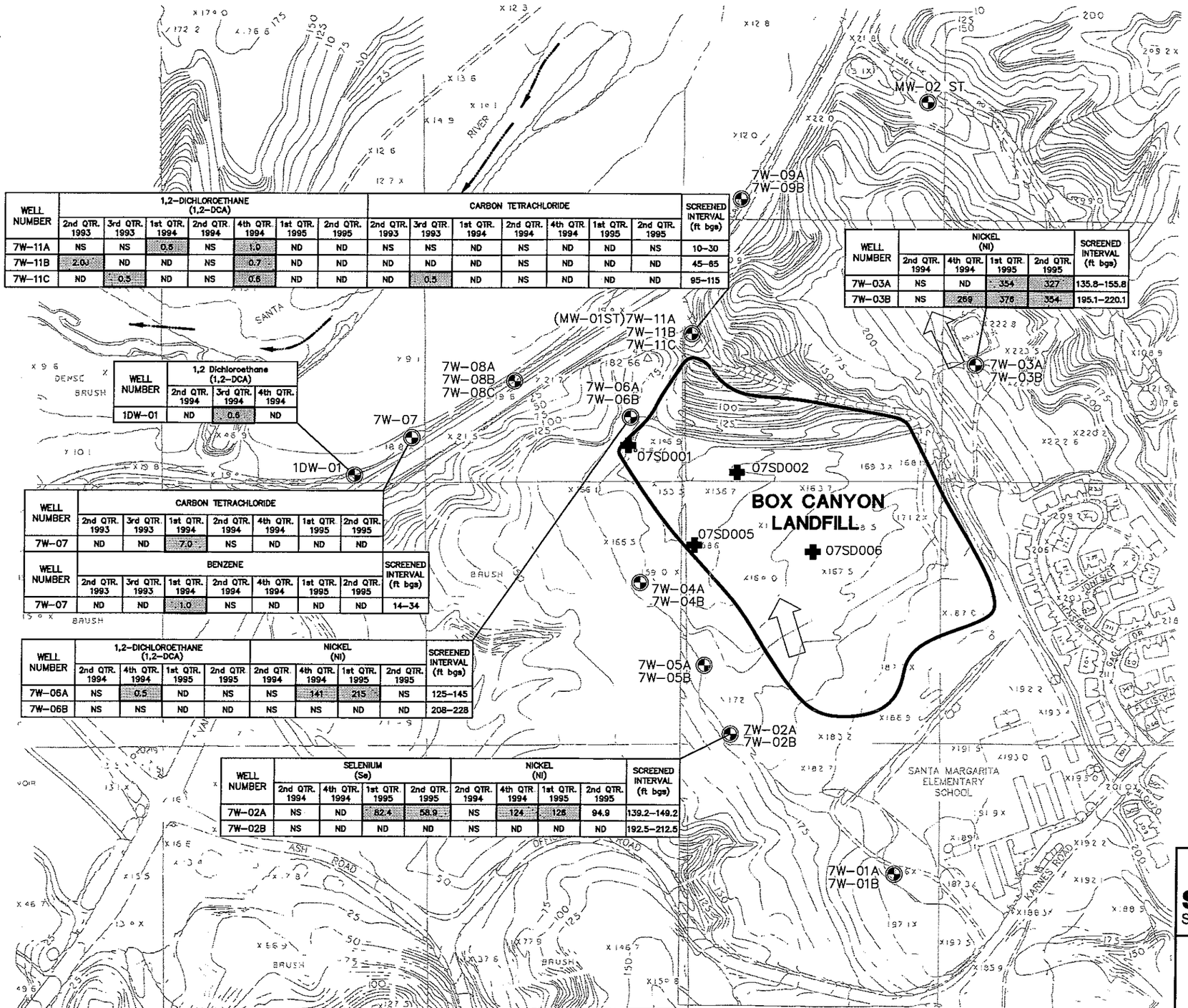
SCALE

0 400 800 FEET

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 2-3
GEOLOGIC FAULTS AND GROUNDWATER WELL LOCATIONS
BOX CANYON LANDFILL
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA



WELL NUMBER	1,2-DICHLOROETHANE (1,2-DCA)							CARBON TETRACHLORIDE							SCREENED INTERVAL (ft bgs)
	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994	2nd QTR. 1994	4th QTR. 1994	1st QTR. 1995	2nd QTR. 1995	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994	2nd QTR. 1994	4th QTR. 1994	1st QTR. 1995	2nd QTR. 1995	
7W-11A	NS	NS	0.5	NS	1.0	ND	ND	NS	NS	ND	NS	ND	ND	NS	10-30
7W-11B	2.0J	ND	ND	NS	0.7	ND	ND	ND	ND	ND	NS	ND	ND	ND	45-65
7W-11C	ND	0.5	ND	NS	0.6	ND	ND	ND	0.5	ND	NS	ND	ND	ND	95-115

WELL NUMBER	1,2 Dichloroethane (1,2-DCA)		
	2nd QTR. 1994	3rd QTR. 1994	4th QTR. 1994
1DW-01	ND	0.6	ND

WELL NUMBER	CARBON TETRACHLORIDE						
	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994	2nd QTR. 1994	4th QTR. 1994	1st QTR. 1995	2nd QTR. 1995
7W-07	ND	ND	7.0	NS	ND	ND	ND

WELL NUMBER	BENZENE							SCREENED INTERVAL (ft bgs)
	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994	2nd QTR. 1994	4th QTR. 1994	1st QTR. 1995	2nd QTR. 1995	
7W-07	ND	ND	1.0	NS	ND	ND	ND	14-34

WELL NUMBER	1,2-DICHLOROETHANE (1,2-DCA)				NICKEL (NI)				SCREENED INTERVAL (ft bgs)
	2nd QTR. 1994	4th QTR. 1994	1st QTR. 1995	2nd QTR. 1995	2nd QTR. 1994	4th QTR. 1994	1st QTR. 1995	2nd QTR. 1995	
7W-06A	NS	0.5	ND	NS	NS	141	215	NS	125-145
7W-06B	NS	NS	ND	ND	NS	NS	ND	ND	208-228

WELL NUMBER	SELENIUM (Se)				NICKEL (NI)				SCREENED INTERVAL (ft bgs)
	2nd QTR. 1994	4th QTR. 1994	1st QTR. 1995	2nd QTR. 1995	2nd QTR. 1994	4th QTR. 1994	1st QTR. 1995	2nd QTR. 1995	
7W-02A	NS	ND	82.4	58.9	NS	124	126	94.9	139.2-149.2
7W-02B	NS	ND	ND	ND	NS	ND	ND	ND	192.5-212.5

WELL NUMBER	NICKEL (NI)				SCREENED INTERVAL (ft bgs)
	2nd QTR. 1994	4th QTR. 1994	1st QTR. 1995	2nd QTR. 1995	
7W-03A	NS	ND	354	327	135.8-155.8
7W-03B	NS	269	376	354	195.1-220.1

LEGEND

- 7W-06A — GROUNDWATER MONITORING WELL INSTALLED DURING RI
- MW-03 ST — GROUNDWATER MONITORING WELL INSTALLED DURING SOLID WASTE ASSESSMENT TEST
- SURFACE SOIL SAMPLE LOCATION
- SURFACE-WATER FLOW DIRECTION
- ESTIMATED LANDFILL WASTE BOUNDARY (FROM 1963 AND 1970 AERIAL PHOTOS AND 1995 TRENCHING)
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- **289** — CONCENTRATIONS THAT EXCEED OR EQUAL MCLs ARE OUTLINED IN BOLD

NOTES:

CONCENTRATIONS GIVEN IN MICROGRAMS PER LITER (μg/l)

ANALYTES WITH CONCENTRATIONS GREATER THAN OR EQUAL TO MAXIMUM CONTAMINANT LEVELS (MCLs) DURING AT LEAST ONE SAMPLING ROUND ARE SHOWN

J,B,D – ANALYTICAL DATA QUALIFIERS

ft bgs – FEET BELOW GROUND SURFACE

ND – NOT DETECTED

NS – NOT SAMPLED

TOPOGRAPHIC REFERENCE:
MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAPS 6A AND 6B
DATE: DECEMBER 1987

FIGURE REFERENCE:
"MARINE CORPS BASE CAMP PENDLETON RECORD OF DECISION OPERABLE UNIT 3"
DATE: JANUARY 1999

SCALE
0 400 800 FEET

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 2-4
PAST GROUNDWATER SAMPLING RESULTS AND SOIL SAMPLING LOCATIONS BOX CANYON LANDFILL
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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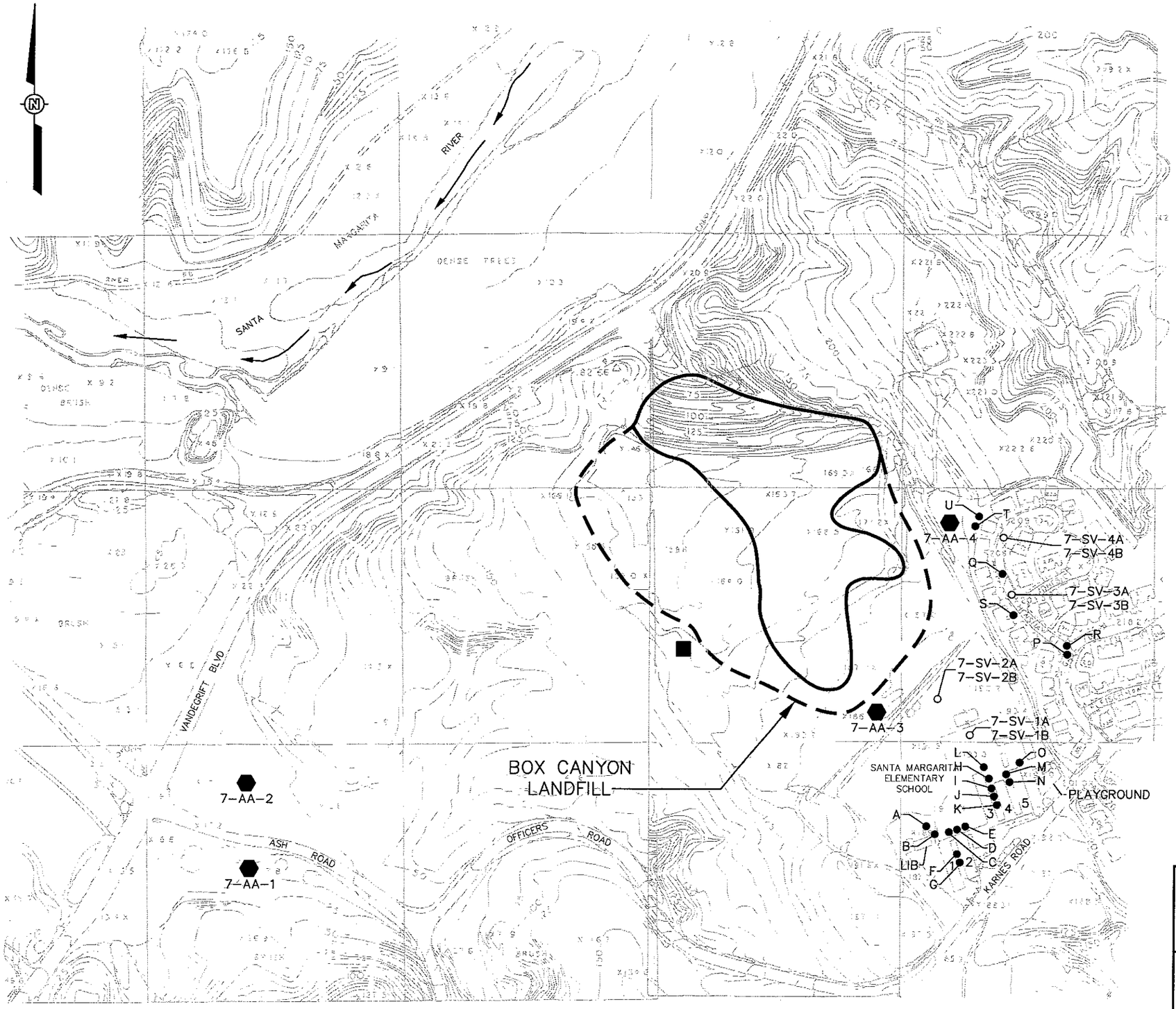

LEGEND

- METEOROLOGICAL STATION
- 7-AA-3 — AMBIENT AIR SAMPLER
- A — HYDROGEN SULFIDE AND METHANE SAMPLE LOCATION
- 7-SV-41 — SOIL-GAS SAMPLE LOCATION
- SURFACE-WATER FLOW DIRECTION
- ESTIMATED SHAPE OF ORIGINAL CANYON (FROM 1963 AND 1970 AERIAL PHOTOS)
- ESTIMATED EXTENT OF DISTURBED VEGETATION (FROM 1984 AERIAL PHOTOS); REPRESENTS AREA WHERE COVER MATERIAL WAS DEPOSITED

SCALE:

0 400 800 FEET

TOPOGRAPHIC REFERENCE:

MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAPS 6A AND 6B
DATE: DECEMBER 1987

SAMPLING LOCATION REFERENCE:

DRAFT FINAL REMEDIAL INVESTIGATION REPORT
FOR GROUP B SITES, R1/FS,
MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA,
17 MARCH 1995

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 2-5

AMBIENT AIR AND SOIL-GAS SAMPLING LOCATIONS
BOX CANYON LANDFILL

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
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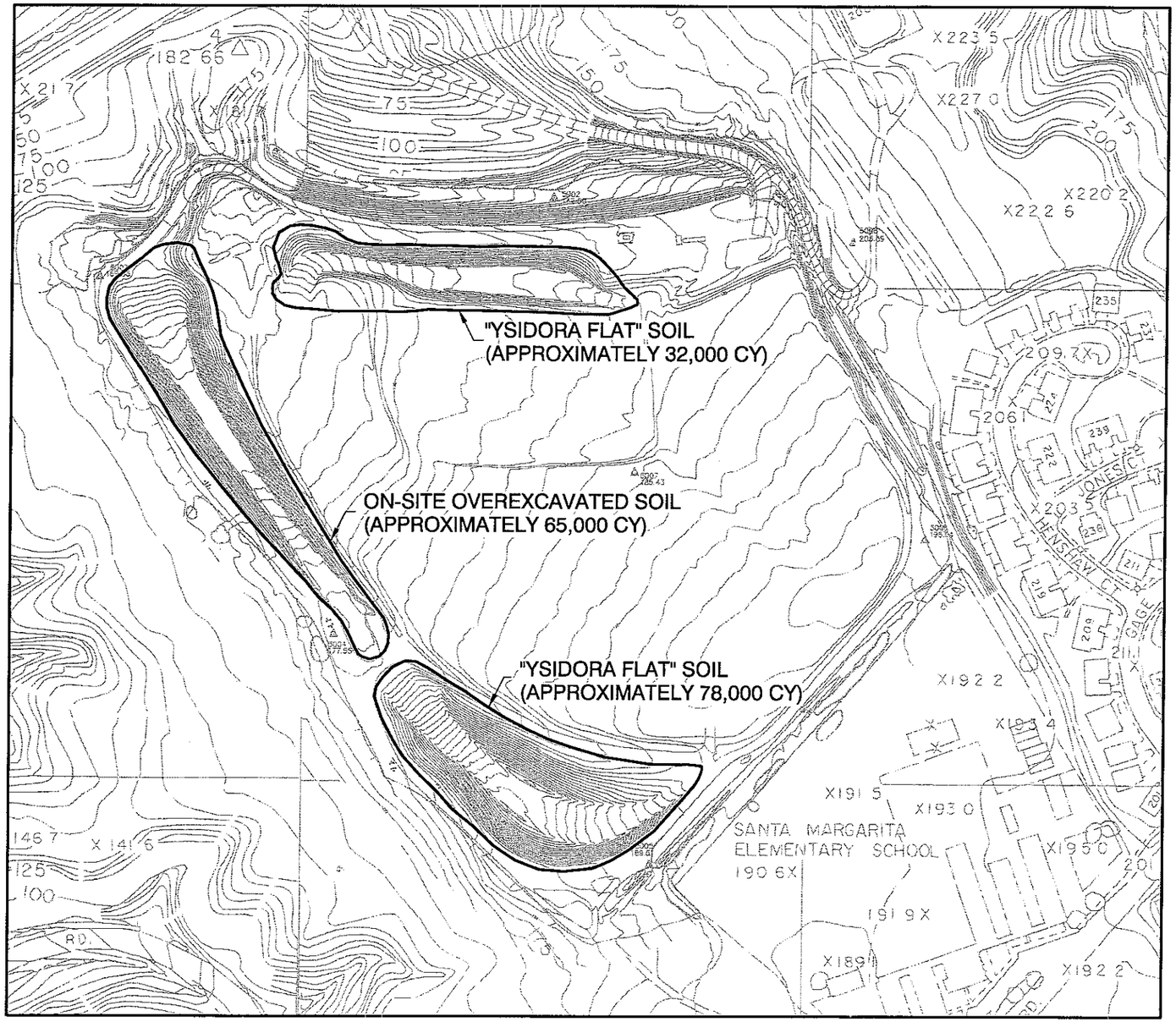

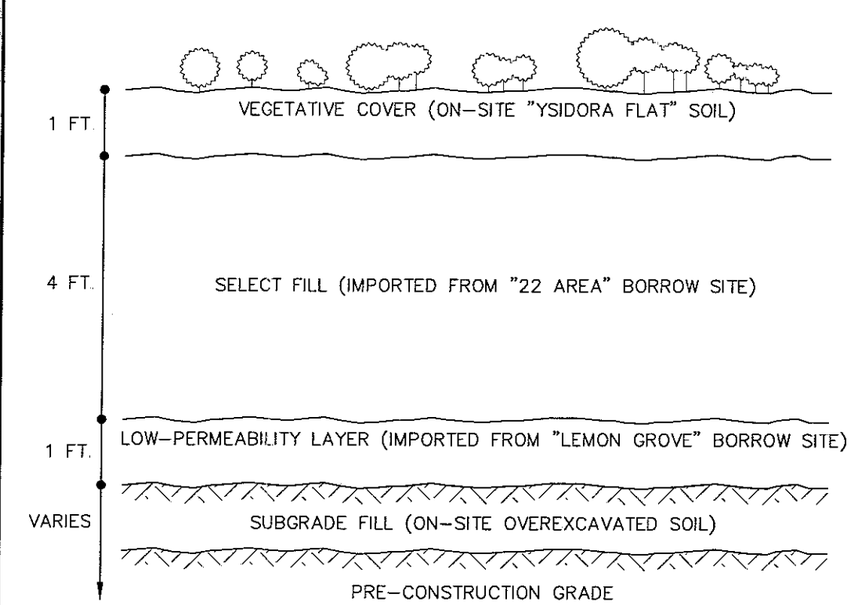

CLOSURE COVER PROFILE AND SOURCE OF COVER MATERIAL
(NOT TO SCALE)

SCALE
0 250 500 FEET

TOPOGRAPHIC REFERENCE:
VICINITY MAP:
MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAPS 6A AND 6B
DATE: DECEMBER 1987

SITE MAP:
CAL VADA SURVEYING INC.
108 BUSINESS CENTER DRIVE
CORONA, CA 92880-1782
FIELD SURVEY: AERIAL TOPO - MARCH 09, 2000

LEGEND:
BOUNDARY OF SOIL STOCKPILE

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 3-1
PRECONSTRUCTION SITE MAP AND ON-SITE SOIL STOCKPILE LOCATIONS

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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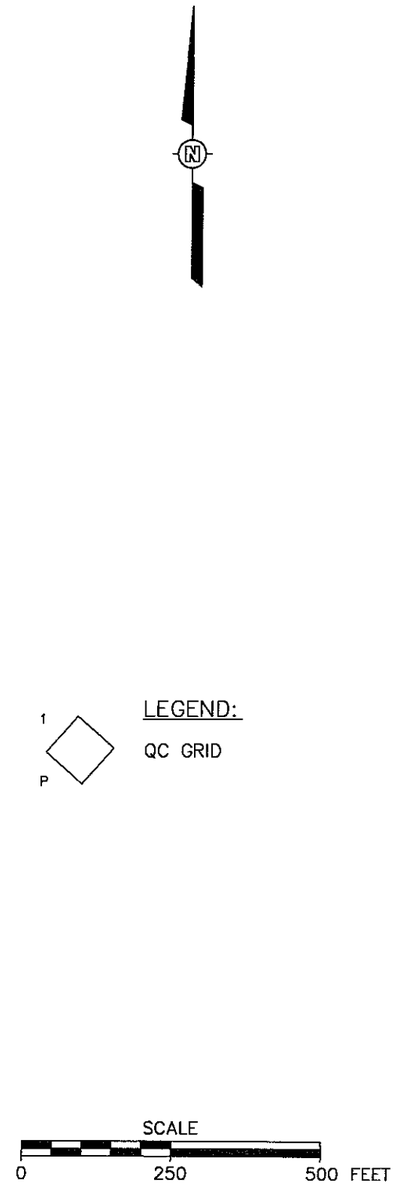

TOPOGRAPHIC REFERENCE:
VICINITY MAP:
MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAPS 6A AND 6B
DATE: DECEMBER 1987

SITE MAP:
CAL VADA SURVEYING INC.
108 BUSINESS CENTER DRIVE
CORONA, CA 92880-1782
FIELD SURVEY: AERIAL TOPO – MARCH 09 2000

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 3-2

QC GRID SYSTEM
BOX CANYON LANDFILL

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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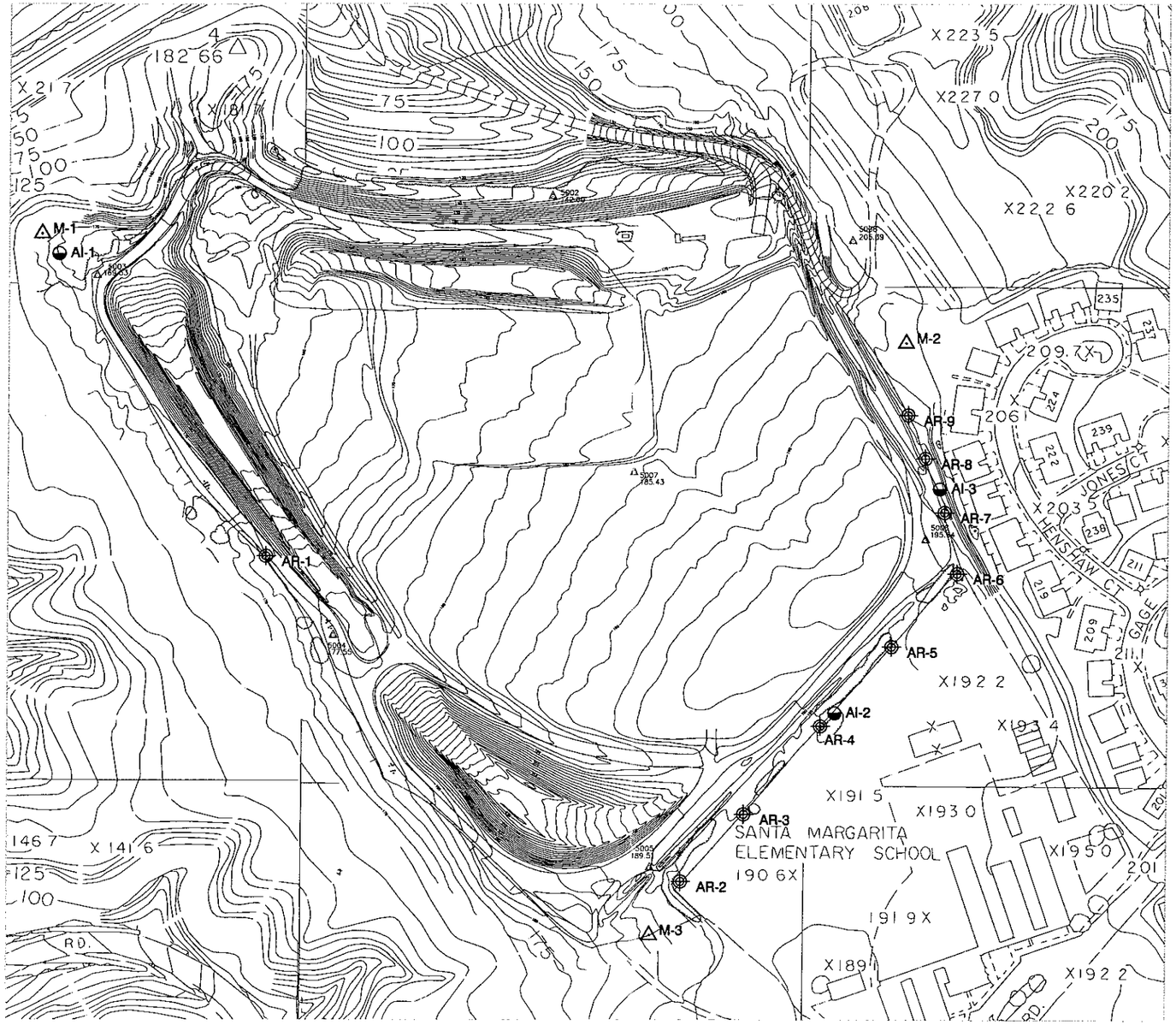

LEGEND:

AR-1	⊕	REAL-TIME MONITORING DEVICE
AI-1	◒	INTEGRATED AIR SAMPLING DEVICE
M-1	△	METEOROLOGICAL STATION

SCALE

0 250 500 FEET

TOPOGRAPHIC REFERENCE:
VICINITY MAP:
MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAPS 6A AND 6B
DATE: DECEMBER 1987

SITE MAP:
CAL VADA SURVEYING INC.
108 BUSINESS CENTER DRIVE
CORONA, CA 92880-1782
FIELD SURVEY: AERIAL TOPO – MARCH 09, 2000

Shaw Environmental, Inc.

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CAMP PENDLETON, CALIFORNIA

FIGURE 3-3

LOCATIONS OF AIR MONITORING DEVICES
BOX CANYON LANDFILL

MARINE CORPS AIR STATION
CAMP PENDLETON, CALIFORNIA

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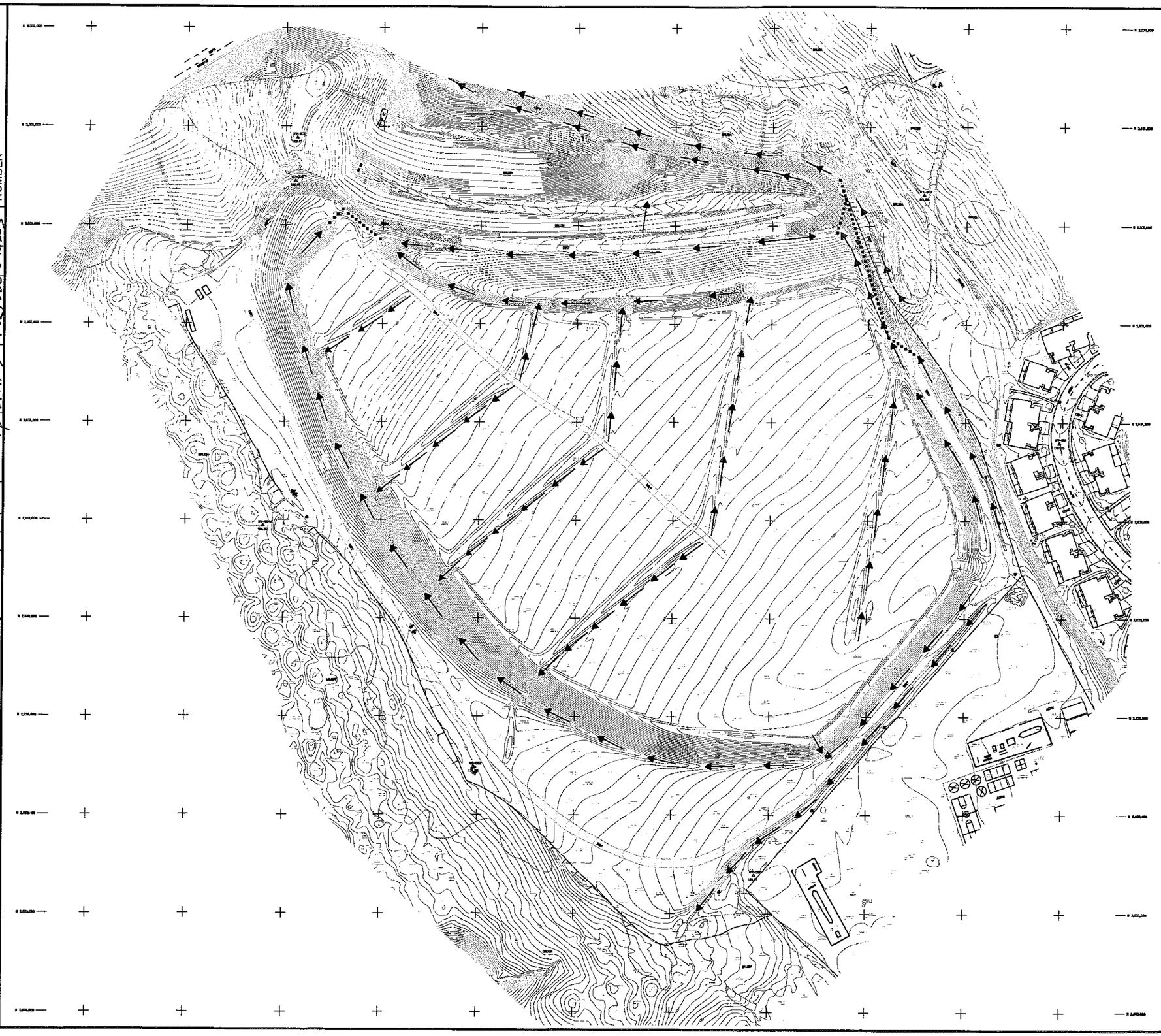

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LEGEND:

- ACCESS ROAD WITH ASPHALT PAVEMENT
- ACCESS ROAD WITH CLASS II PAVEMENT
- V-DITCH WITH EROSION CONTROL BLANKET DITCH LINING
- GROUTED RIP-RAP LINED CHANNEL
- UNDERGROUND PIPE DRAINAGE
- V-DITCH WITH SHOTCRETE LINING

TOPOGRAPHIC MAP RREFERENCE:
SURVEY DATE: JANUARY 28, 2003
TOWILL, INC
5933 SEA LION PLACE, SUITE 100
CARLSBAD, CALIFORNIA 90028

SCALE
0 200 400 FEET

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 3-4

FINAL SURFACE DRAINAGE AND ACCESS ROAD BOX CANYON LANDFILL

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

LEGEND:

GP2 ⌖ LANDFILL GAS MONITORING WELL

TOPOGRAPHIC MAP REFERENCE:
SURVEY DATE: JANUARY 28, 2003
TOWILL, INC.
5933 SEA LION PLACE, SUITE 100
CARLSBAD, CA 90028

SCALE
0 200 400 FEET

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 3-5

LANDFILL GAS MONITORING WELL LOCATIONS
BOX CANYON LANDFILL

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
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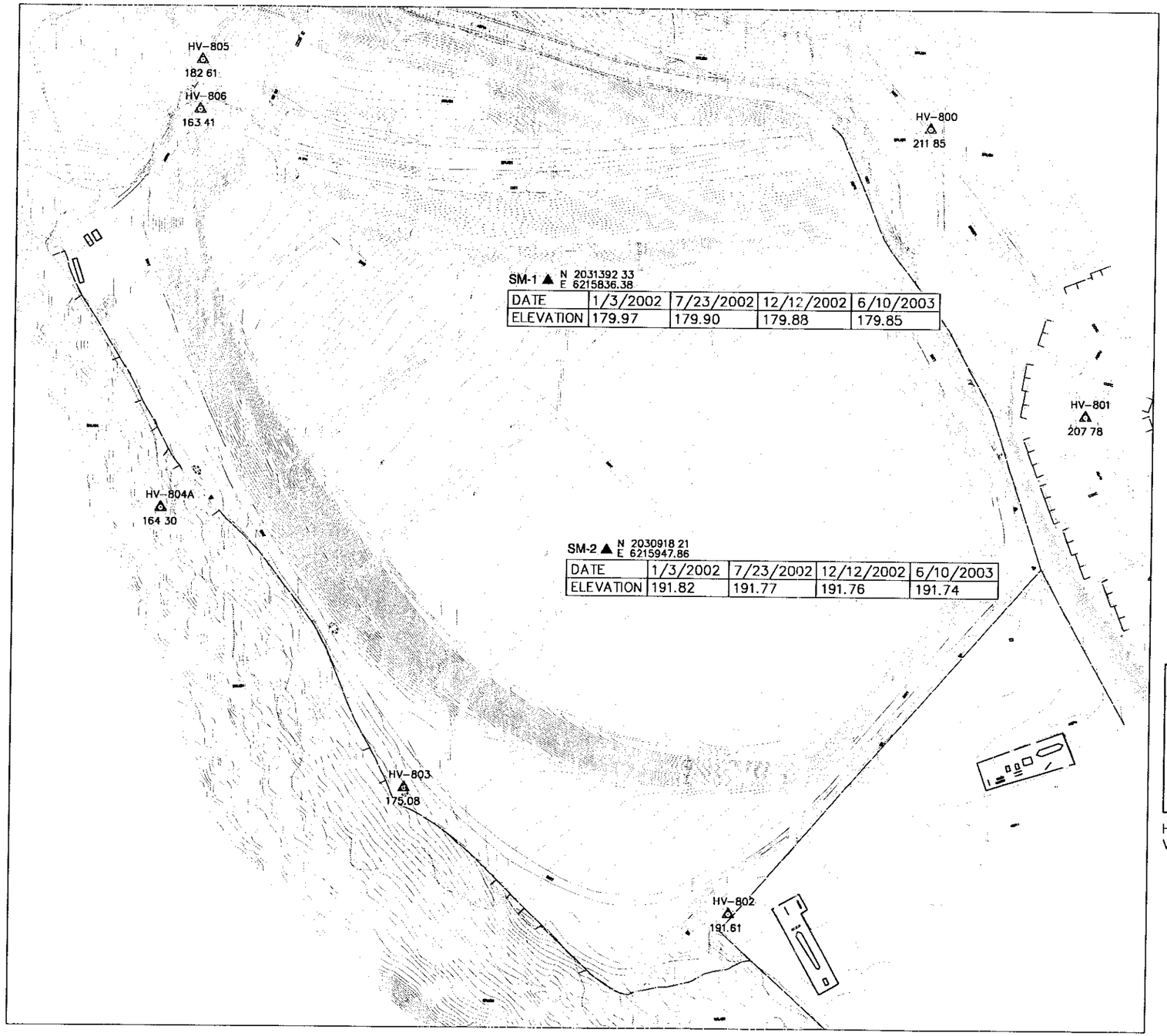

DATE	1/3/2002	7/23/2002	12/12/2002	6/10/2003
ELEVATION	179.97	179.90	179.88	179.85

DATE	1/3/2002	7/23/2002	12/12/2002	6/10/2003
ELEVATION	191.82	191.77	191.76	191.74

LEGEND:

SM-1 ▲ SETTLEMENT MONUMENT LOCATION

HV-800 △ SURVEY CONTROL POINT

TOPOGRAPHIC MAP REFERENCE:
SURVEY DATE: JANUARY 28, 2003
TOWILL, INC
5933 SEA LION PLACE, SUITE 100
CARLSBAD, CA 90028

SCALE
0 200 400 FEET

POINT NO.	NORTHING	EASTING	ELEVATION	D NORTH	D EAST	D ELEV.
800	2031662.92	6216511.74	211.85	−0.41	−0.28	0.00
801	2031158.71	6216793.64	207.78	−0.42	−0.28	0.00
802	2030277.58	6216171.20	191.61	−0.42	−0.28	0.00
803	2030496.40	6215593.77	175.08	−0.42	−0.28	0.00
804	2031058.04	6215219.85	166.19	−0.42	−0.28	0.00
805	2031776.89	6215222.69	182.61	−0.41	−0.28	0.00
806	2031689.70	6215219.59	163.41	−0.42	−0.28	0.00

HORIZONTAL CONTROL BASED ON NAD83, ZONE 6 DATUM
VERTICAL CONTROL BASED ON NAVD88 DATUM

Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 3-6
FINAL COVER TOPOGRAPHIC AND SETTLEMENT SURVEY MAP
BOX CANYON LANDFILL
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
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Tables

Table 1-1
Chronology of Major Events IR Site 7 Remedial Action Program

Description of Event	Date
Landfill operation started	May 1974
Landfill operation ceased	May 1984
NPL Listing of MCB Camp Pendleton	15 November 1990
FFA signed and established	24 October 1990
Remedial Investigation	March 1993 through March 1994 (Group B sites)
Baseline groundwater quarterly monitoring	March 1993 through July 1995
Engineering evaluation/cost analysis (EE/CA)	25 September 1995
Construction of CAMU I	May through December 1996
Addendum to 1995 EE/CA	18 June 1997
Action memorandum for IR Site 7 non-time-critical removal action	9 September 1997
CAMU I interim cover constructoin	October through December 1997
Feasibility study	01 May 1998 (OU-3 RI/FS)
Record of decision for Site 7	11 January 1999 (OU-3 ROD)
Construction of CAMU II	July through December 1999
Remedial design	August 2000
Remedial action work plan	June 2001
Remedial construction (Phase I) started	July 2001
Perimeter landfill gas monitoring wells installed	August 2001
Baseline landfill gas monitoring	22 August through 12 September 2001
Phase I construction completed	January 2002
Postclosure landfill gas monitoring started (bi-monthly)	April 2002
Remedial constructon (Phase II) started	August 2002
Phase II construction completed	December 2002
Postclosure groundwater monitoring started (quarterly)	February 2003

CAMU - Corrective Action Management Unit
EE/CA - engineering evaluation/cost analysis
FFA - Federal Facility Agreement
IR - installation restoration
MCB - Marine Corps Base
NPL - National Priority List
OU - operable unit
RI/FS - remedial investigation/feasibility study

Table 3-1
Soil Hauling Log - Lemon Grove Borrow Site

Date	Number of Trucks	Daily Number of Loads	Daily Volume Hauled (cy)	Cumulative Volume Hauled (cy)	Notes
08/06/2001	10	204	2,244	2,244	Begin hauling low-permeability soil to Site 7
08/07/2001	10	216	2,376	4,620	
08/08/2001	10	211	2,321	6,941	
08/09/2001	10	227	2,497	9,438	
08/10/2001	10	209	2,299	11,737	
				11,737	
08/13/2001	10	245	2,695	14,432	
08/14/2001	10	260	2,860	17,292	
08/15/2001	10	251	2,761	20,053	
08/16/2001	10	230	2,530	22,583	
08/17/2001	10	225	2,475	25,058	
				25,058	
08/20/2001	10	230	2,530	27,588	
08/21/2001	10	230	2,530	30,118	
08/22/2001	10	220	2,420	32,538	
08/23/2001	10	200	2,200	34,738	
08/24/2001	10	143	1,573	36,311	Transition to hauling at 22 Area borrow site
				36,311	
Week of 8/27	0	0		36,311	Hauling select fill from 22 Area borrow site
Week of 9/3	0	0	-	36,311	Continue select fill hauling
			-	36,311	
09/10/2001	5	117	1,287	37,598	Resume hauling at Lemon Grove borrow site
09/11/2001	5	144	1,584	39,182	Threat condition delta
09/12/2001	5	103	1,133	40,315	Threat condition delta
09/13/2001	7	116	1,276	41,591	Threat condition delta
09/14/2001	1	7	77	41,668	Clayey soil in Lemon Grove depleted
			-	41,668	
Week of 10/15				41,668	Screen "Ysidora Flat" soil
10/24/2001	5	119	1,309	42,977	Begin transporting screened soil to Site 7
10/25/2001	5	102	1,122	44,099	Transport screened soil to Site 7
10/26/2001	5	51	561	44,660	Transport screened soil to Site 7
			-	44,660	
Week of 10/29	0	0		44,660	Screen "Ysidora Flat" soil
				44,660	
11/01/2001	10	226	2,486	47,146	Lemon Grove borrow site hauling completed
	Subtotal	**4286**	**47,146**		

Total "in-place volume" hauled to IR Site 7 = 47,146 cy

("in-place volume" based on 20 tons/load or 13 cy/load as hauled and a final compaction ratio of 85%)

cy - cubic yards

Table 3-2
Soil Hauling Log - 22 Area Borrowing Site

Date	Number of Trucks	Daily Number of Loads	Daily Volume Hauled (cy)	Cumulative Volume Hauled (cy)	Comments
08/27/2001	15	230	2,530	2,530	Begin hauling select fill from 22 Area
08/28/2001	15	241	2,651	5,181	
08/29/2001	15	219	2,409	7,590	
08/30/2001	15	224	2,464	10,054	
08/31/2001	15	216	2,376	12,430	
			-	12,430	
09/03/2001	0	0	-	12,430	Holiday
09/04/2001	15	230	2,530	14,960	
09/05/2001	15	219	2,409	17,369	
09/06/2001	15	229	2,519	19,888	
09/07/2001	14	227	2,497	22,385	
			-		
09/10/2001	10	163	1,793	24,178	
09/11/2001	10	144	1,584	25,762	Threat condition delta
09/12/2001	10	146	1,606	27,368	Threat condition delta
09/13/2001	8	141	1,551	28,919	Threat condition delta
09/14/2001	14	224	2,464	31,383	Threat condition delta
			-		
09/17/2001	15	230	2,530	33,913	Threat condition charlie
09/18/2001	14	209	2,299	36,212	Threat condition charlie
09/19/2001	15	234	2,574	38,786	Threat condition charlie
09/20/2001	15	233	2,563	41,349	Threat condition charlie
09/21/2001	15	233	2,563	43,912	Threat condition charlie
			-		
09/24/2001	15	217	2,387	46,299	Heavy fog delays trucking 45 minutes
09/25/2001	15	237	2,607	48,906	
09/26/2001	15	235	2,585	51,491	
09/27/2001	15	233	2,563	54,054	
09/28/2001	15	202	2,222	56,276	Heavy fog delays trucking 1 hour
			-		
10/01/2001	15	250	2,750	59,026	
10/02/2001	15	234	2,574	61,600	
10/03/2001	14	215	2,365	63,965	

Table 3-2
Soil Hauling Log - 22 Area Borrowing Site

Date	Number of Trucks	Daily Number of Loads	Daily Volume Hauled (cy)	Cumulative Volume Hauled (cy)	Comments
10/04/2001	15	232	2,552	66,517	
10/05/2001	15	236	2,596	69,113	
			-	69,113	
10/08/2001	15	240	2,640	71,753	
10/09/2001	15	224	2,464	74,217	
10/10/2001	15	227	2,497	76,714	
10/11/2001	15	235	2,585	79,299	
10/12/2001	15	220	2,420	81,719	
			-	81,719	
10/15/2001	15	206	2,266	83,985	Heavy fog delays trucking 45 minutes
10/16/2001	15	229	2,519	86,504	
10/17/2001	15	222	2,442	88,946	
10/18/2001	15	216	2,376	91,322	
10/19/2001	15	197	2,167	93,489	
	15		-	93,489	
10/22/2001	15	205	2,255	95,744	
10/23/2001	15	204	2,244	97,988	
10/24/2001	10	153	1,683	99,671	Concurrent with Lemon Grove hauling
10/25/2001	10	156	1,716	101,387	Concurrent with Lemon Grove hauling
10/26/2001	10	177	1,947	103,334	Concurrent with Lemon Grove hauling
			-	103,334	
10/29/2001	10	194	2,134	105,468	Concurrent with Lemon Grove hauling
10/30/2001	5	90	990	106,458	Concurrent with Lemon Grove hauling
10/31/2001	10	196	2,156	108,614	Concurrent with Lemon Grove hauling
11/01/2001	5	80	880	109,494	Concurrent with Lemon Grove hauling
11/02/2001	15	215	2,365	111,859	22 Area borrow site hauling completed
	Subtotal	**10,169**	**111,859**		

Total "in-place volume" hauled to IR Site 7 = 111,859 cy

("in-place volume" based on 20 tons/load or 13 cy/load as hauled and a final compaction ratio of 85%)

cy - cubic yards

Table 3-3
Summary of Borrow Soil Analytical Test Results

		Lemon Grove borrow site				On-site Overexcavation				22 Area Borrow Site																Ysidora Flat Soil Borrow Site					
	Sample ID	19739-715		19739-716		19739-912		19739-914		19739-989		19739-990		19739-991		19739-992		19739-993		19739-994		19739-995		19739-996		19739-997		19739-1131		19739-1132		19739-1133	
	Site	LG 7-01		LG 7-02		BC-01		BC-02		22Borrow-01		22Borrow-02		22Borrow-03		22Borrow-04		22Borrow-05		22Borrow-06		22Borrow-07		22Borrow-08		22Borrow-09		Ysidora SP1		Ysidora SP2		Ysidora SP3	
	Date	9/20/1999		9/20/1999		11/22/1999		11/22/1999		3/23/2000		3/23/2000		3/23/2000		3/23/2000		3/23/2000		3/23/2000		3/23/2000		3/23/2000		3/23/2000		9/20/2000		9/20/2000		9/20/2000	
PARAMETER	PRG (µg/kg)	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER	RESULT (µg/kg	QUALIFIER
ALUMINUM	76000																											25600		24600		19100	
ANTIMONY	31	0.12		0.29		<0.15		<0.15		0.25	J	0.35	J	0.24	J	<6.5		0.41	J	0.41	J	<0.59		0.15	J	0.24	J	<0.66		<0.66		<0.66	
ARSENIC	22	1.9		2.2		0.85		1.4		2.3		1.9		5.1		7.4		4.6		1.3		2.3		1.4		1.7		2.7		3.3		2.5	
BARIUM	5400	75.3		55.4		165		253		39.5		57.1		151		74.6		52.8		48.4		41.9		35.2		35.3		244		245		220	
BERYLLIUM	150	<0.21		<0.21		<0.10		<0.11		0.29		0.57		0.99		1.3		0.69		0.38		0.51		0.48		0.42		6.8	J	6.1	J	4.5	
CADMIUM	37	0.019	J	0.025	J	<0.21		0.028	J	<0.21		<0.27		0.19	J	0.21	J	0.021	J	<0.22		0.078	J	<0.23		<0.22		<0.82		<0.82		<0.82	J
CHROMIUM	210	22.8		21.4		77.3		58.1		3.7		5.2		10.3		9.8		5.0		5.1		4.9		3.0		2.2		36.3		35.8		30.8	
COBALT	900	7.5		5.8		20.5		18.8		1.6		2.3		5.8		4.1		1.9		2.5		1.3		0.95		0.77		18.7		18.4		16	
COPPER	3100	6.3		6.3		79.7		71.5		3.5		4.8		8.8		7.7		4.5		5.6		2.6		1.9		1.8		26.7		27.6		22.4	
LEAD	150	3.8		2.9		2.4		2.5		3.0		4.4		12.1		8.0		3.8		3.3		3.0		2.5		2.3		5.4		6.0		4.8	
MERCURY	23	0.055	J	0.067	J	0.01	J	<0.22		<0.21		<0.27		<0.22		<0.26		<0.22		<0.22		0.097	J	0.051	J	<0.22		0.016	J	0.016	J	0.011	
MOLYBDENUM	390	<0.21		<0.21		<0.21		<0.22		0.048	J	<0.27		<0.22		<0.26		<0.22		<0.22		<0.23		<0.23		<0.22		<0.82		<0.82		<0.82	J
NICKEL	1600	9.8		8.1		63		48.5		3.2		4.3		8.4		7.3		3.5		4.1		2.3		1.7		1.6		NA		NA		NA	
SELENIUM	390	0.5	J	<0.5		<0.52		0.25	J	<0.53		<0.67		<0.56		<0.65		<0.56		<0.54		<0.59		<0.57		<0.56		NA		NA		NA	
SILVER	390	<0.53		<0.53		<0.52		<0.55		<0.53		<0.67		<0.56		<0.65		<0.56		<0.54		0.11	J	<0.57		<0.56		<2.1		<2.0		<2.1	
THALLIUM	5.2	<0.091		<0.091		<0.089		<0.093		<0.53		<0.67		<0.56		<0.65		<0.56		<0.54		<0.59		<0.57		<0.56		<0.31		<0.31		<0.31	
VANADIUM	550	39.8		38.6		51.5		41.5		7.6		7.1		28		23.6		10.5		6.7		9.6		6.0		5.0		82.6		81.1		70.5	
ZINC	23000	28		28.2		43.2		37.8		12.9		16.9		43.6		34.3		17.1		17.8		15.5		10.6		8.5		83		79.8		70	

Volatile Organic Compounds: None detected above the detection levels

Semivolatile Organic Compounds: None detected above the detection levels

Pesticides	PRG (µg/kg)	All data reported in µg/kg																															
4,4'-DDD	2400	<0.27		<0.27		<0.27		<0.27		<2.1		<2.7		<2.2		<2.6		<2.2		<2.2		<2.3		<2.3		<2.2		0.54		<.046		0.48	
4,4'-DDE	1700	1.2		0.19		<0.11		<0.11		<2.1		<2.7		<2.2		<2.6		<2.2		<2.2		<2.3		<2.3		<2.2		2.76		1.08		1.99	
4,4'-DDT	1700	1	J	0.9	J	<0.2		<0.2		<2.1		<2.7		<2.2		<2.6		<2.2		<2.2		<2.3		<2.3		<2.2		<2.1		<2.0		<2.1	

4,4'-DDD - 4,4'-dichlorodiphenyldichloroethane

4,4'-DDE - 4,4'-dichlorodiphenyldichloroethene

4,4'-DDT - 4,4'-dichlorodiphenyltrichloroethane

J - level detected was below quantitation limit and an estimate

µg/kg - milligrams per kilogram

NA - not analyzed

PRG - EPA Region IX Preliminary Remedial Goals (published 10/1/2002) for residential soil chronic hazard quotient (HQ) = 1, or cancer risk = 1 E-6, whichever is lower

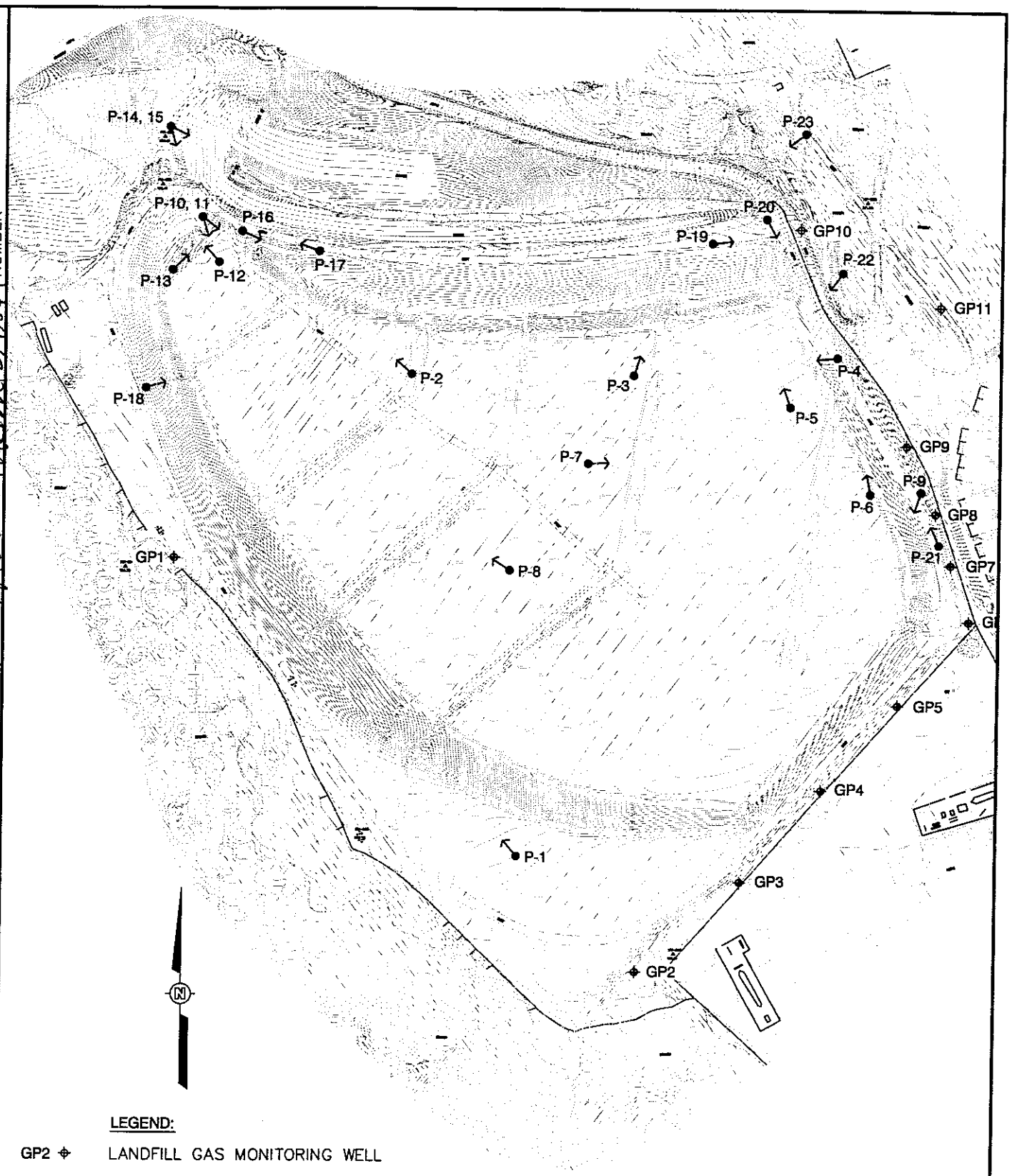
Table 3-4
Summary of Gas Probe As-Built Conditions and Rationales

Probe Number	Coordinates		Depth (ft)			Rationale
	Northing/ Easting	Elevation	Shallow	Mid-level	Deep	
GP-1	2031004.9/ 6215247.3	167.3	20 - 25	35 - 40	65 - 70	Located on east side of the landfill. Shallow probe installed in sandy material and deeper than normal to avoid influence of nearby slope. Mid-level probe installed in sandy clay. Deep probe installed in gravelly sand at the approximate depth of the bottom of the waste.
GP-2	2030244.4/ 6216100.0	189.7	10 - 15	35 - 45	--	Shallow probe located near surface, but deep enough to avoid influence from surface. Mid-level probe located to monitor sand and sandy gravel zone. No deep probe installed because the low-permeability San Onofre Breccia was encountered at 48 feet.
GP-3	2030409.6/ 6216290.3	191.2	10 - 15	35 - 40	--	Shallow probe located near surface, but deep enough to avoid influence from surface. Mid-level probe located to monitor sandy gravel zone. No deep probe installed because the low-permeability San Onofre Breccia was encountered at 41 feet.
GP-4	2030579.3/ 6216438.4	192.7	10 - 15	--	--	Shallow probe located near surface, but deep enough to avoid influence from surface. No mid-level or deep probe installed because the low-permeability San Onofre Breccia was encountered at 15 feet.
GP-5	2030737.3/ 6216576.7	192.9	13 -18	--	--	Shallow probe located near surface to monitor sand unit. No mid-level or deep probe installed because the low-permeability San Onofre Breccia was encountered at 18 feet.
GP-6	2030892.7/ 6216704.8	196.0	18 - 23	55 - 60	83 - 88	Shallow probe located to monitor fine-gravel zone. Mid-level probe located to monitor fine-gravel zone. Deep probe installed in sand at the approximate depth of the bottom of the waste.
GP-7	2030996.5/ 6216670.7	197.0	20 - 25	55 - 60	85 - 90	Shallow probe located deeper than at other sites to monitor sandier zone. Mid-level probe located to monitor sand zone. Deep probe installed in sand at the approximate depth of the bottom of the waste.
GP-8	2031091.2/ 6216641.9	198.1	20 - 25	60 - 65	85 - 90	Shallow probe located deeper than at other sites to monitor sand zone below clay. Mid-level probe located to monitor poorly graded sand zone. Deep probe installed in sand at the approximate depth of the bottom of the waste.
GP-9	2031215.9/ 6216588.0	197.6	15 - 20	60 - 65	85 - 90	Shallow probe located to monitor sand zone. Mid-level probe located to monitor sand and gravel zone. Deep probe installed in gravel at the approximate depth of the bottom of the waste.

Table 3-4 (Continued)
Summary of Gas Probe As-Built Conditions and Rationales

Probe Number	Coordinates		Depth (ft)			Rationale
	Northing/ Easting	Elevation	Shallow	Mid-level	Deep	
GP-10	2031612.1/ 6216390.9	172.6	18 - 23	65 - 70	84 - 89	Shallow probe located near surface to monitor sand unit Mid-level probe located to monitor gravel zone. Deep probe installed in gravel at the approximate depth of the bottom of the waste.

Appendix A
Photographs of Remedial Construction



DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
MB Miller	TP 3-8-04	3/9/04	829771-A8
Date			

LEGEND:

GP2 ⌖ LANDFILL GAS MONITORING WELL

P-1 ●→ PHOTO CONTROL POINT-1 AND SHOOTING DIRECTION

TOPOGRAPHIC MAP REFERENCE:
SURVEY DATE: JANUARY 28, 2003
TOWILL, INC.
5933 SEA LION PLACE, SUITE 100
CARLSBAD, CA 90028

SCALE
0 250 500 FEET

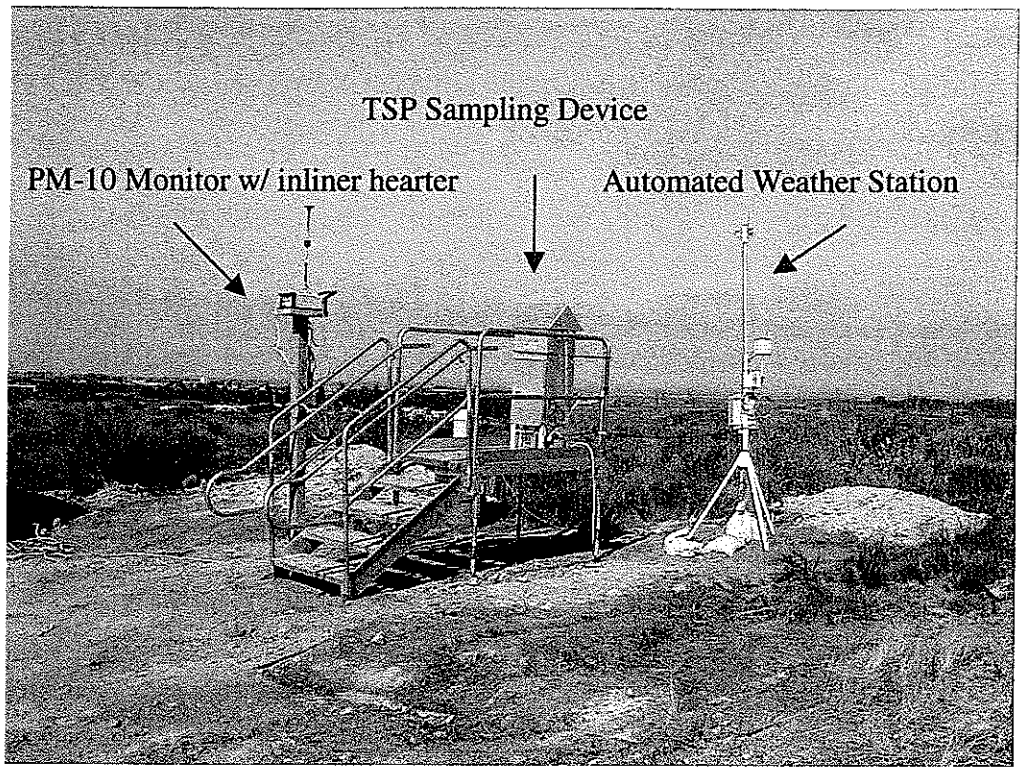
Shaw Environmental, Inc.

EFA WEST
CAMP PENDLETON, CALIFORNIA

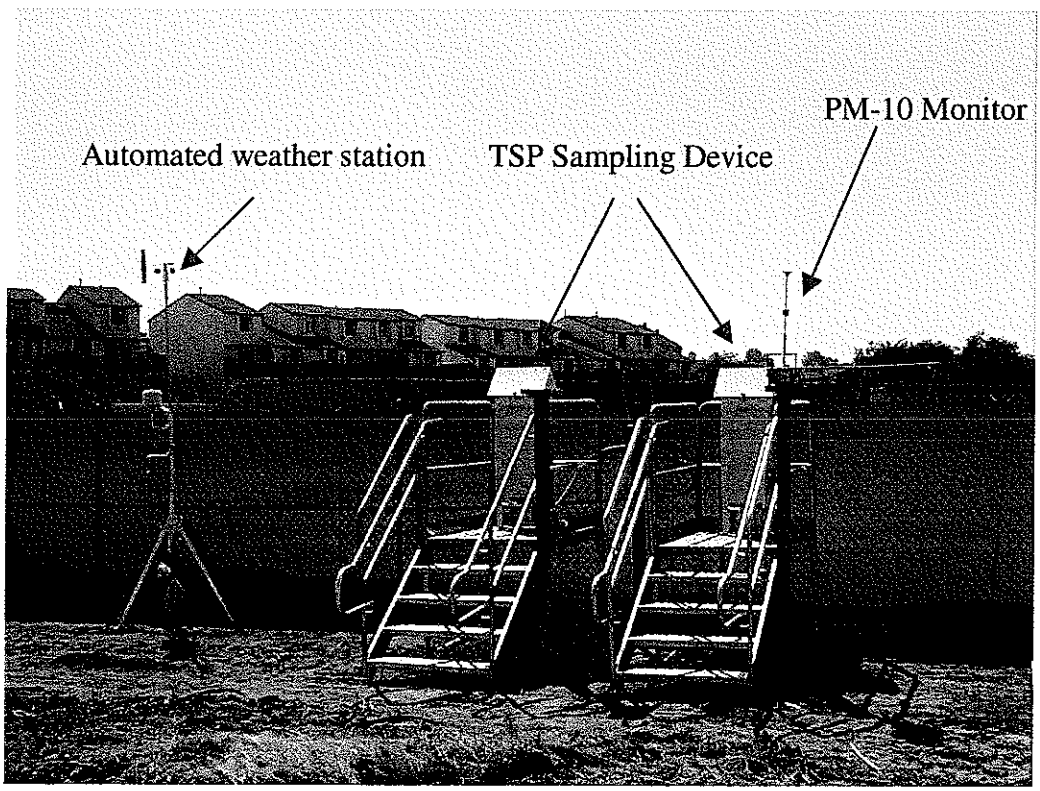
PHOTO CONTROL POINTS
BOX CANYON LANDFILL

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

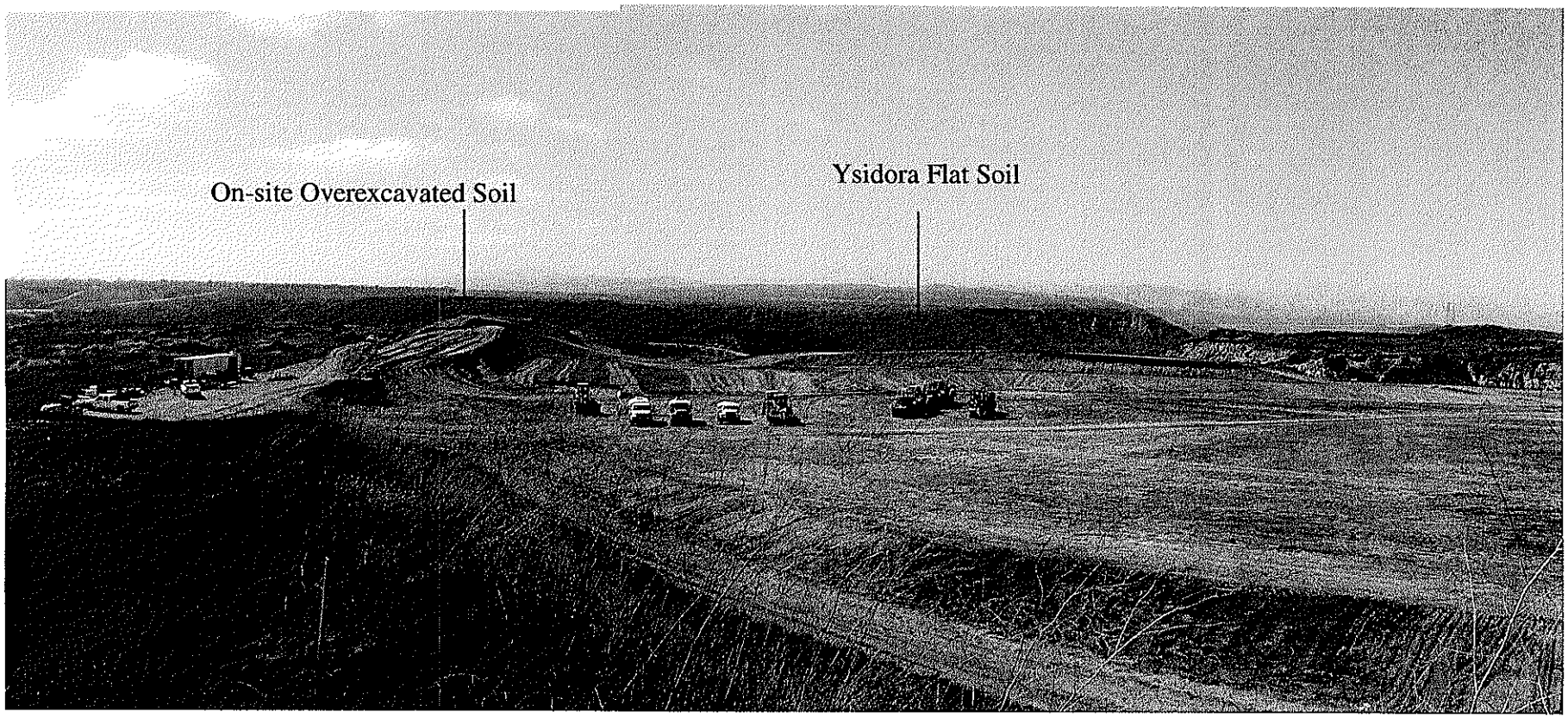
Mar 09, 2004 - 07:30:17 I:\IT Corp\Pendleton\829771\829771A8.dwg



July 18, 2001 - Upwind Air Monitoring Station AI –1

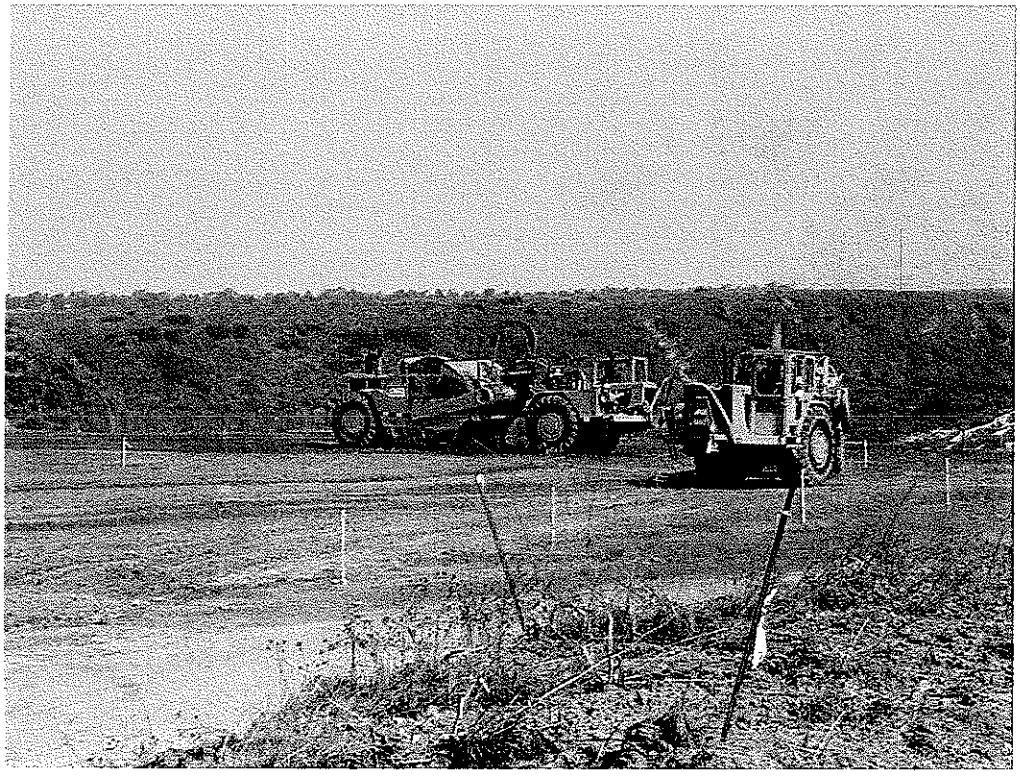


July 18, 2001 – Duplicated Air Monitoring Station AI-2 near School and Housing Area

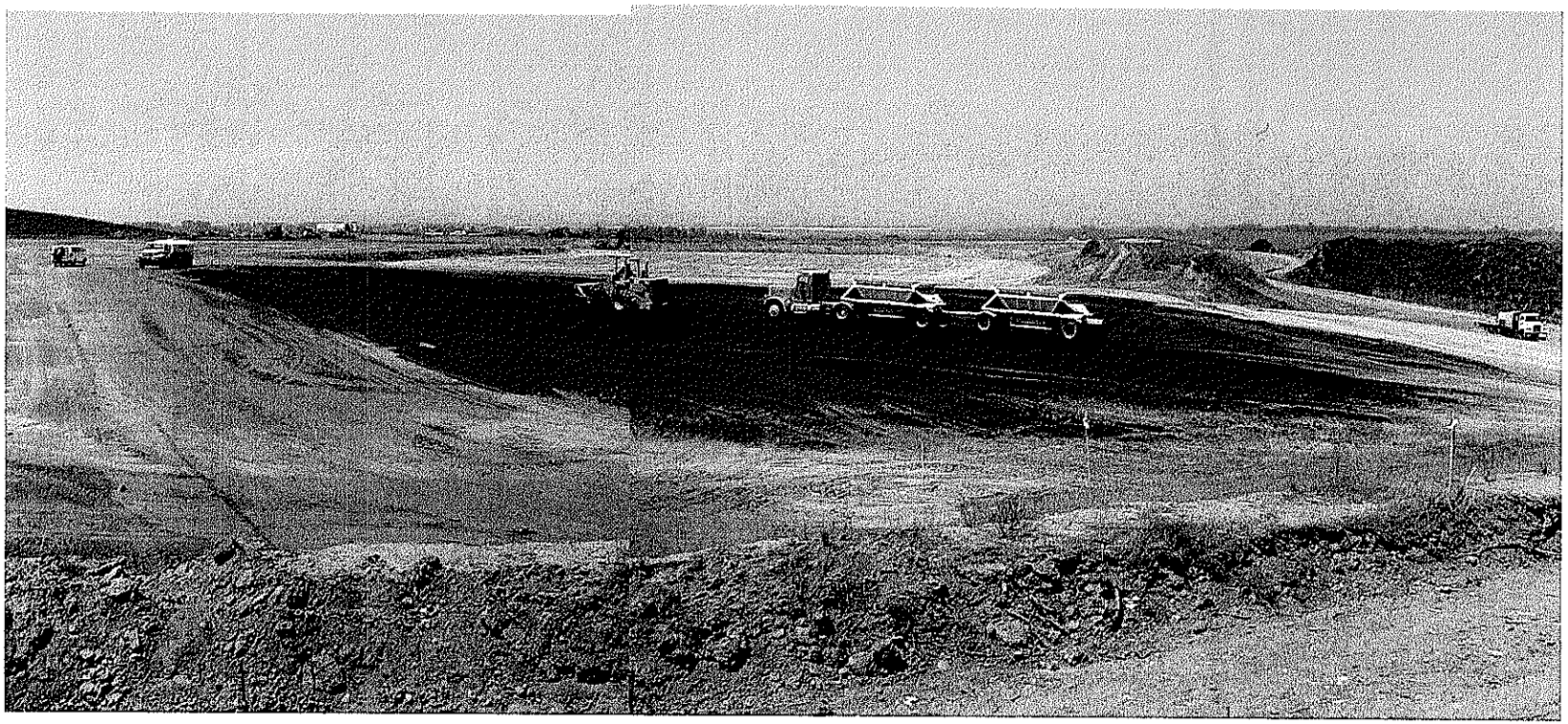


P-1: July 24, 2001 - Panoramic View of Subgrade Preparation in Progress
(The majority of the subgrade was built of existing stockpiles of on-site overexcavated soil and the Ysidora Flat soil as shown)

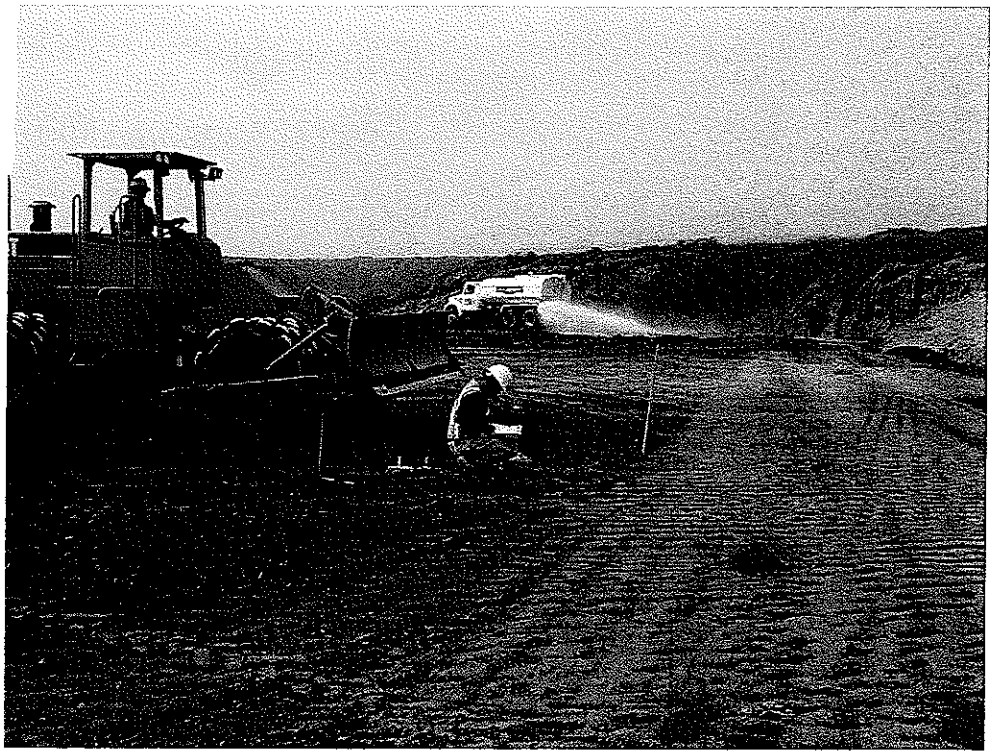
P-2: July 24, 2001 – Subgrade Preparation in Progress



P-3: July 27, 2001 – Subgrade Preparation in Progress

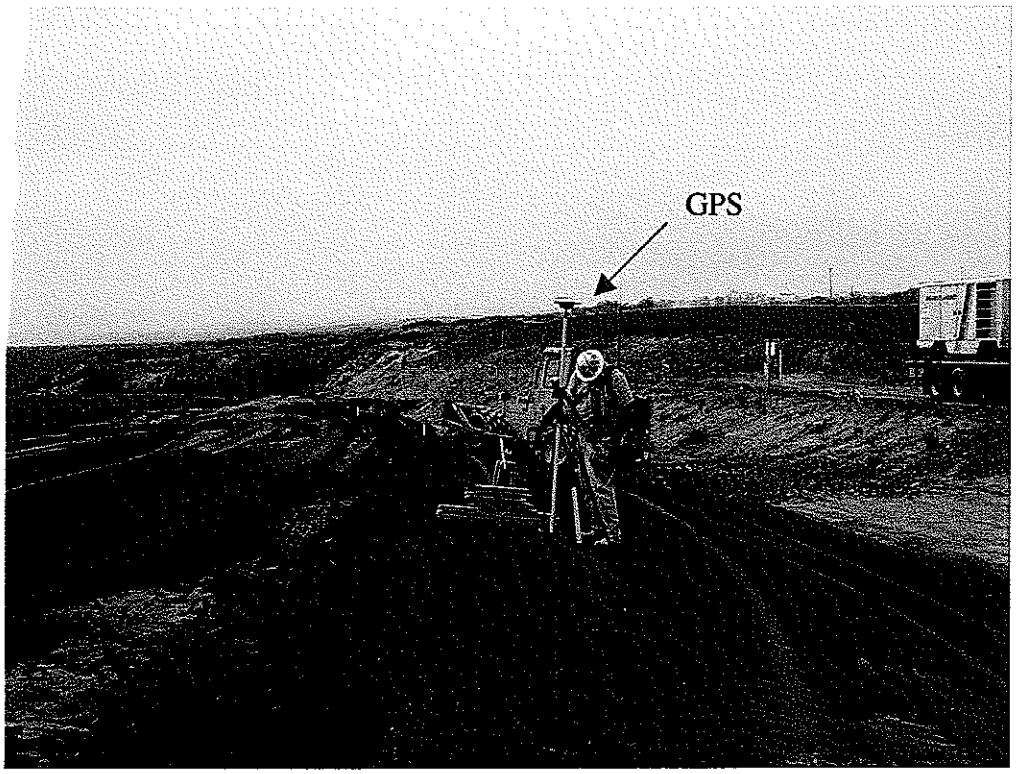


P-4: August 6, 2001 – First Day of Low-Permeability Layer (dark-color soil) Installation over Finished Subgrade (light-color soil) Low-permeability soil was imported from Lemon Grove Borrow Site with belly-dump trucks as shown.

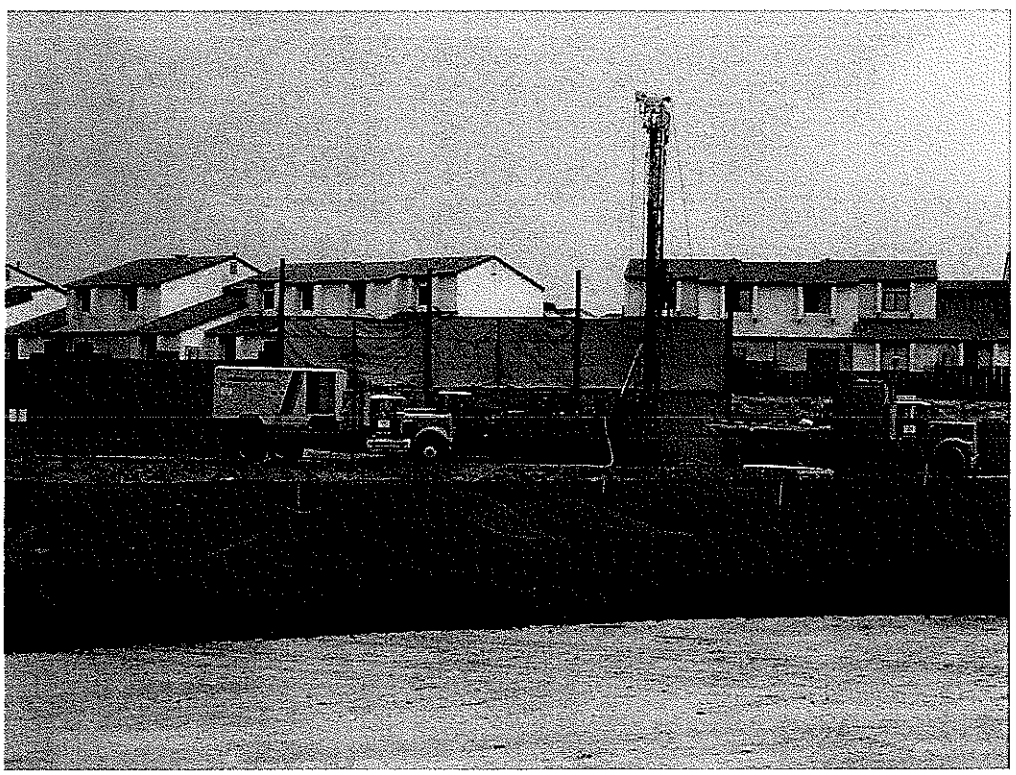


P-5: August 7, 2001 – Geotechnical QC Testing (Nuclear Gauge) on Low-Permeability Layer in Progress

August 8, 2001 – Geotechnical QC Testing (Sand Cone) of Low-Permeability Layer in Progress



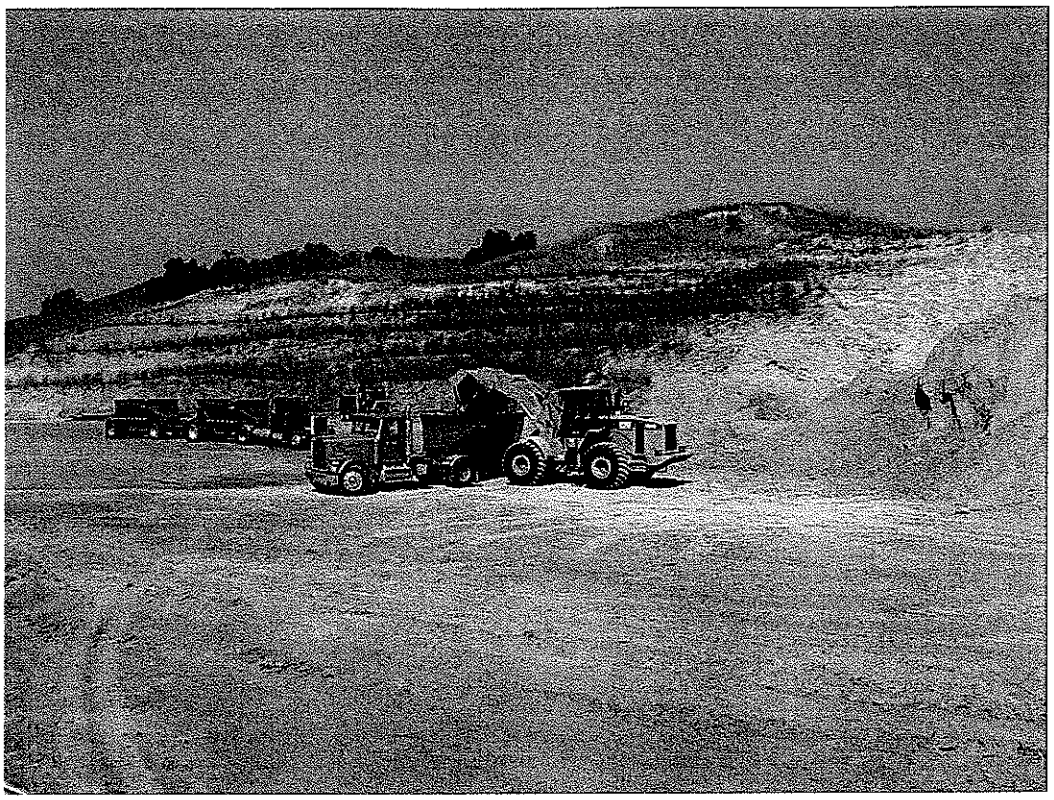
P-6: August 8, 2001 – Survey / Grading Control of Low-Permeability Layer using GPS in Progress



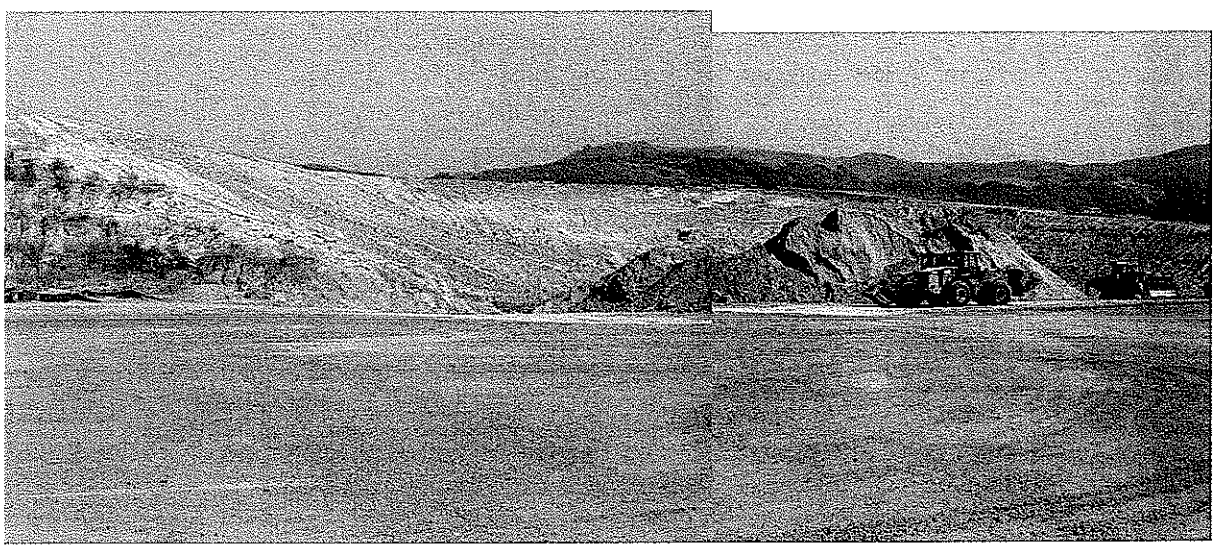
August 8, 2001 – Installation of Perimeter Landfill Gas Monitoring Well GP-8 in Progress
Sound barrier (yellow fencing) was used for noise control and reduction.

P-7: August 17, 2001 – Low-Permeability Layer (dark-color soil) Installation in Progress

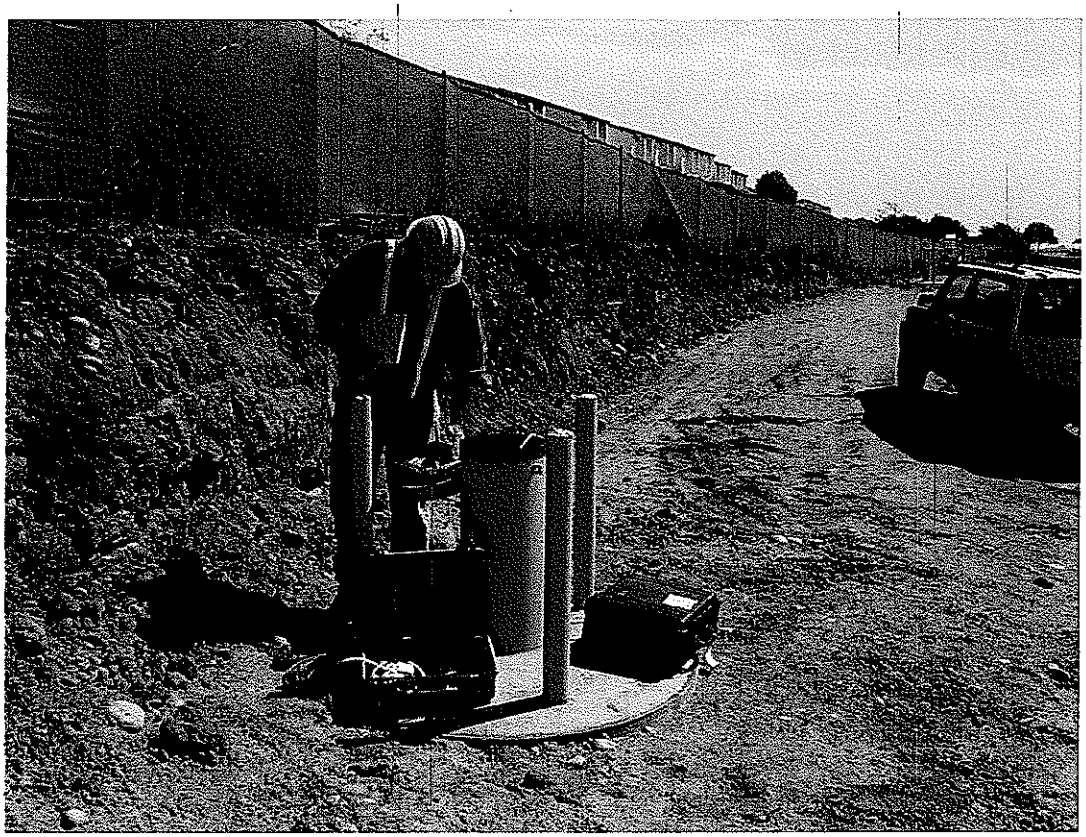
P-8: August 18, 2001 – Low-Permeability Layer Installation in Progress
Low-permeability layer (dark-color soil) being covered with select Fill (light-color soil) immediately after passing QC testing to minimize desiccations and prevent damages



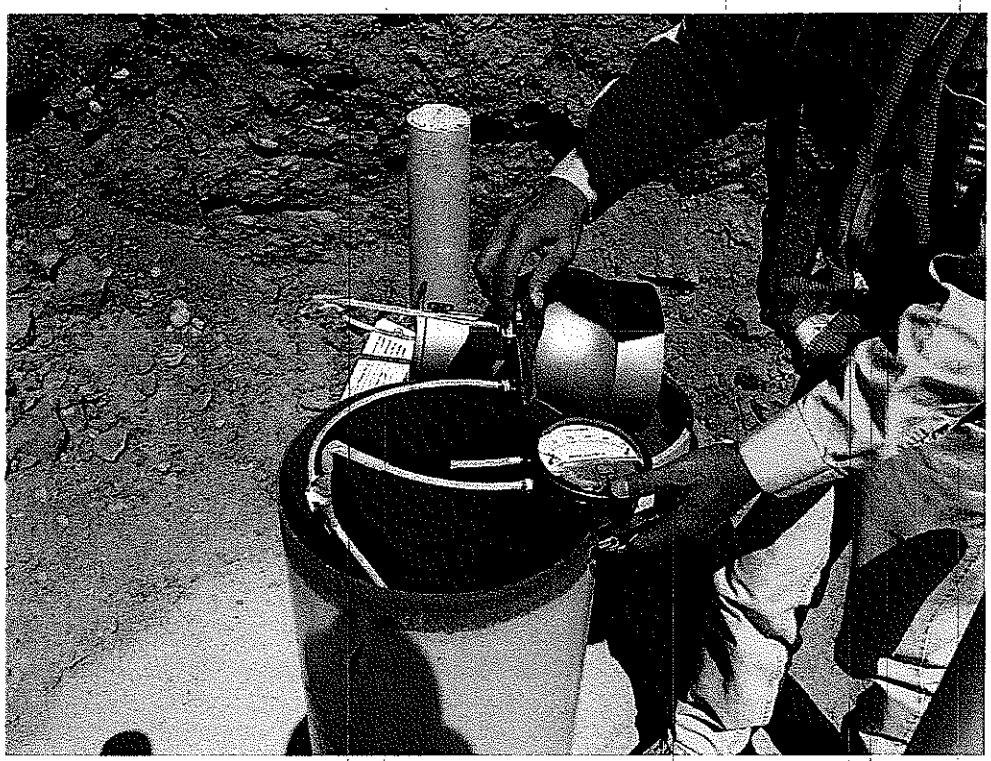
August 20, 2001 – 22 Area Borrow Site Trucking Operation in Progress



August 20, 2001 - Panoramic View of 22 Area Borrow Site



August 20, 2001 – Baseline Landfill Gas Monitoring (GP-9) with Landfill Gas Meter GA-90 in Progress



August 22, 2001 – Baseline Landfill Gas Sampling (GP-9) with SUMMA Canister in Progress

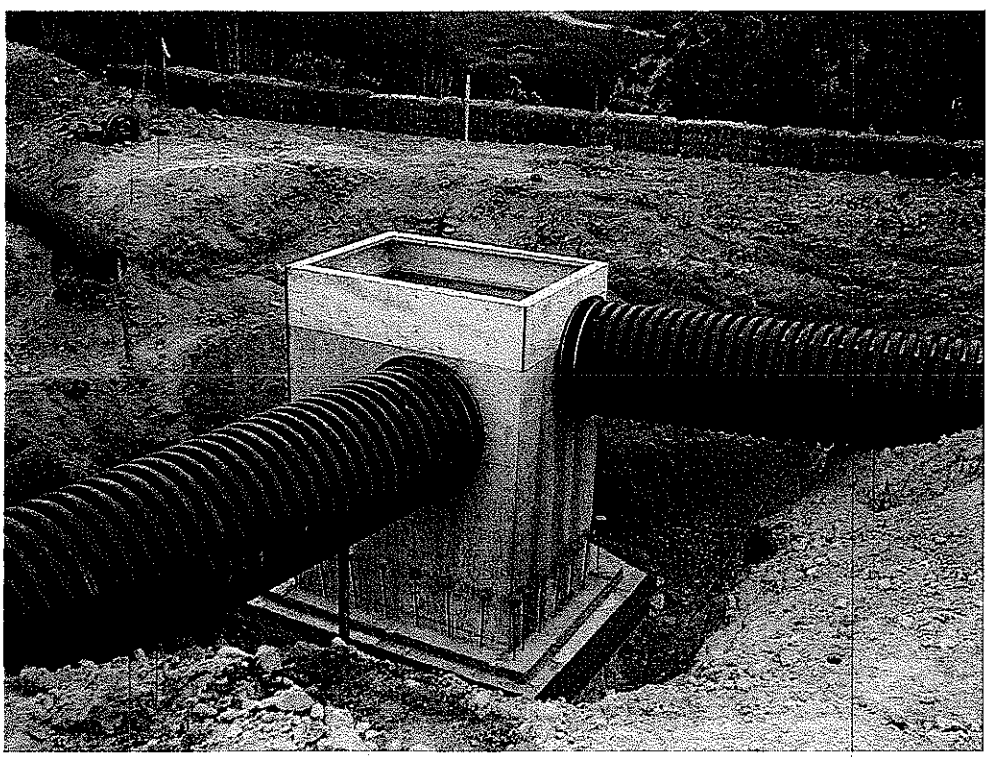
August 29, 2001 – Remove Over-size Material during Select Fill Construction

P-9: August 29, 2001 – Select Fill Construction In Progess

P-10: October 1, 2001 - Installation of Buried Drainage Pipe in Northwest Corner in Progress

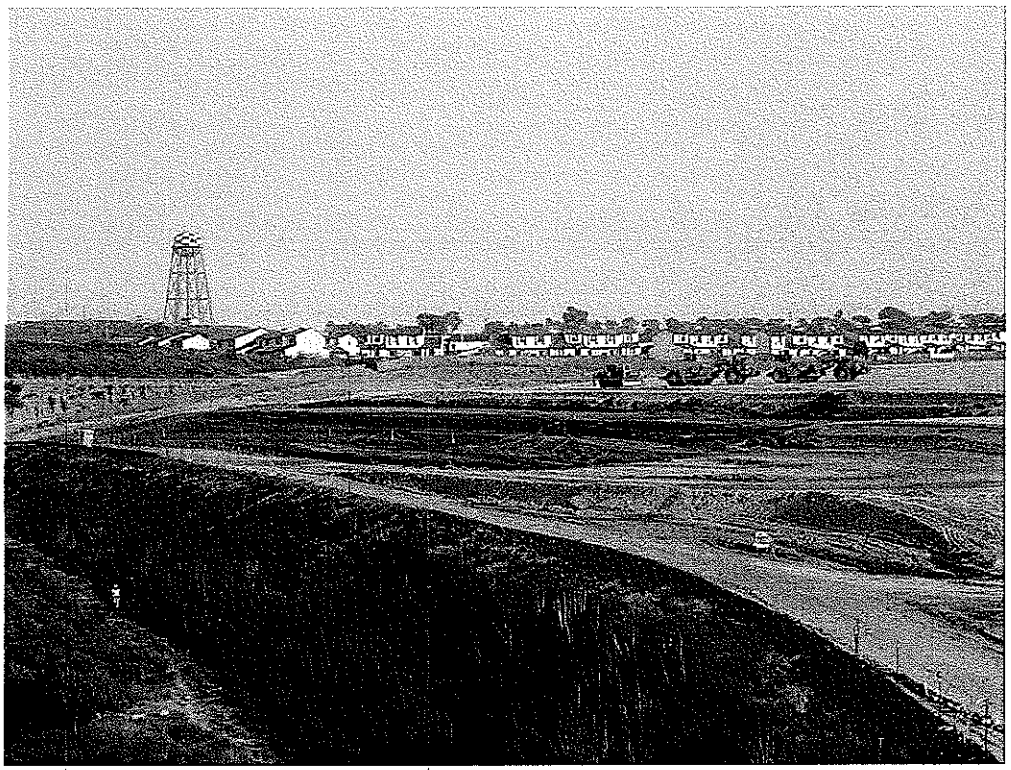
P-11: October 1, 2001 – Pressurized Leak Testing of Buried Pipe in Progress

P-12: October 26, 2001 – Installation of Foundation for Concrete Drainage Box in Progress

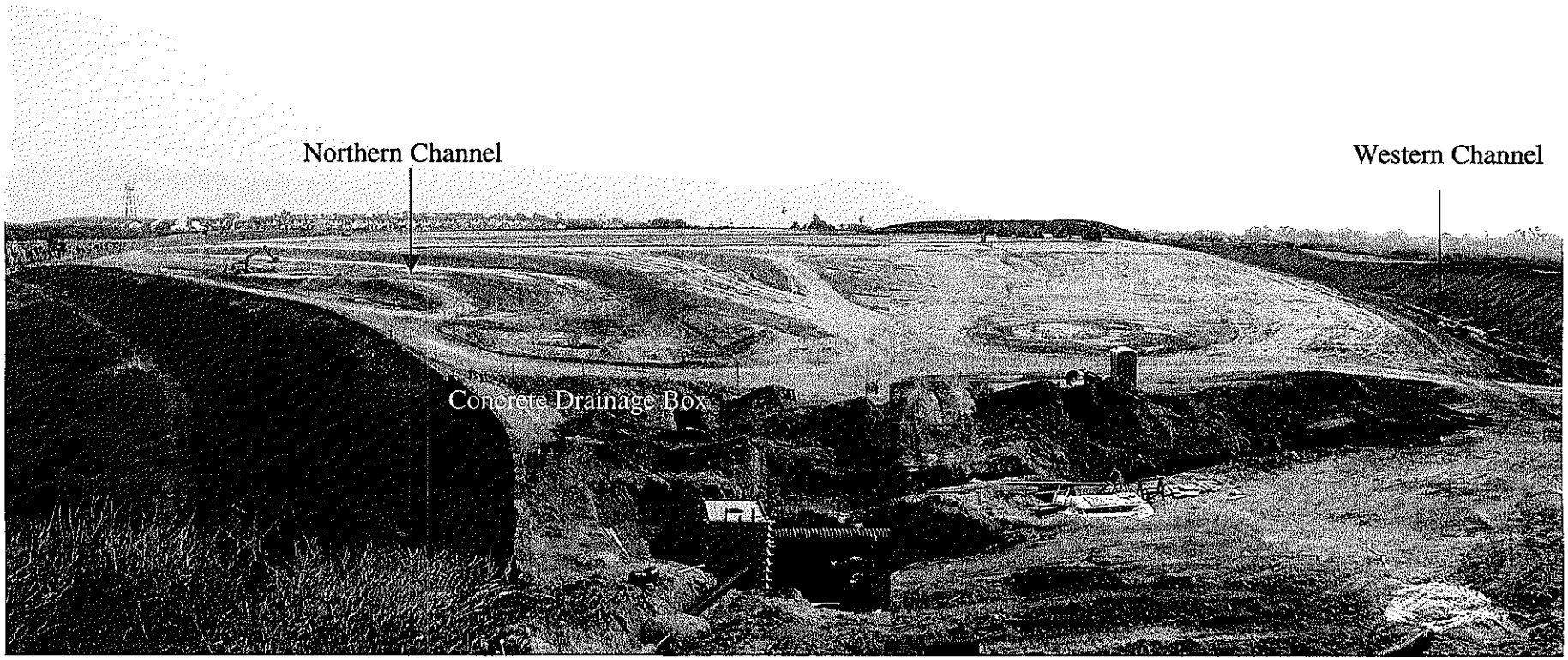


P-13: October 30, 2001, Connection of Drainage Box to Buried Pipe in Northeast Corner in Progress

October 30, 2001 – Lemon Grove Borrow Site Screening Operation in Progress



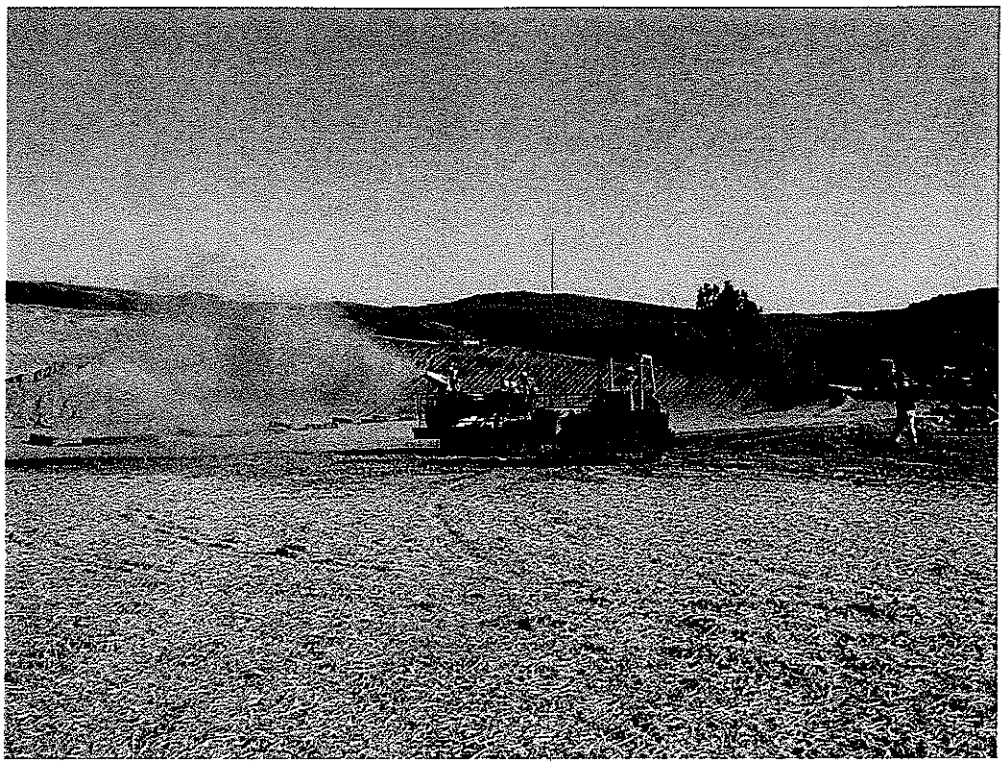
P-14: November 2, 2001 – Low-Permeability Layer (dark-color soil) on Front Face Completed



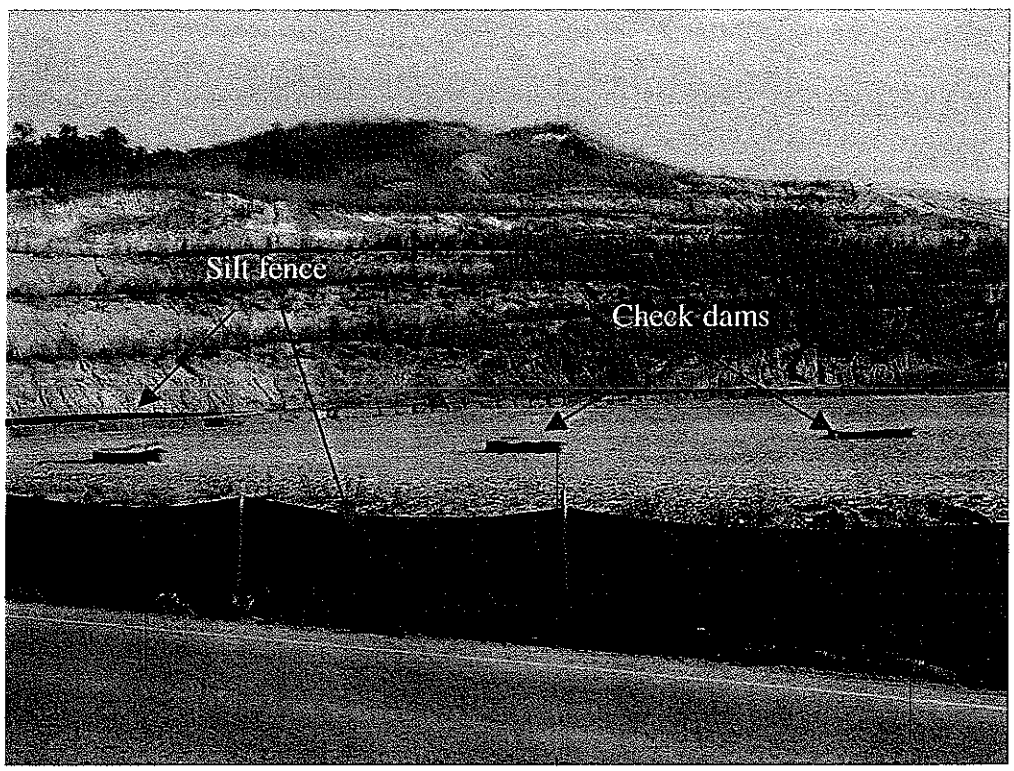
P-15: November 12, 2001 – Final Protective / Vegetative Cover Layer and Perimeter Drainage Structure Construction in Progress

November 20, 2001 – CIWMB and LEA Visiting and Observing Landfill Gas Monitoring (Well GP-2)

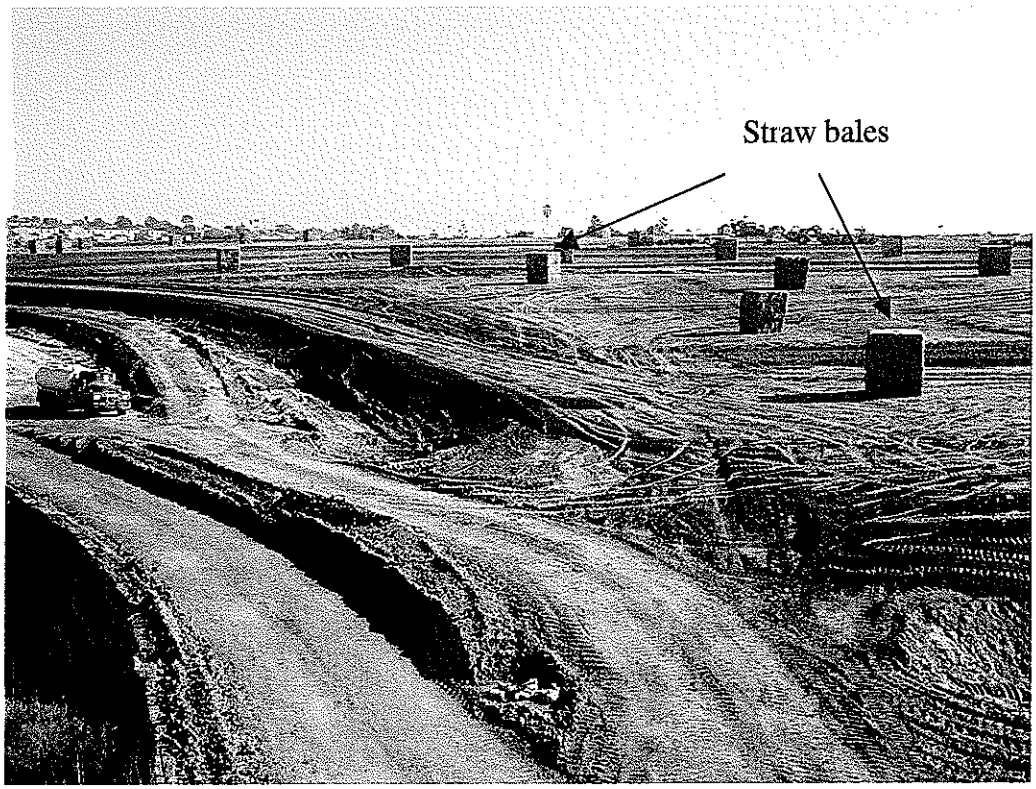
November 20, 2001 – CIWMB and LEA Observing Landfill Gas Monitoring (Well GP-10)



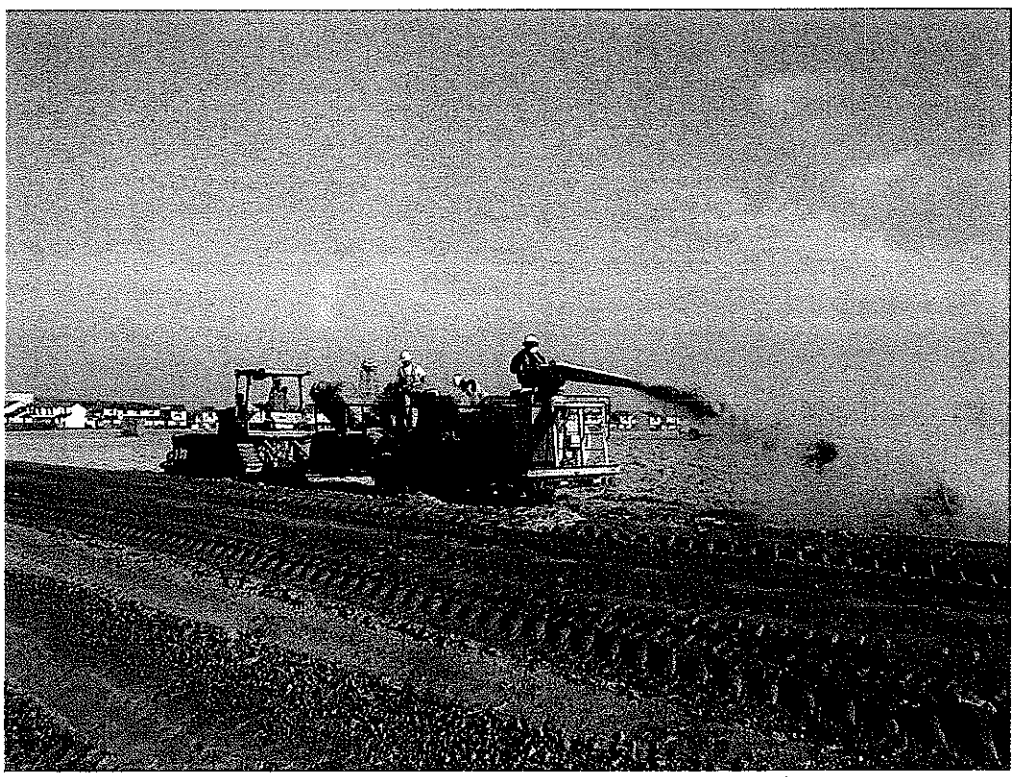
December 4, 2001 – Winterization of 22 Area Borrow Site
(Straw mulch blowing in progress)



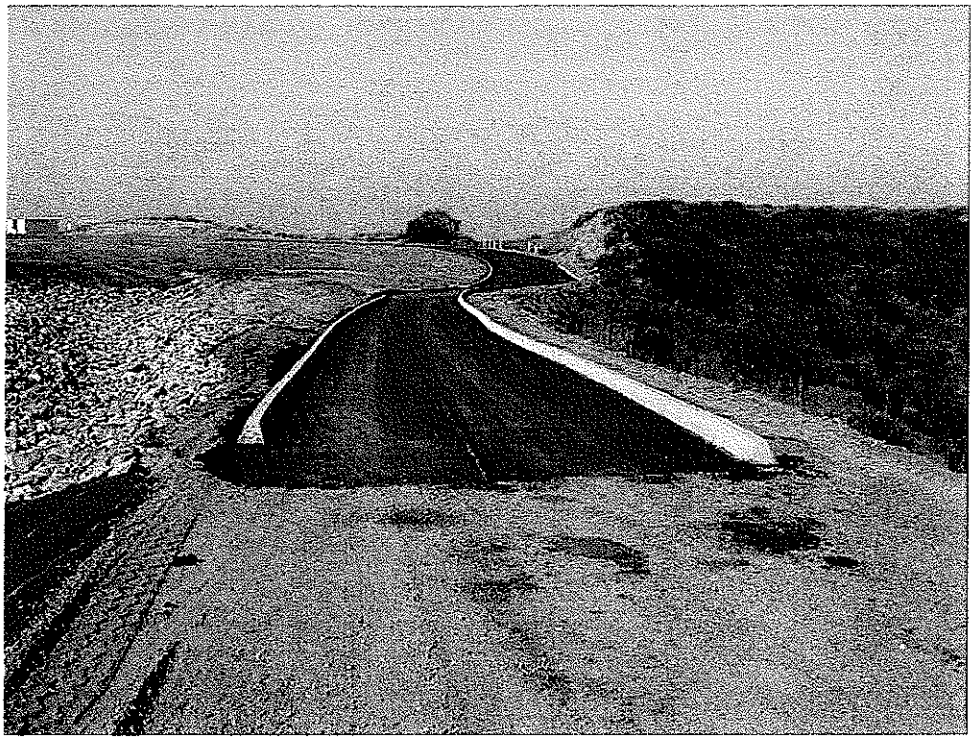
December 4, 2001 – Winterization of 22 Area Borrow Site
(silt fence and check dams in view)



P-16: December 19, 2001 - IR Site 7 Ready for Winterization with Straw Bales (Mulch) Delivered

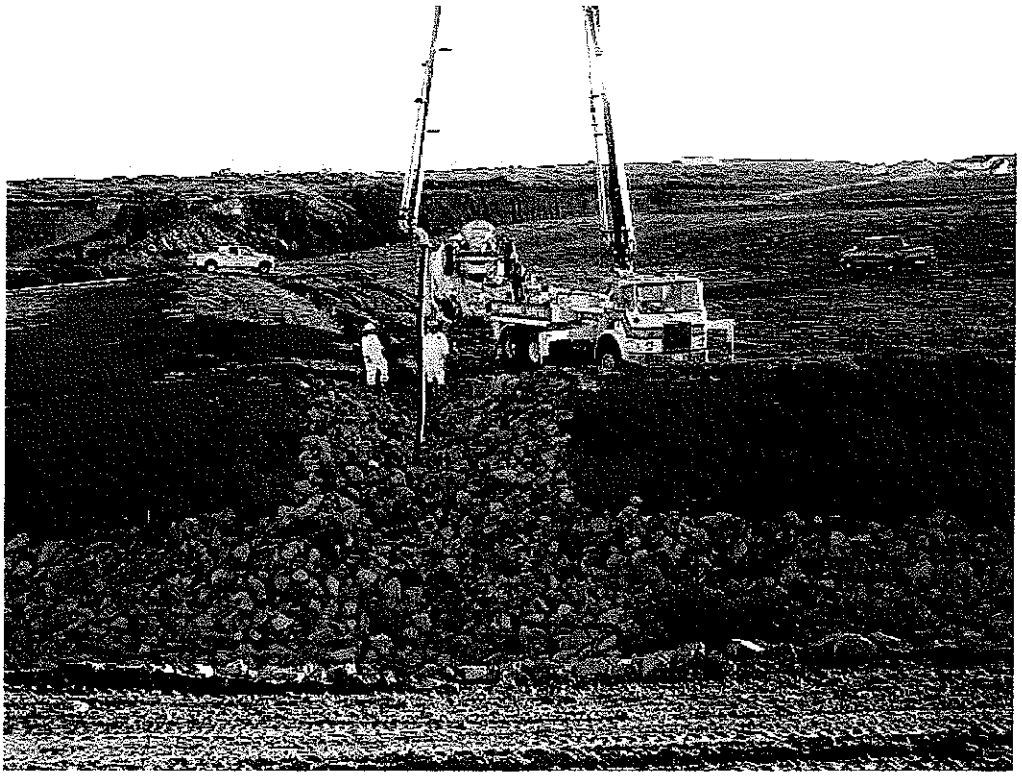


December 20, 2001 – IR Site 7 Winterization with Straw Mulch Blowing in Progress



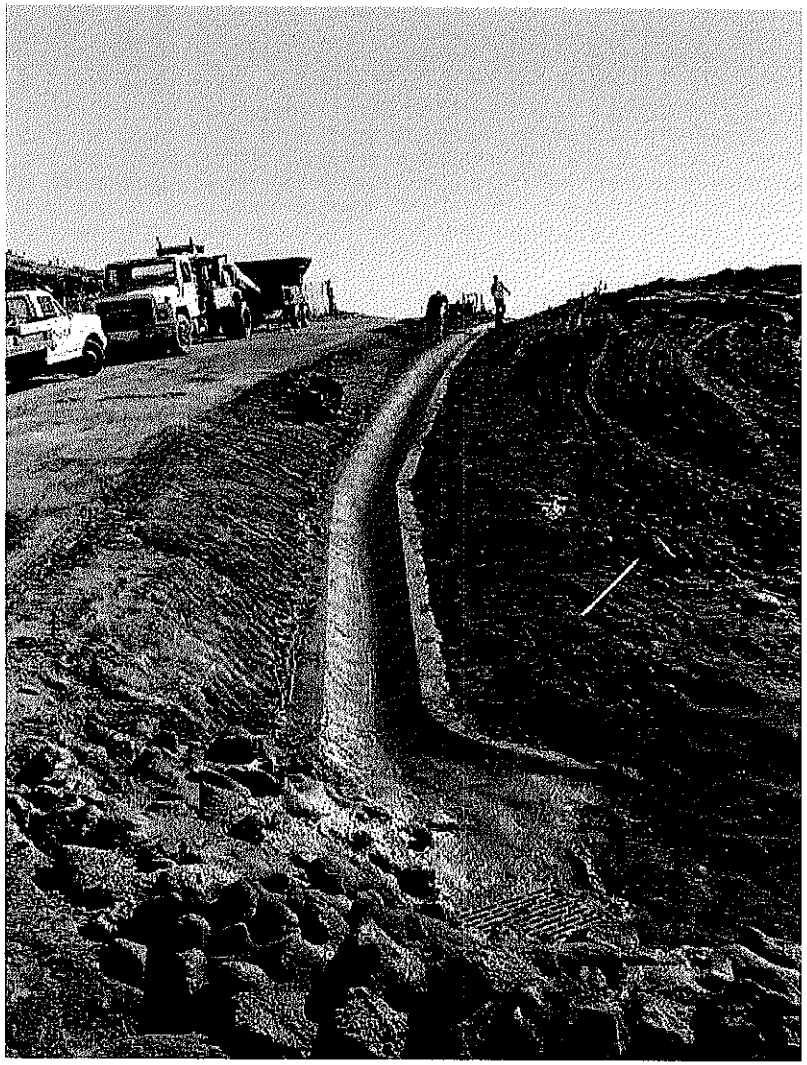
P-17: November 4, 2002 – Final Access Road Construction (Phase II)
Asphalt Pavement in Progress

December 20, 2002 – Final Access Road Construction (Phase II)
Road Sealant Application in Progress

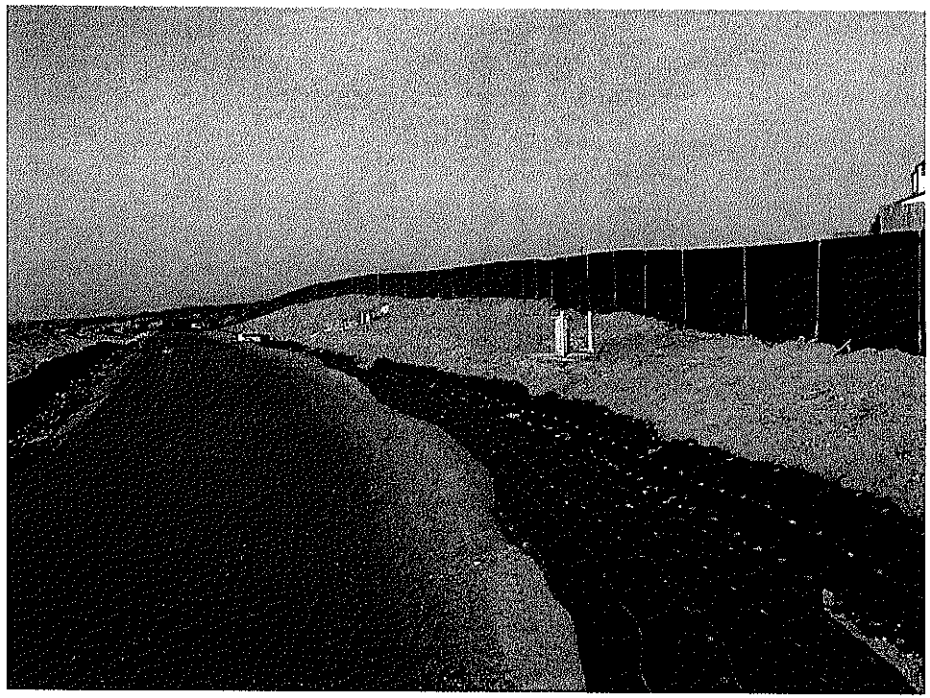


P-18: December 20, 2002 –Final Channel Construction (Phase II)
Concrete Rip-Rap Grouting in Progress

P-19: December 20, 2002 – Final Channel Construction (Phase II)
Installation of Erosion Control Blanket Channel Lining in Progress



P-20: December 20, 2002 – Shotcrete Drainage Ditch Installation



P-21: December 20, 2002 – Channel Lining and Access Road Constructoin

P-22: April 1, 2003 – Postclosure Revegetation Condition

P-23: April 1, 2003 – Postclosure Revegetation Condition

Appendix B
Test Pad Construction and Field Infiltrameter Test Report

Technical Memorandum

To: Project File Date: December 1, 2000

Subject: Results of Test Fill for Field Infiltration Test
Box Canyon Landfill Final Closure

A test fill was constructed during the weeks of August 25 and September 1, 2000 and used to conduct a full-scale field infiltration test. The objectives of the test fill and the full-scale field infiltration test were to evaluate the feasibility of the proposed soil materials, and construction equipment and methods to be used for the construction of the low permeability layer designed for the final closure of Box Canyon Landfill. This memorandum summarizes the test fill soil placement process, test fill quality control activities, and the permeability testing results from the field infiltration test. Photographic records of the test fill construction and infiltration test activities are provided in Attachments 1 and 2, respectively.

Soil Placement Process

During the week of August 25, 2000, an area located to the north of Lemon Grove Road and between the Base Commissary and the recycling center on Vandergrift Boulevard near the Base main entrance was cleared, graded and staked for the test fill construction. The area cleared was sufficiently to build a 100-foot-long by 40-foot-wide and 3-foot-thick test fill. The perimeter of the area was designated with orange fence and both entrances were secured with temporary chain-link fence. Prior to placement of the low permeable soil, the area to be used as the foundation of the test fill was compacted until the CAT 815 sheeps-foot compactor "walked" on top of the soil.

To achieve the 2-inch minus requirement of the low permeable clay soil, a screen plant was mobilized to the Lemon Grove stockpile area on August 28. Screening operations began the next day and the test fill was constructed on August 30. Three belly-dump trucks were used to transport clay soil from the Lemon Grove stockpile screening operation to the test fill area. The clay soil was placed in loose 6-inch lifts and compacted to a minimum of 90% maximum density at a moisture of 2% to 4% higher than the optimum moisture as determined by ASTM D1557 method. The construction proceeded well and in accordance with the work plan until a thickness of 2 feet was achieved. At this time, soil transport operations were halted by some unannounced Base activities that closed the rail spur near the Lemon Grove stockpile area to crossing traffic. In order to complete the remaining lift, approximately 20 feet of each end of the test fill were used to construct the final lift. Soil was pushed with a dozer from both ends of the test fill to the top of the test fill and recompacted until the desired test fill thickness of 3 feet was achieved. Due to this, the final size of the test fill was reduced to about 60-foot-long by 40-foot-wide. The completed surface was then rolled with a smooth drum and covered with plastic sheeting to prevent desiccation. Photographs of the test fill construction are provided in Attachment 1.

Quality Control Activities

Field quality control activities consisted of survey and testing the in-situ density and moisture content. The construction crew surveyed the thickness of each compacted lift of the test fill with a level. Ninyo and Moore Consultants of San Diego, California performed the field quality control testing. Each one-foot lift was tested at least four times for in-situ density by a nuclear gauge following ASTM D 3017 and 2922 methods, and at least once with a san cone kit following ASTM D 1556 method.

Based on the test results, moisture content of the first lift (bottom lift) was below optimum. The lift was ripped, wetted and recompacted until requirements achieved. The field control testing report from Ninyo and Moore is presented in Attachment 3.

Laboratory Permeability Testing Results

On September 6, 2000, six relatively undisturbed 3-inch diameter by 3-inch long thin wall Shelby tube samples were collected at random from the top surface of the test fill. The samples were sealed and transported to Holdrege and Kull of Davis, California for testing of hydraulic conductivity following ASTM D 5084 method. The test results indicated an average permeability of 1×10^{-8} cm/sec. This result is well below the design soil permeability criteria of no higher than 10^{-5} cm/s. A detailed description of the testing results is given in Holdrege and Kull's Final Sealed Double Ring Infiltrometer Permeability Test Report (Attachment 4).

Field Infiltration Test Results

The in-situ permeability of the test fill was determined in accordance with ASTM D 5585 method, Infiltration Rate of Soils in Field Using Sealed Double Ring Infiltrometer (SDRI). Holdrege and Kull of Davis, California was contracted to perform this test. The SDRI installation began on September 6, 2000. Two identical SDRI units were built. Each SDRI consisted of a 6-foot-square open outer ring and a 2-foot-square sealed inner ring. Installation of both units was completed on September 8. A photographic record of the installation process is presented in Attachment 2. The field infiltration test began immediately after the completion of the SDRI. Infiltration reading was taken on daily basis until the test completion on October 17. Results from these tests indicated the test fill had a field permeability of 4.5×10^{-8} cm/sec, relatively consistent with the laboratory test results with a recommended correction. A detailed description of the SDRI test instrumentation, data analysis, and permeability result interpretations is given in Holdrege and Kull's final report (Attachment 4).

Conclusion

A test fill was constructed of soil material proposed for the low-permeability layer of the final closure cover system for the Box Canyon Landfill. A full-scale field infiltration test using a SDRI was performed on the test fill. The results from the SDRI test and other laboratory test indicated that the field permeability of the test fill was almost 3 orders of magnitude lower than the design criterion. Therefore, it is concluded that the proposed soil material and the construction method would be able to achieve the design criterion.

Attachments:

1: Photos of Test Fill Construction
2: Photos of SDRI Installation
3: Ninyo & Moore Summary of Compaction Test Results
4: Holdrege & Kull Sealed Double Ring Infiltrometer Test Report (Excerpt)

Attachment 1
Photos of Test Fill Construction

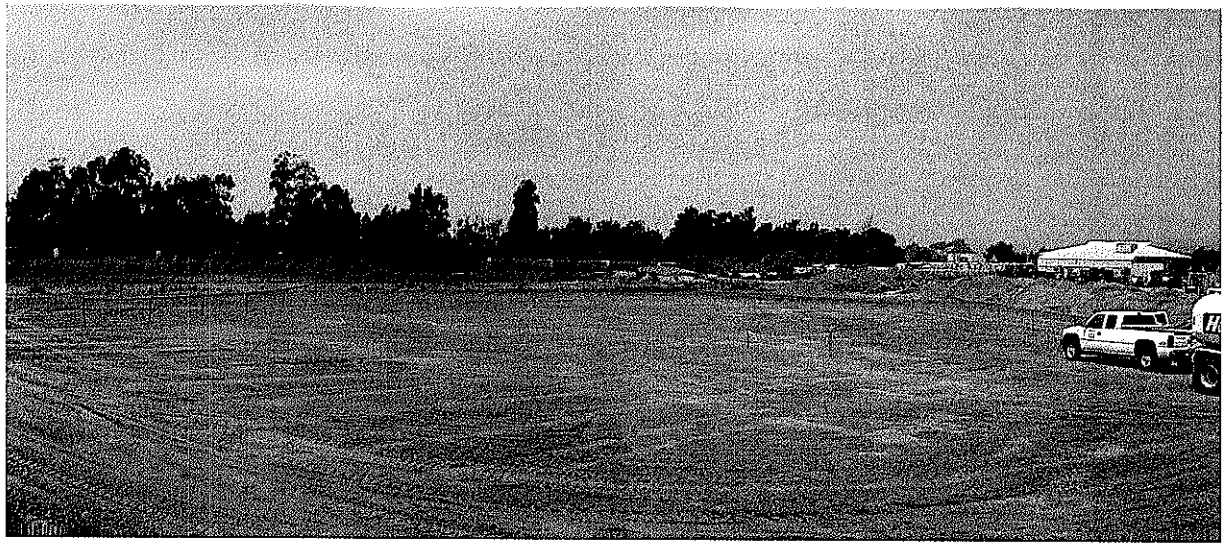


Photo No. 1: Test Pad Construction Area Prior to Placement (Test Pad Location and References are Staked)

Photo No. 2: Placement of First Lift of Clay Material

Photo No. 3: Screening Operation for Lemon Grove Stockpile (Clay Borrow Soil)

Photo No 4: Belly-Dump Truck Used to Transport Clay Soil

Photo No. 5: Test Pad Construction – Second Lift

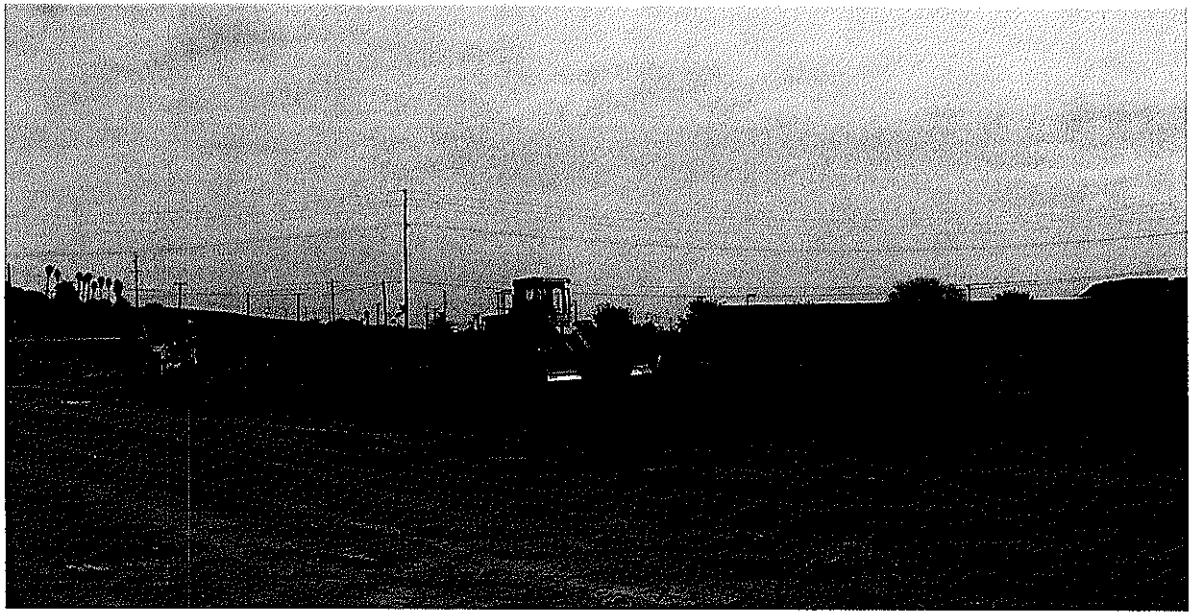


Photo No. 6: Test Pad Construction – Third (Final) Lift

Photo No 7: Field Compaction Testing and Lift Height Confirmation

Photo No. 8: Field Testing Staging Area

Photo No. 9: Completed Test Pad Covered with Plastic to Prevent Desiccation

Attachment 2
Photos of SDRI Installation

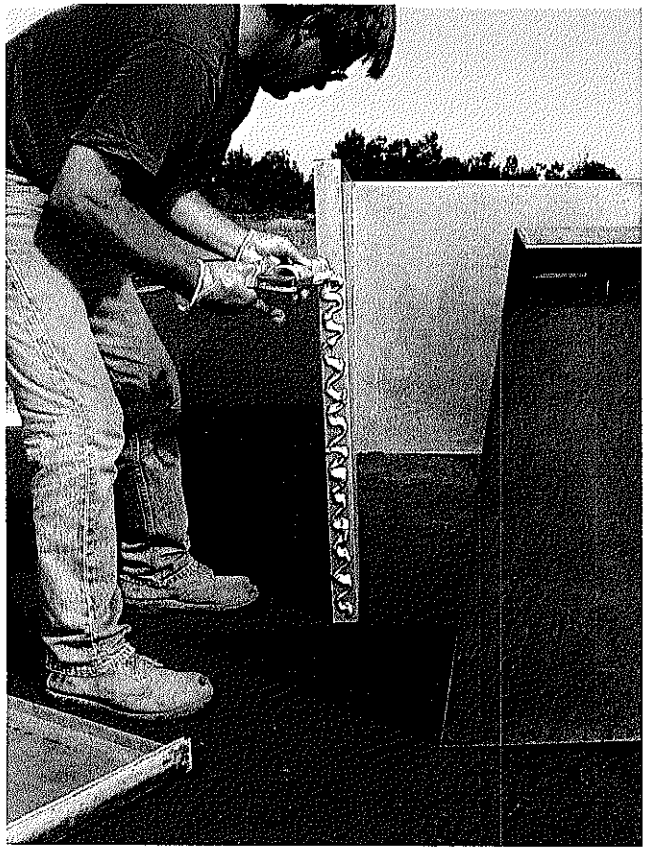


Photo No. 1: Applying Joint Sealant to the Panels of the SDRI Outer Ring prior to Installation

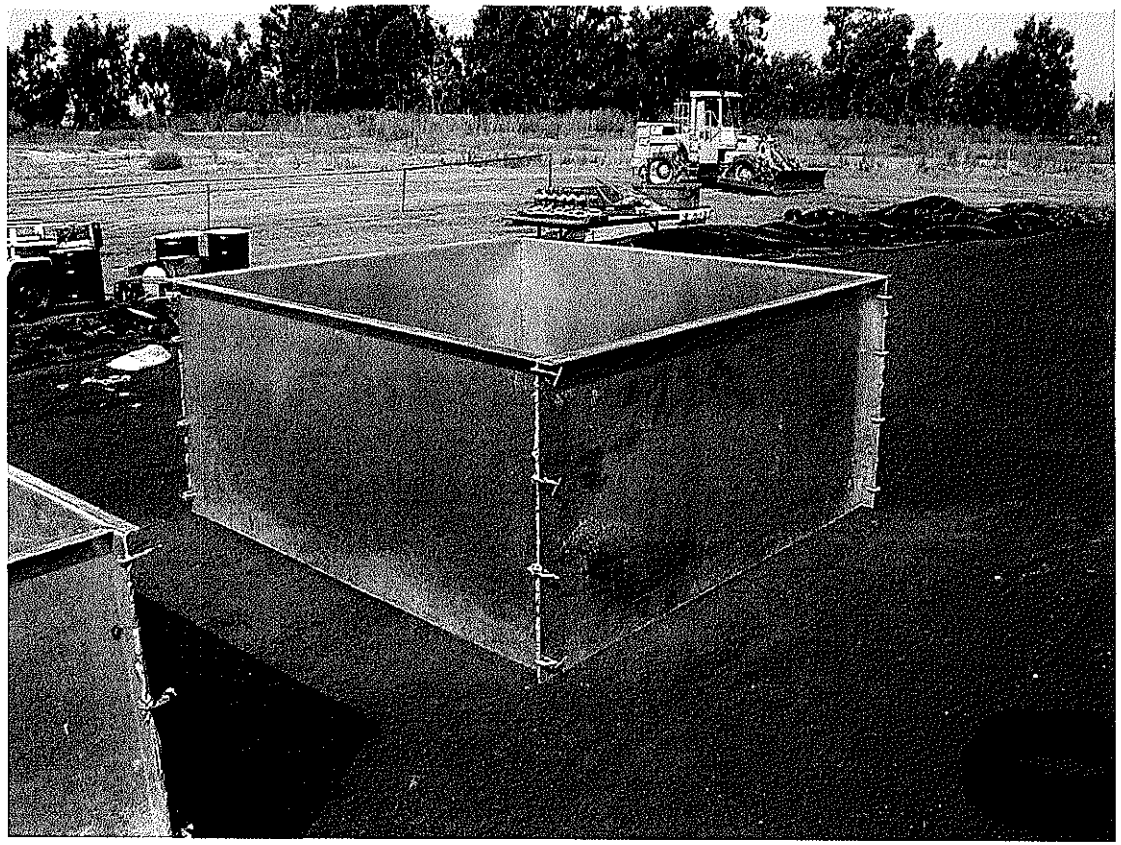


Photo No. 2: SDRI Outer Ring Construction Completed (Joint Sealant and C-Clamps)

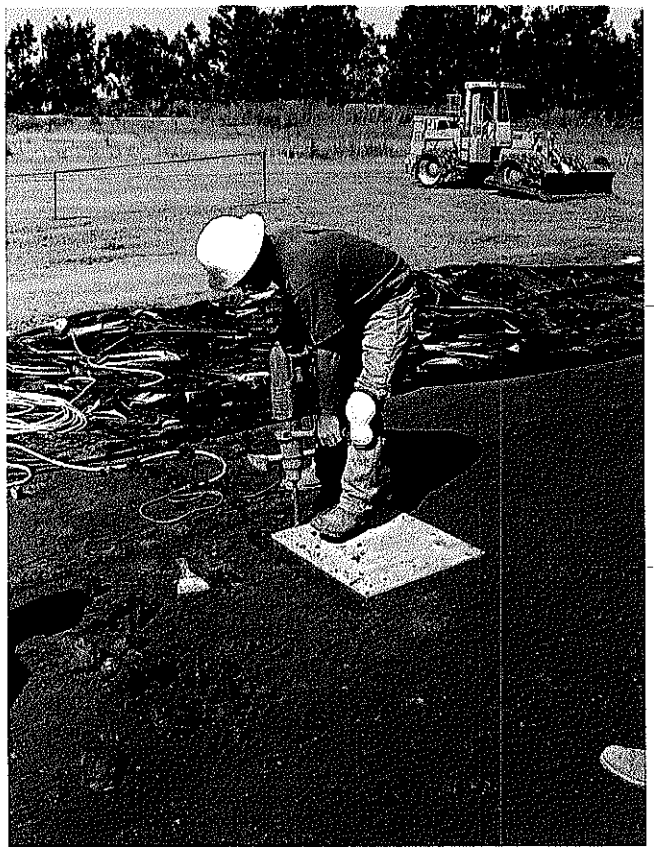


Photo No. 3: Trenching for SDRI Inner Ring

Photo No. 4: Trenching for SDRI Outer Ring and Tensiometer Locations

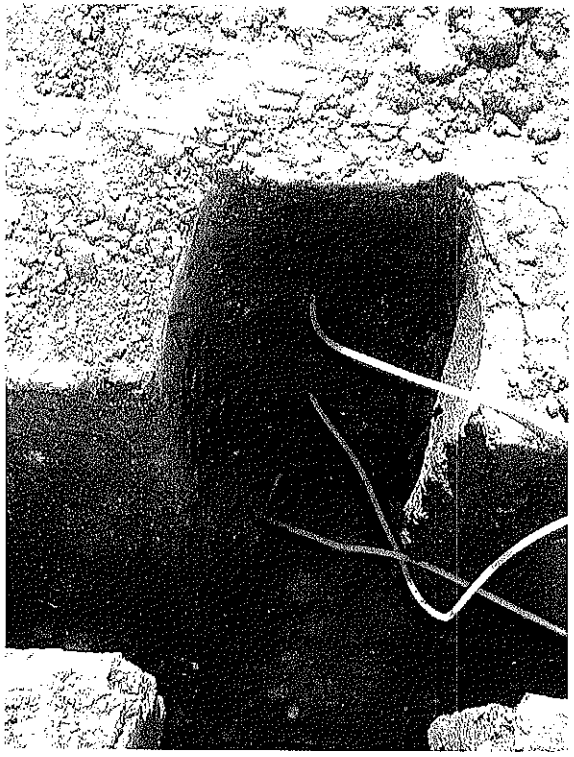


Photo No. 5: Porous Tips of Tensiometers Placed at Depths Indicated

Photo No. 6: SDRI Outer Ring Installed and Trench Filled with Bentonite

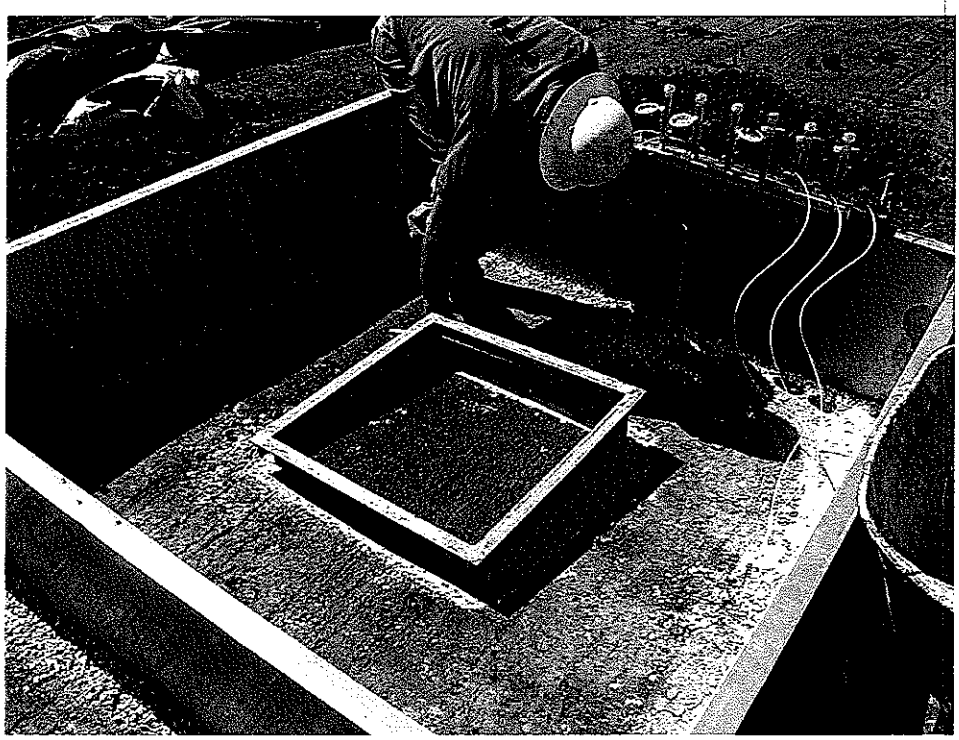


Photo No. 7: SDRI Inner Ring Installed and Trench Filled with Bentonite

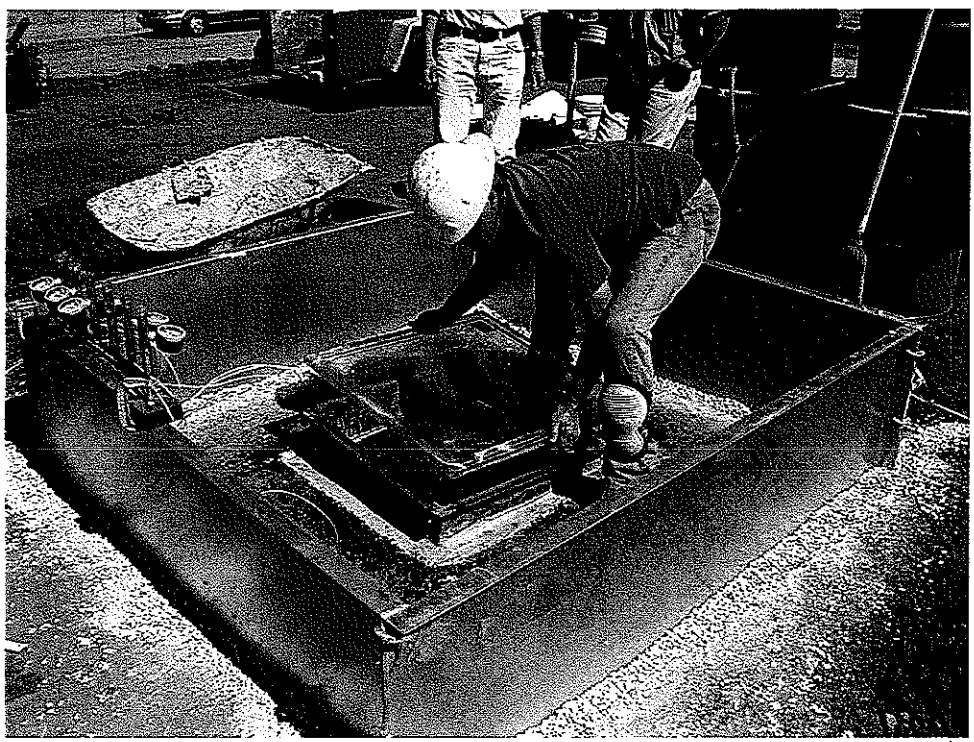


Photo No. 8: Installation of SDRI Inner Ring Cover

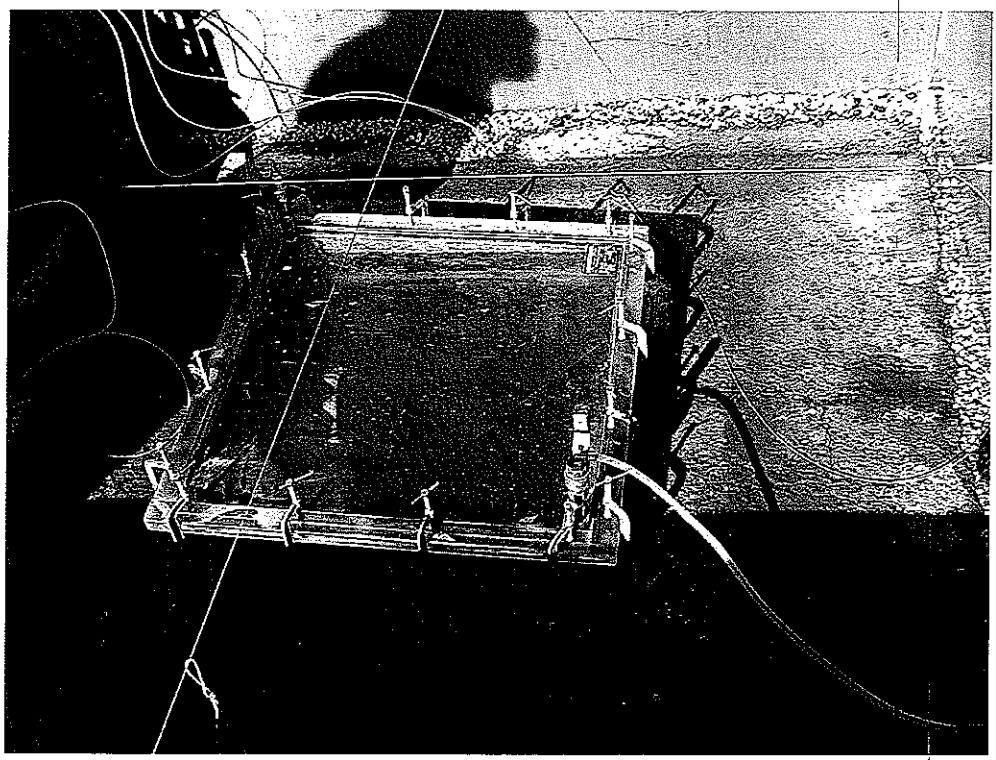


Photo No. 9: Filling and Leak Testing Inner Ring After Installation

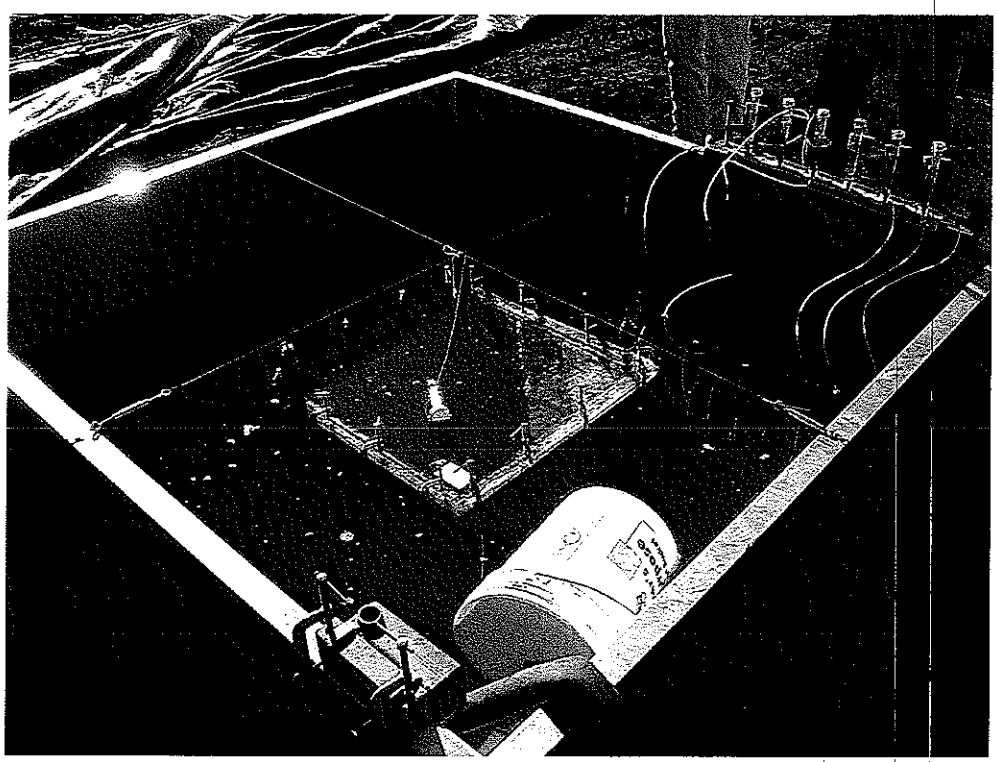


Photo No. 10: Filling Outer Ring

Photo No. 11: Flexible Bags Installed and SDRI Installation Completed

Photo No. 12: Completed Installation of Both SDRI Units

Attachment 3
Ninyo & Moore: Summary of Compaction Test Results

December 18, 2000
Project No. 103067-11.1

Mr. Max Pan
OHM Remediation/IT Group
1230 Columbia Street, Suite 1200
San Diego, California 92101-8517

Subject: Revised Summary of Compaction Test Results for the Box Canyon Test Pad, MCB Camp Pendleton, California

INTRODUCTION

In accordance with your request, Ninyo & Moore has provided compaction testing services for the Box Canyon Test Pad at MCB Camp Pendleton, California. This project included the placement and compaction of proposed backfill soils. Our services consisted of on-call field testing of backfill. This report summarizes our services and presents the results of our field and laboratory tests. This report is a revision to our report dated November 13, 2000. As requested by the client the report has been revised to include testing that had been previously omitted in the original report.

TESTING OPERATIONS

Our services were provided on August 30, 2000. At the request of the client, our field technician performed relative compaction testing of the proposed fill as it was placed and compacted. The tests were performed in general accordance with ASTM D2922-91 and ASTM D3017-88 (Nuclear Method) and ASTM D1556-90 (Sand Cone Method). The results of the field density tests are presented in Table 1, Summary of Field Density Tests for Project No. 103067-11.1. Locations of the field density tests are presented in Figures 1 through 3. Compaction test results were communicated to the client's representative at the time of testing for evaluation.

Laboratory tests were performed on a representative sample of import soil that was used for fill to evaluate maximum dry density and optimum moisture content. Soil Type No. 1, consisting of brown sandy clay with gravel, was imported to the site and used as fill. Laboratory testing of the

maximum dry density and optimum moisture content was conducted in general accordance with ASTM D1557-91, and the results of the laboratory tests are presented in Table 2, Maximum Density Test Results.

SUMMARY

Our technician visited the site on one occasion as requested by the client's field representative. The client's representative evaluated the results of compaction testing and fill placement procedures at the time of testing. The results of our field density tests indicated relative compactions of 90 percent or greater.

LIMITATIONS

The compaction testing services outlined in this report have been conducted in accordance with current practice and standard of care exercised by geotechnical consultants performing similar tasks in this area. No warranty, expressed or implied, is made regarding the opinions presented in this report. Additionally, we did not observe or test the condition of the fill materials below a depth of 6 feet, and can therefore provide no opinion regarding the uniformity or consistency of these materials. The reported test results represent the relative compaction at the locations tested. It is important to note that the precision of field density tests is not exact and variations should be expected. The reported locations and depths of the density tests are estimated based on correlation with the improvement plans. Further accuracy is not implied.

We appreciate this opportunity to be of service. If you have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
NINYO & MOORE

Mark Cuthbert, P.E.
Principal Engineer

Scott R. Adamson
Senior Staff Engineer

SRA/MC/sra

Distribution: (2) Addressee

Attachments: Table 1 - Summary of Field Density Tests for Project No. 103067-11.1
Table 2 - Maximum Density Test Results
Figure 1 - Compaction Test Location Map (Lift 1)
Figure 2 - Compaction Test Location Map (Lift 2)
Figure 3 - Compaction Test Location Map (Lift 3)

Explanation of Summary of Field Density Tests

Test No :	1#	Field density test by Nuclear Method (ASTM D2922-91 & ASTM D3017-88)
	1*	Field density test by Sand Cone Method (ASTM D1556-90)
Test of:		CF Compacted Fill

NOTE: Descriptions of soil types are presented in Table 2.

Ninyo & Moore

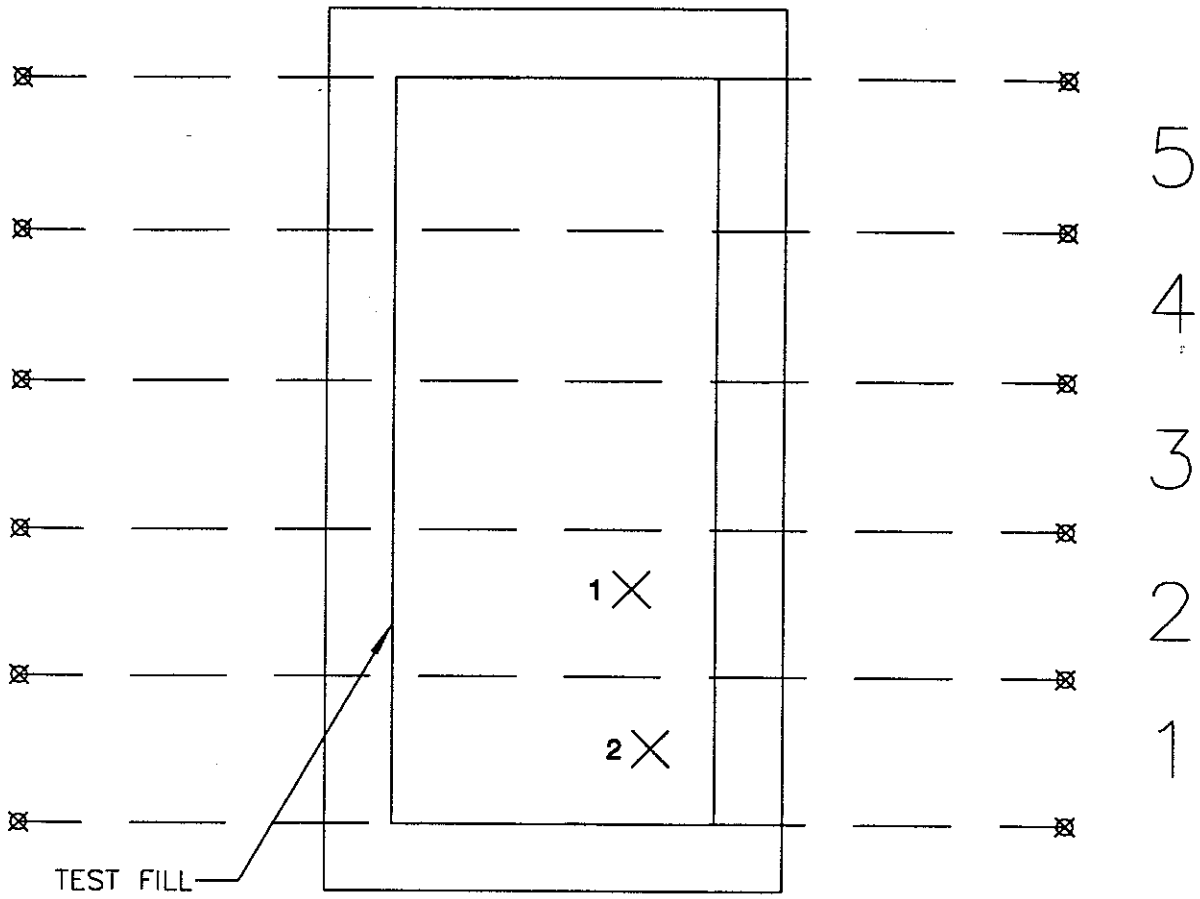
TABLE 1
PAGE 1

SUMMARY OF FIELD DENSITY TESTS FOR PROJECT NO. 103067-11.1 COMPACTED FILL

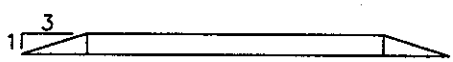
Test No.	Date	Test of	Test Location	Approx Elev. (ft)	Moisture Content		Dry Density		Relative Compaction		Soil Type No.	Remarks
					Field (%)	Opt. (%)	Field (pcf)	Max. (pcf)	Tested (%)	Spec. (%)		
1#	8/30/00	CF	SEE TEST LOCATION MAP	99.2	11.2	9.9	113.7	123.0	92		1	
2*	8/30/00	CF	SEE TEST LOCATION MAP	100.0	9.5	9.9	120.0	123.0	98		1	
3#	8/30/00	CF	SEE TEST LOCATION MAP	100.1	11.5	9.9	118.4	125.7	94		1	
4#	8/30/00	CF	SEE TEST LOCATION MAP	100.4	14.1	9.9	117.8	125.7	94		1	
5#	8/30/00	CF	SEE TEST LOCATION MAP	100.4	11.3	9.9	119.8	125.7	95		1	
6#	8/30/00	CF	SEE TEST LOCATION MAP	100.0	12.4	9.9	119.3	125.7	95		1	
7*	8/30/00	CF	SEE TEST LOCATION MAP	100.2	9.6	9.9	120.4	125.7	96		1	
8#	8/30/00	CF	SEE TEST LOCATION MAP	101.4	13.7	9.9	116.3	125.7	93		1	
9#	8/30/00	CF	SEE TEST LOCATION MAP	101.7	14.1	9.9	115.7	125.7	92		1	
10#	8/30/00	CF	SEE TEST LOCATION MAP	101.7	13.9	9.9	117.3	125.7	93		1	
11#	8/30/00	CF	SEE TEST LOCATION MAP	101.6	13.4	9.9	115.8	125.7	92		1	
12*	8/30/00	CF	SEE TEST LOCATION MAP	101.6	13.0	9.9	116.9	125.7	93		1	

Table 2 – Maximum Density Test Results

Soil Type No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
1	Brown sandy CLAY with gravel	125.7	9.9



TEST FILL DIMENSIONS:
100 FT LONG
40 FT LONG
3 FT LONG



INSTRUCTIONS

1.) IDENTIFY EACH TEST LOCATION WITH AN "X" ON THE MAP.
2.) LABEL EACH LOCATION WITH THE SAMPLE NUMBER.
3.) INDICATE THE LIFT NUMBER
4.) INDICATE THE NUMBER OF PASSES MADE BY COMPACTION EQUIPMENT

EXPLANATION

⊠ FENCE POST
X GEOTECHNICAL TEST LOCATION

LIFT NUMBER: 1

COMPACTION PASS No.: _____

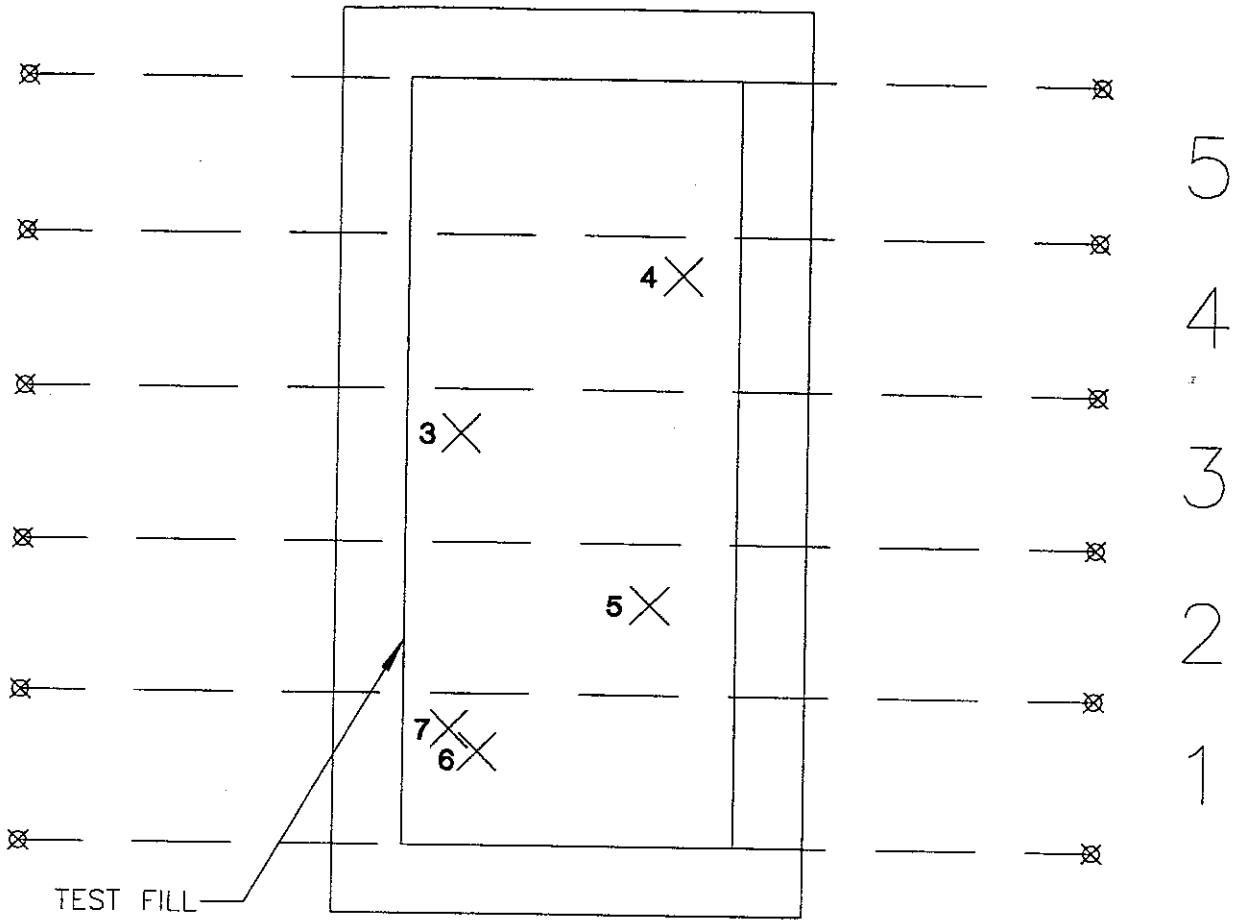
G:3067-11F1

Ninyo & Moore

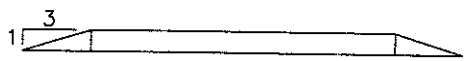
COMPACTION TEST LOCATION MAP

BOX CANYON LANDFILL

PROJECT NO.	DATE	FIGURE
103067-11	12/00	1



TEST FILL DIMENSIONS:
100 FT LONG
40 FT LONG
3 FT LONG



INSTRUCTIONS

1.) IDENTIFY EACH TEST LOCATION WITH AN "X" ON THE MAP.
2.) LABEL EACH LOCATION WITH THE SAMPLE NUMBER.
3.) INDICATE THE LIFT NUMBER.
4.) INDICATE THE NUMBER OF PASSES MADE BY COMPACTION EQUIPMENT

EXPLANATION

⊠ FENCE POST

X GEOTECHNICAL TEST LOCATION

LIFT NUMBER: 2

COMPACTION PASS No.: _____

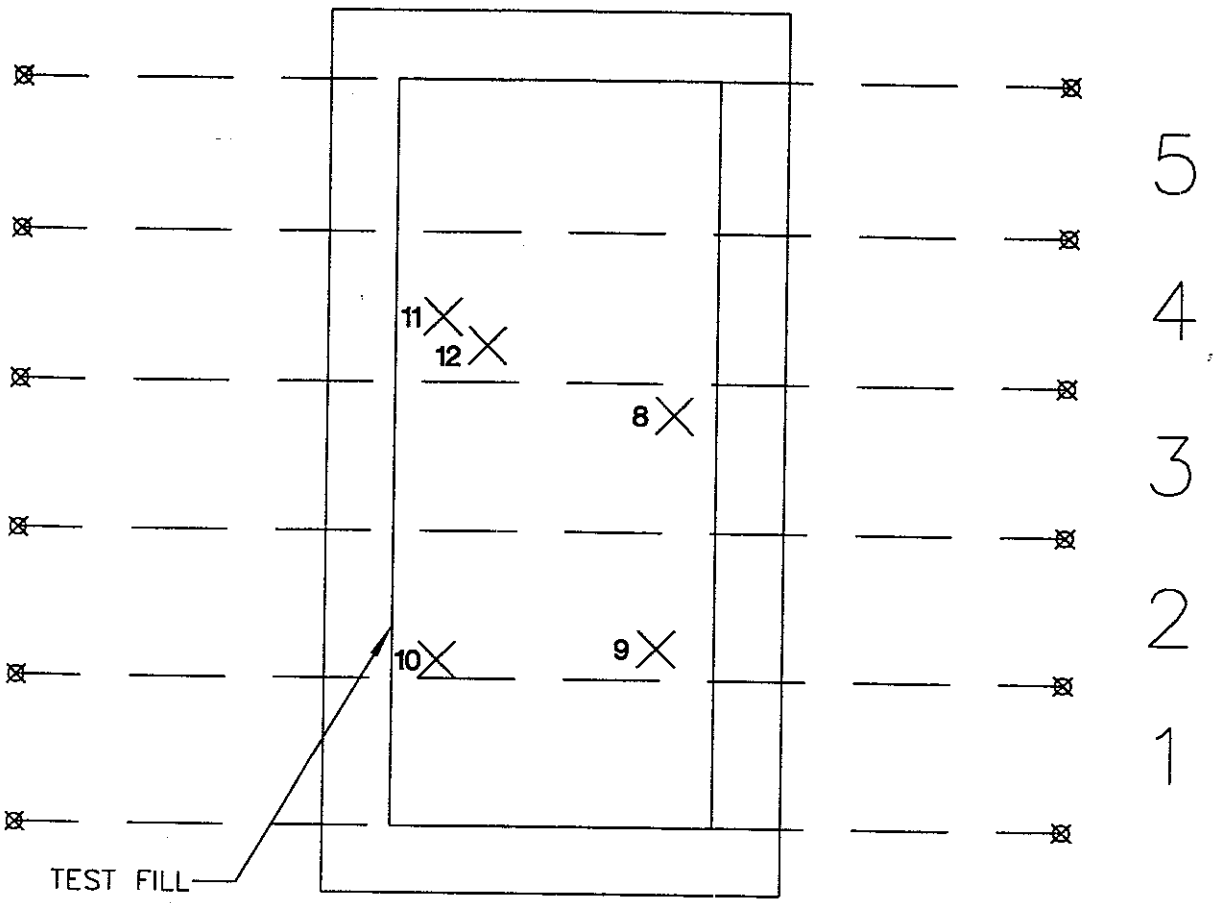
G:3067-11F2

Ninyo & Moore

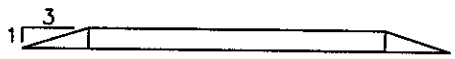
COMPACTION TEST LOCATION MAP

BOX CANYON LANDFILL

PROJECT NO.	DATE	FIGURE
103067-11	12/00	2



TEST FILL DIMENSIONS:
100 FT LONG
40 FT LONG
3 FT LONG



INSTRUCTIONS

1.) IDENTIFY EACH TEST LOCATION WITH AN "X" ON THE MAP.
2.) LABEL EACH LOCATION WITH THE SAMPLE NUMBER.
3.) INDICATE THE LIFT NUMBER.
4.) INDICATE THE NUMBER OF PASSES MADE BY COMPACTION EQUIPMENT

EXPLANATION

⊗ FENCE POST

X GEOTECHNICAL TEST LOCATION

LIFT NUMBER: 3

COMPACTION PASS No.: _____

Ninyo & Moore

COMPACTION TEST LOCATION MAP

BOX CANYON LANDFILL

PROJECT NO.	DATE
103067-11	12/00

FIGURE 3

Attachment 4
Holdrege & Kull: Sealed Double Ring Infiltrometer Permeability Test Report (Excerpt)

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

SEALED DOUBLE RING INFILTROMETER PERMEABILITY TEST REPORT

for

Soil Test Fill Pad
Box Canyon Sanitary Landfill
Camp Pendleton Marine Corps Base,
San Diego County, California

Prepared for:
IT Corporation
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Irvine, California 92612

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Project No. 30,025-01
November 14, 2000

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November 14, 2000
Project No. 30,025-01

Mr. Max Pan
IT Corporation
3347 Mechelson Drive
Irvine, California 92612
Phone: 949-660-7572, Fax: 949-475-5434

Reference: ***Box Canyon Sanitary Landfill***
Camp Pendleton Marine Corps Base, California
Subject: ***Sealed Double Ring Infiltrometer Permeability Test Report***

Dear Max,

Holdrege & Kull (H&K) is pleased to have had this opportunity to perform two sealed double ring infiltrometer (SDRI) tests to measure the in-place soil permeability of a test fill pad at the above referenced site. Both SDRI tests were performed consistent with the American Society for Testing and Materials D5093 standardized procedures. It is our opinion that the tested soil is suitable for constructing the landfill final cover system low-permeability soil layer. The actual borrow soil used to construct the final cover system low-permeability soil layer should be periodically tested to insure that the engineering material properties of the soil remain similar to those of the test fill pad. The borrow soil should also be moisture conditioned, placed and compacted consistent with the methods and criterion used to construct the test fill pad.

We performed the in-place SDRI permeability tests in general compliance with the engineering services presented in our August 22, 2000 Proposal No. DP0062 and IT Corporation Purchase Order No. 153569. Our test results are presented herein. If you have any questions concerning the contents of this report please call the responsible civil engineer whose signature and seal appear below at (530) 759-9800.

Thank you for selecting H&K to perform these important engineering services for the IT Corporation and the Camp Pendleton Marine Corps Base.

Sincerely,

Holdrege & Kull

REGISTERED CIVIL ENGINEER
DONALD M. OLSEN
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11/14/00

Donald M. Olsen, R.C.E. 49,514 11/14/00
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1 INTRODUCTION

H&K performed two in-place sealed double ring infiltrometer (SDRI) permeability tests on a test fill pad. The test fill pad was constructed in accordance with the closure cover design criteria developed for closure of the Box Canyon Sanitary Landfill (BCSL) at the Camp Pendleton Marine Corps Base. We performed all engineering services tasks consistent with the scope-of-services presented in our August 22, 2000 Proposal No. DP0062. Both SDRI tests were performed consistent with the American Society for Testing and Materials (ASTM) D5093 standardized test procedures.

The testfill was constructed and tested in order to determine the suitability of construction techniques and the engineering properties of the proposed borrow soil source for constructing the low-permeability soil layer of the final cover. The design criteria calls for a maximum soil permeability of 1×10^{-5} centimeters per second (cm/s) when the soil is compacted to a minimum of 90 percent of the maximum dry density as determined by the ASTM D1557 test method with a moisture content between 0 and 3 percentage points greater than the ASTM D1557 optimum moisture content.

The testfill pad was constructed from on-site clay borrow soil identified by OHM Remediation Services Corp (OHM). IT Corporation (ITC) performed construction quality assurance and quality control (QA/QC) monitoring and testing during construction of the test fill pad. OHM completed construction of the test fill pad on August 31, 2000. Immediately upon completing construction of the test fill pad OHM deployed a plastic cover sheet over the finished test fill pad surface in order to minimize moisture loss and the development of desiccation cracks. Figure 1 shows the general configuration and dimensions of the test fill pad. Figure 1 also shows the approximate locations of the two SDRI tests and six laboratory test samples.

2 LABORATORY TESTING

An ITC QA/QC monitor took six relatively undisturbed soil samples from the test fill pad top surface for verification laboratory tests. Figure 1 shows the approximate locations where the samples were taken on the test fill pad. The samples were collected using 3-inch-diameter by 3-inch-long thin-wall Shelby tubes. Each soil specimen was sealed inside a Shelby tube by plastic end-caps and then given to our field representative. Our field representative packaged the samples and transported them samples to our laboratory facility for testing. We performed laboratory characterization tests to measure the soil engineering material properties consistent with the ASTM testing guidelines. The general soil engineering material properties are summarized below.

Summary of Laboratory Test Data

ASTM No.	Test Name	Results
D422	Particle Size Gradation	Fine Gravel: 5 to 10 percent Sand: 58 to 44 percent Silt and Clay: 37 to 46 percent
D2488	Unified Soils Classification System	Clayey Sand (SC)
D4318	Atterberg Plasticity Indices	Liquid Limit: 28 to 34 percent Plasticity Index: 16 to 25
D5084	Permeability	Low: 8.48×10^{-10} cm/s High: 1.04×10^{-8} cm/s Average: 8.25×10^{-9} cm/s.

The laboratory test results indicate that the test fill pad soil generally consists of a brown, low-plasticity, clayey, sand. According to the Unified Soil Classification System (USCS) the test fill pad soil is classified as a clayey sand (SC). Table 1 presents a more detailed summary of the laboratory test results. We included the laboratory test data sheets in Appendix A.

3 FIELD SDRI TESTING

We arrived at the site on September 6, 2000 and started to install two identical SDRI apparatus. The installation was completed on September 8, 2000. Figure 1 shows the approximate locations where the two SDRI were installed on the test fill pad. We started both SDRI tests on September 8, 2000. An ITC QA/QC Monitor collected all field measurement data and serviced the equipment during the test. The test data was transmitted to H&K for interpretation and decision-making. We terminated the

SDRI test on October 17, 2000 after determining that sufficient data had been collected to allow us to accurately estimate of the in place permeability of the test fill pad soil.

The methodology and equipment, installation procedures, data collection procedures, and analysis and results are presented in the following sections.

3.1 SDRI METHODOLOGY AND EQUIPMENT

The SDRI tests a relatively large area so that the effects of both micro (intergranular flow) and macro (flow through minor discontinuities) permeabilities are measured. The SDRI measures the vertical, one-dimensional infiltration rate of water through the testfill pad soil. We computed the permeability of the testfill pad soil from the SDRI test area geometry, infiltration rate, and hydraulic gradient data.

The SDRI test apparatus consists of a sealed inner ring assembly (2-foot-square by 8-inch-high, flanged top steel ring with a 3/4-inch-thick transparent plastic top plate, rubber gasket seal, and two port valves); an outer ring assembly (6-foot-square by 3-foot-high aluminum panels); tensiometers; flexible water supply bag and plastic tubing; vacuum pump; Bourdon vacuum gauge; and thermometer. Figure 2 shows the SDRI components and a typical set up configuration on a testfill pad. The SDRI method for determining the in situ permeability of a soil is briefly described below.

Both the inner and outer ring assemblies are embedded and grout-sealed into the test fill pad soil to specified depths. The tensiometers are installed in the soil between the inner and outer rings at depth of 15, 30 and 45 centimeters. Both rings are filled with water and a water trough valve and water supply tank assembly is used to maintain a constant depth of water in the outer ring. The outer ring serves as a water reservoir for the purpose of inducing a uniform hydraulic gradient with one-dimensional downward vertical flow through the soil contained inside the inner ring. The flexible water supply bag and tube assembly is used to quantify the volume of water infiltrating through the 2-foot-square soil test section contained inside the inner ring. The in situ permeability of the testfill pad soil is estimated from the infiltration rate and hydraulic gradient data for each measurement period. Detailed description of the installation procedures, testing procedures, and analysis methods and results are presented below.

3.2 INSTALLATION PROCEDURES

We installed both SDRI apparatus in general conformance with the ASTM D5093 guideline procedures. Although tensiometers are not required by the D5093 test method, we installed tensiometers in the soil test area between the inner and outer rings to measure the soil suction pressure of the unsaturated soil. The tensiometer data enabled us to better estimate the wetting front penetration depth throughout the test. The SDRI apparatus installation procedures are described below.

3.2.1 Inner Ring Installation

The inner ring is installed by excavating four intersecting trenches to form a roughly 2-foot-square test section. The trench dimensions are about 2.5 inches wide by 6 inches deep. The trenches are excavated so that an annular space of about 1/2-inch exists between the ring and inner trench side walls. The bottom of each trench is leveled with hand shovels before placing the ring into the trenches. A bentonite grout is used to seal the ring to the testfill pad soil. The grout is mixed and placed into the trench so that the grout surface is brought to within 1/2-inch of the top of the testfill pad surface. The grout is compacted during placement to remove voids. The ring is then installed by pressing it into the grout filled trench until it touches the trench bottom. The surface of the grout on both the interior and exterior of the inner ring is smoothed with a putty spade.

The transparent plastic top plate assembly is secured to the inner ring with 16 C-clamps. Each C-clamp is tightened as needed until the rubber gasket seal is uniformly seated. Valve assemblies are attached to the lower corner port (bottom port) and higher diagonal corner port (top port) of the top plate assembly. The top port valve remains closed during the entire test with the following exceptions: (1) during filling of the inner ring to allow air to be expelled, (2) during the air purging process performed periodically throughout the test, and (3) to measure the air-entry soil suction head at the end of the test. The bottom port valve is attached to a flexible hose which is connected to a flexible water supply bag.

3.2.2 Outer Ring Installation

The outer ring is installed by excavating four intersecting trenches to form a roughly 6-foot-square test section. The trench dimensions are about 4 inches wide by 18 inches deep. The trenches are excavated so that an annular space of about 2 inches exists between the ring and trench side walls. The bottom of each trench is leveled with hand shovels before placing the ring into the trenches. The outer ring is installed by lowering it into the trench until it touches the trench bottom. A bentonite grout is installed too seal the outer ring to the testfill pad soil. The grout is placed into the trench so that the grout surface is brought to within 1/2-inch of the top of the testfill pad surface. Then soil is placed over the grout surface only on the out side of the outer ring.

3.2.3 Tensiometer Installation

We installed micro-tensiometers at depth of 15, 30 and 45 centimeters below the top surface of the test fill pad between the inner and outer rings. A ¼-inch-diameter drill bit is used to drill each tensiometer bore hole. A tensiometer is pushed into the bore hole until it is seated at the end of the bore hole. The tensiometer is sealed in the bore hole by backfilling with a mixture of soil and bentonite. The test fill soil immediately draws water from the tensiometer due to the natural suction (vacuum) pressure that exists within the unsaturated soil. The soil suction pressure is read directly from

the tensiometers. Tensiometers are not required by the ASTM D5093 SDRI test method.

3.2.4 Ring Leak Testing

Both the inner and outer rings are leak tested to verify that the grout seal and inner ring top plate rubber gasket seal are watertight. The inner ring leak test procedures are: (1) close the top port valve, (2) fill the ring with water using a siphon tube in order to avoid eroding the testfill pad surface, (3) attach a full water supply bag to the open bottom port valve, (4) place the water supply bag at a height of about 60 centimeters above the testfill pad surface, and (5) inspect the grout and rubber gasket seals for evidence of leakage for a period of 10 minutes. Leakage along the rubber gasket seal is abated by tightening or adding C-clamps. The outer ring leak test procedures are: (1) fill the outer ring with about 6 inches of water, and (2) observe the outer surface for the presence of water flow. Leakage along the outer ring is abated by compacting the soil with shovels.

3.2.5 Flexible Water Supply Bag Assembly

A flexible water supply bag assembly is used to measure the volume of water infiltrating through the sealed inner ring test area. The flexible water supply bag is attached to the inner ring through a series of fittings, tubes, and valves. Teflon® tape is used to seal all threaded fittings and plugs. Barbed compression fittings are used to obtain seals for all tube connections. The bottom port tube is attached to a valve that is connected to the flexible water supply bag. The valves and tubing connections allow the flexible water supply bag to be temporarily removed from the inner ring so that the water remaining inside the bag can be isolated and weighed. The volume of water infiltrating the inner ring test area during each measurement period is determined from the initial and final weights of the water contained inside the flexible water supply bag.

3.3 DATA COLLECTION PROCEDURES

An ITC monitor collected the SDRI test data and serviced the equipment during the test. The test data was transmitted to an H&K engineer whom interpreted the test data. The test data collected for the northern and southern SDRI apparatus are presented in Appendices B and C, respectively. The procedures used to collect the SDRI test data are described below.

3.3.1 Relative Elevation Survey Data

A water survey instrument is used to measure the relative elevation of marked control point locations on both the inner and outer rings and hubs set in the soil exposed between the inner and outer rings. The elevations of these control points are measure relative to a control hub set into the top of the test fill pad but outside the influence of the SDRI test apparatus. Changes in the relative elevations of the control points indicates movement of the control points caused by soil swell behavior. The

relative elevation survey data for the northern and southern SDRI apparatus are presented in Tables N1 and S1 of Appendices B and C, respectively.

3.3.2 Entrapped Air Purge Data

Air that is expelled from the soil within the inner ring displaces an equal volume of water within the inner ring and flexible water supply bag system. The entrapped air purge data for the northern and southern SDRI apparatus are presented in Tables N2 and S2 of Appendices B and C, respectively.

The entrapped air volume is quantified by purging the entrapped air from the inner ring as follows:

- Two flexible water bags are prepared by filling one bag near full (supply bag) and draining one bag near empty (receiving bag) and weighing both bags to the nearest tenth of gram.

- The supply bag is attached to the lower inner ring port and the receiving bag is attached to the higher inner ring port. The valves on both bags are closed during installation.

- The valves on both supply and receiving bags are opened to begin the purging process. The supply bag is elevated above the outer ring water level creating a head condition that forces water into the inner ring which pushes both air and water from the inner ring into the receiving bag. When all of the entrapped air has been flushed into the receiving bag the supply bag is then lowered back into the outer ring. Finally the valves on both the supply and receiving bags are closed.

- Both the supply and receiving bags are removed and again weighed to the nearest tenth of a gram. If there is no entrapped air within the inner ring, then the weight loss of the supply bag will equal the weight gain of the receiving bag. If there is entrapped air inside the inner ring, then the supply bag will loose more weight than what the receiving bag will gain. The difference in the weights of the supply bag and receiving bag is equal to the volume of entrapped air within the inner ring.

3.3.3 Tensiometer Data

Tensiometers are used to measure the suction pressure of the test fill pad soil. A suction or vacuum pressure is read by the tensiometers when the soil is unsaturated and approaches a low or zero value when the soil is saturated. The tensiometers are used to estimate the depth of the wetting front during the test. It should be noted that not all of the tensiometers functioned properly, therefore the data recorded from the malfunctioning tensiometers were disregarded. The tensiometer data for the northern

and southern SDRI apparatus are presented in Tables N3 and S3 of Appendices B and C, respectively.

3.3.4 Water Temperature Data

The water temperature is monitored with a thermometer placed inside the outer ring reservoir. Expansion and contraction of the inner ring and of the water within the inner ring, due to temperature changes, causes water to flow into or out of the flexible water supply bag. The temperature correction factor computed for the SDRI test is presented below.

Temperature Correction = 5 milliliters (ml) per 1°Centigrade (C)

The water temperature correction factor is applied by subtracting 5 ml of water from the measured flow volume for every 1°C decrease in water temperature; or adding 5 ml of water to the measured flow volume for every 1°C increase in the water temperature. The water temperature data for the northern and southern SDRI apparatus are presented in Tables N4 and S4 of Appendices B and C, respectively.

3.3.5 Inner Ring Infiltration Data

A flexible water supply bag is used to measure the volume of water infiltrating through the test section that underlies the inner ring. During the test the flexible water supply bag is never allowed too completely empty, because the only source of water to the inner ring is from the flexible water supply bag. The inner ring infiltration data for the northern and southern SDRI apparatus are presented in Tables N4 and S4 and shown on Figures N4 and N5 of Appendices B and C, respectively.

The inner ring infiltration data collection procedures are performed for each measurement period as follows:

- The flexible water supply bag is filled with water, its valve closed, dried, and then weighed to the nearest tenth of a gram.
- The full flexible water supply bag, with its valve closed is submerged in the outer ring reservoir and attached to the inner ring with a flexible tube.
- Each flow measurement period is started by opening the valve, and recording the date and time to the nearest minute.
- Each flow measurement period is ended by closing the flexible water supply bag valve, disconnecting the flexible water supply bag from the inner ring flexible tubing, and recording the date and time to the nearest minute.

- The flexible water supply bag is removed from outer ring reservoir, dried, and weighed to the nearest tenth of a gram.

- The flow volume during each measurement period is determined from the initial and final weight of the flexible water supply bag. The flow volume is then corrected for temperature changes and entrapped air, if applicable.

3.3.6 Soil Moisture Content Versus Depth Profile Data

At the end of the test, a soil moisture content versus depth profile is prepared by taking a core sample of soil from within the inner ring with a 7.6-centimeter-diameter by 76.2-centimeter-long Shelby tube. The sampling process involved evacuating the water from both the inner and outer rings and driving the Shelby tube into the soil to a depth of about 45 to 60 centimeters below the existing testfill pad surface.

The soil sample is removed from the test fill pad and then sealed inside the Shelby tube with plastic caps and tape. The sealed sample is then transported to H&K's soil laboratory testing facility. The soil sample is extruded from the Shelby tube, and sliced into 2-centimeter-thick segments perpendicular to the direction of the flow. The moisture content of each sample segment is then measured. A moisture content versus depth profile for the testfill pad soil is prepared and used to estimate the actual saturated wetting front penetration depth at the end of the SDRI test. The inner ring infiltration data for the northern and southern SDRI apparatus are presented in Tables N5 and S5 and shown on Figures N5 and S5 of Appendices B and C, respectively.

3.3.7 Air-entry Soil Suction Pressure Data

The air-entry soil suction pressure is measured at the end of the infiltration portion of the test. The bottom ring port is closed and a vacuum pump is attached to the open top port and used to create a vacuum inside the ring. The vacuum pressure is slowly increased until air bubbles are visually observed coming to and leaving the soil surface. The vacuum pressure corresponding to the first observation of air bubbles represents the air-entry suction pressure of the soil. The inner ring infiltration data for the northern and southern SDRI apparatus are presented in Tables N6 and S6 of Appendices B and C, respectively.

3.4 ANALYSIS METHODS AND RESULTS

The SDRI test data are used to compute the infiltration rate and the in situ permeability (hydraulic conductivity) of testfill pad soil. The analysis methods and results are presented in the following sections.

3.4.1 Inner Ring Infiltration Rate

The infiltration rate for each measurement period is computed directly from the SDRI test data as follows:

$$I = \frac{V}{(A * t)}$$

Where,

I	=	infiltration rate (cm/s),
V	=	corrected total flow volume (cm^3),
A	=	cross sectional area perpendicular to flow (cm^2), and
t	=	measurement period (seconds [s]).

The infiltration rates and graphs of the infiltration rate as a function of time for the northern and southern SDRI test apparatus are presented in Table N4 and S4, and shown as a function of time on Figures N4 and S4 of Appendices B and C, respectively. The plots for the northern and southern SDRI test apparatus indicate that the average infiltration rates during the last four measurement periods are 2.24×10^{-7} and 1.36×10^{-7} cm/s, respectively.

3.4.2 Soil Moisture Content Versus Depth Profile

The soil moisture content versus depth profile data measured at the end of infiltration test are presented on Table N5 and S5 and shown on Figures N5 and S5 of Appendices B and C, respectively. The plots for the northern and southern SDRI test apparatus indicate that the wetting fronts penetrated to depths of 30 and 29 centimeters, respectively

3.4.3 Air-entry Soil Suction Pressure

The air-entry soil suction pressure data measured at the end of the test are presented in Tables N6 and S6 of Appendices B and C, respectively. H. Bower (1966) developed the following equation for estimating the water-entry soil suction head from the air-entry soil suction head:

$$P_w = \frac{(P_{max} - (G + D_f))}{2}$$

Where,

P_w	=	water-entry soil suction head (cm),
P_{max}	=	maximum air-entry soil suction head corresponding to the first appearance of air bubbles on the test soil surface when a vacuum is applied (cm),

G = vacuum gauge height above the test section surface (cm), and

D_f = wetting front penetration depth (cm)

The water-entry soil suction heads computed during the test are also presented in Tables N6 and S6 of Appendices B and C, respectively. The water-entry soil suction heads computed for the northern and southern SDRI tests are 16 and 16 centimeters, respectively.

3.4.4 Hydraulic Gradient

The hydraulic gradient for flow through porous media (soil) is defined as the energy head loss per material length through which the fluid passed. The equation used to compute the hydraulic gradient for each measurement period by the SDRI is presented below.

$$i = \frac{(H - D_f + [P_w])}{D_f}$$

Where,

i = hydraulic gradient (cm/cm),

H = depth of water in the outer ring (cm),

D_f = saturated wetting front penetration depth (cm, and

P_w = water-entry soil suction head (cm).

The hydraulic gradients estimated for the northern and southern SDRI apparatus are presented in Tables N6 and S6 of Appendices B and C, respectively.

3.4.5 Permeability

The equation used to compute the permeability (hydraulic conductivity) of the testfill pad soil is presented below.

$$k = \frac{I}{i}$$

Where,

k = permeability = hydraulic conductivity (cm/s),

I = infiltration rate (cm/s), and

i = hydraulic gradient (cm/cm).

The test fill pad permeability computed for the northern and southern SDRI test apparatus during each measurement period are presented on Tables N6 and S6 and shown as a function of time on Figures N6 and S6 of Appendices B and C, respectively. The in situ permeability of the testfill pad soil computed from the last four measurement period for the northern and southern SDRI are 5.27×10^{-8} and 3.64×10^{-8} cm/s, respectively. Based upon the results from these two SDRI tests the average in place permeability of the test fill soil is estimated to be 4.45×10^{-8} cm/s.

3.4.6 Field to Laboratory Permeability Correlation

The test fill pad SDRI field and laboratory measured permeabilities were compared to develop a correlation for use in constructing the final cover system low-permeability soil layer. The correlation (C) is computed from the following equation using the average SDRI field and average laboratory measured permeabilities of 4.45×10^{-8} cm/s and 8.25×10^{-9} cm/s, respectively. This correlation indicates that the SDRI field measured permeability is approximately 5.39 times greater than average laboratory measured permeability.

$$C \equiv \frac{K_{SDRI}}{K_{LAB}} \cong \frac{K_{FIELD}}{K_{LAB}}$$

$$C = 4.45 \times 10^{-8} \text{ cm/s} / 8.25 \times 10^{-9} \text{ cm/s} = 5.39$$

Where,

C = correlation factor (unit-less),

K_{SDRI} = SDRI field measured permeability (cm/s), and

K_{LAB} = average laboratory measured permeability (cm/s).

Therefore, a laboratory measured permeability for drive tube samples taken from the constructed final cover system low-permeability soil layer should be multiplied by the factor C = 5.39 to obtain the estimated in situ field permeability of the soil that would have been measured by an SDRI test apparatus. For example if the laboratory measured permeability is equal to $K_{LAB} = 5.25 \times 10^{-9}$ cm/s then the in place field permeability would be equal to $K_{FIELD} = K_{SDRI} = 2.83 \times 10^{-8}$ cm/s.

4 LIMITATIONS

The following limitations apply to the findings presented in this report:

1. Our professional services were performed consistent with the generally accepted geotechnical engineering principles and practices employed in California. This warranty is in lieu of all other warranties, either expressed or implied.

2. These services were performed consistent with our agreement with our client. The findings presented in this report apply to the conditions existing when we performed our services and are intended only for our client, purposes, locations, time frames, and project parameters described herein. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of our services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report. This report is solely for the use of our client unless noted otherwise. Any reliance on this report by a third party is at the party's sole risk.

3. If changes are made to the nature or design of the project as describe in this report, then the findings presented in this report should be considered invalid by all parties. The validity of the findings presented in this report can only be made by our firm: therefore, we should be allowed to review all project changes and prepare written responses with regards to their impacts on our findings. However additional fieldwork and laboratory testing may be required for us to develop any modifications to our findings. The cost to review project changes and performs additional fieldwork and laboratory testing necessary to modify our findings is beyond the scope-of-services presented in this report. Any additional work will be performed only after receipt of an approved scope-of-services, budget, and written authorization to proceed.

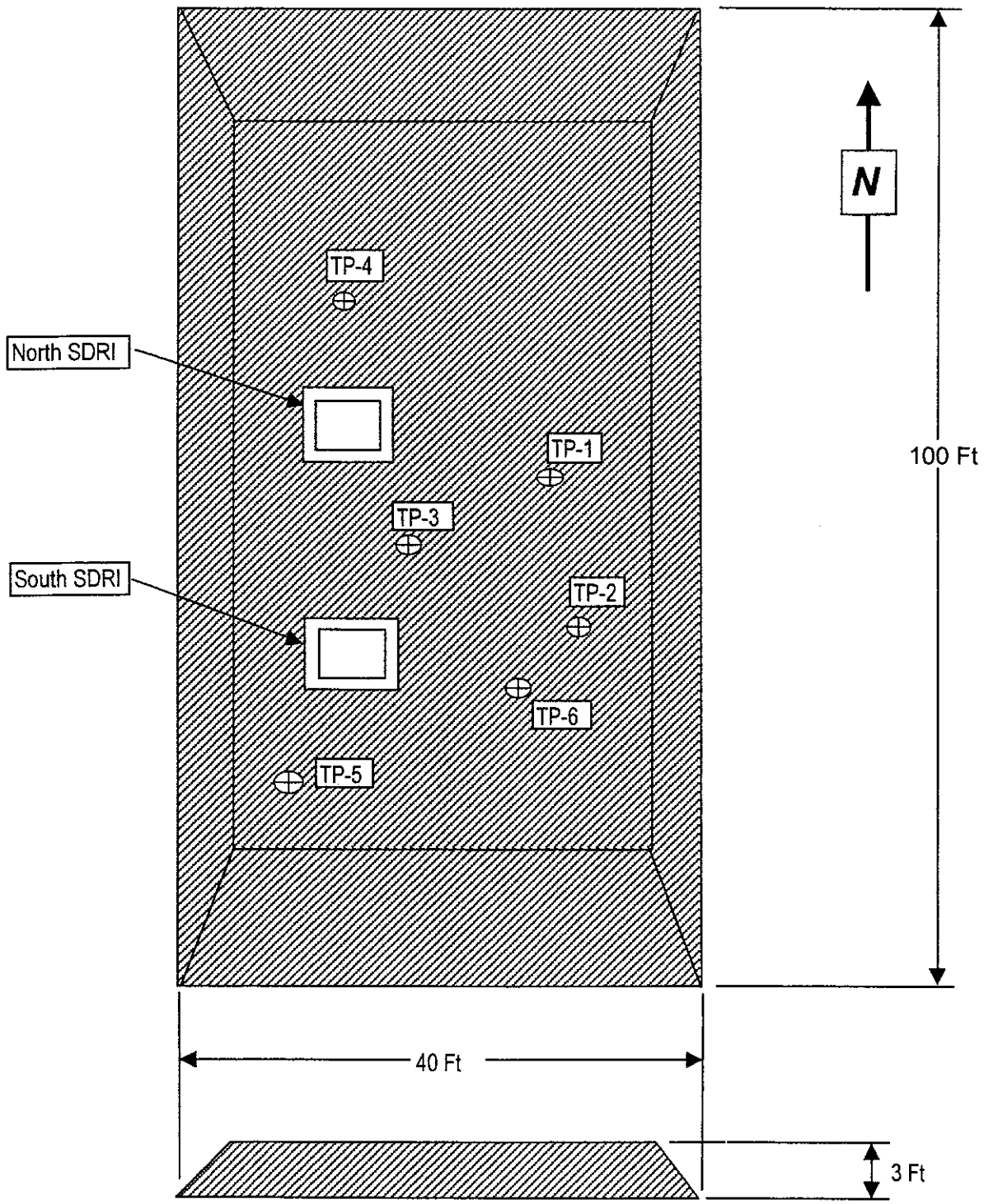
4. The analyses and findings presented in this report are based on the test fill pad soil conditions as they existed at the time we performed the SDRI tests. We have assumed that the test fill pad soil are representative of the entire borrow soil stockpile to be used for constructing the final cover system low-permeability soil layer. However, the actual borrow soil may differ. Therefore, if the borrow soil encountered during construction are different than those of the tested test fill pad, then we should be notified immediately so that we can review these differences and, if necessary, modify our findings.

5. Our SDRI testing scope-of-services did not include an evaluation of the proposed borrow soil source. ITC performed an evaluation of the borrow soil source with regards to material quality and quantity for use in constructing the final cover system low-permeability soil layer. ITC perform all QA/QC activities during construction of the test fill pad.

FIGURES

Figure 1, Test Fill Pad Configuration

Figure 2, Typical SDRI Apparatus Configuration



Not to Scale

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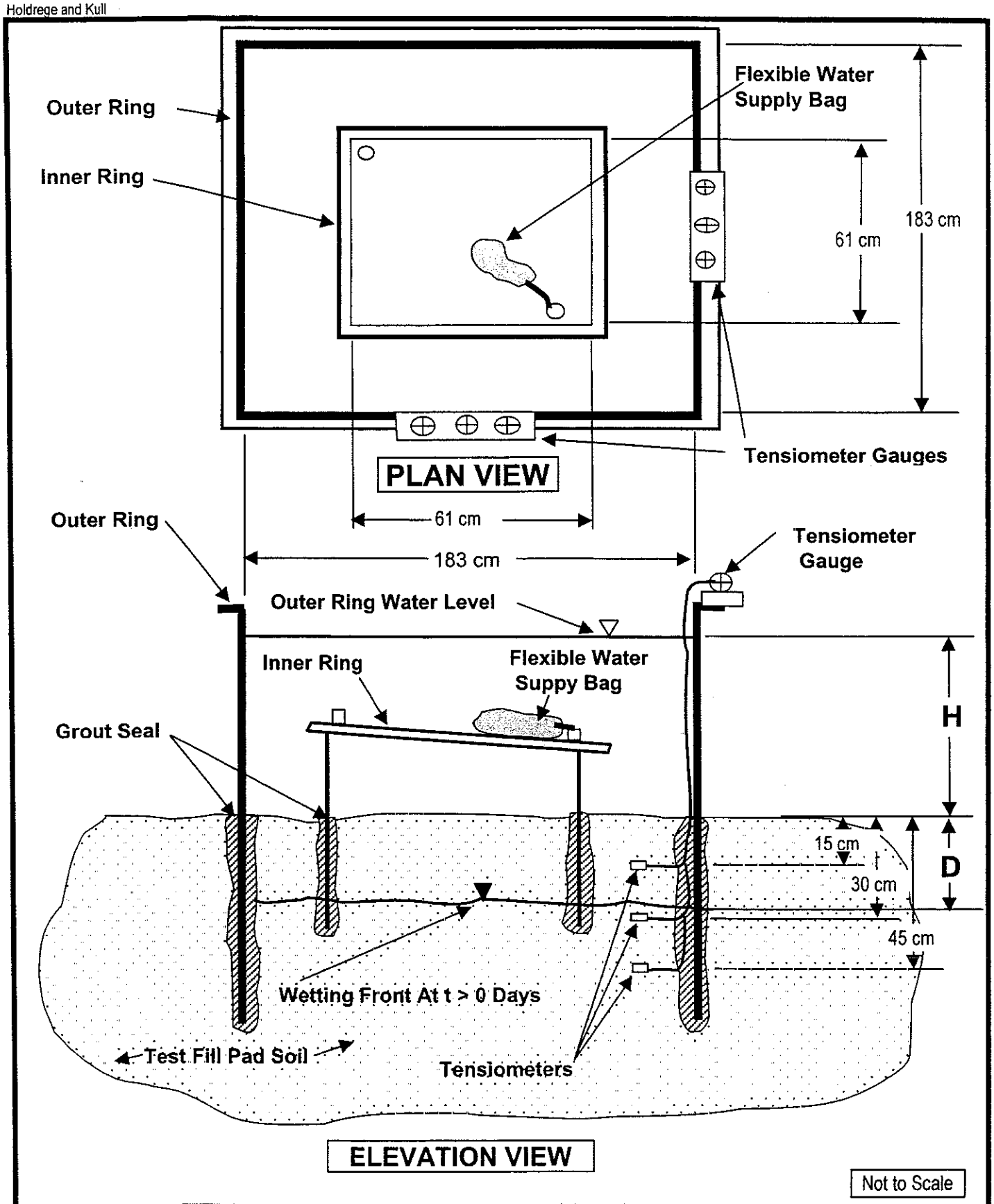
Box Canyon Sanitary Landfill
Camp Pendleton Marine Corps Base

Soil Test Fill Pad Configuration

Figure No.
1
Project No.
30,025-01



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Box Canyon Sanitary Landfill
Camp Pendleton Marine Corps Base

SDRI Apparatus

Figure No
2
Project No
30,025-01

TABLES

Table 1, Summary of Laboratory Test Results

Table 1
Summary of Laboratory Test Results

Sample No.	ASTM D2488 Soil Description		ASTM D422 Particle Size Gradation				ASTM D4318 Atterberg Indices		ASTM D5084 Permeability
	Soil Type	Symbol	Clay (%)	Silt (%)	Sand (%)	Fine Gravel (%)	Liquid Limit (%)	Plasticity Index (%)	(cm/s)
TP-1	Brown, Silty, Clayey Sand	(SC)	23.0	23.1	32.4	21.5	27.9	17.5	1.04E-08
TP-2	Brown, Silty, Clayey Sand	(SC)	25.0	16.2	51.8	7.0	28.8	16.4	9.62E-09
TP-3	Brown, Silty, Clayey Sand	(SC)	25.0	12.3	59.7	3.0	31.0	20.0	8.48E-10
TP-4	Brown, Silty, Clayey Sand	(SC)	20.0	17.8	60.1	2.1	34.0	24.6	3.62E-09
TP-5	Brown, Silty, Clayey Sand	(SC)	22.0	17.4	58.1	2.5	32.0	23.5	4.08E-09
TP-6	Brown, Silty, Clayey Sand	(SC)	20.0	16.7	59.4	3.9	31.5	20.0	4.42E-09

APPENDIX A

Laboratory Test Data

ASTM D422, Particle Size Gradation Data

ASTM D4318, Atterberg Plasticity Indices Data

ASTM D5084, Permeability Data

APPENDIX B

Northernmost SDRI Test Data

Table N1, Relative Elevation Survey Data

Table N2, Inner Ring Entrapped Air Data

Table N3, Tensiometer Data

Table N4, Inner Ring Infiltration Data

Figure N4, Infiltration Rate Versus Total Elapsed Time

Table N5, Moisture Content Versus Depth Data

Figure N5, Moisture Content Versus Depth Profile

Table N6, Permeability Data

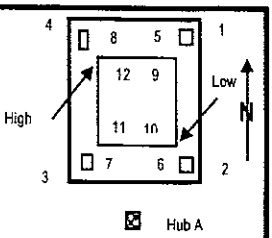
Figure N6, Permeability Versus Total Elapsed Time

TABLE N-1
SEALED DOUBLE RING INFILTROMETER
RELATIVE ELEVATION SURVEY DATA

Holdrege & Kull

JOB NAME: Box Canyon Sanitary Landfill, North SDRI TEST LOCATION: Test Fill Pad

JOB NUMBER: 30,025-01 TASK NO: 002 CONTROL HUB "A" ELEVATION (cm): 79.1



TIME			RELATIVE ELEVATION SURVEY DATA															
	24 HR CLOCK	TOTAL ELAP	OUTER RING POINTS				STAKE POINTS				INNER RING POINTS				HUB "A"		HUB "B"	
DATE (m/d/y)	TIME (h:m)	TIME (days)	1 (cm)	2 (cm)	3 (cm)	4 (cm)	5 (cm)	6 (cm)	7 (cm)	8 (cm)	9 (cm)	10 (cm)	11 (cm)	12 (cm)	Start (cm)	Finish (cm)	Start (cm)	Finish (cm)
9/6/00	8:49	0.00	123.10	127.40	124.30	123.30	76.90	77.90	80.50	78.90	94.10	90.10	86.70	90.00	79.10	79.10		
9/8/00	10:29	2.07	123.30	123.30	124.20	123.10	76.50	78.00	80.30	78.50	93.60	89.80	86.50	89.80	79.10	79.10		
9/11/00	7:39	4.95	123.20	123.30	124.30	123.20	77.00	78.20	80.50	79.00	94.00	89.90	86.80	89.00	79.10	79.10		
9/14/00	6:57	7.92	123.30	123.30	124.30	123.20	77.00	78.40	80.60	79.20	94.10	90.10	86.80	90.10	79.10	79.10		
9/18/00	7:20	11.94	123.20	123.20	124.10	123.10	76.80	78.30	80.60	79.10	94.00	90.00	86.60	90.20	79.10	79.10		
9/20/00	6:39	13.91	123.30	123.30	124.20	123.20	77.20	78.60	80.80	79.30	94.10	90.30	86.90	90.40	79.10	79.10		
9/25/00	7:14	18.93	123.20	123.10	124.20	122.80	77.00	78.20	80.50	79.00	93.90	90.00	86.50	90.20	79.10	79.10		
9/27/00	6:57	20.92	123.20	123.20	124.20	123.10	76.90	78.10	80.60	79.20	94.10	90.00	86.70	90.10	79.10	79.00		
10/2/00	6:50	25.92	123.20	123.20	124.10	123.00	76.80	na	80.60	79.00	94.00	90.00	86.80	90.30	79.10	78.80		
10/4/00	9:11	28.02	123.40	123.40	124.30	123.30	77.20	na	80.70	78.70	94.40	90.20	86.90	90.50	79.10	79.10		
10/9/00	7:07	32.93	123.20	123.20	124.20	123.00	77.00	na	80.60	78.60	94.20	90.00	86.70	90.40	79.10	79.10		
10/6/00	7:24	29.94	123.30	123.30	124.30	123.20	77.00		80.60	78.70	94.30	90.30	86.80	90.50	79.10	79.10		
10/17/00	10:28	41.07	123.20	123.20	124.20	123.20	79.70		80.50	78.70	94.10	90.00	86.90	90.50	79.10	79.10		

TABLE N-2
SEALED DOUBLE RING INFILTROMETER
INNER RING ENTRAPPED AIR PURGE DATA

Holdrege & Kull

JOB NAME Box Canyon Sanitary Landfill, North SDRI

JOB NO : 30,025-01 TASK NO : 002

Notes:

DATE (m/d/y)	24 HR CLOCK TIME (h:m)	FLEXIBLE BAG WEIGHTS INFLOW (bottom) initial Vbi (g)	final Vbf (g)	difference dVb Vbf - Vbi (g)	OUTFLOW (top) initial Vti (g)	final Vtf (g)	difference dVt = Vtf - Vti (g)	PURGED AIR VOLUME Va = |dVb|-dVt (ml)	PERIOD FLOW VOLUME Vp = Vm+Vt+Va -Vs (ml)	PERCENT OF PERIOD FLOW VOL. P = Va/Vp (%)	CORR REQUIRED (YES/NO)	COMMENTS
9/6/00	07:30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	222.6	0.0	NO	No bubbles observed
9/8/00	11:13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.6	0.0	NO	No bubbles observed
9/11/00	09:34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.8	0.0	NO	No bubbles observed
9/14/00	07:16	1589.4	1245.7	-343.7	1070.9	1202.0	131.1	212.6	58.1	365.9	YES	Bubbles observed
9/18/00	07:50	1303.3	300.3	-1003.0	585.1	692.1	107.0	896.0	235.2	381.0	YES	Bubbles observed
9/20/00	06:59	1607.6	1102.1	-505.5	330.6	558.4	227.8	277.7	199.8	139.0	YES	Bubbles observed
9/25/00	07:48	1507.5	458.9	-1048.6	163.0	988.7	825.7	222.9	275.8	80.8	YES	Bubbles observed
9/27/00	07:11	1251.2	185.8	-1065.4	235.2	731.2	496.0	569.4	536.9	106.1	YES	Bubbles observed
10/2/00	07:13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.2	0.0	NO	No bubbles observed
10/4/00	09:26	1037.5	305.4	-732.1	145.9	692.4	546.5	185.6	185.4	100.1	YES	Bubbles observed
10/9/00	07:23	1504.2	730.0	-774.2	146.4	679.4	533.0	241.2	348.7	69.2	YES	Bubbles observed
10/16/00	08:03	1325.2	492.2	-833.0	193.3	699.5	506.2	326.8	466.3	70.1	YES	Bubbles observed
10/17/00	10:36	1041.3	288.3	-753.0	229.6	953.7	724.1	28.9	68.0	42.5	YES	Bubbles observed

TABLE N-3
SEALED DOUBLE RING INFILTROMETER
TENSIOMETER DATA

Holdrege & Kull

JOB NAME: Box Canyon Sanitary Landfill, North SDRI TEST LOCATION: Test Fill Pad

JOB NO: 30,025-01 TASK NO.: 002

TIME			LOCATION DATA						COMMENTS
			A	B	C	D	E	F	
DATE	24 HR. CLOCK TIME	TOTAL ELAPSED DAYS	DEPTH 18 in PRESS	DEPTH 12 in PRESS	DEPTH 6 in PRESS	DEPTH 18 in PRESS	DEPTH 12 in PRESS	DEPTH 6 in PRESS	
(m/d/y)	(h:m)	(days)	(cb)	(cb)	(cb)	(cb)	(cb)	(cb)	
9/5/00	16:00	0.00	8	16	12		6	2	
9/5/00	17:00	0.04	8	16	12		6	2	
9/6/00	17:30	1.06	23	29	30		4	16	
9/8/00	10:53	2.79	21	23	8	5	7	10	D installed, E purged
9/11/00	8:05	5.67	19	9	10	14	14	7	
9/14/00	7:18	8.64	18	22	4	13	15	7	
9/18/00	7:46	12.66	21	25	12	13	17	0	
9/20/00	7:42	14.65	20	24	10	14	18	0	
9/25/00	7:15	19.64	21	23	9	15	17	0	
9/27/00	7:00	21.63	20	24	7	14	16	0	
10/2/00	6:59	26.62	21	22	4	14	17	0	
10/4/00	9:12	28.72	20	23	3	14	14	0	
10/9/00	7:07	33.63	24	20	3	14	18	0	
10/16/00	7:25	40.64	23	24	2	14	18	0	
10/17/00	10:28	41.77	19	21	4	10	14	0	

TABLE N-4
SEALED DOUBLE RING INFILTROMETER
INNER RING INFILTRATION DATA

Holdrege & Kull

JOB NAME: Box Canyon Sanitary Landfill, North SDRI

JOB NO.: 30,025-01 TASK NO.: 002

Soil Description: Brown Silty Clay (CL)

Unit Coversions:

1 lbf. = 453.59243 gr. 1 in. = 2.54 cm.

1 kgr. = 1,000 gr. 1 day = 86400

1 gr. = 1 ml. 1 cb = 10.21 cm

Notes: (1). If dT < 0 then Vt is subtracted from Vm.

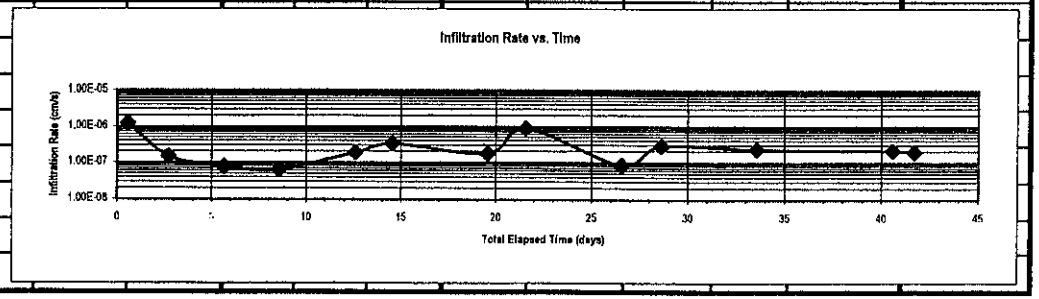
If dT > 0 then Vt is added to Vm

If dT = 0 then Vt is equal to zero and Vc = Vm.

(2). Test section cross-sectional area, A = 3,716 sq. cm.

(3). Apply correction if purged air volume Va is greater than 20%.

TIME INTERVALS							FLEXIBLE BAG WEIGHTS							TEMPERATURE			FLOW VOLUMES					INFILTRATION RATE
INITIAL		FINAL		ELAPSED TIME			BAG NO. 1			BAG NO. 2			TOTAL WEIGHT DIFF.	INITIAL	FINAL	TEMP. DIFF.	MEAS. VOL.	TEMP (1) VOL. CORR.	ENTRAP PURGED AIR CORR.(3)	SWELL CORR	TOTAL COR. VOL	
DATE (m/d/y)	24 HR. CLOCK TIME (h:m)	DATE (m/d/y)	24 HR. CLOCK TIME (h:m)	TOTAL ELAPSED TIME (days)	MEASUREMENT PERIOD dt (days)	(sec)	INITIAL w1i (gr)	FINAL w1f (gr)	DIFF. dw1 = w1i - w1f (gr)	INITIAL w2i (gr)	FINAL w2f (gr)	DIFF. dw2 = w2i - w2f (gr)	dW = dw1+dw2 (gr)	Ti (C)	Tf (C)	dT = Tf - Ti (C)	Vm = dW (ml)	Vt = dTx5.0 ml (ml)	Va (ml)	Vs (ml)	Vc = Vm+Vt+Va-Vs (ml)	I = Vc / (dt x A) (cm/sec)
9/5/00	17:46	9/6/00	7:30	0.57	0.57	49,440	1568.3	1416.7	151.6	1581.7	1485.7	96.0	247.6	23.0	18.0	-5.0	247.6	-25.0	0.0	0.0	222.6	1.21E-06
9/6/00	13:10	9/8/00	11:13	2.73	1.92	165,780	1601.3	1604.2	-2.9	1585.1	1507.6	77.5	74.6	18.0	21.0	3.0	74.6	15.0	0.0	0.0	89.6	1.45E-07
9/8/00	11:51	9/11/00	9:34	5.66	2.90	250,980	1594.2	1573.0	21.2	1564.6	1500.0	64.6	85.8	22.0	19.0	-3.0	85.8	-15.0	0.0	0.0	70.8	7.59E-08
9/11/00	9:43	9/14/00	7:16	8.56	2.90	250,380	1573.0	1616.0	-43.0	1500.0	1631.5	-131.5	-174.5	19.0	23.0	4.0	-174.5	20.0	212.6	0.0	58.1	6.24E-08
9/14/00	8:13	9/18/00	7:50	12.59	3.98	344,220	1202.0	1486.7	-284.7	1245.7	1616.8	-371.1	-655.8	23.0	22.0	-1.0	-655.8	-5.0	896.0	0.0	235.2	1.84E-07
9/18/00	8:30	9/20/00	6:59	14.55	1.94	167,340	0.0	0.0	0.0	1534.7	1607.6	-72.9	-72.9	22.0	21.0	-1.0	-72.9	-5.0	277.7	0.0	199.8	3.21E-07
9/20/00	7:22	9/25/00	7:48	19.58	5.02	433,560	0.0	0.0	0.0	1102.1	1034.2	67.9	67.9	21.0	18.0	-3.0	67.9	-15.0	222.9	0.0	275.8	1.71E-07
9/25/00	8:21	9/27/00	7:11	21.56	1.95	168,600	0.0	0.0	0.0	1208.7	1251.2	-42.5	-42.5	19.0	21.0	2.0	-42.5	10.0	569.4	0.0	536.9	8.57E-07
9/27/00	7:45	10/2/00	7:13	26.56	4.98	430,080	0.0	0.0	0.0	1172.5	1037.3	135.2	135.2	21.0	20.0	-1.0	135.2	-5.0	0.0	0.0	130.2	8.15E-08
10/2/00	7:19	10/4/00	9:26	28.65	2.09	180,420	0.0	0.0	0.0	1037.3	1037.5	-0.2	-0.2	20.0	20.0	0.0	-0.2	0.0	185.6	0.0	185.4	2.77E-07
10/4/00	9:56	10/9/00	7:23	33.57	4.89	422,820	0.0	0.0	0.0	833.3	715.8	117.5	117.5	20.0	18.0	-2.0	117.5	-10.0	241.2	0.0	348.7	2.22E-07
10/9/00	7:50	10/16/00	8:03	40.60	7.01	605,580	0.0	0.0	0.0	1008.2	858.7	149.5	149.5	18.0	16.0	-2.0	149.5	-10.0	326.8	0.0	466.3	2.07E-07
10/16/00	8:03	10/17/00	10:36	41.70	1.11	95,580	0.0	0.0	0.0	1070.4	1041.3	29.1	29.1	16.0	18.0	2.0	29.1	10.0	28.9	0.0	68.0	1.91E-07



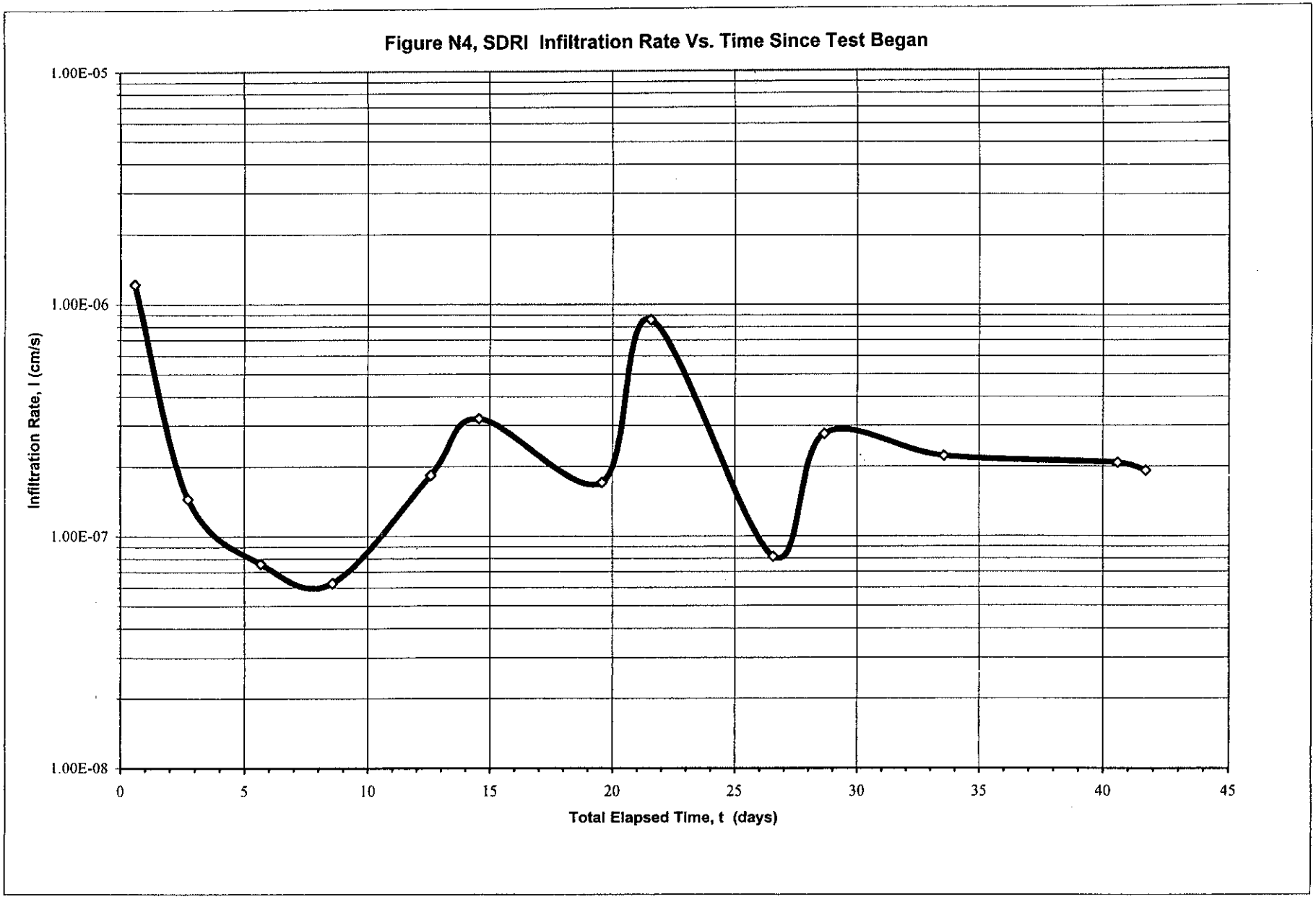


Figure N4, SDRI Infiltration Rate Vs. Time Since Test Began
1.00E-05
1.00E-06
1.00E-07
1.00E-08
Infiltration Rate, I (cm/s)
0
5
10
15
20
25
30
35
40
45
Total Elapsed Time, t (days)

TABLE N-5
SEALED DOUBLE RING INFILTROMETER
END OF TEST MOISTURE CONTENT VS. DEPTH PROFILE

Holdrege & Kull TEST LOCATION: Test Fill Pad, North SDRI
JOB NAME: Box Canyon Sanitary Landfill, North SDRI
JOB NUMBER 30,025-01 TASK: 002

Depth (cm)	Tare No (ID)	Tare (gr)	Wet Soil + Tare (gr)	Dry Soil + Tare (gr)	Water (gr)	Dry Soil (gr)	Moisture Content (%)
1	LX-8	11.6	49.0	43.3	5.7	31.7	18.0
3	A-17	11.6	59.6	53.3	6.3	41.7	15.1
5	A-20	11.7	55.7	50.2	5.5	38.5	14.3
7	LY-1	11.2	52.9	47.9	5.0	36.7	13.6
9	A-15	11.8	57.0	51.5	5.5	39.7	13.9
11	A-35	11.5	55.6	50.5	5.1	39.0	13.1
13	A-12	11.0	62.1	55.9	6.2	44.9	13.8
15	A-7	11.6	52.4	47.6	4.8	36.0	13.3
17	A-6	11.8	60.7	54.8	5.9	43.0	13.7
19	A-14	10.4	58.1	52.6	5.5	42.2	13.0
21	A-18	11.7	53.1	48.0	5.1	36.3	14.0
23	A-36	11.5	58.8	53.3	5.5	41.8	13.2
25	A-20	11.4	60.8	55.0	5.8	43.6	13.3
27	A-10	11.7	51.5	46.6	4.9	34.9	14.0
29	A-16	11.9	59.4	54.0	5.4	42.1	12.8
31	A-5	11.8	52.8	48.3	4.5	36.5	12.3
33	LX-6	11.8	58.5	53.4	5.1	41.6	12.3
35	LX-4	11.5	56.3	51.0	5.3	39.5	13.4
37	A-11	12.0	51.1	46.8	4.3	34.8	12.4
39	LX-3	11.5	47.7	44.1	3.6	32.6	11.0
41	A-9	11.7	52.7	48.4	4.3	36.7	11.7
43	A-8	11.9	50.5	46.9	3.6	35.0	10.3
45	A-1	11.2	54.6	50.2	4.4	39.0	11.3
47	LY-6	11.8	35.7	33.2	2.5	21.4	11.7
49	A-19	11.2	49.9	45.7	4.2	34.5	12.2
51							
53							
55							

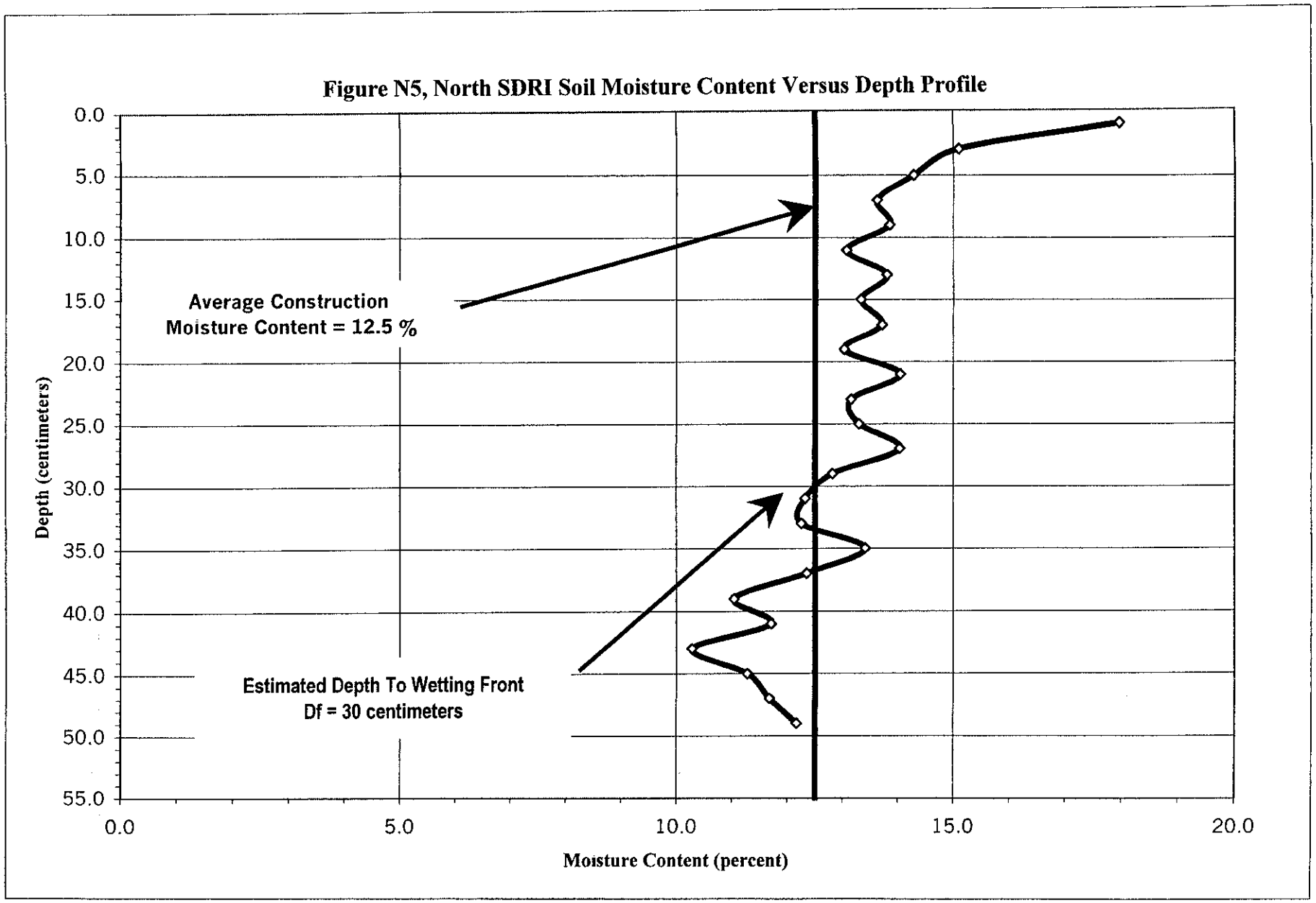


Figure N5, North SDRI Soil Moisture Content Versus Depth Profile
Average Construction
Moisture Content = 12.5 %
Estimated Depth To Wetting Front
Df = 30 centimeters
Depth (centimeters)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
0.0
5.0
10.0
15.0
20.0
Moisture Content (percent)

TABLE N-6
SEALED DOUBLE RING INFILTROMETER
(Hydraulic Gradient Estimated With Soil Suction Head)

Anderson Consulting Group

JOB NAME: Box Canyon Sanitary Landfill, North SDRI
JOB NO.: 30,025-01 **TASK:** 002
OPERATOR: dmo
TEST LOCATION: Test Fill Pad (Constructed by IT Corporation)

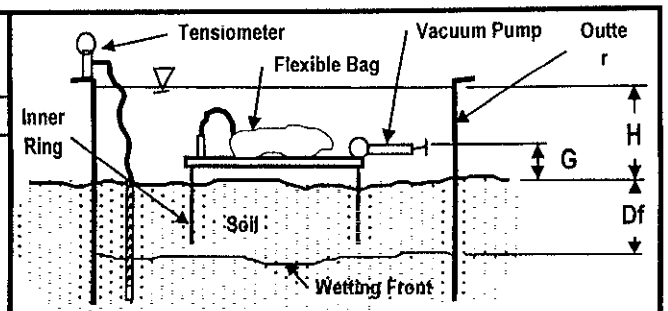
SOIL DESCRIPTION: Brown Silty Clay (CL)

GENERAL INFORMATION:

PRESS. GAUGE HEIGHT, G (cm): 51.50
CROSS SECTIONAL AREA, A (cm^2): 3,716

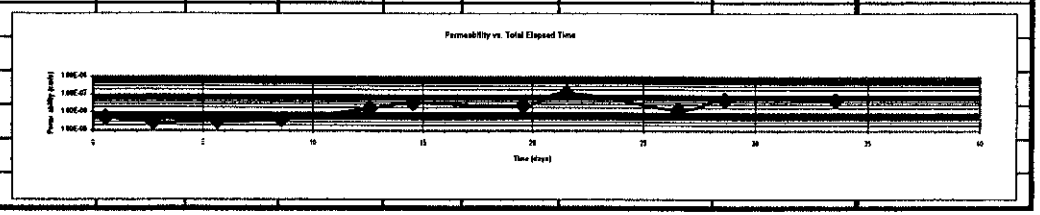
EQUATIONS AND UNIT CONVERSIONS:

I = dVc / (dt x A) — 1 in = 2.54 cm
Pw = (Pmax - (G +Df)) / 2 — 1 g = 1 ml = 1 cc
i = (H + Df + | Pw |) / Df — 1 lb = 452.49 g
k(sdraep) = I / i — 1 cb = 10.21 cm



APPARATUS SET UP: Est. Wetting Depth (cm) = 30.0

TIME INTERVALS							FLOW DATA		HYDRAULIC GRADIENT DATA								
INITIAL		FINAL		ELAPSED TIME			CORR.	INFILTRATION	OUTER RING WATER DEPTH			EST.	MAX.		WATER	HYDRAULIC	HYDRAULIC
DATE	24 HR. CLOCK TIME	DATE	24 HR. CLOCK TIME	TOTAL ELAPSED TIME	MEASUREMENT PERIOD dt		FLOW VOLUME Vc	RATE I	INITIAL DEPTH Hi	FINAL DEPTH Hf	AVERAGE DEPTH H	WETTING DEPTH Df	AIR ENTRY SOIL PRESS. Pmax		ENTRY SOIL SUCTION HEAD Pw	GRADIENT i	CONDUCTIVITY k
(m/d/y)	(h:m)	(m/d/y)	(h:m)	(days)	(days)	(sec)	(ml)	(cm/sec)	(cm)	(cm)	(cm)	(cm)	(cb)	(cm)	(cm)	(cm/cm)	(cm/sec)
9/5/00	17:46	9/6/00	7:30	0.57	0.57	49,440	222.6	1.21E-06	40.00	40.00	40.00	0.41	16.0	163.4	55.72	233.53	5.19E-09
9/6/00	13:10	9/8/00	11:13	2.73	1.92	165,780	89.6	1.45E-07	40.00	40.00	40.00	1.96	16.0	163.4	54.95	49.40	2.94E-09
9/8/00	11:51	9/11/00	9:34	5.66	2.90	250,980	70.8	7.59E-08	40.00	40.00	40.00	4.07	16.0	163.4	53.89	24.07	3.15E-09
9/11/00	9:43	9/14/00	7:16	8.56	2.90	250,380	58.1	6.24E-08	39.50	39.50	39.50	6.16	16.0	163.4	52.85	15.99	3.90E-09
9/14/00	8:13	9/18/00	7:50	12.59	3.98	344,220	235.2	1.84E-07	39.50	39.50	39.50	9.05	16.0	163.4	51.40	11.04	1.67E-08
9/18/00	8:30	9/20/00	6:59	14.55	1.94	167,340	199.8	3.21E-07	39.50	39.50	39.50	10.47	16.0	163.4	50.70	9.62	3.34E-08
9/20/00	7:22	9/25/00	7:48	19.58	5.02	433,560	275.8	1.71E-07	39.50	39.50	39.50	14.09	16.0	163.4	48.89	7.27	2.35E-08
9/25/00	8:21	9/27/00	7:11	21.56	1.95	168,600	536.9	8.57E-07	39.50	39.50	39.50	15.51	16.0	163.4	48.18	6.65	1.29E-07
9/27/00	7:45	10/2/00	7:13	26.56	4.98	430,080	130.2	8.15E-08	39.50	39.50	39.50	19.11	16.0	163.4	46.38	5.49	1.48E-08
10/2/00	7:19	10/4/00	9:26	28.65	2.09	180,420	185.4	2.77E-07	39.50	39.50	39.50	20.61	16.0	163.4	45.62	5.13	5.39E-08
10/4/00	9:56	10/9/00	7:23	33.57	4.89	422,820	348.7	2.22E-07	39.50	39.50	39.50	24.15	16.0	163.4	43.86	4.45	4.99E-08
10/9/00	7:50	10/16/00	8:03	40.60	7.01	605,580	466.3	2.07E-07	39.50	39.50	39.50	29.20	16.0	163.4	41.33	3.77	5.50E-08
10/16/00	8:03	10/17/00	10:36	41.70	1.11	95,580	68.0	1.91E-07	39.50	39.50	39.50	30.00	16.0	163.4	40.93	3.68	5.20E-08



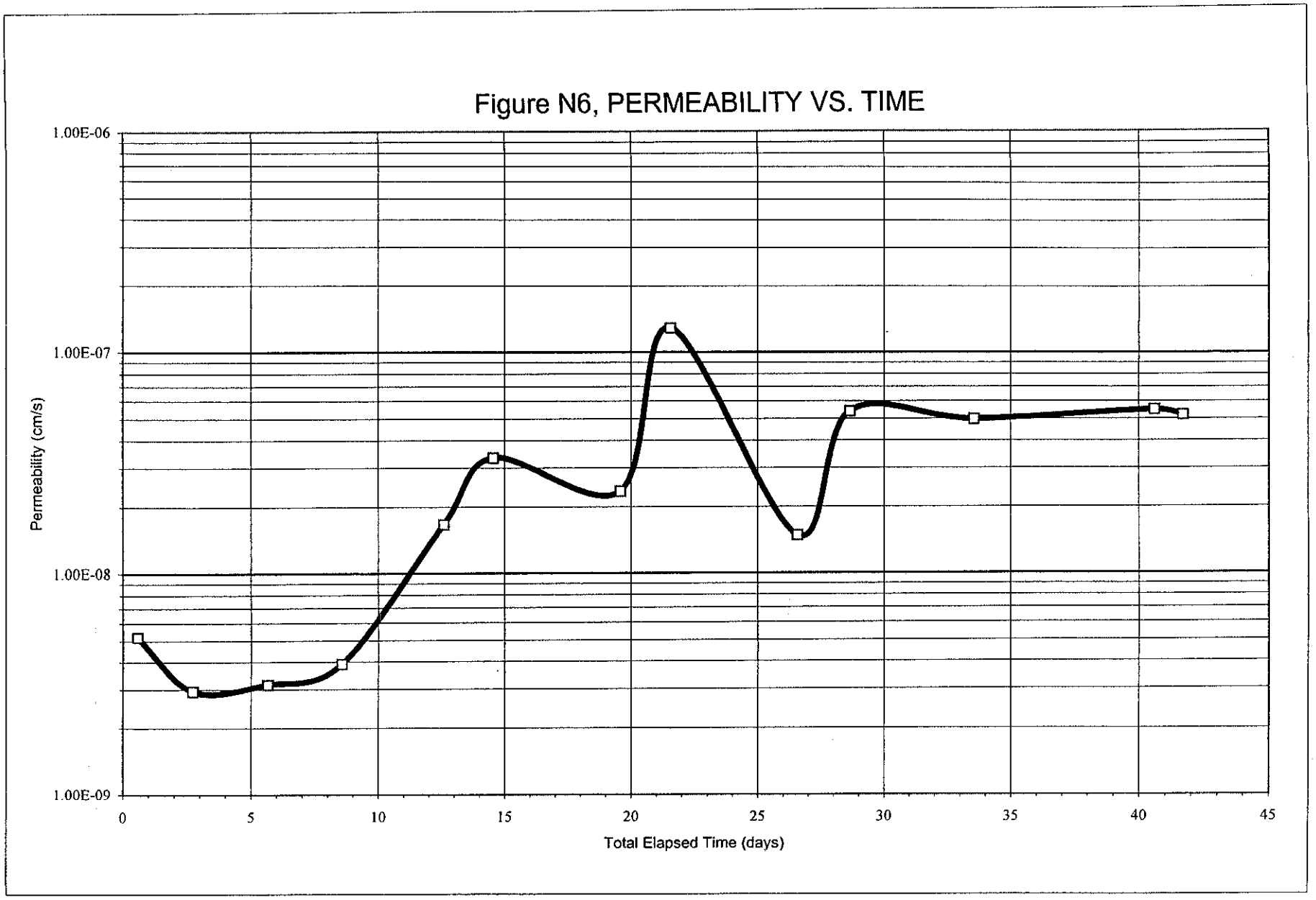


Figure N6, PERMEABILITY VS. TIME
1.00E-06
1.00E-07
1.00E-08
1.00E-09
Permeability (cm/s)
0
5
10
15
20
25
30
35
40
45
Total Elapsed Time (days)

APPENDIX C

Southernmost SDRI Test Data

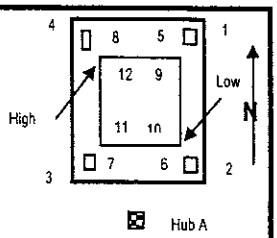
- Table S1, Relative Elevation Survey Data
- Table S2, Inner Ring Entrapped Air Data
- Table S3, Tensiometer Data
- Table S4, Inner Ring Infiltration Data
- Figure S4, Infiltration Rate Versus Total Elapsed Time
- Table S5, Moisture Content Versus Depth Data
- Figure S5, Moisture Content Versus Depth Profile
- Table S6, Permeability Data
- Figure S6, Permeability Versus Total Elapsed Time

TABLE S-1
SEALED DOUBLE RING INFILTROMETER
RELATIVE ELEVATION SURVEY DATA

Holdrege & Kull

JOB NAME: Box Canyon Sanitary Landfill, South SDRI TEST LOCATION: Test Fill Pad

JOB NUMBER: 30,025-01 TASK NO: 002 CONTROL HUB "A" ELEVATION (cm): 79.1



TIME			RELATIVE ELEVATION SURVEY DATA															
	24 HR CLOCK	TOTAL ELAP	OUTER RING POINTS				STAKE POINTS				INNER RING POINTS				HUB "A"		HUB "B"	
DATE (m/d/y)	TIME (h:m)	TIME (days)	1 (cm)	2 (cm)	3 (cm)	4 (cm)	5 (cm)	6 (cm)	7 (cm)	8 (cm)	9 (cm)	10 (cm)	11 (cm)	12 (cm)	Start (cm)	Finish (cm)	Start (cm)	Finish (cm)
9/8/00	10:41	0.00	123.20	122.40	122.30	122.50	80.50	80.30	78.00	79.80	89.80	91.40	89.20	87.50	79.10	79.10		
9/11/00	7:53	2.88	123.20	123.50	122.50	122.60	81.00	80.60	78.20	80.10	90.00	91.60	89.40	87.60	79.10	79.10		
9/14/00	7:07	5.85	123.20	122.50	122.40	122.50	81.00	80.60	80.30	80.20	90.10	91.50	89.50	87.80	79.10	79.10		
9/18/00	7:33	9.87	123.20	122.40	122.40	122.70	81.10	80.70	na	80.20	90.10	91.50	89.70	88.10	79.10	79.10		
9/20/00	6:47	11.84	123.30	122.60	122.50	122.60	81.20	na	na	na	90.20	91.80	89.70	87.80	79.10	79.10		
9/25/00	7:39	16.87	123.10	122.30	122.40	122.30	81.10	na	na	na	90.00	91.40	89.50	87.60	79.00	78.90		
9/27/00	8:03	18.89	123.20	122.50	122.30	122.50	81.10	na	na	na	90.00	91.60	89.40	87.80	79.00	79.00		
10/2/00	7:09	23.85	123.30	122.70	122.60	122.70	81.30	na	na	na	90.20	91.80	89.70	88.00	79.10	79.10		
10/4/00	9:19	25.94	123.30	122.60	122.60	122.60	81.20	na	na	na	90.30	91.70	89.70	87.90	79.10	79.10		
10/9/00	7:17	30.86	123.30	122.70	122.50	122.70	81.20	na	na	na	90.20	91.80	89.60	87.90	79.10	79.10		
10/16/00	7:32	37.87	123.40	122.60	122.50	122.60	81.10	na	na	na	90.20	91.70	89.60	88.00	79.10	79.10		
10/17/00	10:34	39.00	123.20	122.50	122.30	122.40	80.80	na	na	na	90.00	91.60	89.50	87.80	79.10	79.10		

TABLE S-2
SEALED DOUBLE RING INFILTROMETER
INNER RING ENTRAPPED AIR PURGE DATA

Holdrege & Kull

JOB NAME Box Canyon Sanitary Landfill, South SDRI

JOB NO : 30,025-01 TASK NO : 002

Notes:

DATE (m/d/y)	24 HR CLOCK TIME (h:m)	FLEXIBLE BAG WEIGHTS INFLOW (bottom) initial Vbi (g)	final Vbf (g)	difference dVb Vbf - Vbi (g)	OUTFLOW (top) initial Vti (g)	final Vtf (g)	difference dVt = Vtf - Vti (g)	PURGED AIR VOLUME Va = |dVb|-dVt (ml)	PERIOD FLOW VOLUME Vp = Vm+Vt+Va -Vs (ml)	PERCENT OF PERIOD FLOW VOL. P = Va/Vp (%)	CORR REQUIRED (YES/NO)	COMMENTS
9/8/00	11:55	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	0.0	NO	No bubbles observed
9/11/00	09:46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-75.6	0.0	NO	No bubbles observed
9/14/00	08:38	1520.6	1214.5	-306.1	356.2	375.0	18.8	287.3	-68.4	-420.0	NO	Bubbles observed
9/18/00	08:32	1587.5	498.4	-1089.1	300.3	333.5	33.2	1055.9	-25.8	-4092.6	NO	Bubbles observed
9/20/00	07:23	1574.2	580.8	-993.4	388.0	773.9	385.9	607.5	397.7	152.8	YES	Bubbles observed
9/25/00	08:23	1513.5	243.3	-1270.2	241.9	969.2	727.3	542.9	445.3	121.9	YES	Bubbles observed
9/27/00	07:46	1238.2	478.1	-760.1	185.8	780.6	594.8	165.3	130.7	126.5	YES	Bubbles observed
10/2/00	07:21	1075.1	393.0	-682.1	145.6	545.5	399.9	282.2	309.8	91.1	YES	Bubbles observed
10/4/00	09:56	826.4	226.4	-600.0	234.2	685.7	451.5	148.5	114.7	129.5	YES	Bubbles observed
10/9/00	07:52	922.6	277.4	-645.2	151.2	625.6	474.4	170.8	159.5	107.1	YES	Bubbles observed
10/16/00	08:05	1192.6	232.1	-960.5	191.8	829.4	637.6	322.9	311.6	103.6	YES	Bubbles observed
10/17/00	10:53	824.5	196.4	-628.1	183.1	779.8	596.7	31.4	48.2	65.1	YES	Bubbles observed

TABLE S-3
SEALED DOUBLE RING INFILTROMETER
TENSIOMETER DATA

Holdrege & Kull

JOB NAME: Box Canyon Sanitary Landfill, South SDRI TEST LOCATION: Test Fill Pad

JOB NO: 30,025-01 TASK NO.: 002

TIME			LOCATION DATA						COMMENTS
			A	B	C	D	E	F	
DATE (m/d/y)	24 HR CLOCK TIME (h:m)	TOTAL ELAPSED DAYS (days)	DEPTH 18 in PRESS (cb)	DEPTH 12 in PRESS (cb)	DEPTH 6 in PRESS (cb)	DEPTH 18 in PRESS (cb)	DEPTH 12 in PRESS (cb)	DEPTH 6 in PRESS (cb)	
9/8/00	10:56	0.00	33	16	0	19	4	17	C & E purged at 08:00
9/11/00	8:07	2.88	30	14	7	15	5	12	
9/14/00	7:16	5.85	32	16	6	18	6	12	
9/18/00	7:44	9.87	34	15	5	19	8	10	
9/20/00	6:48	11.83	34	15	4	19	4	8	
9/25/00	7:25	16.85	38	15	2	21	5	7	
9/27/00	8:05	18.88	37	13	3	21	4	7	
10/2/00	7:16	23.85	39	14	2	22	4	7	
10/4/00	9:20	25.93	40	14	2	21	3	8	
10/9/00	7:18	30.85	42	15	2	20	5	8	
10/16/00	7:55	37.87	46	15	2	23	6	6	
10/17/00	10:35	38.99	42	12	4	20	6	9	

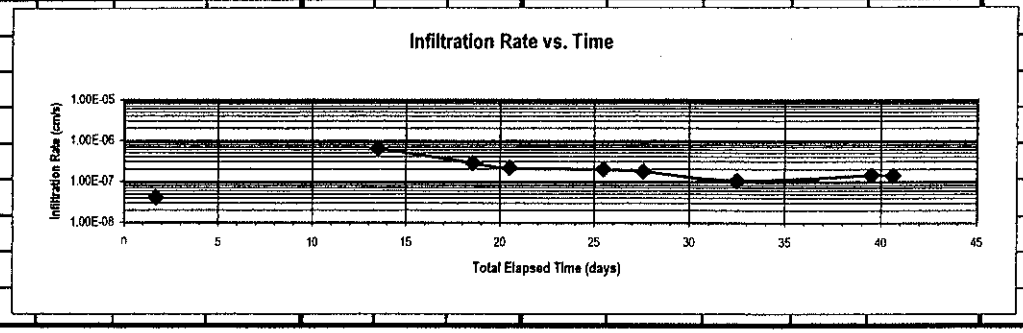
TABLE S-4
SEALED DOUBLE RING INFILTROMETER
INNER RING INFILTRATION DATA

Holdrege & Kull
JOB NAME Box Canyon Sanitary Landfill, South SDRI
JOB NO.: 30,025-01 TASK NO.: 002
Soil Description:

Unit Coversions:
1 lbf. = 453.59243 gr. 1 in. = 2.54 cm.
1 kgr. = 1,000 gr. 1 day = 86400
1 gr. = 1 ml. 1 cb = 10.21 cm

Notes: (1). If dT < 0 then Vt is subtracted from Vm.
If dT > 0 then Vt is added to Vm
If dT = 0 then Vt is equal to zero and Vc = Vm.
(2). Test section cross-sectional area, A = 3,716 sq. cm.
(3). Apply correction if purged air volume Va is greater than 20%.

TIME INTERVALS							FLEXIBLE BAG WEIGHTS							TEMPERATURE			FLOW VOLUMES					INFILTRATION RATE
INITIAL		FINAL		ELAPSED TIME			BAG NO. 3			BAG NO. 4			TOTAL WEIGHT DIFF.	INITIAL	FINAL	TEMP. DIFF.	MEAS. VOL.	TEMP (1) VOL. CORR.	ENTRAP PURGED AIR CORR.(3)	SWELL CORR	TOTAL COR. VOL	
DATE	24 HR. CLOCK TIME	DATE	24 HR. CLOCK TIME	TOTAL ELAPSED TIME	MEASUREMENT PERIOD dt		INITIAL w1i	FINAL w1f	DIFF. dw1 = w1i - w1f	INITIAL w2i	FINAL w2f	DIFF. dw2 = w2i - w2f	dW = dw1+dw2	Ti	Tf	dT = Tf - Ti	Vm = dW	dTx5.0 ml	Va	Vs	Vc = Vm+Vt+Va-Vs	I = Vc / (dt x A)
(m/d/y)	(h:m)	(m/d/y)	(h:m)	(days)	(days)	(sec)	(gr)	(gr)	(gr)	(gr)	(gr)	(gr)	(gr)	(C)	(C)	(C)	(ml)	(ml)	(ml)	(ml)	(ml)	(cm/sec)
9/6/00	19:30	9/8/00	11:55	1.68	1.68	145,500	1569.6	1459.1	110.5	1593.4	1696.9	-103.5	7.0	18.0	21.0	3.0	7.0	15.0	0.0	0.0	22.0	4.07E-08
9/8/00	12:11	9/11/00	9:46	4.59	2.90	250,500	1584.1	1625.3	-41.2	1571.9	1591.3	-19.4	-60.6	22.0	19.0	-3.0	-60.6	-15.0	0.0	0.0	-75.6	-8.12E-08
9/11/00	10:06	9/14/00	8:38	7.55	2.94	253,920	1523.6	1682.2	-158.6	1535.4	1755.0	-219.6	-378.2	19.0	23.5	4.5	-378.2	22.5	287.3	0.0	-68.4	-7.25E-08
9/14/00	9:33	9/18/00	8:32	11.54	3.96	341,940	1416.4	1677.7	-261.3	1214.5	2024.9	-810.4	-1,071.7	24.0	22.0	-2.0	-1071.7	-10.0	1,055.9	0.0	-25.8	-2.03E-08
9/18/00	9:04	9/20/00	7:23	13.50	1.93	166,740	1200.0	1404.8	-204.8	0.0	0.0	0.0	-204.8	22.0	21.0	-1.0	-204.8	-5.0	607.5	0.0	397.7	6.42E-07
9/20/00	7:45	9/25/00	8:23	18.54	5.03	434,280	971.8	1059.4	-87.6	0.0	0.0	0.0	-87.6	21.5	19.5	-2.0	-87.6	-10.0	542.9	0.0	445.3	2.76E-07
9/25/00	9:07	9/27/00	7:46	20.51	1.94	167,940	1197.6	1238.2	-40.6	0.0	0.0	0.0	-40.6	19.8	21.0	1.2	-40.6	6.0	165.3	0.0	130.7	2.09E-07
9/27/00	8:06	10/2/00	7:21	25.49	4.97	429,300	1110.2	1075.1	35.1	0.0	0.0	0.0	35.1	21.5	20.0	-1.5	35.1	-7.5	282.2	0.0	309.8	1.94E-07
10/2/00	7:57	10/4/00	9:56	27.60	2.08	179,940	787.6	826.4	-38.8	0.0	0.0	0.0	-38.8	20.0	21.0	1.0	-38.8	5.0	148.5	0.0	114.7	1.72E-07
10/4/00	10:16	10/9/00	7:52	32.52	4.90	423,360	923.8	922.6	1.2	0.0	0.0	0.0	1.2	21.0	18.5	-2.5	1.2	-12.5	170.8	0.0	159.5	1.01E-07
10/9/00	8:14	10/16/00	8:05	39.52	6.99	604,260	923.8	922.6	1.2	0.0	0.0	0.0	1.2	18.5	16.0	-2.5	1.2	-12.5	322.9	0.0	311.6	1.39E-07
10/16/00	8:22	10/17/00	10:53	40.64	1.10	95,460	826.3	814.5	11.8	0.0	0.0	0.0	11.8	16.0	17.0	1.0	11.8	5.0	31.4	0.0	48.2	1.36E-07



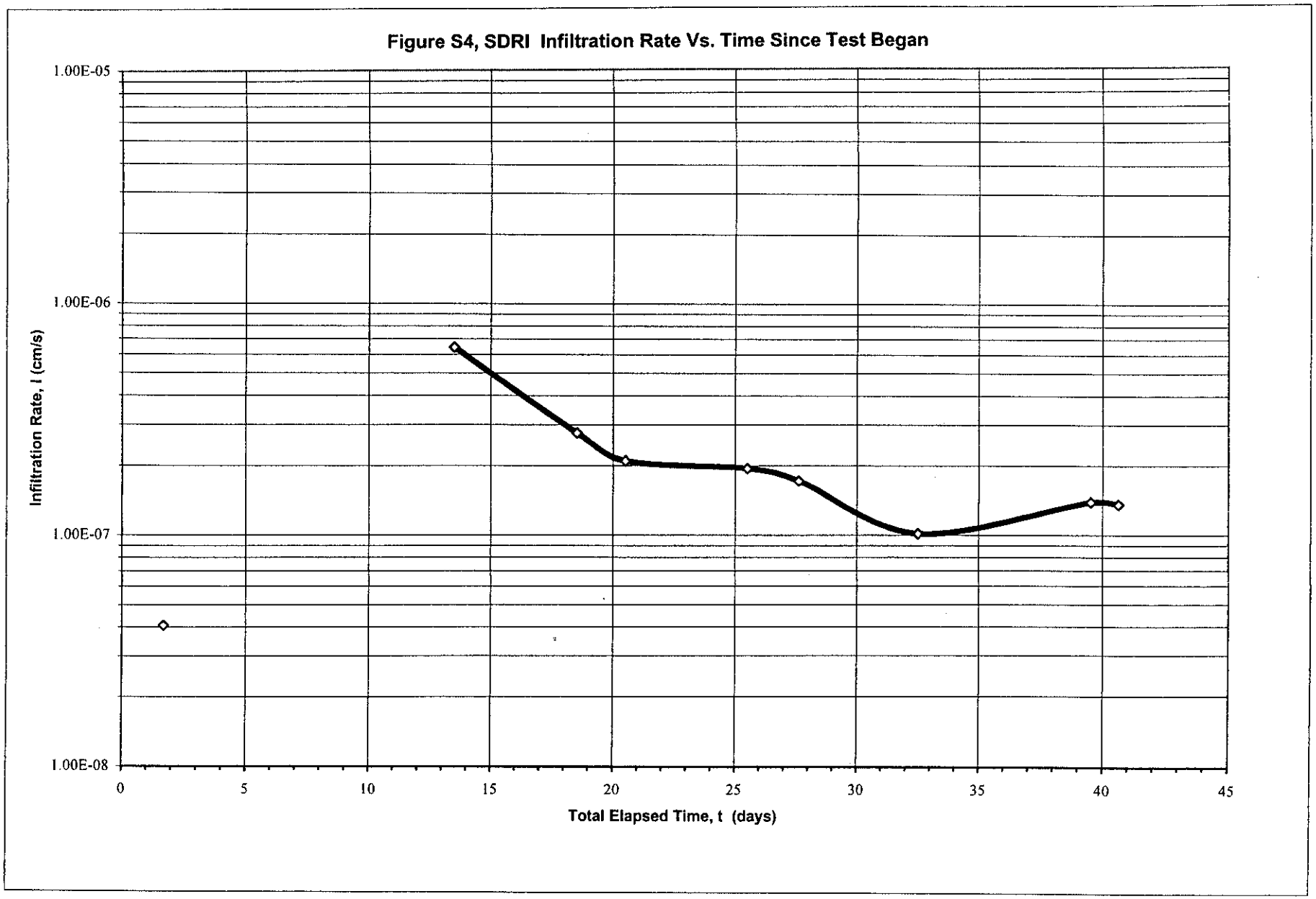


Figure S4, SDRI Infiltration Rate Vs. Time Since Test Began
1.00E-05
1.00E-06
1.00E-07
1.00E-08
Infiltration Rate, I (cm/s)
0
5
10
15
20
25
30
35
40
45
Total Elapsed Time, t (days)

TABLE S-5
SEALED DOUBLE RING INFILTROMETER
END OF TEST MOISTURE CONTENT VS. DEPTH PROFILE

Holdrege & Kull TEST LOCATION: Test Fill Pad, South SDRI
JOB NAME: Box Canyon Sanitary Landfill, South SDRI
JOB NUMBER 30,025-01 TASK: 002

Depth (cm)	Tare No (ID)	Tare (gr)	Wet Soil + Tare (gr)	Dry Soil + Tare (gr)	Water (gr)	Dry Soil (gr)	Moisture Content (%)
1	A-21	11.8	44.0	39.6	4.4	27.8	15.8
3	A-3	11.7	56.1	50.0	6.1	38.3	15.9
5	A-23	11.9	51.1	45.8	5.3	33.9	15.7
7	A-22	11.8	56.7	51.1	5.6	39.3	14.2
9	A-4	11.4	55.5	50.4	5.1	39.0	13.1
11	A-24	11.2	59.9	54.0	5.9	42.8	13.8
13	A-13	11.5	56.4	51.2	5.2	39.7	13.1
15	X-1	49.7	138.7	128.1	10.6	78.4	13.5
17	8	49.9	135.0	125.0	10.0	75.1	13.3
19	A-5	49.2	156.5	143.5	13.0	94.3	13.8
21	X-8	50.3	132.9	122.7	10.2	72.4	14.1
23	A-13	49.7	135.4	124.5	10.9	74.8	14.6
25	X-2	49.8	137.5	126.5	11.0	76.7	14.3
27	LY-5	4.3	39.1	35.1	4.0	30.8	13.0
29	B-5	4.3	46.9	42.3	4.6	38.0	12.1
31	B-9	4.4	40.4	36.6	3.8	32.2	11.8
33	L-2	4.3	45.2	41.0	4.2	36.7	11.4
35	L-6	4.3	44.7	40.6	4.1	36.3	11.3
37	L-11	4.3	50.2	45.8	4.4	41.5	10.6
39	B-1	4.3	43.0	39.0	4.0	34.7	11.5
41	L-7	4.3	36.5	32.7	3.8	28.4	13.4
43	LX-6	4.3	56.4	50.6	5.8	46.3	12.5
45	LY-9	4.3	47.5	43.1	4.4	38.8	11.3
47	KATHY	4.3	39.9	36.3	3.6	32.0	11.3
49	TED	4.3	44.4	40.2	4.2	35.9	11.7
51	L-4	4.3	41.6	37.7	3.9	33.4	11.7

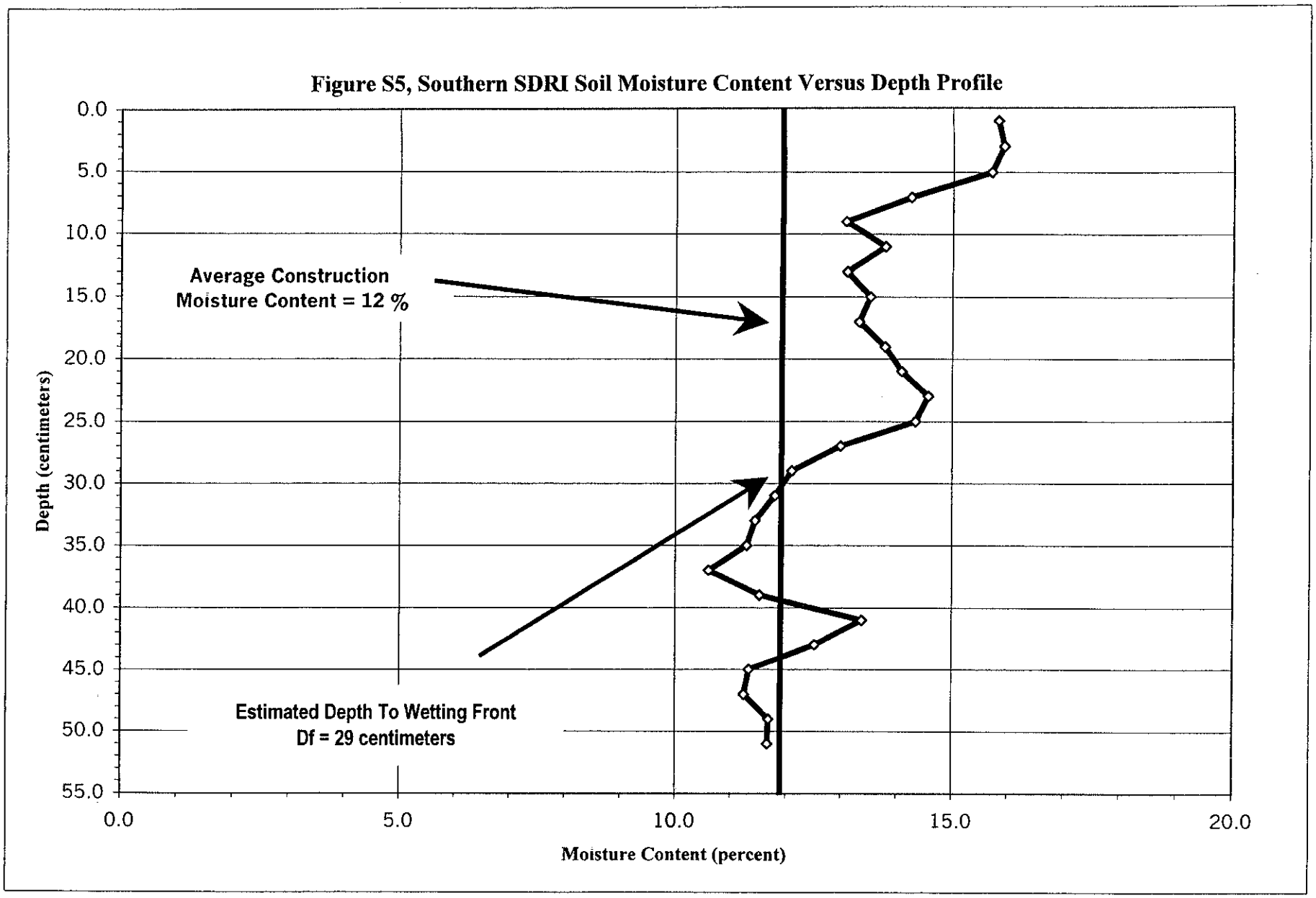


Figure S5, Southern SDRI Soil Moisture Content Versus Depth Profile
Average Construction
Moisture Content = 12 %
Estimated Depth To Wetting Front
Df = 29 centimeters
Depth (centimeters)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
0.0
5.0
10.0
15.0
20.0
Moisture Content (percent)

TABLE S-6
SEALED DOUBLE RING INFILTROMETER
(Hydraulic Gradient Estimated With Soil Suction Head)

Anderson Consulting Group

JOB NAME: Box Canyon Sanitary Landfill, South SDRI
JOB NO.: 30,025-01 **TASK:** 002
OPERATOR: dmo
TEST LOCATION: Test Fill Pad (Constructed by EMCON)

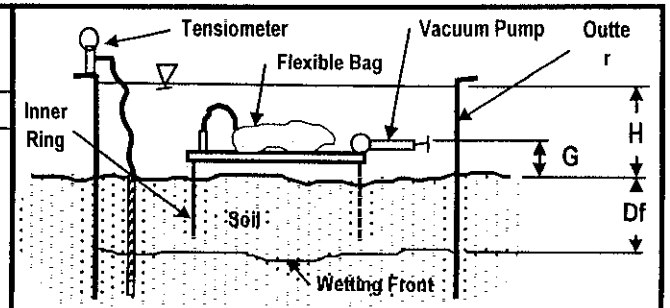
SOIL DESCRIPTION: Brown, Sandy Clay (CH),
LL = 51 to 57%, PI = 30 to 37%, <200 Sieve = 80 to 84%

GENERAL INFORMATION:

PRESS. GAUGE HEIGHT, G (cm):	51.50
CROSS SECTIONAL AREA, A (cm^2):	3,716

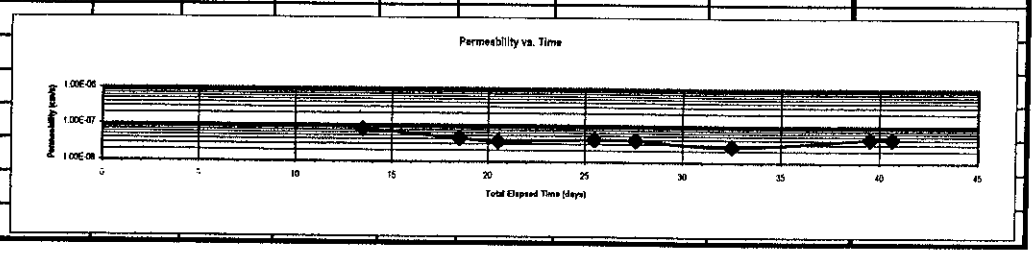
EQUATIONS AND UNIT CONVERSIONS:

I = dVc / (dt x A)	1 in = 2.54 cm
Pw = (Pmax - (G +Df)) / 2	1 g = 1 ml = 1 cc
i = (H + Df + | Pw |) / Df	1 lb = 452.49 g
k(sdraep) = I / i	1 cb = 10.21 cm



APPARATUS SET UP: Est. Wetting Depth (cm) = 35.0

TIME INTERVALS							FLOW DATA		HYDRAULIC GRADIENT DATA								
INITIAL		FINAL		ELAPSED TIME			CORR.	INFILTRATION	OUTER RING WATER DEPTH			EST.	MAX.		WATER	HYDRAULIC	HYDRAULIC
DATE (m/d/y)	24 HR. CLOCK TIME (h:m)	DATE (m/d/y)	24 HR. CLOCK TIME (h:m)	TOTAL ELAPSED TIME (days)	MEASUREMENT PERIOD dt (days)	MEASUREMENT PERIOD dt (sec)	FLOW VOLUME Vc (ml)	RATE I (cm/sec)	INITIAL DEPTH Hi (cm)	FINAL DEPTH Hf (cm)	AVERAGE DEPTH H (cm)	WETTING DEPTH Df (cm)	AIR ENTRY SOIL PRESS. Pmax (cb)	Pmax (cm)	ENTRY SOIL SUCTION HEAD Pw (cm)	GRADIENT i (cm/cm)	CONDUCTIVITY k (cm/sec)
9/6/00	19:30	9/8/00	11:55	1.68	1.68	145,500	22.0	4.07E-08	40.00	40.00	40.00	1.45	16.0	163.4	55.20	66.65	6.11E-10
9/8/00	12:11	9/11/00	9:46	4.59	2.90	250,500	-75.6	-8.12E-08	40.00	40.00	40.00	3.96	16.0	163.4	53.95	24.74	-3.28E-09
9/11/00	10:06	9/14/00	8:38	7.55	2.94	253,920	-68.4	-7.25E-08	40.00	40.00	40.00	6.50	16.0	163.4	52.68	15.26	-4.75E-09
9/14/00	9:33	9/18/00	8:32	11.54	3.96	341,940	-25.8	-2.03E-08	42.00	42.00	42.00	9.94	16.0	163.4	50.96	10.35	-1.96E-09
9/18/00	9:04	9/20/00	7:23	13.50	1.93	166,740	397.7	6.42E-07	42.00	42.00	42.00	11.62	16.0	163.4	50.12	8.93	7.19E-08
9/20/00	7:45	9/25/00	8:23	18.54	5.03	434,280	445.3	2.76E-07	42.00	41.50	41.75	15.96	16.0	163.4	47.95	6.62	4.17E-08
9/25/00	9:07	9/27/00	7:46	20.51	1.94	167,940	130.7	2.09E-07	41.50	41.50	41.50	17.66	16.0	163.4	47.10	6.02	3.48E-08
9/27/00	8:06	10/2/00	7:21	25.49	4.97	429,300	309.8	1.94E-07	41.50	41.50	41.50	21.96	16.0	163.4	44.95	4.94	3.93E-08
10/2/00	7:57	10/4/00	9:56	27.60	2.08	179,940	114.7	1.72E-07	41.50	41.50	41.50	23.77	16.0	163.4	44.04	4.60	3.73E-08
10/4/00	10:16	10/9/00	7:52	32.52	4.90	423,360	159.5	1.01E-07	41.50	41.50	41.50	28.00	16.0	163.4	41.93	3.98	2.55E-08
10/9/00	8:14	10/16/00	8:05	39.52	6.99	604,260	311.6	1.39E-07	41.50	41.50	41.50	34.04	16.0	163.4	38.91	3.36	4.13E-08
10/16/00	8:22	10/17/00	10:53	40.64	1.10	95,460	48.2	1.36E-07	41.50	41.50	41.50	35.00	16.0	163.4	38.43	3.28	4.14E-08



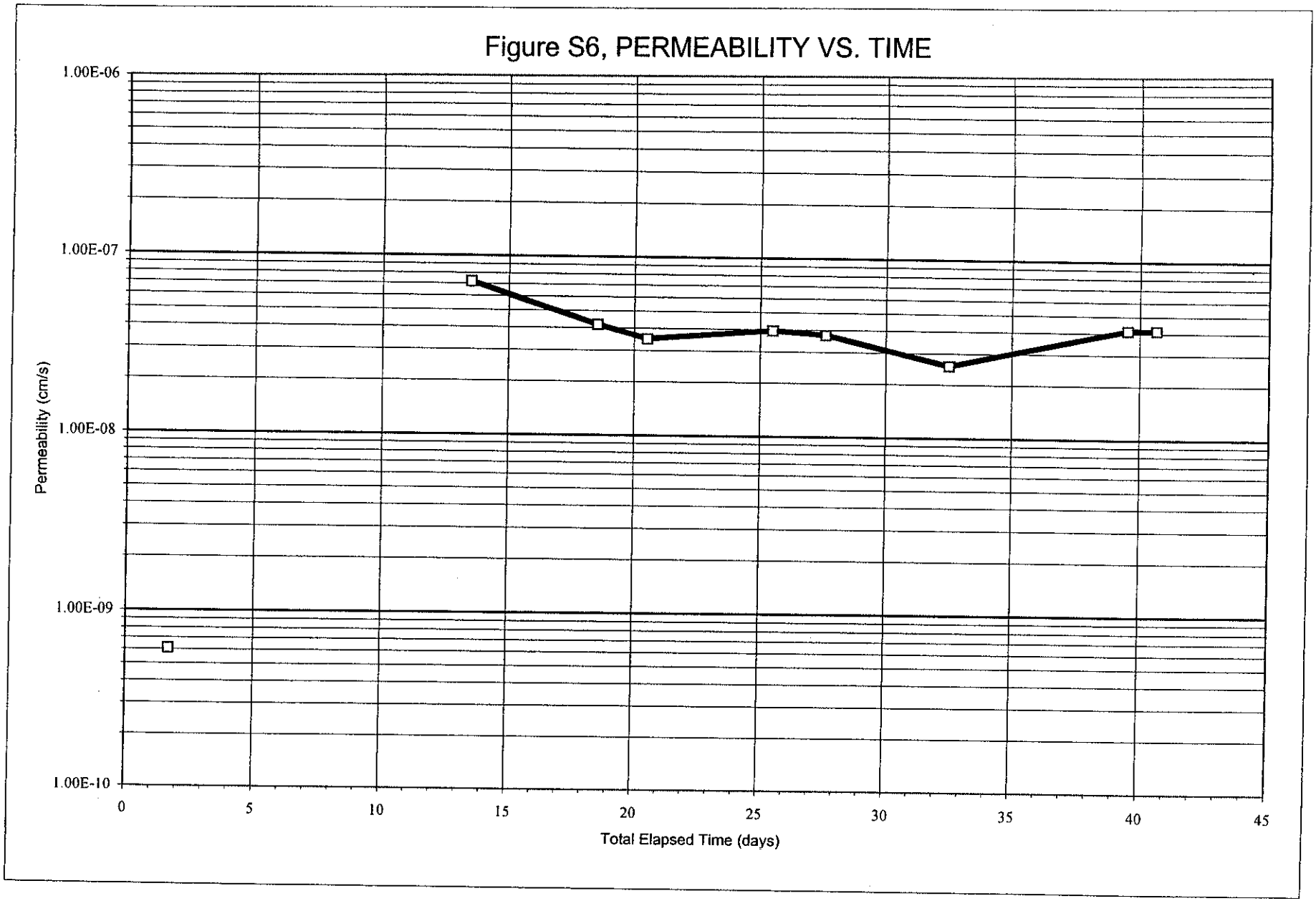


Figure S6, PERMEABILITY VS. TIME
1.00E-06
1.00E-07
1.00E-08
1.00E-09
1.00E-10
Permeability (cm/s)
0
5
10
15
20
25
30
35
40
45
Total Elapsed Time (days)

Appendix C
Design Variance Documentation

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
106 SOUTH 15TH STREET
OMAHA, NEBRASKA 68102-1618

OFFICIAL BUSINESS

To: SOUTHWESTNAVFACENGCOM, Camp Pendleton AFT, Code 5CEN 4 Oct 2001
From: CENWO ED-GA (Conroy)

CC: (a) SOUTHWESTNAVFACENGCOM, Camp Pendleton, ROICC Mr. Paul Hise;
(b) IT Corporation, Mr. Max Pan

Subject: Variance Request – Alternative Material for Construction of Low Permeability Layer for the Box Canyon Landfill Closure

1. The attached variance request is approved. The Ysidora soil has been well characterized and proven to meet the hydraulic permeability requirements of this project. As indicated in your memo, the locations to receive the Ysidora soil are outside the CAMU waste limits and are on the steeper side slopes (3 horizontal on 1 vertical). Steeper slopes will limit infiltration due to increased surface runoff.

2. I recommend that as-placed permeability tests be run on this soil every 2,000 cubic yards rather than every 2,500 cubic yards as currently in the specification. This will result in one additional test for the estimated 7,000 cubic yards of soil required to complete the low permeability layer. If you have any questions please contact me at (402) 221-4381 or by email at James.M.Conroy@usace.army.mil.

JM Conroy

James M. Conroy, PE
Civil Engineer

the IT group.

TECHNICAL MEMORANDUM

FROM: Max Pan, IT Corporation **DATE:** September 28, 2001
TO: Jim Conroy, US Army Corps of Engineers – Omaha District
SUBJECT: Variance Request – Alternative Material for Construction of Low-Permeability Layer for the Closure Cover of Box Canyon Landfill

Status Summary In accordance with your design specification we have been using the soil from the "Lemon Grove" borrow source for the construction of the low-permeability layer. The hydraulic conductivity of this soil was verified through both a full-scale field infiltration test (sealed double-ring infiltrometer test per ASTM D5585) performed on a test pad in September 2000 and subsequent laboratory permeability tests (triaxial flexible-wall hydraulic conductivity per ASTM D5084). The results from the field infiltration test and the laboratory test are both within the same range with the final field permeability estimated at 4.5 $x10^{-8}$ cm/sec.

Since the start of the cover construction in July 2001, we have been monitoring the construction progress and implementing the QC program as required by your specification. To date, laboratory permeability test was completed on a total of 6 core samples collected from the installed low-permeability layer. These core samples were collected at each 2,500 cubic yards of installed earthwork per your specification. The results of the permeability test and soil index property tests (performed on the post-permeability test core) are summarized as follows:

Sample No.	Grain Size Distribution (Gravel – Sand – Fines)	Plasticity Index (LL – PL = PI)	Hydraulic Conductivity (cm/sec)
Grid I-7	3 – 50 – 47	29 – 12 = 17	3.2 x 10 -8
Grid L-3	2 – 49 – 49	27 – 12 = 15	1.0 x 10 -7
Grid L-8	6 – 49 – 45	28 – 12 = 16	1.6 x 10 -7
Grid O-4	2 – 50 – 48	28 – 12 = 16	1.9 x 10 -8
Grid Q-11	1 – 51 – 48	24 – 13 = 11	1.4 x 10 -6
Grid R-8	2 – 46 - 52	26 – 12 = 14	3.3 x 10 -9

The draft laboratory report is presented in Attachment 1. Based on the above results, the average laboratory permeability of the installed layer is 2.8 x 10^{-7} cm/sec. If a correction factor of 5.39 is applied, as suggested by the test pad report, the average field permeability is about 1.5 x 10^{-6} cm/sec, which meets and exceeds your design specification of 1 x 10^{-5} cm/sec. The ranges of grain size distribution and plasticity index indicated that the material used for the construction has been very consistent and met your specification.

As of September 14, we have used up the stockpiled soil that we excavated from the Lemon Grove borrow site in 1998. The survey information indicated that about 41,000 cubic yards were placed as of this date and an additional 7,000 cubic yards would be required to complete the low permeability layer. The as-built condition of the low-permeability layer is shown in the attached Figure 1. As

indicated by the as-built map the areas need to be covered are primarily along the north and west side slopes outside the CAMU units.

Plan Summary We have been working with the Base on borrowing an additional 7,000 cubic yards from the Lemon Grove borrow area since August. Based on our latest interface with the Base biologist on September 4, It appears that the area that we proposed to borrow from is occupied by sensitive habitats and will require extensive permitting effort (biological survey and possible consultation with the US Fish and Wildlife Services). The Base biologist estimated such process would take at least 3 months, which would push our construction schedule into the rainy season that typically starts in November. It should also be noted that without the completion of the low permeability layer we would not be able to construct the overlying select fill.

The above situation demands an alternative source of low permeability soil. We have thus far evaluated two alternatives as follows:

1. The "Ysidora" soil: In 1997 and 1998 we imported about 150,000 cubic yards of soil from Ysidora Flat area to the site. The imported soil was used in 1997 and 1999 to build the interim cover for the corrective action management units (CAMU). The soil grain size distribution and plasticity index test results indicated that the Ysidora soil generally ranged from a silty sand (SM) to a sandy silt (ML). However, soils were mixed during the borrowing and stockpiling operations. The 6-foot-thick interim cover installed in 1997 to cover the CAMU No. 1 was extensively tested as part of the CQC effort. The CQC effort included collecting core samples from every 1,500 cubic yards of earthwork installed for laboratory permeability test. A total of 34 laboratory tests were eventually performed. The results indicated that the Ysidora soil achieved an average permeability of 2.1×10^{-6} cm/sec when compacted to 90% (minimum) of the maximum density at 2% above the optimum moisture as determined by ASTM D1557 method. The soil index test results and the permeability test results are presented in Attachment 2.

   The above test results were verified by the laboratory tests performed by the CQC inspectors from US Army Corps of Engineers, Omaha District, who observed the interim cover construction and collected three core samples as part of their independent CQC verification effort. The three tests yielded hydraulic permeability between 2.38×10^{-7} cm/sec and 7.64×10^{-7} cm/sec. The associated Army Corps CQC laboratory test report is presented in Attachment 3.

2. The "Lemon Grove No. 2" (LG-2) soil: During our September 4 interface with the base biologist, an empty lot about 300 feet east from the original Lemon Grove borrow area was identified as having no biological issues involved. We have since investigated the site by trenching with a backhoe on September 24. Two soil samples were collected and analyzed for various index

properties. The results indicated that the soil is very similar to the original borrow material but with a higher content of fines. The associated laboratory report is presented in Attachment 4. We are in the process of performing laboratory permeability test on this material and believe that the permeability will be very similar to the original borrow material.

To perform borrow activities in LG-2 area, however, will be challenging due to the site's limited accessibility and difficult traffic control (extensive lane closure required). In addition, the Base has to go through an internal environmental review as required by NEPA, which may take 4 to 8 weeks. This would push the construction schedule into rainy season and jeopardize the overall construction.

Variance Request It appears that the alternative borrow sources identified at both the original Lemon Grove site and the Lemon Grove No. 2 site are not accessible in the next 30 to 90 days. With the rainy season fast approaching, we believe that the Ysidora soil should be used as the alternative source for the construction of the low permeability layer for the following reasons:

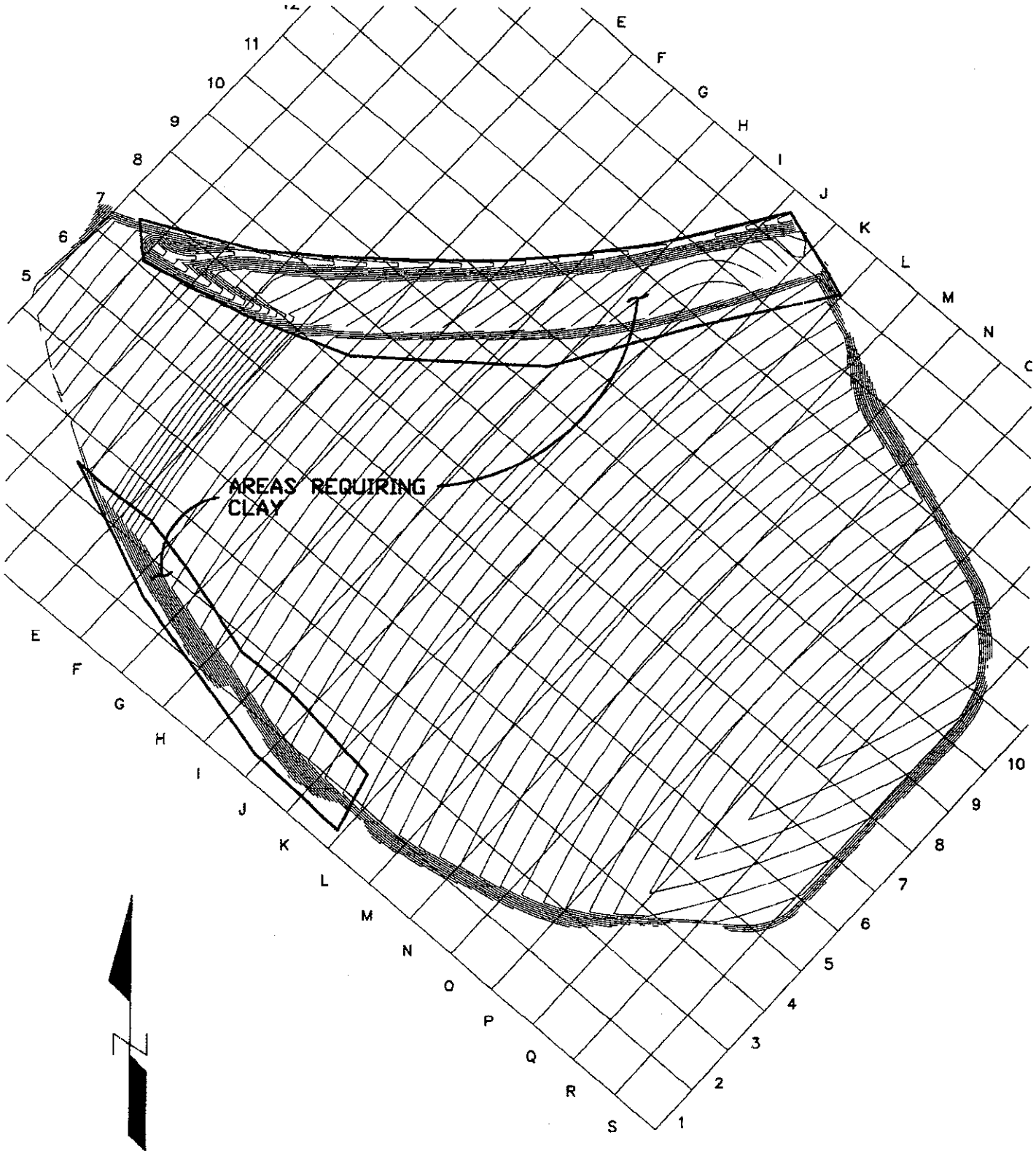
- Based on extensive CQC results from the 1997 construction phase, this soil should achieved a laboratory permeability of 2.1×10^{-6} cm/sec when compacted to 90% of the maximum density at 2% above the optimum moisture content as determined by the ASTM D1557 method.
- Because the areas are primarily on the side slopes (see Figure 1 for locations), it would have less retention time for surface runoff to infiltrate, if any.
- The areas are outside the critical CAMU units.

We believe the design objective of the low-permeability layer will be met by this approach. We are requesting your approval for a construction variance of using the Ysidora soil in lieu of the Lemon Grove soil for the construction of the remaining low-permeability layer.

Attachments

1. Draft Laboratory Test Report – 2001 Installed Low Permeability Layers
2. Laboratory Test Report – 1997 Interim Cover Construction CQC Results by Environmental Geotechnology Laboratory
3. Laboratory Test Report – 1997 Interim Cover Construction CQC Results by US Army Corps of Engineers – Omaha District
4. Laboratory Test Report – Lemon Grove No. 2 Borrow Source

Figure 1: Low Permeability Layer Construction As-built Conditions



NTS FIGURE 1: LOW PERMEABILITY LAYER CONSTRUCTION AS-BUILT CONDITION

JN 7566-501 DATE: 10/02/01 SCALE: NONE SHEET 1 OF 1	BOX CANYON LANDFILL CAMP PENDLETON MARINE CORPS BASE LIMIT OF CLAY PLACED AND THE AREAS NEEDING CLAY PREPARED FOR: THE IT GROUP	Surveying by: TOWILL Surveying, Mapping and GIS Services 15405 Red Hill Ave. Suite A Tustin, CA 92780-7306

Attachment 1:
Draft Laboratory Test Report – 2001 Installed Low Permeability Layer

Environmental
Geotechnology
Laboratory

FAX TRANSMITTAL

Date: 09/27/01 Time: 14:30

Number of pages including
Cover sheet: 7

To: Mr. Max Pan

Phone No.:

Fax No.: 949-475 5434

From: Vincent
EGL

Phone No.: 562-945-0689

Fax No.: 562-945-0364

REMARKS: ☐ Urgent ☑ For your review ☐ Reply ASAP ☐ Please Comment

11823 Slauson Avenue, Unit 18, Santa Fe Springs, CA 90670 • Tel: (562) 945-0689, Fax: (562) 945-0364
E-MAIL: EGL88@AOL.COM

SUMMARY OF PERMEABILITY TEST RESULTS

PROJECT NAME: IT/OHM-Box Canyon
Landfill Site 7

PROJECT NO.: N/A

DATE: 09-18-01

EGL JOB NO.: 01-026-002

CLIENT: IT

SUMMARIZED BY: Vinc W.

BORING NO	SAMPLE NO	Elevation (ft)	DRY DENSITY ASTM D2937 (pcf)	MOISTURE CONTENT ASTM D2216 (%)	EFFECTIVE CONFINED PRESSURE (psi)	SATURATED HYDRAULIC CONDUCTIVITY ASTM D5084 (cm/sec)
Grid I-7	N/A	180.5	126.10	9.6	5.0	3.2E-008
Grid L-3	N/A	199.4	127.60	9.2	5.0	1.0E-007
Grid L-8	N/A	187.9	127.80	7.6	5.0	1.6E-007
Grid O-4	N/A	194.1	129.10	9.6	5.0	1.9E-008
Grid Q-11	N/A	199.1	121.30	7.8	5.0	1.4E-006
Grid R-8	N/A	199.4	129.50	8.9	5.0	3.3E-009

SUMMARY OF ATTERBERG LIMIT TEST RESULTS

PROJECT NAME: IT/ OHM-Box Canyon Landfill

EGL JOB NO.: 01-026-002

PROJECT NO.: 919738

CLIENT: IT Corporation

DATE: 09-21-01

SUMMARIZED BY: V Wang

BORING NO	ELEVATION (ft)	ATTERBERG LIMIT ASTM D4318 *(LL,PL,PI)
Grid I-7	180.5	29,12,17
Grid L-3	186.4	27,12,15
Grid L-8	187.9	28,12,16
Grid O-4	194.1	28,12,16
Grid Q-11	199.1	24,13,11
Grid R-8	199.4	26,12,14

*LL,PI,PI = LIQUID LIMIT PLASTIC LIMIT PLASTICITY INDEX

the group.

Attachment 2:
Laboratory Test Report – 1997 Interim Cover Construction CQC Results By Environmental Geotechnology Laboratory

Environmental Geotechnology Laboratory

September 25, 1998

OHM Remediation Services Corp
2031 Main Street
Irvine, CA 92714-6509

Attn: Mr. Max Pan

RE: LABORATORY TEST RESULTS/REPORT
Project Name: MCLB Camp Pendleton Notch
Project No.: 19738
EGL Job No.: 97-046-003

Gentlemen:

We have completed the testing program conducted on samples from the MCLB Camp Pendleton Notch project. The tests were performed in accordance with testing procedures as follows:

TEST	METHOD
Atterberg Limits	ASTM D4318
Grain Size Analysis	ASTM D422
Modified Proctor	ASTM D1557
Triaxial Permeability	ASTM D5084

Enclosed are Summary of Laboratory Test Results, Summary of Triaxial Permeability Test Results, Compaction Curves, and Grain Size Distribution Curves.

We appreciate the opportunity to provide testing services to OHM Corp. Should you have any questions, please call us.

Sincerely yours,
Environmental Geotechnology Laboratory Inc.

Jack C. Lee, PE, GE
Manager

Enclosure

11823 Slauson Avenue, Unit 18, Santa Fe Springs, CA 90670 • Tel.: (562) 945-0689, Fax: (562) 945-0364

Environmental
Geotechnology
Laboratory

SUMMARY OF TRIAXIAL PERMEABILITY TEST RESULTS
(ASTM D5084)

PROJECT NAME: MCLB CAMP PENDLETON

EGL JOB NO.: 97-046-003

PROJECT NO.: 19738

CLIENT: OHM CORPORATION

DATE: 12-17-97

SUMMARIZED BY: M. TAN

SAMPLE ID	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	EFFECTIVE CONFINING PRESSURE (PSI)	HYDRAULIC CONDUCTIVITY (CM/SEC)
L0-K1-C2	9.2	110.4	5.0	9.6E-007
L0-K2-C4	8.9	124.5	5.0	4.1E-007
L0-K3-A5	6.9	123.3	5.0	5.4E-007
L0-K4-A2	9.4	119.2	5.0	1.4E-006
L1-K1-C2	10.3	114.9	5.0	5.3E-007
L1-K2-C4	10.7	111.0	5.0	4.4E-006
L1-K3-B3	12.5	110.9	5.0	2.6E-006
L1-K4-B1	13.0	112.9	5.0	4.4E-006
L(-1)-K1-C2	10.0	122.8	5.0	5.3E-008
L(-1)-K2-C4	9.1	127.5	5.0	2.1E-007
L(-1)-K3-A5	7.4	118.3	5.0	2.1E-006
L(-1)-K4-A2	9.3	112.0	5.0	9.2E-007
L2-K1-A5	14.7	113.9	5.0	4.5E-007
L2-K2-C2	12.1	113.2	5.0	2.9E-006
L2-K3-B1	10.2	116.5	5.0	3.2E-006
L2-K4-A2	11.4	112.3	5.0	4.9E-006
L3-K1-C3	9.6	121.9	5.0	2.3E-006
L3-K2-B4	10.8	115.5	5.0	6.3E-006
L3-K3-B1	11.7	120.1	5.0	1.3E-006
L3-K4-A2	11.3	117.0	5.0	1.7E-006

11823 Slauson Avenue, Unit 18, Santa Fe Springs, CA 90670 • Tel: (562) 945-0689 Fax: (562) 945-0364

Environmental
Geotechnology
Laboratory

SUMMARY OF TRIAXIAL PERMEABILITY TEST RESULTS
(ASTMD5084)

PROJECT NAME: MCLB CAMP PENDLETON

EGL JOB NO.: 97-046-003

PROJECT NO.: 19738

CLIENT: OHM CORPORATION

DATE: 12-17-97

SUMMARIZED BY: M. TAN

SAMPLE ID	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	EFFECTIVE CONFINING PRESSURE (PSI)	HYDRAULIC CONDUCTIVITY (CM/SEC)
L4-K1-C5	10.2	118.5	5.0	2.4E-006
L4-K2-B5	10.7	117.0	5.0	3.8E-006
L4-K3-C3	9.9	117.0	5.0	3.5E-006
L4-K4-B4	9.0	121.2	5.0	2.2E-006
L5-K1-C5	11.7	118.4	5.0	9.2E-007
L5-K2-A4	10.8	115.1	5.0	9.9E-007
L5-K3-B3	12.2	118.4	5.0	8.6E-007
L5-K4-B2	9.5	117.9	5.0	3.8E-006
L6-K1-C1	9.4	121.4	5.0	4.0E-006
L6-K2-A3	11.6	117.9	5.0	3.6E-006
NL1-K1-B3	13.2	117.2	5.0	4.1E-007
NL1-K2-B5	15.6	113.8	5.0	2.6E-007
NL1-K3-A4	13.7	111.1	5.0	2.1E-006
NL1-K4-B1	8.8	116.1	5.0	2.1E-006

11823 Slauson Avenue, Unit 18 Santa Fe Springs CA 90670 • Tel : (562) 945-0689, Fax: (562) 945-0364

Environmental Geotechnology Laboratory

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NAME: CAMP PENDLETON

EGL JOB NO.: 97-046-003

PROJECT NO : 19738

CLIENT: OHM CORP.

DATE: 10-13-97

SUMMARIZED BY: M. TAN

SAMPLE NO	DEPTH (FT)	ATTERBERG LIMITS ASTM D4318 *(LL,PL,PI)	GRAIN SIZE DIST. ASTM D422 **(GR:SA:FI)	USCS
001	3-6	Non-plastic	7:46:47	SM
002	6	27,25,2	8:51:41	SM
003	6	Non-plastic	2:62:36	SM
004	3-6	Non-plastic	9:64:27	SM
005	3-6	Non-plastic	4:62:34	SM
006	3-6	27,25,2	3:41:56	ML
007	3-6	27,24,3	2:40:58	ML
YF-3-E	N/A	33,27,6	2:25:73	ML
YF-4-W	N/A	30,25,5	0:28:72	ML

NOTES:

*LL PL,PI = LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX

**GR:SA:FI = GRAVEL : SAND: FINES

11823 Slauson Avenue, Unit 18, Santa Fe Springs, CA 90670 • Tel.: (562) 945-0689, Fax: (562) 945-0364

Attachment 3:
Laboratory Test Report - 1997 Interim Cover Construction CQC Results by US Army Corps of Engineers – Omaha District

US Army Corps of Engineers
Omaha District

Fax

To:	Max Pan	**From:**	Jim Conroy
Fax:	949.474.8309	**Pages:**	1 of 12
Phone:	949.660.7572	**Date:**	18-Aug-01
Re:		**CC:**	Kathie Beverly

☐ **Urgent** ☐ **For Action** ☑ **For Review** ☐ **Please Reply** ☐ **Please Recycle**

Max;

Here's the data I found in my files. I can't tell if these are Lemon Grove or Ysidora soils. You should be able to tell from the dates and what work was being done at that time. Samples were tested in Dec 97 or Jan 98. Samples were probably taken in Nov 97. The sample nomenclature may also tell you what soils they are.

Jim Conroy

Email: james.m.conroy@nwo02.usace.army.mil
FAX: 402.221.7769
Phone: 402.221.4381

MR LAB NO. ~~4695~~ 4901

DEPARTMENT OF THE ARMY
MISSOURI RIVER LABORATORY
CORPS OF ENGINEERS
OMAHA, NEBRASKA 68102

Subject: Falling Head Rising Tailwater Permeability Tests

Project: Box Canyon
Intended Use: Landfill
Source of Material: Borings L2-K1-A2-OC, L5-K1-B5-OC, NL1-K2-B5-OC

Submitted by: Chief, CEMRO-ED-GA
Date Sampled: _____, **Date Received:** 12/28/97
Method of Test or Specification: EM 1110-2-1906 and ASTM D-5084-90 Method C

References: Omaha District Purchase Request No. W59XQG7352218 dated 12/11/97

1. Subject testing has been performed in accordance with the above test method and reference. Test results are shown in Figure 1 through 5 and Tables 1 through 5. All tests were performed on specimens from 3 inch shelby tube. Preliminary results were sent on 12/31/97 and 01/09/97.

3. Unless otherwise notified, all remaining material will be disposed of 90 days after the date of this report.

Submitted by:

DOUGLAS B. TAGGART
Director, MR Laboratory

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
DIVISION LABORATORY
OMAHA, NEBRASKA 68102

TABLE 1

FALLING HEAD PERMEABILITY TEST DATA

RISING TAILWATER PRESSURE (ASTM D-5084 METHOD C)

Date	31-Dec-97
Project Name	Box Canyon
MRD Lab No.	4901
Boring No.	L2-K1-A2-QC
Sample No.	
Depth	
Liquid Limit	26
Plastic Limit	27
Specific Gravity	2.75
Classification	Clayey Sand, SC

Initial Specimen Conditions

Moisture Content (%)	14.7
Height (in)	6.461
Diameter (in)	2.877
Wet weight (g)	1483.02
Void Ratio	0.46
Saturation (%)	87.1
Dry Density (pcf)	117.2

Specimen Conditions After Consolidation

Moisture Content (%)	16.5
Height Change (in)	0.021
Height (in)	6.440
Diameter (in)	2.868
Void Ratio	0.45
Saturation (%)	100.0
Dry Density (pcf)	118.4

Test Pressures

Chamber (psi)	100.00
Inflow (psi)	98.00
Outflow (psi)	96.00
B - Value	1.00
Diff. Head (psi)	2.00
Effective Consolidation Pressure (psi)	3.00

Permeability - Top to Bottom

Time (min)	1620.00
Initial Head (cm)	172.84
Final Head (cm)	152.53
k (cm/sec)	5.55E-07

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
DIVISION LABORATORY
OMAHA, NEBRASKA 68102

TABLE 2

FALLING HEAD PERMEABILITY TEST DATA

RISING TAILWATER PRESSURE (ASTM D-5084 METHOD C)

Date	05-Jan-98
Project Name	Box Canyon
MRD Lab No.	4901
Boring No.	L2-K1-A2-QC
Sample No.	
Depth	
Liquid Limit	26
Plastic Limit	17
Specific Gravity	2.75
Classification	Clayey Sand, SC

Initial Specimen Conditions

Moisture Content (%)	14.7
Height (in)	6.461
Diameter (in)	2.877
Wet weight (g)	1483.02
Void Ratio	0.46
Saturation (%)	87.1
Dry Density (pcf)	117.2

Specimen Conditions After Consolidation

Moisture Content (%)	16.5
Height Change (in)	0.021
Height (in)	6.440
Diameter (in)	2.868
Void Ratio	0.45
Saturation (%)	100.0
Dry Density (pcf)	118.4

Test Pressures

Chamber (psi)	100.00
Inflow (psi)	98.00
Outflow (psi)	93.00
B - Value	1.00
Diff. Head (psi)	5.00
Effective Consolidation Pressure (psi)	4.50

Permeability - Top to Bottom

Time (min)	1460.00
Initial Head (cm)	383.85
Final Head (cm)	353.81
k (cm/sec)	4.02E-07

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
DIVISION LABORATORY
OMAHA, NEBRASKA 68102

TABLE 3

FALLING HEAD PERMEABILITY TEST DATA
RISING TAILWATER PRESSURE (ASTM D-5084 METHOD C)

Date	07-Jan-98
Project Name	Box Canyon
MRD Lab No.	4901
Boring No.	L5-K1-B5-QC
Sample No.	
Depth	
Liquid Limit	27
Plastic Limit	16
Specific Gravity	2.78
Classification	Clayey Sand, SC

Initial Specimen Conditions

Moisture Content (%)	10.5
Height (in)	6.106
Diameter (in)	2.880
Wet weight (g)	1372.70
Void Ratio	0.46
Saturation (%)	63.6
Dry Density (pcf)	116.9

Specimen Conditions After Consolidation

Moisture Content (%)	15.4
Height Change (in)	0.006
Height (in)	6.100
Diameter (in)	2.877
Void Ratio	0.45
Saturation (%)	94.2
Dry Density (pcf)	119.3

Test Pressures

Chamber (psi)	120.00
Inflow (psi)	118.00
Outflow (psi)	116.00
B - Value	1.00
Diff. Head (psi)	2.00
Effective Consolidation Pressure (psi)	3.00

Permeability - Top to Bottom

Time (min)	3320.00
Initial Head (cm)	172.84
Final Head (cm)	153.80
k (cm/sec)	2.38E-07

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
DIVISION LABORATORY
OMAHA, NEBRASKA 68102

TABLE 5

FALLING HEAD PERMEABILITY TEST DATA

RISING TAILWATER PRESSURE (ASTM D-5084 METHOD C)

Date	06-Jan-98
Project Name	Box Canyon
MRD Lab No.	4901
Boring No.	NL1-K2-B5-QC
Sample No.	
Depth	
Liquid Limit	30
Plastic Limit	19
Specific Gravity	2.72
Classification	Sandy Clay, CL

Initial Specimen Conditions

Moisture Content (%)	14.9
Height (in)	3.775
Diameter (in)	2.856
Wet weight (g)	774.60
Void Ratio	0.60
Saturation (%)	67.7
Dry Density (pcf)	106.1

Specimen Conditions After Consolidation

Moisture Content (%)	20.9
Height Change (in)	0.005
Height (in)	3.770
Diameter (in)	2.852
Void Ratio	0.59
Saturation (%)	95.9
Dry Density (pcf)	106.6

Test Pressures

Chamber (psi)	110.00
Inflow (psi)	108.00
Outflow (psi)	106.00
B - Value	1.00
Diff. Head (psi)	2.00
Effective Consolidation Pressure (psi)	3.00

Permeability - Top to Bottom

Time (min)	375.00
Initial Head (cm)	160.57
Final Head (cm)	150.83
k (cm/sec)	7.10E-07

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
DIVISION LABORATORY
OMAHA, NEBRASKA 68102

TABLE 6

FALLING HEAD PERMEABILITY TEST DATA
RISING TAILWATER PRESSURE (ASTM D-5084 METHOD C)

Date	09-Jan-98
Project Name	Box Canyon
MRD Lab No.	4901
Boring No.	NL1-K2-B5-QC
Sample No.	
Depth	
Liquid Limit	30
Plastic Limit	19
Specific Gravity	2.72
Classification	Sandy Clay, CL

Initial Specimen Conditions

Moisture Content (%)	14.9
Height (in)	3.775
Diameter (in)	2.856
Wet weight (g)	774.60
Void Ratio	0.60
Saturation (%)	67.7
Dry Density (pcf)	106.1

Specimen Conditions After Consolidation

Moisture Content (%)	20.9
Height Change (in)	0.005
Height (in)	3.770
Diameter (in)	2.852
Void Ratio	0.59
Saturation (%)	95.9
Dry Density (pcf)	106.6

Test Pressures

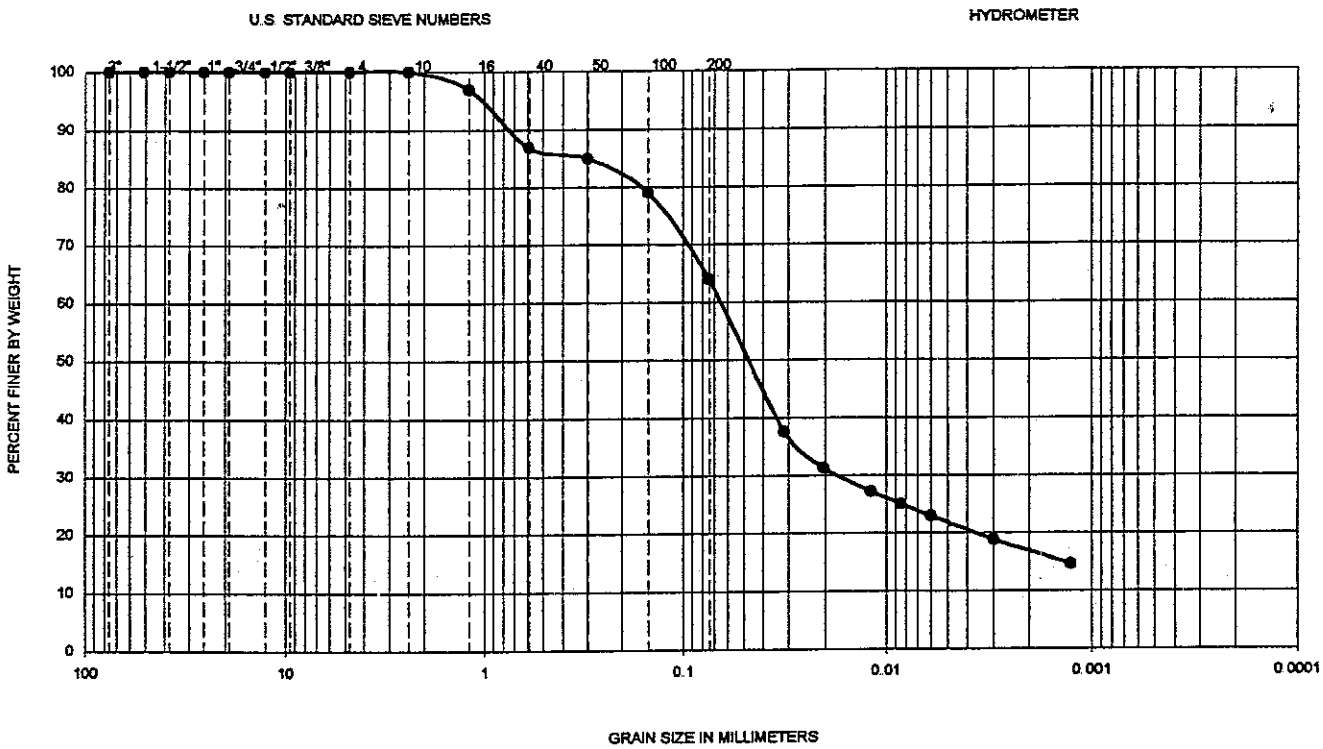
Chamber (psi)	110.00
Inflow (psi)	108.00
Outflow (psi)	103.00
B - Value	1.00
Diff. Head (psi)	5.00
Effective Consolidation Pressure (psi)	4.50

Permeability - Top to Bottom

Time (min)	380.00
Initial Head (cm)	385.12
Final Head (cm)	359.73
k (cm/sec)	7.64E-07

Attachment 4:
Laboratory Test Report – Lemon Grove No. 2 Borrow Source

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (%)	U.S.C.S
●	#65	BULK	30	19	11	--	--	--	--	--	64	CL

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63

Ninyo & Moore

GRADATION TEST RESULTS

ITOHM
BOX CANYON / SITE 7
LEMON GROVE (PERM LAYER)

PROJECT NO.	DATE RECEIVED
103067011.1	09/24/2001

FIGURE B-12

HYDRO#65.xls

Ninyo & Moore — MAXIMUM DENSITY TEST DATA

PROJECT NAME: ITOHM PROJECT NO. 10306701

DATE: 9/24/01 SAMPLE LOCATION: #65 DEPTH: BULK TECHNICIAN: DES

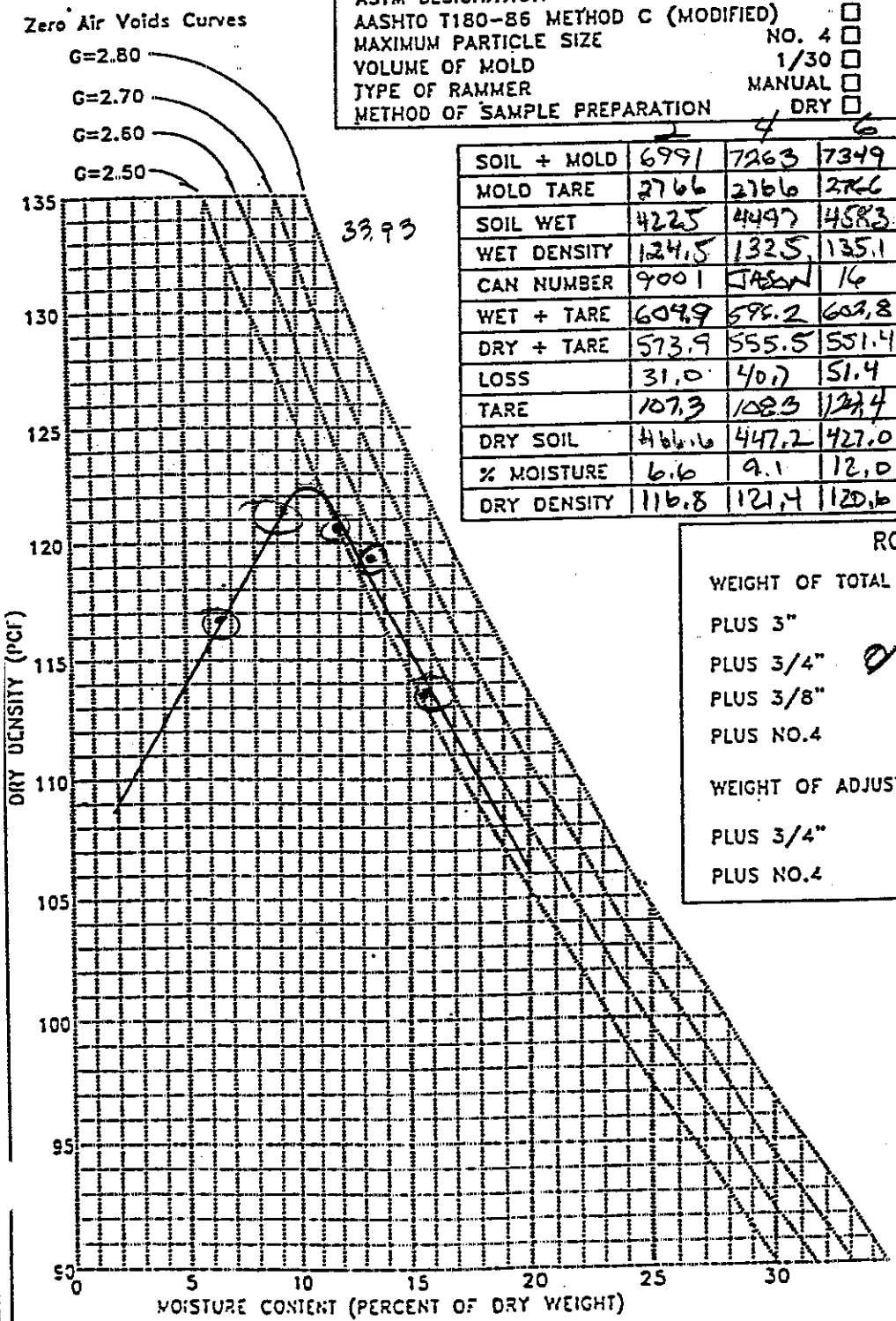
SOIL DESCRIPTION: DARK BROWN silty clay

SAMPLE SOURCE: Lemon Grove (Petm layer) SAMPLED 9-24-01

TEST METHOD

ASTM DESIGNATION	D1557-91 ☒	D698-91 ☐	METHOD C
AASHTO T180-86 METHOD C (MODIFIED)	☐	OVERSIZE CORRECTION	☐
MAXIMUM PARTICLE SIZE	NO. 4 ☐	3/8" ☐	3/4" ☒
VOLUME OF MOLD	1/30 ☐	1/13.33 ☒	
TYPE OF RAMMER	MANUAL ☐	MECHANICAL ☒	
METHOD OF SAMPLE PREPARATION	DRY ☐	MOIST ☒	

	2	4	6	8	10		AS REC'D MOIST CONTENT
SOIL + MOLD	6991	7263	7349	7360	7236		
MOLD TARE	2766	2766	2766	2766	2766		
SOIL WET	4225	4497	4583	4594	4470		
WET DENSITY	124.5	132.5	135.1	135.4	131.7		
CAN NUMBER	9001	JASON	16	9000	VR		
WET + TARE	604.9	595.2	603.8	591.4	597.3		
DRY + TARE	573.9	555.5	551.4	533.9	530.6		
LOSS	31.0	40.7	51.4	57.5	66.7		
TARE	107.3	108.3	124.4	107.7	107.8		
DRY SOIL	466.6	447.2	427.0	426.2	422.8		
% MOISTURE	6.6	9.1	12.0	13.5	15.8		
DRY DENSITY	116.8	121.4	120.6	119.3	113.7		



ROCK CONTENT

WEIGHT OF TOTAL SAMPLE: 32141.0

PLUS 3"	WT.	%	
PLUS 3/4" ∅	WT ∅	% ∅	
PLUS 3/8"	WT.	%	
PLUS NO.4	WT.	%	

WEIGHT OF ADJUSTED SAMPLE

PLUS 3/4"	WT.	%
PLUS NO.4	WT	%

TEST RESULTS

MAXIMUM DENSITY: 122.5

OPTIMUM MOISTURE: 10.5

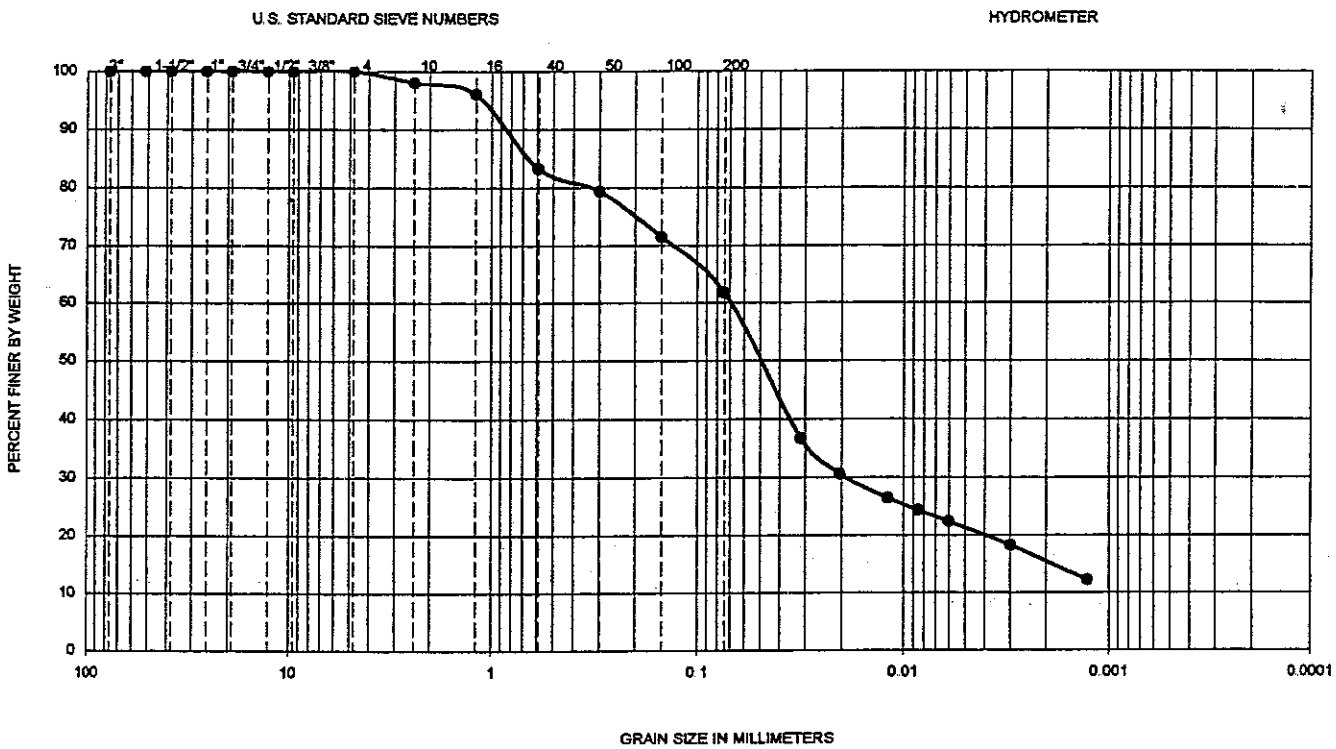
OVERSIZE CORRECTION

MAXIMUM DENSITY

OPTIMUM MOISTURE

Ninyo & Moore

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (%)	U.S.C.S
●	#66	BULK	28	17	11	--	--	--	--	--	62	CL

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63

Ninyo & Moore

GRADATION TEST RESULTS

ITOHM
BOX CANYON / SITE 7
LEMON GROVE (PERM LAYER)

PROJECT NO.	DATE RECEIVED	FIGURE
103067011.1	09/24/2001	B-12

HYDRO#66.xls

Ninyo & Moore — MAXIMUM DENSITY TEST DATA

PROJECT NAME: ITOHM PROJECT NO. 103067011

DATE 9/26/01 SAMPLE LOCATION #66 DEPTH BULK TECHNICIAN TMS

SOIL DESCRIPTION: DARK BROWN clay

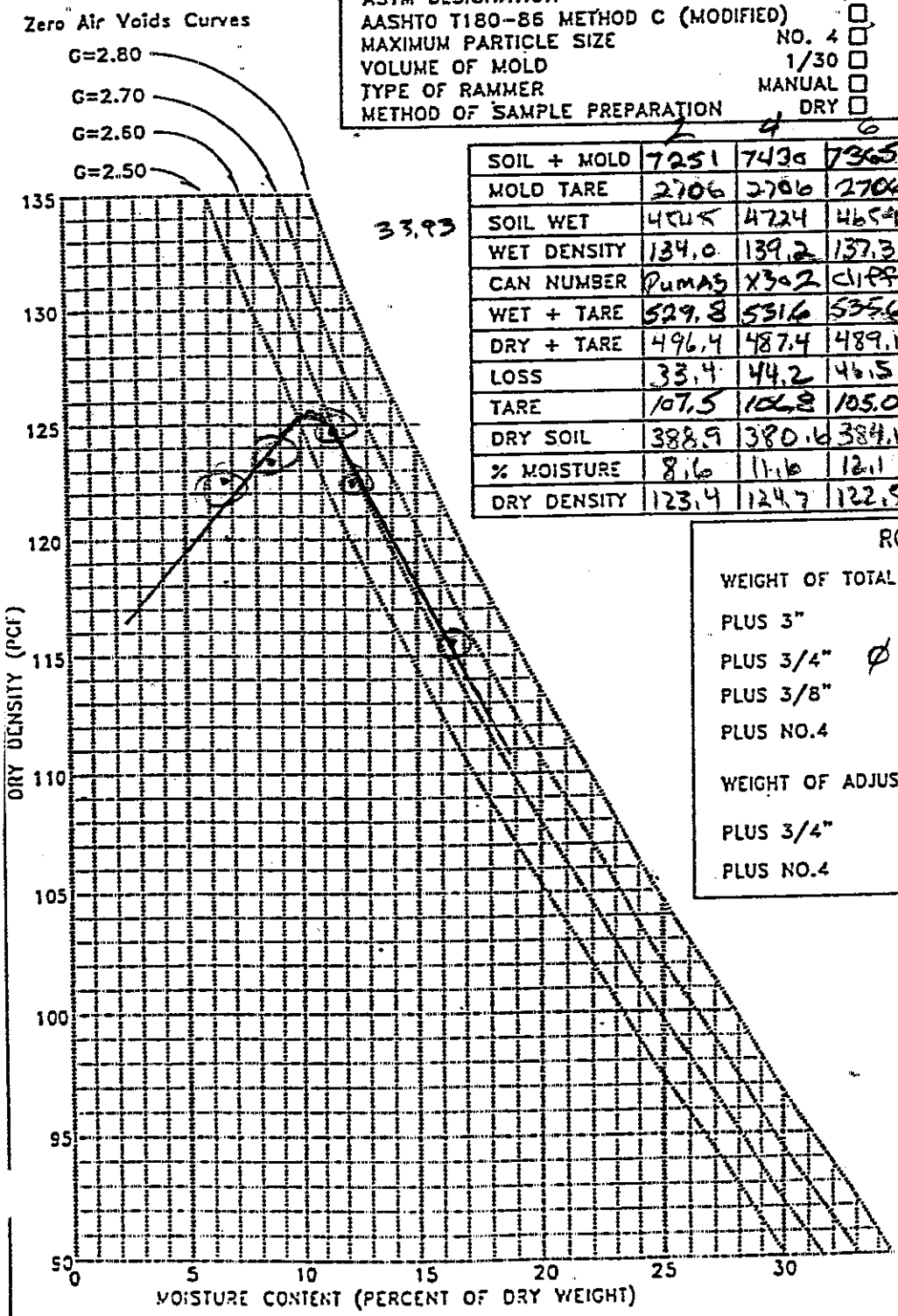
SAMPLE SOURCE:

TEST METHOD

ASTM DESIGNATION	D1557-91 ☒	D698-91 ☐	METHOD C
AASHTO T180-86 METHOD C (MODIFIED)	☐		OVERSIZE CORRECTION ☐
MAXIMUM PARTICLE SIZE	NO. 4 ☐	3/8" ☐	3/4" ☒
VOLUME OF MOLD	1/30 ☐	1/13.33 ☒	
TYPE OF RAMMER	MANUAL ☐	MECHANICAL ☒	
METHOD OF SAMPLE PREPARATION	DRY ☐	MOIST ☒	

	2	4	6	8	8		AS
SOIL + MOLD	7251	7430	7365	7281	7155		REC'D
MOLD TARE	2706	2706	2706	2706	2706		MOIST
SOIL WET	4545	4724	4659	4575	4449		CONTENT
WET DENSITY	134.0	139.2	137.3	134.8	131.1		
CAN NUMBER	PUMAS	X302	CLIFF	DDT	73		
WET + TARE	529.8	531.6	535.6	533.7	548.9		
DRY + TARE	496.4	487.4	489.1	477.7	521.9		
LOSS	33.4	44.2	46.5	61.0	27.0		
TARE	107.5	106.8	105.0	108.9	121.0		
DRY SOIL	388.9	380.6	384.1	368.8	400.9		
% MOISTURE	8.6	11.6	12.1	16.5	6.7		
DRY DENSITY	123.4	124.7	122.5	115.7	122.9		

33.93



ROCK CONTENT

WEIGHT OF TOTAL SAMPLE 31,009.0

PLUS 3"	WT.	%	
PLUS 3/4" Ø	WT Ø	% Ø	
PLUS 3/8"	WT.	%	
PLUS NO.4	WT.	%	

WEIGHT OF ADJUSTED SAMPLE

PLUS 3/4"	WT.	%
PLUS NO.4	WT	%

TEST RESULTS

MAXIMUM DENSITY 125.5

OPTIMUM MOISTURE 10.5

OVERSIZE CORRECTION

MAXIMUM DENSITY

OPTIMUM MOISTURE

Ninyo & Moore

Appendix D
Site Revegetation Seed Mix

Hydroseeding Specifications

Hydroseeding shall be used to establish ground cover and introduce an upland native seed mix to each site. Application of hydroseed shall begin no less than 30 days following the placement of soil amendments where required, unless otherwise directed by IT. The hydroseed mixture shall consist of the three parts described below:

- Upland native seed mix at a rate of 55 pounds per acre. The seed mix shall consist of the following:

Botanical Name	Common Name	Pounds/Acre	Purity/Germination
Artemisia californica	California Sage Brush	4	50/15
Encelia californica	Bush Sunflower	3	60/40
Eschschlozia californica	California Poppy	2	75/98
Lotus scoparius	Deerweed	8	60/90
Eriogonum fasciculatum	California Buckwheat	8	65/10
Lasthenia glabrata	Goldfields	2	85/90
Lupinus succulentus	Arroyo Lupine	4	85/90
Eriophyllum confertiflorum	Golden Yarrow	3	60/30
Salvia apiana	White Sage	4	50/70
Sisyrinchium bellum	Blue-Eyed Grass	1	75/95
Diplacus longiflor-us	Monkey Flower	2	55/2
Salvia mellifera	Black Sage	4	50/70
Nassella pulchra	Purple Needlegrass	2	70/60
Bromus arizonicus	Cucamonga Brome	5	95/80
Melica california	California Melic	3	90/60
	Total Pounds Per Acre	**55**	

- Fiber mulch at a rate of 2,000 pounds per acre.
- Organic soil stabilant (tackifier) at a rate of 140 pounds per acres.

The fiber mulch shall be a specifically prepared virgin wood cellulose fiber, which has been thermomechanically processed for specific use as hydromulch. The fiber mulch shall also contain non-toxic green dye to provide a gage for metering of material over ground surfaces. The tackifier shall be a non-toxic commercial product typically used for binding soil and mulch in erosion control seeding operations. The hydroseeding shall be performed from late October to late November before the start of the winter rainy season

Field Quality Control

The following activities will be performed by IT during the site restoration process:

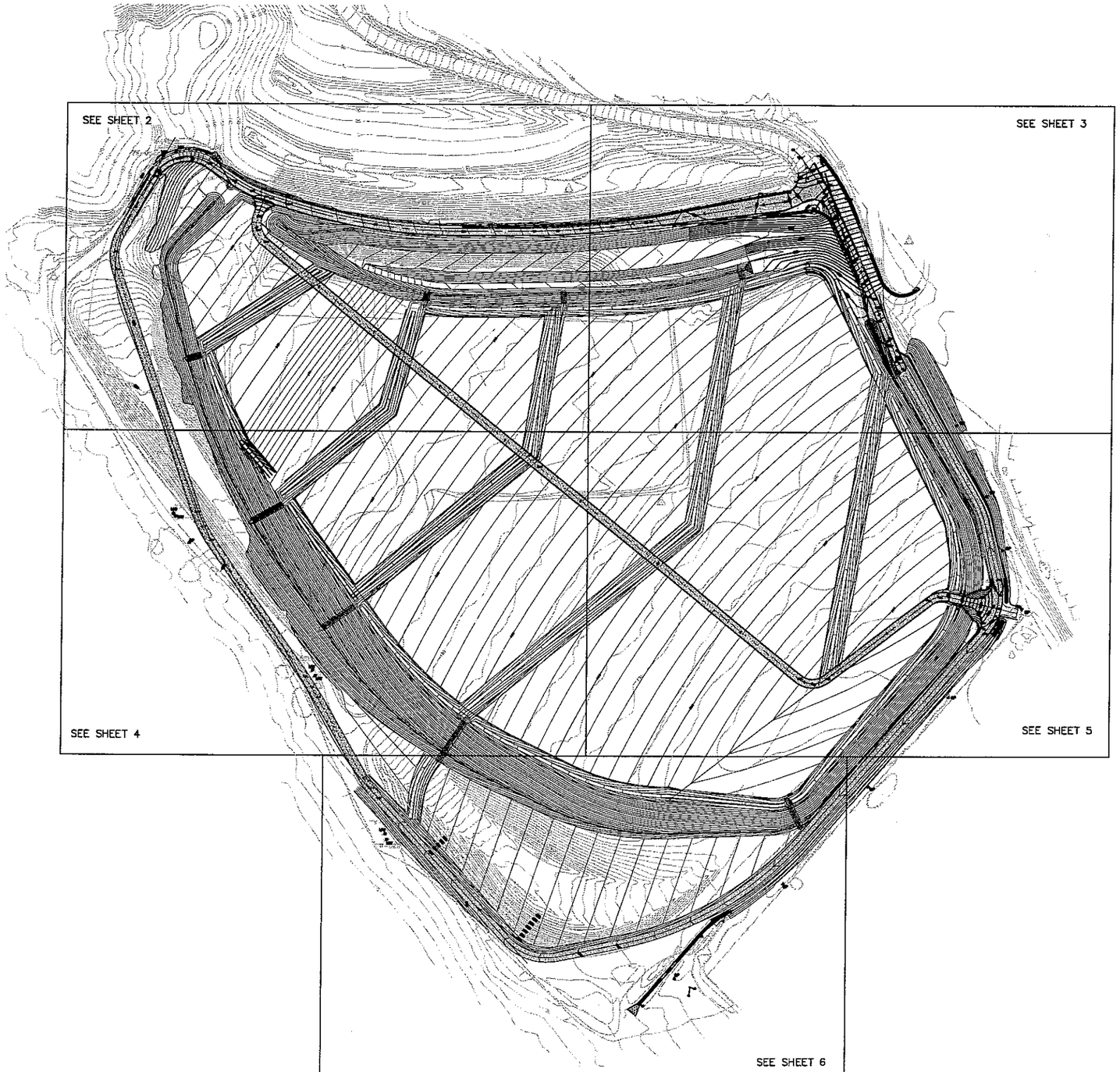
- Visual inspections will be performed to verify that proper amount of compost (based on number of truck loads and surface area), gypsum, and fertilizer are applied and that they are thoroughly mixed with the upper six inch of backfill soil.

- Visual inspection of the hydroseeding process to verify that the proper amount of each of the components is applied.

- Document the visual inspection and all field activities in details. Take photographs as required to show the field conditions before, during, and after the revegetation effort.

Compile field documentation into the final site closure as-built report as required.

Appendix E
Construction Variance Record Drawings



WORK TO BE DONE

SYMBOL	SDRSD (SEE NOTE 1)	DESCRIPTION
		ASPHALT CONCRETE PAVEMENT 2" A.C. ON 6" AGGREGATE BASE
		6" AGGREGATE BASE
		STORM DRAIN
	D-7	CATCH BASIN (TYPE F)
℄ 15'		ROAD (NO SYMBOL) 6" AGGREGATE BASE
	M-7 & M-8	GUARD RAIL (WITH TERMINAL SECTIONS TYPE A OR TYPE B)
		A.C. BERM OR DIKE (6" HIGH)
		A.C. SWALE (3" THICK)
		CHAINLINK FENCE GATE
		CHAINLINK SECURITY FENCE

NOTES:

1. SDRSD = SAN DIEGO REGIONAL STANDARD DRAWINGS.

LEGEND

- 170 — EXISTING TOPOGRAPHY
- 200 — PROPOSED GRADING (AS DESIGNED)
- 75 — RECORD TOPOGRAPHY (AS OF JULY 2002)
- 185 — PROPOSED NEW GRADING

N

SCALE
0 50 100 200

MARK	DATE	DESCRIPTION
4	9/18/02	INCORPORATE USACE COMMENTS
3	8/30/02	FOR USACE REVIEW
2	8/23/02	INCORPORATE COMMENTS
1	7/31/02	ISSUE FOR COMMENTS

REVISIONS

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

DO NOT USE THIS DRAWINGS FOR CONSTRUCTION UNLESS STAMPED AND SIGNED BY A CALIFORNIA REGISTERED CIVIL ENGINEER.

Shaw Environmental, Inc.

CAMP PENDLETON
MARINE CORPS BASE
CALIFORNIA

BOX CANYON LANDFILL
EVAPO-TRANSPIRATION COVER

LANDFILL PERIMETER ROAD
KEY MAP

DESIGNED M. WILLIAMS
DRAWN C.GERONIMO
CHECKED –
SCALE: AS SHOWN
DATE
DRAWING NO. 829771-D1 (layout 1)
SHEET 1 OF 7

H:\BOX CANYON\829771-D1 (LAYOUT 1)

NOTES:

1 DRAWING IS A MODIFICATION TO USACE SHEET G8

2 DESIGN CONTOURS FOR ROAD ARE NOT SHOWN.
- PLACE A MINIMUM OF 6" AGGREGATE BASE.
- GRADE CENTER LINE STRAIGHT BETWEEN BERMS.
- PROVIDE 3% CROSSFALL FROM CENTER LINE.

3. ORIGINAL BERM LOCATION: ACTUAL BERM LOCATION WILL BE SHOWN ON RECORD DRAWING.

4. REFER TO USACE ORIGINAL DESIGN FOR DETAILS.

SCALE 0 15 30 60

NEW 2" THICK A.C. PAVEMENT
NEW CENTER LINE
BEGIN A.C. PAVEMENT STA. 27+75
OLD USACE CENTER LINE
15'
2.5'
R67.5'
A.C. BERM
NEW CENTER LINE
NEW GUARD RAIL
NEW AC BERM (SEE NOTE 3)
NEW AC SWALE
R25'
R32.5'
COVER ROAD CENTER LINE
OLD USACE CENTER LINE
NEW CENTER LINE
NEW A.C. BERM
STA. 32+21 END A.C. PAVEMENT
SEE NOTE 4
SEE NOTE 2
SEE NOTE 4
SEE SHEET 3
SEE SHEET 4

DRAFT
FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

MARK	DATE	DESCRIPTION
3	9/30/02	FOR USACE REVIEW
2	9/23/02	INCORPORATE COMMENTS
1	7/31/02	ISSUE FOR COMMENTS

REVISIONS

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

DO NOT USE THIS DRAWINGS FOR CONSTRUCTION UNLESS STAMPED AND SIGNED BY A CALIFORNIA REGISTERED CIVIL ENGINEER.

Shaw Environmental, Inc.

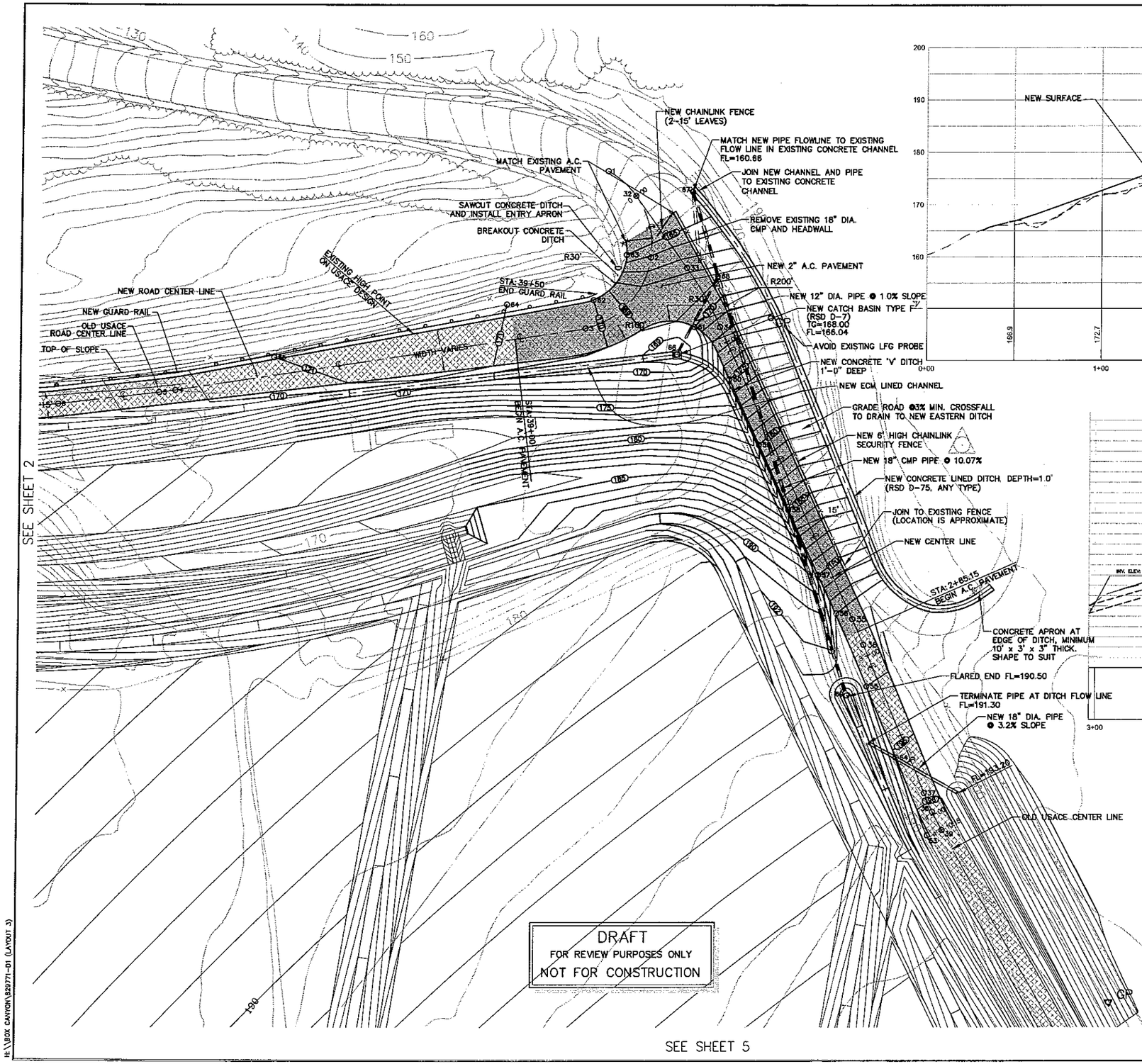
CAMP PENDLETON
MARINE CORPS BASE
CALIFORNIA

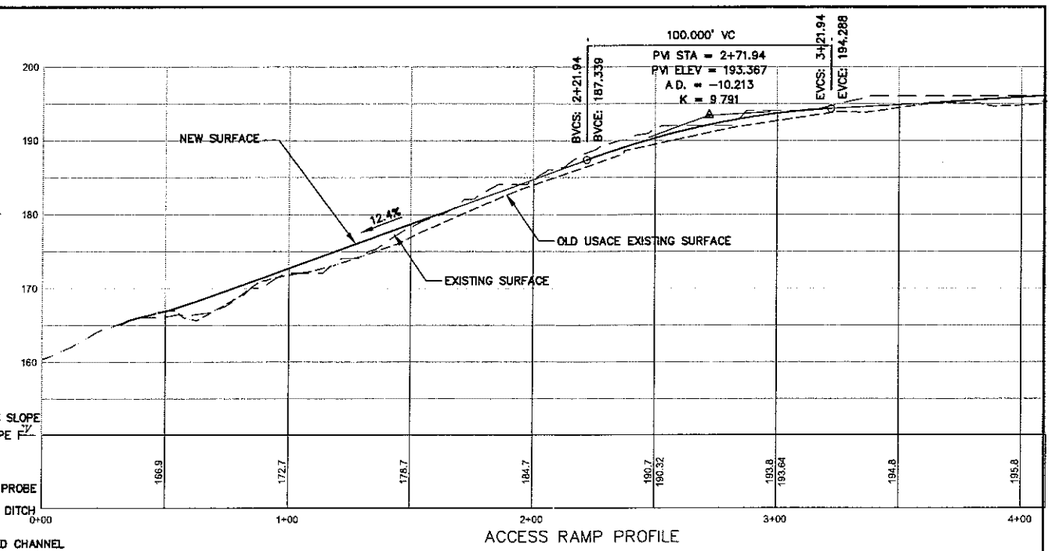
BOX CANYON LANDFILL
EVAPO-TRANSPIRATION COVER

LANDFILL PERIMETER ROAD
(NORTH WEST CORNER AND LANDFILL COVER ROAD)

DESIGNED M. WILLIAMS
DRAWN C.GERONIMO
CHECKED =
SCALE AS SHOWN
DATE
DRAWING NO. 829771-01 (layout 2)
SHEET 2 OF 7

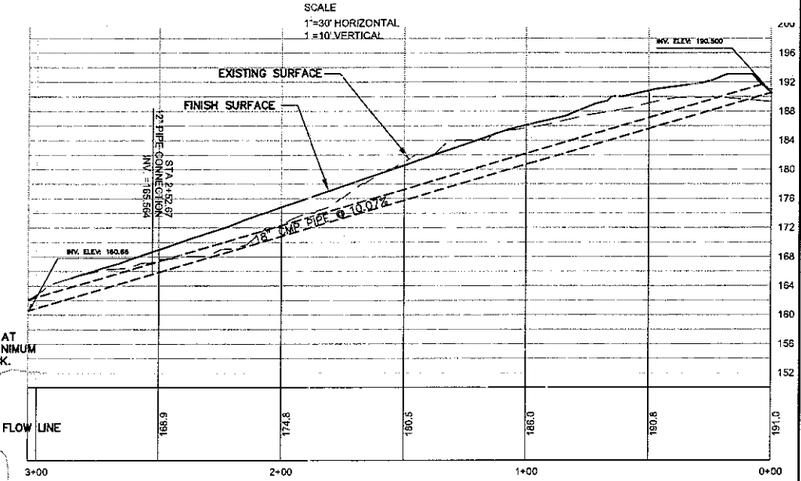
H:\BOX CANYON\bcz/71-01 (LAYOUT 2)





ACCESS RAMP PROFILE

SCALE
1"=30' HORIZONTAL
1"=10' VERTICAL



18" PIPE PROFILE

SCALE
1"=30' HORIZONTAL
1"=10' VERTICAL

NOTES:

1. DRAWING IS A MODIFICATION TO USACE SHEET G9

MARK	DATE	DESCRIPTION
4	9/18/04	INCORPORATE USACE COMMENTS
3	8/30/02	FOR USACE REVIEW
2	8/23/02	INCORPORATE COMMENTS
1	7/31/02	ISSUE FOR COMMENTS

REVISIONS

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

DO NOT USE THIS DRAWINGS FOR CONSTRUCTION UNLESS STAMPED AND SIGNED BY A CALIFORNIA REGISTERED CIVIL ENGINEER.

Shaw
Shaw Environmental, Inc.

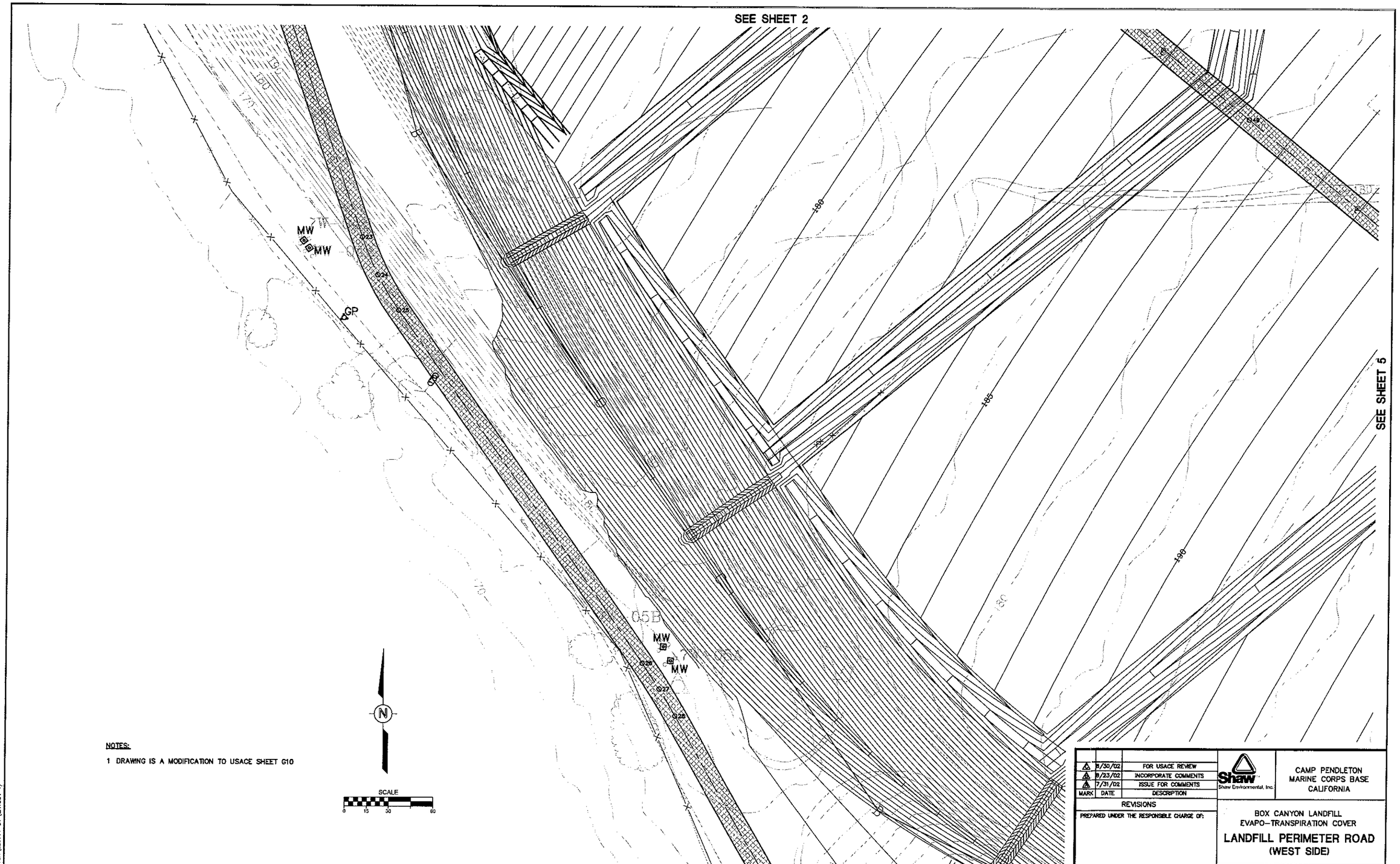
CAMP PENDLETON
MARINE CORPS BASE
CALIFORNIA

BOX CANYON LANDFILL
EVAPO-TRANSPIRATION COVER

LANDFILL PERIMETER ROAD
(NORTH LANDFILL ENTRANCE)

DESIGNED M. WILLIAMS
DRAWN G.GERONIMO
CHECKED -
SCALE: AS SHOWN
DATE
DRAWING NO. 829771-D1 (layout 3)
SHEET 3 OF 7

H:\BOX CANYON\829771-D1 (LAYOUT 3)



NOTES:

1 DRAWING IS A MODIFICATION TO USACE SHEET G10

MARK	DATE	DESCRIPTION
4	9/30/02	FOR USACE REVIEW
3	8/23/02	INCORPORATE COMMENTS
2	7/31/02	ISSUE FOR COMMENTS

REVISIONS

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

DO NOT USE THIS DRAWINGS FOR CONSTRUCTION UNLESS STAMPED AND SIGNED BY A CALIFORNIA REGISTERED CIVIL ENGINEER.

Shaw Environmental, Inc.

CAMP PENDLETON
MARINE CORPS BASE
CALIFORNIA

BOX CANYON LANDFILL
EVAPO–TRANSPIRATION COVER

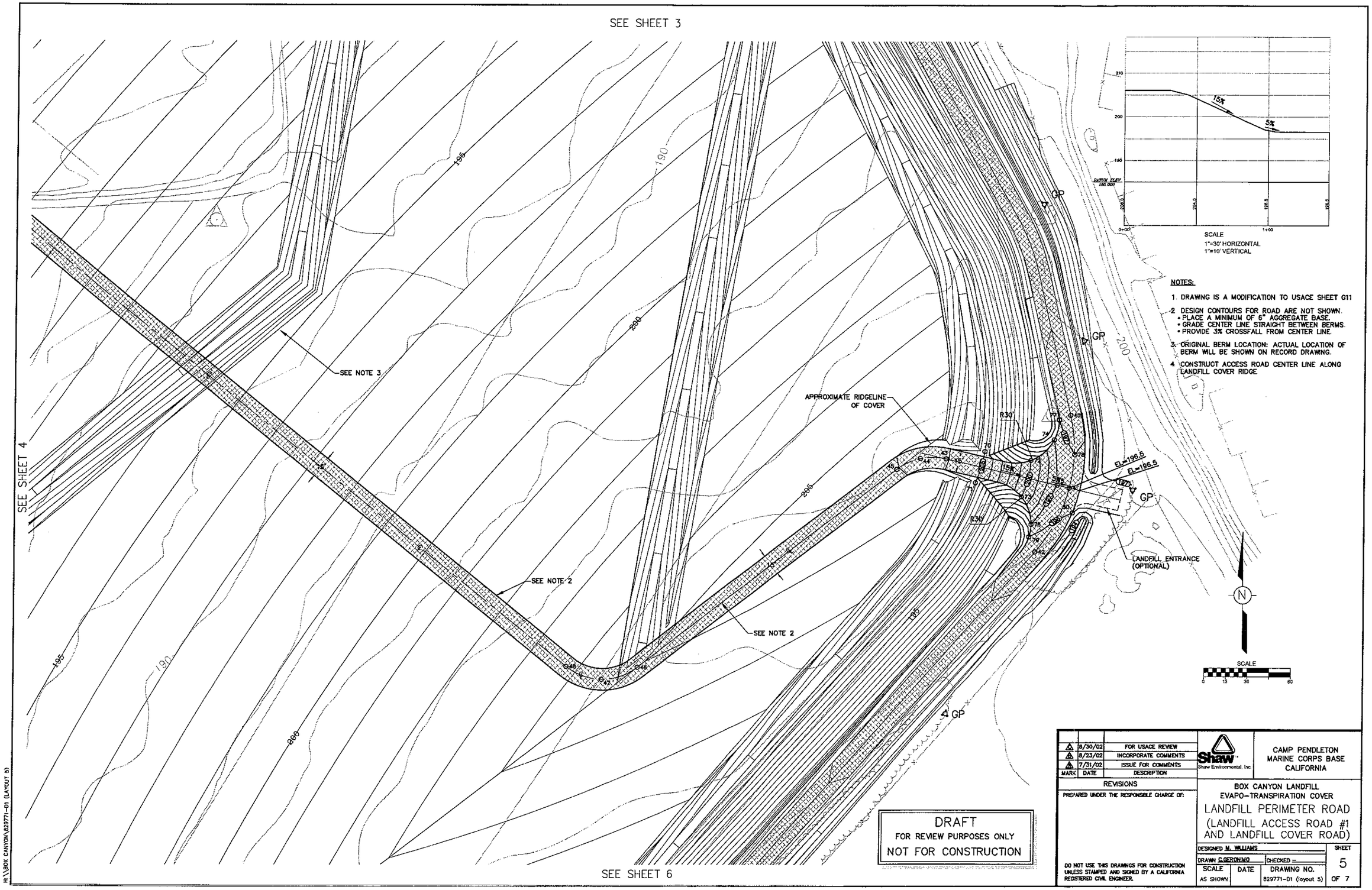
LANDFILL PERIMETER ROAD (WEST SIDE)

DESIGNED M. WILLIAMS
DRAWN G.GERONIMO
CHECKED –

SCALE	DATE	DRAWING NO.	SHEET
AS SHOWN		829771–D1 (layout 4)	4 OF 7

H:\BOX CANYON\829771–D1 (LAYOUT 4)

SEE SHEET 3



MARK	DATE	DESCRIPTION
3	8/30/02	FOR USACE REVIEW
2	8/23/02	INCORPORATE COMMENTS
1	7/31/02	ISSUE FOR COMMENTS

REVISIONS

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

DO NOT USE THIS DRAWINGS FOR CONSTRUCTION UNLESS STAMPED AND SIGNED BY A CALIFORNIA REGISTERED CIVIL ENGINEER.

Shaw Environmental, Inc.

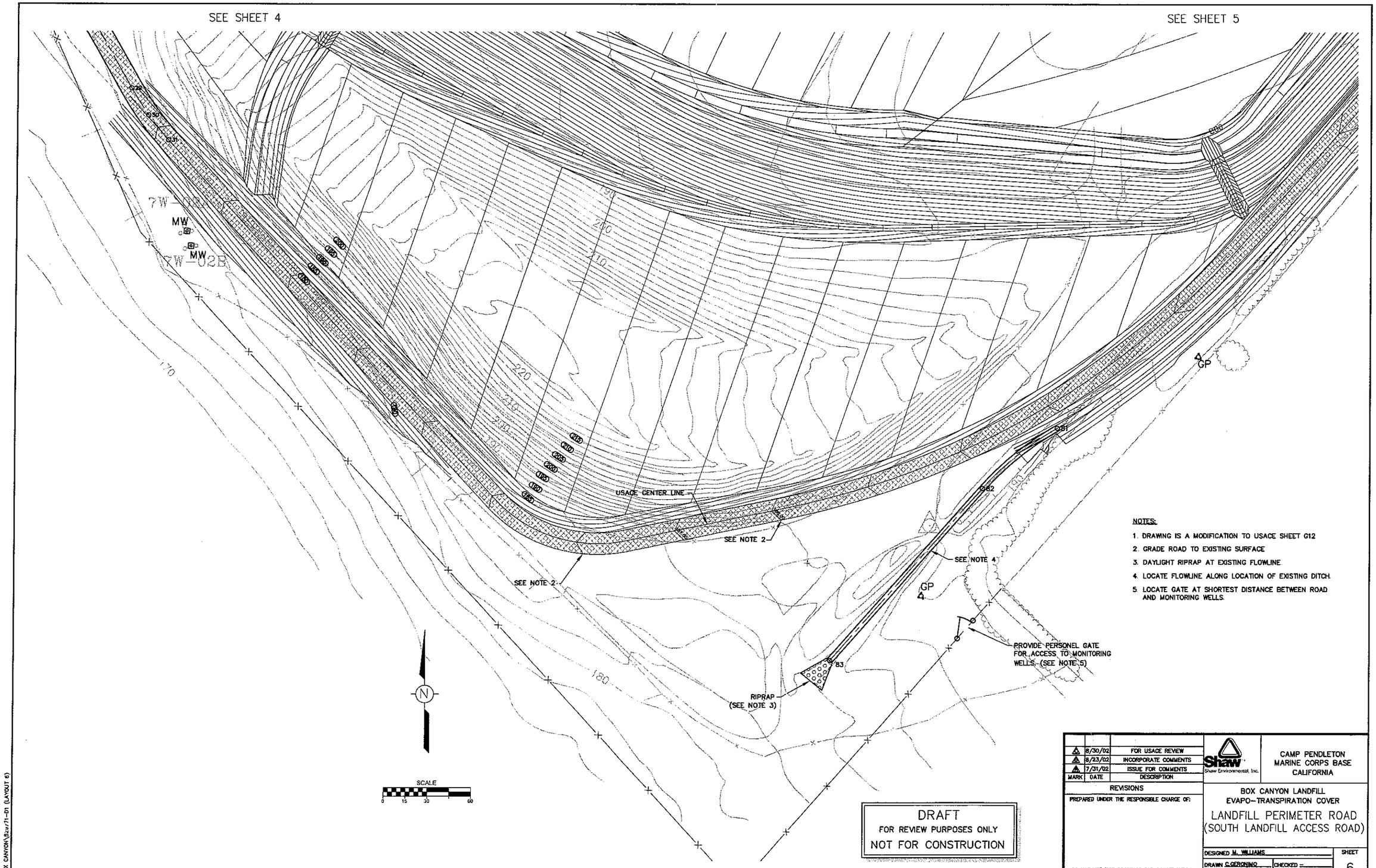
CAMP PENDLETON
MARINE CORPS BASE
CALIFORNIA

BOX CANYON LANDFILL
EVAPO-TRANSPIRATION COVER

LANDFILL PERIMETER ROAD
(LANDFILL ACCESS ROAD #1
AND LANDFILL COVER ROAD)

DESIGNED M. WILLIAMS
DRAWN C. GERONIMO
CHECKED –

SCALE	DATE	DRAWING NO.	SHEET
AS SHOWN		829771-D1 (layout 5)	5 OF 7



NOTES:

1. DRAWING IS A MODIFICATION TO USACE SHEET G12
2. GRADE ROAD TO EXISTING SURFACE
3. DAYLIGHT RIPRAP AT EXISTING FLOWLINE.
4. LOCATE FLOWLINE ALONG LOCATION OF EXISTING DITCH.
5. LOCATE GATE AT SHORTEST DISTANCE BETWEEN ROAD AND MONITORING WELLS.

DRAFT
FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

MARK	DATE	DESCRIPTION
3	8/30/02	FOR USACE REVIEW
2	8/23/02	INCORPORATE COMMENTS
1	7/31/02	ISSUE FOR COMMENTS

REVISIONS

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

DO NOT USE THIS DRAWINGS FOR CONSTRUCTION UNLESS STAMPED AND SIGNED BY A CALIFORNIA REGISTERED CIVIL ENGINEER.

Shaw Environmental, Inc.

CAMP PENDLETON
MARINE CORPS BASE
CALIFORNIA

BOX CANYON LANDFILL
EVAPO-TRANSPIRATION COVER

LANDFILL PERIMETER ROAD
(SOUTH LANDFILL ACCESS ROAD)

DESIGNED M. WILLIAMS
DRAWN C.GERONIMO
CHECKED

SCALE	DATE	DRAWING NO.	SHEET
AS SHOWN		829771-D1 (layout 6)	6 OF 7

H:\BOX CANYON\829771-D1 (LAYOUT 6)

POINT#	NORTHING	EASTIING	ELEVATION	DESCRIPTION
1	2031696.706	6216295.991	.	CL ROAD
2	2031647.171	6216320.716	.	CL ROAD
3	2031606.202	6216283.478	.	CL ROAD
4	2031570.240	6216047.313	.	CL ROAD
5	2031568.964	6216037.905	.	CL ROAD
6	2031561.924	6215979.193	.	CL ROAD
7	2031557.316	6215925.745	.	CL ROAD
8	2031554.647	6215885.266	.	CL ROAD
9	2031553.619	6215844.712	.	CL ROAD
10	2031552.988	6215720.279	.	CL ROAD
11	2031564.139	6215566.090	.	CL ROAD
12	2031598.887	6215415.455	.	CL ROAD
13	2031608.805	6215383.837	.	CL ROAD
14	2031612.010	6215374.287	.	CL ROAD
15	2031621.875	6215350.572	.	CL ROAD
16	2031639.483	6215319.468	.	CL ROAD
17	2031668.832	6215275.206	.	CL ROAD
18	2031678.298	6215222.518	.	CL ROAD
19	2031646.428	6215179.507	.	CL ROAD
20	2031545.916	6215121.239	.	CL ROAD
21	2031515.704	6215111.491	.	CL ROAD
22	2031484.165	6215115.115	.	CL ROAD
23	2031059.851	6215259.338	.	CL ROAD
24	2031034.164	6215270.118	.	CL ROAD
25	2031010.224	6215284.362	.	CL ROAD
26	2030770.712	6215450.498	.	CL ROAD
27	2030753.049	6215462.203	.	CL ROAD
28	2030734.907	6215473.149	.	CL ROAD
29	2030593.528	6215554.413	.	CL ROAD
30	2030575.125	6215566.381	.	CL ROAD
31	2030558.144	6215580.294	.	CL ROAD
32	2031682.562	6216311.907	.	CL ROAD
33	2031641.200	6216341.766	.	CL ROAD
34	2031607.082	6216361.596	.	CL ROAD
35	2031437.419	6216438.924	.	CL ROAD
36	2031422.468	6216445.446	.	CL ROAD
37	2031336.667	6216481.220	.	CL ROAD
38	2031325.789	6216486.142	.	CL ROAD
39	2031315.224	6216491.704	.	CL ROAD
40	2030944.434	6216661.586	.	CL ROAD
41	2030893.783	6216661.085	.	CL ROAD
42	2030849.263	6216637.689	.	CL ROAD
43	2030913.994	6216575.562	.	COVER ROAD CL
44	2030914.159	6216557.890	.	COVER ROAD CL
45	2030906.693	6216541.871	.	COVER ROAD CL
46	2030768.845	6216363.860	.	COVER ROAD CL
47	2030760.474	6216338.897	.	COVER ROAD CL
48	2030769.433	6216314.138	.	COVER ROAD CL

POINT#	NORTHING	EASTIING	ELEVATION	DESCRIPTION
49	2031141.249	6215856.754	.	COVER ROAD CL
50	2031533.298	6215374.481	.	COVER ROAD CL
51	2031553.579	6215361.186	.	COVER ROAD CL
52	2031577.813	6215362.051	.	COVER ROAD CL
53	2031312.226	6216483.261	196.00	CONTOUR
54	2031357.141	6216464.558	195.00	CONTOUR
55	2031398.342	6216447.444	194.00	CONTOUR
56	2031440.787	6216429.712	193.00	CONTOUR
57	2031463.097	6216418.990	190.00	CONTOUR
58	2031500.989	6216401.708	185.00	CONTOUR
59	2031538.857	6216384.449	180.00	CONTOUR
60	2031576.830	6216367.142	175.00	CONTOUR
61	2031607.123	6216346.328	170.00	CONTOUR
62	2031622.447	6216287.970	170.00	CONTOUR
63	2031648.684	6216306.712	165.00	CONTOUR
64	2031620.024	6216238.420	171.00	CONTOUR
65	2031589.332	6216104.327	171.00	CONTOUR
66	2031591.149	6216336.307	168.00	CB TG
67	2031684.895	6216344.965	160.66	18" PIPE INV
68	2031636.389	6216360.066	165.56	PIPE INV.
69	2031393.052	6216436.042	190.50	18" PIPE INV
70	2030919.091	6216602.369	205.00	CONTOUR
71	2030897.370	6216596.002	205.00	CONTOUR
72	2030912.984	6216634.287	200.00	CONTOUR
73	2030887.635	6216627.900	200.00	CONTOUR
74	2030927.493	6216650.591	197.00	CONTOUR
75	2030895.753	6216652.751	197.00	CONTOUR
76	2030868.355	6216634.739	197.00	CONTOUR
77	2030941.241	6216653.861	197.00	CONTOUR
78	2030916.989	6216664.684	197.00	CONTOUR
79	2030859.660	6216633.387	196.00	CONTOUR
80	2030876.485	6216663.263	196.00	CONTOUR
81	2030360.260	6216193.236	.	CL CHANNEL
82	2030318.498	6216141.884	.	CL CHANNEL
83	2030199.699	6216037.310	.	CL CHANNEL

MARK	DATE	DESCRIPTION
4	9/18/02	INCORPORATE USACE COMMENTS
3	8/30/02	FOR USACE REVIEW
2	8/23/02	INCORPORATE COMMENTS
1	7/31/02	ISSUE FOR COMMENTS

REVISIONS

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

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Shaw Environmental, Inc.

CAMP PENDLETON
MARINE CORPS BASE
CALIFORNIA

BOX CANYON LANDFILL
EVAPO-TRANSPIRATION COVER

LANDFILL PERIMETER ROAD
HORIZONTAL CONTROL POINTS

DESIGNED M. WILLIAMS
DRAWN C.GERONIMO
CHECKED -

SCALE	DATE	DRAWING NO.	SHEET
AS SHOWN		829771-01 (layout 7)	7 OF 7

H:\BOX CANYON\829771-01 (LAYOUT 7)

Appendix F
Transmittals of CQC Submittal and RFI

SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION
SELECT FILL AND TOPSOIL FOR LANDFILL COVER

CONTRACTOR
IT CORPORATION

SPECIFICATION SECTION
02140

					TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE	REMARKS
	0004	1	1.3	Materials Handling Plan	X											X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	
	0031	2	3.1	Borrow Source Assessment						X						X		09/07/01			A	12/12/01	12/12/01	A	12/13/01	0013
	0036	3	3.4.1	Select Fill and Topsoil Material						X						X		08/10/01			A	11/30/01	01/09/02	A	02/04/02	0013, 0016, 0021, 0022, 0023, 0029
				Tests																						
	0036	4	3.4.2	Moisture Content and Density						X						X		08/10/01			A	11/30/01	01/09/02	A	02/04/02	0013, 0016, 0019, 0021, 0022, 0023, 0029
				Tests of In-Place Select Fill																						
	0022	5	1.3	Suitable Topsoil						X						X		09/24/01			A	10/24/01	11/02/01	A	11/06/01	
	0013	6	2.1	Select Fill								X				X		08/17/01			A	09/06/01	09/06/01	A	09/12/01	
	0022	7	2.2	Topsoil								X				X		08/17/01			A	10/24/01	11/02/01	A	11/06/01	
	0013	8	3.1.3	Chemical Contamination Test						X						X		09/07/01			A	09/06/01	09/06/01	A	09/12/01	

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EDITION OF AUG 89 IS OBSOLETE

SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION
GRADING

CONTRACTOR
IT CORPORATION

SPECIFICATION SECTION
02210

ACTIVITY NO	TRANS MITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	CLASSIFICATION: INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
		1	3.1	Disposal Facility	X											X		~~08/10/01~~								NA
	0025	2	3.9	Field Testing Control					X							X		08/03/01			A	11/09/01	11/09/01	A	11/25/01	0003,0007,0010, 0014, 0017
		3	1.3.1	Suitable Materials						X						X		~~09/24/01~~								NA
		4	1.4	Borrow Materials						X						X										NA
	0007	5	3.1.1	UXO Construction Support						X						X		08/10/01			A	08/10/01	08/10/01	A	08/16/01	

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EDITION OF AUG 69 IS OBSOLETE

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SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION
STONE (RIPRAP) PROTECTION

CONTRACTOR
IT CORPORATION

SPECIFICATION SECTION
02245

ACTIVITY NO	TRANS MITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	CLASSIFICATION: INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
		1	1.4.3	Initial Sampling and Testing						X					X			~~12/01/01~~								NA
		2	3.2.3	Field Gradation						X					X			~~12/01/01~~								NA
	0034	3	1.2	Waybills and Delivery Tickets									X		X			12/01/01			A	01/07/02	01/09/02			

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EDITION OF AUG 69 IS OBSOLETE

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SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION
GAS MONITORING PROBES

CONTRACTOR
IT CORPORATION

SPECIFICATION SECTION
02253

ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	CLASSIFICATION: INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
	0002	1	1.3	Proposed Method of Drilling	X											X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	
	0009	2	1.3	Daily Drilling Log	X											X		08/03/01			A	08/14/01	08/15/01	A	08/31/01	0002
	0024	3	1.3	Final Boring Log	X											X		08/31/01			A	11/09/01	11/09/01	A	11/25/01	
	0002	4	1.3	Driller Qualifications					X							X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	

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SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION
TEST FILL

CONTRACTOR
IT CORPORATION

SPECIFICATION SECTION
02318

					TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE	REMARKS
	0001	1	1.3	Test Fill Construction Plan	X											X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	
	0001	2	1.4	Third Party Inspector	X											X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	
	0001	3	1.3	Weekly Reports						X						X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	
	0001	4	1.3	Final Report						X						X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	

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EDITION OF AUG 89 IS OBSOLETE

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SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION
SOIL EROSION AND SEDIMENTATION CONTROL

CONTRACTOR
IT CORPORATION

SPECIFICATION SECTION
02370

					TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
ACTIVITY NO	TRANS MITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE	REMARKS
		1	1.3	Geotextile Fabrics	X										X			~~12/01/01~~								NA*
	0035	2	1.3	Erosion Control Blankets	X										X			12/01/01			A	12/12/01	01/09/02	A	02/04/02	0033
		3	3.2.3	Layout		X									X			~~12/01/01~~								NA*
		4	1.3	Obstrutions Below Ground		X									X			~~12/01/01~~								NA*
		5	1.3	Erosion Control Details		X									X			~~12/01/01~~								NA*
	0033	6	1.3	Equipment				X							X			12/01/01			A	12/12/01	12/12/01	A	12/13/01	
		7	1.3	Finished Grade					X						X			~~12/01/01~~								NA*
		8	1.3	Erosion Control Plan						X					X			~~12/01/01~~								NA*
		9	1.3	Construction Sequence						X					X			~~12/01/01~~								NA*
				Schedule																						
		10	1.3	Installer's Qualification						X					X			~~12/01/01~~								NA*
	0033	11	1.3	Materials								X			X			12/01/01			A	12/12/01	12/12/01	A	12/13/01	
		12	3.4	Maintenance Record									X		X			~~12/01/01~~								NA*

ENG FENG FORM 4288, MAY 91

EDITION OF AUG 89 IS OBSOLETE

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NA*: Self-Performed under direct supervision of USACE

SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION
GEOMEMBRANE

CONTRACTOR
IT CORPORATION

SPECIFICATION SECTION
02372

ACTIVITY NO	TRANS MITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	CLASSIFICATION: INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
		1	2.1.1	Raw Materils	X										X			~~12/01/01~~								Not Used
		2	2.2.1.2	Sheet Material	X										X			~~12/01/01~~								Not Used
		3	3.8	As-Built Drawings		X									X			~~12/01/01~~								Not Used
		4	2.2	Tests, Inspections, and			X								X			~~12/01/01~~								Not Used
				Verifications																						
		5	1.3	Field Seaming			X								X			~~12/01/01~~								Not Used
		6	1.2	Qualifications					X						X			~~12/01/01~~								Not Used
		7	3.1.1	Surface Preparation						X					X			~~12/01/01~~								Not Used
		8	1.3	Thickness Measurement						X					X			~~12/01/01~~								Not Used
		9	1.3	Non-Destructive Field Seam						X					X			~~12/01/01~~								Not Used
				Continuity Testing																						
		10	1.3	Samples								X			X			~~12/01/01~~								Not Used
		11	1.3	Tests								X			X			~~12/01/01~~								Not Used

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EDITION OF AUG 89 IS OBSOLETE

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SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION: LOW PERMEABILITY CLAY LAYER

CONTRACTOR: IT CORPORATION

SPECIFICATION SECTION: 02377

ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	CLASSIFICATION: INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
	0005	i	1.3	Materials Handling Plan	X											X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	
	0005	2	3.1.6	Commercial Testing Laboratory					X							X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	
		3	3.1	Borrow Source Assessment						X						X		08/10/01								
	0018	4	1.3	Borrow Tests						X						X					A	10/02/01	10/02/01	A	10/10/01	
	0027	5	1.3	Moisture Content and Density						X						X		08/10/01			A	10/21/01	10/21/01	A	12/13/01	0008,0011,0012, 0015
				Tests																						
	0030	6	1.3	Hydraulic Conductivity Tests						X						X		08/24/01			A	12/05/01	12/05/01	A	12/13/01	0020
	0012	7	2.1	Clay								X				X		08/10/01			A	09/06/01	09/06/01	A	09/12/01	
		8	3.4.4	Quality Assurance Samples								X				X										
		9	3.1.5	Chemical Contamination Tests						X						X		08/10/01								
	0005	10	3.4	Construction Testing Location						X						X		08/03/01			A	08/03/01	08/03/01	A	08/15/01	

ENG ENG FORM 4288, MAY 91

EDITION OF AUG 89 IS OBSOLETE

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SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION: BITUMINOUS PAVING FOR ROADS, STREETS, AND OPEN STORAGE AREAS

CONTRACTOR: IT CORPORATION

SPECIFICATION SECTION: 02551

					TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE	REMARKS
		1	1.2	Bituminous Pavement						X						X		~~12/01/01~~								NA per RFI-09
		2	1.2	Moisture Density Relationship						X						X		~~12/01/01~~								NA per RFI-09
		3	1.2	Certified Refinery Analysis						X						X		~~12/01/01~~								NA per RFI-09
		4	1.2	Aggregate						X						X		~~12/01/01~~								NA per RFI-09

SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION
STORM DRAINAGE SYSTEM

CONTRACTOR
IT CORPORATION

SPECIFICATION SECTION
02630

					TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE	REMARKS
	0006	i	3.4	Placing Pipe			X									X		10/01/01			A	08/10/01	08/10/01	A	08/15/01	
	0006	2	1.2	Reinforced Concrete Pipe and							X					X		10/01/01			A	08/10/01	08/10/01	A	08/15/01	
				Joint Details																						
	0006	3	1.2	Pipeline Testing							X					X		10/01/01			A	08/10/01	08/10/01	A	08/15/01	
	0006	4	1.2	Hydrostatic Test on Watertight							X					X		10/01/01			A	08/10/01	08/10/01	A	08/15/01	
				Joints																						
		5	3.8.5	Determination of Density							X					X		~~10/01/01~~								NA
		6	1.2	Frame and Cover for Gratings							X					X		~~10/01/01~~								NA

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EDITION OF AUG 80 IS OBSOLETE

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SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION: **FENCING**

CONTRACTOR: **IT CORPORATION**

SPECIFICATION SECTION: **02821**

					TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE	REMARKS
		1	1.2	Chain Link Fence							X				X			~~12/01/01~~								Descoped

ENG ENG FORM 4288, MAY 91

EDITION OF AUG 89 IS OBSOLETE

PAGE__ OF __ PAGES

01:01330-A-(page #)

SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION: TURF

CONTRACTOR: IT CORPORATION

SPECIFICATION SECTION: 02935

ACTIVITY NO	TRANSMITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	CLASSIFICATION: INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
		1	1.3	Maintenance Report					X							X		~~12/01/01~~								Descoped
	0037	2	1.3	Seed							X					X		12/01/01			A	04/29/02	04/29/02			
		3	2.1.2.1	Fertilizer							X				X			~~12/01/01~~								Not needed

ENG ENG FORM 4288, MAY 91

EDITION OF AUG 69 IS OBSOLETE

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SUBMITTAL REGISTER

(ER 415-1-10)

CONTRACT NUMBER

TITLE AND LOCATION
CONCRETE FOR MINOR STRUCTURES

CONTRACTOR
IT CORPORATION

SPECIFICATION SECTION
03307

ACTIVITY NO	TRANS MITTAL NO	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL: DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	OPERATION AND MAINTENANCE	CLASSIFICATION: INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	CONTRACTOR SCHEDULE DATES: SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CONTRACTOR ACTION: CODE	DATE	SUBMIT TO GOVERNMENT	GOVERNMENT ACTION: CODE	DATE	REMARKS
		1	1.3	Accelerating Admixture	X										X			~~10/01/01~~								NA
	0026	2	2.1.3.2	Water-Reducing or Retarding	X										X			10/01/01			A	11/09/01	11/09/01	A	11/25/01	
				Admixture																						
	0026	3	2.1.12	Curing Materials	X										X			10/01/01			A	11/09/01	11/09/01	A	11/25/01	
	0026	4	2.1.5	Reinforcing Steel	X										X			10/01/01			A	11/09/01	11/09/01	A	11/25/01	
		5	2.1.6	Expansion Joint Filler Strips,	X										X			~~10/01/01~~								NA
				Premolded																						
		6	2.1.7	Joint Sealants - Field Molded	X										X			~~10/01/01~~								NA
				Sealants																						
	0026	7	2.1.8	Waterstops	X										X			10/01/01			A	11/09/01	11/09/01	A	11/25/01	
	0026	8	2.1.9	Formwork					X						X			10/01/01			A	11/09/01	11/09/01	A	11/25/01	
	0028	9	2.1.2	Aggregates						X					X			10/01/01			A	12/03/01	12/04/01	A	12/13/01	
	0026	10	1.2.3	Concrete Mixture Proportions						X					X			10/01/01			A	11/09/01	11/09/01	A	11/25/01	
	0028	11	2.1.1	Cemetitious Materials							X				X			10/01/01			A	12/03/01	12/04/01	A	12/13/01	
	0032	12	1.2	Compression Test Results						X								12/03/01			A	12/12/01	12/12/01	A	12/13/01	0028

ENG ENG FORM 4288, MAY 91

EDITION OF AUG 89 IS OBSOLETE

PAGE__ OF __ PAGES

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required numbers of copies.

2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.

3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288 for each entry on this form.

4. Submittals requiring expeditious handling will be submitted under a separate form.

5. Separate transmittal form will be used for submittals under separate sections of the specifications.

6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications -- also a written statement to that effect shall be included in the space provided for "Remarks".

7. Form is self transmitting, letter of transmittal is not required.

8. When a sample of a material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I

9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column I to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated in Section I, Column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A -- Approved as submitted
B -- Approved, except as noted on drawings.
C -- Approved except as noted on drawings. Refer to attached sheet resubmission required.
D -- Will be returned by separate correspondence.
E -- Disapproved (See Attached)
F -- Receipt acknowledged
FX -- Receipt acknowledged, does not comply as noted with contract requirements
G -- Other (*Specify*)

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/03/01

TRANSMITTAL NO **0001**

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
215 N 17th Street, Suite 1612
Omaha, NE 68102

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) **02318**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
1	Test Fill Construction Plan		3	1.3		A		
2	Third Party Inspector		3	1.4		A		
3	Weekly Reports		3	1.3		A		
4	Final Report		3	1.3		A		

AND

REMARKS
Note: Item No. 2 submitted under this Transmittal also fulfills the submittal requirements for Specification Section 02377 Item No. 2 given in the updated Submittal Register. Therefore this item will not be submitted under a Transmittal for Specification Section 02377. If submission under Section 02377 is required please give notification to Contractor.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JM Conroy, Project Engineer, USACE

DATE: 8-15-01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/03/01

TRANSMITTAL NO **0002**

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
215 N 17th Street, Suite 1612
Omaha, NE 68102

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) **02253**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
1	Proposed Method of Drilling		3	1.3		A		
2	Daily Drilling Log		3	1.4		A		
3	Driller Qualifications		3	1.3		A		

A N O

REMARKS
Note: Item No. 2 submitted under this Transmittal is for the coring operations only. Additional Daily Drilling Logs will be submitted throughout the Gas Monitoring Probe installation.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JM Conroy, Project Engineer, USACE

DATE: 8-15-01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1 (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/03/01

TRANSMITTAL NO **0003**

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
215 N 17th Street, Suite 1612
Omaha, NE 68102

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) **02210**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Field Testing Control		3	3.9		A		

ANO

REMARKS
Note: Item No. 2 submitted under this Transmittal is for Foundation soil placement activities conducted between 7/23/01 to 7/31/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JM Conroy, Project Engineer, USACE

DATE: 8-15-01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/03/01

TRANSMITTAL NO **0004**

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
215 N 17th Street, Suite 1612
Omaha, NE 68102

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) **02140**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
1	Materials Handling Plan		3	1.3		A		

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JM Conroy, Project Engineer, USACE

DATE: 8-15-01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/03/01

TRANSMITTAL NO 0005

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
215 N 17th Street, Suite 1612
Omaha, NE 68102

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02377

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
1	Materials Handling Plan		3	1.3		A		
2	Commercial Testing Laboratory missing		3	3.1.6		JMC		
10	Construction Testing Location See Remarks		3	3.4		A		

ANO

REMARKS
Note: Item No. 2 under this Transmittal was submittal under Transmittal No. 0001. If submission under Section 02377 is required please give notification to Contractor.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JM Conroy, Project Engineer, USACE

DATE: 8/15/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/10/01

TRANSMITTAL NO **0006**

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) **02630**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
1	Placing Pipe		3	3.4	H6	A	X	
2	Reinforced Concrete Pipe and Joint Details		3	1.2	H5, H6	A	X	
3	Pipeline Testing		3	1.2, 3.9		A	X	
4	Hydrostatic Test on Watertight Joints		3	1.2, 3.9		A	X	
	variance request approved JMC							
	use CALTRANS class II aggregate as backfill							
	instead of bentonite cement slurry. JMC							

REMARKS
Note: Items No. 1 to 4 are addressed in the attached Construction Variance Request. These documents were also emailed to your attention on 08/10/01.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: J M Conroy, Project Engineer, USACE

DATE: 8/15/01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET ___ OF ___ (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/10/01

TRANSMITTAL NO 0007

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) **02210**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Field Testing Control		3	3.9		A		
5	UXO Construction Support ~~missing~~ JMC		3	3.1.1		A		

UXO

REMARKS
Note: Item No. 2 submitted under this Transmittal is for Foundation soil placement activities conducted between 8/01/01 to 8/08/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: J M Conroy, Project Engineer, USACE

DATE: 8-16-01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/10/01

TRANSMITTAL NO **0008**

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) **02377**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
5	Moisture Content and Density Tests		3	1.3		A		

A No

REMARKS
Note: Item No. 5 submitted under this Transmittal is for Low Permeability soil placement activities conducted between 8/06/01 to 8/08/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JMConroy, Project Engineer USACE

DATE: 8/16/01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/14/01

TRANSMITTAL NO 0009

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO (Cover only one section with each transmittal) 02253

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Daily Drilling Log		3	1.3		A		A

REMARKS
Note: Item No. 2 submitted under this Transmittal is for the gas probe installation activities. Daily Drilling Logs for the coring activities were submitted under Transmittal 0002.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE OF APPROVING AUTHORITY	DATE
	JMConroy, Project Engineer	8/31/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/16/01

TRANSMITTAL NO 0010

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO. N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02210

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Field Testing Control		3	3.9		A		A

REMARKS
Note: Item No. 2 submitted under this Transmittal is for Foundation soil placement activities conducted between 8/09/01 to 8/15/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shawn [illegible]
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: Jim Conroy, Project Engineer

DATE: 8/31/01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE SHEET 1 OF 1 (Proponent: CEMP-CE)

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 08/16/01

TRANSMITTAL NO 0011

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO. N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02377

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
5	Moisture Content and Density Tests		3	1.3		A		A
	Note Results of Hole #16:							
	37% passing #200, below the required		40%					

REMARKS
Note: Item No. 5 submitted under this Transmittal is for Low Permeability soil placement activities conducted between 8/09/01 to 8/15/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: Jim Conroy, Project Engineer

DATE: 8/31/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 09/06/01

TRANSMITTAL NO 0012

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02377

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
7	Clay		1	2.1		A		
5	Moisture Content and Density Tests		3	1.3		A		

REMARKS
Note: Item No. 7 is for the 100 pound sample of Low Permeability Layer soil. This sample will be shipped to your attention under a separate carrier on 09/06/01. Item No. 5 is for Low Permeability soil placement activities conducted between 8/16/01 to 9/4/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

David V Pallard
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: J M Conroy, Project Eng

DATE: 9/12/01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1 (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 09/06/01

TRANSMITTAL NO 0013

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02140

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Borrow Source Assessment JMC		3	3.1		A		
3	Select Fill ~~and Topsoil~~ Material Tests		3	3.4.1		A		
4	Moisture Content and Density Tests of In-Place Select Fill		3	3.4.2		A		
6	Select Fill		One 5-Gallon Bucket	2.1		A		
8	Chemical Contamination Test		3	3.1.3		A		
	Rocks larger than 4" not allowable in select fill. Material excavated for channels must be tested prior to use as select fill.							

REMARKS
Note: Items No. 2 and No. 8 submitted under this Transmittal are both included in the Borrow Source Assessment Document. Item No. 6 will be shipped via UPS separately on this date. Item No. 3 is for Select Fill, laboratory material test results, for samples that were collected between 7/21/01 to 8/21/01. Item No. 4 is for Select Fill soil placement activities conducted between 8/27/01 to 9/04/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

David V Pallard
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by item No.)

NAME, TITLE OF APPROVING AUTHORITY: J M Conroy, Project Engineer

DATE: 9/12/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE (Read instructions on page two prior to initiating this form)	DATE: Mo / Day / Yr 09/06/01	TRANSMITTAL NO 0014

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO:	FROM:	CONTRACT NO.	CHECK ONE:
Jim Conroy USACE 106 South 15th Street Omaha, NE 68102-1618	IT Corporation 3347 Micheison Drive, Suite 200 Irvine, CA 92612-1692	N68711-93-D-1459	☒ THIS IS A NEW SUBMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02210	PROJECT TITLE AND LOCATION Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Field Testing Control		3	3.9		A		
	- Note rocks larger than 4" in select fill.	not allowable						

REMARKS
Note: Item No. 2 submitted under this Transmittal is for Foundation soil placement activities conducted between 8/23/01 to 8/27/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

David V. Pollard
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE OF APPROVING AUTHORITY	DATE
	JM Conroy Project Engineer	9/12/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 09/27/01

TRANSMITTAL NO 0015

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02377

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
5	Moisture Content and Density Tests		3	1.3		A		

REMARKS
Note: Item No. 5 is for Low Permeability soil placement activities conducted through 09/17/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

David V. Pollard
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: Jim Conroy, Project Engineer

DATE: 10/2/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 09/27/01

TRANSMITTAL NO 0016

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02140

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 6) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
3	Select Fill and Topsoil Material Tests		3	3.4.1		A		A
4	Moisture Content and Density Tests of In-Place Select Fill		3	3.4.2		A		A

REMARKS
Note: Item No. 3 is for Select Fill, laboratory material test results, for samples that were analyzed through 09/17/01. Item No. 4 is for Select Fill soil placement activities conducted from 09/04/01 to 09/17/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Ward V. Pollard
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: Jim Conroy, Project Engineer

DATE: 10/2/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 09/27/01

TRANSMITTAL NO 0017

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02210

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Field Testing Control		3	3.9		A		A

REMARKS
Note: Item No. 2 submitted under this Transmittal is for Foundation soil placement activities conducted from 8/16/01 to 8/22/01 and from 09/7/01 to 09/18/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

David V. Pollard
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY
J M Conroy, Project Engineer

DATE 10/2/01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE SHEET 1 OF 1 (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE (Read instructions on page two prior to initiating this form)	DATE: Mo / Day / Yr 10/02/01	TRANSMITTAL NO 0018

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO:	FROM:	CONTRACT NO.	CHECK ONE:
Jim Conroy USACE 106 South 15th Street Omaha, NE 68102-1618	IT Corporation 3347 Michelson Drive, Suite 200 Irvine, CA 92612-1692	N68711-93-D-1459	☒ THIS IS A NEW SUBMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal)	PROJECT TITLE AND LOCATION
02377	Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
4	Borrow Tests		1	1.3		A	X	

REMARKS
The attached variance request is for the use of Ysidora soil as low permeability layer.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE OF APPROVING AUTHORITY	DATE
	Jim Conroy, Project Engineer	10/5/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 10/03/01

TRANSMITTAL NO 0019

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. *(Cover only one section with each transmittal)* **02140**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
4	Moisture Content and Density Tests of In-Place Select Fill		3	3.4.2		A		

REMARKS
Note: Item No. 4 is for Select Fill soil placement activities conducted from 09/18/01 to 10/02/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: Jim Conroy, Project Engineer

DATE: 10/10/01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1 (Proponent: CEMP-CE)

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 10/11/01

TRANSMITTAL NO 0020

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO. N68711-93-D-1459

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02377

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
6	Hydraulic Conductivity Tests		3	1.3		A		

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶ 6

To Max Pan
Dept./Agency
Fax # 949. 474. 8309

From Jim Conroy
Phone # 402 221 4550
Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

REMARKS
Note: Item No. 6 submitted under this Transmittal only contains permeability test data for six (6) of the samples collected to date. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

Sharon [illegible]
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: Jim Conroy, Project Engineer

DATE

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE (Read instructions on page two prior to initiating this form)	DATE: Mo / Day / Yr 10/12/01	TRANSMITTAL NO 0021

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE:
Jim Conroy USACE 106 South 15th Street Omaha, NE 68102-1618	IT Corporation 3347 Michelson Drive, Suite 200 Irvine, CA 92612-1692	N68711-93-D-1459	☒ THIS IS A NEW SUBMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal)	PROJECT TITLE AND LOCATION
02140	Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
3	Select Fill and Topsoil Material Tests		3	3.4.1		A		A
4	Moisture Content and Density Tests of In-Place Select Fill		3	3.4.2		A		A
	Although not SM or ML material it is very close to a SM.							

REMARKS
Note: Item No. 3 is for Select Fill, laboratory material test results, for samples that were analyzed through 10/02/01. Item No. 4 is for Select Fill soil placement activities conducted from 10/03/01 to 10/09/01, and corrections for 10/01/01 to 10/02/01. Additional test results will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Sheu [illegible]
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE OF APPROVING AUTHORITY	DATE
	JM Conroy, Project Engineer	10/17/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 11/02/01

TRANSMITTAL NO 0022

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02140

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 8) h.	FOR CE USE CODE i.
3	Select Fill and Topsoil Material Tests		3	3.4.1		A		
4	Moisture Content and Density Tests of In-Place Select Fill		3	3.4.2		A		
5, 7	Suitable Topsoil, Topsoil		3	1.3, 2.2		A	X	

JMC

REMARKS
Note: Item No. 3 is for Select Fill, laboratory material test results, for samples that were analyzed through 10/23/01. Item No. 4 is for Select Fill soil placement activities conducted from 10/10/01 to 10/30/01, and a correction for 10/08/01. Additional test results for Select Fill and Topsoil will be submitted throughout this activity, including the additional Topsoil tests.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shane A

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: J M Conroy, Project Engineer

DATE: 11/6/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE (*Read instructions on page two prior to initiating this form*)	DATE: Mo / Day / Yr 11/09/01	TRANSMITTAL NO 0023

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (*This section will be initiated by the contractor*)

TO:	FROM:	CONTRACT NO.	CHECK ONE:
Jim Conroy USACE 106 South 15th Street Omaha, NE 68102-1618	IT Corporation 3347 Michelson Drive, Suite 200 Irvine, CA 92612-1692	N62474-98-D-2076 CTO 80	☒ THIS IS A NEW SUBMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal)	PROJECT TITLE AND LOCATION
02140	Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (*Type size, model number/etc.*) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (*See instruction no. 8*) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See Instruction No. 6) h.	FOR CE USE CODE i.
3	Select Fill and Topsoil Material Tests		3	3.4.1		A		
4	Moisture Content and Density Tests of In-Place Select Fill		3	3.4.2		A		

REMARKS

Note: Item No. 3 is for Select Fill, laboratory material test results, for samples that were analyzed through 10/31/01. Item No. 4 is for Select Fill soil placement activities conducted from 10/31/01 to 11/06/01. Additional test results for Select Fill will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shumate ITCORP

NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE OF APPROVING AUTHORITY	DATE
	JM Conroy, Project Engineer	11/25/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 11/09/01

TRANSMITTAL NO 0024

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02253

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
3	Final Boring Log		3	1.3		A		

REMARKS
Note: Item No. 3 submitted under this Transmittal are the boring logs for the core hole and gas probe installation activities.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

Shane Austin Shanlin IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: J M Conroy, Project Engineer

DATE: 11/25/01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 11/09/01

TRANSMITTAL NO 0025

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL.

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02210

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See Instruction No. 6) h.	FOR CE USE CODE i.
2	Field Testing Control		3	3.9		A		

REMARKS
Note: Item No. 2 submitted under this Transmittal is for Foundation soil placement activities conducted on 10/12/01 and 10/31/01.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Ashton IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JM Conroy, Project Engineer

DATE: 11/25/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read Instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 11/09/01

TRANSMITTAL NO 0026

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) ~~02210~~ 03307 SK

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Water-Reducing or Retarding Admixture		3	2.1.3.2		A		
3	Curing Materials		3	2.1.12		A		
4	Reinforcing Steel		3	2.1.5		A		
7	Waterstops		3	2.1.8		A		
8	Formwork		3	2.1.9		A		
10	Concrete Mixture Proportions		3	1.2.3		A		

REMARKS
Note:

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shane Austin ITCorp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JM Conroy, Project Engineer

DATE: 11/25/01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 10/21/01

TRANSMITTAL NO 0027

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02377

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See Instruction No. 6) h.	FOR CE USE CODE i.
5	Moisture Content and Density Tests		3	1.3		A		

REMARKS
Note: Item No. 5 is the final set of information to be submitted under this item number for Low Permeability soil placement activities conducted through 11/05/01.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shane Austin IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY
JM Conroy, Project Engineer

DATE 12-13-01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 12/03/01

TRANSMITTAL NO 0028

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) **03307**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
9	Aggregates		3	2.1.2		A		
11	Cementitious Materials		3	2.1.1		A		
12	Compression Test Results		3	1.2		A		

REMARKS
Note: Item No. 12 was not listed on the original Submittal Register.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shaulta IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY
JM Conroy, Project Engineer

DATE
12-13-01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 12/05/01

TRANSMITTAL NO 0029

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02140

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
3	Select Fill and Topsoil Material Tests		3	3.4.1		A		
4	Moisture Content and Density Tests of In-Place Select Fill		3	3.4.2		A		

REMARKS
Note: Item No. 3 is for Select Fill, laboratory material test results, for samples that were analyzed through 11/08/01. Item No. 4 is for Select Fill soil placement activities conducted from 11/07/01 to 11/12/01, and 11/26/01 to 11/28/01. Additional test results for Select Fill will be submitted throughout this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

Shane Austin Shane Austin IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY
JM Conroy, Project Engineer

DATE 12-13-01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1 (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 12/05/01

TRANSMITTAL NO 0030

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☒ THIS IS A RESUBMITTAL OF TRANSMITTAL 0020

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02377

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See Instruction No. 6) h.	FOR CE USE CODE i.
6	Hydraulic Conductivity Tests		3	1.3		A		

REMARKS
Note: Item No. 6 contains new submittal information and a resubmittal of information originally sent under Transmittal number 0020. Additional test results will be submitted when they are received.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

Shane Austin Shaw IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JM Conroy, Project Engineer

DATE: 12-13-01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 12/12/01

TRANSMITTAL NO 0031

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02140

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Borrow Source Assessment		3	3.1		A		

REMARKS
Note: Item No. 2 contains information regarding a proposed borrow source.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shane Austin IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY
JM Conroy, Project Eng.

DATE
12-13-01

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 12/12/01

TRANSMITTAL NO 0032

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 03307

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
12	Compression Test Results		3	1.2		A		

REMARKS
Note: Item No. 12 was not listed on the original Submittal Register.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

Shane Austin Shane Austin IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY
JM Conroy, Project Engineer

DATE
12-13-01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 12/12/01

TRANSMITTAL NO 0033

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) **02370**

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Erosion Control Blankets		3	1.3		A		
6	Equipment		3	1.3		A		
11	Materials	Sample	1	1.3		A		

REMARKS
Note:

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as other wise stated.

Shane Austin Shane Austin IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY
JM Conroy Project Eng

DATE
12-13-01

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 01/09/02

TRANSMITTAL NO 0034

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02245

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
3	Waybills and Delivery Tickets		3	1.2		A		

REMARKS
Note: The materials in Item No. 3 were delivered between Sept 21 and 28, 2001. This material has not been placed.

Submittal FIO, no Gov approval req'd.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shaw 01/09/02
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE OF APPROVING AUTHORITY	DATE

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE).

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 01/09/02

TRANSMITTAL NO 0035

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02370

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Erosion Control Blankets		3	1.3		A		A

REMARKS
Note:

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shane Austin IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: Jim Conroy, Project Engineer

DATE: 2-4-02

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 69 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE)

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 01/09/02

TRANSMITTAL NO 0036

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 02140

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
3	Select Fill and Topsoil Material Tests		3	3.4.1		A		A
4	Moisture Content and Density Tests of In-Place Select Fill		3	3.4.2		A		A

REMARKS
Note: Item No. 3 is for Topsoil, laboratory material test results, for samples that were analyzed through 12/01/01. Item No. 4 is for Select Fill and Topsoil placement activities conducted between 11/26/01 and 12/27/01. Additional test results will be submitted following the completion of this activity.

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shane Austin IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE OF APPROVING AUTHORITY: JM Conroy, Project Engineer

DATE: 2/4/02

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 69 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE):

TRANSMITTAL OF SHOPDRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on page two prior to initiating this form)

DATE: Mo / Day / Yr 04/29/02

TRANSMITTAL NO 0037

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:
Jim Conroy
USACE
106 South 15th Street
Omaha, NE 68102-1618

FROM:
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

CONTRACT NO.
N62474-98-D-2076 CTO 80

CHECK ONE:
☒ THIS IS A NEW SUBMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC NO. (Cover only one section with each transmittal) 2935

PROJECT TITLE AND LOCATION
Installation Restoration Site 7, Box Canyon Landfill MCB Camp Pendleton California

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTR-ACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.
2	Seed		3	1.3		A		

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated.

Shane Austin Shane Austin IT Corp
NAME AND SIGNATURE OF THE CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE OF APPROVING AUTHORITY	DATE

ENG FORM 4025, MAY 91 (ER 415-1-10) EDITION OF AUG 89 IS OBSOLETE. SHEET 1 OF 1. (Proponent: CEMP-CE):

REQUEST FOR INFORMATION LOG

Project Name: MCB Camp Pendleton BCL IT Contract Number: N6474-98-D-2076 CTO 80

RFI No.	SUBMIT DATE	RESPONSE DATE	SUBJECT
IT-RFI-001	08/17/01	08/31/01	Scarification of Low Permeability Clay Layer
IT-RFI-002	08/17/01	08/31/01	Construction of Low Permeability Clay Layer Foundation/Subgrade
IT-RFI-003	08/17/01	08/31/01	Construction of Low Permeability Clay Layer in the area of the North Landfill Channel and the North Ditch
IT-RFI-004	8/17/01	08/31/01	Drainage Pipe No. 1
IT-RFI-005	08/20/01	08/31/01	6 x 4 foot Area Inlet
IT-RFI-006	10/04/01	10/16/01	Topsoil – particle size
IT-RFI-007	10/15/01	10/16/01	Grouted Riprap in cover side slope chutes
IT-RFI-008	10/30/01	11/06/01	Turf (seeding), erosion control blankets (ECB), and erosion control mats (ECM)
IT-RFI-009	10/30/01	11/21/01	Bituminous Paving for Roads, Streets, and Open Storage Areas
IT-RFI-010	12/05/01	12/06/01	Confirmation of Landfill Road Construction
IT-RFI-011	12/05/01	12/05/01	Compaction of Topsoil, Berms, Slopes, and Channels
IT-RFI-012	12/19/01	12/20/01	North Landfill Perimeter Channel
IT-RFI-013	12/19/01	12/20/01	Concrete Cutoff Wall for Sideslope Chutes and Mulch Application
IT-RFI-014	09/03/02	09/04/02	Riprap Testing, Western Perimeter Road, and Landfill Top Access Road
IT-RFI-015	09/03/02	09/15/02	Landfill Perimeter Road Realignment and Drainage Pipe Variation
IT-RFI-016	11/06/02	11/07/02	Terrance Channels 1 and 2 on North Face

CONTRACT NUMBER: N68711-93-D-1459 Delivery Order #0104	REQUEST FOR INFORMATION	RFI No.: IT-RFI-001
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: N/A SPEC. SECTION: 02377	DRAWING DETAIL N/A SPEC. PARA: 3.2.4

TITLE/SUBJECT: Scarification of Low Permeability Clay Layer

DESCRIPTION OF PROBLEM:

This section of the specifications requires: "The final lift of clay shall also be scarified. The total thickness of the low permeability layer shall be such to ensure the total thickness shown in the drawings without intermixing of the subsequent layer due to the final scarification."

When compaction of the final lift of low permeability soil is completed, it often requires trimming such that the thickness is within the limits established in the Specifications. After trimming, the surface is smooth and is often times close to the minimum thickness for this layer. Scarifying the surface after trimming could reduce the thickness of the layer below minimum allowed. Therefore, if the surface can be sufficiently roughened by recompacting the completed lift/layer with the CAT 815 compactor to provide bonding between lifts/layers, is it acceptable to place and compact each succeeding lift or layer without scarifying the surface?

Date	Subcontractor/Supplier	August 17, 2001 Date	IT Corporation General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

APPROVED

8/31/01
Date

JM Conroy
~~BY DIRECTION~~

_____ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. RFP to follow.

_____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod.

CONTRACT NUMBER: N68711-93-D-1459 Delivery Order #0104	REQUEST FOR INFORMATION	RFI No.: IT-RFI-002
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: G2 SPEC. SECTION: N/A	DRAWING DETAIL N/A SPEC. PARA: N/A

TITLE/SUBJECT: Construction of Low Permeability Clay Layer Foundation/Subgrade

DESCRIPTION OF PROBLEM:

This drawing provides a topographic representation of the top of subgrade surface upon which the low permeability clay layer is to be constructed. The perimeter limits of this layer, as shown, were staked. The resulting grade-staking indicated that the existing surface of the CAMU needs to be cut to depths as deep as 4 feet. This would require CAMU wastes to be exposed and removed, according to the Navy and the Regulatory Agencies, is unallowable. Therefore IT proposes the following:

- In those perimeter areas where a cut is indicated, the existing surface will be considered the top of subgrade.
- The existing surface will be surveyed to document the surface for future low permeability clay layer thickness verification.
- The low permeability clay layer will be constructed directly on top of the existing surface.

Is this proposed procedure acceptable?

Date	Subcontractor/Supplier	August 17, 2001 Date	IT Corporation General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

APPROVED. This refers to sheet G22, detail 13. The CAMU waste and cover extend farther than indicated in the design. This occurs in only a few locations. These areas are on the 3:1 sideslope, therefore runoff will be greater than on the top of cap. This will offset the thinned layer of select fill

8/31/01
Date

JM Conroy
~~BY DIRECTION~~

_____ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. RFP to follow

_____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod

CONTRACT NUMBER: N68711-93-D-1459 Delivery Order #0104	REQUEST FOR INFORMATION	RFI No.: IT-RFI-003
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: G22 SPEC. SECTION: N/A	DRAWING DETAIL Section 14 SPEC. PARA: N/A

TITLE/SUBJECT: Construction of Low Permeability Clay Layer in the area of the North Landfill Channel and the North Ditch

DESCRIPTION OF PROBLEM:

This Drawing Section indicates that the evapotranspiration cover layers mirror the proposed final configuration.

Construction of the low permeability clay layer will be difficult to construct in this area due to the multiple (five) changes in the grading of the ground surface.

IT proposes to construct the low permeability clay at a maximum slope of 3H:1V from the top of the subgrade to the toe of the existing slope. The low permeability clay layer will extend from the toe of slope to 39 feet from the centerline of the Landfill Perimeter Road. The select fill will be constructed on top of the low permeability clay layer to the lines and grades shown in the design drawings. The resulting thickness of the select fill and topsoil layer combined will be a minimum of 5 feet and in some areas (e.g., between the channel and ditch) will exceed the minimum required. The North Landfill Channel and the North Ditch will be shaped during placement of the select fill layer. This proposed change would provide a low permeability clay layer that is more easily controlled during construction as well as the testing.

Is this proposed procedure acceptable?

Date	Subcontractor/Supplier	August 17, 2001 Date	IT Corporation General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

APPROVED, see revised drawing G22 emailed on 8/22/01.

8/31/01
Date

JM Comoy
~~BY DIRECTION~~

_____ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. RFP to follow

_____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod.

CONTRACT NUMBER: N68711-93-D-1459 Delivery Order #0104	REQUEST FOR INFORMATION	RFI No.
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: G8, G14 G16, H4 SPEC. SECTION: N/A	DRAWI Profile & Dr SPEC. P

TITLE/SUBJECT: Drainage Pipe No. 1

DESCRIPTION OF PROBLEM:

During excavation activities for the perimeter drainage channel and piping in the northwest corner o very limited trash outside the area of the Drainage Pipe No. 1. We request that the following field d

- Extend the existing drainage channel to replace Drainage Pipe No. 1.
- The area to the west of the alignment of the landfill perimeter drainage channel will not be does not contain municipal or CAMU waste. The small area that does contain municipal w outlet structure) will be excavated to exposed virgin soil. The waste will be placed in an ar
- The alignment of the channel from station C 2+23 to C 3+50 will be realigned approximatel is currently graded to virgin soil and no trash is present.

IT will photograph the areas described above to document that all waste has been removed.

Date	Subcontractor/Supplier	August 17, 2001 Date

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

APPROVED, with the exception that 40' of Pipe #1 will remain to transition flow into the concrete wingwall structure would be required.

8/31/01
Date

_____ Response may involve additional costs or time. If you feel additional costs or time is warra contract modification. RFP to follow.

_____ Response is provided on the presumption of no increase in contract price or time. If additio do not proceed without a contract mod.

CONTRACT NUMBER: N68711-93-D-1459 Delivery Order #0104	REQUEST FOR INFORMATION	RFI No.: II-RFI-004
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: G8, G14 G16, H4 SPEC. SECTION: N/A	DRAWING DETAIL Perimeter Channel Profile & Drainage Pipe No 1 Profile SPEC. PARA: N/A

TITLE/SUBJECT: Drainage Pipe No 1

DESCRIPTION OF PROBLEM:

During excavation activities for the perimeter drainage channel and piping in the northwest corner of Box Canyon landfill, we found very limited trash outside the area of the Drainage Pipe No. 1. We request that the following field design changes be accepted:

- Extend the existing drainage channel to replace Drainage Pipe No 1
- The area to the west of the alignment of the landfill perimeter drainage channel will not be capped. The bulk of the area does not contain municipal or CAMU waste. The small area that does contain municipal waste (near the existing drainage outlet structure) will be excavated to exposed virgin soil. The waste will be placed in an area within the limits of the cap.
- The alignment of the channel from station C 2+23 to C 3+50 will be realigned approximately 40 feet to the east. This area is currently graded to virgin soil and no trash is present.

IT will photograph the areas described above to document that all waste has been removed.

Date	Subcontractor/Supplier	August 17, 2001 Date	IT Corporation General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

APPROVED, with the exception that 40' of Pipe #1 will remain to transition flow into the concrete area inlet. Without this a large wingwall structure would be required.

8/31/01 Date	JM Conroy BY DIRECTION

_____ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. RFP to follow

_____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod

CONTRACT NUMBER: N68711-93-D-1459 Delivery Order #0104	REQUEST FOR INFORMATION	RFI No.: IT-RFI-005
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: H4 & H5 SPEC. SECTION: N/A	DRAWING DETAIL: Plans and Sections SPEC. PARA: N/A

TITLE/SUBJECT: 6' x 4' Area Inlet

DESCRIPTION OF PROBLEM: Ref: IT-RFI-004

With the elimination of Drainage Pipe No. 1 (36-inch) from the perimeter drainage system, the 6- x 4-foot area inlet will change significantly. Rather than redesigning and constructing the 6- x 4-foot area inlet structure, IT proposes the following:

- Eliminate the 6' x 4' Area Inlet and construct an open inlet with a trash grate on the existing 48-inch CMP
- Drainage pipes Nos. 2 and 3 (30- and 12-inch, respectively) would discharge into the open inlet upstream of the trash grate on the existing 48-inch CMP.
- Change the orientation of Drainage Pipe No. 3 (12-inch) such that it discharges into a shotcrete lined open channel on the right side of the Landfill Perimeter Road near Sta. R 29+15

Date	Subcontractor/Supplier	August 20, 2001 Date	IT Corporation General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

DISSAPROVED, see revised drawing which re-orients the box area inlet to align with the HDPE pipes. Additionaly bollards will added to prevent traffic over the inlet

8/31/01
Date

JM Conroy
~~BY DIRECTION~~

_____ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. RFP to follow

_____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod.

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	REQUEST FOR INFORMATION	RFI No.: IT-RFI [redacted]
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: N/A SPEC. SECTION: 02140	DRAWING DETA[redacted] SPEC. PARA:

TITLE/SUBJECT: Topsoil

DESCRIPTION OF PROBLEM:

Table 1 of the above referenced specification paragraph indicates the maximum allowable particle size for topsoi[redacted] has identified soils from an existing stockpile (Ysidora) as the most suitable soil readily available for use as the t[redacted] will provide and submit the appropriate test results and required amendments as per specification paragraph 1.3 a[redacted] Screening of this soil would be the only means to reliably obtain a 2-inch minus particle size. Due to constraints maintaining a zero visible dust requirement, it is not feasible to mechanically screen this soil at the Box Canyon [redacted] Therefore, IT request that the following changes be accepted:

- Maximum particle size for topsoil be increased from 2-inches to 4-inches.
- Identification and removal of material exceeding the 4-inch particle size be conducted during placement

10/15/01	Shaw Ot[redacted]	October 4, 2001	IT C[redacted]
Date	~~Subcontractor/Supplier~~	Date	Genera[redacted]

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

Approved

10/16/01	JMC[redacted]
Date	BY DI[redacted]

_X_ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not p[redacted] contract modification. ~~RFP to follow.~~ JMC

____ Response is provided on the presumption of no increase in contract price or time. If additional costs or ti[redacted] do not proceed without a contract mod.

09:08 IT CORPORATION → 402+221+7848 NO.485 P003/003

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	REQUEST FOR INFORMATION	RFI No.: IT-RFI-006
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: N/A SPEC. SECTION: 02140	DRAWING DETAIL SPEC. PARA: 2.2

TITLE/SUBJECT: Topsoil

DESCRIPTION OF PROBLEM:

Table 1 of the above referenced specification paragraph indicates the maximum allowable particle size for topsoil is 2-inches. IT has identified soils from an existing stockpile (Ysidora) as the most suitable soil readily available for use as the topsoil layer. IT will provide and submit the appropriate test results and required amendments as per specification paragraph 1.3 at a later date. Screening of this soil would be the only means to reliably obtain a 2-inch minus particle size. Due to constraints presented by maintaining a zero visible dust requirement, it is not feasible to mechanically screen this soil at the Box Canyon Landfill site. Therefore, IT request that the following changes be accepted:

- Maximum particle size for topsoil be increased from 2-inches to 4-inches.
- Identification and removal of material exceeding the 4-inch particle size be conducted during placement activities.

10/15/01	Shaw	October 4, 2001	IT Corporation
Date	~~Subcontractor/Supplier~~	Date	General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

Approved.

10/16/01	JM Conroy
Date	BY DIRECTION

X Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. ~~RFP to follow.~~ JMC

____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod.

10/16/01 09:08 IT CORPORATION → 402+221+7845 NO.485 P003/003

CONTRACT NUMBER: N68711-93-D-1459 CTO 80	**REQUEST FOR INFORMATION**	RFI No.: IT-RFI-007
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: H2 SPEC. SECTION: 02245	DRAWING: Plan view and Sections A and C SPEC. PARA:

TITLE/SUBJECT: Grouted Riprap in cover side slope chutes

DESCRIPTION OF PROBLEM:

1. Are the chutes the only place that riprap is grouted? IT believes that the small rock gradation (minus 3- inch) of ungrouted riprap in the perimeter channel will not withstand the design velocities of storm water drainage.
2. The grout depth shown on Section A and Section C is inconsistent. Section C shows 12 inches from the bottom while Section A indicates about 12 inches from the top.
3. Section C shows grout extending up the 3:1 sideslope on the left while the plan view grouted riprap graphic symbol shows the grout stopping about 5 feet up the above mentioned slope.
4. What is the width of the concrete cutoff wall? Is reinforcement required and if so, provide details.
5. Show the erosion control mat and erosion control blanket on the plan view and on Section C. How do these materials tie into the riprap ? Provide a detail of the tie-in.
6. On the plan view, on the left side, change the wording "erosion control blanket" to "erosion control mat" for the channel lining, where applicable. Provide a detail of the riprap and erosion control mat tie-in.

Mick Williams, P.E. — Date: 10/15/01 — IT Corporation, General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

1. Yes. Riprap D_{100} = 12", D_{50} = 5.8" smaller rock fills gaps between larger rock.
2. Grout depth is 12" from bottom.
3. Grout extends as shown on plan view. Extend 4.5' horizontal from edge of scour hole.
4. Width = 8"; 2 #4 bars, centered horizontally with 3" minimum cover from top & bottom: 3'
5. Plan view will be provided separately. Butt edge to riprap, staple according to manufacturers recommendations.
6. See attached drawing.

Date: 10/16/01 — BY DIRECTION: JM Conroy

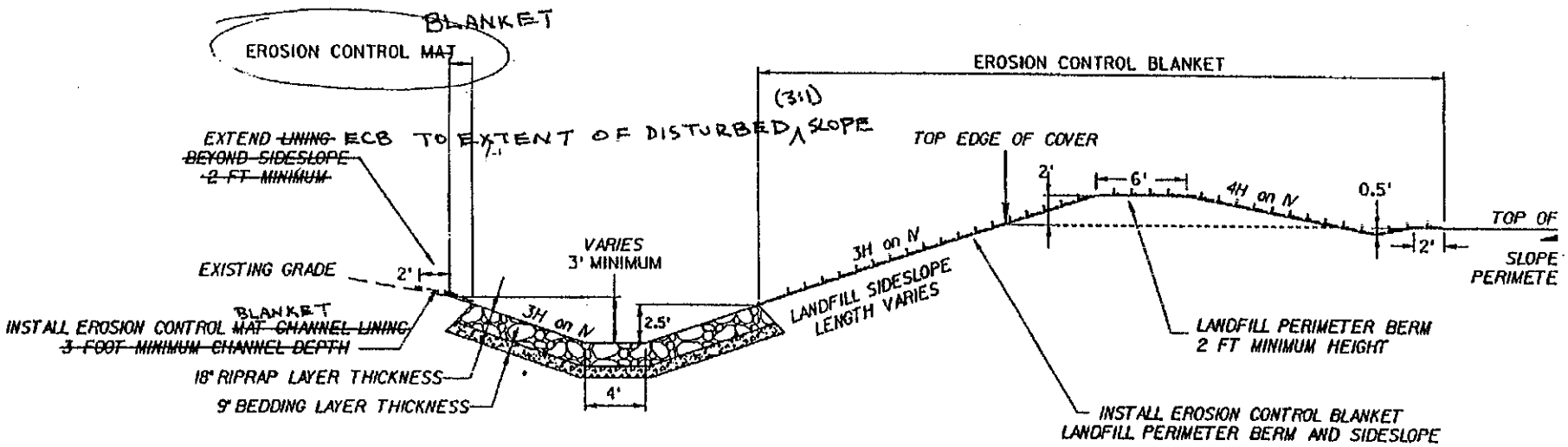
_X_ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. ~~RFP to follow~~.

____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod

10/16/01 09:08 IT CORPORATION → 402+221+7848 NO.485 P002/003

TYPICAL PERIMETER CHANNEL EROSION CONTROL MAT SECTION

SCALE. 1 INCH = 5 FEET



TYPICAL PERIMETER CHANNEL RIPRAP AND EROSION CONTROL MAT SECTION

SCALE. 1 INCH = 5 FEET

CONTRACT NUMBER: N62474-98-D-2076 CTO 80	REQUEST FOR INFORMATION	RFI No.: IT-RFI-008
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: SPEC. SECTION: 02370 & 02935	DRAWING SPEC. PARA:

TITLE/SUBJECT: Turf (seeding), erosion control blankets (ECB), and erosion control mats (ECM)

DESCRIPTION OF PROBLEM:

1. Is the area under the ECB and ECM to be seeded and mulched? If so, buy what method is the seed to be applied? The installation of ECB and ECM over the top of hydroseeded areas and access to these areas could destroy the hydroseed surface crust.
2. Clarify the surface preparation for the ECB and ECM. Section 02370 subsection 3.1.2 requires a smooth graded surface however Section 02935 subsection 3.2.2 requires tilling the surface to a depth of 2 inches. IT experience with ECB is that intimate contact between the soil surface and ECB and ECM is crucial to the performance. If contact is poor, typically rills, leading to channels, then gullies develop under the ECB and ECM and the underlying soil surface is undermined leaving the ECB and ECM spanning over an eroded surface

Mick Williams, P.E. — 10/30/01 Date — IT Corporation General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

1. Section 02935, para. 3.3.2 allows drill seeding or hydroseeding, whichever is most beneficial.

2. Section 02935, para. 3.3.2.2 describes rolling the area seeded. Although it says not to be used on areas with slopes greater than 3H:1V, use this approach beneath ECB or ECM.

11/6/01 Date — JMConway BY DIRECTION

_____ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. RFP to follow

X Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	REQUEST FOR INFORMATION	RFI No.: IT-RFI-009
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: G12, G24, G14A, SPEC. SECTION: 02551	DRAWING SPEC. PARA:

TITLE/SUBJECT: Bituminous Paving for Roads, Streets, and Open Storage Areas

DESCRIPTION OF PROBLEM:

1. Specification section 02551 subsection 2.5.3, 2.5.4, 2.5.5, and 2.5.6 specifies similar crushed rock material properties to be provided and installed in accordance with Caltrans specification Section 26. For simplicity, can a Caltrans ¾-inch Class 2 aggregate base be used for the base course, subbase course, and rock surfacing?
2. Do all roads except the Landfill Perimeter Road North have crushed rock surfacing? For example, on sheet G12, does the south landfill access road have crushed rock surfacing and if so, at what station does it begin?
3. On sheet G14A, do the Landfill Access Road #1 and Turnaround have crushed rock surfacing?
4. Sheet G24 shows crushed rock surfacing at a one percent cross fall slope. Typically, slopes with such a flat crossfall are difficult to build and drain properly and subsequently pond water. Unpaved roads are typically constructed at a minimum of 3 percent crossfall. As an alternative, in addition to the 3 percent crossfall, a suggestion is to use a soil stabilizer, such as Soil-Sement, to improve the drainage and weathering characteristics of the base course. The stabilizer, which can be blended into the upper portion of the aggregate base course during placement, forms a hard surface that provides resistance to erosion for a few years.
5. Another option is to delete the 2" AC paving on the Landfill Perimeter Road North and use that money to pave all the roads using a cheaper chip seal (Caltrans Section 26). The chip seal should be adequate considering the small traffic volume anticipated over the life of the landfill.

Mick Williams, P.E. — Date: 10/30/01 — IT Corporation, General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

1. CALTRANS Class 2, 1½" aggregate base can be used for base course, subbase course and rock surfacing.
2. Yes, all roads except paved receive rock surfacing. Begin rock surfacing at station 0+00, South Landfill Access Road.
3. Yes
4. Use 3% cross slope, raise ℄ or high side edge to achieve slope.
5. Retain asphalt paving at locations with steeper slopes, USACE will field locate. Apply soil-cement stabilizer to rock surfacing.

Date: 11/21/01 — BY DIRECTION: Jim Conroy

X Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. RFP to follow.

____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod.

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	**REQUEST FOR INFORMATION**	RFI No.: IT-RFI-010
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: G12, G24, G14A, SPEC. SECTION: 02551	DRAWING SPEC. PARA:

TITLE/SUBJECT: Confirmation of Landfill Road Construction

DESCRIPTION:

The Purpose of this RFI is to confirm the requests, changes, and decisions made regarding landfill road construction

1. IT proposes to construct gravel roads using 6-inches of Caltrans ¾-inch Class 2 aggregate at a 3 percent crossfall. A soil stabilization product called Soil-Sement will be mixed into the top 3-inches of the aggregate at a rate of one gallon per 20 square feet. After the roads have been graded to the finished surface, an additional "top coat" of Soil-Sement will be applied at the same rate of one gallon per 20 square feet.
2. Asphalt concrete pavement (2-inches thick) will be applied in selected areas, which will be field located by USACE
3. A 15-feet wide gravel access road will be extended from the access ramp on the east side of the landfill, down the center of the landfill. A 30-feet radius gravel turn around will be provided at the end of the road near the large area inlet. The road will cross the landfill cover drainage channels at the high points of those channels.

Shane Austin — 12/05/01 — IT Corporation

Shane Austin — Date — General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

1. Approved

2. Approved

3. Approved, alignment to be finalized by USACE.

12/6/01 — JMConroy

Date — BY DIRECTION

X Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. ~~RFP to follow.~~

_____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod.

H:\DO 104\QUALITY CONTROL\RFIs\RFI Documents\IT RFI - 010_ Road Construction.doc

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	REQUEST FOR INFORMATION	RFI No.: IT-RFI-011
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: SPEC. SECTION: 02140	DRAWING SPEC. PARA:

TITLE/SUBJECT: Compaction of Topsoil, Berms, Slopes, and Channels

DESCRIPTION:

1. During the revegetation work, scarifying, seed drilling, and straw crimping activities will impact the density of the Topsoil layer. Compaction test results obtained will not accurately depict the actual final product, and will not reflect the cost in time and effort to achieve the required compaction range. Therefore, as a cost saving measure IT requests the compaction testing requirement for this layer be removed. Topsoil will be installed per the specification and areas with high traffic loads will be scarified to a depth of at least 6-inches.
2. In an effort to limit erosion on the finished surfaces of berms, slopes, and channels, IT requests a variance to the compaction requirements for the soils used to construct these features. These features will be constructed using Select Fill and Topsoil, each having a compaction requirement of 85 to 88 percent of the maximum dry density. IT requests the compaction requirement of these features be change to at least 90 percent of the maximum dry density. This change will also improve constructability of these features, and provide a solid foundation for erosion mat placement and sideslope chute construction.

for Shane Austin — Date: 12-5-01 — IT Corporation, General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

1. Approved

2. Approved

Date: 12/5/01 — BY DIRECTION

____ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. RFP to follow

____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	REQUEST FOR INFORMATION	RFI No.: IT-RFI-012
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: G9, G20 SPEC. SECTION:	DRAWING SPEC. PARA:

TITLE/SUBJECT: North Landfill Perimeter Channel

DESCRIPTION:

1. IT proposes to remove a section of the North Landfill Perimeter Channel from stations CN9+70 to CN11+20. The only drainage area collected by this portion of the channel is the channel itself, therefore drainage from this area can be conveyed to the North Ditch. The elimination of this channel section will provide additional area for the redesign of the landfill entrance road. The turn radius at the entrance should be extended to the south to allow for the access and loading and unloading of large vehicles, such as a lowboy, and take advantage of existing road alignment and drainage features.

Shane Austin — 12/09/01 (Date) — IT Corporation, General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

1. Approved. IT to incorporate change in Record Drawings.

12/20/01 (Date) — JMConroy, BY DIRECTION

__X__ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. ~~RFP to follow~~.

_____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod.

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	REQUEST FOR INFORMATION	RFI No.: IT-RFI-013
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: H2 SPEC. SECTION: 02935	DRAWING SPEC. PARA:

TITLE/SUBJECT: Concrete Cutoff Wall for Sideslope Chutes and Mulch Application

DESCRIPTION:

1. IT proposes to eliminate the concrete cutoff wall for the sideslope chutes. IT proposes to grout the full length of the chutes from the cover channel inverts to include both cross hatched areas on the design drawing H2. Construction of the cutoff wall would involve a separate activity to form, place reinforcement, and pour the concrete. Therefore, the concrete cutoff wall would be redundant, as the full grouted section should sheet water off the cover and minimize infiltration.
2. Paragraph 3.3.4 of specification section 02935 states that mulching shall be performed the same day as seeding. IT proposes the use of rice straw mulch, which will be applied and mechanically anchored prior to seeding. The application of mulch prior to seeding will reduce erosion until seed can be applied and a vegetative cover established. The proposed method of seed application is seed drilling with a no-till machine. This will limit damage to and possibly improve performance of the anchored straw mulch. At this time, the use of hydroseeding is not planned. The seeded area will also not be rolled in order to limit damage to the anchored straw.

Shane Austin — 12/09/01 (Date) — IT Corporation, General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

1. Approved. IT to incorporate the change in Record Drawings.

2. Approved. IT will have the flexibility to use best judgement from local practices suited to provide satisfactory stand of turf.

12/20/01 (Date) — JM Conroy, BY DIRECTION

X Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. ~~RFP to follow~~.

____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod.

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	REQUEST FOR INFORMATION	RFI No.: IT-RFI-014
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: H2 SPEC. SECTION: 02935	DRAWING SPEC. PARA:

TITLE/SUBJECT: RIPRAP TESTING, WESTERN PERIMETER ROAD, AND LANDFILL TOP ACCESS ROAD

DESCRIPTION:

1. IT proposes to use riprap recovered from soil screening operations for the riprap and bedding material to be used in perimeter channel construction. The riprap proposed for use originated from a removed section of the Santa Margarita levee surrounding the MCB Pendleton airfield. The riprap will be crushed to achieve the size requirements stated in Specification 2245, paragraph 2.1. IT will use visual inspection to confirm gradations as stated in paragraph 2.1 are achieved. Based on the known background of the riprap, IT request a waiver for the testing requirements as outlined in Specification 2245, paragraph 1.4.
2. IT proposes to construct a road along the western portion of the landfill to connect the northern and southern landfill perimeter roads. IT will provide As-Built drawings of the completed road and final grade of the surrounding area.
3. IT proposes to extend the Landfill Access Road No. 1, as shown on G11, across the landfill and connect it with the northern perimeter access road. IT will provide drawings indicating the location of this road prior to construction.

Shane Austin	09/04/02 Date	IT Corporation General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

1. Approved.
2. Approved, drawings provided 9/3/02.
3. Approved, drawings provided 9/3/02.

9/4/02 — Date

JM Conroy — BY DIRECTION

_X_ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. ~~RFP to follow~~ Contact ROKC.

____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod.

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	**REQUEST FOR INFORMATION**	RFI No.: IT-RFI-015
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: G9 SPEC. SECTION:	DRAWING SPEC. PARA:

TITLE/SUBJECT: Landfill Perimeter Road (North Landfill Entrance)

DESCRIPTION:

1 IT proposes the modifications indicated on the attached drawing (Drawing No 829771-D1 layout 3) to the area surrounding the Landfill Perimeter Road Entrance The changes include the replacement of the Northeast Drainage Channel with an 18-inch culvert pipe, realignment of the East and North Landfill Perimeter Roads, and the addition of ECM and concrete lined drainage ditches. The 18-inch culvert pipe will be a smooth interior corrugated polyethylene pipe. The supporting pipe capacity calculations are included as Attachment A

Shane Austin	09/13/02 Date	IT Corporation General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

Approved, as shown on drawing and calculation sheets provided.

9/15/02 Jim Conroy
Date

_____ Response may involve additional costs or time If you feel additional costs or time is warranted, do not proceed without a contract modification RFP to follow.

_____ Response is provided on the presumption of no increase in contract price or time If additional costs or time is warranted, do not proceed without a contract mod

CONTRACT NUMBER: N62474-98-D-2076 CTO 080	REQUEST FOR INFORMATION	RFI No.: IT-RFI-016
CONTRACTOR/SUPPLIER: IT CORPORATION	DRAWING SHEET: G8, G9 SPEC. SECTION:	DRAWING DETAIL/ SPEC. PARA:

TITLE/SUBJECT: Terrace Channels 1 and 2 on North Slope

DESCRIPTION OF PROBLEM:

1. USACE sheets G8 and G9 show the location of Terrace Channels 1 and 2 on the North Slope of the landfill and Sheet H3 shows a typical section (Terrace Channel Section). This typical section requires multiple layers of lining, from bottom to top, 6-inch select fill, geotextile, geomembrane lining, geotextile, 9-inch bedding layer, and an 18-inch riprap layer. The section requires the geomembrane anchoring 2 feet deep into the slope along the edges.
2. The existing terrace channels are unlined and function as intended. The existing vegetation and flat slopes of the existing channels appear capable of minimizing erosion. Although some erosion in the existing channels exists, this can be repaired easily.
3. IT Corporation's (IT) concern is that the proposed lining may instigate environmental and structural damage to the existing slope. The existing slope is heavily vegetated with diverse plant species that may in turn support endangered bird species. Construction of the proposed channel will require clearing of existing vegetation and excavation of channel using heavy earthmoving equipment. The North Slope is constructed over the existing landfill. If heavy equipment operates on the slope, the landfill side slope surface is likely to be damaged and destabilized.
4. Anchoring and excavation for the channel lining construction is also likely to encounter waste and open the excavated area for landfill gas to escape and allow the ingress of both water and air, both of which could instigate a landfill fire.

PROPOSED SOLUTION:

1. Delete lining the terrace channels. With minimal hand backfilling and compaction, the existing vegetated channels can be repaired and function as intended. The repaired areas are likely to reseed themselves with native vegetation on the slope
2. Deletion of the lining will save the Navy approximately $50,000 and avoid destruction of established vegetation and habitat that will take years to restore.

Date	Mick Williams, P.E.	11/06/2002 Date	IT Corporation General Contractor

FM: Army Corp of Engineers – Omaha District
TO: IT Corporation

Approved

11/7/02
Date

SMConroy

_____ Response may involve additional costs or time. If you feel additional costs or time is warranted, do not proceed without a contract modification. RFP to follow.

_____ Response is provided on the presumption of no increase in contract price or time. If additional costs or time is warranted, do not proceed without a contract mod

Appendix G
Review Comments

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Beatrice Griffey, Associated Engineering Geologist, dated November 17, 2003. Reference No. SMC:30-0456.05:grifb			
1.	General	The proposed Report title is considered to be incorrect for the following two reasons. First, based on recent developments regarding landfill gas, it is highly probable additional environmental activities will be required at IR Site 7 and site closure is inappropriate at this time. Additionally, the Report content is inadequate for a closure report. The Report should be entitled something to the effect of "Evapotranspiration Cover Completion Report for Installation Restoration (IR) Site 7, Box Canyon Landfill, Marine Corps Base Camp Pendleton, California," which is more representative of the subject matter presented in the Report. Commencing in February 2003, environmentally significant landfill gas conditions (VOC and methane gases) developed in the subsurface environment along the eastern perimeter of IR Site 7. The timing of the development of these conditions in relation to the completion of the ET cover, suggests there may be a correlation between these two events. Based on the following issues, the landfill gas condition is significant and warrants a detailed and comprehensive discussion in the Report: • magnitude and extent of subsurface landfill gases, • landfill gases are migrating offsite and are a potential significant current and future threat to water quality, • the level of uncertainty regarding the extent of landfill gases offsite, • the duration and persistence of these conditions, • the presence of multiple and potentially significant preferential migration pathways, • proximity of multiple sensitive receptors, • the complexity of the site, • the vertical spatial relationship between the water table and landfill gases, and • conditions are not in compliance with State Regulations. The California Integrated Waste Management Board (CIWMB) and the California Department of Toxic Substances Control (DTSC) also have expressed concerns regarding this matter in numerous letters and verbally during numerous meetings.	The Navy agrees with the comment regarding the report title. In accordance with the USEPA guidance for "Close Out Procedures for National Priority List Sites" (EPA 540-R-98-016, 2000), which was used as the guidance for producing this report, the Navy proposes to revise the report title to be "Remedial Action Report for Installation Restoration Site 7..." to reflect that this report does not address the site closure as implied by the current title. Per the EPA guidance (shown in Exhibit 2-2 of the guidance), the completion of RA for containment remedies that include long-term monitoring and maintenance (such as a landfill cap) is achieved after construction of the designed remedy is completed and the operation and maintenance phase is started. After the monitoring and maintenance phase is achieved for a period of time, the Navy will present these data to justify the completion of the RA phase. The EPA guidance (in Section 3.7 of the guidance) further clarifies that routine adjustments or modifications to a constructed remedy include maintaining a landfill cap, making service/repair/adjustment to landfill gas collection treatment system, clearing/repairing/replacing drainage system, and modifying sampling and analysis scheme for a monitoring remedy. The above adjustment and/or modification will be implemented as part of the operation and maintenance phase of the remedial action specified in the ROD. The complete site closure will be achieved when all the cleanup goals are achieved and the site is deemed protective of human health and the environment.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Beatrice Griffey, Associated Engineering Geologist, dated November 17, 2003. Reference No. SMC:30-0456.05:grifb			
2.	Executive Summary, Second Paragraph	A discussion of the rock quarry operations in Box Canyon by Marine Corps Base Camp Pendleton (Base) from 1946 through 1970 and the designation of a Corrective Action Management Unit (CAMU) at the Landfill, are required	The requested information is added.
3	Executive Summary, Fourth Paragraph	In the first sentence, delete the reference to "The low-level threats posed by contaminants ...." Such a statement contradicts the findings of remedial investigations (RI) that indicated waste excavated from several IR sites and disposed of at IR Site 7 contained various types of contaminants at concentrations that posed a threat to human health and ecological receptors (IT, 1997, 1998, and 1999). Note each reference to "low-level threat" in the Report requires revision.	All references to "low-level threats" are revised to "exposure risks."
4.	Subsection 1.1, Fifth Paragraph, First Sentence	The discussion of historical site use should commence with the rock quarry operations in Box Canyon from 1946 through 1970 by the Marine Corps Base Camp Pendleton (IT, 1999).	The requested information is added.
5.	Subsection 1.1, Fifth Paragraph, Eighth Sentence	Include a discussion as to why it was necessary to consider an alternative cap design and generate an Engineering Evaluation/Cost Analysis (EE/CA) Addendum.	Detailed justifications were fully discussed in Section 2.3 and not to be repeated in the background overview.
6.	Subsection 1.1, Ninth Paragraph, First Sentence	Specify the time frame during which wastes excavated from Installation Restoration (IR) Sites 3 and 6 were disposed of at IR Site 7.	The time frame is added.
7.	Subsection 1.1, Tenth Paragraph, Third Sentence	The subject sentence states that remedial action at IR Site 1D was not initiated because the Base decided that the Corrective Action Management Unit (CAMU) had reached "natural fruition." Based on a Department of the Navy letter (dated August 17, 2001), it is our understanding that remedial actions at IR Site 1D were not initiated because the disposal site for the excavated waste (IR Site 7) was ordered closed by the Commanding General of Marine Corps Base Camp Pendleton (letter dated December 1, 2000). Additionally, "natural fruition" is an ambiguous phrase. The Report is a technical document and hence, should be written in a detailed, explicit, and concise manner.	The sentence will be revised by deleting reference to "reaching natural fruition"

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Beatrice Griffey, Associated Engineering Geologist, dated November 17, 2003. Reference No. SMC:30-0456.05:grifb			
8.	Subsection 1.1, Eleventh Paragraph	A discussion of the need and timing of the destruction of the sole upgradient ground water monitoring well for IR Site 7 (MW-3) is required. The location of the former ground water monitoring well needs to be illustrated in a Report figure.	The destruction of MW-3 was performed on November 2, 1999 as part of the 1999 CAMU construction process. Therefore, it is not considered a task performed under cover construction. Details of the well destruction can be found in our well destruction permit submittals (well permit No. W98594) provided to the San Diego County Department of Environmental Health.
9.	Subsection 1.2	Identify the remedial action activities referenced in the first sentence.	Details of the remedial action activities are discussed in Section 3.0 and not to be repeated in the background overview.
10.	Subsection 2.1.1	Expand the last sentence of this Subsection to include an approximation of the distances between the landfill and the residential units, and the elementary school.	The requested information is added.
11.	Subsection 2.1.2, Second Paragraph	Expand the description of the CAMU cells to indicate whether or not the cells are lined. If appropriate, provide a detailed description of the liner system.	The requested information is added. None of the CAMU cells have constructed bottom liners.
12.	Subsection 2.1.3, Second Paragraph, Second Sentence	The following revision to the subject sentence provides additional information regarding relevant historical activities conducted at the Site; "The majority of the quarried canyon was backfilled with...."	The subject sentence is revised as requested.
13.	Subsection 2.1.3, Third Paragraph, Fifth and Sixth Sentences	The subject sentences require revision for clarification purposes. The fifth sentence, which states "Before the final closure cap was constructed, the top portion of the landfill drained toward north sheet flow that was collected by two perimeter drainage channels." is unclear and requires revision. According to the Sixth Sentence, it appears that the 48-inch pipe drains to the bottom of the landfill. Please indicate whether or not this is the case and if warranted revise the subject sentence.	The subject sentences are revised as requested. The 48-inch pipe drains the sheet flow collected by the two perimeter channels to the bottom of the landfill into a culvert that eventually drains into Santa Margarita River.
14.	Subsection 2.1.3, Fourth Paragraph, Third Sentence	According to the subject sentence, the Pleistocene marine terrace deposit underlies the Landfill. According to the current site conceptual model (Navy Public Works Center San Diego, 2003) the Landfill is underlain by the Miocene San Onofre Breccia (Breccia). This is a significant disparity that must be rectified.	The subject sentence is revised to reflect that the majority of the landfill is built on top of the San Onofre Breccia.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Beatrice Griffey, Associated Engineering Geologist, dated November 17, 2003. Reference No. SMC:30-0456.05:grifb			
15.	Subsection 2.1.3, Eighth Sentence	The noted depths for the top of the Breccia are not correct for the eastern boundary of the Landfill where the formation was not encountered in borings advanced to depths of up to 110 ft. bgs. This is a significant environmental issue that requires discussion.	The subject sentence is revised to reflect that these conditions are found along the east and south boundaries.
16.	Subsection 2.1.3, Eighth Paragraph, Fifth Sentence	The subject sentence requires revision to identify the nature of the aquitard present between the two members of the Breccia and the basis of the determination that the aquitard exists. Additionally, identify the title and date of the submittal(s) that documents the investigation of the aquitard.	Detailed descriptions and identification of the aquitard characteristics were presented in the RI/FS report. The reference to the RI/FS report is added.
17.	Subsection 2.2.1	Figure 2-4 should be revised to clearly illustrate which contaminant concentrations encountered dissolved in ground water exceed their respective maximum contaminant levels (MCLs).	Figure 2-4 is revised as requested.
18.	Subsection 2.3, Third Paragraph	Include a discussion as to why it was necessary to consider a fourth cap alternative and generate an EE/CA Addendum.	The requested information is added.
19.	Subsection 3.1	The inclusion of a detailed crossectional view of the evapotranspiration (ET) cover, including the thickness of each layer, and the source and composition of the material used in each layer, may assist reviewers understanding the vertical construction of the ET cover.	Figure 3-1 is added as requested to provide a cover profile and sources of soil materials used to construct each layer of the cover. Due to the addition of Figure 3-1, the rest of the figure numbers associated with Section 3.0 are changed.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Beatrice Griffey, Associated Engineering Geologist, dated November 17, 2003. Reference No. SMC:30-0456.05:grifb			
20.	Subsection 3.1, Second Paragraph, Second Sentence	Identify the origin(s) (examples: Ysidora Flat soils or IR Site 6 waste) of the materials overexcavated at the Landfill during 1999 to create additional fill capacity.	The on-site overexcavated materials were generated from areas along the eastern perimeter of the original landfill footprint. However, the landfill wastes in these areas were very shallow and scattered in small quantities. During the construction of the CAMU, these landfill wastes were overexcavated and consolidated into the CAMU until the underlying native soils were exposed. Soil samples were taken from the surface of the exposed areas to verify that there was no residual contamination before subsequently overexcavated soil was stockpiled for later use as the subgrade soil. The stockpiled soils were further sampled (results shown in Table 3-3) to verify that the overexcavated soil is clean.
21.	Subsection 3.4, Landfill Gas Monitoring	Identify the landfill gas monitoring well discussed in the second sentence of this Subsection. Additionally, this Subsection needs to include a thorough and comprehensive discussion of the development of landfill gas conditions (elevated concentrations of methane and volatile organic compounds) during February 2003 along the eastern perimeter of the Landfill and the persistence of these conditions to date. In part, the discussion needs to address current and future environmental and regulatory significance and the need to mitigate these conditions, refer to the second portion of the General Comments Section above. Provide the title and transmittal date of the document containing the installation and construction details of the landfill gas probes and wells installed at IR Site 7.	As stated in Section 1.2, the primary objective of this report is to serve as a complete documentation of the implementation of the RA as mandated by the OU-3 ROD. The current landfill gas issues are not part of the remedial construction activities. The landfill gas issues will be addressed by the landfill gas migration response plan and under the long-term postclosure monitoring and maintenance plan. The title and transmittal date of the document regarding the installation and construction of landfill gas probes are added as requested.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Beatrice Griffey, Associated Engineering Geologist, dated November 17, 2003. Reference No. SMC:30-0456.05:grifb			
22.	Subsection 4.0, Second Paragraph	The third sentence and Figure 4-1 must be revised so that the terms used to identify the different ET cover layers are consistent. As an example, in Figure 4-1 the of the ET cover layers are referred to as subgrade, clay, and veggie cover, whereas in Subsection 4.0 the layers are referred to as low-permeability, select fill, and vegetative cover. Additionally, this issue may be clarified with the inclusion of the figure requested above regarding Subsection 3.1.	Figure 4-1 is revised to be consistent with the text discussion in Sections 3.1 and 4.0.
23.	Subsection 5, Second Paragraph	According to the last sentence, "various production quantities" were presented and discussed during FFA Meetings. Identify the media for which the production quantities were calculated. It is our understanding that landfill gas production quantities are an outstanding environmental issue at this site that are to be presented to the FFA Team in the near future.	The "various production quantities" were referenced to the construction production quantities such as soil importation, cover placement, channel installation, and various construction quality control data. They were not referenced to the landfill gas production. The text description is revised to clarify this issue.
24.	Subsection 5, Third Paragraph	Specifically identify the remedial action(s) (RA) that FFA Team final concurrence and certification is being requested.	The text is revised to reflect that this report is to request concurrence on the "completion of the remedial construction as stated in the report." It will serve as the final inspection and certification that the RA at IR Site 7 is implemented in accordance with the OU-3 ROD requirement.
25.	Subsection 6, Fourth Sentence	Provide a detailed description of the activities that will be conducted to winterize the site.	As stated in the paragraph, specific winterization effort depends on the pace of vegetation restoration. The site revegetation effort was very successful as discussed in Section 3.4 and shown in site photographs presented in Appendix A. Therefore, there has been little additional winterization effort as the time of this response other than minor repairs of erosions along the drainage channels and road areas.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Beatrice Griffey, Associated Engineering Geologist, dated November 17, 2003. Reference No. SMC:30-0456.05:grifb			
26.	Subsection 7, Last Sentence	Provide the title and transmittal date of the documents containing CAMU construction expenditures.	The CAMU construction expenditures have not been published to date. Costs associated with CAMU construction are not part of the remedial action work scope associated with this report. Specific information can be provided up request.
27.	Appendix A	Whereas the photographs are informative, the photograph descriptions should include the geographic direction each photograph represents. Additionally, a site figure illustrating the photographer's position for each photograph would be informative.	A figure showing the requested information is added to Appendix A.
28.	Appendix E	It appears that "Sheet 4" is misidentified as the east side of the Landfill Perimeter Road. The road illustrated in the Sheet appears to be on the west side of IR Site 7.	The title of Sheet 4 is revised as requested.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Bill Maybe, Ph.D. Tech Law Inc., Technical Consultant to USEPA Region IX, dated November 19, 2003.			
1.	General	The Draft Remedial Action Site Closure Report for Operable Unit 3, Installation Restoration Site 7, Box Canyon Landfill (Closure Report) does not contain all of the documentation necessary to show that the landfill was closed in accordance with the plans and specifications. Documentation that appears missing includes: • Records of field density and moisture content testing • Calibration records for field density testing instruments • Daily field logs prepared by site inspectors • Results of ambient air/weather monitoring • Boring logs from the installation of the soil gas monitoring probes • Results of the soil gas monitoring Please revise the Closure Report to include this information or reference the location where the information is reported.	As discussed in Section 4.0, the raw construction quality control (CQC) data (i.e., records of field density and moisture content testing, calibration records, daily field logs, results of ambient air/weather monitoring) were submitted to the Navy's design engineer, Omaha District of the U.S. Army Corps of Engineers, and the Resident Officer in Charge of Construction (ROICC) for review and approval throughout the construction process as required by the construction specifications and Remedial Action Work Plan. The submittal registers, transmittals, and review approval records provided in Appendix F summarize the types of CQC submittals and provide a "paper trail" of the subsequent review and approval process. A total of 83 CQC items were addressed by 37 submittals to the design engineer. A complete record of the raw CQC data submittals and daily logs is maintained as part of the Navy project file, which can be provided upon request. The boring logs of landfill gas monitoring wells and the initial monitoring results are provided in the Baseline Perimeter Landfill Gas Monitoring Report (SWDIV, 2002). The landfill gas monitoring data have been continuously updated and reported through various emails and FFA meetings in 2002 and 2003.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Bill Maybe, Ph.D. Tech Law Inc., Technical Consultant to USEPA Region IX, dated November 19, 2003.			
2.	General	As construction of the landfill final cover was completed two years ago, the landfill is now in the post-closure operations and maintenance phase of its existence. Title 27 Section 21769 et seq. of the California Code of Regulations requires that a post closure maintenance plan be prepared for the landfill. Please revise the closure report to reference the landfill's post closure maintenance plan.	In the 70th FFA meting of 24 October 2002, it was agreed that the postclosure monitoring and maintenance plan should be submitted separately from the remedial action completion report to expedite the review process. The Navy is currently preparing the postclosure monitoring and maintenance plan to be submitted for review in March 2004.
3	Figure 2-4	It appears that monitoring wells 7W-01A,B are located upgradient of the landfill and therefore groundwater samples collected from these wells are likely representative of upgradient groundwater conditions. Please revise Figure 2-4 to show analytical results (especially for nickel and selenium) from any past groundwater sampling events at these two wells	Figure 2-4 is a direct reference to the discussions of the exposure risks as it occurred in the RI/FS reports. The intent of this figure is not to provide new interpretation, nor data update. To have a complete understanding of the decision on risk exposure assessment, please read the complete discussions and data set presented in the original RI/FS reports.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Bill Maybe, Ph.D. Tech Law Inc., Technical Consultant to USEPA Region IX, dated November 19, 2003.			
4.	Section 2.2.1, Page 2-5	The closure report states: "Four soil-gas samples were collected, in duplicate, at the Santa Margarita School and the Wire Mountain Housing Area. The presence of an impenetrable terrace deposit, a caliche-type soil layer, limited sampling depths to 1.5 feet. The terrace deposit layer was deemed a barrier layer for upward migration of soil vapor, if any. No halogenated volatile compounds were detected in the sol gas samples." These soil gas analyses collected from less than 1.5 foot depths and above the caliche layer are of questionable representativeness for gases originating from the landfill. Furthermore, it is unlikely that the caliche layer is continuous and unbroken over an area of approximately 35 acres (1000 feet out from the landfill boundary into the areas with inhabited structures), and the Navy cannot rely on the caliche layer to prevent the upward migration of soil gas. Depending on the extent of the caliche layer, the situation is potentially more hazardous than if there was no barrier as the gas being produced in the landfill may accumulate under the caliche layer and migrate until it encounters a break in the caliche (such as where utility lines have been installed). For example, backfilled utility trenches could serve as a line source for gases beneath the caliche layer to be move to the surface, and if buildings are constructed over these trenches then a localized migration pathway into buildings could exist. Please evaluate the need for returning to the Santa Margarita School and the Wire Mountain Housing Area, collecting soil gas samples from beneath the caliche layer, and have the samples analyzed for methane and common landfill gas constituents. If landfill gases are found beneath the caliche layer, then a plan for investigating preferential migration pathways for landfill gases that may enter buildings should be prepared.	Comments are noted. Currently there are 24 monitoring probes located between 15 feet and 85 feet below the surface grade that are used to monitor the landfill gas along the site perimeter. The caliche-type of soil referenced in the past investigation was consistent with the observation made during the installation of these landfill gas probes. All the landfill gas monitoring probes were installed below the caliche layer.
5.	Table 3-3, Page 1 of 1	The listed values of the Region 9 Preliminary Remediation Goals (PRGs) for the pesticides are a factor of 1000 too high; for example the PRG for 4,4'-DDE is 1.7 mg/kg, not 1,700 mg/kg. Additionally, two of the Ysidora Flat Soil Borrow samples have 4,4'-DDE concentrations that exceed the 1.7 mg/kg PRG value. Please correct the listed PRG values in Table 3-3, and recognize that the apparent condition that the Ysidora Flat Soil Borrow soil may be contaminated at concentrations that exceed the PRG values for 4,4'-DDE.	The reporting units for both the PRG and the soil sampling results in Table 3-3 were wrong and require to be revised from milligram per kilogram (mg/kg) to microgram per kilogram (μg/kg). The numeric data in the table were correct and need no revisions. Therefore, the statement that none of detections are above the PRG is still correct.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Bill Maybe, Ph.D. Tech Law Inc., Technical Consultant to USEPA Region IX, dated November 19, 2003.			
6.	Figures 2-1 and 2-4	The scales on Figures 2-1 and 2-4 are the same but the extent of the landfill appears to be different. Please check the scales on these figures for accuracy.	The scale of Figure 2-1 is revised to "one inch = 400 feet," consistent with Figure 2-4.
7.	Page 2-5	There appears to be an incorrect chemical name, and please verify that hydrogen sulfite should be hydrogen sulfide.	The subject text is revised accordingly. It should be stated as "hydrogen sulfide."
8.	Page 2-6	Hazardous index and hazardous quotient are not correct terms, and they should be hazard index and hazard quotient. Also, the risk management range is $1x10^{-4}$ to $1x10^{-6}$, not $1x10^{-5}$. Please revise the text accordingly.	The subject text is revised accordingly.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Tayseer Mahmoud, Hazardous Substances Engineer, dated November 19 and December 15, 2003.			
1.	Section 3.4	Groundwater Monitoring: The ROD required long-term monitoring for the site, however, the statement in the report indicates groundwater monitoring activities will be continued on a quarterly basis for the next 5 years. Please clarify the statements in the report	Additional information is added to reflect that the quarterly monitoring frequency will be evaluated after 5 years on the basis of the monitoring results.
2.	Table 3-3	Please update the table to reflect the most recently published preliminary remediation goals (PRGs). Also, the unit of measure used for pesticides is a typographical error and should be μg/kg instead of mg/kg	The PRGs are "evergreen" and updated at least yearly. A footnote is added to identify that the cited PRGs were published 10/1/2002 (the latest version).
3		Although this report documents the RA activities, DTSC wants to point out that its February 26, 2001 letter conditionally approved the design of the landfill cap provided the Department of Navy (DoN) proceeded immediately to modify the cover design and construct an active gas collection system if landfill gas was detected at levels above regulatory limits. Since February 2003, methane gas has been detected at levels above regulatory limits in gas monitoring well GP-10, which indicates that the remedy has not performed effectively to contain releases form the waste in the landfill. DTSC may not approve the closure document until conditions at the landfill comply with appropriate state requirements. Moreover, deferring the landfill gas issues to the Operation and Maintenance phase will not be acceptable. DTSC sent letters to DoN regarding landfill gas issues on May 13, 2003, June 18, 2003, and September 17, 2003 and requested a gas remediation plan which will adequately prevent landfill gas from migrating off site	Comments are noted. The DoN is aware of the 2/26/2001 letter and has been addressing landfill gas issues through the submittal of a landfill gas migration response plan in December 2003 to specifically address elevated methane levels found in well GP-10 as requested in your letters of May 13, June 18, and September 17of 2003. As summarized in Section 5.0, the time frame of the activities stated in this report begins in June 2001, when the remedial construction was mobilized, and ends in January 2003, when the remedial construction was completed. The purpose of this report is to document the completion of remedial construction implemented in accordance with the Remedial Design and Remedial Action Work Plan. The landfill gas issues referenced in your comments are not part of the aforementioned work scope. Therefore, the Navy will continue to address the landfill gas issues under the long-term postclosure monitoring and maintenance plan as discussed in Section 3.4.

Comment No.	Section/Page Number	Comment	Department of Navy's Response
Comments from Tayseer Mahmoud, Hazardous Substances Engineer, dated November 19 and December 15, 2003.			
4.	Figure 3-6	Figure 3-6 shows the location of the settlement monuments SM-1 and SM-2 on the landfill. The text and figure should include the geographic coordinates and elevation of the benchmarks used to measure the settlement monument elevations	The requested information is added to Figure 3-6.