Draft

Work Plan for Site Inspection Munitions Response Program Sites UXO1, UXO2, UXO6, AOC1, and AOC2

Naval Weapons Station Seal Beach Seal Beach, California

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ACRONYMS AND ABBREVIATIONS

AECRU	Indefinite Quantity Contract for Architectural-Engineering Services to Provide CERCLA/RCRA/UST Studies
AOC	Area of concern
APP	Accident prevention plan
asl	above sea level
bgs	Below ground surface
CAD	Cartridge actuated device
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
ChaduxTt	Joint Venture of St. George Chadux Corp. and Tetra Tech EM, Inc.
COPC	Chemical of potential concern
COPEC	Chemical of potential ecological concern
CSM	Conceptual site model
DGPS	Differential global positioning system
DMM	Discarded military munitions
DTSC	California Department of Toxic Substances Control
EOD	Explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
ESQD	Explosives safety quantity distance
ESS	Explosives Safety Submission
ESSL	Ecological soil screening level
^{o}F	Degrees Fahrenheit
FSP	Field sampling plan
HMX	High melting explosive
IAS	Initial assessment study
IDW	Investigation-derived waste
in	Inch
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
MC	Munitions constituents
MD	Munitions debris
MEC	Munitions and explosives of concern
mm	Millimeter
MMRP	Military Munitions Response Program
MRP	Munitions Response Program
NAD	Naval Ammunition Depot
NAVFAC SW	Naval Facilities Engineering Command, Southwest Division

NAVWPNSTA	Naval Weapons Station
NEESA	Naval Energy and Environmental Support Activity
NFA	No further action
NHPA	National Historic Preservation Act
NOSSA	Naval Ordnance Safety and Security Activity
NSWC	Naval Surface Warfare Center
NWR	National Wildlife Refuge
OCWD	Orange County Water District
ORP	Oxidation-reduction potential
OU	Operable unit
PA	Preliminary assessment
PAD	Propellant actuated device
PBX	Polymer-bonded explosive
PD	Point detonating
PID	Photoionization detector
POLB	Port of Long Beach
PPE	Personal protective equipment
PRG	Preliminary remediation goal
PSI	Preliminary site inspection
PTTF	Powder train time fuze
QAPP	Quality assurance project plan
QE	Quality evaluation
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RDX	Research Department explosive
SAP	Sampling and analysis plan
SI	Site inspection
SKR	Stephens' kangaroo rat
SHPO	State Historic Preservation Officer
SVOC	Semivolatile organic compound
SWRCB	California State Water Resources Control Board
Tetra Tech	Tetra Tech EM Inc.
TDS	Total dissolved solids
TKN	Total Kjeldahl nitrogen
TOC	Total organic carbon
TNT	Trinitrotoluene
TPH	Total petroleum hydrocarbons

ULBV	Upper-level background value
USFWS	U.S. Fish and Wildlife Service
UST	Underground storage tank
VOC	Volatile organic compound

1.0 INTRODUCTION

ChaduxTt is performing a site inspection (SI) at Munitions Response Program (MRP) Sites UXO1, UXO2, UXO6, AOC1, and AOC2 at Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach) in Seal Beach, California. The field, laboratory, and data reporting efforts associated with the SI are detailed in this work plan, which includes a sampling and analysis plan (SAP) as Attachment 1. The SAP includes a field sampling plan and a quality assurance project plan in an integrated format.

The purpose of the SI, organization of this work plan, and facility/site background information are summarized below. Much of the facility/site background information is derived from the draft preliminary site inspection (PSI) report for NAVWPNSTA Seal Beach, prepared by Malcolm Pirnie, Inc. (Malcolm Pirnie 2008).

1.1 PURPOSE

The objectives of the SI are to evaluate whether munitions and explosives of concern (MEC) or munitions constituents (MC) are present and to evaluate whether or not chemicals of potential concern (COPC) to human health, chemicals of potential ecological concern (COPEC), or both have been released. Based on the findings of the field investigation, the SI report will recommend either further action, such as additional characterization or a remedial response, or no further action.

The scope of this SI includes surface soil sampling where evidence of surface munitions, significant magnetic anomalies, surface MC, or pertinent site features are identified during site walks. In addition, the SI will include biased and grid- based soil and surface water grab sampling as well as further delineation of site boundaries.

For this SI, surface soils include the depth interval of 0 to 1.5 feet below ground surface (bgs). If evidence of MEC or MC are identified or suspected from historical maps, records, aerial photographs, or other documentation, soil sampling will be performed at the areas identified. Where evidence for biased sample locations is insufficient or nonexistent, a grid-based soil sampling scheme will be used. Both biased and grid soil samples will be collected from 0 to 0.5 foot bgs and 1 to 1.5 feet bgs.

1.2 REPORT ORGANIZATION

This SI work plan is divided into the following sections:

- Section 1, Introduction, includes the purpose, report organization, facility description, regional setting of NAVWPNSTA Seal Beach, previous investigations, and site descriptions and history.
- Section 2, Conceptual Site Models, presents a conceptual site model (CSM) for each site.
- Section 3, Data Generation and Acquisition, describes the investigation methods and sampling design.
- Section 4, Human Health and Ecological Risk Evaluations, summarizes the technical approach for the screening-level risk evaluations for each site.

- Section 5, Health and Safety Requirements, provides a brief summary of the health and safety aspects of the planned field work for the SI.
- Section 6, Schedule, presents the anticipated schedule for the SI effort.
- Section 7, References, lists the references cited in this work plan.

1.3 FACILITY DESCRIPTION

In 1944, the Eleventh Naval District, Bureau of Ordnance, commissioned the naval facility at Seal Beach as the Naval Ammunition and Net Depot Seal Beach. In 1962, the Depot was redesignated as a Naval Weapons Station. The mission of NAVWPNSTA Seal Beach is to provide shore-based infrastructure support to the Navy's ordnance mission and other fleet and fleet support activities. The original depot site consisted of approximately 3,090 acres, but expansion to include a classification and segregation yard necessitated the acquisition of 1,717 additional acres. In 1972, the Seal Beach National Wildlife Refuge (NWR) was established on Naval Weapon Station land. In October 1998, the base was redesignated as Naval Weapons Station Seal Beach (Naval Facilities Engineering Command, Southwest [NAVFACSW], 2005).

NAVWPNSTA Seal Beach is used by the Navy to receive, store, and guard large quantities of explosives and ammunition and to distribute and deliver them as needed to other installations. Missiles, torpedoes, countermeasure devices, and conventional ammunition are loaded onto ships at the facility's 1,000-foot-long wharf. In addition, personnel also perform maintenance on some weapons systems. On average, 60 vessels per year are loaded or unloaded (NAVWPNSTA Seal Beach, undated). There is one active small arms firing range at the installation.

1.4 REGIONAL SETTING

NAVWPNSTA Seal Beach is a 5,000-acre facility located adjacent to the Pacific Ocean in the city of Seal Beach, Orange County, California, approximately 26 miles south of the Los Angeles urban center. The U.S. Fish and Wildlife Service (USFWS) manages about 911 acres in the southwest portion of the station as part of Seal Beach NWR, which provides habitat for various federally and state listed species (USFWS 2007). Urban areas surrounding NAVWPNSTA Seal Beach include the cities of Huntington Beach and Westminster to the east and Los Alamitos to the north. The city of Seal Beach lies adjacent to the installation to the north, south, and west. Anaheim Bay and the Pacific Ocean lie adjacent to the south of the installation. The location of the installation and the sites addressed by the SI are shown on Figure 1.

1.4.1 Regional Geology

Bedrock beneath NAVWPNSTA Seal Beach is a thick sequence of Tertiary and Quaternary sedimentary rocks deposited on a basement of pre-Tertiary metamorphic and crystalline rocks. Tertiary rocks range from Oligocene to Pliocene and include sandstone, siltstone, shale, and mudstone, and are almost exclusively of marine origin (NAVFAC SW 2005). The Newport-Inglewood fault zone parallels the coastline and generally forms a barrier to groundwater flow. Erosion channels filled with permeable alluvium break this barrier at the Alamitos Gap (Department of Water Resources 2003). Table 1.4.1 provides a summary of the geologic

formations present at NAVWPNSTA Seal Beach (C.T. Higgins et al. 1984; NAVFAC SW 2005) Aquifer system nomenclature of Orange County Water District (OCWD, 2008).

Table 1.4.1: Summary of NAVWPNSTA Seal Beach Formations

Geologic Age (Name)		Formation Name	Aquifer System	Aquifer
Holocene	–	Recent alluvium	Upper Aquifer	Perched to semiconfined water
Pleistocene	Upper	Lakewood		Exposition-Artesia, Gage
	Lower	San Pedro	Middle Aquifer	Lynwood, Silverado, Sunnyside
Pliocene	Upper	Pico	Lower Aquifer	Sunnyside
	Lower	Repetto	*No freshwater aquifer*	
Miocene	Upper	Puente		
	Middle	Topanga		
Jurassic to Cretaceous	–	Schist and granitic basement		

1.4.2 Regional Hydrogeology

Hydrogeologic information pertaining to NAVWPNSTA Seal Beach obtained from previous investigations and a regional groundwater contour study by the Orange County Water District (OCWD) show that groundwater flow direction at the station is influenced by groundwater extraction and, in the vicinity of the Los Alamitos injection barrier, by groundwater injection.

The installation is located in the southwest corner of the Orange County basin, overlying important confined alluvial groundwater supply aquifers of sand, gravel, and clay deposits of Pleistocene to Pliocene age (Table 1.4.1). Fresh groundwater containing less than 50 parts per million chloride is found in aquifers east of the Newport-Inglewood fault. West of the fault, groundwater is predominantly brackish to saline. In general, groundwater flows away from the Seal Beach NWR to the northeast; however, the direction may vary seasonally (Naval Energy and Environmental Support Activity [NEESA] 1985; NAVFAC SW 2002).

The upper aquifers (75 to 200 feet deep) are no longer used for water supply. The primary freshwater aquifers at NAVWPNSTA Seal Beach are at a depth of 600 to 1,000 feet below ground surface (bgs) and are confined by a 100- to 200-foot-thick clay layer. These aquifers correspond to the Middle (or Principal) Aquifer System of OCWD. A June 2007 OCWD report indicates groundwater contours for the Middle Aquifer System at NAVWPNSTA from roughly 65 to 85 feet below mean sea level, and a generally northeasterly gradient. The confined freshwater aquifers lie entirely inland from the Newport-Inglewood fault. Groundwater recharge is primarily from rainfall in the upgradient areas of the aquifer. Groundwater migration from the shallow semiperched aquifer to the lower aquifers is unlikely due to the thick clay layer (confining layer) separating the deeper aquifers (NAVWPNSTA Seal Beach 1992).

The confined aquifers are artesian and have historically supplied potable water to NAVWPNSTA Seal Beach and surrounding communities. Currently, groundwater on NAVWPNSTA Seal Beach is used only for agricultural irrigation. Nine production wells are reported on NAVWPNSTA Seal Beach, with six reported active in 2008. The wells are located to the east of the Primer/Salvage Yard, to the west of the Westminster Port of Long Beach (POLB) Fill Area, and in the northeast corner of the northern half of NAVWPNSTA Seal Beach (NAVFAC SW 1998a; NAVFAC SW 2002; NAVWPNSTA Seal Beach 2007).

Lateral groundwater movement in the moderately permeable shallow aquifer is estimated to be on the order of several hundred feet per year (NEESA 1985). The hydraulic conductivity of the shallow aquifer is estimated to be around 450 feet per day, and the maximum hydraulic gradient on the station is about 7.5 feet per mile, or 0.0014. The porosity of sand and gravel ranges from 0.25 to 0.5, with an effective porosity of 0.3. Given these parameters, the calculated velocity for groundwater in the shallow aquifer beneath the station is estimated at 2.1 feet per day or approximately 770 feet per year (NEESA 1985).

Depth to groundwater within the shallow aquifer underlying the installation typically ranges from near surface (less than 5 feet bgs) to 20 feet bgs and can be tidally influenced. Groundwater flow direction in the shallow aquifer is generally to the northeast and varies seasonally. (NEESA 1985; NAVFAC SW 1998b; NAVFAC SW 1999).

1.4.3 Ecological and Environmental Setting

In the PSI report, Malcolm Pirnie (2008) identified no cultural resources within or adjacent to the boundaries of the five MRP sites. Within NAVWPNSTA Seal Beach, cultural resource features have been identified, including prehistoric archeological sites and World War II and Apollo space program era historic buildings (NAVFAC SW 2002; COUP Incorporated, undated).

Protected within the station boundaries is the Seal Beach NWR, which is one of the largest remaining salt marshes along the southern California coast. About 740 acres of the 911-acre Seal Beach NWR are subject to unobstructed tidal influence, including 565 acres of salt marsh vegetation, 60 acres of intertidal mudflats, and 115 acres of tidal channels and open water. Since its establishment in 1974, Seal Beach NWR's principal focus has been on protecting federally listed species and coastal wetlands used for foraging and resting by migratory waterfowl, shorebirds, and raptors that travel along the Pacific Flyway (USFWS 2007). The Seal Beach NWR supports federally and state listed sensitive, threatened, and endangered species, as presented in Section 3.1.2 of this Work Plan (NAVWPNSTA Seal Beach 2007).

Several significant producing oil fields lie in the vicinity of the installation, including the Seal Beach oil field that extends into the western portion of the installation.

1.5 PREVIOUS INVESTIGATIONS

An initial assessment study (IAS) for NAVWPNSTA Seal Beach was completed by NEESA in February 1985 (NEESA 1985). In 1989, NAVWPNSTA Seal Beach requested that NEESA update the IAS; a revised IAS was issued in August 1990 (NEESA 1990). Sites addressed in the IAS include Installation Restoration Program (IRP) Site 16, which is now part of MRP Site UXO1 (Primer/Salvage Yard and POLB Mitigation Pond); IRP Sites 2 and 36 (currently MRP Site UXO2, Buildings 101 and 102 and Associated Evaporation Ponds); and Building 94, which is associated with MRP Site AOC1 (Building 94 Settling Basin). The IAS recommended an SI at the IRP Sites 16, 2, and 36, but not at the Building 94 site.

A Preliminary Site Inspection (PSI) for the MRP was performed in 2008 (Malcolm Pirnie 2008). The study addressed all the sites included in this SI. The PSI recommended an SI for MEC and MC at MRP Sites UXO1 (Primer/Salvage Yard and POLB Mitigation Pond) and UXO6 (Westminster POLB Fill Area). In addition, the PSI recommended an SI for MC at MRP Sites

UXO2 (Building 101 and 102 and Associated Evaporation Ponds), AOC1 (Building 94 Settling Basin), and AOC2 (Explosives Drop Test Tower).

1.6 SITE DESCRIPTIONS AND HISTORY

A physical description of each site and its history are provided in this section. The location of each site within the installation is shown on Figure 1.

1.6.1 MRP Site UXO1

MRP Site UXO1, Primer/Salvage Yard and POLB Mitigation Pond, is located in the south-central portion of the installation. The Primer/Salvage Yard area comprises the northern portion of UXO1 and is approximately 48 acres (Figure 2). The Primer/Salvage Yard has previously been known as the Lumber Yard, the Ordnance Storage/Salvage Yard, and the Can Yard. Malcolm Pirnie (2008) referred to the site as the Ordnance Storage/Salvage Yard. The southern portion of UXO1 (POLB Mitigation Pond) is located immediately south of Slough Road.

From 1944 through the 1980s, the Primer/Salvage Yard was actively used for ordnance storage related to rocket and projectile (e.g., 20- to 40-mm) segregation, inspection, and repackaging, as well as bomb and rocket (e.g., 2.75- and 7.2-inch) overhaul. The Primer/Salvage Yard received thousands of cleaned projectile casings from Buildings 101 and 102. It is also reported that damaged ammunition was stored in the Primer/Salvage Yard along with non-ordnance materials, such as lumber, batteries, and other types of scrap (NEESA 1985).

The Primer/Salvage Yard (former IRP Site 16) boundaries were initially defined in the IAS (NEESA 1985) (see Appendix A). The site encompasses an area south of Bolsa Avenue, east of 7th Street, and west of 9th Street and the Marshalling Yard. The southern boundary of the former Primer/Salvage Yard area is now the north bank of the POLB Mitigation Pond.

Three activities and locations of concern at the Primer/Salvage Yard were identified in the 1985 IAS. The first location, known as the depriming area, was used from 1944 through 1982. It was reported as an unpaved area 100 to 400 feet south of former Building 413 that was used as a smoke pot filling station. Reportedly, smoke pots were used as obscurants and filled with roughly 1 quart of a petroleum product, consisting primarily of kerosene, called “fog oil.” Spillage of fog oil occurred, but the amount discharged to the soil is unknown. An estimated 10,000 smoke pots were filled with fog oil at this site (NEESA 1985). During the same time period, the area was also used for depriming ordnance projectiles. Primers, whose main MC was either smokeless powder or black powder, were removed from projectiles and placed in 5-gallon powder cans until they were shipped off station or sent to the explosives burning ground (IRP Site 6) for disposal (NEESA 1985).

The second location of concern was northeast of the depriming area and identified as the recovered live ammunition and grenades area. Disposal of munitions is believed to have occurred roughly 100 feet east of former Building 413 at an unknown date. Reportedly, the disposal items were mixed with nonenergetic, inert material (e.g., empty metal canisters, wooden packing materials, and electronics). Station personnel recovered unknown quantities of live small-caliber ammunition and grenades from this area at an unspecified date (NEESA 1985). The 1985 report recommended further action to address these items.

The third location of concern was an explosive ordnance disposal (EOD) demonstration area and a safety demonstration area (known as the EOD safety demonstrations area) that were reported 600 feet south of former Building 413. This area is currently occupied by the POLB Mitigation Pond.

Reportedly, munitions items stored at the Primer/Salvage Yard may have been disposed of by burial. A former site employee reported that munitions were unofficially buried underneath the asphalt of the Primer/Salvage Yard (Malcolm Pirnie 2008). It was also reported that munitions (possibly live) were tossed into the willow trees outside the northern boundary of the currently fenced yard.

Active operations ceased at the Primer/Salvage Yard area in the late 1990s. In 2000, it was reported that the Primer/Salvage Yard was poorly organized prior to being cleaned up. During the cleanup of the yard, live ordnance items were found (Malcolm Pirnie 2008). It was also reported that when the Primer/Salvage Yard was operational, there were certification errors in the classification of ordnance as inert or live, and that live munitions items may have possibly been left in the Primer/Salvage Yard (Malcolm Pirnie 2008).

During a site visit in November 2007, numerous munitions-related items were observed. These items were reported to EOD Mobile Unit 3, and a detachment responded on December 14, 2007 with an emergency action that detonated in place four MEC items that were reported as unsafe to handle or move (Malcolm Pirnie 2008).

The POLB Mitigation Pond area (the southern portion of MRP Site UXO1), located immediately south of Slough Road, encompasses approximately 39 acres. This area also includes the former EOD and safety demonstration areas (Figure 2). The POLB Mitigation Pond area was used from 1944 to 1982 in conjunction with the Primer/Salvage Yard for explosive ordnance disposal and safety demonstrations at an unknown frequency. During previous detector-aided visual surveys, MEC and munitions debris (MD) were observed along the bank of the POLB Mitigation Pond (Malcolm Pirnie 2008).

Reportedly, an area roughly 600 feet south of former Building 413 was used for EOD and safety demonstrations prior to creation of the POLB Mitigation Pond in 1989-1990. EOD personnel detonated 1 pound or less of Composition 4 (C4) explosive each time the site was used. The safety demonstrations consisted of igniting 1 ounce or less of black powder each time to demonstrate to station personnel the explosive properties of the products they were handling (NEESA 1985). The site is also documented to have unreported disposal of munitions similar to those reported at the Primer/Salvage Yard (e.g., live, inert, and damaged 2.75-inch rockets; 20- to 40-mm projectiles; grenades; black and smokeless powders; primers; fuzes; small arms ammunition) (NEESA 1985).

During the previous IAS (NEESA 1985), investigators concluded that only residual quantities of MC from both the EOD and the safety demonstrations would likely be present and that a confirmation study was not recommended for the area. However, they did recommend that an EOD survey be conducted at the site to retrieve and properly dispose of any possible munitions related to the reported live small-caliber ammunition and grenades.

1.6.1.1 1989 Subsurface Investigation

Before soil was removed to create the POLB wetland mitigation ponds, a subsurface investigation was conducted in 1989 (Earth Technology Corporation 1989). The discrete soil samples were composited into four samples from strata-equivalent depths of 1.5, 3, 6, and 9 feet bgs from 10 borings. The soil was described as silty clays, clayey silts, and silty sands. The composite samples were analyzed for metals and organic compounds. Of the 10 borings, 2 were in the former safety demonstration area of IRP Site 16, and 8 were outside IRP Site 16. None of the parameters analyzed in the composite samples exceeded state or federal hazardous waste criteria. A summary of the parameters analyzed for and results is presented below.

Table 1.6.1: Summary of Composite Soil Sample Results, Seventh Avenue Site For Proposed Mitigation Pond (1989)

Analyte	Results* (mg/kg)
Metals and Inorganics	
Antimony	Trace (9.0)
Arsenic	2.9 to 3.9
Asbestos	ND (<1%)
Barium	58 to 120
Beryllium	0.4 to 0.9
Cadmium	ND (<0.2)
Chromium, total	14 to 25
Chromium, hexavalent	ND (<0.005)
Cobalt	4.7 to 10
Copper	8.9 to 24
Fluoride	Trace (4)
Lead	ND (<2.0) to 15
Mercury	ND (<0.17) to Trace (0.17)
Molybdenum	3.8 to 5.7
Nickel	8.1 to 14
Selenium	ND (<1.0) to Trace (1.0)
Silver	Trace (0.4) to 1.6
Thallium	ND (<2.0) to Trace (2.0)
Vanadium	32 to 52
Zinc	42 to 78
Organics	
None of the organic compounds tested were detected:	
Aldrin, Chlordane, DDT, DDE, DDD, 2,4-Dichlorophenoxyacetic acid, Dieldrin, Dioxin (2,3,7,8-TCDD), Endrin, Heptachlor, Kepone, Lead compounds (organic), Lindane, Methoxychlor, Mirex, Pentachlorophenol, Polychlorinated biphenyls (PCBs), Toxaphene, Trichloroethylene, 2,4,5-Trichlorophenoxyproprionic acid, and Dioxins (screen).	
Detection limits range from 0.002 to 0.2 mg/kg.	

Notes:
*Results provided as a range of four composite samples from depths of 1.5, 3.0, 6.0, and 9.0 feet bgs
mg/kg = milligrams per kilogram
ND = Not detected
Trace = The presence of the compound was noted but its concentration was below the quantitation limit.
Reference: Earth Technology Corporation (1989).

According to the Initial Assessment Study / Preliminary Assessment Addendum (NEESA 1990), it was noted during a site visit that the area of the smoke pot filling and projectile depriming was paved and being excavated for additional surfacing. A portion of IRP Site 16 had been excavated for the POLB, and the report stated that "preliminary tests" proximate to the POLB "reflect no hazardous characteristics." The investigators recommended that EOD be contacted concerning the live ordnance finds in the area, and concluded that the site posed no threat to human health or the environment.

1.6.1.2 Operable Unit 5 Site Inspection

During the Operable Unit (OU)-5 SI (NAVFAC SW 1998b), which included IRP Site 16, soil and groundwater samples from the site were collected and analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), nitrogen compounds (ammonia-N, nitrate-N, and total Kjeldahl nitrogen [TKN]), metals, and total petroleum hydrocarbons (TPH) as diesel. Three SVOC compounds tested include nitrobenzene, 2,4-dinitrotoluene, and 2,6-dinitrotoluene, each compounds included as part of EPA test method 8330 for explosives and related compounds. Copper, zinc, ammonia, and TKN were detected in soil and groundwater. The chemicals of potential concern (COPC) detected in soil were copper, pyrene, nitrate, and trichlorofluoromethane. The report shows that 29 soil samples were collected from 14 locations from depths ranging from the surface to 3.5 feet bgs:

- 6 within the smoke-pot filling and depriming area,
- 5 in the ammunition finds area,
- 2 from an island in the pond at the location of the ordnance disposal area, and
- 1 north of the fenced area.

Total inorganic nitrogen (nitrate/nitrite plus ammonia) inside the fenced Primer/Salvage Yard was also detected at a concentration greater than typical for unfertilized soils and was suspected to possibly indicate explosives or explosives residue. The following table summarizes the results.

Table 1.6.2: Summary of Soil Sample Results, IRP Site 16 OU-5 Site Inspection (Samples Collected July-August 1993), NAVFAC SW (1998b)

Analyte	Results* (mg/kg)	Background (mg/kg)
Metals and Inorganics (29 samples)		
Aluminum	2,220 to 29,600	36,271
Antimony	ND	
Arsenic	ND to 5.8	15.4
Barium	10.6 to 132	NE
Beryllium	ND (<0.67) to 1.3	2.11
Cadmium	ND (<0.68) to 1.2	2.22
Chromium, total	3.7 to 31.8	46.24
Cobalt	2.2 to 16.1	NE
Copper	2.7 to 42.3	39.04
Lead	1.4 to 25.2	35.7
Manganese	53.4 to 774	1,103
Mercury	ND	
Nickel	3.3 to 28.2	32.49
Selenium	ND	
Silver	ND (<1.3) to 1.5	NE

Table 1.6.2: Summary of Soil Sample Results, IRP Site 16 OU-5 Site Inspection (Samples Collected July-August 1993), NAVFAC SW (1998b)

Analyte	Results* (mg/kg)	Background (mg/kg)
Thallium	ND (<0.54) to 2.5	NE
Vanadium	7.3 to 71.8	85.95
Zinc	10.5 to 242	177.17
Nitrogen Compounds		
TKN	ND (<1) to 2,500	NE
Ammonia, as N	ND (<1) to 71	NE
Nitrate/Nitrite	ND (<0.1) to 129	31.2/2.4
Semivolatile Organic Compounds		
Trace to low concentrations were detected of the following SVOCs:		
bis(2-ethylhexyl)phthalate		
butylbenzylphthalate		
di-n-butylphthalate		
diethylphthalate		
pyrene		
Volatile Organic Compounds		
Trace to low concentrations were detected of the following VOCs:		
Acetone		
Toluene		
trichlorofluoromethane		

Notes: mg/kg = milligrams per kilogram
ND = Not detected
NE = Not established
Background values from upper limit background values (ULBV), NAVFAC SW (1995 and 1997)
Reference: NAVFAC SW 1998b

This soil assessment leaves several data gaps the current Site Investigation proposes to fill:

1. There is an analytical suite data gap. Explosives were not tested for. However, the data for metals and nitrogen compounds can be used.

2. There is a time data gap. The soil data are from soil samples collected in 1993. The existing data may be used only to inform rather than support decisions. Current data are needed for accurate comparison.

3. There is a spatial data gap. Some areas of current interest were not sampled in the 1993 investigation.

4. The soil boring locations were poorly documented. No coordinates were provided. The sketch map provides only approximate locations. Replication of locations cannot be accomplished with the location data provided.

Antimony was detected in groundwater collected from the salvage yard at three hydropunch locations at 62.7, 78.7, and <60 ug/L. These results were compared to the MCL of 6 ug/L, background level ("upper limit background value") of 8.7 ug/L, and ambient water quality criteria of 500 ug/L.

1.6.1.3 Operable Units 4 and 5 Focused Site Inspection

During the OU-4 and -5 focused SI (NAVFAC SW 1998c), two groundwater monitoring wells were installed to the north of Slough Road, just south of the current Primer/Salvage Yard fence near previous hydropunch locations where antimony was detected in groundwater. This study was not able to reproduce the elevated antimony levels reported during the previous SI investigation. Depth to groundwater was found to be approximately 4.5 feet bgs. The water samples were collected from the wells and from surface water near the northern bank of the POLB Mitigation Pond and analyzed for antimony. Three groundwater samples were reported to contain <2.2 ug/L antimony. The finding indicates that antimony would not be expected to be a groundwater concern at UXO1.

The OU-4 and -5 Final Screening Ecological Risk Assessment (NAVFAC SW 1999) was prepared as a supplement to the OU-5 SI report and the OU-4 and -5 focused SI report (NAVFAC SW 1998b and 1998c). Previously detected maximum metals concentrations for copper and zinc in soil exceeded their respective upper-level background values (ULBV) inside the fenced portion of the Primer/Salvage Yard. The nitrogen compounds nitrate plus ammonia (inorganic nitrogen) and TKN were also detected and retained as COPCs. Maximum and average concentrations of nickel and zinc exceeded their respective conservative estimates of chronic values in groundwater at IRP Site 16, with the highest concentration of zinc exceeding the chronic toxicity value by 186-fold (NAVFAC SW 1999; California State Water Resources Control Board [SWRCB] 2001). Ammonia and TKN were detected in groundwater and were retained as COPCs. Despite the elevated COPC concentrations, the soil exposure pathway was found to be incomplete for metals. All the elevated concentrations were located inside the locked and fenced Primer/Salvage Yard. In addition, the possible discharge of nickel- and zinc-contaminated groundwater to the 7th Street POLB Mitigation Pond was identified in the ecological risk assessment report. The investigators recommended that samples be collected from the northern banks of the pond. Concentrations of zinc and sodium detected in the pond samples varied in rough proportion to one another, suggesting that elevated zinc values could be analytical artifacts caused by seawater intrusion.

In the Focused SI Phase II Report (NAVFAC SW 2002), groundwater samples were collected and analyzed for nickel and zinc (total and dissolved) and total suspended solids. Three of the groundwater samples were analyzed for total metals. Nickel and zinc were detected at concentrations greater than ULBVs. In addition, the potential presence of buried live ammunition along the “eastern portion” of the site (the recovered live ammunition and grenades area) was identified as a data gap to be resolved. However, based on a lack of complete exposure pathways, no further action was recommended for IRP Site 16. The results of the OU-4 and -5 focused SI indicated no significant human health risks from soil. The results of the OU-4 and -5 screening ecological risk assessment indicated no significant ecological risks from soil and noted that the groundwater exposure pathway for humans is incomplete because the groundwater is saline. The investigation also found no significant risks to aquatic ecological receptors because significant amounts of metals-contaminated groundwater are not suspected to discharge to the POLB Mitigation Pond. However, it was noted that high nickel and zinc were detected in the Primer/Salvage Yard area, and additional site management practices were recommended to prevent future releases of metals from nearby scrap metal storage operations. The scrap metal storage operation at the primer/salvage yard was terminated in the early 2000s.

1.6.2 MRP Site UXO2

MRP Site UXO2 is located south of Westminster Street at 8th Street. The site comprises four unlined evaporation ponds associated with Buildings 101, 102, and 98 (Figure 3). The Evaporation Ponds were formerly known as IRP Site 2, Buildings 101/102 were formerly known as IRP Site 3, and Building 98 was formerly referred to as IRP Site 36.

The complex operated from 1945 through the mid-1950s, in 1962, and in 1971 to demilitarize 5-inch projectiles. When the projectiles were retired, Explosive D (ammonium picrate) was drilled out of the casing. The initial drillout procedure did not remove all the Explosive D from the casing, and the remaining portion was removed by rinsing with warm water and steam.

During peak production periods (1945 to 1947 and 1953 to 1955), an estimated average of 250 5-inch projectiles were drilled out each working day (NEESA 1985; NEESA 1990). Wash water containing Explosive D was produced during final steam and warm water washout of projectile casings and was discharged for primary settling and cooling from a tank in Building 98 into a series of 10-foot by 10-foot baffled concrete settling basins located on the south side of the building. Based on an engineering diagram (see Appendix A), there were originally four 2.5-foot-deep concrete basins with concrete floors in a two-by-two matrix configuration. In the late 1950s, the two northern concrete basins were filled with compacted soil and capped with a concrete slab during the expansion of the southern portion of Building 98 (Malcolm Pirine 2008). In addition, Building 98 had a 4-foot-square by 5-foot deep pit on the west side of the building that was used for an unknown purpose until it was filled with soil when Building 98 was expanded (Malcolm Pirnie 2008).

Once the wash water containing Explosive D went through the concrete primary settling basins, it drained through a 2-foot-deep, 150-foot-long concrete trench into a series of three connected evaporation ponds, which totaled approximately 2.3 acres. Reportedly, the ponds were connected by 6-inch-diameter pipes (NEESA 1985; NAVFAC SW 1990). From 1945 to the mid-1950s, approximately 13 tons of Explosive D mixed with wash water drained into the Evaporation Ponds for evaporation and settling. In 1962, an additional 32 tons of Explosive D was drained into the ponds. In 1971, 5 pounds was drained into the ponds. In addition, the ponds were occasionally allowed to dry by draining and evaporation and then burned to control Explosive D surface accumulation. Treatment in the ponds consisted only of the controlled burns that were conducted while the ponds were in operation. It is also reported that in 1948 the ponds detonated rather than burned. The last controlled burn occurred in 1962 (NEESA 1985; NAVFAC SW 1990; Naval Surface Warfare Center [NSWC] Indian Head 2003). The facilities ceased operation in 1972 and have been inactive since that time.

In addition to Building 98 related operations, the floors in Buildings 101 and 102 periodically were washed down, and the resulting contaminated wash water exited through floor drains and discharged to a 50- by 50-foot evaporation pond located on the east side of Building 101 and former Building 102. Reportedly, an estimated total of 520 pounds of Explosive D mixed with wash water was discharged into the evaporation pond (NEESA 1985).

A 1990 SI investigated the Evaporation Ponds (see Appendix A) and analyzed soil samples at 0.5, 2.0, and 3.5 feet bgs for Explosive D breakdown products including ammonia as nitrogen,

picric acid, and picramic acid. The only analyte detected was ammonia as nitrogen, at low concentrations that were attributed to background or agricultural practices. The report recommended an additional investigation be conducted to determine if other breakdown products of Explosive D should be investigated, whether MC migrated to groundwater, and whether other areas not investigated (e.g., Buildings 101/102) were impacted.

The previously conducted SI (NAVFAC SW 1998a) had sampled the evaporation ponds at approximately 0.5 and 1.75 feet bgs and the earth-filled concrete settling basin behind Building 98 (IRP Site 36) at 0.4 and 2.5 feet bgs (see Appendix A). Samples were analyzed for explosives (naphthalic acid, nitrocellulose, nitroglycerine, nitroguanidine, and picric acid) and nitrogen compounds (ammonia-N, nitrate-N, and TKN). The SI reported that no explosive compounds were detected and that no nitrogen compounds were detected in soil at concentrations of concern. In addition, the SI report noted that impacts to ecological receptors would be addressed under a separate study (NAVFAC SW 1998b). During the PSI (Malcolm Pirnie 2008), Malcolm Pirnie reviewed the sampling methodology for the IRP Final SI. During the review, historical engineering diagrams, aerial photographs, and many sampling methodology concerns were identified. It was found that the samples were not analyzed for a full explosives suite, including Research Department explosive (RDX). In addition, background concentrations for the identified COPCs were from samples (Borings 02_H06 and 02_H06A) collected in an area that was possibly used for site drainage south of Building 98. It was also found that contrary to the SI report results section, low unquantifiable concentrations (i.e., greater than the method detection limit, but below the reporting limit) of explosives including naphthalic acid, nitrocellulose, nitroglycerine, nitroguanidine, and picric acid were detected at IRP Site 2. Malcolm Pirnie (2008) also found the location of IRP Site 3 to be incorrectly determined and sampled (see Appendix A). The soil samples collected from IRP Site 36 were too shallow, as the concrete basin had a concrete floor and was filled with roughly 2 feet of assumed clean fill. A 4-foot-square pit used for an unknown purpose and filled with soil has not been investigated (Engineering Diagram 10, 1958).

1.6.3 MRP Site UXO6

MRP Site UXO6, Westminster POLB Fill Area, is located south of Westminster Avenue and along the Westminster railroad spur (Figure 4). The site is estimated to be 1.75 miles long and 715 feet wide; it encompasses approximately 180 acres. In 1989-1990, the site was used to place approximately 3 to 5 feet of fill that may have been excavated from the POLB Mitigation Pond (the southern portion of the current MRP Site UXO1), a known MEC area. A calculated 330,000 cubic yards of soil from the 7th Street POLB Mitigation Pond, excavated to an average depth of 5 feet bgs (based on a required average depth of 3 feet below the mean lower low water tide), was placed in the Westminster POLB Fill Area (see Appendix A).

Soil was also stockpiled at the currently operational NAVWPNSTA Seal Beach wharf to 15 to 20 feet (POLB Civil Engineering Division Engineering Diagrams, 1988). However, because the wharf area is operational, it is not being evaluated under the Munitions Response Program. During the November 2007 site visit (Malcolm Pirnie 2008), the stockpiled soil at the wharf was observed to be near ground level. Reportedly, the soil had been used for numerous unspecified fill projects with no known reports of MEC (Malcolm Pirnie 2008).

Suspected munitions present at the POLB Mitigation Pond that potentially could have been transported to the Westminster POLB Fill Area include live, inert and/or damaged rockets (e.g., 2.75- and 7.2-inch), projectiles (e.g., 20- to 40-mm), grenades, obscurants (i.e., fog oil), black and smokeless powders, primers, fuzes, small arms ammunition, cartridge actuated devices (CAD), propellant actuated devices (PAD), and submunitions (NEESA, 1985). The potential munitions concern at the POLB Mitigation Pond was documented in a 1989 POLB memo prior to the pond excavation (POLB 1989b). During the excavation of the 7th Street POLB Mitigation Pond, it was reported that 3-inch rounds were seen falling out of trucks, and that EOD responded to these incidents (Malcolm Pirnie 2008). While it is likely that soil from the 7th Street POLB Mitigation Pond was used as fill at the Westminster POLB Fill Area, there is no known documentation of this.

1.6.4 MRP Site AOC1

MRP Site AOC1, Building 94 Settling Basin, is located east of Case Road in the central portion of the installation (Figure 5). Building 94 (a gun propellant charge loading and breakdown facility) was commissioned in 1945 and operated until at least 1981 for the loading and breakdown of 20-mm, 40-mm, 3-inch, and 5-inch projectiles (NEESA 1985). The cartridge case loading function consisted of filling both 3-inch and 5-inch casings with smokeless powder (NEESA 1985). Reportedly, approximately 1.5 tons of waste smokeless powder was generated per week between 1945 and 1970. To prevent smokeless powder dust accumulation, the interior of Building 94 was occasionally washed down with water, and the wash water drained through floor drains. According to engineering diagrams (see Appendix A), the floor drains led to a 50-foot by 50-foot settling basin to the east of Building 94. However, the frequency and period of use of the basin is unknown, nor is the amount of MC drained to the basin. The settling basin is no longer visible and its previous location is now graded and used for agriculture.

Reportedly, small amounts of spillage occurred during operations at Building 94, which were swept up, placed in powder cans, and taken to a magazine for storage. In 2003, analytical sampling from inside Building 94 reported below-hazard-threshold concentrations of RDX, high melting explosive (HMX), and picrate in floor drains (NAVFAC SW 2005). However, the existence of the wash-down and draining system implies that release of MC is possible. This hypothesis is supported by an NSWC explosive hazard characterization evaluation for Building 94, which noted that a conveyor shaft and four floor drains in the east side of the building have below-hazard-threshold concentrations of explosives including RDX, HMX, and picrate. However, the primary concern noted during the investigation was that Building 94 has the potential for accumulation of gun propellant in drains that are currently inaccessible and that must be evaluated to be certified free of hazard (NSWC Indian Head 2003).

Based on a 1944 engineering diagram, a drainpipe, which was likely associated with the Building 94 floor drains, originated from the east side of Building 94 and led to a roughly 50-foot by -50-foot settling basin (see Appendix A). The settling basin at Building 94 is visible in a 1947 aerial photograph (see Appendix A) and is notable in aerial photographs through 1968. However, all post-1968 aerial photos reviewed show the settling basin has been graded over. Reportedly, Building 94 was redesigned to drain to the sanitary sewer system at an unknown date (NEESA 1985). It is possible that this change occurred in 1973, when the station's sewer system was connected to the Orange County municipal wastewater collection system (NEESA 1985).

1.6.5 MRP Site AOC2

MRP Site AOC2, Explosives Drop Test Tower, is located at the southern terminus of 7th Street within the Seal Beach NWR (Figure 6). The Explosives Drop Test Tower was used from 1955 to 1977, in conjunction with former Buildings 435 and 437, to test experimental propellants. Reportedly, the tower was used for safety testing of 1.4 cartridges, which pose a minor explosion hazard (Malcolm Pirnie 2008).

Engineering diagrams show that the tower is 50 feet high (see Appendix A). Ordnance was dropped through the center of the tower into a 2.5-foot-square, 6-foot-high thick steel box. The bottom of the box is reinforced with a below-ground 4-inch-thick armor plate block on top of a 3-foot-thick concrete block. Based on the engineering diagram, a small ball-type object the size of a large grenade was dropped into the steel box (Engineering Diagram 8, 1956).

The low-lying salt marsh area to the north of and adjacent to the Explosives Drop Test Tower was used for the disposal of waste quenching water containing RDX (NEESA 1985). The marsh was investigated as IRP Site 24 in 1990 and sampled for explosives, including HMX and RDX (Appendix A). IRP Site 24 was recommended for no further action because no explosives were detected. However, the area underneath the tower has not been evaluated. In addition, a detonator cap was observed roughly 70 feet east of the drop test tower during the 1990 SI (NAVFAC SW 1990).

2.0 CONCEPTUAL SITE MODELS

This section provides CSMs for each of the MRP sites addressed for this SI. The CSMs are based on the PSI (Malcolm Pirnie, August 2008) and initial SI activities, including site walks. The CSMs have been developed using current knowledge of historical activities that may have affected the site. They include possible sources and release mechanisms, exposure pathways, and potential ecological and human receptors.

2.1 SITE UXO1

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach
	Site Name	MRP Site UXO1 (Primer/Salvage Yard and POLB Mitigation Pond)
	Site Area and Layout	UXO1 occupies approximately 87 acres, approximately 24 acres of which are fenced.
	Site Structures	No buildings are currently located within the site boundary. Former Buildings 412 and 413 were located in a currently fenced area within the site.
	Site Boundaries	A line of brush lies just south of the northern boundary of MRP Site UXO1. Bolsa Road lies just north of the site. The NAVWPNSTA Seal Beach installation boundary, which borders the city of Seal

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		Beach, lies roughly 2 miles north of the site. The southern portion of UXO1 includes the 40-acre 7th Street POLB Mitigation Pond, which is part of the Seal Beach NWR. The NAVWPNSTA Seal Beach installation boundary lies roughly 0.6 mile south of UXO1. Beyond the installation boundary is the Orange County Flood Control Channel, which flows into Anaheim Bay and then to the Pacific Ocean, and the city of the Huntington Beach. The western boundary of UXO1 is 7th Street. IRP Site 74 (Old Skeet Range) is located roughly 600 feet west of UXO1. The installation boundary, which is bordered by the city of Seal Beach, lies roughly 1.75 miles to the west. Just east of UXO1 lie low grasses, railroad sidings, and agricultural fields. The Marshalling Yard is located roughly 600 feet of the site to the east. The installation boundary lies roughly 1 mile to the south, bordered by the cities of Westminster and Huntington Beach.
	Site Security	MRP Site UXO1 is located on NAVWPNSTA Seal Beach, which is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order and for implementing access control policies and procedures. Access to UXO1 from within NAVWPNSTA Seal Beach is controlled by vehicular security patrol. Roughly half of the northern portion of UXO1 (the Primer/Salvage Yard area) is fenced and secured by a locked gate with signs warning of unexploded ordnance (UXO) hazards. However, the area outside of the fenced area is open to personnel. Limited public access is granted to the POLB Mitigation Pond (the southern portion of UXO1), within Seal Beach NWR, by permission only.
Munitions/ Release Profile	Munitions Types	The Primer/Salvage Yard area (the northern portion of UXO1) likely stored live, inert, and/or damaged rockets (e.g., 2.75- and 7.2-inch), projectiles (e.g., 20- to 40-mm), grenades, obscurants (i.e., fog oil), black and smokeless powders, primers, fuzes, small arms ammunition, CADs, PADs, and submunitions

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		(NEESA 1985). A base plate with live primer and numerous cartridges have been observed lying within or along the northern bank of the POLB Mitigation Pond (the southern portion of UXO1). Munitions potentially present within the pond also include munitions attributed to the adjacent Primer/Salvage Yard (e.g., inert and/or damaged rockets, grenades, submunitions).
	Maximum Probability Penetration Depth	Penetration from munitions use within the Primer/Salvage Yard area is not expected, and the maximum depth of munitions would be related to burial. It is also suspected that munitions observed along the northern bank of the POLB Mitigation Pond likely extend under Slough Road and to the north. The maximum depth of munitions within the POLB Mitigation Pond would likely be related to burial. Soil at the southern portion of UXO1 (the POLB Mitigation Pond) was excavated to roughly 6 feet bgs to create the POLB Mitigation Pond. Munitions debris is still emerging from the banks of the pond, indicating that additional MEC is present below the water/ground surface.
	MEC Density	Based on reported use of the Primer/Salvage Yard and reported munitions buried as well as observed items potentially related to discarded or buried MEC during the site visit, density of MEC at UXO1 is estimated to range from very low (1 to 2 items per acre) to high (greater than 40 items per acre).
	MEC Field Observations	Various munitions or munitions-related items were observed within the northern portion of UXO1 (the Primer/Salvage Yard area). These include (1) a 2.75-inch high-explosive style warhead, colored blue, with inert filling; (2) an intact submunition BLU63 T-1 series (baseball size), colored blue; (3) an expended point detonating (PD) fuze; and (4) expended powder train time fuze (PTTF). In addition, numerous half shells from M30 or M40 series submunitions (golf ball size) and 5.56-mm and 50-caliber casings were observed. These items were mostly scattered within the fenced Primer/Salvage Yard area, other than a few cartridge casings to the south of the fence and a

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		missile fin located to the north of the fence. Numerous empty 40-mm cartridge casings were observed within and along the northern bank of the POLB Mitigation Pond (the southern portion of UXO1) during site visits. In addition, 20-mm cartridge casings and a primer plate had been reported at the pond.
	Munitions Constituents	According to previous SI results, concentrations of copper and zinc in soil and groundwater are greater than the ULBVs for soil and conservative chronic values in groundwater within the Primer/Salvage Yard area (SWRCB 2001). In addition, total inorganic nitrogen inside the currently fenced Primer/Salvage Yard area was detected at concentrations greater than typical concentrations for unfertilized soils and possibly indicates explosives or explosives residue (NAVFAC SW 1998b). MCs related to removing primers from projectiles and placing them in 5-gallon can includes black powder (e.g., potassium nitrate) and smokeless powder (e.g., nitrocellulose, nitroglycerin, nitroguanidine) (NEESA 1985). Metals of concern related to black and smokeless powder include antimony, arsenic, copper, nickel, and zinc. Small arms typically have projectiles composed of lead cores that are typically 85 percent by weight, with copper alloy jackets. The presence of explosives (e.g., RDX, HMX, and trinitrotoluene [TNT]) related to rockets is also possible according to the site history. In addition, the obscurant fog oil (kerosene/mineral oil) was reportedly spilled at the site in unknown quantities. Based on previous Primer/Salvage Yard area SI results, MC likely include nickel, zinc, ammonia, and TKN within the POLB Mitigation Pond. Black powder (potassium nitrate) and C4 explosives (RDX) were reportedly used during EOD and safety demonstrations at the POLB Mitigation Pond area. Explosive MC related to cartridges likely include double base powders (nitrocellulose, nitroglycerin). MC related to removal of primers from projectiles at the adjacent Primer/Salvage Yard area include black

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		powder and smokeless powder (nitrocellulose, nitroglycerin, and nitroguanidine) and may be present within the POLB Mitigation Pond area. Metallic MC related to black and smokeless powder (antimony, arsenic, copper, nickel, and zinc) may also be present within the pond area. In addition, the obscurant fog oil (kerosene/mineral oil) reportedly was spilled in the vicinity, which may include part of the POLB Mitigation Pond.
	Migration Routes/Release Mechanisms	The natural migration (e.g., soil erosion) of MEC within the Primer/Salvage Yard area (the northern portion of UXO1) is not suspected given the low erosion capability of soils in this area. Earth moving associated with future construction, excavation, and maintenance at the site is a mechanism by which both MEC and MC in soil can be physically redistributed at the surface and to the subsurface. Surface migration of MC may occur naturally through surface soil erosion and by wind and/or mechanically driven dust generation. MC that may be present in surface soil can also be bioaccumulated by biota. MC potentially can leach through soil to groundwater in the shallow alluvial aquifer. Migration or reposition of known MEC within the POLB Mitigation Pond area may occur through surface soil erosion of the pond banks or tidal changes. Intrusive earth moving activities, including future excavation related to maintenance or dredging of the pond, could redistribute MC or MEC to surface or subsurface soil. In addition, MC can leach from MEC and bioaccumulate in biota in water. MC can also leach from MEC to surface and/or subsurface soils.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach is typical of the maritime subclimate within the California Mediterranean climate, which includes mild winters, cool summers, high relative humidity, and frequent early morning clouds that lead to afternoon sunshine. The annual average temperature is 74°F. Summer average high temperatures range from 77 °F to 84 °F, and average lows range from 60°F to 65°F. Winters tend to have moderate temperatures, with highs typically 67 °F and average lows ranging from 45 °F

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		to 47 °F. Yearly precipitation averages 13 inches; February, the wettest month, averages 3 inches, and July, the driest, averages 0.02 inch (WRCC, undated). Periodically, the region experiences El Niño conditions, which tend to bring wetter winters to the area through heavy storms. The prevailing winds are westerly with an average velocity of 10 knots. Strong, dry northeasterly winds occasionally descend the mountain slopes in the fall, winter, and early spring months (NAVFAC SW 1979). The strongest winds that occur within the region are associated with the winter and spring storms off the Pacific Ocean (NAVFAC SW 2005).
	Topography	The Primer/Salvage Yard (the northern portion of UXO1) terrain is flat and ranges in elevation from 7 feet above sea level (asl) at its northern extent to 4 feet asl at its southern extent (NAVFAC SW 2002). The POLB Mitigation Pond (the southern portion of UXO1) is an artificial pond dug to a depth of 6 feet with three islands. The POLB Mitigation Pond elevation ranges from 3.5 feet asl to roughly 3 feet below sea level within the pond. The pond is bounded by flat terrain.
	Geology	MRP Site UXO1 surficial geology is characterized by alluvial and coastal deposits (Qal) (NAVFAC SW 1998a).
	Soil	Soil at MRP Site UXO1 consists of predominantly clay and silt layers. The IAS and Integrated Natural Resources Management Plan (INRMP) note the site is characterized by drained Bolsa silty clay loam, which occurs on large alluvial fans and is moderately to slowly permeable (NEESA 1985; NAVWPNSTA Seal Beach 2007). Runoff is slow over bare level soil, and the erosion hazard is slight. The soil within UXO1 is moderately alkaline and calcareous to a depth of approximately 49 inches (NEESA 1985).
	Hydrogeology	The depth to groundwater at the southern edge of the Primer/Salvage Yard area (or center of MRP Site UXO1) is 4.5 feet bgs. Groundwater levels in the vicinity of the POLB Mitigation Pond (the southern portion of UXO1) range from 5 to 10 feet bgs. Depth to groundwater to the north of MRP Site UXO1 at

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Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		nearby IRP Site 37 (Bolsa Avenue Storage Yard) is reported at 15 to 20 feet bgs (NAVFAC SW 1998b). Depth to groundwater within the Primer/Salvage Yard area varies and is tidally influenced by the presence of the POLB Mitigation Pond, the southern portion of UXO1 (NAVFAC SW 2002). Shallow groundwater flow is reportedly to the northeast, away from the POLB Mitigation Pond (NAVFAC SW 1999). Due to salt-water intrusion, shallow groundwater at UXO1 is saline to brackish and is therefore not used for drinking water. Lateral movement of groundwater in the moderately permeable shallow aquifer is estimated to be on the order of several hundred feet per year (NEESA 1985). There are two monitoring wells located north of Slough Road. Navy Well 3, located roughly 700 feet northeast of UXO1, is 680 feet deep (screened at 615 feet bgs) and currently is used for agricultural irrigation (Malcolm Pirnie 2008).
	Hydrology	Surface water generally flows southwest toward the POLB Mitigation Pond and then through channels in the Seal Beach NWR to Anaheim Bay and the Pacific Ocean. Surface water on the site flows generally southwest, following the topography of the installation, toward the Pacific Ocean (NAVFAC SW 2002). The POLB Mitigation Pond is tidally connected with the Seal Beach NWR, Anaheim Bay, and the Pacific Ocean to the south.
	Vegetation	The vegetation in the Primer/Salvage Yard area consists of non-native annual grasses. Along the northern boundary of the site is a dense row of southern willow scrub trees, dominated by several *Salix* species. To the immediate east is nonagricultural area with low sparse grasses, beyond which are agriculture lands (NAVWPNSTA Seal Beach 2007). The POLB Mitigation Pond is primarily a coastal salt marsh habitat that is typically dominated by cordgrass (*Spartina* spp.) and pickleweed (*Salicornia* spp.). In addition, the POLB Mitigation Pond also has become increasingly important eelgrass (*Zostera marina*) habitat (NAVWPNSTA Seal Beach 2007). Vegetation above the banks of the POLB Mitigation Pond is

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		characterized by non-native annual grasses (NAVFAC SW 1999; NAVWPNSTA Seal Beach 2007).
Land Use and Exposure Profile	Current Land Use	The Primer/Salvage Yard is no longer in use. Agricultural land use occurs north and east of the Primer/Salvage Yard. The adjacent Seal Beach NWR to the south and west provides wetland habitat. The POLB Mitigation Pond is part of the Seal Beach NWR and provides protected habitat for migratory birds and for other endangered, threatened, and sensitive species. Since the area is a known MEC site, no intrusive maintenance is conducted at the site.
	Current Human Receptors	Navy personnel and contractors (including maintenance personnel), Navy-escorted visitors, and environmental and ecological researchers are current human receptors. In addition, farm workers and leaseholder farmers inhaling dust potentially impacted with MC are potential receptors. Only limited public access is granted to the NWR.
	Current Activities (Frequency, Nature of Activity)	The Primer/Salvage Yard area (northern portion UXO1) is no longer in use. No ground maintenance is conducted since the area is a known MEC site. Known current activities at the POLB Mitigation Pond (the southern portion of UXO1) include site visits to conduct environmental and ecological surveys and research. Historically, rowboats have been used infrequently in the pond for ecological research (e.g., species counting).
	Potential Future Land Use	Potential future land uses within the Primer/Salvage Yard area include storage and unused land. In addition, agriculture is a potential future land use if the MEC hazard is eliminated. However, future land uses are expected to be the same as current uses for the POLB Mitigation Pond.
	Potential Future Human Receptors	Future receptors are expected to be the same as current receptors.
	Potential Future Land Use-Related Activities	Navy personnel and contractors potentially may use the Primer/Salvage Yard area for storage. In addition, construction activities for repaving the cracked and decomposing asphalt within the Primer/Salvage Yard may occur. Future site activities may also include

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		environmental and ecological surveys or reseeding with native grasses (NAVWPNSTA Seal Beach 2007). Agriculture is also a potential future land use within the Primer/Salvage Yard area if the MEC hazard is eliminated. Future land use activities within the southern portion of UXO1 (the POLB Mitigation Pond) are expected to be the same as current uses. Additional potential future activities include environmental work (e.g., field research surveys, soil sampling) and construction related to maintenance activities and dredging of the pond.
	Zoning/Land Use Restrictions	Due to the reported presence of MEC, roughly one-half of the Primer/Salvage Yard area is fenced, with access restricted to authorized personnel only. However, the area outside of the fenced yard is also reported to contain MEC (e.g., cartridge casings), but there are no physical land restrictions to the unfenced area. In addition, the POLB Mitigation Pond is federally protected within the Seal Beach NWR.
	Demographics/Zoning	NAVWPNSTA Seal Beach has a combined workforce of 150 military personnel and 600 civilian personnel. Population data include the following (U.S. Census, 2000): • City of Seal Beach: 24,154 • City of Westminster: 88,207 • City of Huntington Beach: 189,594 • Orange County: 2,846,289
	Beneficial Resources	The Seal Beach NWR, which encompasses the southern portion of UXO1, is adjacent to the southern installation border and provides habitat for federally and state listed threatened and endangered species. The INRMP lists the site as an area used by the burrowing owl (*Athene cunicularia*), merlin (*Falco columbarius*), and Cooper's hawk (*Accipiter cooperii*) (NAVWPNSTA Seal Beach 2007). The POLB Mitigation Pond area is a tidally influenced wetland with islands providing protected habitat for migratory birds and other endangered, threatened, and sensitive species (NAVWPNSTA Seal Beach 2007).
Ecological	Habitat Type	The habitat occupied by UXO1 consists of low non-

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
Profile		native grasses to barren land and coastal salt marsh.
	Degree of Disturbance	Nearly one-half of the Primer/Salvage Yard area is fenced and paved with asphalt or concrete. The remainder of this area is undisturbed open land. The POLB Mitigation Pond area is part of the Seal Beach NWR and is undisturbed. Environmental research is the only known activity at the site and is considered low-impact based on the nature of the work.
	Ecological Receptors	
	General	Mammals reported at the installation include various species of pocket gophers, voles, shrews, and ground squirrels, Audubon's cottontail rabbit (*Sylvilagus audubonii*), and brush rabbit (*Sylvilagus bachmani*). Nineteen species of raptors are known to occur within NAVWPNSTA Seal Beach, nine of which nest on the station. These species include red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), great-horned owl (*Bubo virginianus*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), American kestrel (*Falco sparverius*), great blue heron (*Ardea herodias*), common raven (*Corvus corax*), and American crow (*Corvus brachyrhynchos*). The avian wildlife forages over a large area and would spend relatively little time on site. Aquatic ecological receptors within the POLB Mitigation Pond area include marine invertebrates and fish, including the federally endangered tidewater goby (*Eucyclogobius newberryi*), which also inhabit the Anaheim Bay (NAVFAC SW 2005; NAVWPNSTA Seal Beach 2007). Migrant or resident bird species listed as threatened or endangered by federal or state agencies (or both) include the following: • Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) • California brown pelican (*Pelecanus occidentali californicus*) • California least tern (*Sterna antillarum browni*) • Light-footed clapper rail (*Rallus longirostris levipes*)

Table 2.1: Conceptual Site Model Information Profiles – MRP Site UXO1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		• Western snowy plover (*Charadrius alexandrinus nivosus*) The breeding season for these salt marsh and shorebird species extends from approximately late January to mid-September. The California least tern occupies the Seal Beach NWR only during the breeding season, with most of its food supply coming from the Seal Beach NWR during that period (NAVFAC SW 2005).
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Ecological receptors may come into direct contact with MEC or MC in soil. Ecological receptors coming into contact with MEC and creating an explosive hazard is unlikely, but should be considered where threatened and/or endangered species may be present. Receptors may be exposed to MC that could have been incorporated into the food chain (e.g., bioaccumulated in plants and animals). Sensitive species like the light-footed clapper rail nest near the site and may consume fish that have been impacted by MC. Various mammals and other animals that inhabit the site may come into contact with MC while burrowing, foraging, or nesting. In addition, they may also consume plants and/or prey that in which MC has bioaccumulated.

2.2 SITE UXO2

Table 2.2: Conceptual Site Model Information Profiles – MRP Site UXO2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
General Information	Installation Name	NAVWPNSTA Seal Beach
	Site Name	MRP Site UXO2 (Buildings 101 and 102 and Associated Evaporation Ponds)
	Site Area and Layout	The UXO2 site footprint encompasses approximately 8 acres. The Building 98 evaporation ponds within the site occupy approximately 2.3 acres. The Buildings 101 and 102 associated evaporation ponds occupy a portion of the site and are roughly 50-foot-square. The corresponding concrete settling basin is roughly 16 by 8 feet.

Table 2.2: Conceptual Site Model Information Profiles – MRP Site UXO2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
	Site Structures	Building 98 is the Explosive D Steam-Out Building. Buildings 101 and 102 are the vacuum dust removal and ammunition rework buildings, respectively. Building 99 housed a former generator, and Building 103 was used for paint/flammable storage. Building 104 is a small locked magazine.
	Site Boundaries	To the north, unused land and the Westminster POLB Fill Area lie between UXO2 and the fenced installation boundary at Westminster Avenue, 0.25 mile to the north. Agricultural fields lie to the south of UXO2. The Case Road POLB Mitigation Pond is located approximately 0.5 mile southwest of the site. In addition, the installation boundary is located roughly 1.75 miles to the south. Beyond the installation boundary is an Orange County flood control channel, which flows into Anaheim Bay, and then the Pacific Ocean, and the city of the Huntington Beach. Agricultural fields extend 0.3 mile west of UXO2; beyond them are active installation offices and the cantonment area. The installation boundary, which borders the city of Seal Beach, is located roughly 1.25 miles away. East of UXO2 are agricultural fields and magazines. The cities of Westminster and Huntington Beach border the installation roughly 1 mile away.
	Site Security	UXO2 is located on NAVWPNSTA Seal Beach, which is a fenced and guarded installation. Security personnel are responsible for maintaining law and order and for implementing access control policies and procedures. Access to the site from within NAVWPNSTA Seal Beach is controlled by vehicular security patrol; the site is unfenced.
Munitions/ Release Profile	Munitions Types	The function of the facility was to demilitarize 5-inch projectiles. No munitions were processed or disposed of outside of the buildings or in the evaporation ponds. However, the Buildings 101-102 complex discharged wash water with Explosive D into evaporation ponds (NEESA 1985; NAVFAC SW 1990; NAVFAC 2003). In addition, RDX has been detected in Buildings 101

Table 2.2: Conceptual Site Model Information Profiles – MRP Site UXO2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		and 102 at concentrations presenting an explosive hazard.
	Maximum Probability Penetration Depth	MEC are not known or suspected to be present.
	MEC Density	MEC are not known or suspected to be present.
	MEC Field Observations	MEC are not known or suspected to be present.
	Munitions Constituents	Explosive D (ammonium picrate) and associated breakdown products, which may include picric acid and picramic acid, were disposed of with wash water and drained into evaporation ponds associated with UXO2. Precipitates expected to form during the breakdown process are calcium, sodium, ammonia, nickel, and zinc salts, due to the relative concentrations of these metals in the soil (NEESA 1990). In addition, RDX has been identified in Buildings 101 and 102. Reportedly, the evaporation ponds have not been sampled for RDX.
	Migration Routes/Release Mechanisms	MEC are not known or suspected to be present. However, migration of MC may occur through surface soil erosion and by wind and/or mechanically driven dust generation. MC present in soil can potentially leach through soil to groundwater and be bioaccumulated by biota or agricultural crops. Earth moving associated with future construction, excavation, and maintenance at the UXO2 is also a mechanism by which MC in soil may be redistributed.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach is typical of the maritime subclimate within the California Mediterranean climate, which includes mild winters, cool summers, high relative humidity, and frequent early morning clouds that lead to afternoon sunshine. The annual average temperature is 74°F. Summer average high temperatures range from 77°F to 84°F, and average lows range from 60°F to 65°F. Winters tend to have moderate temperatures, with highs typically 67°F and average lows ranging from 45°F to 47°F. Yearly precipitation averages 13 inches; February, the wettest month, averages 3 inches, and July, the driest, averages 0.02 inch (WRCC, undated). Periodically, the region experiences El Niño

Table 2.2: Conceptual Site Model Information Profiles – MRP Site UXO2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		conditions, which tend to bring wetter winters to the area through heavy storms. The prevailing winds are westerly with an average velocity of 10 knots. Strong, dry northeasterly winds occasionally descend the mountain slopes in the fall, winter, and early spring months (NAVFAC SW 1979). The strongest winds that occur within the region are associated with the winter and spring storms off the Pacific Ocean (NAVFAC SW 2005).
	Topography	MRP Site UXO2 has flat terrain and is at an elevation of approximately 10 feet asl. NAVWPNSTA Seal Beach is located on flat alluvial deposits that slope southwest from approximately 20 feet asl to sea level at the NWR. The highest topographic feature on the installation is Landing Hill (50 feet asl), on the southwest side of the facility (California Department of Toxic Substances Control [DTSC] 2003).
	Geology	MRP Site UXO2 surficial geology is characterized by alluvial and coastal deposits (Qal) (NAVFAC SW 1998a).
	Soil	Soil at UXO2 consists of predominantly clay and silt layers. The IAS and INRMP note the site is characterized by drained Bolsa silty clay loam, which occurs on large alluvial fans and is moderately to slowly permeable (NEESA 1985; NAVWPNSTA Seal Beach 2007). Runoff is slow over bare level soil. In addition, the erosion hazard for the soil at UXO2 is considered slight. The soil within the site is moderately alkaline and calcareous to a depth of approximately 49 inches (NEESA 1985).
	Hydrogeology	Groundwater in the vicinity of UXO2 is approximately 10 feet bgs and is reported to generally flow to the northeast (NAVFAC SW 1999). Groundwater is no longer used for drinking water at NAVWPNSTA Seal Beach, although parts of the station do use groundwater for agricultural irrigation (NAVWPNSTA Seal Beach 2007). There are no wells reported in the vicinity of the site. Lateral groundwater movement in the moderately permeable shallow aquifer is estimated to be on the order of several hundred feet per year (NEESA 1985).
	Hydrology	There are no permanent water bodies on site. However, water tends to pond in the bermed IRP Site

Table 2.2: Conceptual Site Model Information Profiles – MRP Site UXO2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		2 evaporation ponds. Site-specific surface water flow is unknown, although surface water generally flows southwest, following the topography of the installation (NAVFAC SW 2002). Surface water flow is anticipated to pond intermittently and infiltrate to groundwater. In general, runoff at NAVWPNSTA Seal Beach either ponds or flows overland through man-made channels, natural ditches, and/or tidal sloughs. Flow is intermittent in channels and ditches and is dependent on rainfall and excess landscape irrigation runoff (NAVWPNSTA Seal Beach 2007).
	Vegetation	Vegetation at Buildings 101 and 102 evaporation ponds is characterized by southern willow scrub. However, vegetation in the vicinity of UXO2 is primarily agricultural crops of lima beans and barley (NAVWPNSTA Seal Beach 2007).
Land Use and Exposure Profile	Current Land Use	The evaporation ponds and associated buildings within UXO2 are no longer in use. The east side of UXO2 is being used to raise honeybees, and nearby surrounding land is used for agriculture or is unused. IRP Site 2 evaporation ponds are maintained by NAVWPNSTA Seal Beach as part of a riparian corridor to the Seal Beach NWR (NAVWPNSTA Seal Beach 2007).
	Current Human Receptors	Current human receptors include Navy personnel, contractors (including maintenance personnel), and Navy-escorted visitors. In addition, farm workers and leaseholder farmers are potential receptors.
	Current Activities (Frequency, Nature of Activity)	All buildings and associated evaporation ponds at UXO2 are inactive and no longer in use. Current activities on site include infrequent clearing of nests and overgrowth at the unused buildings, site visits to conduct environmental and ecological surveys, and raising honeybees. Current activities adjacent to the site are primarily agricultural farming.
	Potential Future Land Use	Future land use at UXO2 is expected to be the same as present use. In addition, demolition of the Buildings 101 and 102 complex has been funded through the Department of Public Works (Malcolm Pirnie 2008). After the demolition of the buildings, agricultural use in the vicinity of the site is likely to continue.
	Potential Future Human Receptors	Future receptors are expected to be the same as current receptors.

Table 2.2: Conceptual Site Model Information Profiles – MRP Site UXO2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
	Potential Future Land Use-Related Activities	Future activities at the site potentially include building demolition by construction workers, environmental and ecological surveys, and riparian restoration projects by Navy personnel and contractors. In addition, crop cultivation by leaseholders is anticipated.
	Zoning/Land Use Restrictions	UXO2 is part of a secure and active Navy base. The IRP Site 2 evaporation pond scrub willow habitat is maintained as part of a wildlife corridor to the Seal Beach NWR (NAVWPNSTA Seal Beach 2007). No other known land use restrictions have been identified.
	Demographics/Zoning	NAVWPNSTA Seal Beach has a combined workforce of 150 military personnel and 600 civilian personnel. Population data are as follows (U.S. Census, 2000): • City of Seal Beach: 24,154 • City of Westminster: 88,207 • City of Huntington Beach: 189,594 • Orange County: 2,846,289
	Beneficial Resources	The IRP Site 2 evaporation ponds are part of a riparian corridor to the Seal Beach NWR, which provides protected habitat for migratory birds and for other endangered, threatened, and sensitive species (NAVWPNSTA Seal Beach 2007).
Ecological Profile	Habitat Type	The IRP Site 2 evaporation ponds and a small area to the south of them are characterized as riparian woodland of southern willow scrub (NAVWPNSTA Seal Beach 2007). UXO2 is surrounded on three sides by agricultural land. To the north of the site is Westminster Street, which is characterized by dredged fill soil possibly from the POLB Mitigation Pond that has sparse grass and pickleweed (*Salicornia spp.*) cover.
	Degree of Disturbance	UXO2 was formerly used for activities related to the Buildings 101-102 complex evaporation ponds. However, the site is presently unused.
	Ecological Receptors	
	General	Mammals reported at the installation include various species of pocket gophers, voles, shrews, and ground squirrels, Audubon's cottontail rabbit *(Sylvilagus audubonii)*, and brush rabbit *(Sylvilagus bachmani)*. Nineteen species of raptors are known to occur within

Table 2.2: Conceptual Site Model Information Profiles – MRP Site UXO2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		NAVWPNSTA Seal Beach, nine of which nest on the station. These species include red-tailed hawk *(Buteo jamaicensis)*, Swainson's hawk *(Buteo swainsoni)*, great-horned owl *(Bubo virginianus)*, burrowing owl *(Athene cunicularia)*, loggerhead shrike *(Lanius ludovicianus)*, American kestrel *(Falco sparverius)*, great blue heron *(Ardea herodias)*, common raven *(Corvus corax)*, and American crow *(Corvus brachyrhynchos)*. The avian wildlife forages over a large area and would spend relatively little time on site. Aquatic ecological receptors within the POLB Mitigation Pond area include marine invertebrates and fish, including the federally endangered tidewater goby *(Eucyclogobius newberryi)*, which also inhabit the Anaheim Bay (NAVFAC SW 2005; NAVWPNSTA Seal Beach, 2007). Migrant or resident bird species listed as threatened or endangered by federal or state agencies (or both) include the following: • Belding's savannah sparrow *(Passerculus sandwichensis beldingi)* • California brown pelican *(Pelecanus occidentali californicus)* • California least tern *(Sterna antillarum browni)* • Light-footed clapper rail *(Rallus longirostris levipes)* • Western snowy plover *(Charadrius alexandrinus nivosus)* The breeding season for these salt marsh and shorebird species extends from approximately late January to mid-September. The California least tern occupies the Seal Beach NWR only during the breeding season, with most of its food supply coming from the Seal Beach NWR during that period (NAVFAC SW 2005).
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Ecological receptors may come into direct contact with MC in soil. Ecological receptors coming into contact with MC and creating an explosive hazard is unlikely, but should be considered where threatened and/or endangered species may be present. Receptors may be exposed to MC that could have been

Table 2.2: Conceptual Site Model Information Profiles – MRP Site UXO2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		incorporated into the food chain (e.g., bioaccumulated in plants and animals). Sensitive species like the light-footed clapper rail nest near the site and may consume fish that have been impacted by MC. Various mammals and other animals that inhabit the site may come into contact with MC while burrowing, foraging, or nesting. In addition, they may also consume plants and/or prey in which MC has bioaccumulated.

2.3 SITE UXO6

Table 2.3: Conceptual Site Model Information Profiles – MRP Site UXO6		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
General Information	Installation Name	NAVWPNSTA Seal Beach
	Site Name	MRP Site UXO6 (Westminster POLB Fill Area)
	Site Area and Layout	UXO6 occupies approximately 180 acres.
	Site Structures	A railroad spur runs along the length of UXO6. In addition, an administrative building and vehicle and railroad scales are located at central portion of the site.
	Site Boundaries	Westminster Avenue lies approximately 75 to 250 feet north of UXO6, and bisects the northern and southern areas of NAVWPNSTA Seal Beach. The installation boundary lies roughly 1 mile north of the site, where the installation is bordered by the city of Seal Beach. Westminster Street and agricultural fields are located just south of UXO6. In addition, the installation boundary is located approximately 1.75 miles south of the site. Beyond the installation boundary is the Orange County Flood Control Channel, which flows into Anaheim Bay and then the Pacific Ocean, and the city of Huntington Beach. West of UXO6 is active installation offices and production buildings. The installation boundary is approximately 0.25 mile to the west, where the installation is bordered by the city of Seal Beach. The installation's fenced boundary lies adjacent to the east of UXO6, where the installation is bordered by the city of Westminster.

Table 2.3: Conceptual Site Model Information Profiles – MRP Site UXO6		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
	Site Security	UXO6 is located on NAVWPNSTA Seal Beach, which is a fenced and guarded installation. Security personnel are responsible for maintaining law and order and for implementing access control policies and procedures. Access to UXO6 from within the Station is controlled by vehicular security patrol.
Munitions/ Release Profile	Munitions Types	The various types of munitions reported for the Primer/Salvage Yard and the POLB Mitigation Pond could be present at UXO6 if fill material from the pond is indeed present. These munitions include live, inert, and/or damaged rockets (e.g., 2.75- and 7.2-inch), projectiles (e.g., 20- to 40-mm), grenades, obscurants (i.e., fog oil), black and smokeless powders, primers, fuzes, small arms ammunition, CADs, PADs, and submunitions (NEESA 1985). According to site interviews (Malcolm Pirnie 2008), 3-inch rounds were reported falling off of trucks during the excavation of soil from the POLB Mitigation Pond (Malcolm Pirnie 2008).
	Maximum Probability Penetration Depth	If present, the depth would be equal to the fill placed at the site, which is approximately 3 to 5 feet deep.
	MEC Density	MEC density is suspected to be very low.
	MEC Field Observations	No MEC-related material or metallic debris was observed during previous site visits or reported in any documents obtained for the PSI (Malcolm Pirnie 2008).
	Munitions Constituents	MC associated with UXO6 that may have been transported to the site include nickel, zinc, ammonia, and TKN. Black powder (potassium nitrate) and C4 explosives (RDX) reportedly were also used during EOD and safety demonstrations at MRP Site UXO1. Explosive MC related to cartridges likely include double base powders (nitrocellulose and nitroglycerin). MC related to the removal of primers from projectiles at the adjacent Primer/Salvage Yard area also include black powder and smokeless powder, including nitrocellulose, nitroglycerin, and nitroguanidine. Metal MCs related to black and smokeless powder include antimony, arsenic, copper, nickel, and zinc. In addition, the obscurant fog oil (kerosene/mineral oil) reportedly was spilled in the vicinity of the Primer/Salvage Yard area of UXO1.

Table 2.3: Conceptual Site Model Information Profiles – MRP Site UXO6		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
	Migration Routes/Release Mechanisms	The natural migration of MEC is not suspected given the low erosion capability of soils present at UXO6. However, MC present in soil can potentially leach through soil to groundwater and be bioaccumulated by biota or agricultural crops. Earth moving associated with future construction, excavation, and maintenance at the site is also a mechanism by which MC in soil could be redistributed.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach is typical of the maritime subclimate within the California Mediterranean climate, which includes mild winters, cool summers, high relative humidity, and frequent early morning clouds that lead to afternoon sunshine. The annual average temperature is 74°F. Summer average high temperatures range from 77 °F to 84 °F, and average lows range from 60 °F to 65 °F. Winters tend to have moderate temperatures, with highs typically 67 °F and average lows ranging from 45 °F to 47 °F. Yearly precipitation averages 13 inches; February, the wettest month, averages 3 inches, and July, the driest, averages 0.02 inch (WRCC, undated). Periodically, the region experiences El Niño conditions, which tend to bring wetter winters to the area through heavy storms. The prevailing winds are westerly with an average velocity of 10 knots. Strong, dry northeasterly winds occasionally descend the mountain slopes in the fall, winter, and early spring months (NAVFAC SW 1979). The strongest winds that occur within the region are associated with the winter and spring storms off the Pacific Ocean (NAVFAC SW 2005).
	Topography	UXO6 has relatively flat terrain and was filled to an elevation of 8.5 feet asl at the western edge of the site and to 16.5 feet asl at its eastern edge (Malcolm Pirnie 2008; Appendix A).
	Geology	MRP Site UX06 surficial geology is characterized by alluvial and coastal deposits (Qal) (NAVFAC SW 1998a)..
	Soil	The top few feet of soil at UXO6 have soil fill excavated from the creation of the POLB Mitigation Ponds (the southern portion of MRP Site UXO1). Native soils at the site are expected to be of predominantly poorly drained clay and silt (NEESA

Table 2.3: Conceptual Site Model Information Profiles – MRP Site UXO6		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		1985; NAVFAC SW 2002).
	Hydrogeology	Groundwater in the vicinity of UXO6 is approximately 20 feet bgs and reportedly flows to the northeast (NAVFAC SW 1999). Shallow groundwater is not used for drinking water or agricultural irrigation in the vicinity of the site; however, production wells on the installation extend to depths greater than 600 feet bgs. The closest reported well to UXO6 is located near the Contractors Gate, and is screened at a depth of roughly 600 feet bgs (NAVFAC SW 1998a). Lateral groundwater movement in the moderately permeable shallow aquifer at NAVWPNSTA Seal Beach is estimated to be on the order of several hundred feet per year (NEESA 1985).
	Hydrology	Surface water generally flows southwest, following the topography of the installation (NAVFAC SW 2002). Runoff is expected to be slow over bare level soil, and surface water is expected only intermittently to pond and to infiltrate to groundwater. No permanent surface water bodies exist within UXO6.
	Vegetation	The dominant vegetation at UXO6 is sparse coverage of low grasses and pickleweed (*Salicornia* spp.).
Land Use and Exposure Profile	Current Land Use	UXO6 is primarily unused, other than for limited railcar movement through the site and a small portion in the center of the site that is used for railroad transfer operations.
	Current Human Receptors	Current human receptors include Navy personnel, contractors (including maintenance personnel), and Navy-escorted visitors. In addition, leaseholder farmers and farm workers are potential receptors.
	Current Activities (Frequency, Nature of Activity)	UXO6 is currently unused other than for railcar transport through the site, maintenance of the rail spurs, and mowing to keep grasses low.
	Potential Future Land Use	Future land uses are expected to be the same as current use.
	Potential Future Human Receptors	Future human receptors are expected to be the same as current receptors.
	Potential Future Land Use-Related Activities	Future land use activities are anticipated to be the same as current uses.
	Zoning/Land Use Restrictions	The unfenced site is part of a secure and active Navy base. There are no other known land use restrictions.

Table 2.3: Conceptual Site Model Information Profiles – MRP Site UXO6		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
	Demographics/Zoning	NAVWPNSTA Seal Beach has a combined workforce of 150 military personnel and 600 civilian personnel. Population data include the following (U.S. Census, 2000): • City of Seal Beach: 24,154 • City of Westminster: 88,207 • City of Huntington Beach: 189,594 • Orange County: 2,846,289
	Beneficial Resources	Besides railway operations, UXO6 is open, unused land. In addition, UXO6 is noted in the INRMP as a goose foraging area that can be used by wildlife (NAVWPNSTA Seal Beach 2007).
Ecological Profile	Habitat Type	UXO6 habitat is open land and is classified as dredge spoil pickleweed (*Salicornia* spp.) (NAVWPNSTA Seal Beach 2007).
	Degree of Disturbance	UXO6 is composed of fill material. There are no activities associated with the site that would create disturbance other than occasional mowing to keep the grasses low and railcars passing through the site.
	Ecological Receptors	
	General	Mammals reported at the installation include various species of pocket gophers, voles, shrews, and ground squirrels, Audubon's cottontail rabbit *(Sylvilagus audubonii)*, and brush rabbit *(Sylvilagus bachmani)*. Nineteen species of raptors are known to occur within NAVWPNSTA Seal Beach, nine of which nest on the station. These species include red-tailed hawk *(Buteo jamaicensis)*, Swainson's hawk *(Buteo swainsoni)*, great-horned owl *(Bubo virginianus)*, burrowing owl *(Athene cunicularia)*, loggerhead shrike *(Lanius ludovicianus)*, American kestrel *(Falco sparverius)*, great blue heron *(Ardea herodias)*, common raven *(Corvus corax)*, and American crow *(Corvus brachyrhynchos)*. The avian wildlife forages over a large area and would spend relatively little time on site. Aquatic ecological receptors within the POLB Mitigation Pond area include marine invertebrates and fish, including the federally endangered tidewater goby *(Eucyclogobius newberryi)*, which also inhabit the Anaheim Bay (NAVFAC SW 2005; NAVWPNSTA Seal Beach 2007). Migrant or resident bird species listed as threatened or endangered by

Table 2.3: Conceptual Site Model Information Profiles – MRP Site UXO6		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		federal or state agencies (or both) include the following: • Belding's savannah sparrow *(Passerculus sandwichensis beldingi)* • California brown pelican *(Pelecanus occidentali californicus)* • California least tern *(Sterna antillarum browni)* • Light-footed clapper rail *(Rallus longirostris levipes)* • Western snowy plover *(Charadrius alexandrinus nivosus)* The breeding season for these salt marsh and shorebird species extends from approximately late January to mid-September. The California least tern occupies the Seal Beach NWR only during the breeding season, with most of its food supply coming from the Seal Beach NWR during that period (NAVFAC SW 2005).
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Ecological receptors may come into direct contact with MEC or MC in soil. Ecological receptors coming into contact with MEC and creating an explosive hazard is unlikely, but should be considered where threatened and/or endangered species may be present. Receptors may be exposed to MC that could have been incorporated into the food chain (e.g., bioaccumulated in plants and animals). Sensitive species like the light-footed clapper rail nest near the site and may consume fish that have been impacted by MC. Various mammals and other animals that inhabit the site may come into contact with MC while burrowing, foraging, or nesting. In addition, they may also consume plants and/or prey in which MC has bioaccumulated.

2.4 SITE AOC1

Table 2.4: Conceptual Site Model Information Profiles – MRP Site AOC1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
General Information	Installation Name	NAVWPNSTA Seal Beach
	Site Name	MRP Site AOC1 (Building 94 Settling Basin)
	Site Area and Layout	The AOC1 site footprint occupies an area of approximately 0.4 acre. Within the site footprint was the former 50-foot-square settling basin.
	Site Structures	Building 94 and its associated paint locker, smoke shack, and equipment storage buildings are the only structures adjacent to the site but are not included within the site footprint. There are no structures on site.
	Site Boundaries	Agricultural fields exist north of AOC1. The installation boundary is roughly 1.5 miles north of the site, where the installation is bordered by the city of Seal Beach. Agricultural fields lie south of the AOC1, and the Seal Beach NWR lies about 400 yards south. The installation boundary is located roughly 1.5 miles to the south. Beyond the installation boundary is an Orange County flood control channel, which flows into Anaheim Bay and then the Pacific Ocean, and the city of the Huntington Beach. Building 94 is located adjacent and west of the site. The northern tip of the Seal Beach NWR is located nearby AOC1 to the west. In addition, the installation boundary is roughly 1 mile west, where the installation is bordered by the city of Seal Beach. East of the AOC1 are more agricultural fields. The installation boundary is located approximately 1.5 miles to the east, where the installation is bordered by the cities of Westminster and Huntington Beach.
	Site Security	AOC1 is located on NAVWPNSTA Seal Beach, which is a fenced and guarded installation. Security personnel are responsible for maintaining law and order and for implementing access control policies and procedures. Access to AOC1 from within NAVWPNSTA Seal Beach is enforced by vehicular security patrol.

Table 2.4: Conceptual Site Model Information Profiles – MRP Site AOC1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
Munitions/ Release Profile	Munitions Types	Building 94 was a processing facility for 20-mm, 40-mm, 3- inch, and 5-inch projectiles. Reportedly, no munitions were processed in the settling basin. However, wash water with MC, which was disposed of in the settling basin, could potentially create explosive soil conditions (i.e., explosive MC concentrations greater than 10%) in the subsurface.
	Maximum Probability Penetration Depth	No munitions were processed in AOC1, but possible explosive MC concentrations exist in soil from the former settling basin, which was approximately 2 to 3 feet deep.
	MEC Density	UXO and discarded military munitions (DMM) are not suspected or known to be present at AOC1. However, explosive soils (i.e., MC concentrations in soil greater than 10%) could exist below grade in the former settling basin.
	MEC Field Observations	MEC debris is not suspected.
	Munitions Constituents	Small amounts of spillage were reported for smokeless powder inside Building 94, which was drained to the settling basin. In addition, analytical sampling of floor drains inside Building 94 reported below-hazard-threshold concentrations of RDX, HMX, and picrate (NAVFAC SW 2005).
	Migration Routes/Release Mechanisms	UXO and DMM are not known or suspected to be present at AOC1. In addition, MC are not suspected in surface soil. However, MC are potentially present in subsurface soil that could migrate by plant and animal uptake into the food web or by physical migration (e.g., earth moving associated with future construction, excavation, or maintenance at the site). MC can potentially leach from soil to groundwater in the shallow alluvial aquifer.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach is typical of the maritime subclimate within the California Mediterranean climate, which includes mild winters, cool summers, high relative humidity, and frequent early morning clouds that lead to afternoon sunshine. The annual average temperature is 74°F. Summer average high temperatures range from 77 °F to 84 °F, and average lows range from 60 °F to 65 °F. Winters tend to have moderate temperatures, with highs

Table 2.4: Conceptual Site Model Information Profiles – MRP Site AOC1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		typically 67 °F and average lows ranging from 45 °F to 47 °F. Yearly precipitation averages 13 inches; February, the wettest month, averages 3 inches, and July, the driest, averages 0.02 inch (WRCC, undated). Periodically, the region experiences El Niño conditions, which tend to bring wetter winters to the area through heavy storms. The prevailing winds are westerly with an average velocity of 10 knots. Strong, dry northeasterly winds occasionally descend the mountain slopes in the fall, winter, and early spring months (NAVFAC SW 1979). The strongest winds that occur within the region are associated with the winter and spring storms off the Pacific Ocean (NAVFAC SW 2005).
	Topography	AOC1 consists of relatively flat terrain and lies at an elevation of approximately 7 feet asl.
	Geology	Surficial geology at AOC1 is characterized by alluvial and coastal deposits (Qal) (NAVFAC SW 1998a).
	Soil	Soil at MRP Site AOC1 consists of predominantly clay and silt layers. The IAS and INRMP note the site is characterized by drained Bolsa silty clay loam, which occurs on large alluvial fans and is moderately to slowly permeable (NEESA 1985; NAVWPNSTA Seal Beach 2007). In general, runoff is slow over bare level soil, and the erosion hazard is slight. The soil within AOC1 is moderately alkaline and calcareous to a depth of approximately 49 inches (NEESA 1985).
	Hydrogeology	Groundwater in the vicinity of AOC1 is approximately 10 to 20 feet bgs (NEESA 1985), and reportedly flows generally to the northeast (NAVFAC SW 1999). Shallow groundwater is not used for drinking water or agricultural irrigation at NAVWPNSTA Seal Beach, although parts of the station do use groundwater for agriculture. Navy Well 2 is reported to be located adjacent to AOC1 and is roughly 725 feet deep. Lateral groundwater movement in the moderately permeable shallow aquifer at NAVWPNSTA Seal Beach is estimated to be on the order of several hundred feet per year (NEESA 1985).
	Hydrology	There are no permanent surface water bodies within AOC1. Runoff is expected to be slow over level terrain, and surface water is expected to only intermittently pond and to infiltrate to groundwater.

Table 2.4: Conceptual Site Model Information Profiles – MRP Site AOC1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		Surface water generally flows southwest, following the topography of the installation.
	Vegetation	AOC1 is located in a cultivated field. Nearby, to the west of the site, are 4 acres of southern willow scrub and 4 acres of non-native annual grasses. Southwest of AOC1 across from Case Road is wheatgrass grassland that grades into the coastal salt marsh of the Case Road POLB Mitigation Pond (NAVWPNSTA Seal Beach 2007).
Land Use and Exposure Profile	Current Land Use	MRP Site AOC1 is no longer in use. The former settling basin has been graded over and is now used for agriculture.
	Current Human Receptors	Current human receptors include Navy personnel and contractors (including maintenance personnel) and Navy-escorted visitors. In addition, leaseholder farmers and farm workers are potential receptors.
	Current Activities (Frequency, Nature of Activity)	AOC1 is currently used for agricultural farming and crop cultivation.
	Potential Future Land Use	Future land uses at the site are expected to be the same as current land uses. Additionally, Building 94, adjacent to the site, will likely be demolished (NSWC Indian Head 2003), although this task is presently not funded (Malcolm Pirnie 2008).
	Potential Future Human Receptors	Future receptors are expected to be the same as current receptors.
	Potential Future Land Use-Related Activities	Future land use activities are expected to be the same as current uses. Additional future activities adjacent to the site likely include Building 94 demolition.
	Zoning/Land Use Restrictions	AOC1 is part of a secure and active Navy base. There are no other known land use restrictions.
	Demographics/Zoning	NAVWPNSTA Seal Beach has a combined workforce of 150 military personnel and 600 civilian personnel. Population data include the following (U.S. Census, 2000): • City of Seal Beach: 24,154 • City of Westminster: 88,207 • City of Huntington Beach: 189,594 • Orange County: 2,846,289

Table 2.4: Conceptual Site Model Information Profiles – MRP Site AOC1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
	Beneficial Resources	The 50-acre Case Road POLB Mitigation Pond, part of the Seal Beach NWR, lies approximately 400 yards to the southwest of AOC1 and provides habitat for migratory birds and for other endangered, threatened, and sensitive species (NAVWPNSTA Seal Beach 2007).
Ecological Profile	Habitat Type	AOC1 lies on graded cultivated land. West of the site is 4 acres of southern willow scrub. The 50-acre Case Road POLB Mitigation Pond is located 400 yards to the southwest and is part of the Seal Beach NWR.
	Degree of Disturbance	AOC1 has been filled in and graded over and is used for agriculture.
	Ecological Receptors	
	General	Mammals reported at the installation include various species of pocket gophers, voles, shrews, and ground squirrels, Audubon's cottontail rabbit (*Sylvilagus audubonii*), and brush rabbit (*Sylvilagus bachmani*). Nineteen species of raptors are known to occur within NAVWPNSTA Seal Beach, nine of which nest on the station. These species include red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), great-horned owl (*Bubo virginianus*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), American kestrel (*Falco sparverius*), great blue heron (*Ardea herodias*), common raven (*Corvus corax*), and American crow (*Corvus brachyrhynchos*). The avian wildlife forages over a large area and would spend relatively little time on site. Aquatic ecological receptors within the POLB Mitigation Pond area include marine invertebrates and fish, including the federally endangered tidewater goby (*Eucyclogobius newberryi*), which also inhabit the Anaheim Bay (NAVFAC SW 2005; NAVWPNSTA Seal Beach 2007). Migrant or resident bird species listed as threatened or endangered by federal or state agencies (or both) include the following: • Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) • California brown pelican (*Pelecanus occidentali californicus*) • California least tern (*Sterna antillarum browni*)

Table 2.4: Conceptual Site Model Information Profiles – MRP Site AOC1		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		• Light-footed clapper rail (*Rallus longirostris levipes*) • Western snowy plover (*Charadrius alexandrinus nivosus*) The breeding season for these salt marsh and shorebird species extends from approximately late January to mid-September. The California least tern occupies the Seal Beach NWR only during the breeding season, with most of its food supply coming from the Seal Beach NWR during that period (NAVFAC SW 2005).
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Ecological receptors may come into direct contact with MC in soil. Ecological receptors coming into contact with MC and creating an explosive hazard is unlikely, but should be considered where threatened and/or endangered species may be present. Receptors may be exposed to MC that could have been incorporated into the food chain. Sensitive species like the light-footed clapper rail nest near the site and may consume fish that have been impacted by MC. Various mammals and other animals that inhabit the site may come into contact with MC while burrowing, foraging, or nesting. In addition, they may also consume plants and/or prey in which MC has bioaccumulated.

2.5 SITE AOC2

Table 2.5: Conceptual Site Model Information Profiles – MRP Site AOC2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
General Information	Installation Name	NAVWPNSTA Seal Beach
	Site Name	MRP Site AOC2 (Explosives Drop Test Tower)
	Site Area and Layout	The site footprint for AOC2 is an area of approximately 0.15 acre. The tower occupies an 11-foot-square footprint within an approximate 1/4-acre flat area surrounded by a 4-foot-high berm. A low-lying area (IRP Site 24) is located immediately northeast of AOC2.
	Site Structures	The only structure remaining within AOC2 is the tower itself.

Table 2.5: Conceptual Site Model Information Profiles – MRP Site AOC2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
	Site Boundaries	AOC2 is bounded by a 4-foot-high berm located approximately 100 feet to the north. The berm acts as a boundary for the Seal Beach NWR wetland area. The installation boundary is located roughly 2.75 miles north of AOC2, where the installation is bordered by the city of Seal Beach. Approximately 100 feet south of the site is a 4-foot-high berm that acts as a boundary for the Seal Beach NWR wetland area. The installation boundary is located 0.25 mile south of AOC2. Beyond the installation boundary is the city of Huntington Beach and an Orange County flood control channel, which flows into Anaheim Bay and the Pacific Ocean. Another 4-foot-high berm is located approximately 50 feet west of AOC2, which also serves as a boundary for the Seal Beach NWR wetland area. The installation boundary lies approximately 1 mile west of AOC2, where the installation is bordered by the city of Seal Beach. The former Buildings 432-437 complex was located 80 feet east of AOC2. Primarily bare earth extends 400 to 500 feet from the former complex to a 4-foot-high soil berm that separates the area from IRP Site 6 and the Seal Beach NWR. The installation boundary with the city of Huntington Beach is located roughly 1.5 miles from the site.
	Site Security	MRP Site AOC2 is located on NAVWPNSTA Seal Beach, which is a fenced and guarded installation. Security personnel are responsible for maintaining law and order and for implementing access control policies and procedures. Access to AOC2 from within NAVWPNSTA Seal Beach is controlled by vehicular security patrol. In addition, the site is surrounded on three sides by Seal Beach NWR.
Munitions/ Release Profile	Munitions Types	Explosive class 1.4 cartridges, which can be a minor explosion hazard, were tested at the Explosives Drop Test Tower.

Table 2.5: Conceptual Site Model Information Profiles – MRP Site AOC2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
	Maximum Probability Penetration Depth	Subsurface MEC are not suspected, as the bottom of the tower at AOC2 was reinforced with a belowground 4-inch-thick armor plate block that rested on top of a 3-foot-thick concrete block. Therefore, MEC penetration depths are not of concern.
	MEC Density	Presence of MEC is unlikely and not suspected.
	MEC Field Observations	AOC2 is not suspected to contain MEC based on the historical use of the Explosives Drop Test Tower. No MEC scrap was observed during a previous visual survey (Malcolm Pirnie 2008).
	Munitions Constituents	MC is not expected at AOC2 as explosives and any potential residue would have detonated at explosion, and unexploded MEC items would likely have been accounted for if they did not explode. In addition, soil samples from IRP Site 24, the closest low-lying area and adjacent to the tower, were nondetect for explosives (NAVFACSW, 1990).
	Migration Routes/Release Mechanisms	MEC and MC are not known or suspected to be present.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach is typical of the maritime subclimate within the California Mediterranean climate, which includes mild winters, cool summers, high relative humidity, and frequent early morning clouds that lead to afternoon sunshine. The annual average temperature is 74°F. Summer average high temperatures range from 77 °F to 84 °F, and average lows range from 60 °F to 65 °F. Winters tend to have moderate temperatures, with highs typically 67 °F and average lows ranging from 45 °F to 47 °F. Yearly precipitation averages 13 inches; February, the wettest month, averages 3 inches, and July, the driest, averages 0.02 inch (WRCC, undated). Periodically, the region experiences El Niño conditions, which tend to bring wetter winters to the area through heavy storms. The prevailing winds are westerly with an average velocity of 10 knots. Strong, dry northeasterly winds occasionally descend the mountain slopes in the fall, winter, and early spring months (NAVFAC SW 1979). The strongest winds that occur within the region are associated with the

Table 2.5: Conceptual Site Model Information Profiles – MRP Site AOC2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		winter and spring storms off the Pacific Ocean (NAVFAC SW 2005).
	Topography	The terrain at AOC2 is flat and lies at an elevation of 5 feet asl (Malcolm Pirnie 2008).
	Geology	Surficial geology at AOC2 is characterized by alluvial and coastal deposits (Qal) (NAVFAC SW 1998a).
	Soil	AOC2 surface soil appears to be composed primarily of soil with gravel fill. Subsurface soil consists of predominantly clay and silt layers. The IAS and INRMP note the site is characterized by drained Bolsa silty clay loam, which occurs on large alluvial fans and is moderately to slowly permeable (NEESA 1985; NAVWPNSTA Seal Beach 2007). Runoff is slow over bare level soil, and the erosion hazard is slight. The soil at the site is also moderately alkaline and calcareous to a depth of about 49 inches (NEESA 1985).
	Hydrogeology	Groundwater at AOC2 is at near-surface depths and is tidally influenced. Groundwater is reported to flow to the northeast, toward the 7th Street POLB Mitigation Pond (NAVFAC SW 1999). Due to salt-water intrusion, groundwater at the site is saline to brackish and is not used for drinking water (NAVFAC SW 2002). Lateral groundwater movement in the moderately permeable shallow aquifer at NAVWPNSTA Seal Beach is estimated to be on the order of several hundred feet per year (NEESA 1985). Two monitoring wells are located north of Slough Road. Navy Well 3, located roughly 0.75 mile north of AOC2, is 680 feet deep (screened at 615 feet bgs) and currently is used for agricultural irrigation (Malcolm Pirnie 2008).
	Hydrology	Surface water from AOC2 would be contained within the roughly 3-acre bermed area surrounding the site.
	Vegetation	Low grasses, pickleweed (*Salicornia* spp.), and a few large bushes are present at AOC2.
Land Use and Exposure Profile	Current Land Use	The tower within AOC2 is no longer in use other than as a nesting platform for herons (NAVWPNSTA Seal Beach 2007).
	Current Human Receptors	MEC and MC are not expected to be present at the site. As a result, receptor pathways are not evaluated.

Table 2.5: Conceptual Site Model Information Profiles – MRP Site AOC2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
	Current Activities (Frequency, Nature of Activity)	AOC2 is no longer in use. The only activities occurring within the site are infrequent visits to conduct environmental and ecological surveys.
	Potential Future Land Use	Future land uses for AOC2 are expected to be the same as current use.
	Potential Future Human Receptors	MEC and MC are not expected to be present at AOC2, and as a result, human receptor pathways are not evaluated.
	Potential Future Land Use-Related Activities	The tower will remain in place to accommodate heron nesting. NAVWPNSTA Seal Beach Environmental Division has plans to restore tidal flow by removing the road extending east from AOC2 and excavating tidal channels into the area (NAVWPNSTA Seal Beach 2007).
	Zoning/Land Use Restrictions	AOC2 is part of a secure and active Navy base and is located within the Seal Beach NWR.
	Demographics/Zoning	NAVWPNSTA Seal Beach has a combined workforce of 150 military personnel and 600 civilian personnel. Population data include the following (U.S. Census, 2000): • City of Seal Beach: 24,154 • City of Westminster: 88,207 • City of Huntington Beach: 189,594 • Orange County: 2,846,289
	Beneficial Resources	As AOC2 remains unused and part of the Seal Beach NWR, the area provides habitat to potentially sensitive resources. Additionally, herons, which are protected by the U.S. Migratory Bird Treaty Act, use the tower for nesting (NAVWPNSTA Seal Beach 2007).
Ecological Profile	Habitat Type	AOC2 is characterized by low grasses to barren land with isolated shrubs. The site is located within the Seal Beach NWR.
	Degree of Disturbance	The site is unused, although the soil is largely composed of what appears to be soil with gravel fill.
	Ecological Receptors	
	General	Mammals reported at the installation include various species of pocket gophers, voles, shrews, and ground squirrels, Audubon's cottontail rabbit *(Sylvilagus audubonii)*, and brush rabbit *(Sylvilagus bachmani)*. Nineteen species of raptors are known to occur within NAVWPNSTA Seal Beach, nine of which nest on the

Table 2.5: Conceptual Site Model Information Profiles – MRP Site AOC2		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
		station. These species include red-tailed hawk *(Buteo jamaicensis)*, Swainson's hawk *(Buteo swainsoni)*, great-horned owl *(Bubo virginianus)*, burrowing owl *(Athene cunicularia)*, loggerhead shrike *(Lanius ludovicianus)*, American kestrel *(Falco sparverius)*, great blue heron *(Ardea herodias)*, common raven *(Corvus corax)*, and American crow *(Corvus brachyrhynchos)*. The avian wildlife forages over a large area and would spend relatively little time on site. Aquatic ecological receptors within the POLB Mitigation Pond area include marine invertebrates and fish, including the federally endangered tidewater goby *(Eucyclogobius newberryi)*, which also inhabit the Anaheim Bay (NAVFAC SW 2005; NAVWPNSTA Seal Beach 2007). Migrant or resident bird species listed as threatened or endangered by federal or state agencies (or both) include the following: • Belding's savannah sparrow *(Passerculus sandwichensis beldingi)* • California brown pelican *(Pelecanus occidentalis californicus)* • California least tern *(Sterna antillarum browni)* • Light-footed clapper rail *(Rallus longirostris levipes)* • Western snowy plover *(Charadrius alexandrinus nivosus)* The breeding season for these salt marsh and shorebird species extends from approximately late January to mid-September. The California least tern occupies the Seal Beach NWR only during the breeding season, with most of its food supply coming from the Seal Beach NWR during that period (NAVFAC SW 2005).
	Relationship of Contaminant Sources to Habitat and Potential Receptors	MEC and MC are not expected to be present at the site. Therefore, migration and release mechanisms within the site are not of concern.

3.0 DATA GENERATION AND ACQUISITION

The following discusses the site inspection methodology and approach for each of the sites. Investigation methods are presented first, followed by a site-by-site discussion of how these will be employed.

3.1 INVESTIGATION METHODS

This section briefly describes the methods that will be employed during the SI. Additional information on field methods is provided in the SAP (Attachment 1).

3.1.1 MEC Avoidance Measures and Detector-Aided Visual Surveys

Sites UXO1 and UXO6 require procedures to avoid disturbing MEC during the site inspection. A UXO technician will be present during field activities at these sites to provide clearance for sampling. Other duties of the UXO technician will include clearing and restricting work areas, establishing necessary controls, and otherwise protecting personnel.

Prior to sampling, a Schonstedt Magnetic Locator GA-52Cx (magnetic gradiometer) or equivalent will be used to screen each proposed sample location. The Schonstedt Magnetic Locator GA-52Cx has two fixed fluxgate magnetic sensors, spaced about 20 inches apart, that are passed closely to and over the ground. Audible frequency of the sound emitted from the instrument is a function of the magnetic field gradient between the two sensors. When not in close proximity to a magnetic object, where the instrument is primarily detecting the earth's magnetic field, a low-frequency audible sound is emitted. When the instrument passes over buried iron-containing objects, the magnetic field is significantly different at the two sensors, and the frequency of the emitted sound increases. The magnetic gradiometer can be used to detect magnetic anomalies to an approximate depth of 2 to 3 feet bgs, depending on the size, shape, and orientation of the ferrous metal target. The Schonstedt or its equivalent will therefore be used to clear the proposed surface soil sampling locations. If an anomaly is detected, the proposed sampling location will be marked and avoided, and an alternative sampling location will be designated at least 2 to 3 feet away.

During all field activities at UXO1 and UXO6, field personnel will follow behind the UXO technician escort to avoid any possible MEC. In addition, a field crew member will follow behind the UXO technician with a differential global positioning system (DGPS) to map the detector-aided visual survey traverses along site access paths that have been cleared. Any suspect MEC encountered during site reconnaissance will be identified, marked with a plastic flag or wooden stake, photographed, and mapped with a DGPS. If a significant anomaly or MD is detected that could possibly indicate the presence of MEC, the location will also be marked with a plastic flag or wooden stake, mapped with DGPS, and considered for a possible biased soil sampling location.

A simulated or surrogate 20-mm projectile and 40-mm projectile will be buried at 0.5 to1 foot bgs at each site prior to commencement of detector-aided visual surveying to evaluate the instrument response associated with the smaller MEC that could be present at each site. Each test item will be buried in an anomaly-free location within each site that has no visual indication of

MEC or MD at the surface. The description of each test item will be recorded, and the location of each buried test item at each site will be mapped with a DGPS and photographed.

Detector-aided visual surveys will also include a limited number of transects across UXO1 and UXO6 to aid in evaluation of potential MEC within each site footprint. 100 percent detector-aided visual surveys (meaning UXO technician traverses are spaced approximately 5 feet apart covering the entire site) will not be conducted due to the large size of each site (approximately 87 acres for UXO1 and 180 acres for UXO6). Transect grid locations and/or beginning and end points of transects/surveyed lines will be mapped with GPS along with any suspect MEC observed by the UXO technicians.

For MRP Site UXO1, detector-aided visual surface sweeps/transects will be nominally spaced 40 feet apart. Visual survey transects at UXO6 will be spaced 60 feet apart. The data provided by these transects will provide a relative percent likelihood of detecting MECthat can be projected for the entire area with a calculated uncertainty.

3.1.2 Protection of Natural Resources

Federally listed and state listed endangered and threatened species as well as California Department of Fish and Game (CDFG) species of concern have been documented within NAVWPNSTA Seal Beach by biologists. Protected within the station boundaries is the Seal Beach National Wildlife Refuge (NWR), which is one of the largest remaining salt marshes along the southern California coast. A summary of the protected species documented, particularly within the Seal Beach NWR, is listed below.

<u>Federal and state endangered</u>

- California brown pelican (*Pelecanus occidentalis californicus*)
- California least tern (*Sterna antillarum browni*)
- Light-footed clapper rail (*Rallus longirostris levipes*)
- Tidewater goby (*Eucyclogobius newberryi*)

<u>Federal threatened</u>

- Western snowy plover (*Charadrius alexandrinus nivosus*)

<u>California protected</u>

- Golden Eagle (*Aquila chrysaetos canadensis*)

<u>State endangered</u>

- Belding’s savannah sparrow (*Passerculus sandwichensis beldingi*)

<u>State threatened</u>

- Swainson’s hawk (*Buteo swainsoni*)

<u>CDFG species of concern</u>

- American white pelican (*Pelecanus erythrorhynchos*)
- Black skimmer (*Rynchops niger*)
- Black tern (*Chlidonias niger*)

- Burrowing owl (*Athene cunicularia*)
- California gull (*Larus californicus*)
- Common loon (*Gavia immer)*
- Cooper's hawk (*Accipiter cooperii*)
- Double-crested cormorant (*Phalacrocorax auritus*)
- Elegant tern (*Thalasseus elegans*)
- Ferruginous hawk (*Buteo regalis*)
- Large-billed savannah sparrow (*Passerculus sandwichensis rostratus*)
- Loggerhead shrike (*Lanius ludovicianus*)
- Long-billed curlew (*Numenius americanus*)
- Merlin (*Falco columbarius*)
- Mountain plover (*Charadrius montanus*)
- Northern harrier (*Circus cyaneus*)
- Osprey (*Pandion haliaetus*)
- Prairie falcon (*Falco mexicanus*)
- San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)
- San Diego horned lizard (*Phrynosoma coronatum blainvillii population*)
- Sharp-shinned hawk (*Accipiter striatus*)
- Short-eared owl (*Asio flammeus*)
- Tricolored blackbird (*Agelaius tricolor*)
- Western snowy plover (*Charadrius alexandrinus nivosus*)
- White-faced ibis (*Plegadis chihi*)
- Yellow warbler (*Dendroica petechia brewsteri*)

Although it is unlikely that these endangered and threatened species will be encountered during the SI field work, ChaduxTt will adhere to general installation practices to avoid impacts to these species and other ecological receptors located on the NAVWPNSTA Seal Beach. Of particular concern are ground nesting and burrowing birds that may be present on all five sites. Potential ground nesters that may be present within the five sites include the mourning dove (*Zenaida macroura*), horned lark (*Eremophila alpestris*), killdeer (*Charadrius vociferous*), and the burrowing owl (*Athene cunicularia*). The breeding season for the aforementioned ground nesting species generally occurs between March and September.

Based on the current schedule, ChaduxTt will be conducting field work at the five sites between August and September. Field work at potential ground nesting sites, specifically the former evaporation pond areas at UXO2, will be scheduled to occur first to avoid the breeding season. In addition, a ChaduxTt representative, in coordination with a Navy biologist, will conduct a preliminary site walk at each site prior to field work commencement to ensure that ground nests are not present in sampling and vehicle access areas. ChaduxTt will notify the Seal Beach Wildlife Refuge Office represented by the U.S. Fish and Wildlife Service (USFWS) about the site walk(s) so that biologists may accompany the ChaduxTt field team. Recognizing that burrowing owl breeding or other non-breeding wildlife issues may be present at any of the sites and that the POLB Mitigation Pond and AOC2 are located within the NWR, ChaduxTt will also coordinate with the local office of the USFWS at a kickoff meeting and prior to field work commencement at UXO1 and AOC2. Herons typically nest in the tower at AOC2; therefore,

ChaduxTt will notify the Seal Beach Wildlife Refuge office manager when we will be at that site.

During field work, ChaduxTt will adhere to general installation practices to minimize the impact to natural resources at the project sites. Such practices include minimizing off-road vehicle and foot traffic access routes; sampling only from surface water at the POLB Mitigation Pond, using a nonpowered boat and clean/decontaminated sampling equipment; and avoiding staging, sampling, and decontaminating equipment in areas where wildlife activity is observed.

3.1.3 Soil Sampling

Surface soil samples from a depth of 0-0.5 feet bgs and 1-1.5 feet bgs will be collected for MC analysis. Subsurface sampling is not included in the scope of this SI and, therefore, will not be conducted, however, if results of the SI warrant subsurface investigation (based on DQOs in the SAP), then further investigation will be recommended. Each soil sample will be collected as a single sample from the identified depth interval. A combination of biased and grid sampling approaches will be used for all of the sites except AOC1, where only biased sampling is planned. If no specific targets are identified for the proposed biased sampling during the detector-aided visual surveying at UXO1 and UXO6, baseline sampling locations will be selected at the sites.

3.1.4 Surface Water Sampling

According to records of past practices at the EOD Safety Demonstrations Area (currently the POLB Mitigation Pond) and visual observation of munitions burial along the northern bank of the pond, MC could have been released into the pond water. As a result, collection and laboratory analysis of surface water samples will be conducted to investigate the possible presence of MC. Up to five surface water grab samples will be collected from the POLB Mitigation Pond to evaluate the presence of MC. Surface water sample locations will be determined using random grid sampling methods. The surface water grid sample locations will be selected from the sampling grid using a random number generator. The POLB Mitigation Pond sampling grid is depicted on Figure 2.

Water quality measurements will be made from each sampling location prior to collecting surface water grab samples using a portable, field-calibrated, hand-held water quality meter. Water quality parameters that will be measured at each sampling location include pH, conductivity, oxidation-reduction potential, dissolved oxygen, and temperature.

Surface water samples will be collected using a pond sampler (dipper). The sampler consists of a polyethylene beaker attached to the end of an adjustable-length pole. All water samples collected from the POLB Mitigation Pond will be collected just below the water surface. The sampler will be extended to the sample location from the boat, lowered into the water, allowed to fill with water just below the water surface, then transferred to appropriate sample containers.

Samples will be labeled, placed in secondary plastic bags, and placed on ice for transportation to a California-certified laboratory under chain-of-custody protocol. Surface water samples will be analyzed for explosives, metals, TKN, inorganic nitrogen, ammonia, and perchlorate within the applicable holding times.

3.1.5 Geophysical Surveying

MRP Site UXO1 is categorized as an MEC area based on review of historical records and previous site visits. During previous detector-aided and visual surveys MEC and MD were observed along the northern and western banks of the pond (Malcolm Pirnie 2008). Casings can be observed in the shallow water adjacent to the north bank. However, the presence and extent of MEC south of these banks is unknown. It is suspected that MEC may extend 10 to 15 feet south of the bank based on the fact that excavation of the pond occurred after MEC was buried at the site.

As part of the MEC investigation at MRP Site UXO1, a focused geophysical survey will be conducted to help define the southern extent of MEC observed in the north bank of the pond. A secondary purpose of the geophysical survey is to locate possible buried metallic (ferrous and non-ferrous) MEC and MD that may be present at depths of 3 to 6 feet below the ground surface that existed prior to excavation/creation of the pond.

3.1.5.1 Focused Geophysical Survey – Northeast Portion POLB Mitigation Pond

A Geonics EM61 Mark II Metal Detector (EM61) or EM61S (or equivalent) will be used to collect data along parallel traverses nominally spaced 5 feet apart over a 15-foot wide accessible portion of the northern portion of the pond parallel to the north bank. The EM61 instrument uses electromagnetic (EM) induction principles to detect both ferrous and non-ferrous metals. For the purposes of the SI, 100 percent EM61 survey coverage (i.e., traverses spaced 2.5 feet apart) is not planned. If significant unforeseen obstructions are encountered during geophysical surveying that do not allow for traverses to be relatively parallel, data may be collected along random transects within the study areas.

A real-time kinematic global positioning system (RTK GPS) capable of 8-inch accuracy will be used to provide location coordinates for the geophysical data collected. It is anticipated that the EM61 will be towed on an inflatable raft or other non-metallic flotation platform at least 14 to 20 feet behind a boat as the pond is known to have between 3 to 4 feet of water. Prior to field mobilization the floatable EM61 configuration shall be tested to evaluate potential noise sources and logistics required to ensure that the system is feasible to detect MEC.

Adverse site conditions identified will be noted throughout the course of the geophysical survey. In addition, data will not be collected over areas that are inaccessible to the floatable (or land-based) EM61 configuration.

3.1.5.2 Focused Geophysical Survey – Former Primer/Salvage Yard

Focused geophysical survey transects are proposed in the former primer/salvage yard to provide data on the presence of or absence of MEC and to refine spatial boundaries of MEC that has been reported or observed in three areas. These areas are based on 1) observations of munitions related items including casings in an unpaved area 100 to 400 feet south of former Building 413, 2) a report that munitions items stored at the Primer/Salvage Yard may have been unofficially buried underneath the asphalt to the north of former Building 413, and 3) recovered live ammunition and grenades found roughly 100 feet east of former Building 413.

Additional EM61 data will be collected along seven transects over suspect MEC impacted areas identified during detector-aided visual surveys, in high density anomaly areas (or anomalies warranting further investigation), at suspected MEC disposal areas observed in historical aerial photos, or a combination of all three. Proposed transects are shown on Figure 2, subject to modification following detector-aided visual surveys.

3.1.5.3 Geophysical Survey QA/QC

Prior to initiation of the geophysical surveys, a UXO technician will conduct a detector-aided visual survey using a Schonstedt Magnetic Locator GA-52Cx (magnetic gradiometer) or equivalent to clear proposed staging areas and pond access routes. UXO sweep and avoidance activities and geophysical surveys will be carried out in accordance with local, state, and federal regulations, and applicable guidance from U.S. Army Corps of Engineers (USACE) DID requirements, including Engineer Pamphlet EP-75-1-2 dated 01 August 2004 (USACE 2004), DID MR-001 (USACE 2003a), MR-005-05A (USACE 2003c), MR-005-05 (USACE 2003d), and MR-005-07 (USACE 2003e). Additional guidance is provided in Ordnance and Explosives Digital Geophysical Mapping Guidance – Operational Procedures and Quality Control Manual (DGM QC Guidance) (USACE 2003f). The geophysical investigation shall also include applicable geophysical equipment QC tests (Table 3.1.5).

Table 3.1.5: Geophysical Equipment QC Tests

Test No.	Test Description	Acceptance Criteria	Power On	Beginning of Day	Beginning and End of Day
1	Equipment Warm-up	Equipment Specific (could be up a 1/2 hour depending on drift exhibited in channel 1)	X		
2	Record Sensor Positions	± 1 inch (2.54 cm)		X	
3	Personnel Test	EM61 ±2 mV p-p (channel 3 on EM61 MK II)		X	
4	RTK GPS Positioning	Positional Accuracy ± 8 in		X	
5	Vibration Test (Cable Shake)	Data Profile does not exhibit data spikes		X	
6	Static Background and Static Spike	Background: EM61 ± 2.5 mV p-p			X
		Spike: ± 20% of standard item response, after background correction			X

Notes:
cm centimeters
in inches
p-p peak-to-peak

The Equipment/Electronics Warm-Up Test (Test No. 1) minimizes sensor drift caused by thermal stabilization. Most instruments need a few minutes to warm up before data collection begins. All manufacturer instructions will be followed or, if none are given, data readings will be observed until they stabilize. The acceptance criterion for this test is equipment specific. Time required for equipment warm-up is typically about 5 minutes for most geophysical instruments. However, up to a 1/2 hour of equipment warm-up time could be needed for the EM61 Mark II in order to minimize drift that is often exhibited in channel 1. This test will be conducted each time the unit is started.

The purpose of the Record Sensor Positions Test (Test No. 2) is to document relative navigation and sensor offsets, detector separation, and detector heights above the ground surface. This information will ensure that the detector offset corrections and gradient calculations can be done correctly and that the surveys are repeatable. The acceptance criterion for this test will be ±1 inch. This test will be conducted at the beginning of each day. This test will not include evaluation of detector heights above the ground surface during EM61 surveying over the pond since a floatable boat-towed EM61 configuration will be employed.

The EM61 will be nulled before the remaining tests are performed. This action will be performed at the beginning of each day and each time the instrument is powered up.

The Personnel Test (Test No.3) ensures that survey personnel have removed all potential interference (ferrous and non-ferrous metal) sources from their bodies. Common interference sources are ballpoint pens, steel-toe boots, or large metallic belt buckles, which can produce data anomalies similar to ordnance and explosives targets. All personnel who will be coming near the sensor during survey operations must approach the sensor and have a second person monitor and record the results. The acceptance criterion for this test is a background EM61 response within ±2mV of the background. This test will be conducted at the beginning of each day.

RTK GPS positioning (Test No.4) will be tested by surveying two survey control points in the vicinity of the site. The GPS coordinates will be compared with the documented coordinates for the control points. The acceptance criterion for this test is ±8-inch GPS accuracy.

The Vibration Test (Cable Shake) [Test No.5] will be used to identify and replace shorting cables and broken pin-outs on connectors. With the instrument held in a static position and collecting data, field personnel will shake all cables to test for shorts and broken pin-outs. If shorts are found, the cable should be immediately replaced or repaired. After repair, cables need to be rigorously tested before use. The acceptance criterion is that the data profile does not exhibit data spike responses. This test will be conducted at the beginning of each day.

The Static Background and Static Spike (or Standard Response) Test (Test No.6) will serve to quantify instrument background readings and electronic drift, locate potential interference spikes in the time domain, and determine impulse response and repeatability of the instrument to a standard test item (typically a 2-inch-diameter steel trailer hitch ball). Improper instrument function, the presence of local sources of ambient noise (such as EM transmissions from high-voltage electric lines), and faulty equipment are all potential causes of inconsistent, non-repeatable readings. A minimum of 3 minutes static background test after instrument warm-up, followed by a 1-minute standard response test, in turn followed by an additional 1 minute static

background test, will be performed. The field geophysicist must review the readings to confirm they are stable before the geophysical survey continues. The acceptance criteria for the Static Background Test are EM61 response fluctuations of ±2.5 mV. The acceptance criteria for the Static Response Test are EM61 response being ±20% of standard item response after background correction. This test will be conducted at the beginning and end of each day.

3.1.5.4 Geophysical Technology Demonstration

The geophysical investigation will include a geophysical technology demonstration (GTD) to evaluate geophysical surveying techniques, personnel, and survey design. The GTD will include three to five 100 to 150-foot long parallel EM61 traverses nominally spaced 5 feet apart over three test items (the size of a 40-mm projectile of larger) that will be placed at the pond bottom. These test items will include one inert or simulated 40-mm projectile and two simulated submunitions. Prior to placement of the test items, preliminary EM61 traverses will be conducted over the proposed location where the three test items will be placed to evaluate the background response GTD transect test area.

The specific objectives for the GTD will be:

- Demonstrate that the geophysical investigation systems and equipment are operating properly.
- Provide a safe test location with a known set of isolated objects (for example, a single inert munition or munition surrogates). The sensor response from these items will be used to evaluate the equipment limitations within site conditions and to optimize equipment, procedures, and data analysis.
- Assess the operators' performance and update related procedures to assist in the development of operator measurement techniques.
- Establish a baseline of performance capabilities for the selected instruments.
- Evaluate all data processing, including corrections, map production, and target selection, to produce final datasets.
- Evaluate detection depth capabilities.
- Detect at least 2 out of 3 test items placed at the bottom of the pond.
- Yield no more than 15 percent false positives (anomalies identified as MEC that were not seed items or anomalies detected during the pre-seeded geophysical survey).
- Identify horizontal positions of detected test items to be within 3 feet of known locations.

The specified GTD objectives will be met prior to commencement of geophysical surveying at the subject sites. The North American Datum of 1983, California State Plane, Zone IV coordinate system in U.S. survey feet (California State Plane coordinate system) will be used to

record all findings during the GTD and geophysical survey operation. All RTK GPS data collected will be tied into nearby established benchmarks (for example, U.S. Geodetic Survey monuments).

Project documentation will be collected and managed on site during the life of all field activities. Geophysical data will be recorded digitally during the GTD and geophysical surveys and downloaded periodically to a field computer for review in the field. In addition to the copy of data saved on the field computer's hard drive, a copy of the data will be saved on a portable storage device or compact disk (CD) for backup before the data are erased from the equipment. The data will be reviewed the downloaded to verify that the download system is functioning properly. This review will also check the field data for quality. All geophysical data shall be evaluated for quality, post-processed, plotted, and interpreted using Oasis Monatj software (by Geosoft) with the UX Detect module.

The results of the geophysical survey shall be presented in a data report that includes a discussion of the methods and instruments used, the findings of the survey, figures which show all anomalies detected, interpolated disposal features and miscellaneous areas of buried debris, as well as dig lists providing the northing and easting coordinates of target anomaly picks. The report, including all figures will become an appendix to the SI report submitted to the Navy. Applicable figures in the report shall also be submitted in electronic format capable of being imported into ArcMap Geographic Information System (GIS) and AutoCAD.

3.1.6 GPS Location Mapping

GPS location mapping will include pertinent site features and/or structures, sample locations, test item burial locations, and locations of suspect MEC. Locations will be obtained to a horizontal accuracy of less than 1.0 meter using differential GPS equipment capable of average horizontal accuracy of 1.0 centimeter or less.

3.1.7 Investigation-Derived Waste

Investigation-derived waste (IDW) will consist of decontamination water, soil cuttings, personal protective equipment, and miscellaneous solid waste. Disposable equipment will be used to the maximum extent possible to limit the amount of IDW generated from the equipment decontamination process. Equipment wash and rinsate water generated during the investigation will be placed in U.S. Department of Transportation (DOT) compliant drums, labeled with the accumulation start date and all other appropriate information, and temporarily staged on site pending sample analysis results. IDW will be profiled to determine the appropriate method of disposal. IDW will be analyzed for contaminants identified as potential contaminants in conjunction with the profiling requirements of the disposal facility chosen. Each waste drum will be inspected prior to use to verify that it meets required specifications. After IDW has been placed in the drum, it will be secured using a lid. Before leaving the site, the drum will be inspected to verify adequacy of labeling. Once it has been characterized, any IDW stored in the drums will be disposed of in accordance with applicable federal, state, and local laws and regulations. Drum tracking on site will be accomplished using the dedicated project field notebook. If the drum is shipped off site for disposal, a waste manifest will be used for tracking.

Soil cuttings generated from hand augering of shallow soil borings (to 1.5 feet bgs depth) will be returned to each borehole unless visual or olfactory observation indicates potential contamination and there is a potential exposure pathway to human or ecological receptors. If contamination as well as potential risk to human or ecological receptors is suspected, the soil cuttings from the bore hole will be placed in a DOT-compliant drum and a waste characterization sample will be collected and analyzed for the applicable COPCs. The drum will be labeled and temporarily staged on site pending the waste characterization results. If field observations indicate potential contamination with a potential risk of exposure pathways to human or ecological receptors, the borehole will be backfilled with an appropriate material, such as hydrated bentonite chips.

Upon receipt of the laboratory results, ChaduxTt will arrange for the removal and disposal of the containerized IDW according to all applicable federal, state, and local regulations, and NAVWPNSTA Seal Beach policy. A representative from the NAVWPNSTA Seal Beach will be responsible as the generator for signing all waste profiles and disposal manifests. Soil cuttings that do not meet state or federal hazardous waste criteria and that do not pose human health and ecological concern will be spread on site.

Personal protective equipment (PPE) and miscellaneous nonhazardous solid waste from field sampling activities will be placed in garbage bags, sealed, and disposed of in on-site trash receptacles.

3.2 SAMPLING DESIGN

This section discusses the sampling approach and rationale for each of the MRP sites.

The general approach to sampling the MRP sites will utilize a combination of biased sampling and grid sampling. The biased sampling will focus on locations where some evidence appears of waste or munitions disposal or other practices that would result in soil contamination. Surface samples from 0-0.5 feet bgs and 1-1.5 feet bgs intervals will be collected at those locations to evaluate the possible penetration of contaminants into the subsurface. The grid sampling will provide additional lateral coverage of the sites where there is insufficient evidence to warrant biased sampling. For the grid sampling, a grid will be laid out across each site (or made viewable on a DGPS), and surface soil samples will be collected from randomly selected grid cells.

Figures 2 through 6 show initial locations of the biased samples and sampling grids. However, a site walk will be conducted at the initiation of the field effort, and adjustments to the locations (and possibly the number) of the biased samples will likely be made based on field observations. Table 1 provides a sample summary table for the MRP sites based on current plans.

3.2.1 MRP Site UXO1

As shown on Figure 2, Site UXO1 is a large site (approximately 87 acres) that contains three main subareas based upon historical site use. These subareas include the depriming area, recovered live ammunition and grenades area, and EOD safety demonstrations area. Most of the sample locations within UXO1 will be biased, although grid samples are also proposed within the southern portion of the site that covers the POLB Mitigation Pond.

Surface soil samples will be collected at approximately 14 biased sampling locations where evidence of munitions use and/or burial has previously been identified or is identified during detector-aided visual surveying. At least three of these surface soil sampling locations will be placed within the depriming area, recovered live ammunition and grenades area, and EOD safety demonstrations area . An additional six random grid sample locations will be placed within the southern portion of the site (the POLB Mitigation Pond area) because of the uncertainty associated with the extent of the former EOD safety demonstration area within the pond. However, the exact number of judgmental and grid samples within UXO1 will depend on the results of detector-aided visual surveys.

Two samples will be collected from each of the 20 sample locations (from depths of 0 to 0.5 foot bgs and 1 to 1.5 feet bgs). Placement of all 20 sample locations will require anomaly avoidance measures described in Section 3.1.1. The 40 samples will be analyzed for explosives, metals, TKN, inorganic nitrogen, ammonia, and perchlorate.

To evaluate the possible presence of MC that could have been released into surface water, up to five surface water grab samples will be collected from the POLB Mitigation Pond. Surface water sample locations will be determined using random number generator on a 3 by 4 sampling grid as depicted on Figure 2. The samples will be collected just below the water surface using a pond sampler, as described in Section 3.1.4.

3.2.2 MRP Site UXO2

A combination of biased and grid soil sampling will be conducted at UXO2. Within the northern portion of the site, 16 biased sample locations are proposed. One biased sampling location will lie just north of Building 102 and another will be east of Building 102, just beyond the pavement. Two sampling locations will also be selected further east, in topographically low areas along the eastern portion of the site, to investigate the easternmost extent of the site. Two biased sample locations will be located just south of Building 103 where a possible former settling pond appears in a 1952 aerial photo (see Figure 3 and Appendix A). One sample location is proposed next to Building 104. In addition, three sampling locations are proposed adjacent to Building 101 (the vacuum dust removal and cleaning building), one of which will lie in the area between Buildings 101 and 104. A project is currently planned by the Navy to demolish the Building 101/102 complex. The biased soil sampling locations may be modified if different structures or drain lines are exposed during the demolition activities. However, potential contamination of the buildings, including the concrete settling basins, will be addressed as part of the demolition project; no sampling of these structures or the soil beneath them is planned as part of this SI.

Just south of Building 98, adjacent to the concrete settling basin, one biased soil sampling location is proposed. Two sampling locations will also lie just southwest of the end of the concrete drainage trench, including one at the outlet of the drainage trench. In addition, two biased sampling locations will lie within the north-central portion of UXO2, south of Building 99, where a suspected drainage trench possibly leading to a previously unreported pond may have existed according to Malcolm Pirnie (2008), and as suggested by 1956 and 1960 aerial photos.

The southernmost biased sampling location within UXO2 will lie in a topographically low area where the evaporation ponds are suspected. Due to the size of the southern portion of the UXO2 and the uncertainty associated with the evaporation pond locations, nine grid sampling locations are proposed to provide adequate lateral sampling coverage. However, the exact number of biased and grid samples within UXO2 will depend on visual observations made in the field during site reconnaissance.

Two soil samples will be collected from each of the 25 sample locations (from depths of 0 to 0.5 foot bgs and 1 to 1.5 feet bgs). Placement of these 25 sample locations will not require anomaly avoidance measures as MEC is not known or suspected to be present within the site. The 50 samples will be analyzed for explosives, picrate, TKN, inorganic nitrogen, ammonia, and perchlorate.

3.2.3 MRP Site UXO6

A combination of biased and grid soil sampling will be conducted at UXO6. Approximately 10 surface soil sampling locations will be placed throughout the site where evidence of munitions is identified during detector-aided visual surveying. If no evidence of munitions is found within UXO6 during detector-aided visual surveying, then the 10 sample locations may also be placed where significant magnetic anomalies are identified.

A sampling grid will be laid out over the entire site or made viewable in a DGPS in the field. Approximately 20 grid sample locations will be randomly placed throughout the site to provide additional lateral coverage of the site footprint (see Figure 4). However, the exact number of biased and grid samples within UXO6 will depend on the results of detector-aided visual surveys.

Two samples will be collected from each of the 30 sample locations (from depths of 0 to 0.5 foot bgs and 1 to 1.5 feet bgs). Placement of all 30 sample locations will require anomaly avoidance measures described in Section 3.1.1. The 60 samples will be analyzed for explosives, metals, picrate, and perchlorate.

3.2.4 MRP Site AOC1

Only biased sample locations will be placed within MRP Site AOC1. Five biased sample locations will lie within the location of the former settling basin, which is based on a 1947 aerial photo and 1944 Engineering Diagram (Malcolm Pirnie 2008). In addition, one biased sampling location will lie at the former drain pipe location between the pavement and the former settling basin location (Figure 5). Four other sampling locations are proposed around the former settling basin location to evaluate whether contamination is present outside of the former settling basin.

Two samples will be collected from each of the 10 sample locations (from depths of 0 to 0.5 foot bgs and 1 to 1.5 feet bgs). Placement of the sample locations within the site will not require anomaly avoidance measures, as MEC is not known or suspected to be present. The 20 samples will be analyzed for explosives, metals, and picrate.

3.2.5 MRP Site AOC2

A combination of biased and grid soil sampling will be used to investigate AOC2. Six biased sampling locations will lie adjacent to and around the tower (Figure 6). In addition, four grid sampling locations will cover the site to evaluate the surrounding area further out from the tower. However, the exact number of biased and grid samples within AOC2 will depend on visual observations made in the field during site reconnaissance.

Two samples will be collected from each of the 10 sample locations (from depths of 0 to 0.5 foot bgs and 1 to 1.5 feet bgs). Placement of sample locations within the site will not require anomaly avoidance measures, as MEC is not known or suspected to be present within the site. The 20 samples will be analyzed for explosives, metals, and perchlorate.

4.0 HUMAN HEALTH AND ECOLOGICAL RISK EVALUATIONS

This section summarizes the methodology for the screening-level human health and ecological risk evaluations. Specific screening levels, source references, default screening values, and laboratory detection limits are listed in the SAP (Attachment 1).

4.1 SCREENING-LEVEL HUMAN HEALTH RISK EVALUATIONS

Analytical results from each sample will be compared with the Oak Ridge National Laboratory (ORNL) Regional Screening Levels, formerly the U.S. Environmental Protection Agency (EPA) Region IX Industrial and Residential preliminary remediation goals (PRG) for soil. Risk-based PRG-like values are also available from the California Environmental Protection Agency (Cal/EPA) for arsenic and lead. These values are more stringent than the corresponding EPA Region IX PRGs and will be used for the screening-level human health risk evaluation. Metals detected at maximum concentrations that exceed the PRGs will also be compared with background concentrations from the NAVWPNSTA Seal Beach Background Study (NAVFAC 1995).

4.2 SCREENING-LEVEL ECOLOGICAL RISK EVALUATION

Analytical results will be compared with ecological soil screening levels (ESSL). The ESSLs will be compiled from multiple sources. The primary values will be EPA ESSLs; secondary sources include values from the ORNL Ecological Risk Division. The ORNL ESSLs are based on extremely conservative assumptions and will be used only for screening purposes. PRGs will be used for chemicals without published screening values. If the analytical laboratory cannot report to a prescribed screening level, the laboratory's quantitation limit will be used instead.

5.0 HEALTH AND SAFETY REQUIREMENTS

A project-specific health and safety plan has been developed for this investigation. An accident prevention plan (APP) has also been prepared that includes activity hazard analyses relevant to site operations. These plans will be enforced by the on-site health and safety officer.

A request for explosives safety submission (ESS) determination has been submitted to Naval Ordnance Safety and Security Activity (NOSSA) for review and is pending approval for SI field

activities at the MRP sites. However, an ESS is likely to be waived by NOSSA because a UXO technician will support the sampling efforts using anomaly avoidance techniques. ChaduxTt will use anomaly avoidance techniques for all sampling at MRP sites UXO1 and UXO6, as specified in Section 3.1.1. A copy of ESS waiver acceptance documentation will be included as Appendix B in the final version of this document once it is received.

6.0 SCHEDULE

The current schedule for the investigation is shown on Figure 7. This schedule will be updated as necessary as the project progresses.

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Engineering Diagrams:

1. Ammunition Overhaul Case Bldg, Location and Grading Plan, 1944

2. Ammunition Overhaul Case Filling Bldg 1st & 2nd Floor, 1944

3. U.S. Naval Ammunition and Net Depot Underground Utilities (As Built), Sheet 16 or 21, 1945

4. As Built Underground Utilities (Salvage Yard area), 4 of 21, 1945

5. Master Shore and Development Plan Part IV, Plate K, 1954

6. Static Rocket Firing Test Facility Bldg Floor Plan (QE-10) 437, 1954

7. Equipment Layout Plan, Bldg 102 SOP-11 Exterior Maintenance 5/38 Projectiles, 1954

8. Quality Evaluation Laboratory, Steel (QE-10b) 436 Drop Test Tower, 1956

9. Mineral Rights, U.S. Naval Ammunition and Net Depot, Seal Beach, CA 1957

10. Additions to Explosive D Stream Out Shed, Bldg 98, 1958

11. Vacuum Dust Removal and Cleaning System, Bldg 101, Location & Grading Plan, 1965

12. Master Plan Basic Information Maps, General Site Plan (showing wetland extent), Seal Beach Facility, 1969

13. General Development Map, Key Map, Existing Structures, 1969

14. Range Survey Form EOD Areas 1 & 2, 1973

15. Floor Plan Building 101, 1977

16. IAS Waste Disposal Sites, (marked up 1975 General Development Map), 1985

17. POLB Sheet Index 2 of 32, 1987

18. POLB Grading Plan - Forrestal Road & Bolsa Cell 10 of 32, 1987

19. POLB Grading Plan - Case Road North 11 of 32, 1987

20. POLB Grading Plan - Case Road South 12 of 32, 1987

21. POLB Grading Plan - Seventh Street North 13 of 32, 1987

22. POLB Grading Plan - Seventh Street South 14 of 32, 1987

23. POLB Grading Plan - Perimeter Road 15 of 32, 1987

24. POLB Fill Area Grading Plan 24 of 32, 1987

25. POLB Fill Area Grading Plan 25 of 32, 1987

26. POLB Fill Area Grading Plan 26 of 32, 1987

27. POLB Fill Area Grading Plan 27 of 32, 1987

28. POLB Fill Area Grading Plan 28 of 32, 1987

29. POLB Fill Area Grading Plan 29 of 32, 1987

30. POLB Fill Area Grading Plan 30 of 32, 1987

31. POLB Fill Area Grading Plan 31 of 32, 1987

32. POLB Fill Area Grading Plan 32 of 32, 1987

33. Floor Plan Bldg (AO-13) 102, Proposed Dust Collector Installation for Buffing Machines, undated

34. Proposed Installation of Wheelebrator Projectile Shotblast Equipment, Bldg (AO-13) 102, undated

35. Equipment layout Plan Bldg 94 SOP-14, undated

36. Demo of Buildings 432,433,434,435 and 436 Site and Utility Demo Plan, undated

37. Install Spark Proof Floor & Drain - Rocket Test Bldg 437, undated

38. Hazardous Waste Areas Station Map, Attachment L, undated

Aerial Photographs and Maps:

Flight ID AXK-1938, Frame AXK-29-22. Scale 1:20,000. 1938.

Flight ID C-11351, Frames 7-11. Scale 1:24,000. 1947.

Flight ID AXK-1953, Frame IK-15. Scale 1:20,000. 1953.

Flight ID C-22555, Frames 29-40, 29-42, 30-41. Scale 1:14,000. 1956.

Flight ID C-23023, Frames 1-41. Scale 1:36,000. 1958.

Flight ID C-23870, Frames 471, 547. Scale 1:14,000. 1960.

Flight ID PAI-LA-BASIN, Frame 1933-01-11. Scale 1:36,000. 1965.

Flight ID TG-2400, Frames 2-92. Scale 1:28,000. 1968.

Flight ID AMI-OC-70, Frame 5164. Scale 1:36,000. 1970.

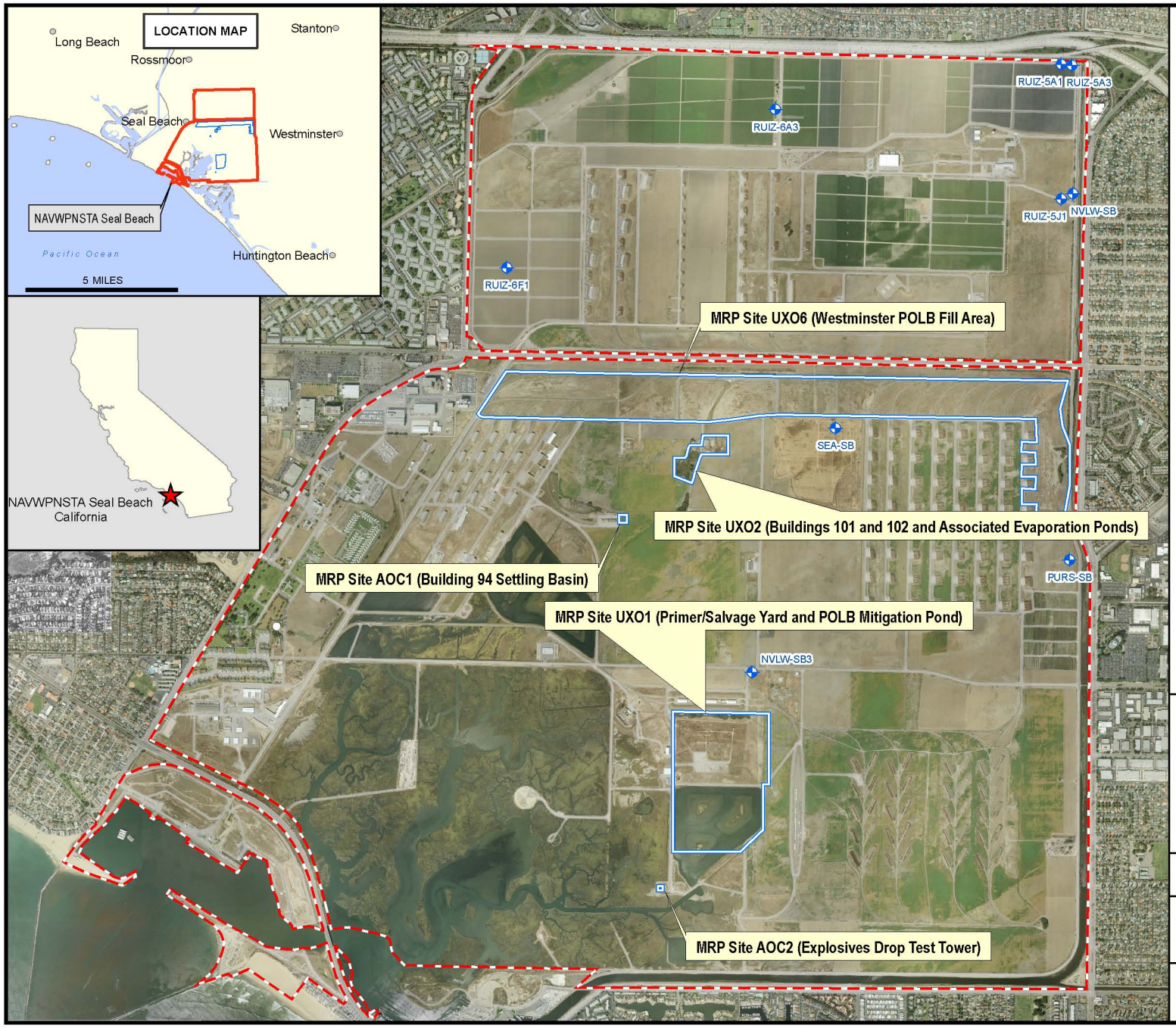
Flight ID TG-7400, Frames 12-34. Scale 1:24,000. 1974.

Flight ID TG-7700, Frames 11-16. Scale 1:24,000. 1977.

Flight ID AMI-OC-83, Frame 11601. Scale 1:36,000. 1983.

Flight ID AMI-OC-89, Frame 12386. Scale 1:36.000. 1989.

FIGURES



LEGEND

- Installation Area
- MRP Sites
- Roads
- Fences
- Agricultural Wells

NOTES:
MRP = MUNITIONS RESPONSE PROGRAM
POLB = PORT OF LONG BEACH

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 2,500 FEET

1 INCH = 2,500 FEET

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 1
SITE LOCATION MAP

MAP PRODUCED BY TTEM, INC.
NOVEMBER 25, 2008
FILE: Figure1-Seal Beach All Sites.mxd

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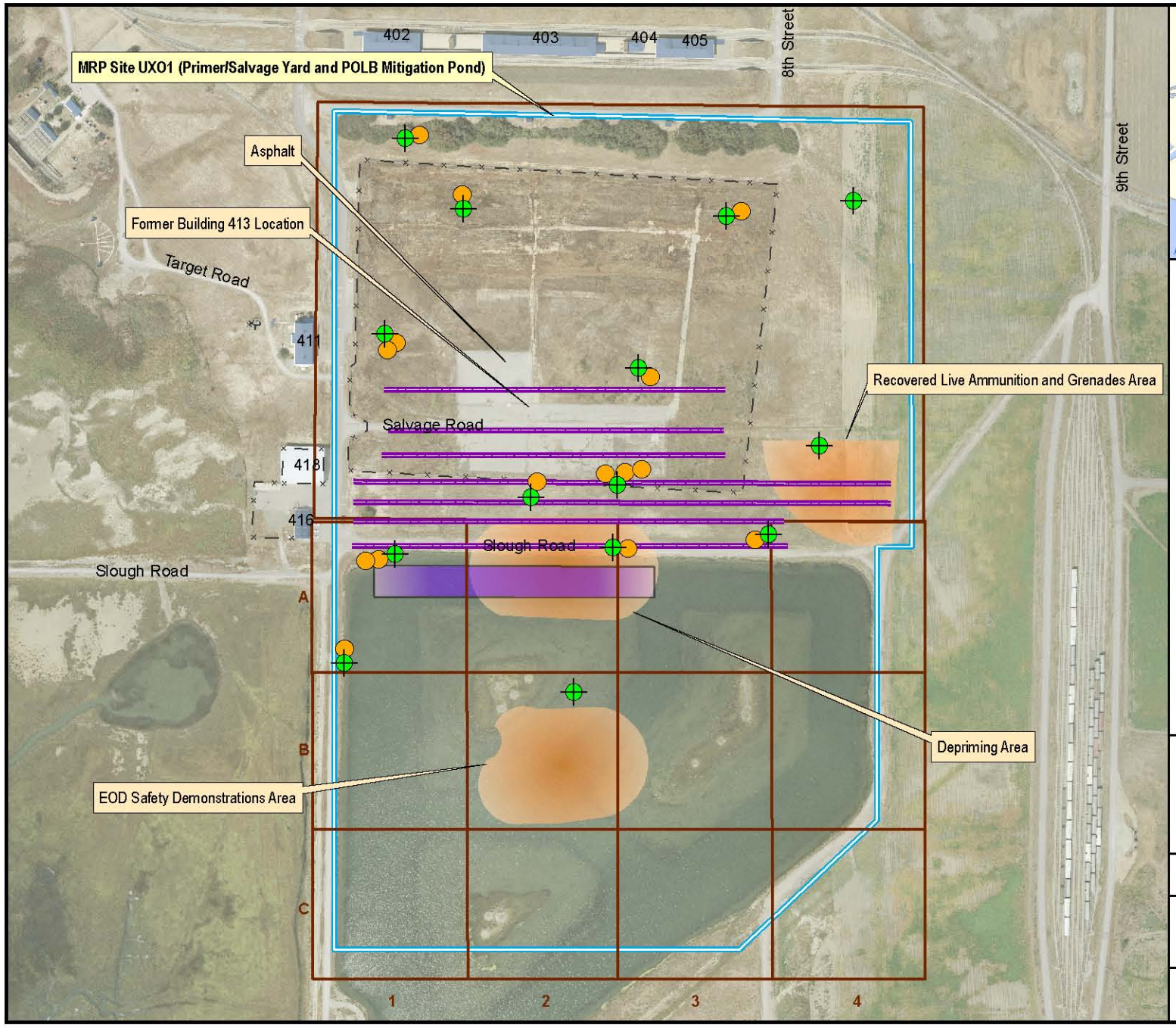

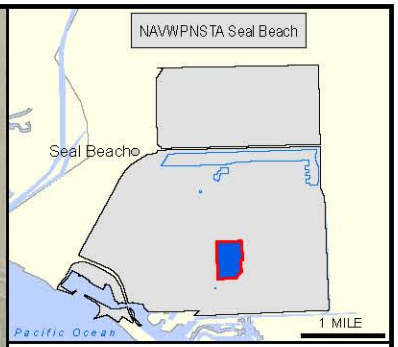

LEGEND

- MRP Site
- Buildings
- Roads
- Fences
- Proposed Geophysical Transect
- Proposed Geophysical Survey Area*
- Proposed Soil Sample Location
- Evidence of Munitions Use, Approx. (Malcolm Pirnie, 2008)
- Soil and Surface Water Sampling Grid

NOTES:
* SURVEY LINE SPACING APPROXIMATELY 5 FEET
MRP = MUNITIONS RESPONSE PROGRAM
POLB = PORT OF LONG BEACH

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 500 FEET

1 INCH = 450 FEET

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 2
MRP SITE UXO1
(PRIMER/SALVAGE YARD AND POLB MITIGATION POND)

MAP PRODUCED BY TTEM, INC.
NOVEMBER 25, 2008
FILE: Figure2-UXO1 Sample Locations.mxd

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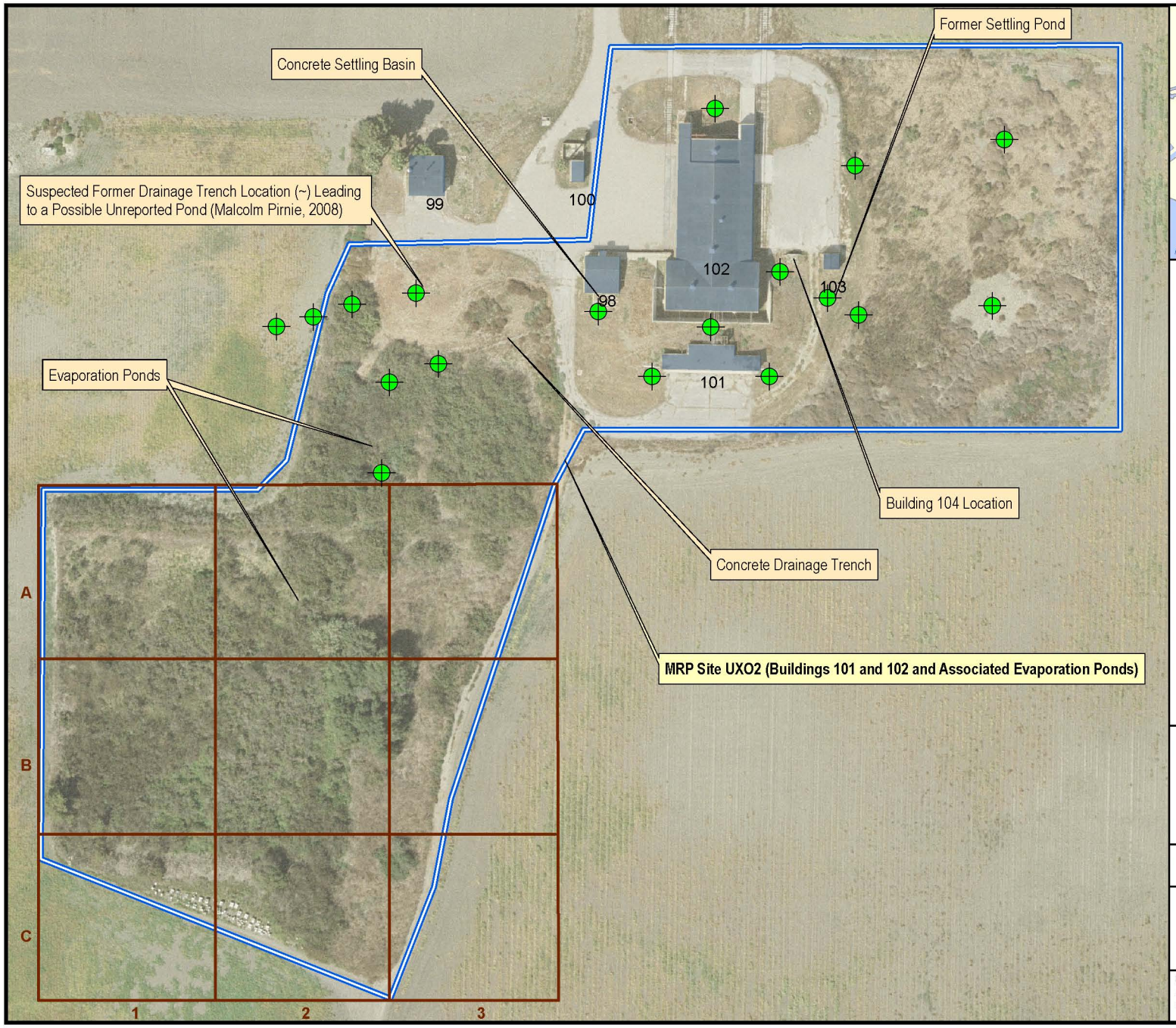

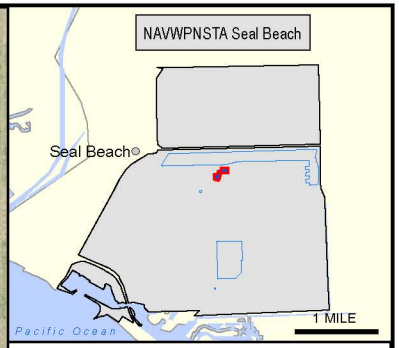

Legend

- MRP Site
- Buildings
- Roads
- Proposed Soil Sample Location (~)
- Soil Sampling Grid

NOTES:
* SURVEY LINE SPACING APPROXIMATELY 5 FEET
MRP = MUNITIONS RESPONSE PROGRAM
POLB = PORT OF LONG BEACH

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 150 Feet

1 INCH = 125 FEET

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 3
MRP SITE UXO2
(BUILDINGS 101 AND 102 AND ASSOCIATED EVAPORATION PONDS)

MAP PRODUCED BY TTEM, INC.
DECEMBER 1, 2008
FILE: Figure3-UXO2 Sample Locations.mxd

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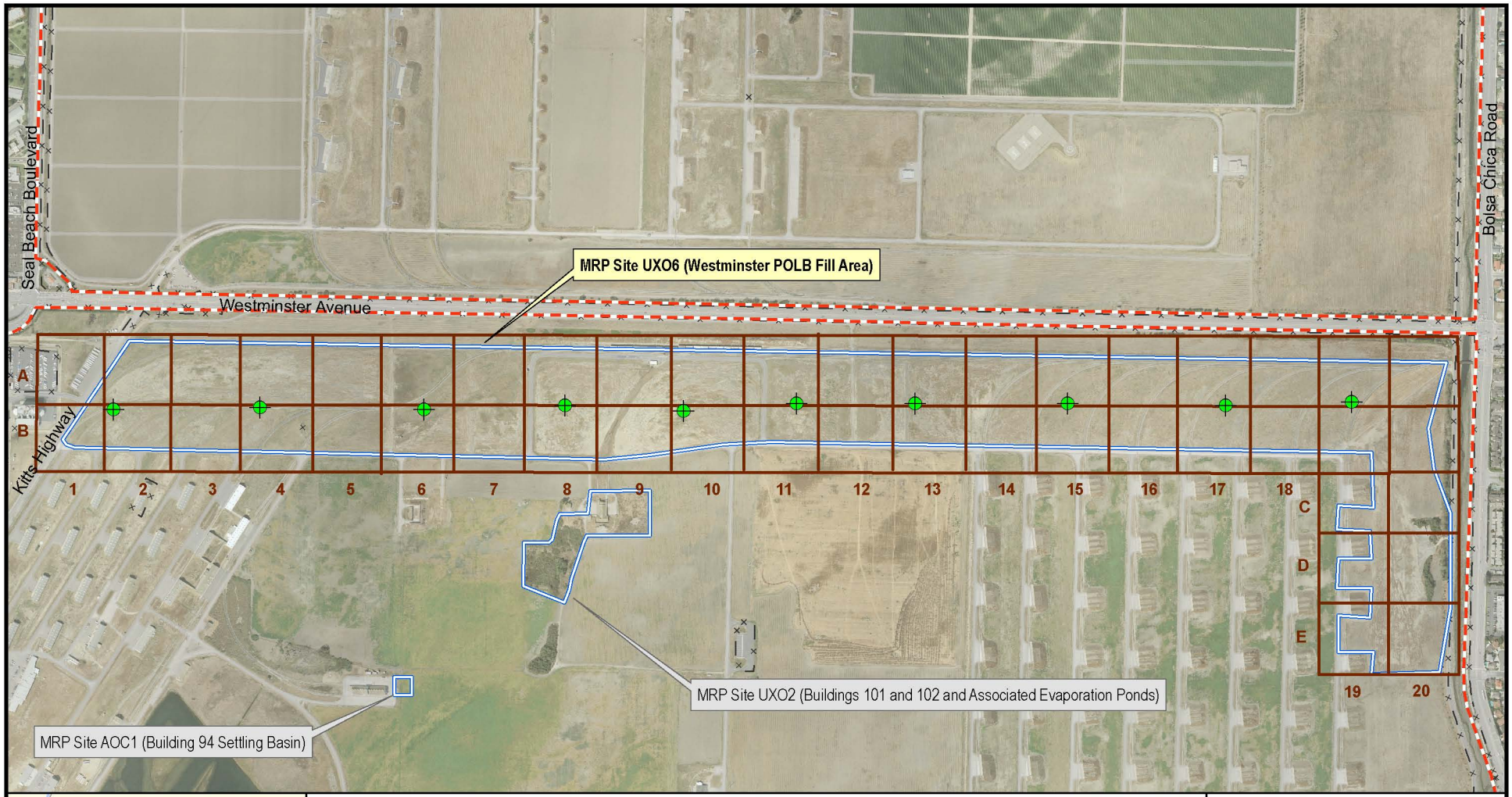

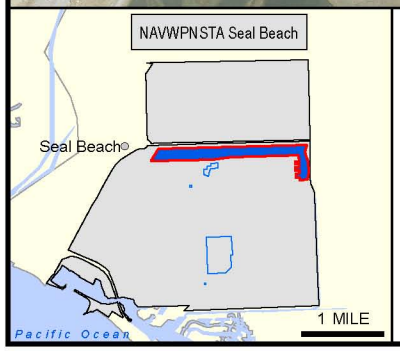

0 1,500 Feet

1 in = 1,100 feet

Legend

- Installation Area
- MRP Site
- Roads
- Fences
- Proposed Soil Sample Location (~)
- Soil Sampling Grid

NOTES:
MRP = MUNITIONS RESPONSE PROGRAM
POLB = PORT OF LONG BEACH

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 4
MRP SITE UXO6
(WESTMINSTER POLB FILL AREA)

MAP PRODUCED BY TTEM, INC.
JANUARY 15, 2009
FILE: Figure4-UXO6 SampleLocations.mxd

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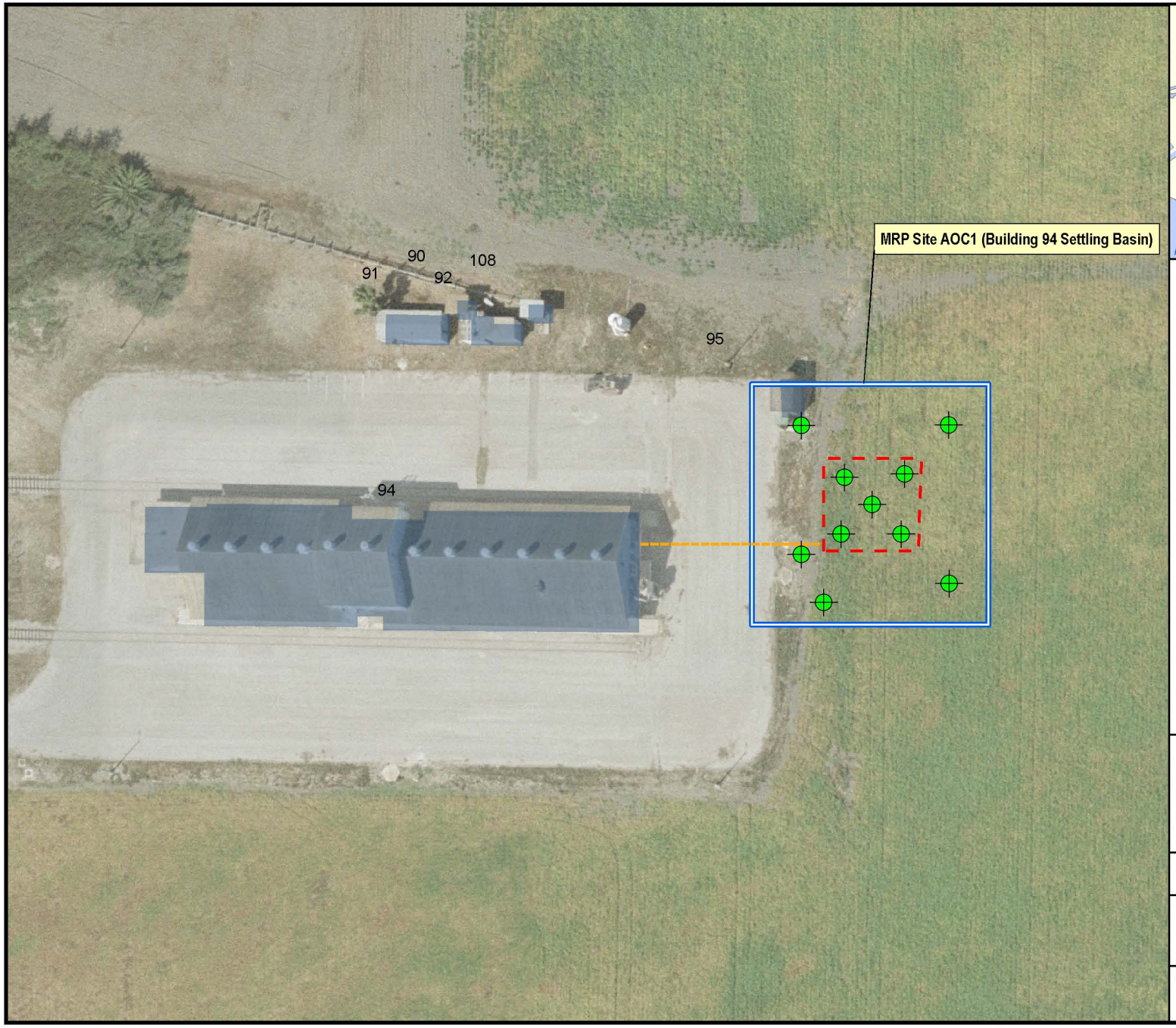

Legend

- MRP Site
- Buildings
- Roads
- Proposed Soil Sample Location (~)
- Former Settling Basin Location (~) From 1947 Aerial Photo and 1944 Engineering Diagram
- Former Drain Pipe Location (~) From 1944 Engineering Diagram

NOTES:
MRP = MUNITIONS RESPONSE PROGRAM

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 100 Feet

1 INCH = 80 FEET

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 5
MRP SITE AOC1
(BUILDING 94 SETTLING BASIN)

MAP PRODUCED BY TTEM, INC.
DECEMBER 1, 2008
FILE: Figure5-AOC1 Sample Locations.mxd

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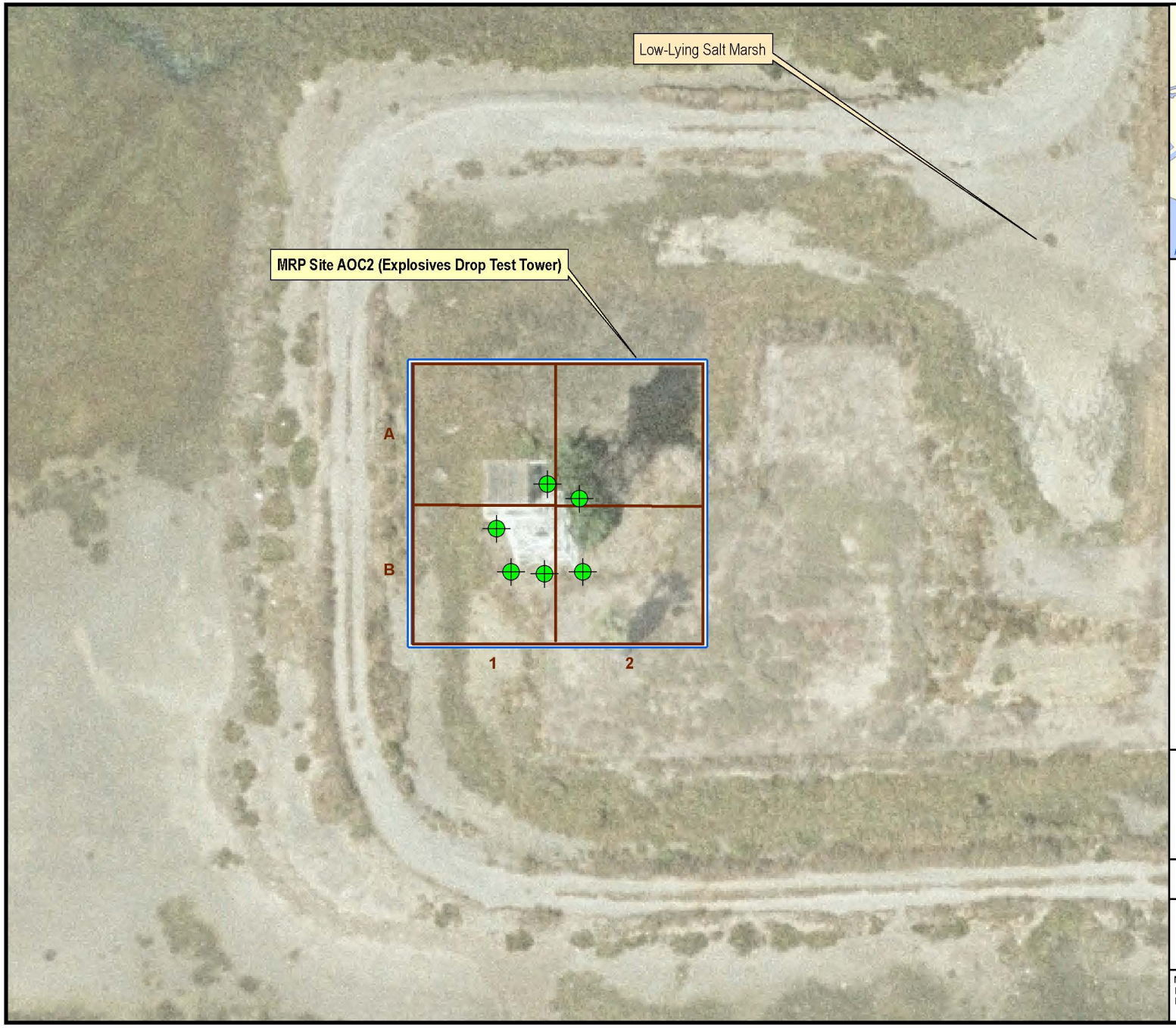

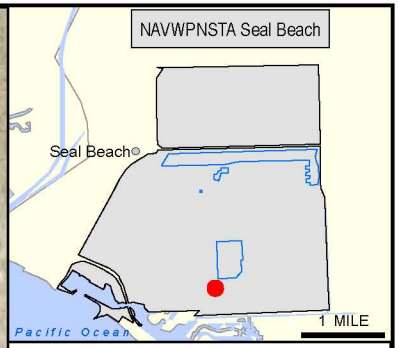

Legend

- MRP Site
- Buildings
- Roads
- Proposed Soil Sample Location (~)
- Soil Sampling Grid

NOTES:
MRP = MUNITIONS RESPONSE PROGRAM

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 40 Feet

1 INCH = 40 FEET

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 6
MRP SITE AOC2
(EXPLOSIVES DROP TEST TOWER)

MAP PRODUCED BY TTEM, INC.
DECEMBER 1, 2008
FILE: Figure6-AOC2 Sample Locations.mxd

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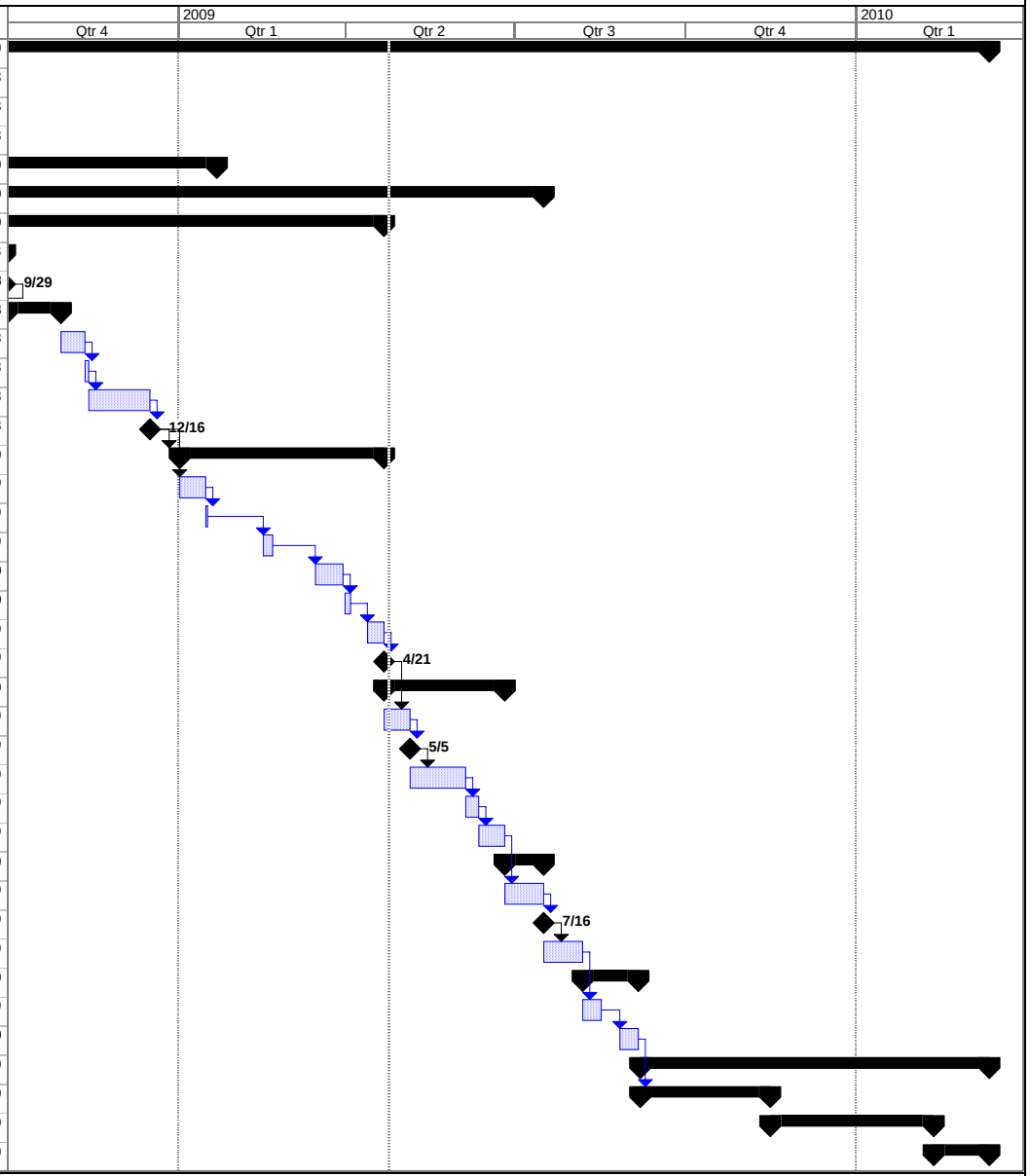
FIGURE 7 - PROJECT SCHEDULE

DO 0043, Site Inspection for Munitions Response Program (MRP)
Sites UXO1, UXO2, UXO6, AOC1, and AOC2
Naval Weapons Station Seal Beach, California

ID	Task Name	Duration	Start	Finish
1	**DO 0043 Schedule**	**442 days?**	**Thu 7/3/08**	**Sat 3/13/10**
2	Award	0 days	Thu 7/3/08	Thu 7/3/08
3	Kick-off Meeting	1 day	Fri 7/25/08	Fri 7/25/08
4	Prepare Pre-Draft Work Plan Schedule	10 days	Fri 7/4/08	Thu 7/17/08
5	**APP/HASP**	**145 days?**	**Thu 7/3/08**	**Wed 1/21/09**
15	**SI Work Plan**	**271 days**	**Thu 7/3/08**	**Thu 7/16/09**
16	**SI Work Plan/SAP - Initial Draft**	**209 days**	**Thu 7/3/08**	**Tue 4/21/09**
17	**Prepare Preliminary Draft Work Plan to Gov't**	**63 days**	**Thu 7/3/08**	**Mon 9/29/08**
23	Submit Initial Draft Work Plan to Government	0 days	Mon 9/29/08	Mon 9/29/08
24	**Government Review of Initial Draft Work Plan**	**21 days**	**Tue 9/30/08**	**Wed 10/29/08**
30	Repond to Government Comments	13 edays	Wed 10/29/08	Tue 11/11/08
31	Government Approval of Initial Draft Work Plan	2 edays	Tue 11/11/08	Thu 11/13/08
32	Prepare Revised Prelim Draft Work Plan/SAP	33 edays	Thu 11/13/08	Tue 12/16/08
33	Submit (Nars) Revised Prelim Draft Work Plan/S	0 days	Tue 12/16/08	Tue 12/16/08
34	**Navy QAO review of Revised Prelim Draft Wo**	**78 days**	**Fri 1/2/09**	**Tue 4/21/09**
35	Navy QAO reviews SAP	10 days	Fri 1/2/09	Thu 1/15/09
36	Navy QAO calls QA POC w/verbal comme	1 day	Fri 1/16/09	Fri 1/16/09
37	Prepare responses to Navy QAO comment	5 days	Mon 2/16/09	Fri 2/20/09
38	Incorporate Navy QAO comments	11 days	Mon 3/16/09	Mon 3/30/09
39	Submit RTCs w/revised pages with change	3 days	Wed 4/1/09	Fri 4/3/09
40	Navy QAO reviews changed pages/respon	7 days	Mon 4/13/09	Tue 4/21/09
41	Government (QAO) approval of Revised Pr	0 days	Tue 4/21/09	Tue 4/21/09
42	**SI Work Plan/SAP - Draft**	**47 days**	**Wed 4/22/09**	**Thu 6/25/09**
43	Revise Initial Draft/Prepare Draft Work Plan	10 days	Wed 4/22/09	Tue 5/5/09
44	Submit Draft Work Plan	0 days	Tue 5/5/09	Tue 5/5/09
45	Regulatory Review of Draft Work Plan	30 edays	Tue 5/5/09	Thu 6/4/09
46	Repond to Regulator Comments	5 days	Fri 6/5/09	Thu 6/11/09
47	Government Approval of Draft Work Plan RTC	10 days	Fri 6/12/09	Thu 6/25/09
48	**SI Work Plan - Final**	**15 days**	**Fri 6/26/09**	**Thu 7/16/09**
49	Prepare Final Work Plan	15 days	Fri 6/26/09	Thu 7/16/09
50	Submit Final Work Plan	0 days	Thu 7/16/09	Thu 7/16/09
51	Prepare for Field Work	15 days	Fri 7/17/09	Thu 8/6/09
52	**Field Work (Two 10-day mobilizations)**	**21 days**	**Thu 8/6/09**	**Sat 9/5/09**
53	Mobilization 1	10 edays	Thu 8/6/09	Sun 8/16/09
54	Mobilization 2	10 edays	Wed 8/26/09	Sat 9/5/09
55	**SI Report**	**135 days?**	**Mon 9/7/09**	**Sat 3/13/10**
56	**SI Report - Initial Draft**	**50 days**	**Mon 9/7/09**	**Sun 11/15/09**
62	**SI Report - Draft**	**64 days?**	**Sun 11/15/09**	**Thu 2/11/10**
68	**SI Report - Final**	**21 days**	**Thu 2/11/10**	**Sat 3/13/10**



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Printed Fri 4/24/09
Page 1

TABLES

TABLE 1: SOIL SAMPLE SUMMARY TABLE

Site	Subarea	Grid/ Biased	No. Borings	Depths (feet bgs)	No. Samples	Analyses
UXO1	Depriming Area	Biased	1	0-0.5, 1-1.5	2	Explosives, metals, TKN, inorganic nitrogen, ammonia, perchlorate (30)
	Recovered Live Ammunition and Grenades Area	Biased	1	0-0.5, 1-1.5	2	
	EOD Safety Demonstrations Area*	Biased	1	0-0.5, 1-1.5	2	
		Grid	6	0-0.5, 1-1.5	12	
	Areas where munitions and/or magnetic anomalies are identified	Biased	11	0-0.5, 1-1.5	22	
UXO2	North of Building 104	Biased	1	0-0.5, 1-1.5	2	Explosives, picrate, TKN, inorganic nitrogen, ammonia, perchlorate
	East of Building 104 and beyond the pavement	Biased	1	0-0.5, 1-1.5	2	
	Easternmost Area	Biased	2	0-0.5, 1-1.5	4	
	Former Settling Pond south of Building 103	Biased	2	0-0.5, 1-1.5	4	
	Former Building 102 Location	Biased	1	0-0.5, 1-1.5	2	
	Area surrounding Building 101	Biased	3	0-0.5, 1-1.5	6	
	Concrete Settling Basin	Biased	1	0-0.5, 1-1.5	2	
	Outlet of Concrete Drainage Trench	Biased	2	0-0.5, 1-1.5	4	
	Outlet of Suspected Drainage Trench	Biased	2	0-0.5, 1-1.5	4	
	Evaporation Ponds	Biased	1	0-0.5, 1-1.5	2	
		Grid	9	0-0.5, 1-1.5	18	

TABLE 1: SOIL SAMPLE SUMMARY TABLE (CONTINUED)

Site	Subarea	Grid/ Biased	No. Borings	Depths (feet bgs)	No. Samples	Analyses
UXO6	Areas where munitions and/or magnetic anomalies are identified	Biased	10	0-0.5, 1-1.5	20	Explosives, metals, picrate, perchlorate
	None	Grid	20	0-0.5, 1-1.5	40	
AOC1	Former Settling Basin	Biased	5	0-0.5, 1-1.5	10	Explosives, metals, picrate
	Former Drain Pipe Location	Biased	1	0-0.5, 1-1.5	2	
	Area surrounding the Former Settling Basin	Biased	4	0-0.5, 1-1.5	8	
AOC2	Explosives Drop Test Tower	Biased	6	0-0.5, 1-1.5	12	Explosives, metals, perchlorate
	None	Grid	4	0-0.5, 1-1.5	8	

Notes:
bgs = below ground surface
TKN = Total Kjeldahl nitrogen
*Additionally, up to five surface water samples are to be sampled from the pond on a grid and tested for explosives, metals, TKN, inorganic nitrogen, ammonia, and perchlorate.

APPENDIX A

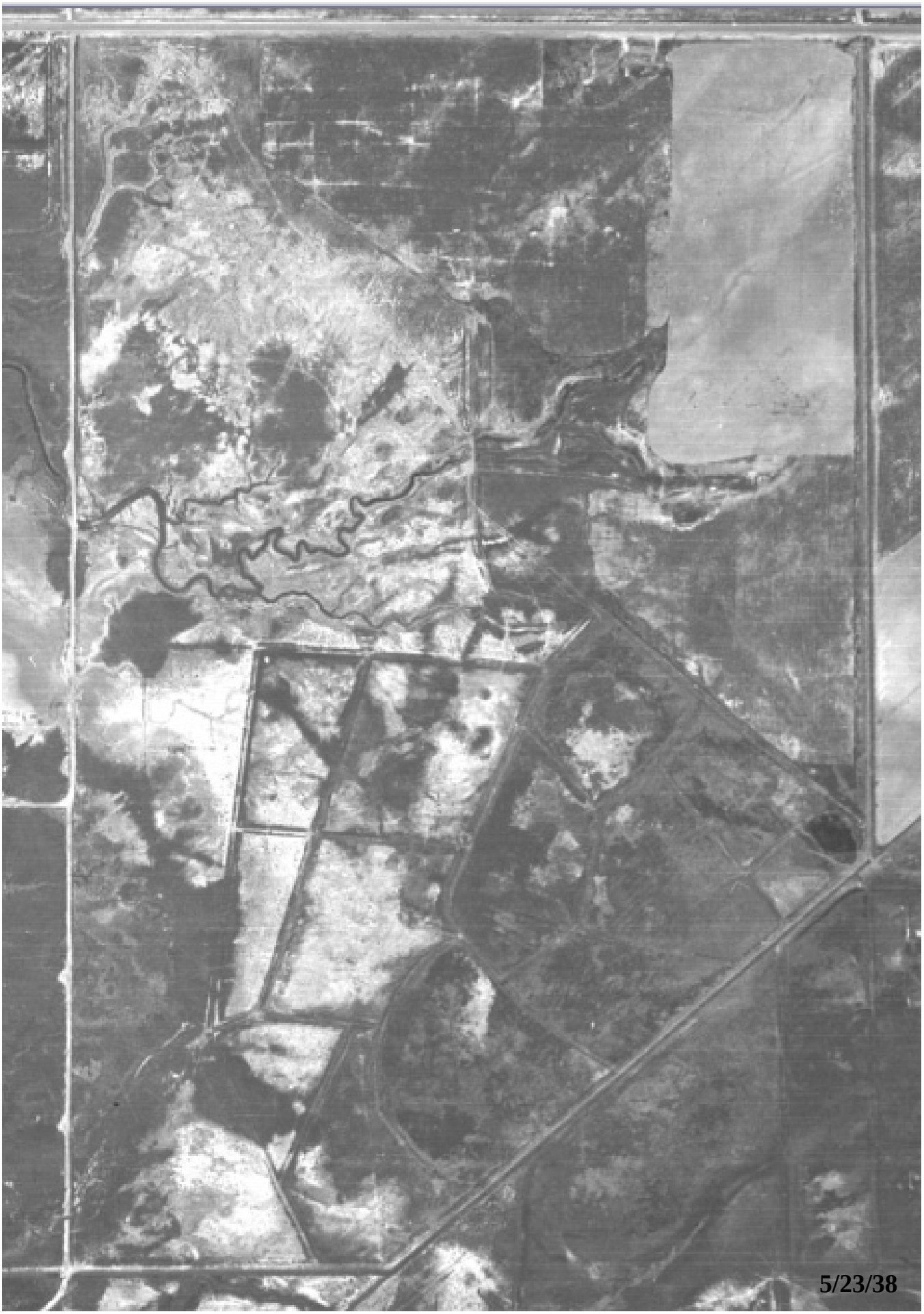
Historical Aerial Photos, Maps, and Diagrams

NOTE:

Some detailed station maps have been deleted from the Internet-accessible version of this document as per Department of the Navy Internet security regulations.

APPENDIX A-1

MRP Site UXO1 Historical Aerial Photos, Maps, and Diagrams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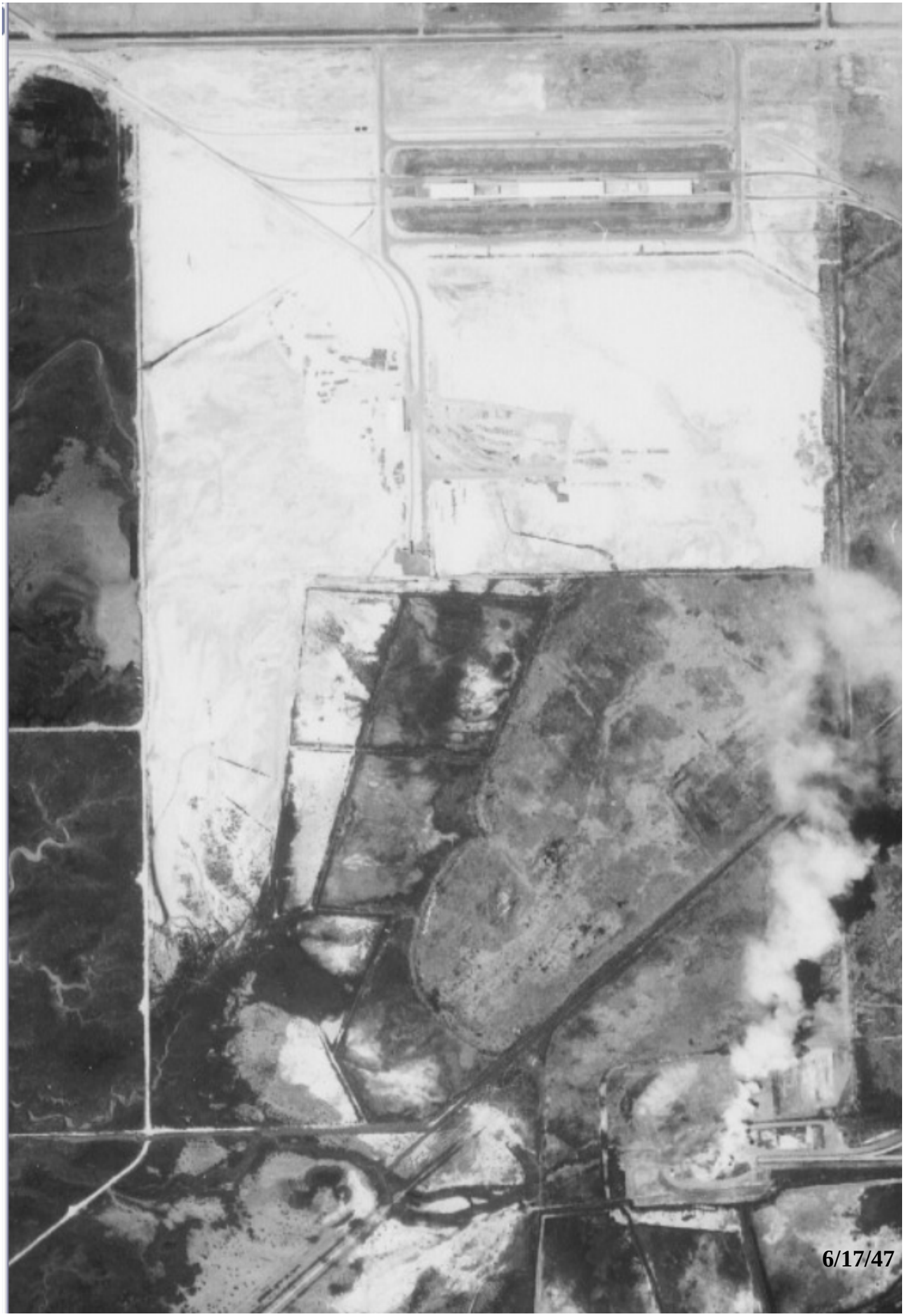
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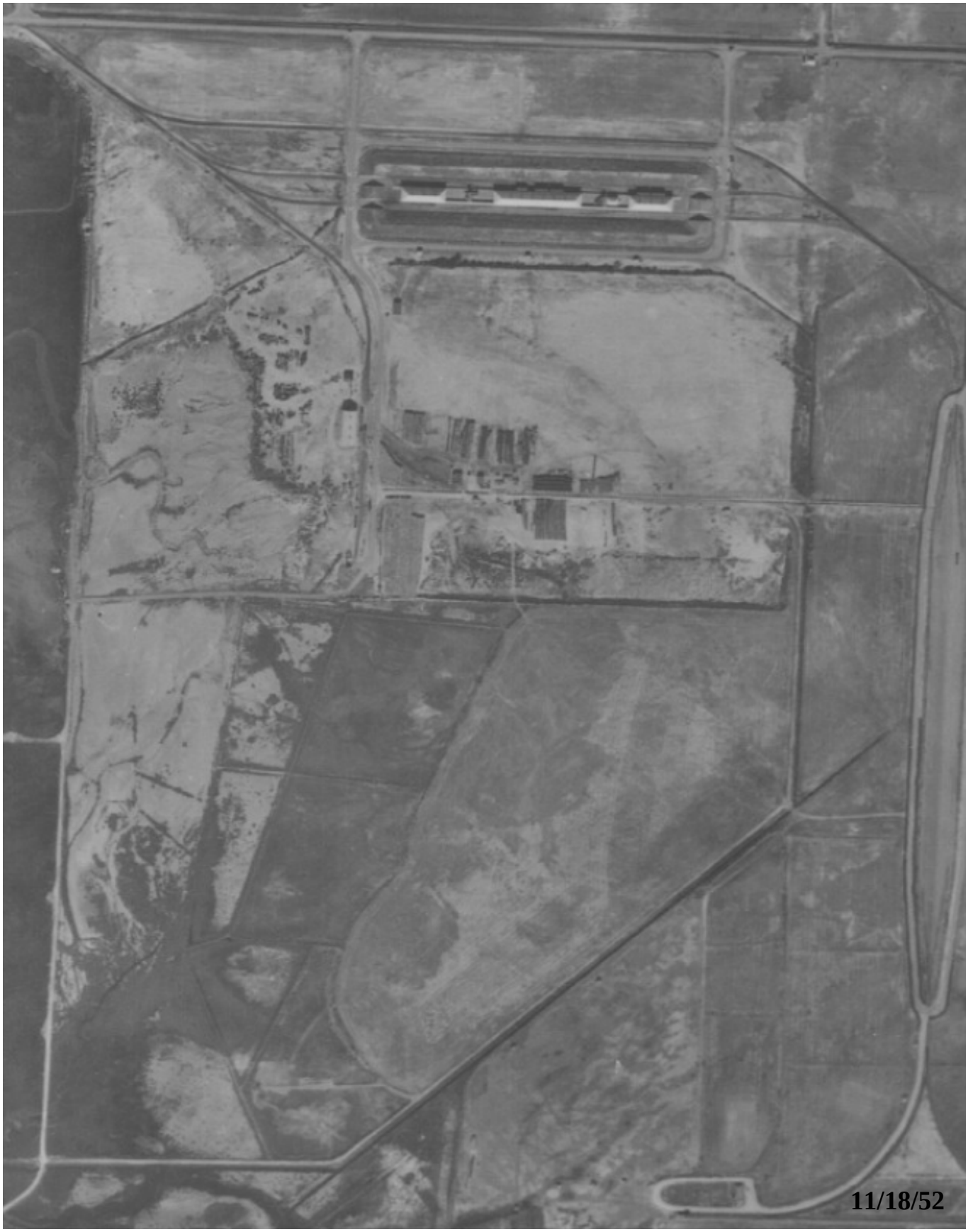
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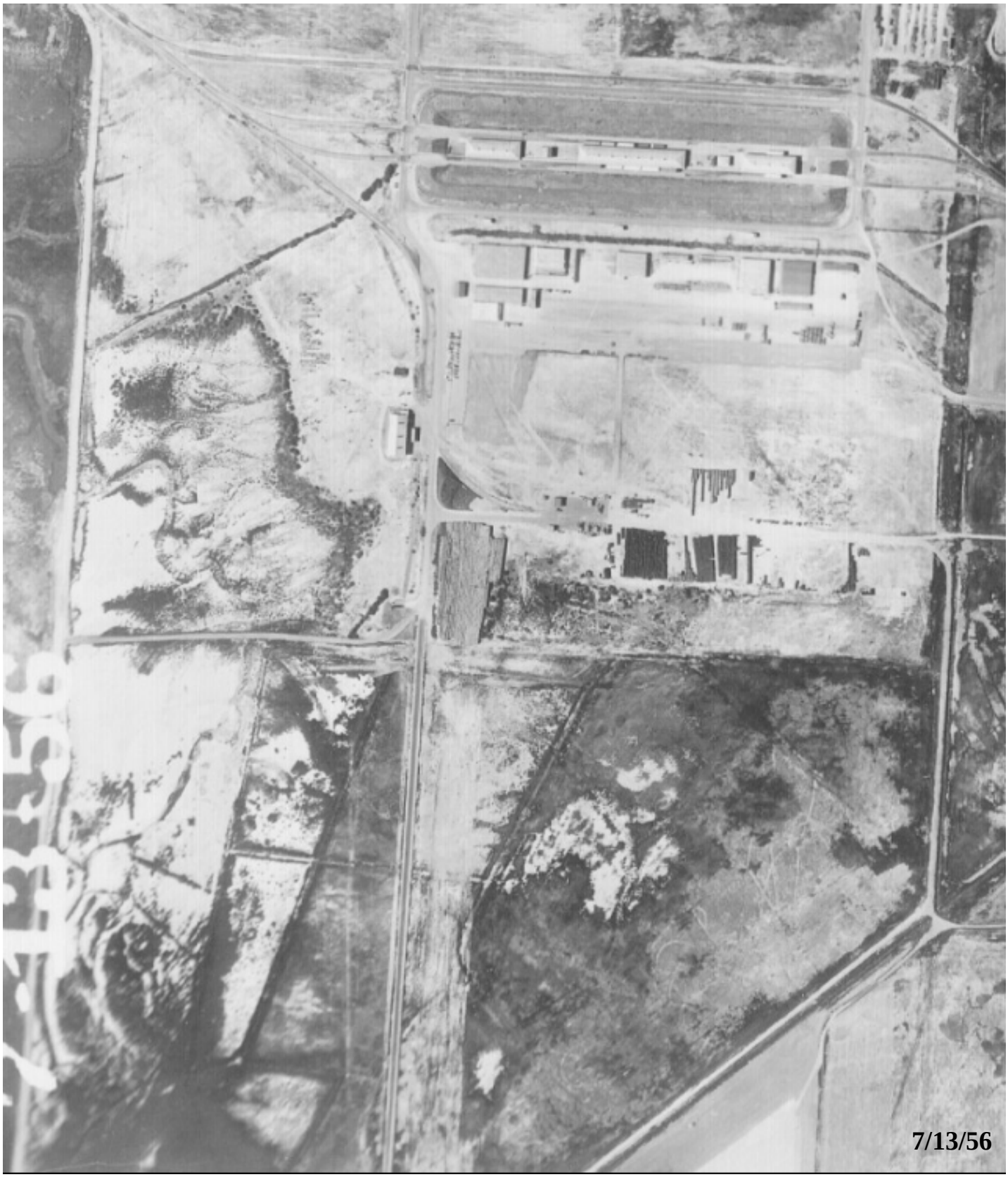

7/13/56

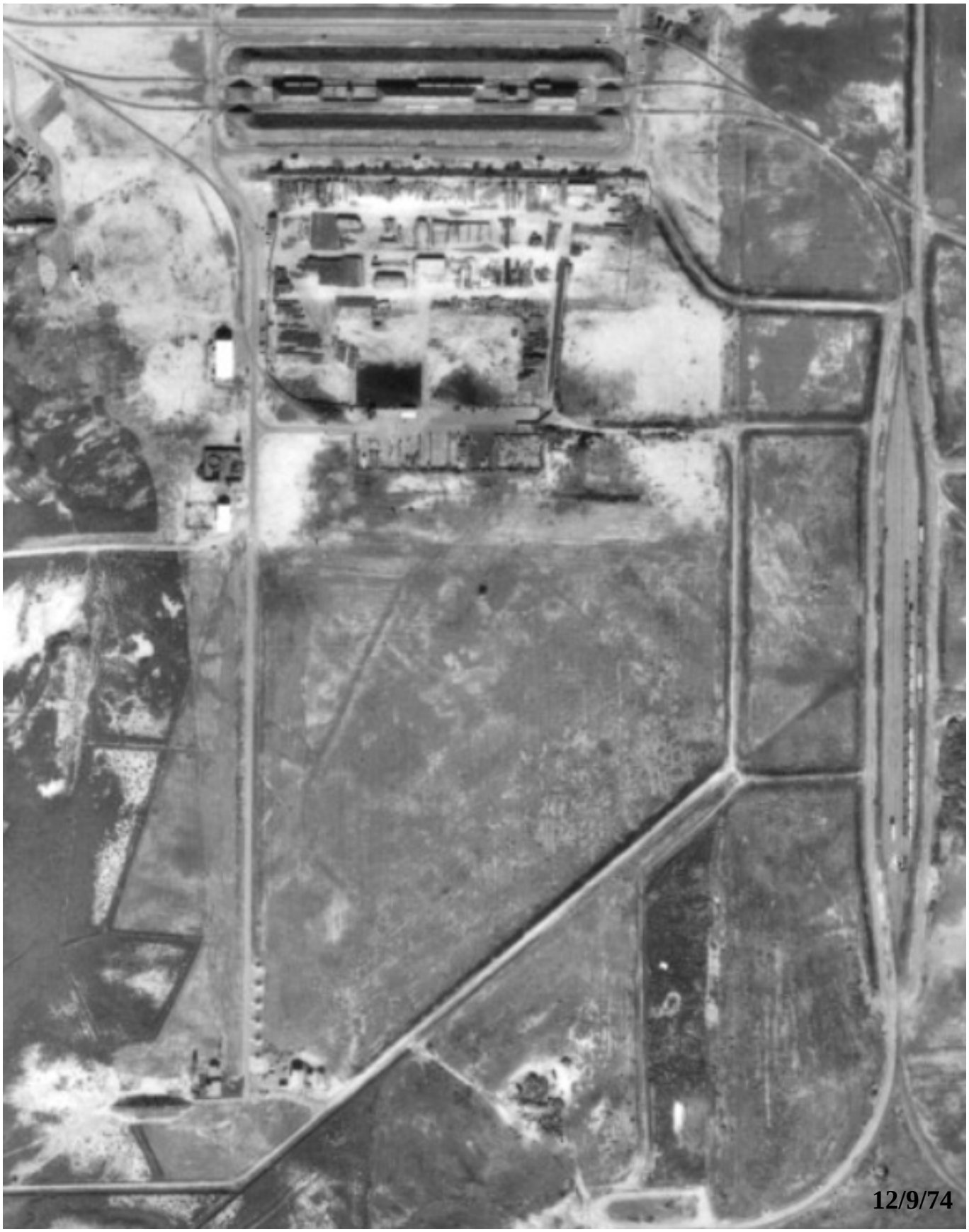
1958

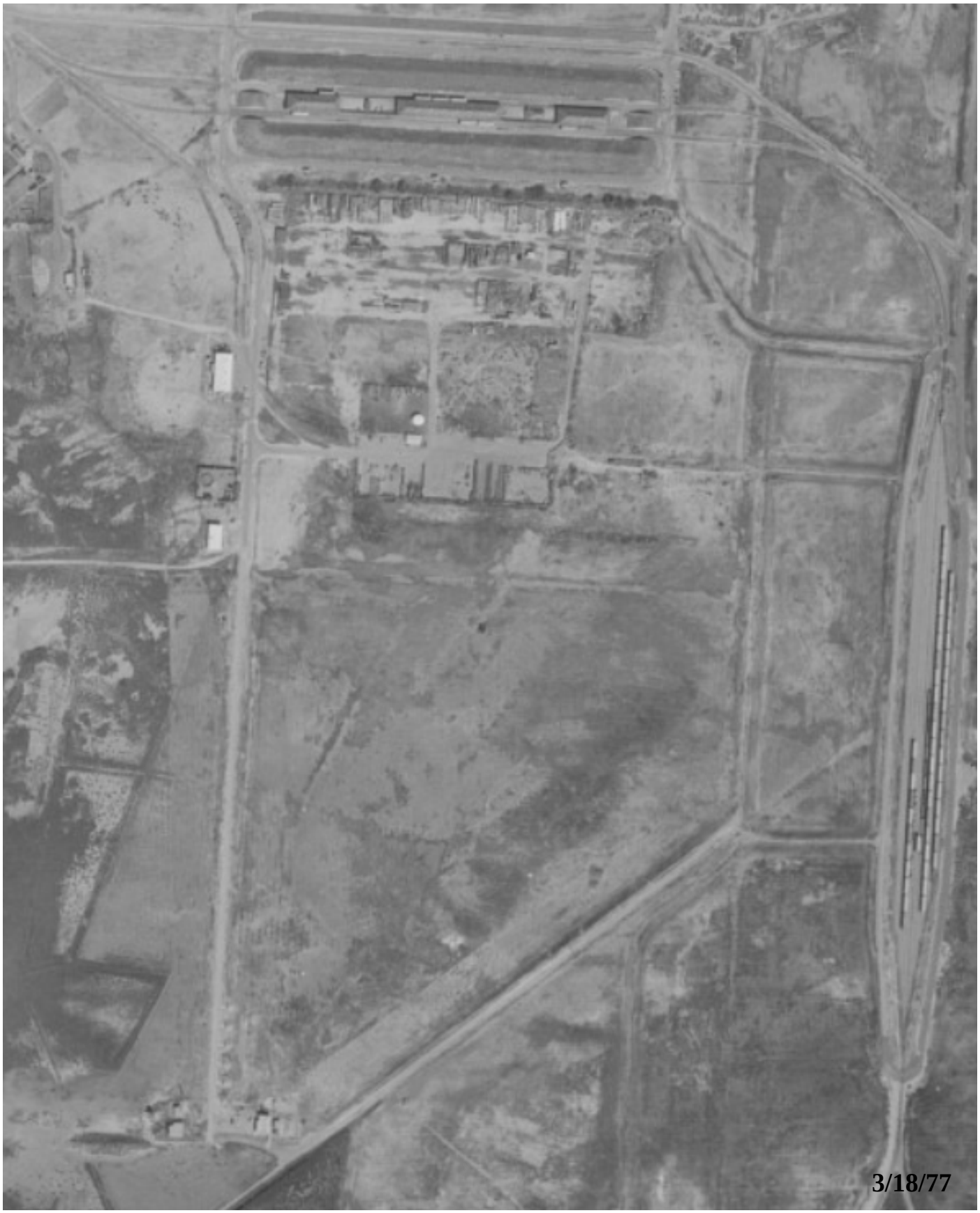
5/7/60

1965

8/22/68

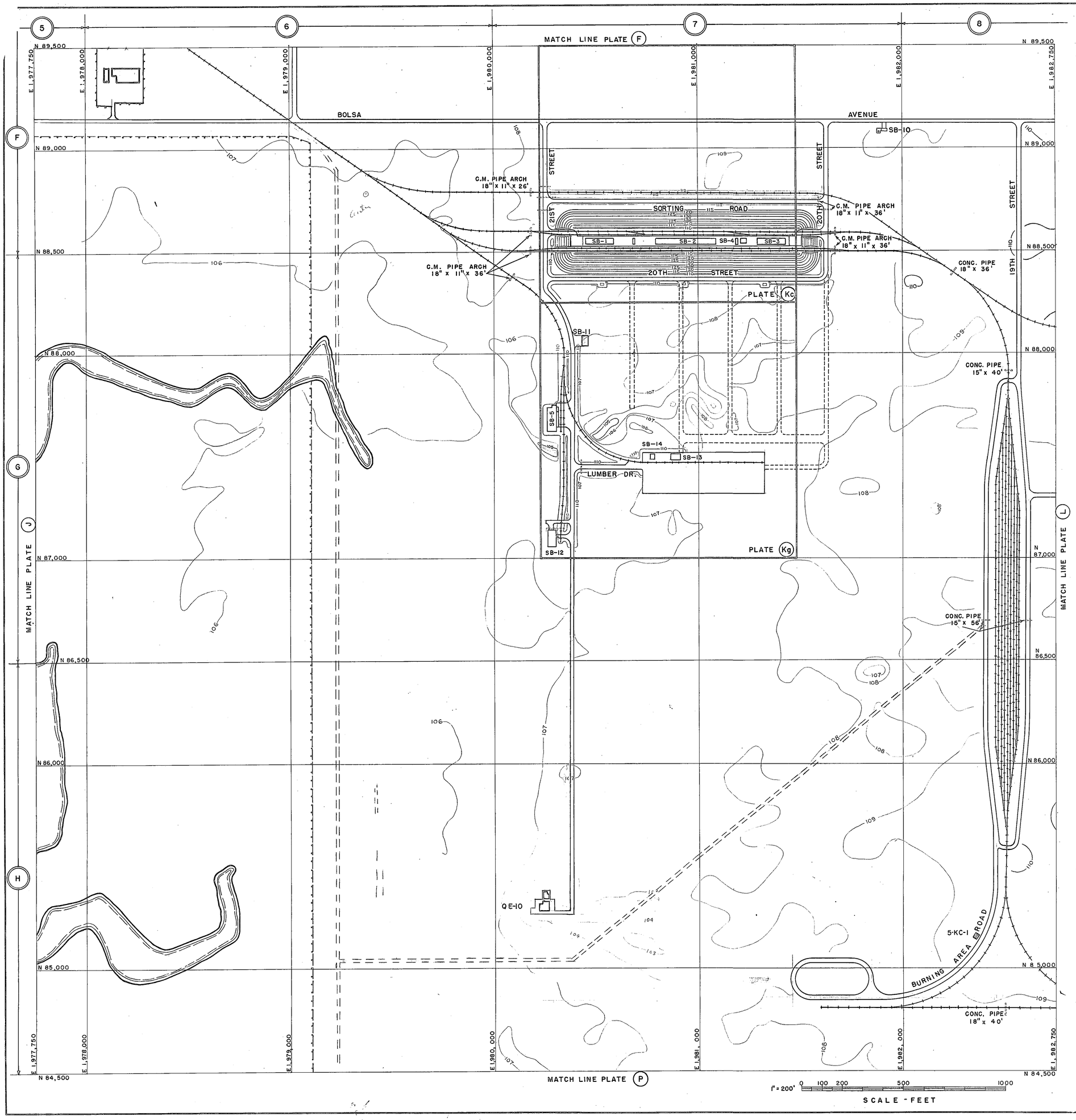
1970


12/9/74


3/18/77

1983

1989



LEGEND

- EXISTING STRUCTURES AND BUILD
- STRUCTURES AND BUILD
- EXISTING ROADS
- ROADS
- EXISTING FENCE
- EXISTING RAILROADS
- RAILROADS
- (2) LOCATION INDEX

SYMBOLS

- 100 EXISTING CONTOURS
- EXISTING CULVERTS
- EXISTING DIRT ROAD

NOTE:

FOR ADDITIONAL DETAILS SEE PLATES (Kc) AND (Kg)

SYMBOL	DESCRIPTION
(1)	UPDATED SALVAGE YARD & ADDED BLDGS. SB-12

REVISIONS

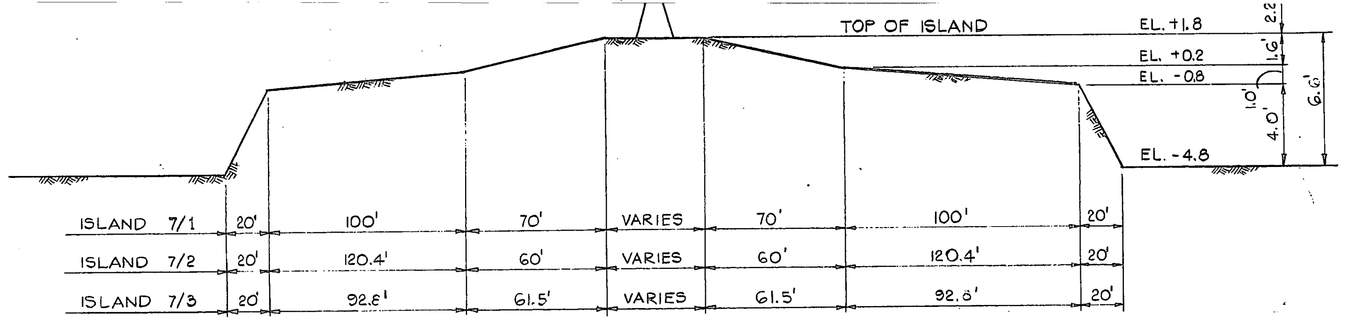
DEPARTMENT OF THE NAVY
NAVAL AMMUNITIO
SEAL BEACH

DRAWN	R.A.B.
TRACED	R.A.B.
CHECKED	J.A.B.
REVIEWED	

MASTER SHO
DEVELOPME
PART IV, S
AREA DEVELO
PLATE (K)

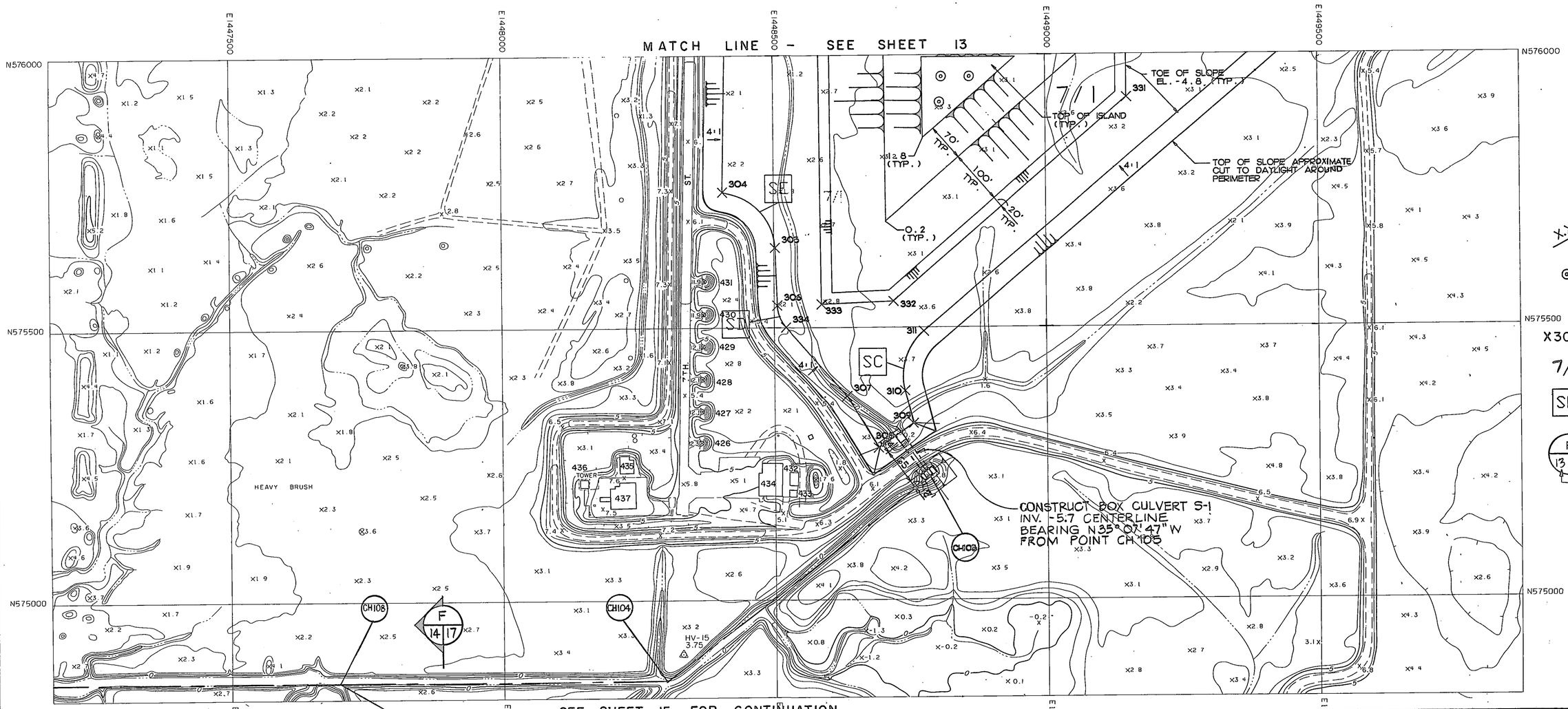
APPROVED 7/30/54 DATE
COMMANDING OFFICER

SUBMITTED 7/30/54 DATE
STATION DEVELOPMENT BOARD



ISLAND SECTION

SCALE HORIZ: 1"=40'
VERT: 1"= 4'



LEGEND

X.X'	ELEVATION POINT (IN FEE WITH RESPECT TO MSL D
⊙	EARTH MOUNDS 17.5± F AT BASE; TOP ELEVATION DIA. 5± FEET- LOCATIONS A
X300	CONTROL POINT
7/1	ISLAND NUMBER
SH	CURVE NUMBER
F / 13 16	SECTION OR DETAIL; SHEET NUMBER THE SECTION O DETAIL CAN BE FOUND ON; SHEET NUMBER THE SECTION O IS TAKEN FROM.

MARK	DATE	BY	REVISIONS

		DATE
DRAWN	M&N	
DESIGNED	M&N	P.E. NO. C-19871
PROJ. MGR.	DHB	P.E. NO.
SUBMITTED	DHB	P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24520 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION
PORT of LONG BEACH
925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

MODIFIED NATIONAL DATUM

ANAHEIM BAY MITIGATION PROJECT
GRADING PLAN-
SEVENTH STREET SOUTH

SCALE 1"=100' SI
SPECIFICATION NUMBER HD
DRAWING NUMBER HD-

PW SKETCH NO.

CONTROL POINT COORDINATES*

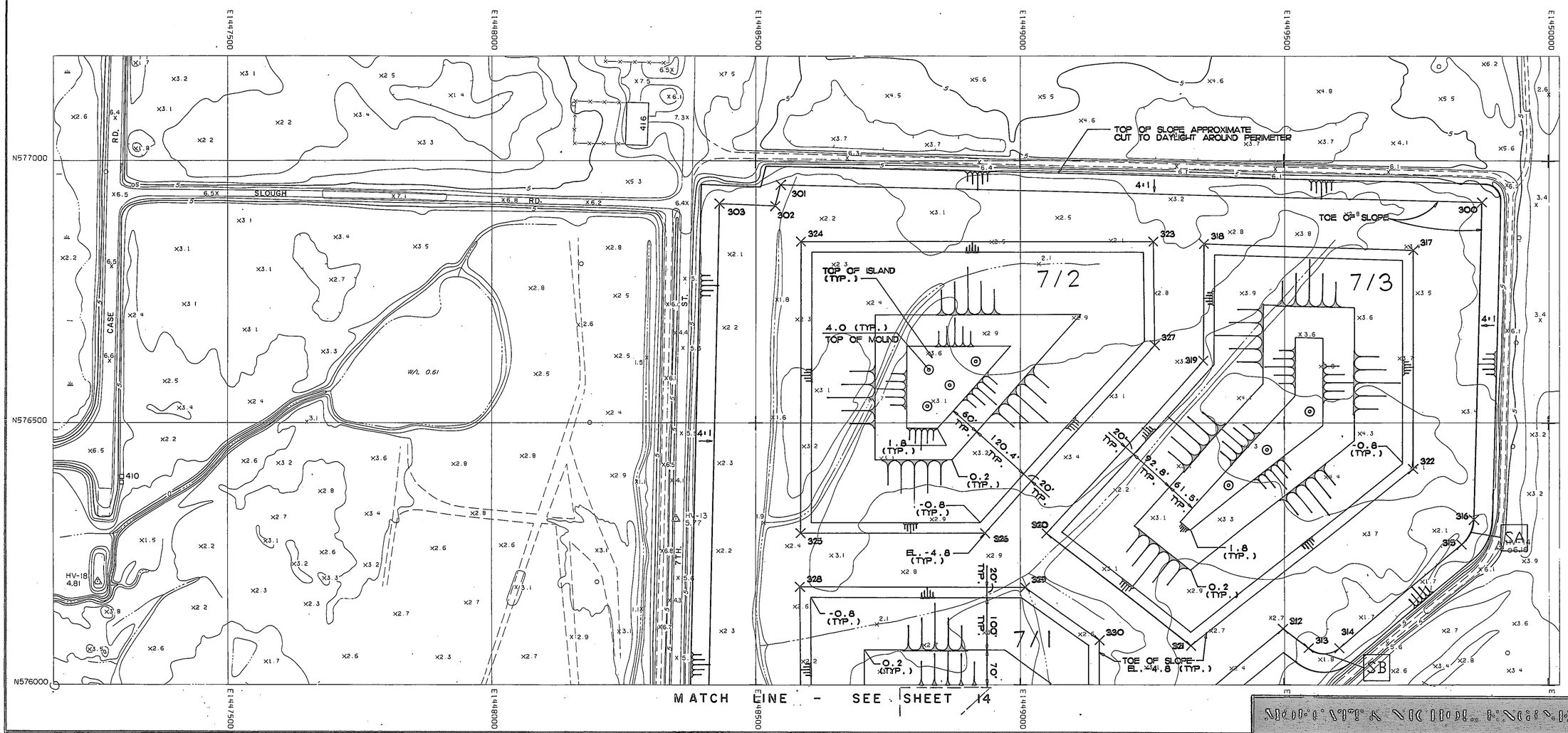
POINT	NORTHING	EASTING	POINT	NORTHING	EASTING
300	76921	49874	318	76841	49349
301	76954	48547	319	76618	49348
302	76914	48537	320	76289	49051
303	76918	48431	321	76075	49324
304	75749	48406	322	76412	49745
305	75647	48502	323	76845	49251
306	75541	48506	324	76846	48586
307	75373	48634	325	76289	48585
308	75277	48691	326	76289	48932
309	75322	48755	327	76648	49254
310	75383	48740	328	76187	48583
311	75493	48775	329	76186	49010
312	76107	49498	330	76085	49149
313	76070	49545	331	75921	49149
314	76070	49603	332	75548	48720
315	76268	49836	333	75543	48588
316	76316	49859	334	75500	48522
317	76829	49745			

*ADD 500000 TO THE NORTHINGS AND 1400000 TO THE EASTINGS

CURVE	Δ	R	L	T
SA	48°-14′-43″	64.80′	54.56′	29.02′
SB	80°-42′-21″	44.80′	63.10′	38.06′
SC	63°-41′-32″	109.42′	121.64′	67.97′
SD	39°-07′-10″	64.80′	44.24′	23.02′
SE	73°-45′-20″	105.20′	135.42′	78.92′

LEGEND

- X.X — ELEVATION POINT (IN FEET WITH RESPECT TO MSL DATUM)
- ⊙ — EARTH MOUNDS 17.5± FEET IN DIAMETER AT BASE; TOP ELEVATION +4.0 MSL., DIAMETER 5± FEET-LOCATIONS ARE APPROXIMATE.
- X 300 — CONTROL POINT
- 7/1 — ISLAND NUMBER
- SH — CURVE NUMBER



MARK	DATE	BY	REVISIONS

DRAWN M&N DATE 4/88
DESIGNED M&N R.E. NO. C-19871
PROJ. MGR. DHB R.E. NO.
SUBMITTED DHB R.E. NO. C-30260

DIRECTOR OF ENGINEERING R.E. NO. C-24528 DATE
MANAGING DIRECTOR R.E. NO. C-19039 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

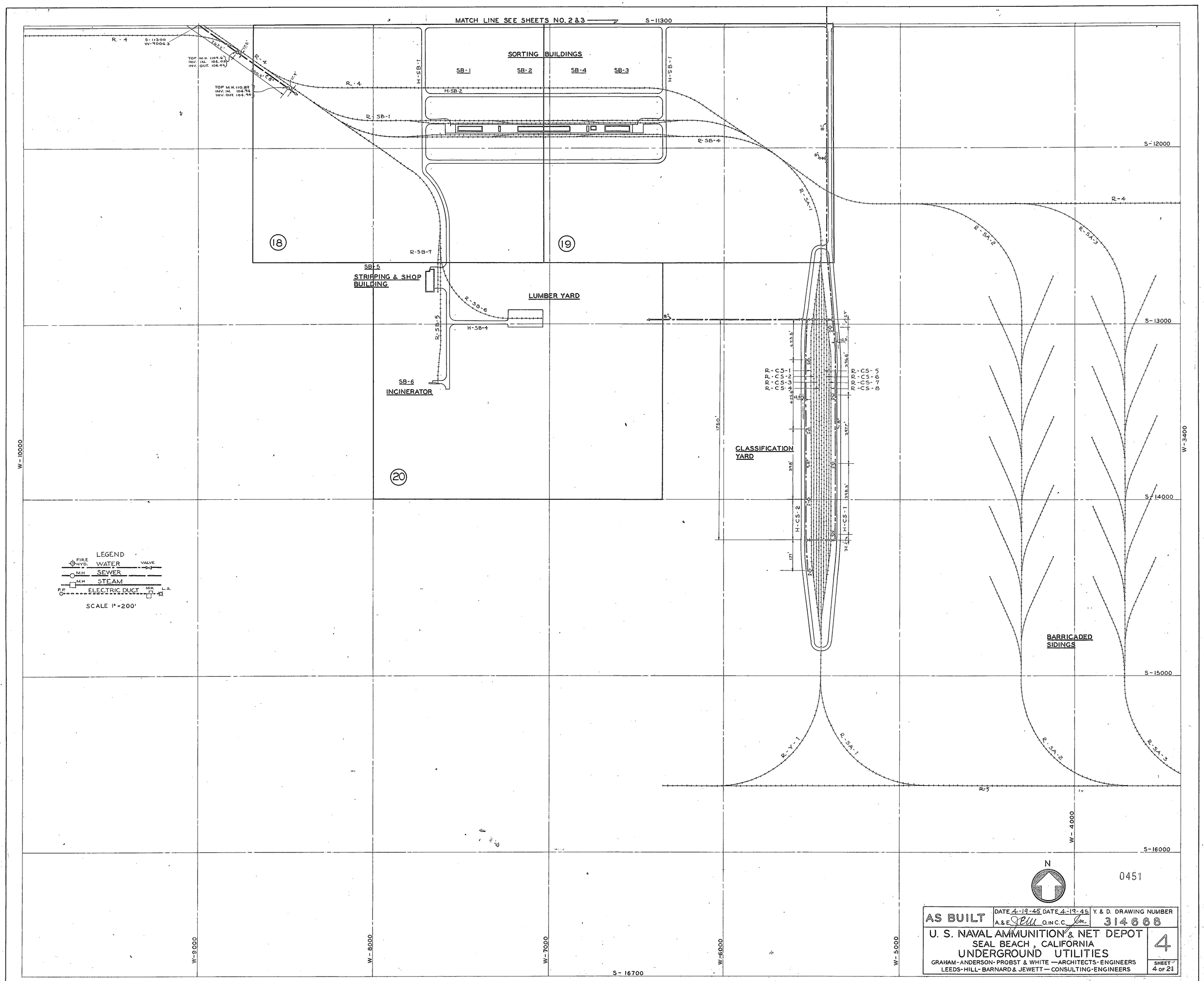
GRADING PLAN-SEVENTH STREET NORTH

SCALE 1" = 100' SHEET 13 OF 32

SPECIFICATION NUMBER HD-S1670

DRAWING NUMBER HD 10-1034-13

PW SKETCH NO. SK-6675-F

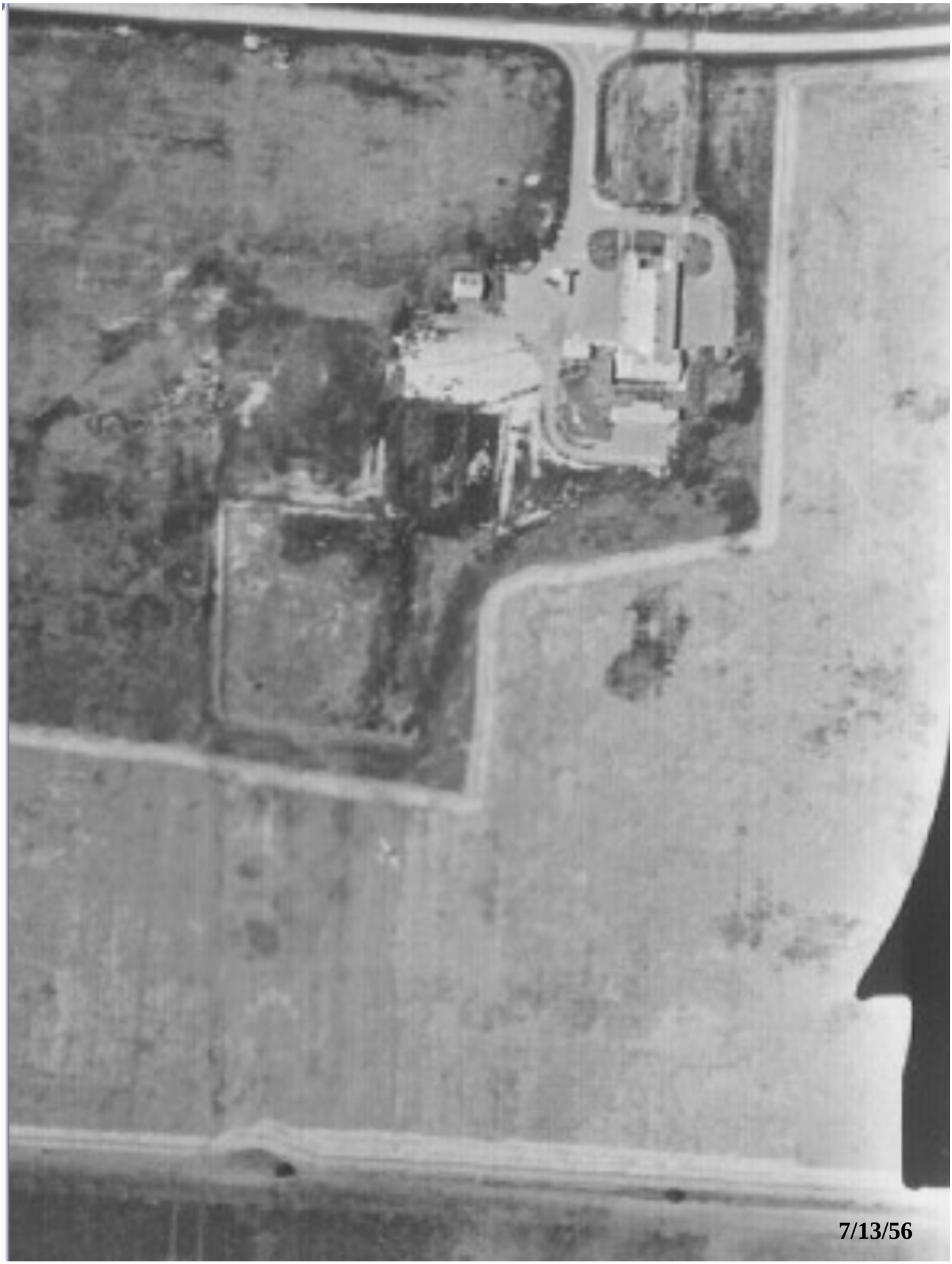

MATCH LINE SEE SHEETS NO. 2 & 3
S-11300
SORTING BUILDINGS
SB-1
SB-2
SB-4
SB-3
H-SB-1
H-SB-2
R-4
R-SB-1
R-SB-4
R-SA-1
R-SA-2
R-SA-3
R-SB-7
SB-5
STRIPPING & SHOP BUILDING
LUMBER YARD
R-SB-6
H-SB-4
R-SB-5
SB-6
INCINERATOR
CLASSIFICATION YARD
R-CS-1
R-CS-2
R-CS-3
R-CS-4
R-CS-5
R-CS-6
R-CS-7
R-CS-8
H-CS-2
H-CS-1
BARRICADED SIDINGS
R-Y-1
R-5
18
19
20
S-12000
S-13000
S-14000
S-15000
S-16000
W-10000
W-3400
W-4000
W-9000
W-8000
W-7000
W-6000
W-5000
S-16700
LEGEND
FIRE HYD.
WATER
VALVE
M.H.
SEWER
STEAM
P.P.
ELECTRIC DUCT
L.S.
SCALE 1" = 200'
N
0451
AS BUILT
DATE 4-19-45 DATE 4-19-45
A.&E. O.IN C.C.
Y. & D. DRAWING NUMBER
314668
U. S. NAVAL AMMUNITION & NET DEPOT
SEAL BEACH, CALIFORNIA
UNDERGROUND UTILITIES
GRAHAM-ANDERSON-PROBST & WHITE — ARCHITECTS-ENGINEERS
LEEDS-HILL-BARNARD & JEWETT — CONSULTING-ENGINEERS
4
SHEET 4 OF 21

APPENDIX A-2

MRP Site UXO2 Historical Aerial Photos, Maps, and Diagrams

6/17/47

11/18/52


7/13/56

1958

5/7/60

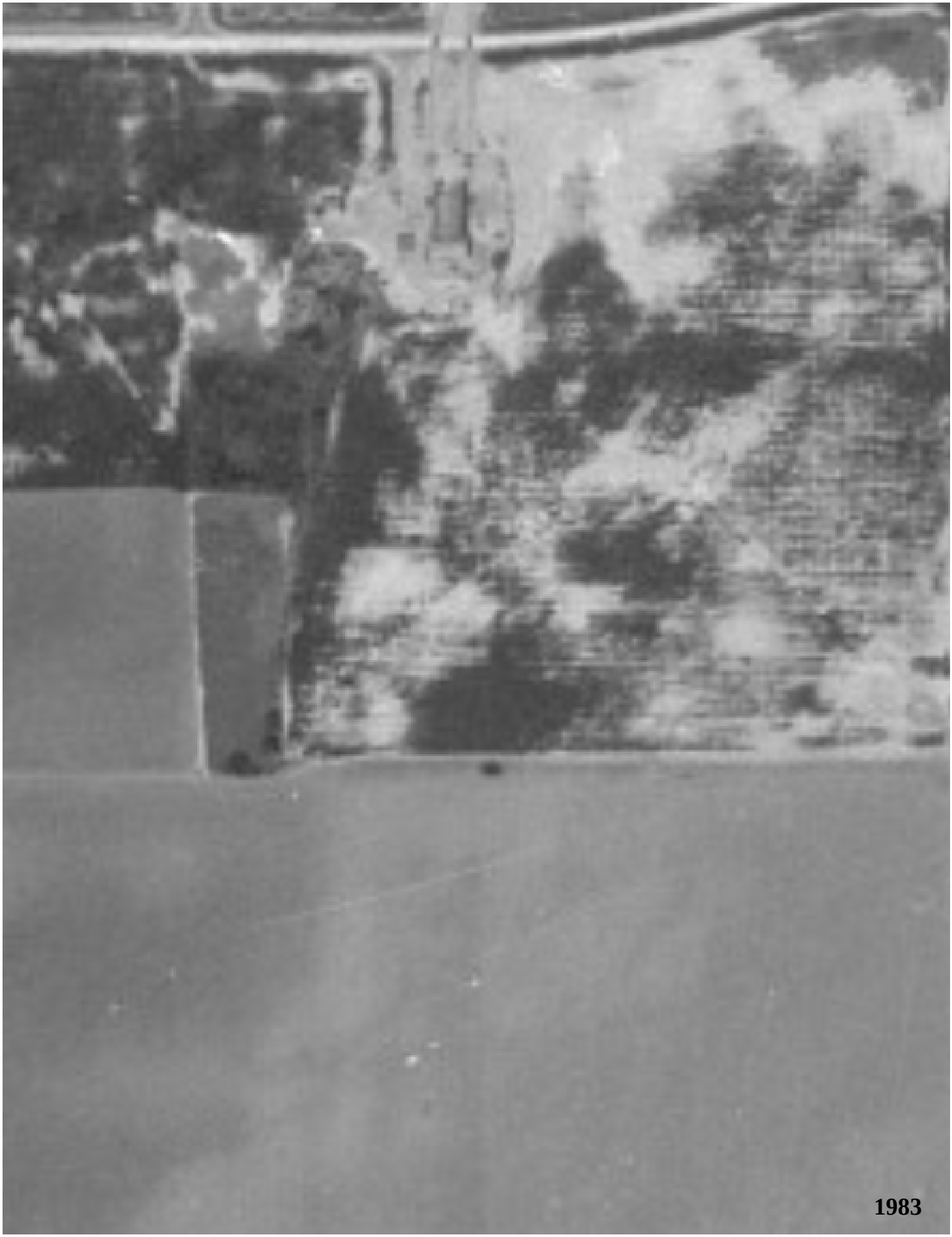
1965

8/22/68

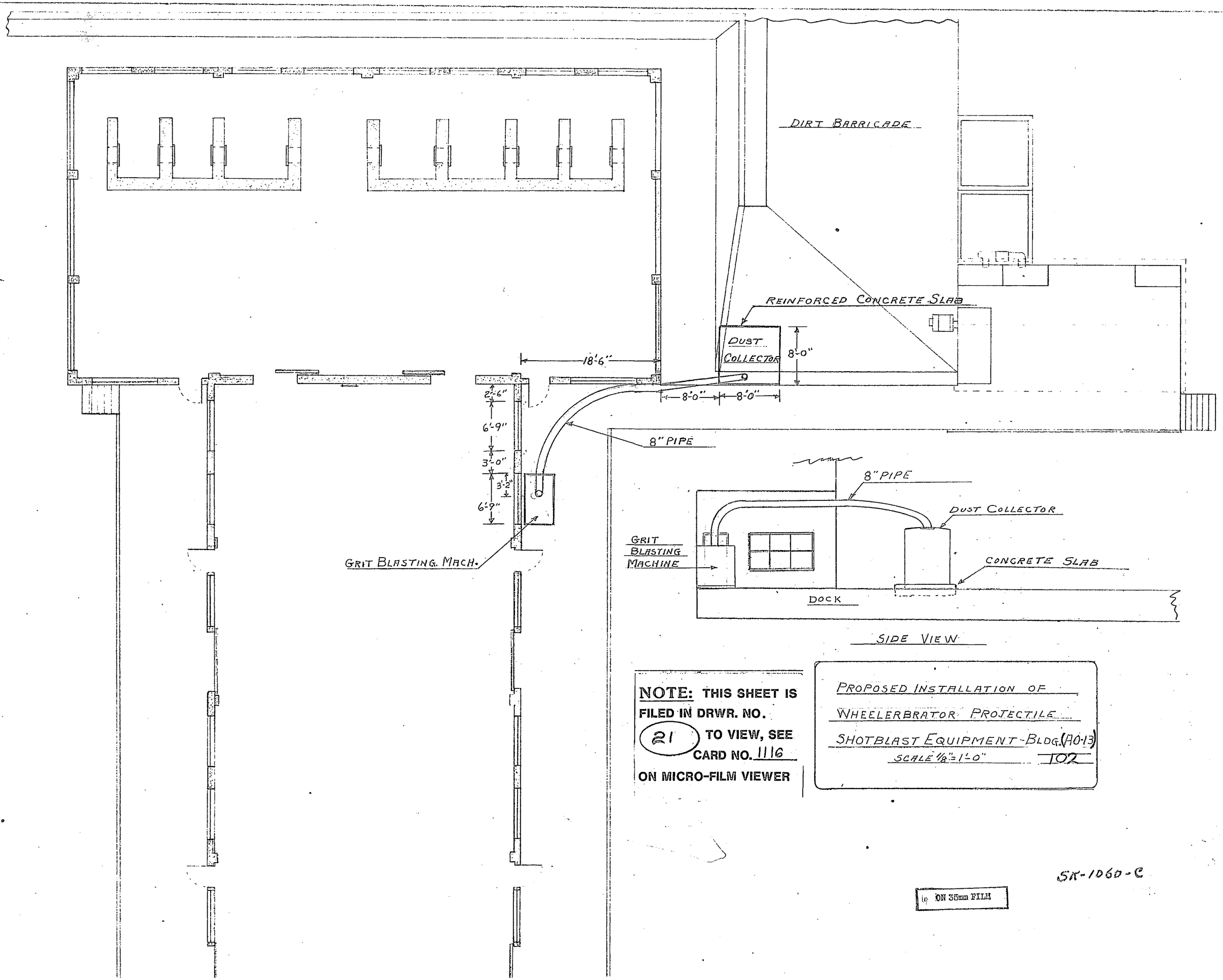
1970

12/9/74

3/18/77


1983

1989



NOTE: THIS SHEET IS FILED IN DRWR. NO. 21 TO VIEW, SEE CARD NO. 1116 ON MICRO-FILM VIEWER

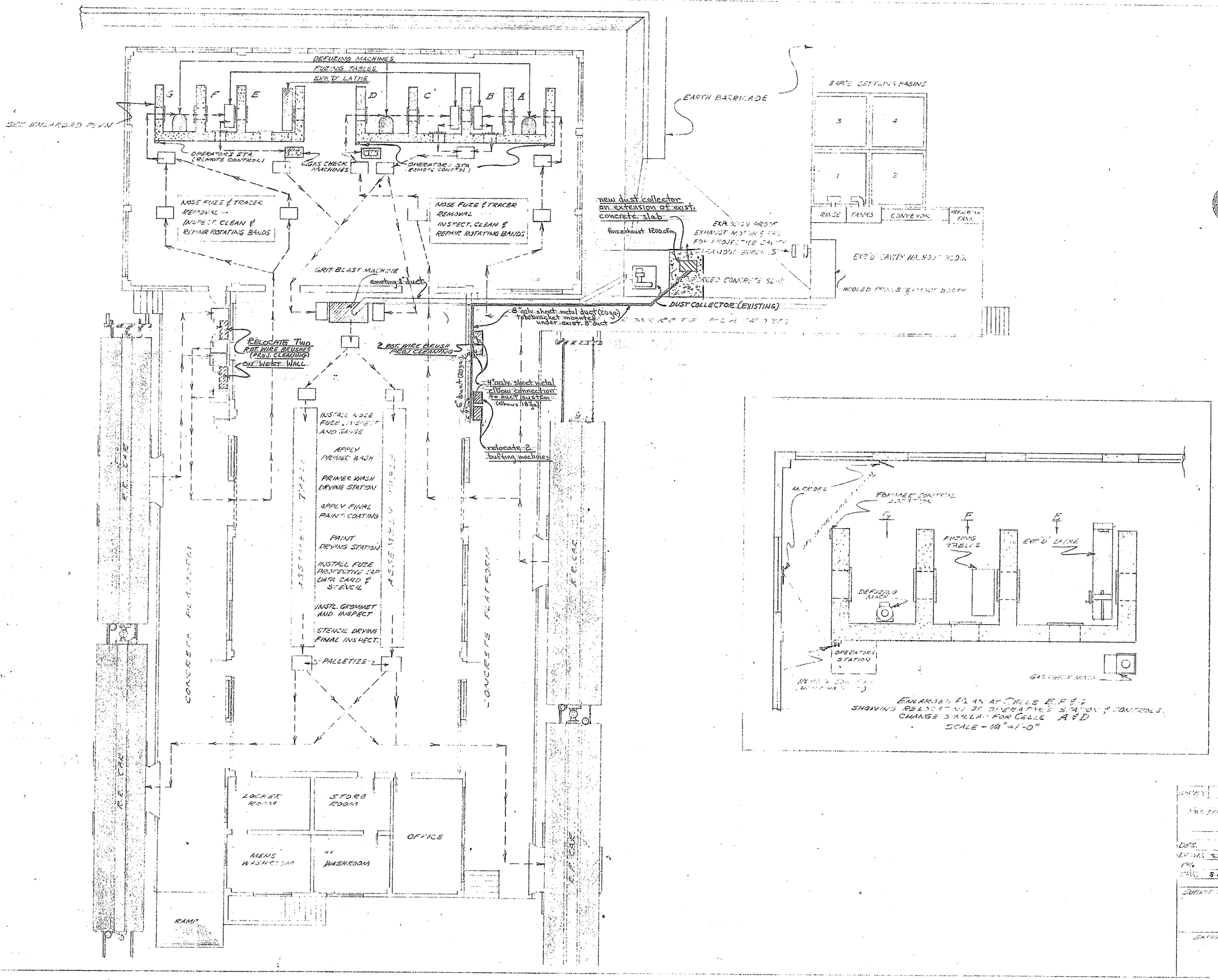
PROPOSED INSTALLATION OF WHEELERBRATOR PROJECTILE SHOTBLAST EQUIPMENT - BLDG. (A0-13)

SCALE 1/8" = 1'-0"

102

SK-1060-C

ON 35mm FILM



NOTE: THIS SHEET IS FILED IN DRWR. NO. 21 TO VIEW, SEE CARD NO. 1121 ON MICRO-FILM VIEWER

US NAVAL AMMUNITION DEPOT, SAN CLEMENTE, SOUTH CALIFORNIA

DES. S. LEFKOWITZ

FLOOR PLAN - Bldg. (AO-13) 102

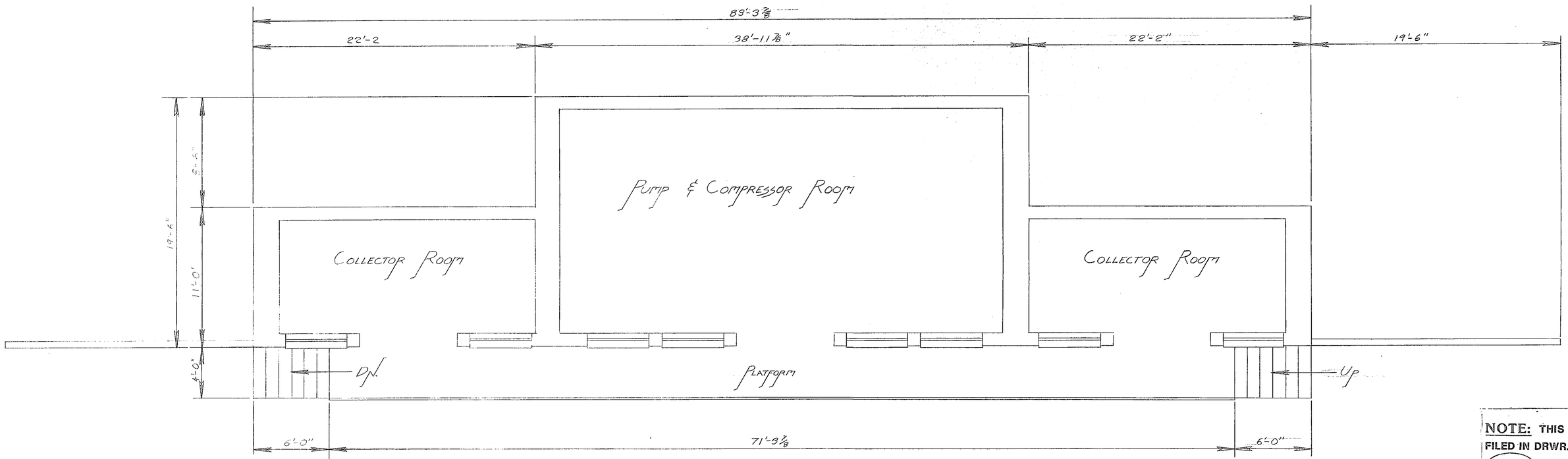
PROPOSED DUST COLLECTOR INSTALLATION FOR BUFFING MACHINES

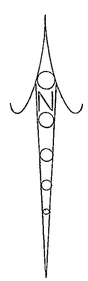
PUBLIC WORKS OFFICER

SCALE 1/8" = 1'-0"

SHEET 1 OF 1

DRAWING NO. SK-1127-D





FLOOR PLAN
SCALE: 1/4"=1'-0"

NOTE: THIS SHEET IS FILED IN DRWR. NO. 21 TO VIEW, SEE CARD NO. 6036 (21) ON MICRO-FILM VIEWER

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS		

PWO DRAWING NO. SK-1787-D	DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND U. S. NAVAL WEAPONS STATION SEAL BEACH, CALIFORNIA
DSGN. DR. CHK. SECURITY DEPT. FIRE DEPT. SAFETY DEPT. DEPT.	FLOOR PLAN BLDG. 101
APPROVED DATE OFFICER IN CHARGE	SIZE D · CODE IDENT. NO. 80091 · NAVFAC DWG. NO. · CONTR. NO.
FILE NO.	SCALE · SPEC · SHEET 1 OF 1

UP DATE AUG. 17-1977 ECE

SOP-11

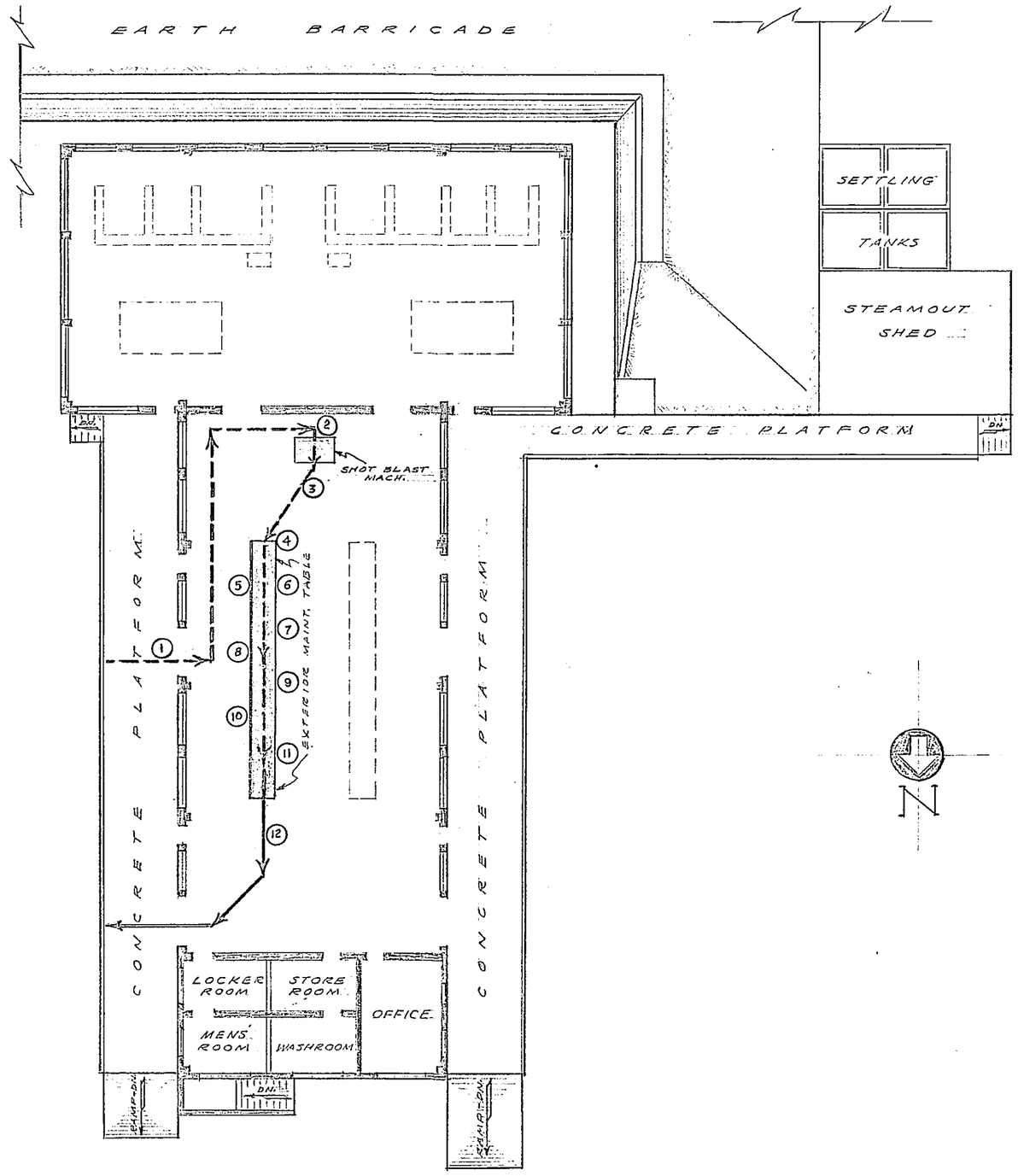
U S NAVAL AMMUNITION & NET DEPOT
SEAL BEACH, CALIF.

PRODUCTION FLOW PLAN Bldg. AO-13

5"/38 PROJECTILES
EXTERIOR MAINTENANCE

LEGEND

- PRODUCTION FLOW
- UNFINISHED PROJ. FLOW
- FINISHED PROJ. FLOW
- (4) STATIONS
- STATIONARY MACH. & EQUIP. USED



PLAN VIEW
SCALE 1/16"=1'-0"

NOTE: THIS SHEET IS FILED IN DRWR. NO. (21) TO VIEW, SEE CARD NO. 1115 ON MICRO-FILM VIEWER

EQUIPMENT LAYOUT PLAN

BLDG. 107 SOP-11

EXTERIOR MAINTENANCE
5"/38 PROJECTILES
PERSONNEL - 14 PRODUCTION - 300

SUBMITTED: R.S. Pickens
PRODUCTION OFFICER

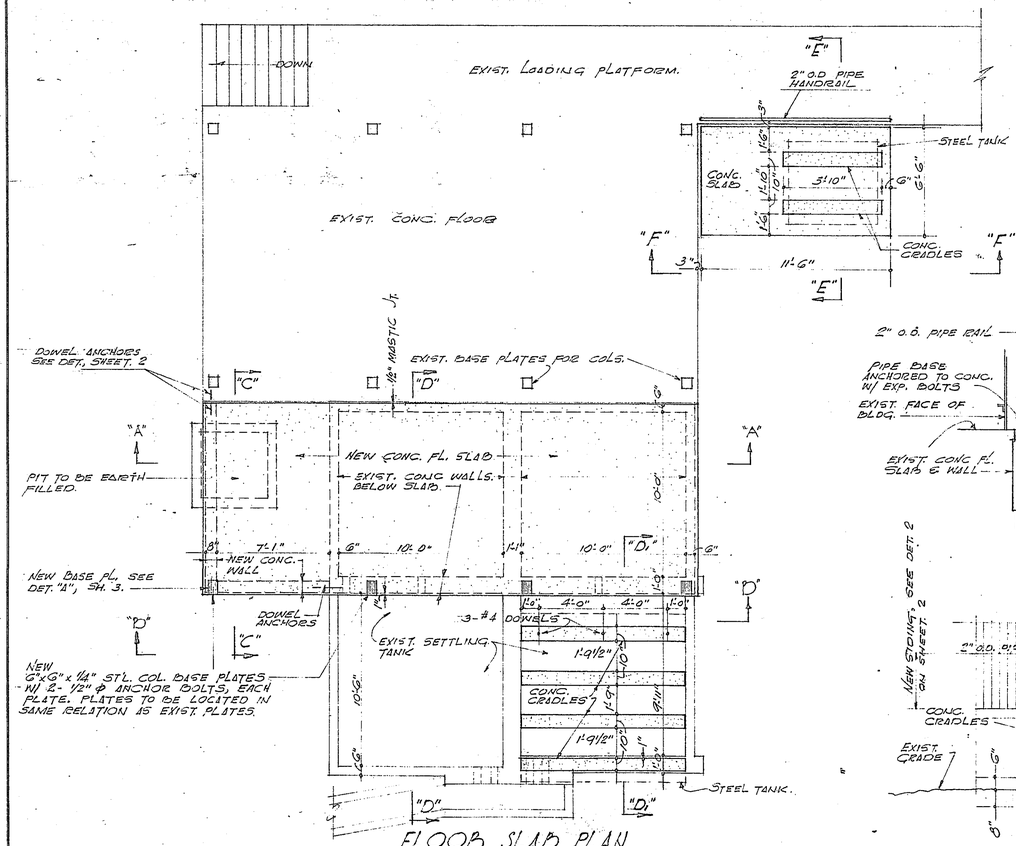
APPROVED: [illegible]
ORDNANCE OFFICER

10-12-54
DATE PREPARED

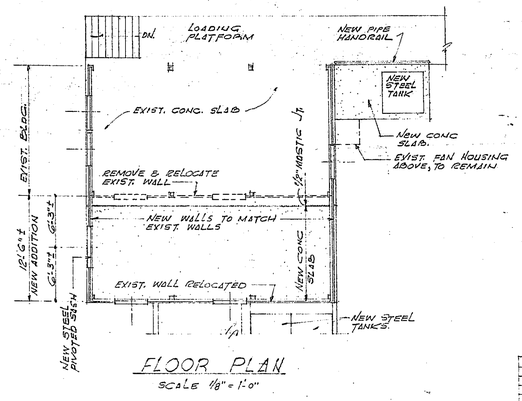
SK-1077-C
DRAWING NO.

HAT
DRWN

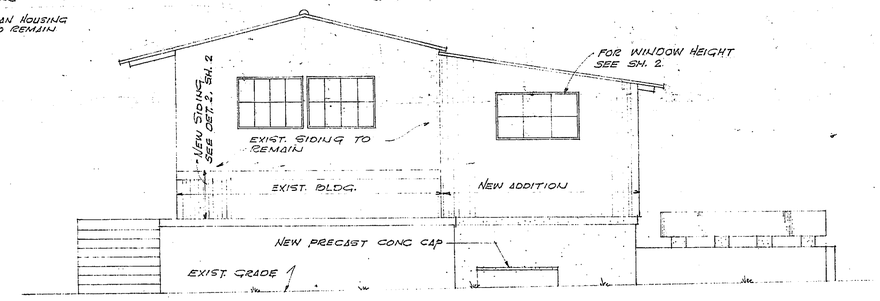
ON 35mm FILM



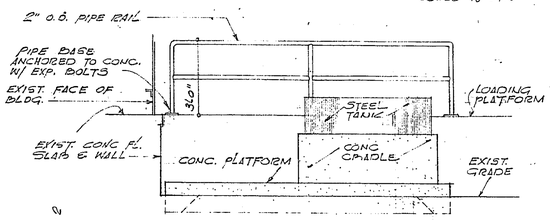
FLOOR SLAB PLAN
SCALE 1/4" = 1'-0"



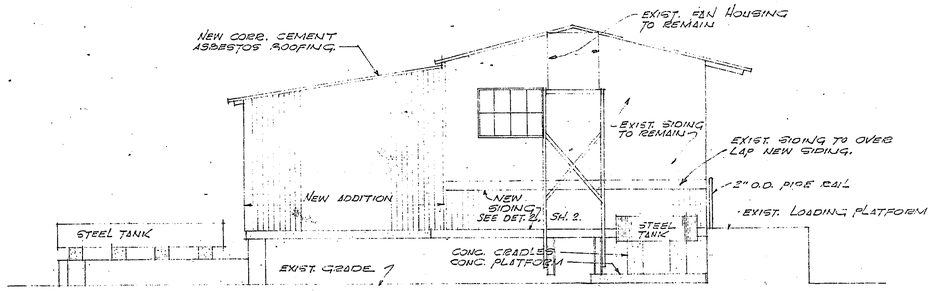
FLOOR PLAN
SCALE 1/8" = 1'-0"



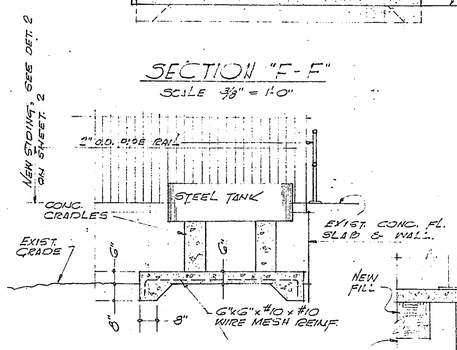
WEST ELEVATION
SCALE 1/4" = 1'-0"



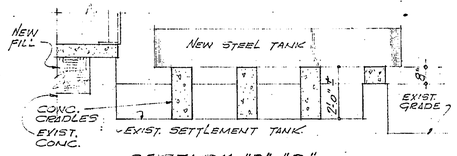
SECTION "F-F"
SCALE 3/8" = 1'-0"



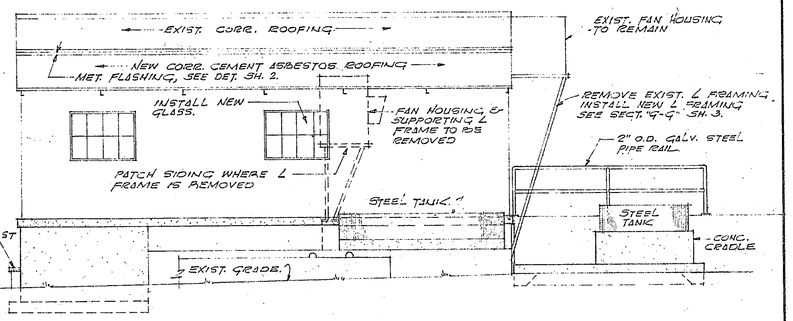
EAST ELEVATION
SCALE 1/4" = 1'-0"



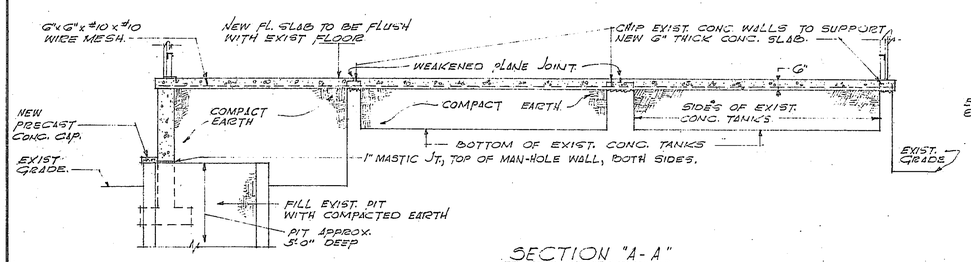
SECTION "E-E"
SCALE 3/8" = 1'-0"



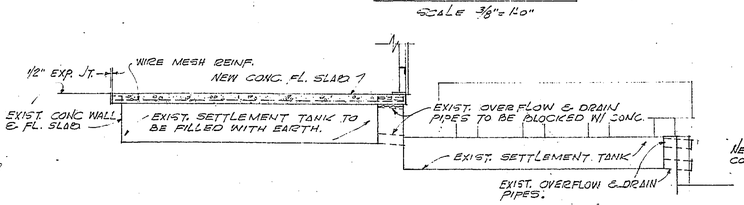
SECTION "D1"-"D1"
SCALE 3/8" = 1'-0"



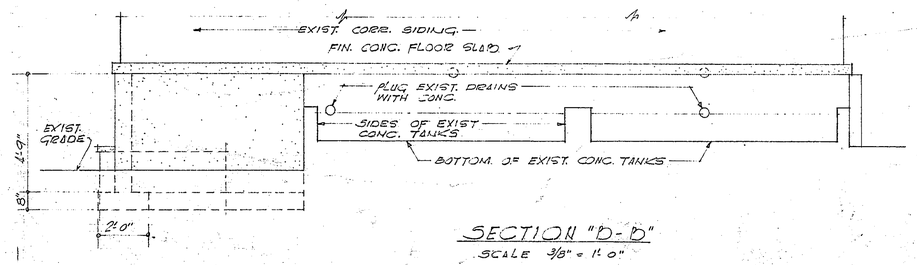
SOUTH ELEVATION
SCALE 1/4" = 1'-0"



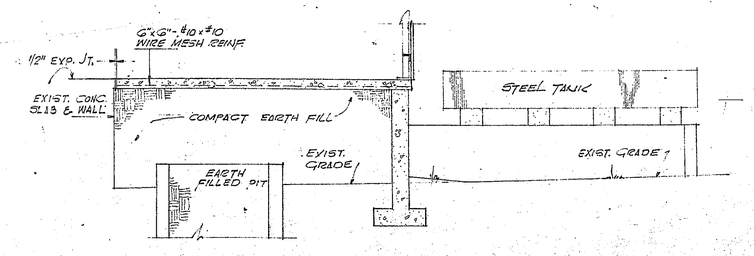
SECTION "A-A"
SCALE 3/8" = 1'-0"



SECTION "D-D"
SCALE 3/8" = 1'-0"



SECTION "D-D"
SCALE 3/8" = 1'-0"



SECTION "C-C"
SCALE 3/8" = 1'-0"

NOTE: CONC. SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 2500 LB/SQ. IN. AT 28 DAYS.

NOTE: FOR DETAILS OF CONC. WALL, CONC. CRADLES & FLASHING, SEE SHEET NO. 2.

LEGEND
NEW CONC. WORK
EXIST. WORK TO REMAIN

GRAPHIC SCALES
1/4" = 1'-0"
3/8" = 1'-0"
1/8" = 1'-0"

NOTE:
SHTS 1 THRU 5
ARE FILED IN DWR
NO. 21 . TO VIEW
SEE CARD NO's 1089
THRU 1093 ON THE
MICRO-FILM VIEWER.

OTHER SHEETS INVOLVED

SYMBOL	BY	DESCRIPTION	DATE	APPROVAL
		REVISIONS		

D. P. W. DRAWING No.

DEPARTMENT OF THE NAVY — BUREAU OF YARDS AND DOCKS
DISTRICT PUBLIC WORKS OFFICE
ELEVENTH NAVAL DISTRICT — SAN DIEGO, CALIFORNIA

DESIGNED Rel
DRAWN Rel
CHECKED J.D.G.
PROJ. DSGN. ENGR. Rel
FIRE PROT. ENGR. Jacobson
BRANCH MGR. Williams
ACTING DIRECTOR Ray Oleman
PROJ. MGR. H.A. Sewell
ASST. FOR DSGN. G

U.S. NAVAL AMMUNITION & NET DEPOT.
SEAL BEACH • CALIFORNIA

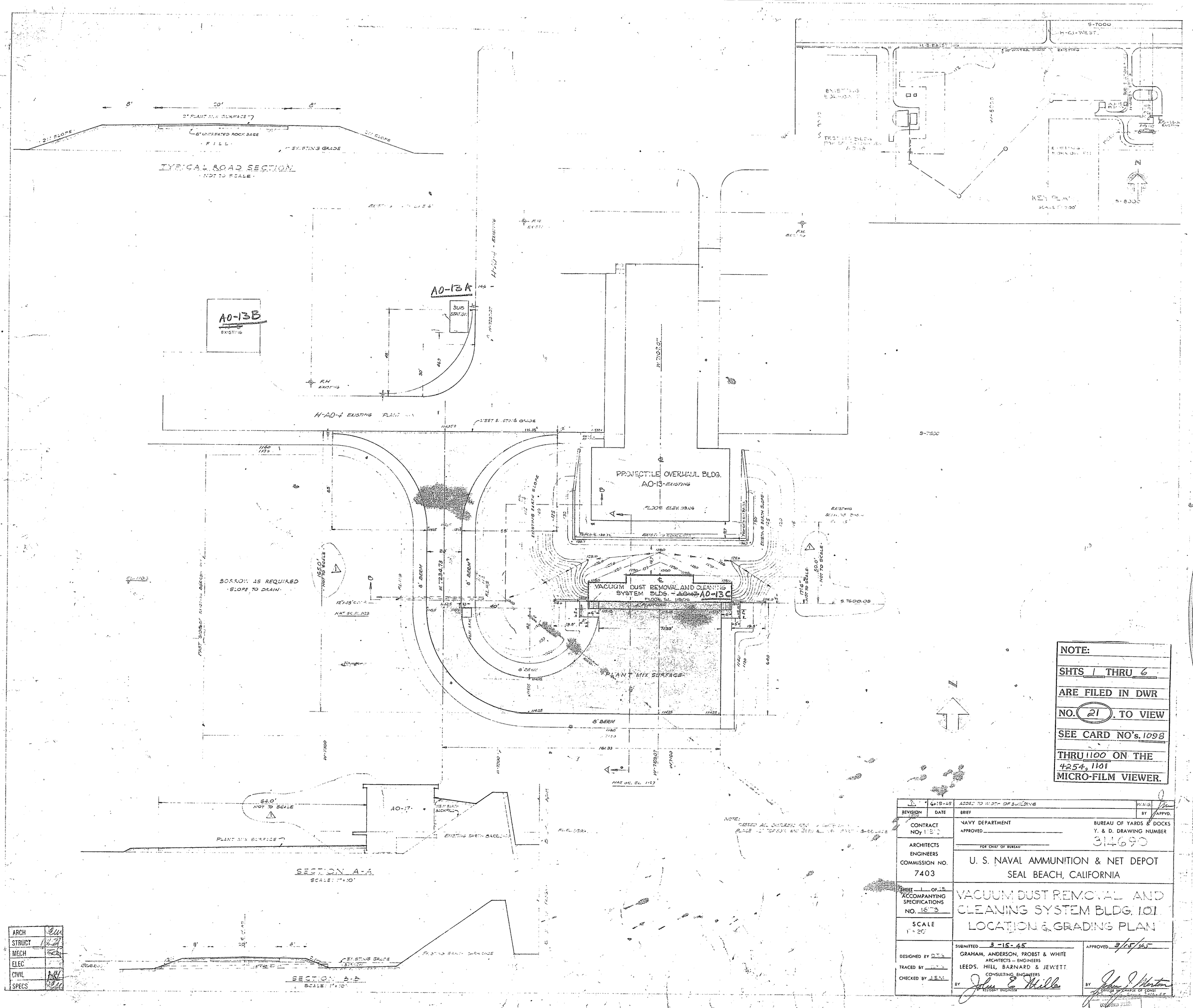
ADDITIONS TO EXPLOSIVE "D" STEAM OUT SHED • BUILDING 98
PLAN • ELEVATIONS • SECTIONS.

APPROVED C.C. Sullivan
FOR DISTRICT PUBLIC WORKS OFFICER, FOR CHIEF OF BUREAU
DATE 11-25-58

SATISFACTORY TO
DATE

SCALE AS NOTED | SPEC. 1951 & 1953
SHEET 1 OF 5 | NBI 1951A
Y & D DRAWING No. 845845

ON 35mm FILM



NOTE:
SHTS 1 THRU 6
ARE FILED IN DWR
NO. 21 TO VIEW
SEE CARD NO's. 1098
THRU 1100 ON THE
4254, 1101
MICRO-FILM VIEWER.

REVISION	DATE	BRIEF	BY	APPVD.
1	4-19-45	ADDED TO WIDTH OF BUILDING	W.M.G.	

CONTRACT NOy 1150

ARCHITECTS ENGINEERS COMMISSION NO. 7403

SHEET 1 OF 15
ACCOMPANYING SPECIFICATIONS NO. 1678

SCALE 1" = 20'

NAVY DEPARTMENT
APPROVED _____
FOR CHIEF OF BUREAU

BUREAU OF YARDS & DOCKS
Y. & D. DRAWING NUMBER
314690

U. S. NAVAL AMMUNITION & NET DEPOT
SEAL BEACH, CALIFORNIA

VACUUM DUST REMOVAL AND CLEANING SYSTEM BLDG. 101
LOCATION & GRADING PLAN

DESIGNED BY D.T.S.
TRACED BY
CHECKED BY J.E.M.

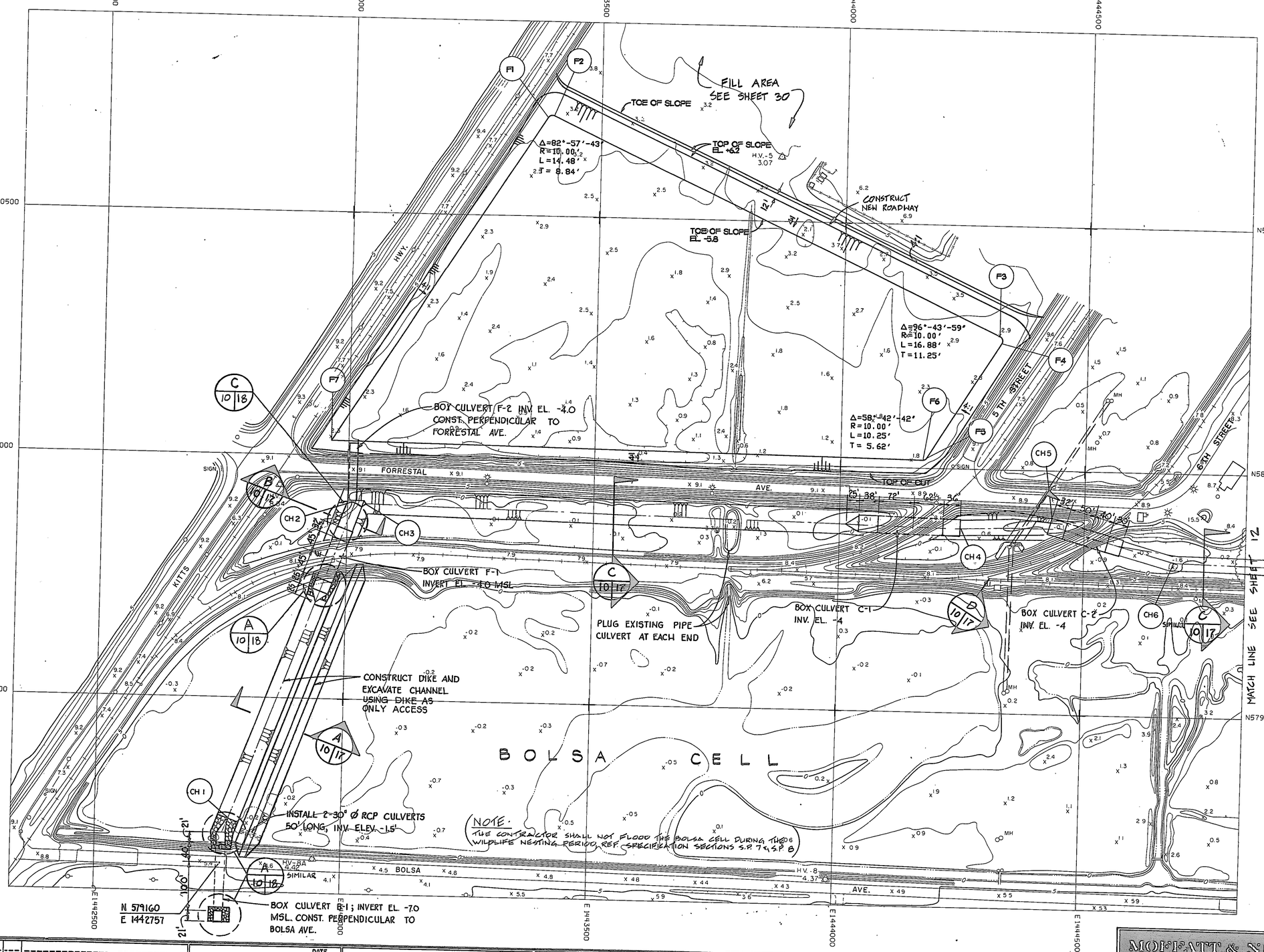
SUBMITTED 3-15-45
GRAHAM, ANDERSON, PROBST & WHITE
ARCHITECTS – ENGINEERS
LEEDS, HILL, BARNARD & JEWETT
CONSULTING ENGINEERS
BY John E. Hills
RESIDENT ENGINEER

APPROVED 3/15/45
BY John J. Merton
OFFICER IN CHARGE OF CONST.

ARCH	
STRUCT	
MECH	
ELEC	
CIVIL	
SPECS	

APPENDIX A-3

MRP Site UXO6 Historical Aerial Photos, Maps, and Diagrams



CONTROL POINT COORDINATES*

POINT	NORTHING	EASTING	TYPE
F1	80703	43390	BC
F2	80707	43402	EC
F3	80274	44321	BC
F4	80260	44325	EC
F5	80022	44177	BC
F6	80017	44168	EC
F7	80031	42965	—
CH1	79250	42770	—
CH2	79909	43017	—
CH3	79900	43035	—
CH4	79867	44250	—
CH5	79887	44430	—
CH6	79815	44785	—
CH7	79812	44955	—
CH8	80005	45185	—

*ADD 500000 TO THE NORTHINGS AND 1400000 TO THE EASTINGS

LEGEND

F1 CONTROL POINT

ELEVATIONS IN FEET WITH RESPECT TO MSL DATUM

A — SECTION OR DETAIL

9 | 16 — SHEET NUMBER THE SECTION OR DETAIL CAN BE FOUND ON

SHEET NUMBER THE SECTION OR DETAIL IS TAKEN FROM

MARK	DATE	BY	REVISIONS

DRAWN M&N DATE 4/88
DESIGNED M&N P.E. NO. C-19871
PROJ. MGR. DHB P.E. NO.
SUBMITTED DHD P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-26526 DATE
MANAGING DIRECTOR P.E. NO. C-10030 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

MOFFATT & NICHOL ENGINEERS

ANAHEIM BAY MITIGATION PROJECT

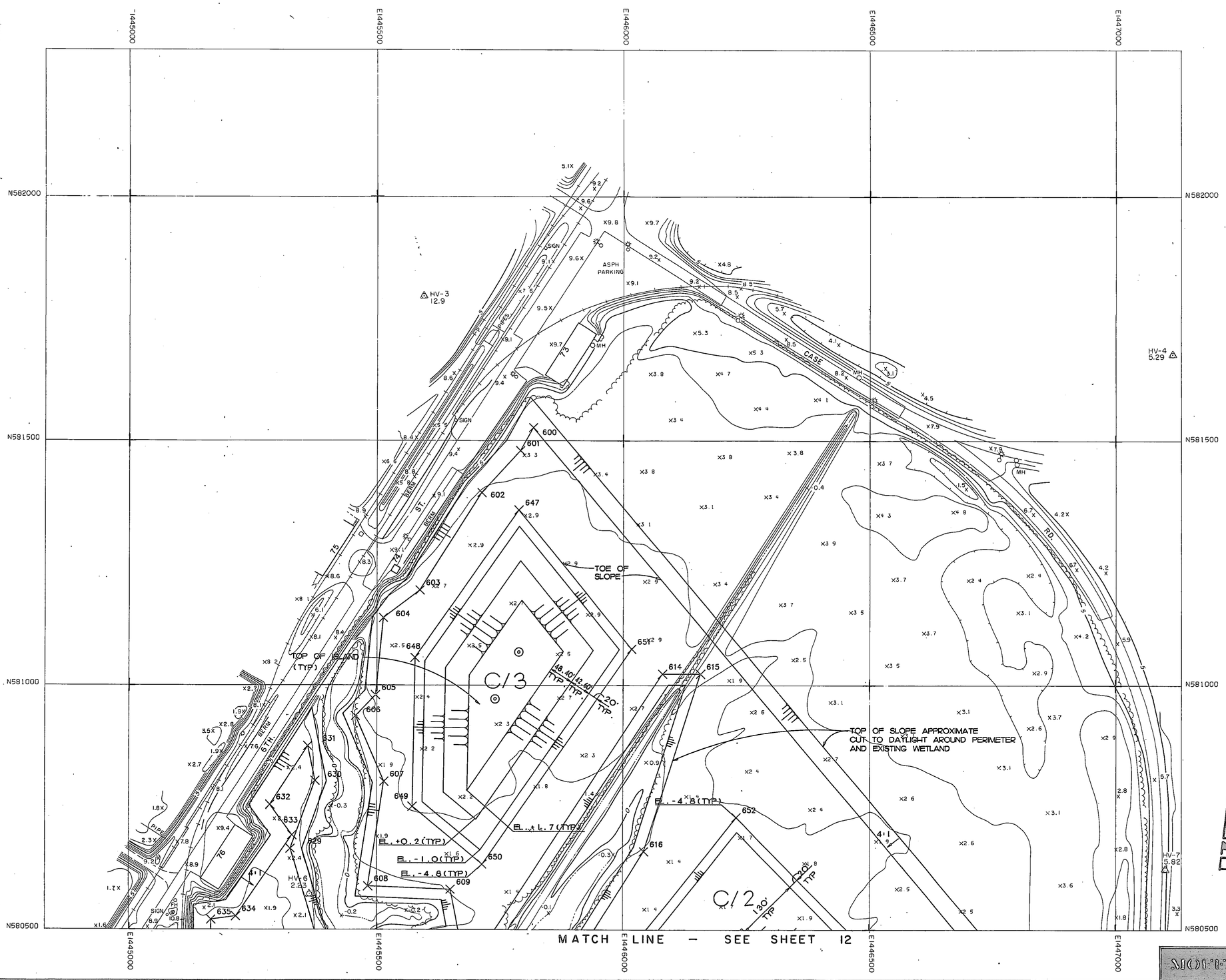
GRADING PLAN- FORRESTAL ROAD & BOLSA CELL

SCALE 1"=100' SHEET 10 OF 32

SPECIFICATION NUMBER HD-S1670

DRAWING NUMBER HD 10-1034-10

PW SKETCH NO. SK-6672-F



CONTROL POINT COORDINATES *

POINT	NORTHING	EASTING
600	81526	45818
601	81479	45792
602	81394	45713
603	81194	45587
604	81138	45513
605	80980	45497
606	80937	45457
607	80803	45514
608	80589	45482
609	80582	45649
610	80488	45667
611	80469	45553
612	80406	45601
613	80489	45733
614	81023	46079
615	81023	46157
616	80660	46042
617	80486	45933
618	80363	45818
619	80360	45784
620	80157	45664
621	80120	45600
622	79944	45492
623	80045	45385
624	80142	45336
625	80127	45407
626	80227	45453
627	80287	45404
628	80406	45402
629	80666	45326
630	80805	45376
631	80876	45361
632	80756	45285
633	80693	45329
634	80527	45215
635	80520	45165
636	80316	45206
637	80021	45352
638	79910	45471
639	79812	45672
640	79797	45974
641	79780	46076
642	79747	46178
643	79650	46334
644	79195	46984
645	79419	47008
646	80098	47011
647	81358	45788
648	81056	45577
649	80752	45572
650	80634	45714
651	81074	46017
652	80730	46230
653	80138	45759
654	79963	45759
655	79837	46200
656	80419	46533
657	80372	46592
658	79788	46273
659	79385	46859
660	80062	46909

* ADD 500000 TO THE NORTHINGS AND 1400000 TO THE EASTINGS

LEGEND

- X.X' ELEVATION POINT (IN FEET WITH RESPECT TO MSL DATUM)
- ⊙ EARTH MOUNDS 17.5± FEET IN DIAMETER AT BASE; TOP ELEVATION +4.0 MSL., DIAMETER 5± FEET - LOCATIONS ARE APPROXIMATE.
- X600 CONTROL POINT
- C/1 ISLAND NUMBER

MARK	DATE	BY	REVISIONS

DRAWN MAN DATE 4/88
DESIGNED MAN P.E. NO. C-19871
PROJ. MGR. DMO P.E. NO.
SUBMITTED DMB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24529 DATE
MANAGING DIRECTOR P.E. NO. C-16830 DATE

WORLD TRADE CENTER — AMERICAS MOST MODERN PORT

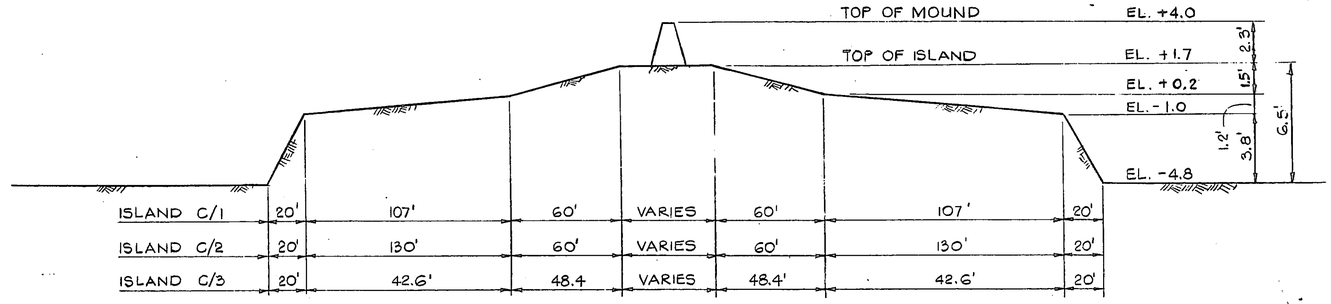
CIVIL ENGINEERING DIVISION
PORT of LONG BEACH
925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

MOFFATT & NICHOL ENGINEERS

ANAHEIM BAY MITIGATION PROJECT
GRADING PLAN-CASE ROAD NORTH

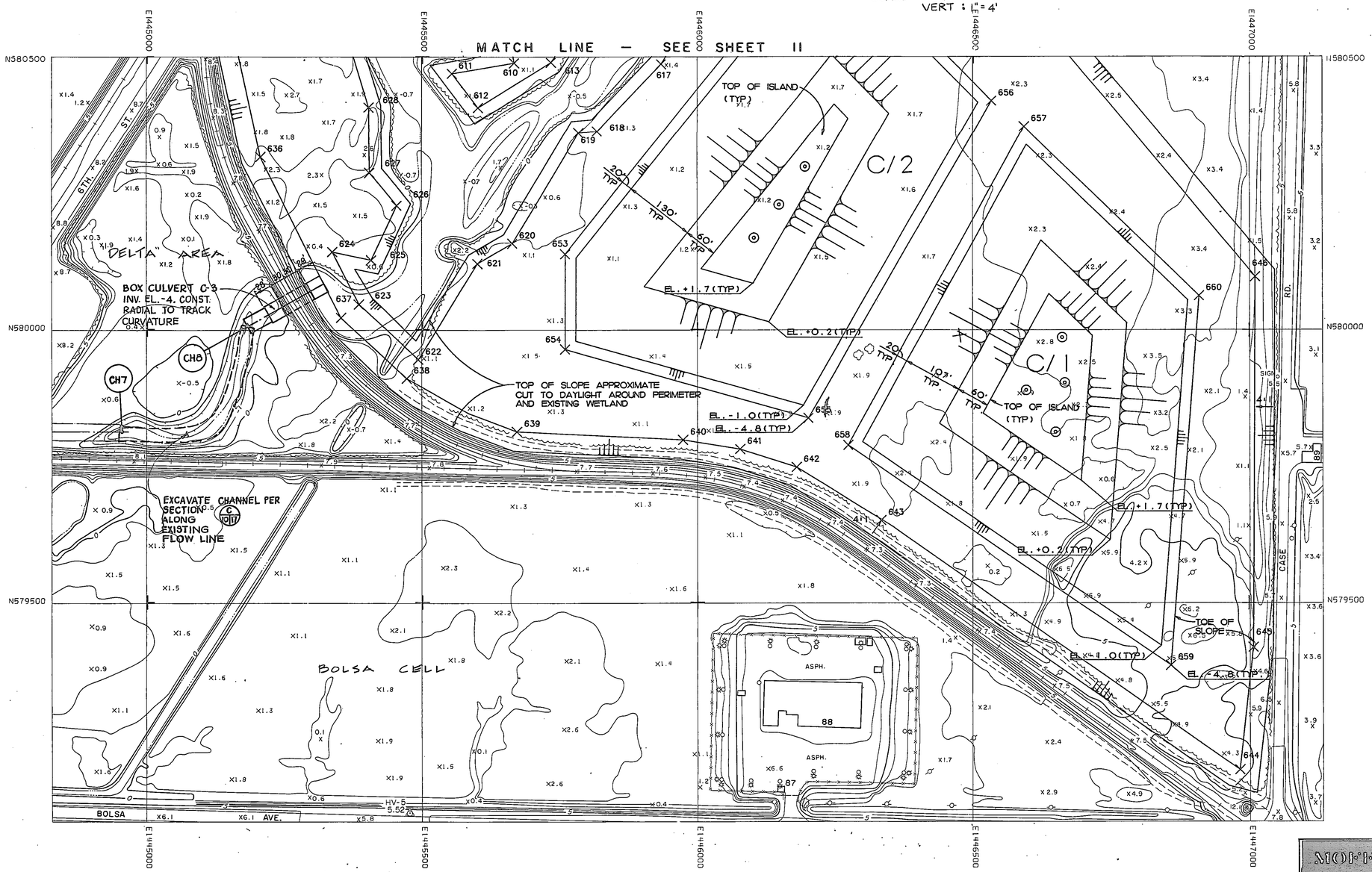
SCALE 1"= 100' SHEET 11 OF 32
SPECIFICATION NUMBER HD-S1670
DRAWING NUMBER HD 10-1034-11

PW SKETCH NO. SK-6673-F



ISLAND SECTION

SCALE HORIZ : 1" = 40'
VERT : 1" = 4'



LEGEND

X.X'	ELEVATION POINT (IN FEET WITH RESPECT TO MSL DATUM)
⊙	EARTH MOUNDS 17.5± FEET IN DIAMETER AT BASE; TOP ELEVATION +4.0 MSL., DIAMETER 5± FEET — LOCATIONS ARE APPROXIMATE.
X600	CONTROL POINT
C/1	ISLAND NUMBER

MOFFATT & NICHOL ENGINEERS

MARK	DATE	BY	REVISIONS

DRAWN M&N DATE 4/88
DESIGNED M&N P.E. NO. C-19871
PROJ. MGR. DHB P.E. NO.
SUBMITTED DHB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24520 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION
PORT of LONG BEACH
925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT
GRADING PLAN-CASE ROAD SOUTH

SCALE 1" = 100' SHEET 12 OF 32
SPECIFICATION NUMBER HD-S1670
DRAWING NUMBER HD 10-1034-12

PW SKETCH NO. SK-6674-F

CONTROL POINT COORDINATES*

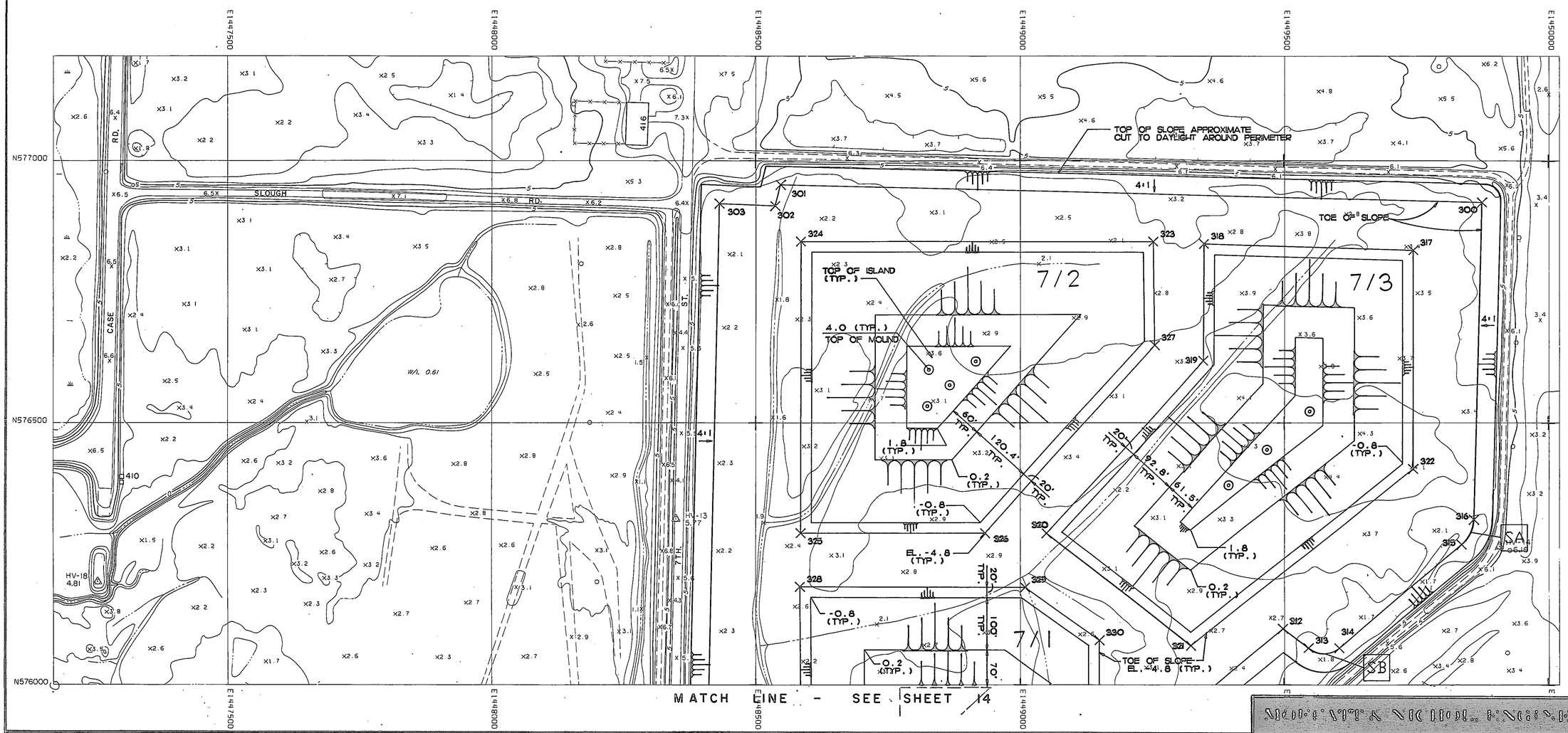
POINT	NORTHING	EASTING	POINT	NORTHING	EASTING
300	76921	49874	318	76841	49349
301	76954	48547	319	76618	49348
302	76914	48537	320	76289	49051
303	76918	48431	321	76075	49324
304	75749	48406	322	76412	49745
305	75647	48502	323	76845	49251
306	75541	48506	324	76846	48586
307	75373	48634	325	76289	48585
308	75277	48691	326	76289	48932
309	75322	48755	327	76648	49254
310	75383	48740	328	76187	48583
311	75493	48775	329	76186	49010
312	76107	49498	330	76085	49149
313	76070	49545	331	75921	49149
314	76070	49603	332	75548	48720
315	76268	49836	333	75543	48588
316	76316	49859	334	75500	48522
317	76829	49745			

*ADD 500000 TO THE NORTHINGS AND 1400000 TO THE EASTINGS

CURVE	Δ	R	L	T
SA	48°-14′-43″	64.80′	54.56′	29.02′
SB	80°-42′-21″	44.80′	63.10′	38.06′
SC	63°-41′-32″	109.42′	121.64′	67.97′
SD	39°-07′-10″	64.80′	44.24′	23.02′
SE	73°-45′-20″	105.20′	135.42′	78.92′

LEGEND

- X.X — ELEVATION POINT (IN FEET WITH RESPECT TO MSL DATUM)
- ⊙ — EARTH MOUNDS 17.5± FEET IN DIAMETER AT BASE; TOP ELEVATION +4.0 MSL., DIAMETER 5± FEET-LOCATIONS ARE APPROXIMATE.
- X 300 — CONTROL POINT
- 7/1 — ISLAND NUMBER
- SH — CURVE NUMBER



MARK	DATE	BY	REVISIONS

DRAWN M&N DATE 4/88
DESIGNED M&N R.E. NO. C-19871
PROJ. MGR. DHB R.E. NO.
SUBMITTED DHB R.E. NO. C-30260

DIRECTOR OF ENGINEERING R.E. NO. C-24528 DATE
MANAGING DIRECTOR R.E. NO. C-19039 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

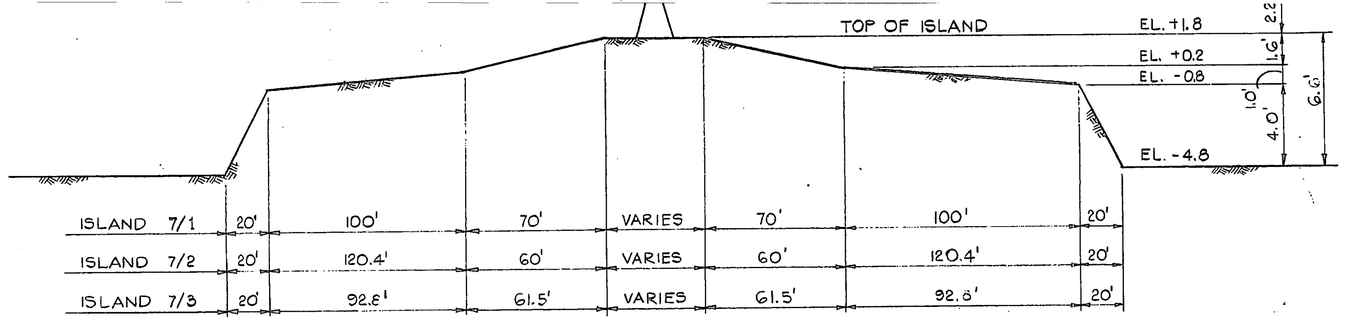
GRADING PLAN-SEVENTH STREET NORTH

SCALE 1" = 100' SHEET 13 OF 32

SPECIFICATION NUMBER HD-S1670

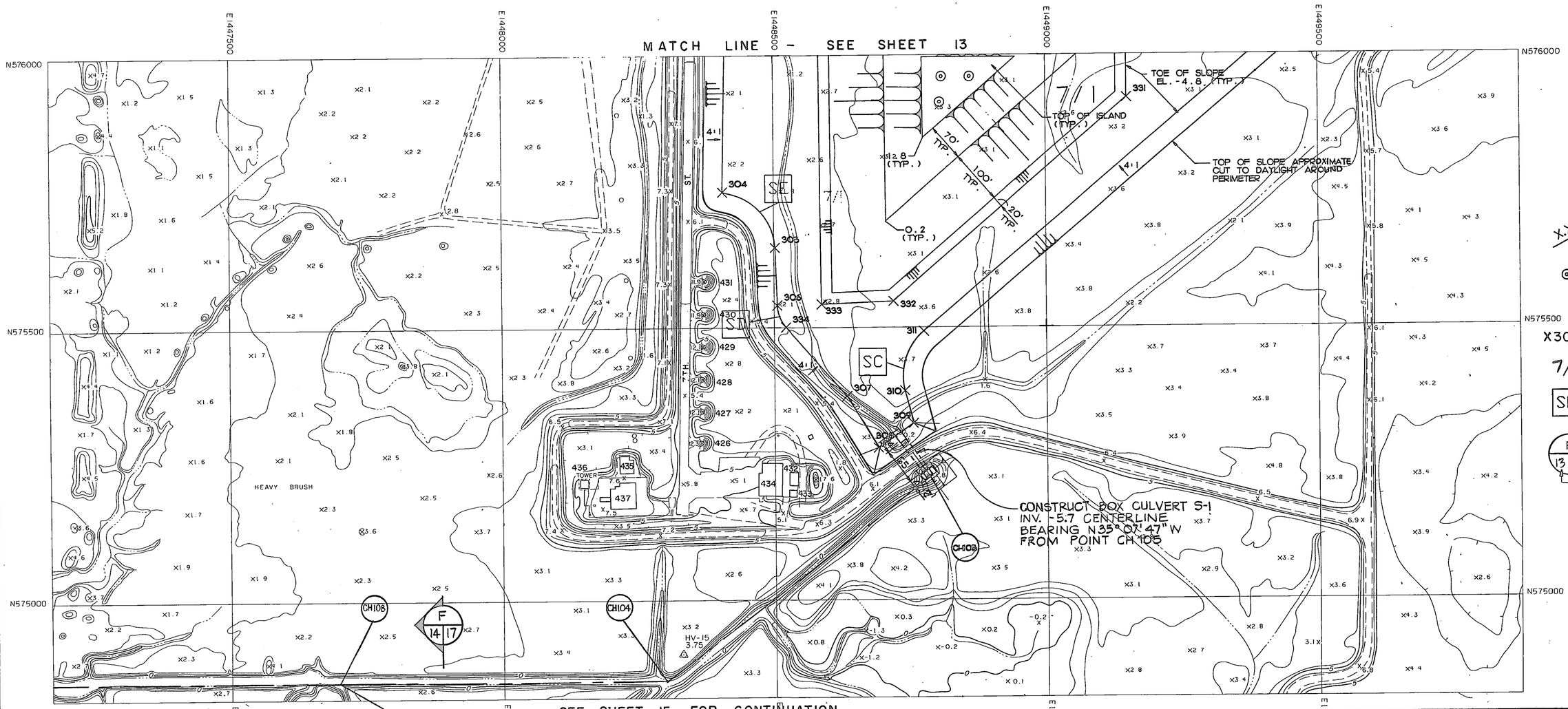
DRAWING NUMBER HD 10-1034-13

PW SKETCH NO. SK-6675-F



ISLAND SECTION

SCALE HORIZ: 1"=40'
VERT: 1"= 4'



LEGEND

X.X'	ELEVATION POINT (IN FEE WITH RESPECT TO MSL D
⊙	EARTH MOUNDS 17.5± F AT BASE; TOP ELEVATION DIA. 5± FEET- LOCATIONS A
X300	CONTROL POINT
7/1	ISLAND NUMBER
SH	CURVE NUMBER
F / 13 16	SECTION OR DETAIL; SHEET NUMBER THE SECTION O DETAIL CAN BE FOUND ON; SHEET NUMBER THE SECTION O IS TAKEN FROM.

MARK	DATE	BY	REVISIONS

		DATE
DRAWN	M&N	
DESIGNED	M&N	P.E. NO. C-19871
PROJ. MGR.	DHB	P.E. NO.
SUBMITTED	DHB	P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24520 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

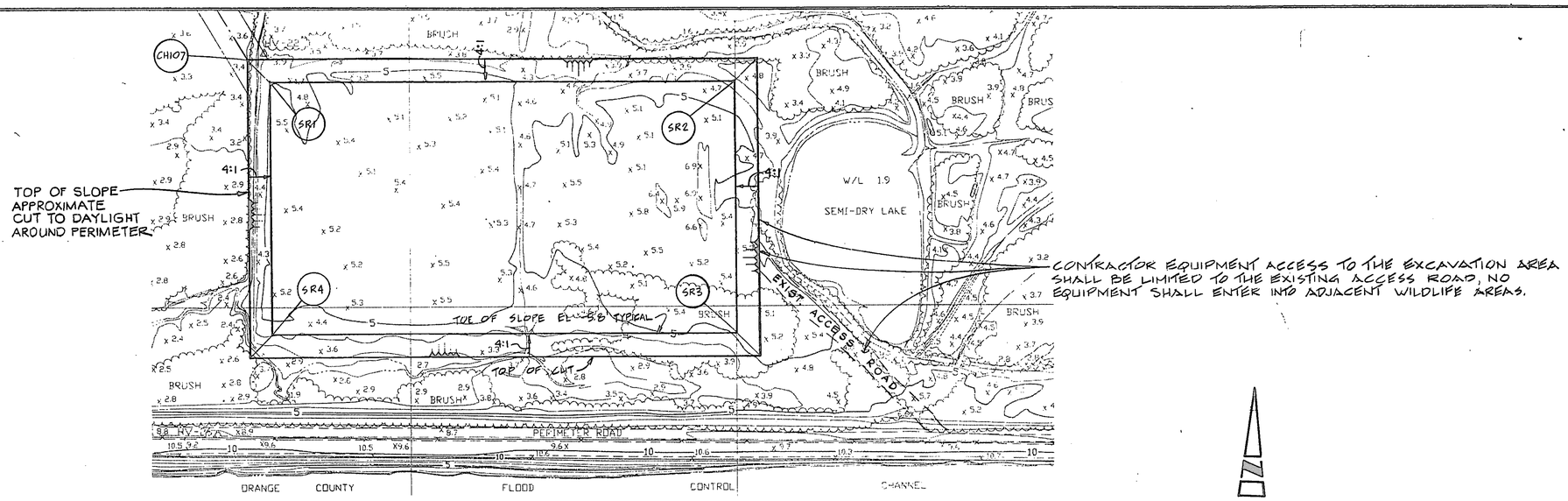
CIVIL ENGINEERING DIVISION
PORT of LONG BEACH
925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

MODIFIED NATIONAL DATUM

ANAHEIM BAY MITIGATION PROJECT
GRADING PLAN-
SEVENTH STREET SOUTH

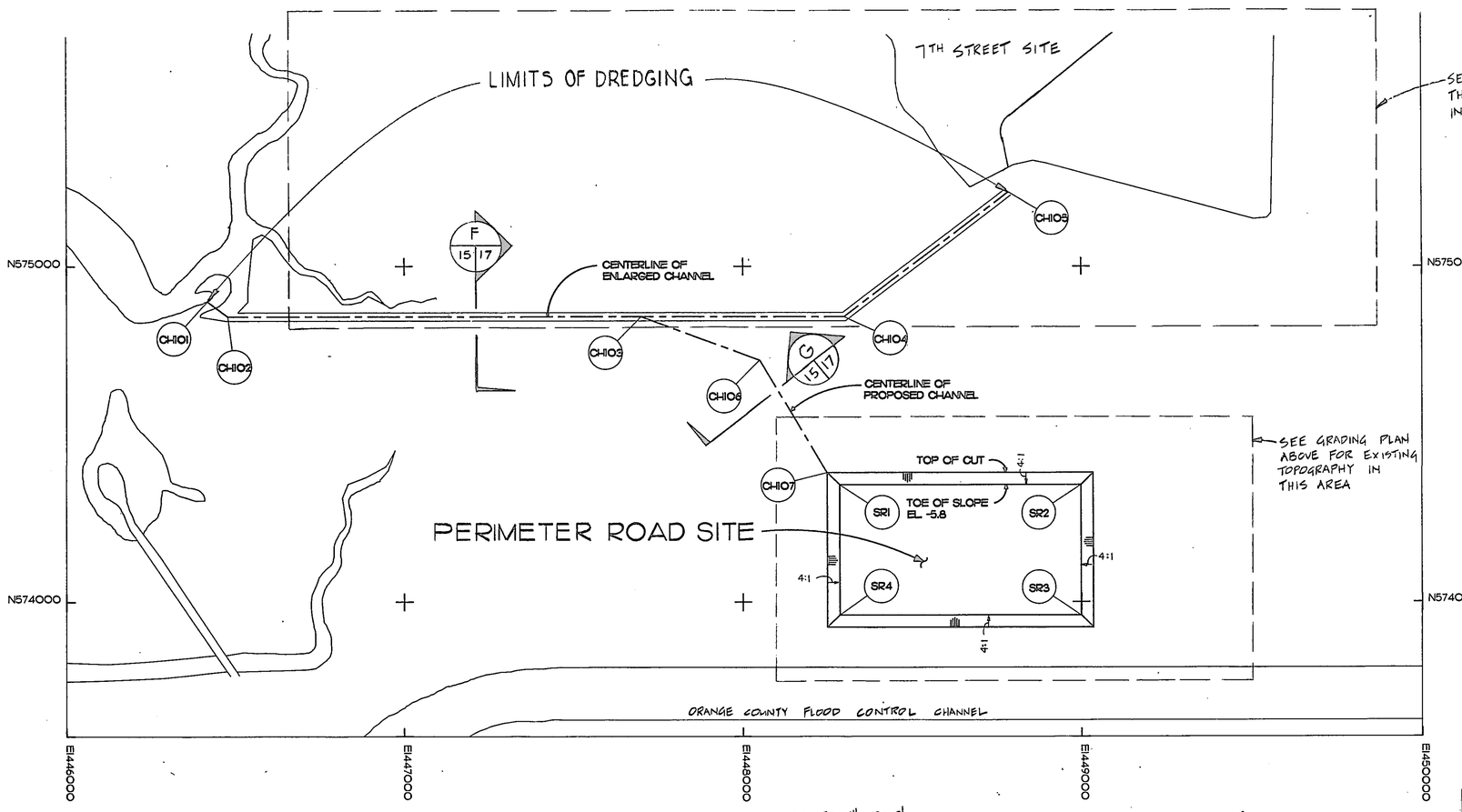
SCALE 1"=100' SI
SPECIFICATION NUMBER HD
DRAWING NUMBER HD-

PW SKETCH NO.



GRADING PLAN - PERIMETER ROAD

SCALE: 1" = 100'



SCALE: 1" = 200'

CONTROL POINT COORDINATES*

POINT	NORTHING	EASTING
SR1	74349	48286
SR2	74349	48999
SR3	73961	48999
SR4	73961	48286
CH101	74896	46422
CH102	74850	46480
CH103	74850	47700
CH104	74850	48300
CH105	75222	48785
CH106	74720	48050
CH107	74385	48250

*ADD 500000 TO THE NORTHINGS AND 1400000 TO THE EASTINGS

LEGEND

SR1 CONTROL POINT

ELEVATIONS IN FEET WITH RESPECT TO MSL DATUM

MOFFATT & NICHOL, ENGINEERS

MARK	DATE	BY	REVISIONS

DRAWN M&N DATE 4/88
DESIGNED M&N P.E. NO. C-19871
PROJ. MGR. DHB P.E. NO.
SUBMITTED DHB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24568 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

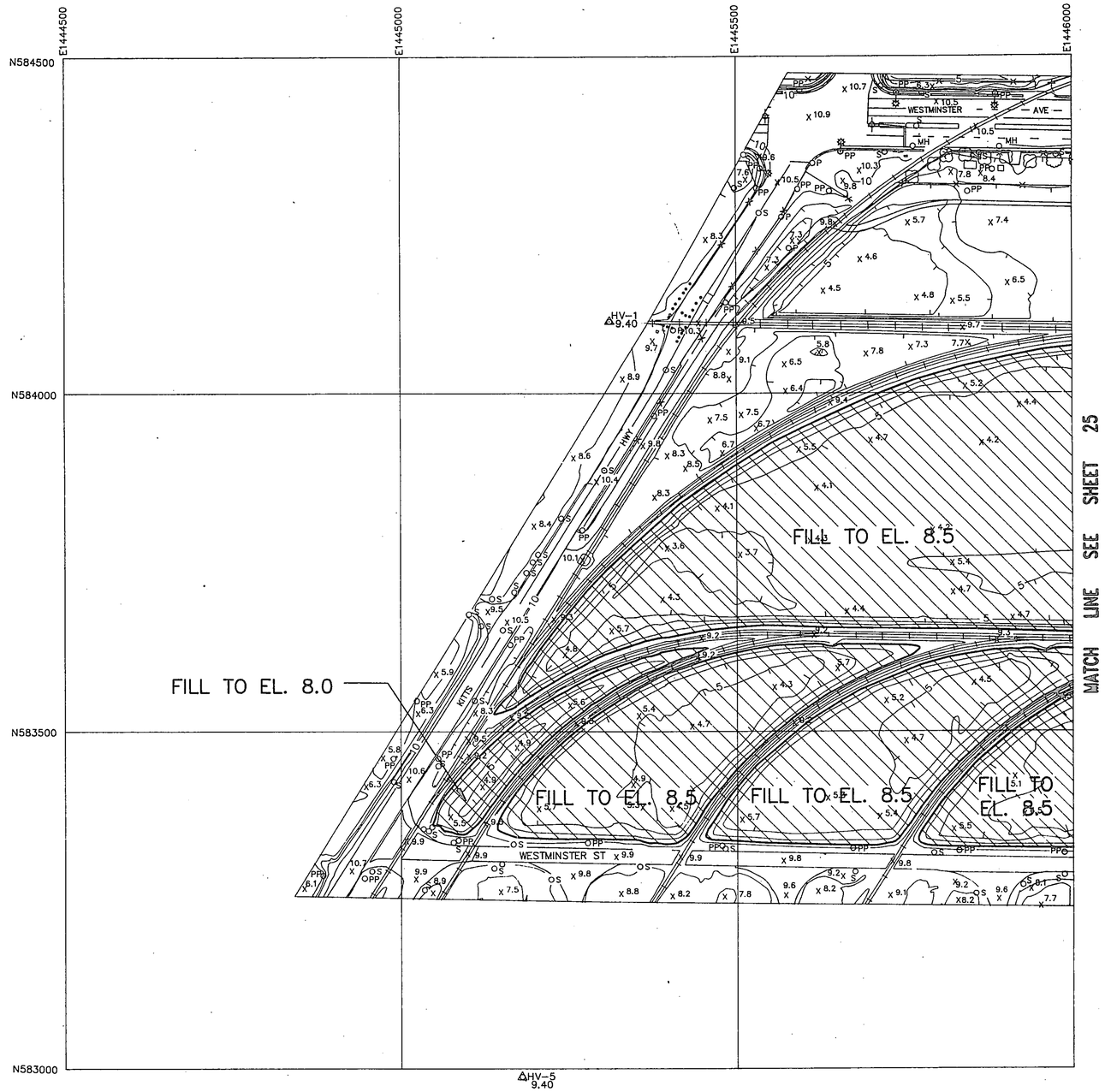
GRADING PLAN - PERIMETER ROAD

SCALE NOTED SHEET 15 OF 32

SPECIFICATION NUMBER HD-S1670

DRAWING NUMBER HD 10-1034-15

PW SKETCH NO. SK-6677-F



MARK	DATE	BY	REVISIONS

DRAWN FCL DATE 4/88
DESIGNED DMB P.E. NO.
PROJ. MGR. DMB P.E. NO.
SUBMITTED DMB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24528 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

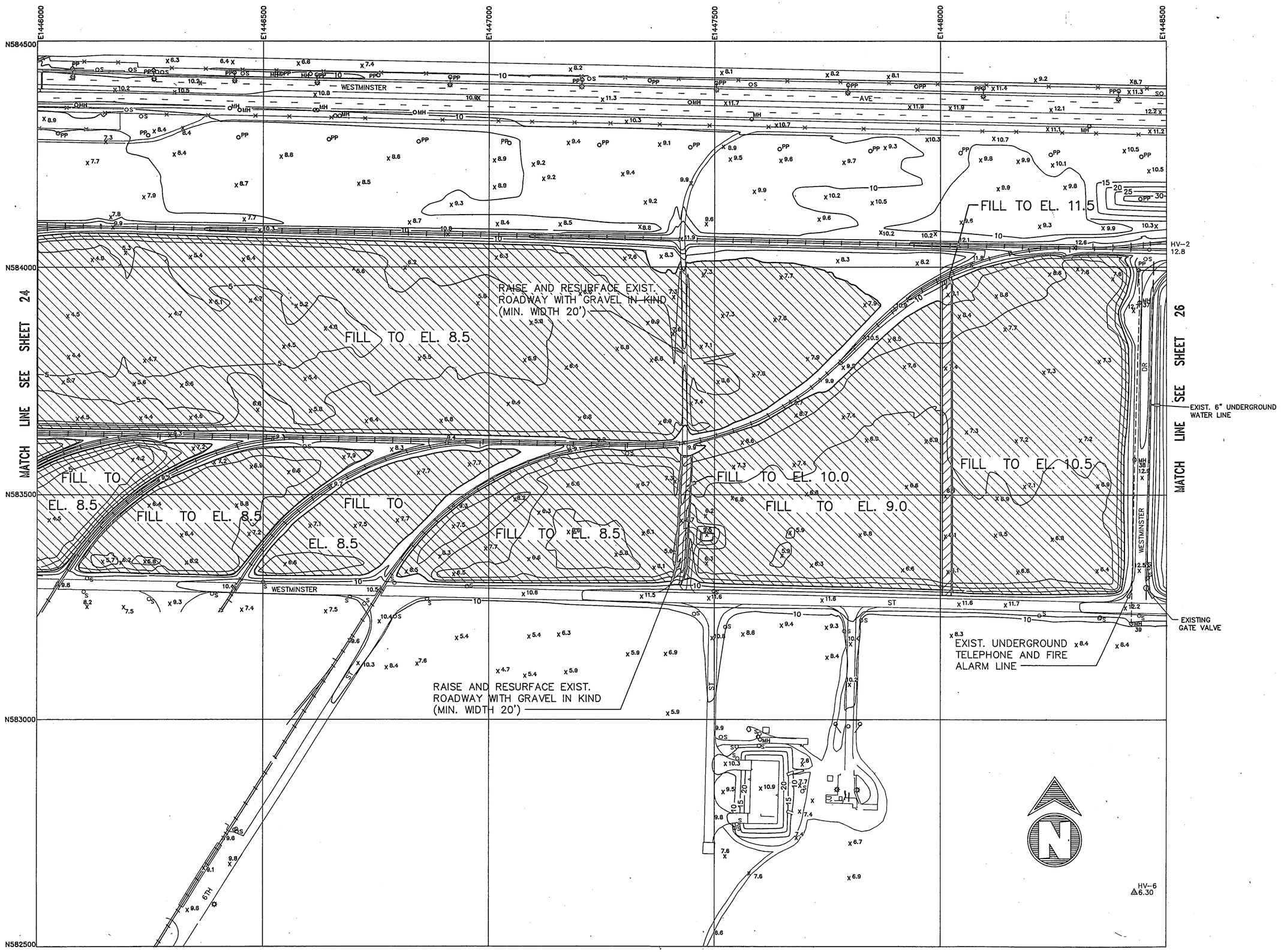
925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

FILL AREA GRADING PLAN

SCALE 1" = 100' SHEET 24
SPECIFICATION NUMBER HD-S1
DRAWING NUMBER HD 10-

PW SKETCH NO. SK



MARK	DATE	BY	REVISIONS

DRAWN FCL DATE 4/88
DESIGNED DMB P.E. NO.
PROJ. MGR. DMB P.E. NO.
SUBMITTED DMB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24528 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

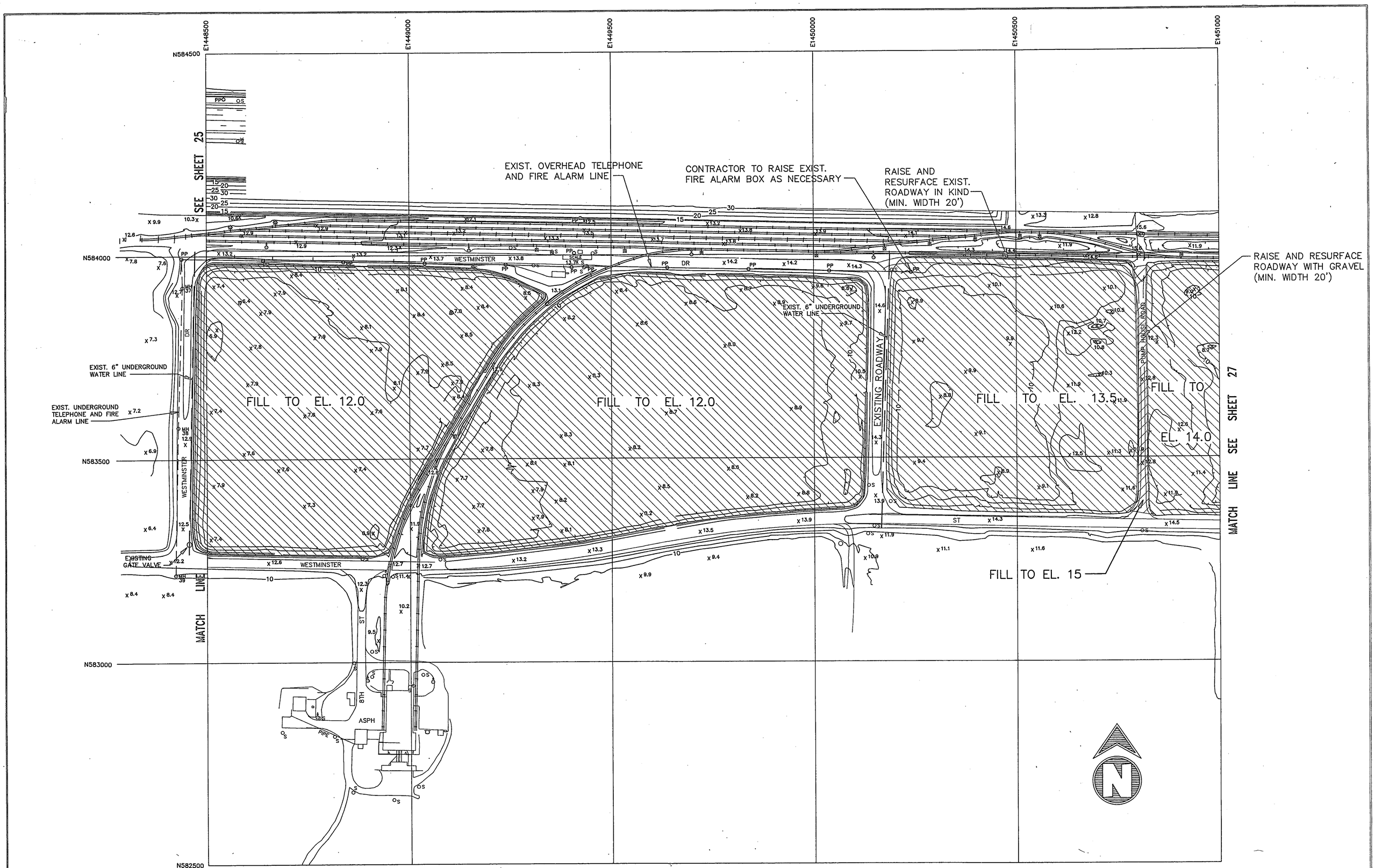
FILL AREA GRADING PLAN

SCALE 1" = 100' SHEET 25 OF 32

SPECIFICATION NUMBER HD-S1670

DRAWING NUMBER HD 10-1034-25

PW SKETCH NO. SK-6687



MARK	DATE	BY	REVISIONS

DRAWN FCL DATE 4/88
DESIGNED DMB P.E. NO.
PROJ. MGR. DMB P.E. NO.
SUBMITTED DMB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24528 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

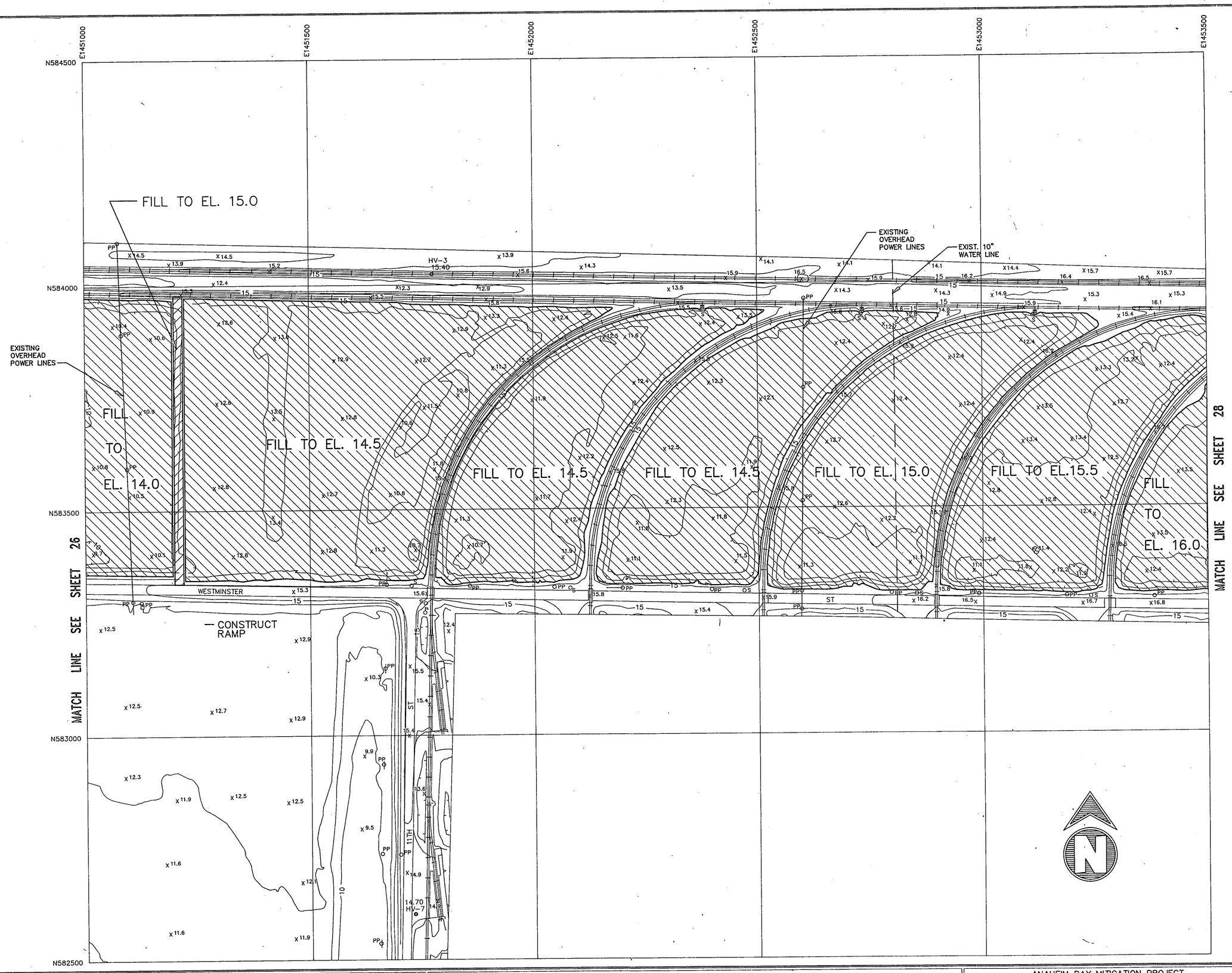
925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

FILL AREA GRADING PLAN

SCALE 1" = 100' SHEET 26 OF 32
SPECIFICATION NUMBER HD-S1670
DRAWING NUMBER HD-10-1034-26

PW SKETCH NO. SK-6688-F



MARK	DATE	BY	REVISIONS

DRAWN FCL DATE 4/88
DESIGNED DMB P.E. NO.
PROJ. MGR. DMB P.E. NO.
SUBMITTED DMB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24528 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

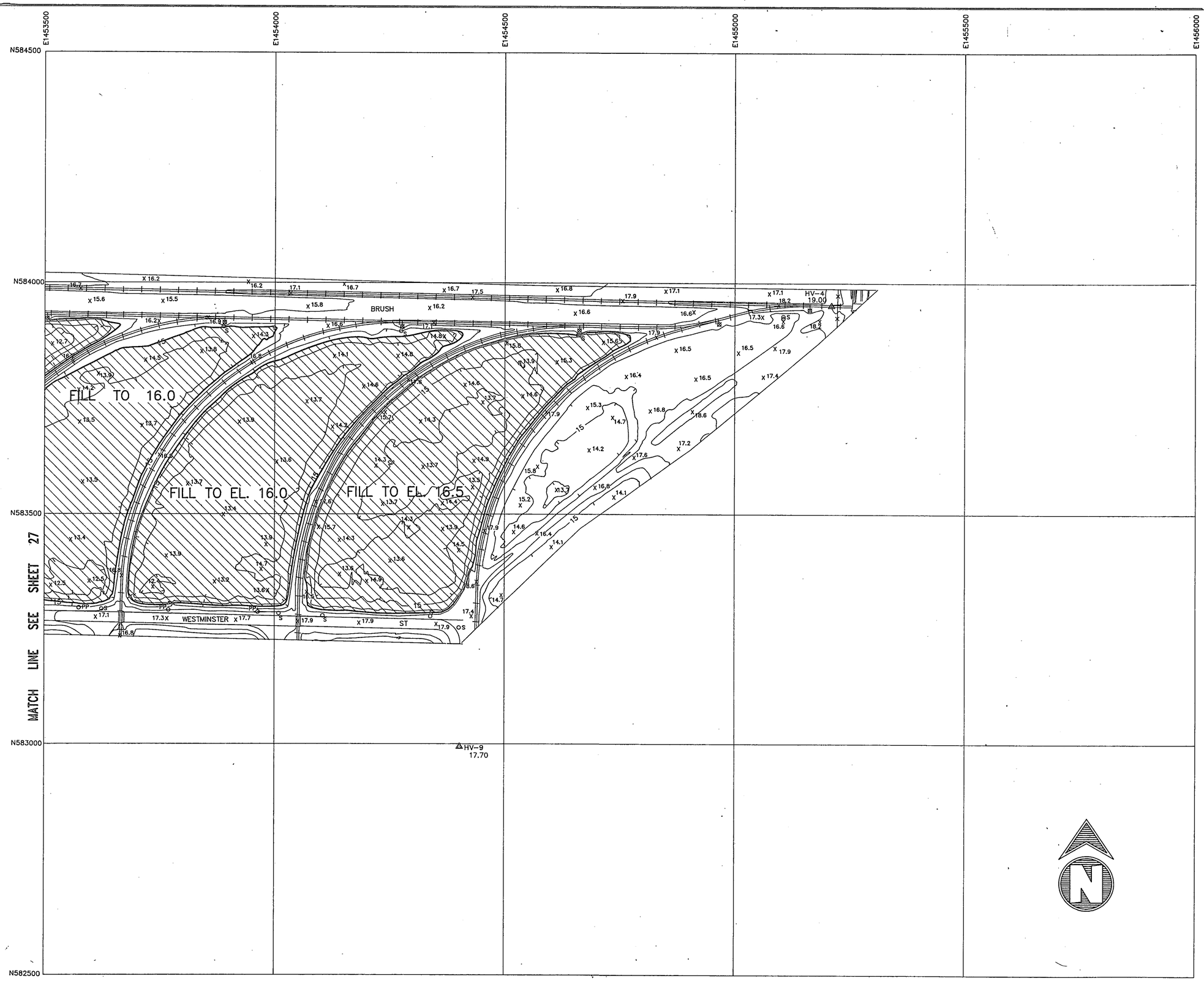
FILL AREA GRADING PLAN

SCALE 1" = 100' SHEET 27 OF 32

SPECIFICATION NUMBER HD-S1670

DRAWING NUMBER HD-10-1034-27

PW SKETCH NO. SK-6689-F



MARK	DATE	BY	REVISIONS

DRAWN FCL DATE 4/88
DESIGNED DMB P.E. NO.
PROJ. MGR. DMB P.E. NO.
SUBMITTED DMB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24528 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

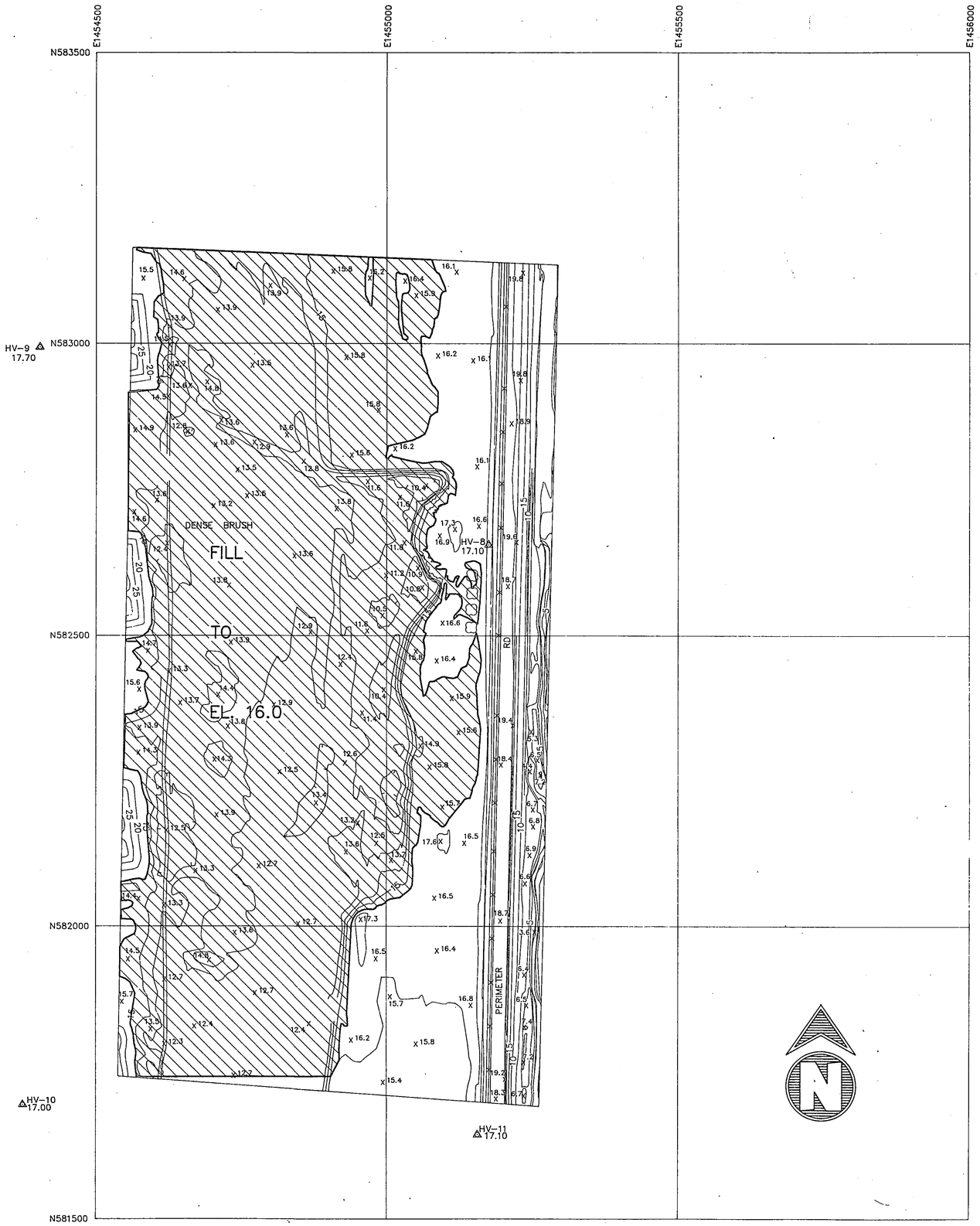
925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

FILL AREA GRADING PLAN

SCALE 1" = 100' SHEET 28 OF 32
SPECIFICATION NUMBER HD-S1670
DRAWING NUMBER HD-10-1034-28

PW SKETCH NO. SK-6690-F



MARK	DATE	BY	REVISIONS

DRAWN FCL DATE 4/88
DESIGNED DMB P.E. NO.
PROJ. MGR. DMB P.E. NO.
SUBMITTED DMB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24528 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

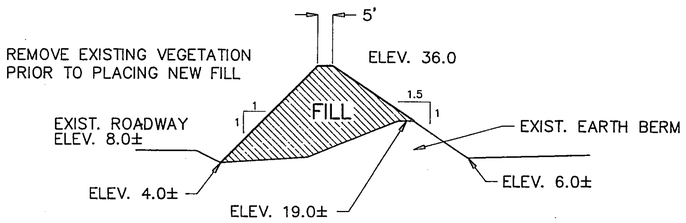
925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

FILL AREA GRADING PLAN

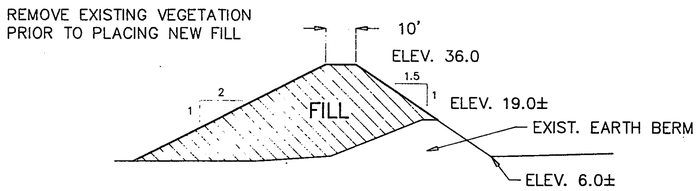
SCALE 1" = 100' SHEET 29 OF 32
SPECIFICATION NUMBER HD-S1670
DRAWING NUMBER HD 10-1034-29

PW SKETCH NO. SK-6691-F



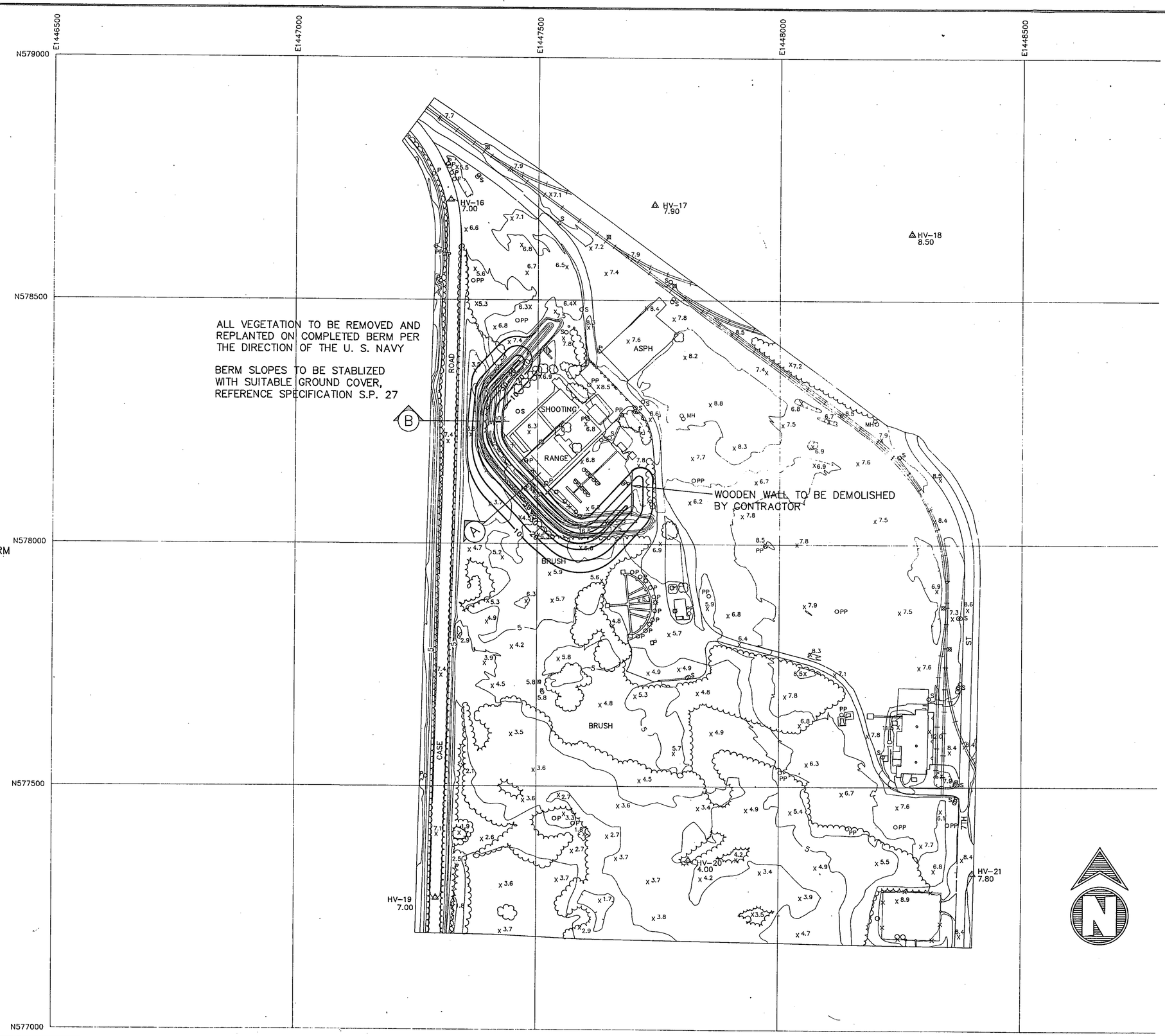
FILL SECTION (B)

NO SCALE



FILL SECTION (A)

NO SCALE



MARK	DATE	BY	REVISIONS

DRAWN FCL/ALG DATE 4/88
DESIGNED DMB P.E. NO.
PROJ. MGR. DMB P.E. NO.
SUBMITTED DMB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24528 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

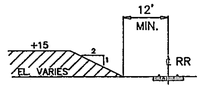
FILL AREA GRADING PLAN

SCALE 1" = 100' SHEET 30 OF 32

SPECIFICATION NUMBER HD-S1670

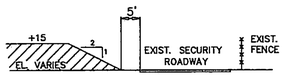
DRAWING NUMBER HD-10-1034-30

PW SKETCH NO. SK-6692-F



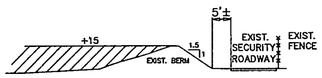
SECTION A–A

NO SCALE



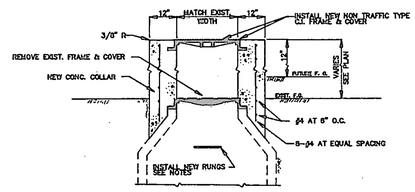
SECTION B–B

NO SCALE



SECTION C–C

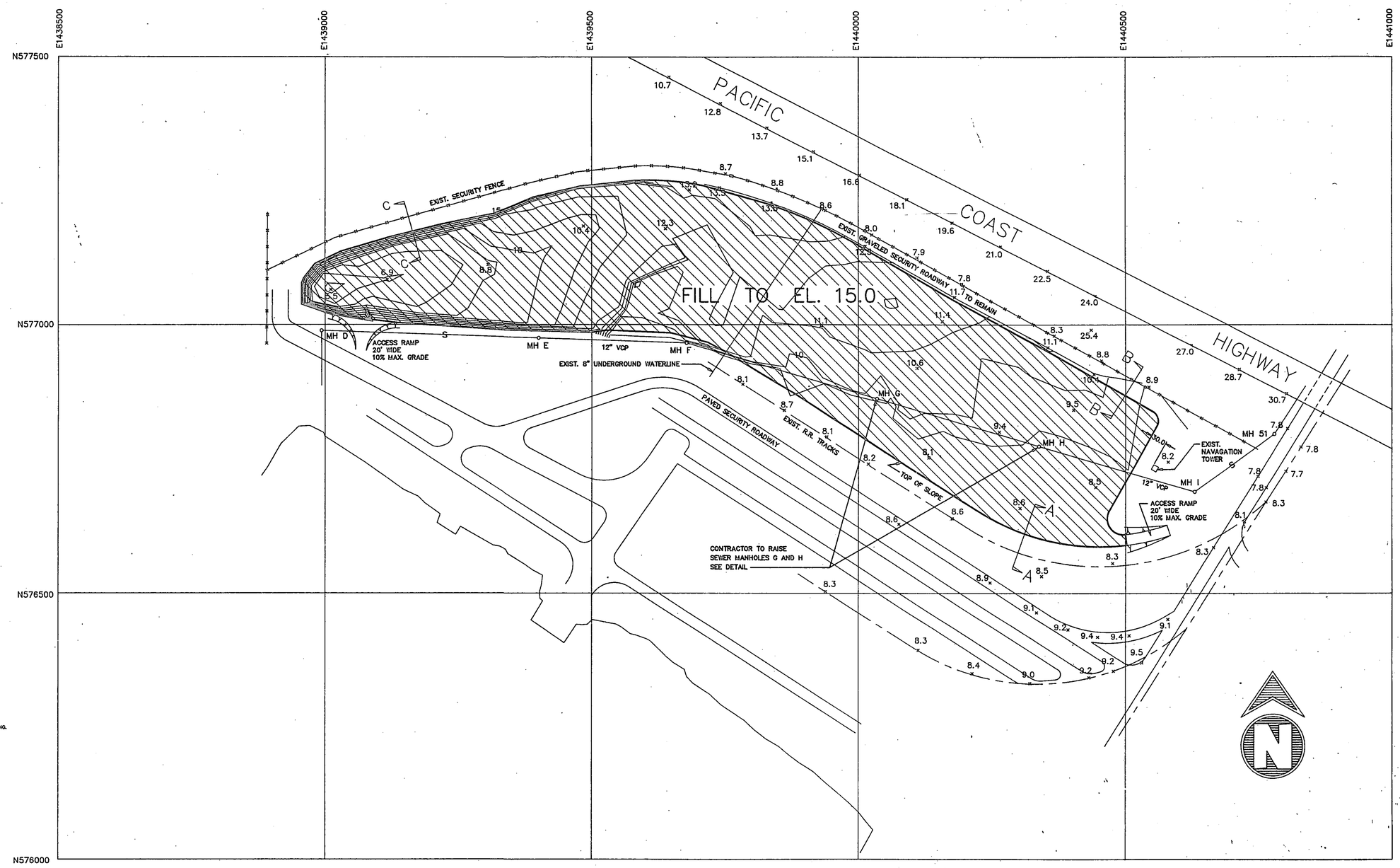
NO SCALE



NOTES –
1. RUNGS SHALL BE 1" ø STEEL AND PLASTIC COATED
2. RUNGS SHALL BE EQUALLY SPACED AT 12" O.C. MAX. THE TRAFFIC PORTION SHALL HAVE A NON-SKID COATING.
3. PROVIDE EXTRA RUNGS AS REQ'D. FOR GRAB BARS.
4. ALL BENDS AT 2" MAX. RADIUS.
5. RUNG SPACING FROM WALL SHALL CONFORM TO MANUFACTURER'S STD.

MH. TOP ADJUST DETAIL

NO SCALE



NOTES: CONTRACTOR TO CONSTRUCT TWO (2) SECURITY VEHICLE ACCESS RAMPS IN LOCATIONS SHOWN. RAMPS TO BE - COMPACTED TO 90% RELATIVE COMPACTION AND SURFACED WITH 3" MIN. OF APPROVED GRAVEL BASE.

ALL UNDERGROUND UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS, CONTRACTOR SHALL FIELD VERIFY ALL OBSTRUCTIONS PRIOR TO FILL PLACEMENT.

MARK	DATE	BY	REVISIONS

DRAWN ALG/FCL DATE 4/88
DESIGNED DMB P.E. NO.
PROJ. MGR. DMB P.E. NO.
SUBMITTED DMB P.E. NO. C-30260

DIRECTOR OF ENGINEERING P.E. NO. C-24528 DATE
MANAGING DIRECTOR P.E. NO. C-16630 DATE

WORLD TRADE CENTER — AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

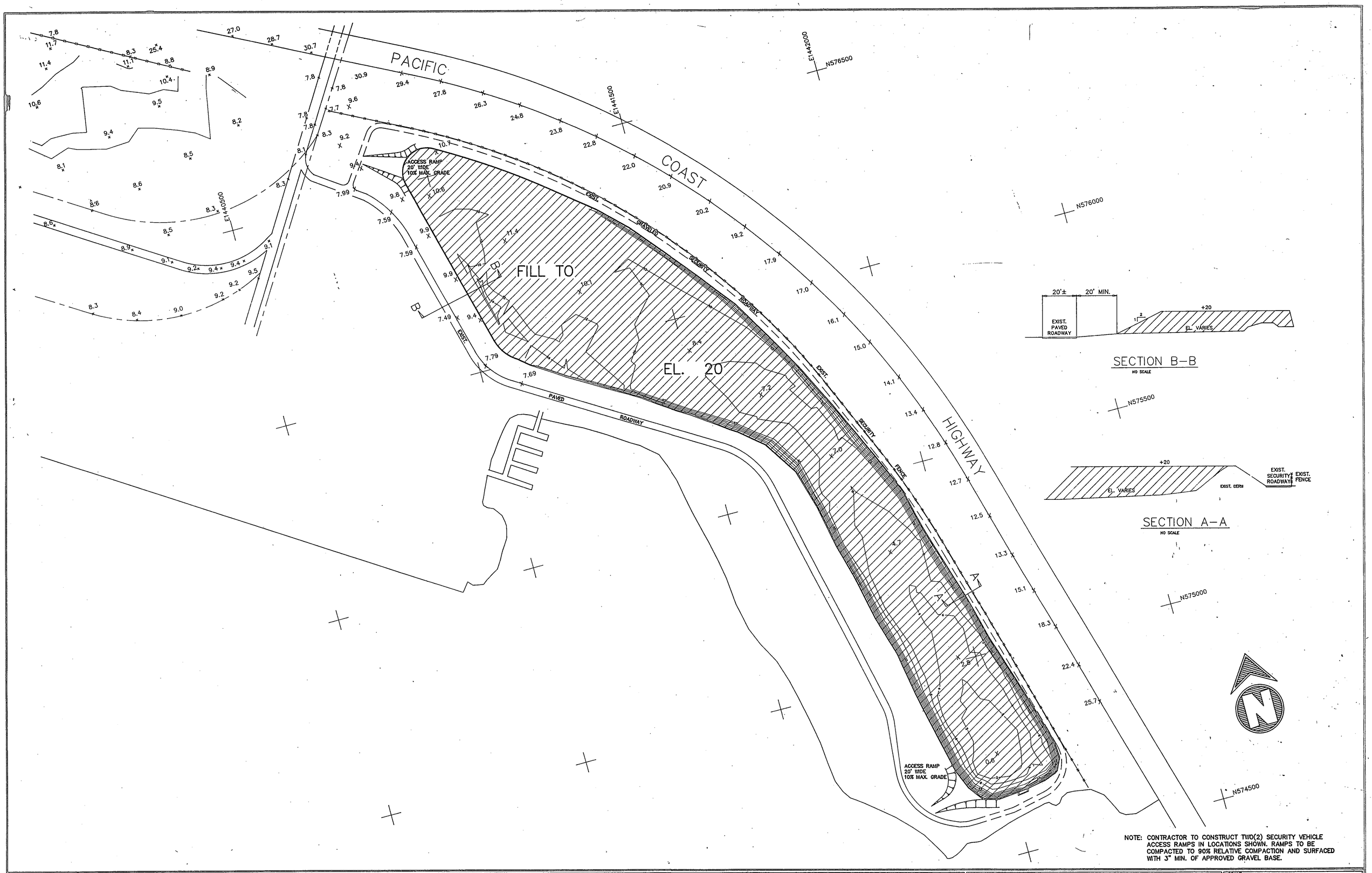
925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL. (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

FILL AREA GRADING PLAN

SCALE 1" = 100' SHEET 31 OF 32
SPECIFICATION NUMBER HD-S1670
DRAWING NUMBER HD 10-1034-31

PW SKETCH NO. SK-6693-F



NOTE: CONTRACTOR TO CONSTRUCT TWO(2) SECURITY VEHICLE ACCESS RAMPS IN LOCATIONS SHOWN. RAMPS TO BE COMPACTED TO 90% RELATIVE COMPACTION AND SURFACED WITH 3" MIN. OF APPROVED GRAVEL BASE.

MARK	DATE	BY	REVISIONS

DRAWN FCL DATE 4/88
DESIGNED DMB P.E. NO.
PROJ. MGR. DMB P.E. NO.
SUBMITTED DMB P.E. NO.

DIRECTOR OF ENGINEERING P.E. NO. C-24528 DATE
MANAGING DIRECTOR P.E. NO. C-10330 DATE

WORLD TRADE CENTER
AMERICA'S MOST MODERN PORT

CIVIL ENGINEERING DIVISION

PORT of LONG BEACH

925 HARBOR PLAZA P.O. BOX 570 LONG BEACH CALIFORNIA 90801 TEL (213) 437-0041

ANAHEIM BAY MITIGATION PROJECT

FILL AREA GRADING PLAN

SCALE 1" = 100' SHEET 32 OF 32
SPECIFICATION NUMBER HD-S1670
DRAWING NUMBER HD 10-1034-32

PW SKETCH NO. SK-6694-F

APPENDIX A-4

MRP Site AOC1 Historical Aerial Photos, Maps, and Diagrams

6/17/47

11/18/52

7/13/56

1958

5/7/60

1965

8/22/68

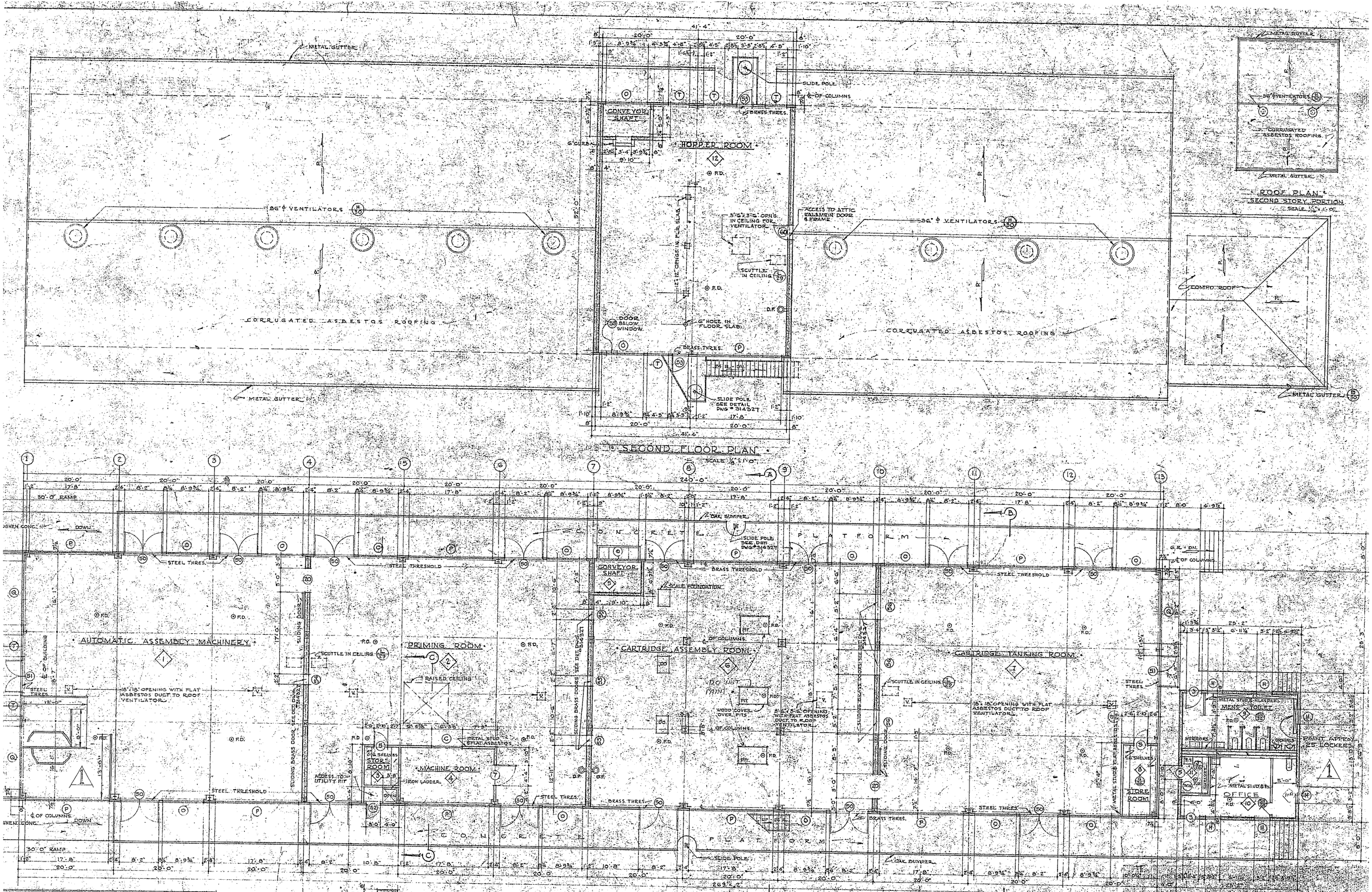
1970

12/9/74

1977

1983

1989



FINISH SCHEDULE

AGE	WALLS	CEILG	PAINTING: WALLS	PAINTING: CEILG	REMARKS
CONC.	CONC.	ASB.	PAINT CONC.	NONE.	
	CONC. & ASB.	DO	DO	DO	
	FLAT ASB.	DO	NONE.	DO	
	DO	DO	DO	DO	
NE	CONC.	NONE.	DO	DO	
ARK	CONC. & ASB.	CONC. & ASB.	PAINT CONC.	DO	
ONC.	DO	ASB.	DO	DO	
	FLAT ASB.	DO	NONE.	DO	
	CONC. & FLAT	CONC.	PAINT	DO	
	DO	DO	DO	DO	
	DO	DO	NONE.	DO	
SH	CONC.	ASB.	PAINT	DO	

ARCH
STRUCT
MECH
ELEC
CIVIL
SPECS

DOOR SCHEDULE

MARK	OPENING SIZE	TYPE	FRAME	THRESHOLD	DOOR SIZE: WIDTH	DOOR SIZE: HEIGHT	DOOR SIZE: TH.	GLASS	REMARKS
50	8'-2"x10'-6"	KALAMEIN	SEE DETAIL	SEE SCHEDULE	2'-4"-1"	10'-6½"	1¾"	NONE.	
51	6'-9"x6'-11½"	DO	DO.	DO.	2'-3¼"	7'-0½"	1¾"	OBSC.	STEEL SASH TRANSOM
52	3'-0"x7'-0"	DO	DO	DO	3'-0"	7'-0½"	1¾"	OBSC.	METAL LOUVRE TRANSOM
53	3'-5"x7'-0"	DO	DO	DO	3'-5"	7'-0½"	1¾"	OBSC.	
54	2'-7"x2'-8"	BRASS	BRASS		SEE DETAIL				
55	2'-2"x4'-8"	DO	DO		DO				
56	3'-2"x2'-2"	DO	DO		DO				
58	2'-6"x3'-5"	DO	DO.		DO				
60	2'-6"x7'-0"	KALAMEIN	KALAMEIN	CONC.	2'-2"	4'-8"	1¾	NONE	@ 2ND FLOOR

NOTE: DOORS NOT INCLUDED IN THE ABOVE SCHEDULE, DOORS INDICATED ON THE PLAN ARE TO BE IN ACCORDANCE WITH THE TYPICAL SHEET "D" DWG. NO. 314279

GENERAL NOTES

① REFERENCE IS MADE TO "Y & D" DRAWINGS Nº 314275 TO 314283 INCLUSIVE, COVERING TYPICAL DETAILS, WHICH SHALL APPLY TO THIS BUILDING WHERE APPLICABLE.

NOTE: THIS DRAWING SUPERSEDES "Y&D" DRAWING Nº 314323

RECORD DRAWING

SHEET 74 OF 139

SEE LETTER NOV. 5th 1953 DATED

REVISION	DATE	BY
	5-3-56	ADDED STEEL PARTITIONS IN OFFICE & LOCKERS

CONTRACT NOY 7853 — NAVY DEPARTMENT — BUREAU OF YARDS & DOCKS DRAWING 314512

ARCHITECTS / ENGINEERS COMMISSION NO. 7403

SHEET 7 OF 14 ACCOMPANYING SPECIFICATIONS NO. 10615

SCALE AS NOTED

KEY MAP CO-ORD

U. S. NAVAL MAGAZINE & NET DEP
SEAL BEACH, CALIFORNIA

AMMUNITION OVERHAUL, FACIL
CASE FILLING BUILDING (AC
FIRST & SECOND FLOOR PL
& ROOF

SUBMITTED 7-31-44

GRAHAM, ANDERSON, PROBST & WHITE
ARCHITECTS — ENGINEERS
LEEDS, HILL, BARNARD & JEWETT
ARCHITECTS — ENGINEERS

DRAWN BY Brown
CHECKED BY Jones

APPROVED 8-1-44

SOP-14

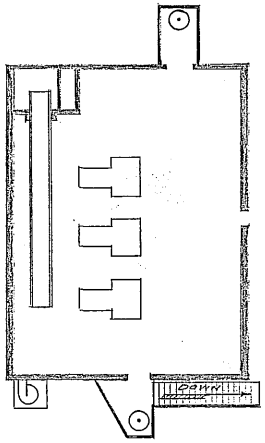
U S NAVAL AMMUNITION & NET DEPOT
SEAL BEACH, CALIFORNIA

PRODUCTION FLOW PLAN Bldg. AO-1

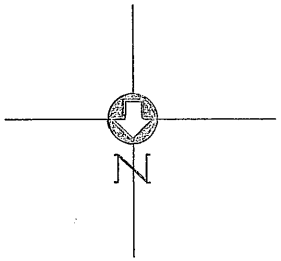
EXTERIOR MAINT. of 5"/38 CTGS.

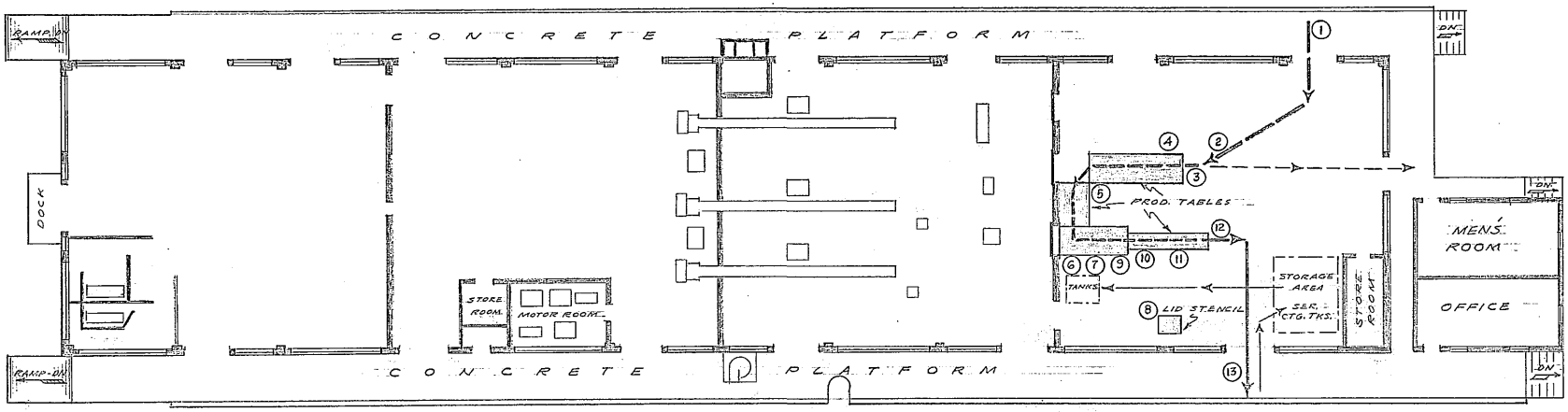
LEGEND

- PRODUCTION FLOW
- UNSERVICEABLE CTG. FLOW
- UNSERVICEABLE CTG. TANK FLOW
- INCOMPLETE CTG. FLOW
- SERVICEABLE CTG. TANK FLOW
- SERVICEABLE CTG. FLOW
- (3) STATIONS



SECOND FLOOR PLAN
SCALE 1/16" = 1'-0"

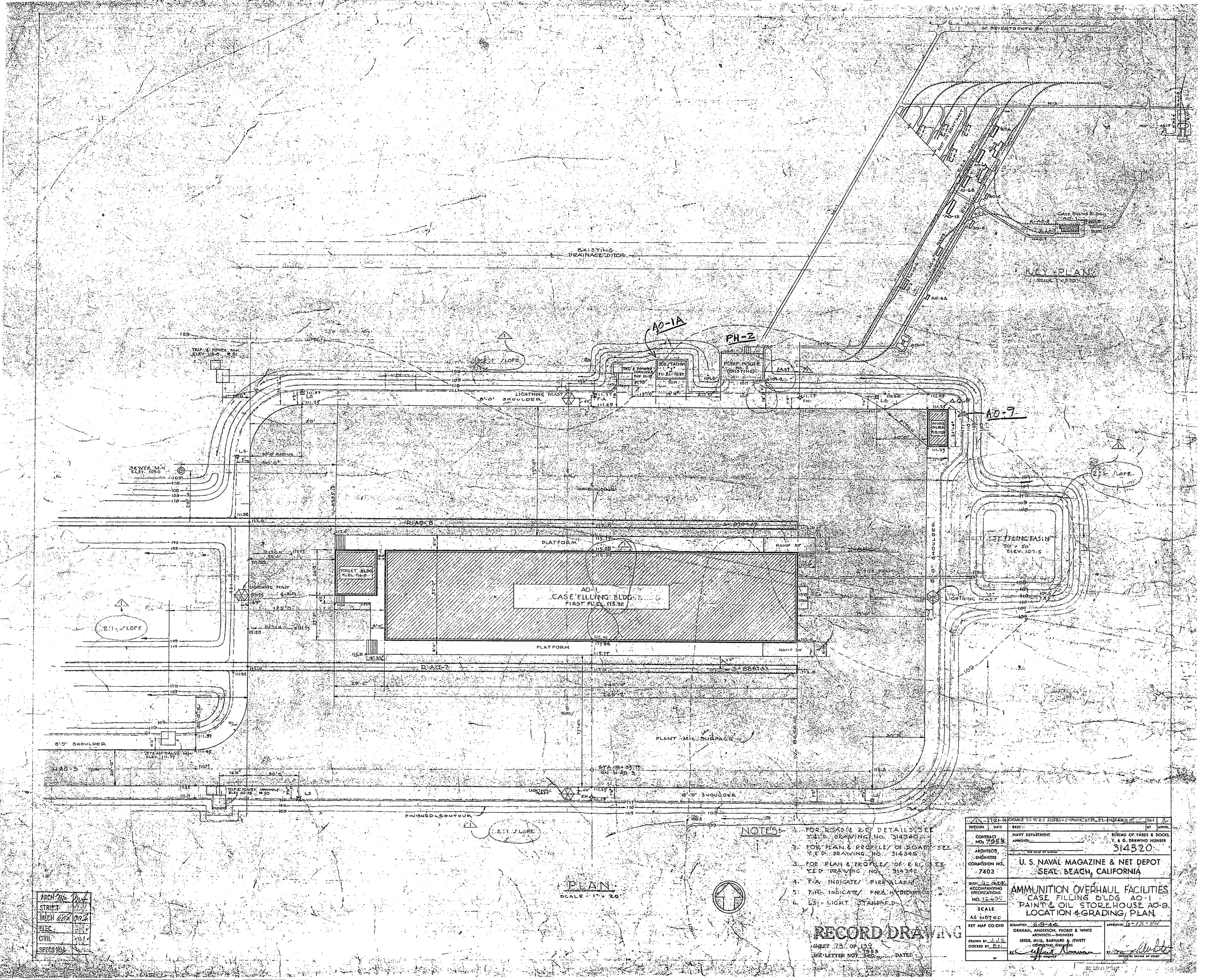




FIRST FLOOR PLAN
SCALE 1/16" = 1'-0"

NO MEC

EQUIPMENT LAYOUT PLAN BLDG. 94	SOP-14
EXTERIOR MAINT. OF 5"/38 CTGS.	
PERSONNEL - 17	PRODUCTION - 700
SUBMITTED: M W Sanders PRODUCTION OFFICER	APPROVED: O O Davis ORDNANCE OFFICER
DATE PREPARED:	SK-1082-C DRAWING NO.
DRWN.	



NOTES:-

1. FOR ROADS & R/R DETAILS SEE Y.&D. DRAWING NO. 314340
2. FOR PLAN & PROFILES OF ROADS SEE Y.&D. DRAWING NO. 314345
3. FOR PLAN & PROFILES OF R/R SEE Y.&D. DRAWING NO. 314342
4. F.A. INDICATES FIRE ALARM
5. F.H. INDICATES FIRE HYDRANT
6. LS - LIGHT STANDARD

RECORD DRAWING

SHEET 73 OF 139
SEE LETTER NO Y-7953 DATED

ARCH	
STRUCT	
MECH	
ELEC	
CIVIL	
SPECS	

REVISION	DATE	BRIEF	BY	APPVD.
1	7-31-44	CHANGE 3:1 TO 2:1 SLOPES & CHANGE DITCH EL. & GRADE		

CONTRACT NOy 7953
ARCHITECTS, ENGINEERS COMMISSION NO. 7403
SHEET 12 OF 14 ACCOMPANYING SPECIFICATIONS NO. 12-951
SCALE AS NOTED
KEY MAP CO-ORD
DRAWN BY J.J.S.
CHECKED BY E.H.

NAVY DEPARTMENT
APPROVED
CHIEF OF BUREAU

BUREAU OF YARDS & DOCKS
Y. & D. DRAWING NUMBER
314320

U. S. NAVAL MAGAZINE & NET DEPOT
SEAL BEACH, CALIFORNIA

AMMUNITION OVERHAUL FACILITIES
CASE FILLING BLDG AO-1
PAINT & OIL STOREHOUSE AO-9
LOCATION & GRADING, PLAN

SUBMITTED 6-9-44
APPROVED 6-12-44

GRAHAM, ANDERSON, PROBST & WHITE
ARCHITECTS — ENGINEERS
LEEDS, HILL, BARNARD & JEWETT
CONSULTING ENGINEERS

BY Clifford Norman
STAFF ENGINEER

BY
OFFICER IN CHARGE OF CONST.

APPENDIX A-5

MRP Site AOC2 Historical Aerial Photos, Maps, and Diagrams

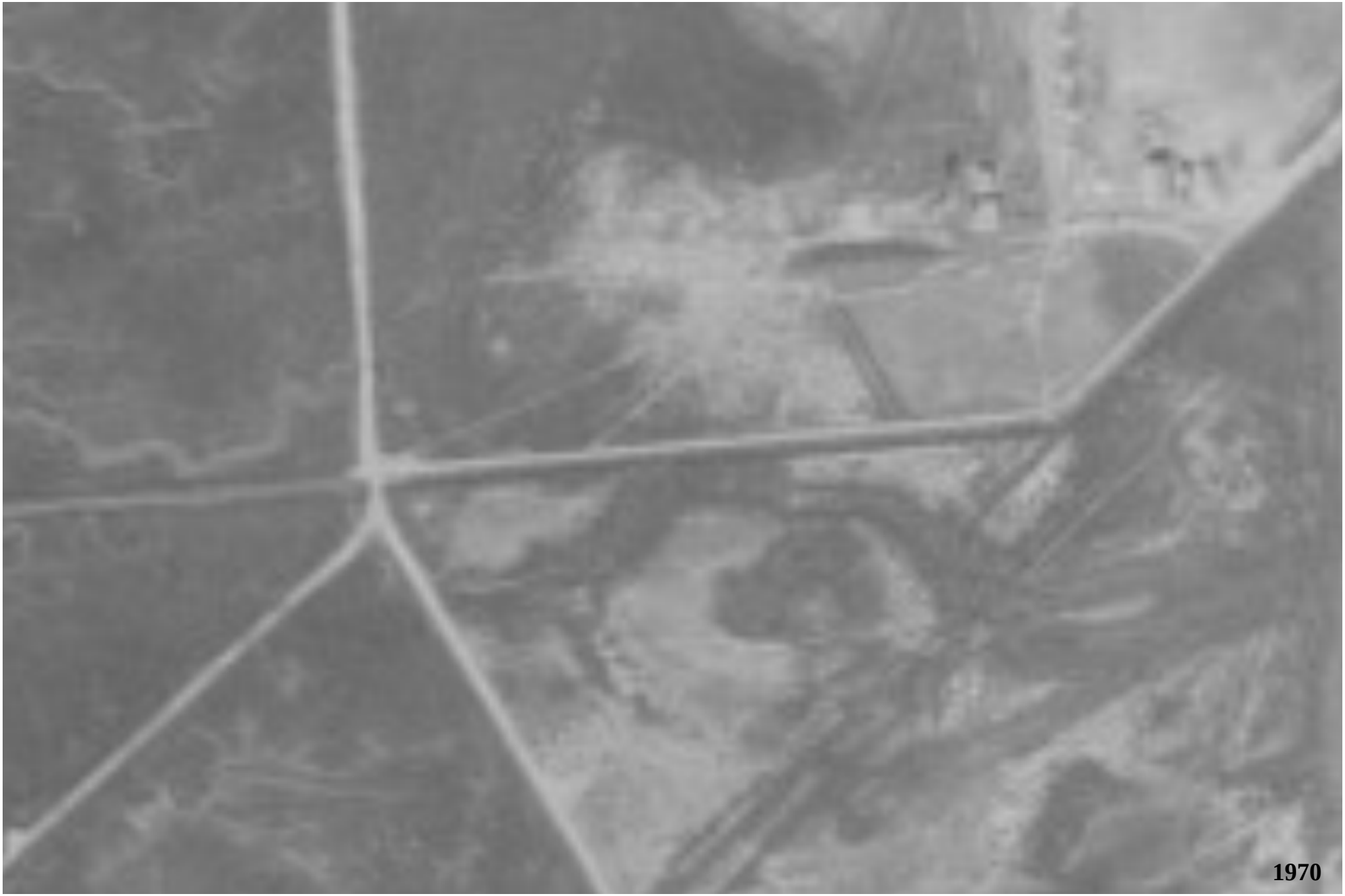
7/13/1956

1958

5/7/60

1965

8/22/68


1970

12/9/74

3/18/77

1983

1989

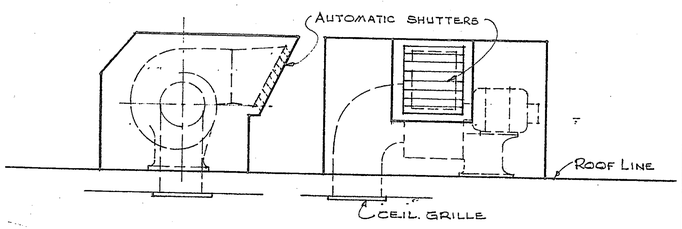
EXHAUST FAN SCHEDULE			
UNIT NO.		FAN MOTOR H.P.	REMARKS
1	800 CFM	1/20	EXHAUST FANS IN HOUSINGS WITH AUTOMATIC SHUTTERS ON ROOF. OPENING OF HOUSING TO FACE EAST.
2	810 CFM	1/20	
3	650 CFM	1/20	
4	600 CFM	1/20	
5	1800 CFM	1/6	

PLUMBING & VENTILATING SYMBOLS

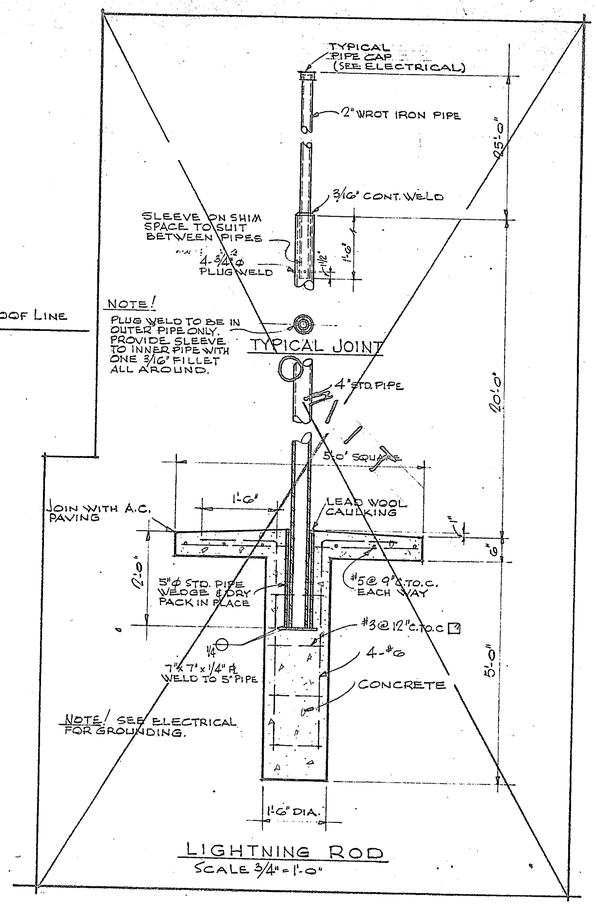
- (EF) EXHAUST FAN - (UNIT NUMBER & OPENING DIAMETER)
- HOSE BIBB - LOCATE HOSE BIBB +30" ABOVE FLOOR
- COMPRESSED AIR VALVE - QUICK COUPLING
- WASTE LINE
- COLD WATER LINE
- —A— AIR LINE
- HOT WATER LINE
- P.O.C. POINT OF CONNECTION
- F.C.O. FLOOR CLEANOUT
- C.W. COLD WATER
- F.D. FLOOR DRAIN

NOTE! RUN ALL WATER & AIR PIPING EXPOSED INSIDE BUILDING AT CEILING WITH DROPS TO OUTLETS. LOCATE QUICK COUPLING AIR VALVES +42" ABOVE FLOOR

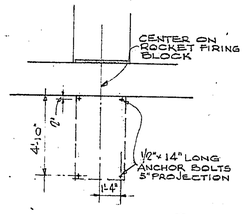
NOTE:
SHTS 2 THRU 6
ARE FILED IN DWR
NO. 32. TO VIEW
SEE CARD NO'S. 1675
THRU 1679 ON THE
MICRO-FILM VIEWER



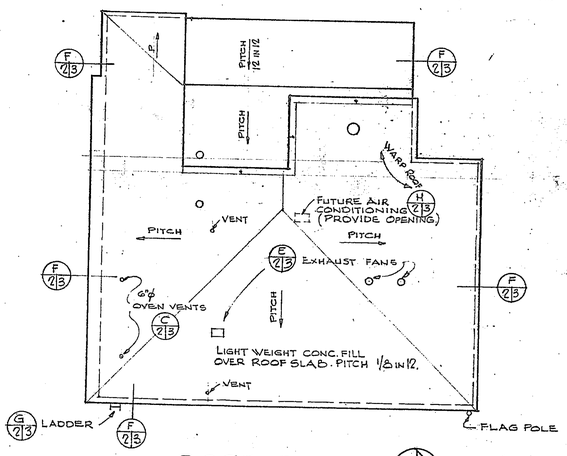
TYPICAL EXHAUST FAN & HOUSING ASSEMBLY ON ROOF
NO SCALE



LIGHTNING ROD
SCALE 3/4" = 1'-0"

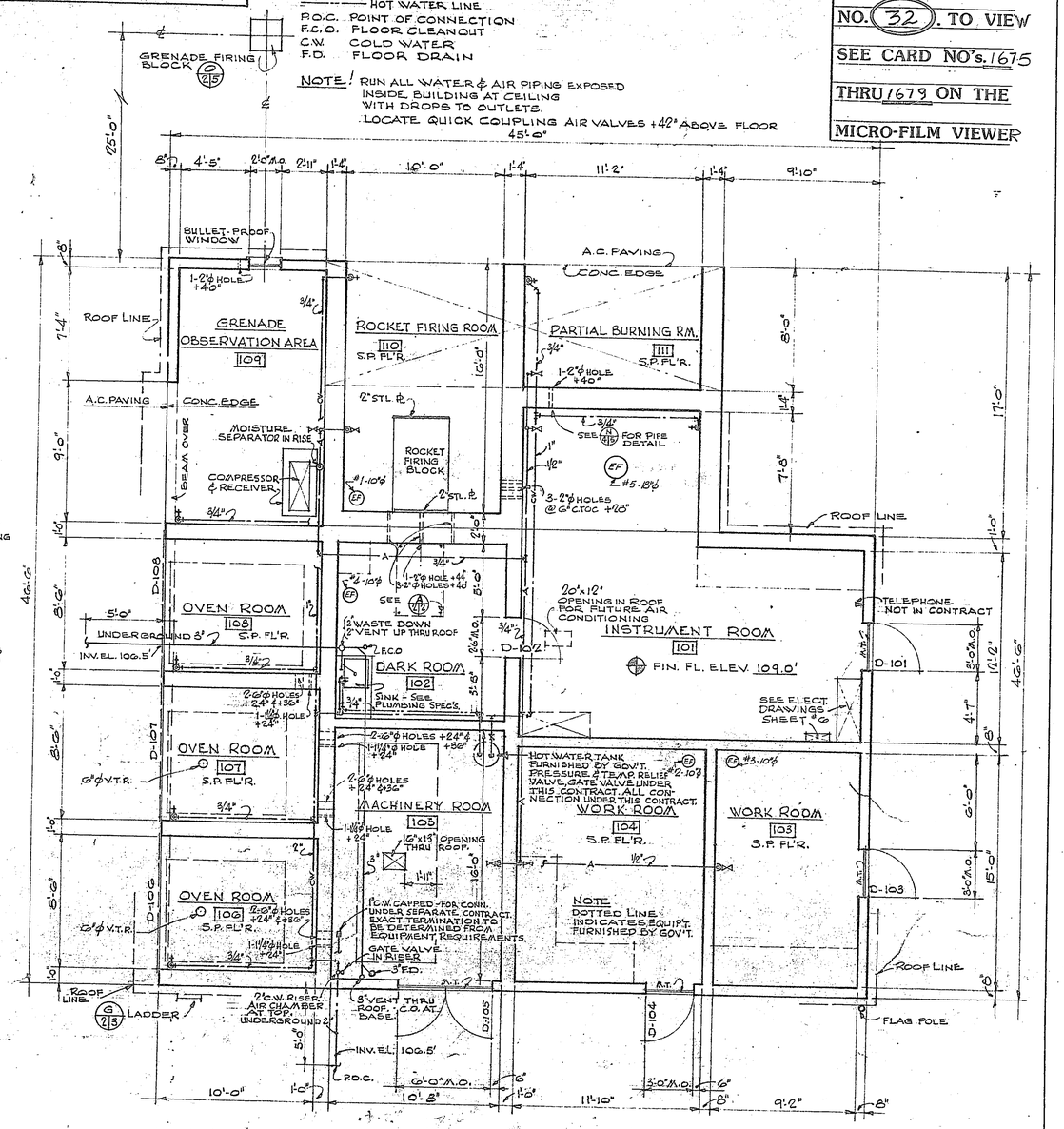


DETAIL (A/2/2)
SCALE 1/4" = 1'-0"



ROOF PLAN
SCALE 1/8" = 1'-0"

NOTE!
GRAVEL SURFACED COMPO. ROOF OVER 5" CONC. ROOF SLAB & FILL.



FLOOR PLAN
SCALE 1/4" = 1'-0"
NORTH

NOTE!
FLOOR SLAB TO HAVE SPARK PROOF TOPPING. SEE SPECIFICATIONS ROOMS 103, 104, 106, 107, 108, 110 & 111

STUB LINES & CONDUIT 2'-0" MIN. BEYOND TOE OF FILL & 1'-6" MIN. UNDER EXISTING GRADE.

SYMBOLS

- DETAIL LETTER
- SHEET WHERE DETAIL IS FOUND
- SHEET WHERE DETAIL APPLIES
- 101 - ROOM NUMBER
- D-101 - D - DOOR; 101 - DOOR NUMBER - DOOR NUMBERS ARE RELATED TO ROOM NUMBERS.
- FINISH FLOOR ELEVATION

ABBREVIATIONS

- @ - AT
- C.TO.C. - CENTER TO CENTER
- CEIL. - CEILING
- COMPO. ROOF - COMPOSITION ROOFING
- CONC. PLAT. - CONCRETE PLATFORM
- CONC. - CONCRETE
- ℄ - CENTER LINE
- EXP. - EXPANSION
- MET. FLASH. - METAL FLASHING
- W.P.J. - WEAKENED PLANE JOINT
- M.T. - METAL THRESHOLD
- M.O. - MASONRY OPENING
- ST'L. - STEEL
- S.P.FL'R - SPARK PROOF FLOOR
- PL - PLATE
- V.T.R. - VENT THRU ROOF

SHEET INDEX

SHEET NO.	Y&D DWG.	TITLE
1	640509	PLOT PLAN
2	640510	FLOOR PLAN
3	640511	ELEVATIONS & MISCELLANEOUS DETAILS
4	640512	FOUNDATION & ROOF FRAMING PLANS - WALL SECTIONS
5	640513	STRUCTURAL DETAILS
6	640514	ELECTRICAL PLAN & DETAILS
—	309590	STANDARD PRIMARY & SECONDARY LIGHTNING PROTECTION DETAILS

GRAPHIC SCALES
1/8" = 1'-0" 0 5 10 20 30
1/4" = 1'-0" 0 5 10 15
3/4" = 1'-0" 0 1 2 3 4 5

OTHER SHEETS INVOLVED

REVISION	DATE	APPR.	BRIEF	BY

A & E JOB NO. 54-49
A & E DRAWING NO. 2

DEPARTMENT OF THE NAVY — BUREAU OF YARDS AND DOCKS
ELEVENTH NAVAL DISTRICT P.W.O., SAN DIEGO, CALIFORNIA
KISTNER WRIGHT & WRIGHT
ARCHITECTS AND ENGINEER — LOS ANGELES, CALIF.

DESIGNED R.E.M.
DRAWN R.E.M.
CHECKED L.T.
PP'D Hugo E. Nybo
FIRE PROT. ENGR. Gustafson
BRANCH MGR. Williams 6/2/54
DIRECTOR A. Bartell 6/3
PROJECT MGR. Tolen 6/4
COORDINATOR J. Wilson 6/4

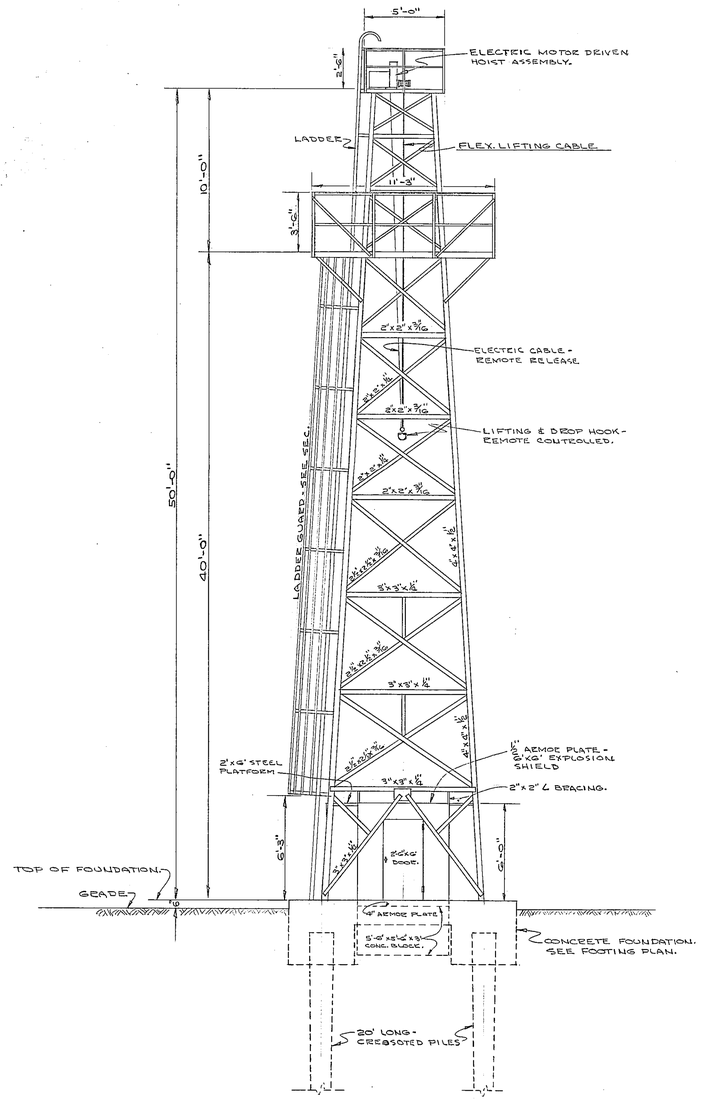
U.S. NAVAL AMMUNITION & NET DEPOT, SEAL BEACH, CAL.
STATIC ROCKET FIRING TEST FACILITY BUILDING

FLOOR PLAN
(QE-10) 437

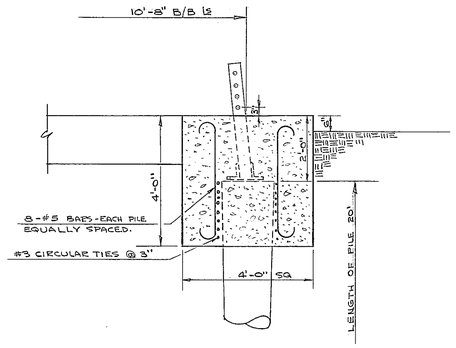
APPROVED Earl S. Hopping, ACTING DISTRICT PUBLIC WORKS OFFICER — DATE 6-4-54

SATISFACTORY TO
DATE

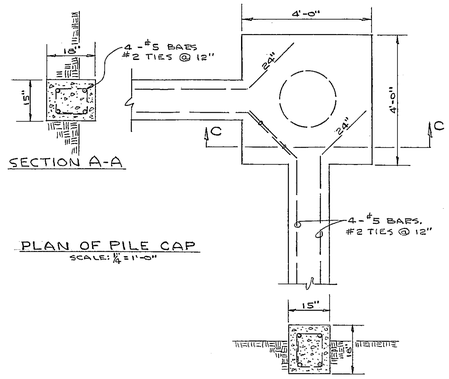
SCALE NOTED — SPEC. 42882
SHEET 2 OF 6 — NOY 83010
Y & D DRAWING NO. 640510



DROP TEST TOWER-ELEV.
SCALE: 1/4 = 1'-0"

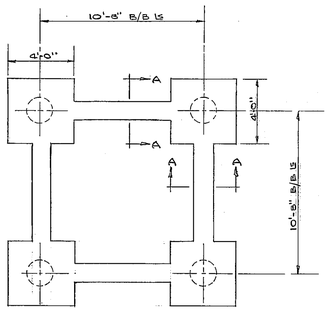


SECTION C-C
SCALE: 1/2 = 1'-0"

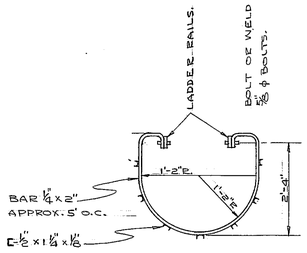


PLAN OF PILE CAP
SCALE: 1/4 = 1'-0"

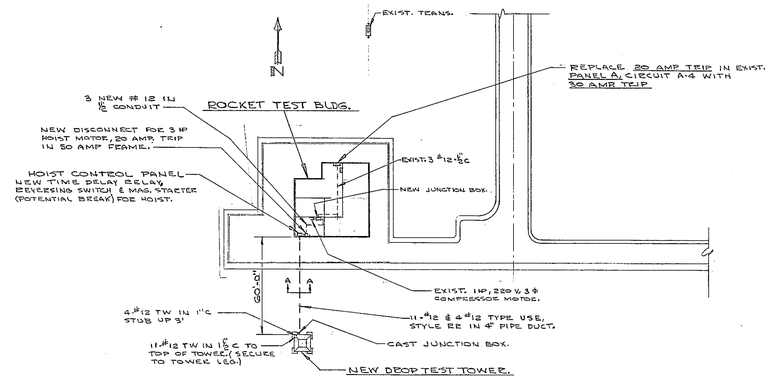
SECTION A-A
SCALE: 1/2 = 1'-0"



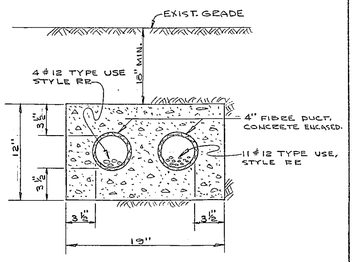
PLAN OF FOOTING
SCALE: 1/4 = 1'-0"



TYPICAL SEC.-LADDER GUARD



DROP TEST TOWER.
ELECTRICAL & LOCATION PLAN.
SCALE: 1" = 40'-0"



SECTION A-A
UNDERGROUND DUCT SECTION

NOTE: THIS SHEET IS FILED IN DRWR. NO. 32 TO VIEW, SEE CARD NO. 1669 ON MICRO-FILM VIEWER

SYMBOL	DESCRIPTION	DATE	APPROVAL
	REVISIONS		

PWO DRAWING NO. SK-1036-E

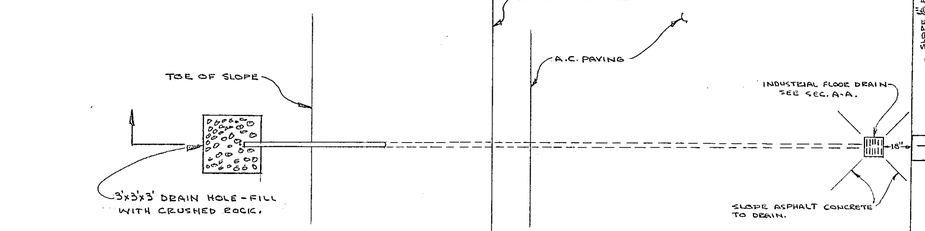
DEPARTMENT OF THE NAVY — BUREAU OF YARDS & DOCKS
ELEVENTH NAVAL DISTRICT — SAN DIEGO, CALIF.
U. S. NAVAL AMMUNITION AND NET DEPOT
SEAL BEACH, CALIF.

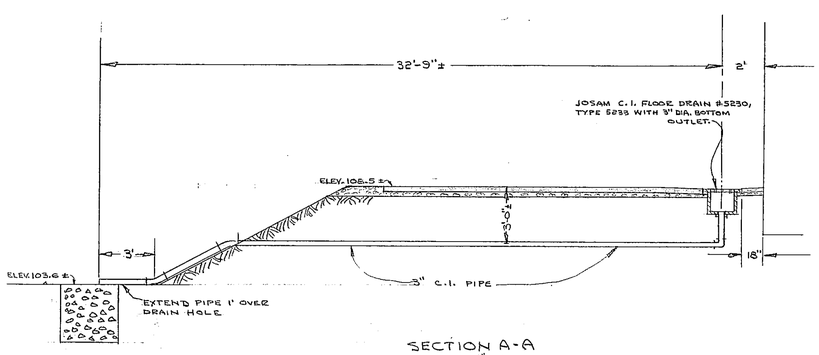
DES. S. LEPKOWITZ
DRAWN. NEUMANN
TR.
CHK. S.L.

QUALITY EVALUATION LABORATORY.
STEEL (QE-108) 436
DROP TEST TOWER.

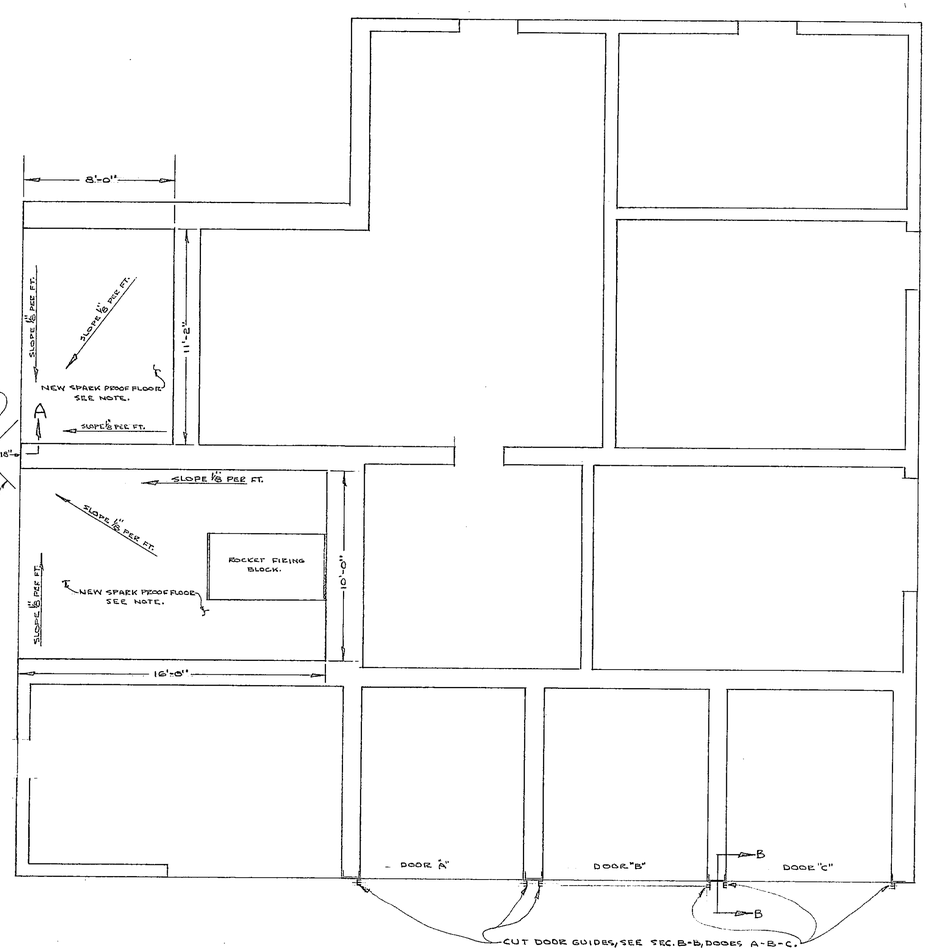
APPROVED W.B.S. PUBLIC WORKS OFFICER DATE 4-11-56

SCALE NOTED SPEC.
SHEET 1 OF 1 NO.
DRAWING No. SK-1036-E

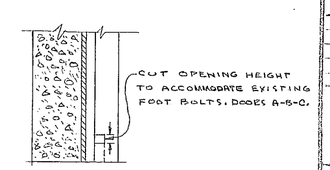




SECTION A-A
SCALE 1/2" = 1'-0"



PLAN
ROCKET TEST BUILDING.
SCALE 1/4" = 1'-0"



SECTION B-B
NO SCALE.

NOTE

1. PREPARE EXISTING CONCRETE FLOOR FOR THE OXYCHLORIDE SPARK PROOFING AS FOLLOWS:
   (a) WASH ENTIRE DECK WITH A SOLVENT SUCH AS WHITE GASOLINE TO REMOVE ALL SURFACE WAX & GREASE OR SANDBLAST FLOOR.
   NOTE IF SANDBLASTING IS USED, IT WILL NOT BE NECESSARY TO ROUGHEN THE FLOOR AS SHOWN BELOW.
   (b) ROUGHEN EXISTING FLOORS BY EITHER OF THE FOLLOWING METHODS:
      1. TOOTH CHISELING OR PICKING. CHISEL OR PICK MARKS NOT LESS THAN 1/8 DEEP & EVENLY SPACED AT NOT MORE THAN 6 INCHES IN ALL DIRECTIONS.
      2. CONCRETE NAILS NOT OVER 4 INCHES ON CENTER IN ALL DIRECTIONS. NAILS TO BE NOT LESS THAN 5/4 LONG AND TO PROTRUDE NOT MORE THAN 1/4 ABOVE THE FLOOR.
2. DAMPEN FLOOR WITH FULL STRENGTH GAUGING SOLUTION, LEAVING NO PUDDLES. THE SURFACE SHALL THEN BE BROOMED WITH A THIN SLURRY PREPARED BY MIXING THE GAUGING SOLUTION & THE DRY MIX.
3. AFTER PREPARING THE SURFACES ABOVE, SPREAD A THIN LAYER OF THE FLOORING COMPOSITION BY WORKING IT INTO ALL RECESSES, AROUND ANCHORS & IN ALL DEPRESSIONS.
4. THE FLOORING MIX SHALL THAN BE SPREAD AT A MINIMUM THICKNESS OF 5/8 & A MAXIMUM OF 1". APPLY ADDITIONAL COATS TO PROVIDE THE REQUIRED SLOPE IN THICKNESSES NOT OVER 1"

NOTE: THIS SHEET IS FILED IN DRWR. NO. 32 TO VIEW, SEE CARD NO. 1618 ON MICRO-FILM VIEWER

SYMBOL	DESCRIPTION	DATE	APPROVAL
	REVISIONS		

PWO DRAWING NO. SK-1144-D

DEPARTMENT OF THE NAVY — BUREAU OF YARDS & DOCKS
ELEVENTH NAVAL DISTRICT — SAN DIEGO, CALIF.
U. S. NAVAL AMMUNITION AND NET DEPOT
SEAL BEACH, CALIF.

DES. S.L.
DRAWN: NEUMANN
TR.
CHK. S.L. & F.K. 01/11/72

INSTALL SPARK PROOF FLOOR & DRAIN - ROCKET TEST BUILDING. 437

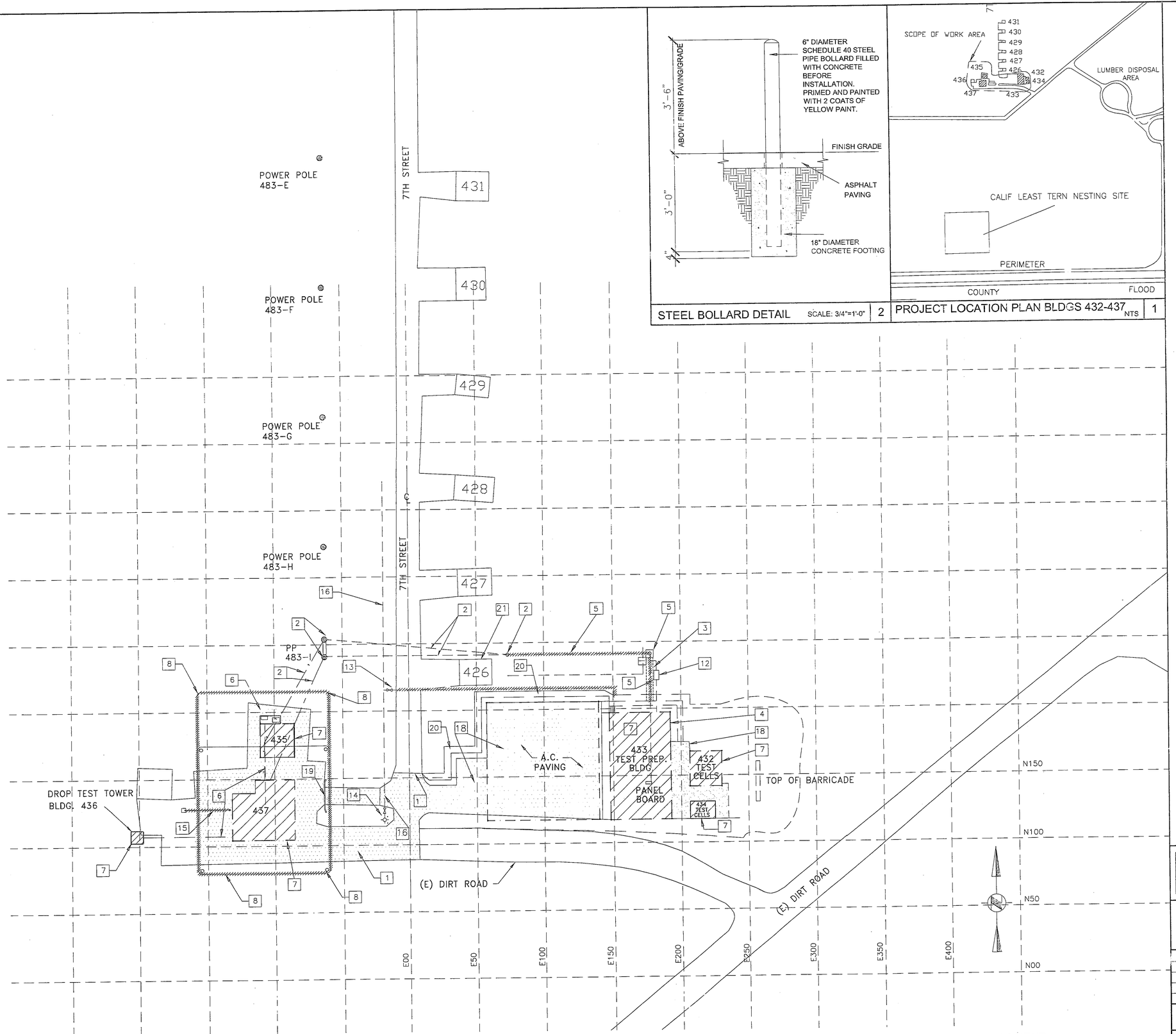
APPROVED _____ PUBLIC WORKS OFFICER _____ DATE _____

SCALE NOTED | SPEC.
SHEET ___ OF ___ | NO.
DRAWING No. SK-1144-D

DM 35mm FILM

STEEL BOLLARD DETAIL SCALE: 3/4"=1'-0" | 2

PROJECT LOCATION PLAN BLDGS 432-437 NTS | 1



DEMOLITION KEYNOTES

THE CONTRACTOR SHALL:

1 VERIFY EXTENT OF PAVING DEMOLITION AT FIELD.

2 DISCONNECT AND REMOVE OVERHEAD ELECTRICAL POWER AND COMMUNICATION LINES LEADING TO DEMOLITION SITE AT POLE # 483-H AND TWIN POWER POLE #483-I. SHALL TERMINATE BOTH ELECTRICAL POWER COMMUNICATION LINES AT POLE # 483-H.

3 REMOVE CONCRETE SIDEWALK

4 REMOVE CONCRETE SIDE-WALK AROUND BUILDING 433.

5 REMOVE ELECTRICAL POWER AND COMMUNICATION LINES ABOVE GROUND AND UNDERGROUND DUCTING BETWEEN OVERHEAD/UNDERGROUND POWER POLE THROUGH JUNCTION BOX TO BLDG 433. SHALL REMOVE BURIED CONDUITS AND ELECTRICAL POWER JUNCTION BOX FROM THE OVERHEAD/UNDERGROUND POWER POLE TO BLDG 433 ELECTRICAL ROOM. REMOVE CONCRETE PAD AND CHAIN-LINKED FENCE.

6 REMOVE ELECTRICAL POWER AND COMMUNICATION CONDUCTORS AND DUCTING FROM BLDG 437 ELECTRICAL ROOM TO BLDG 435 AND 436 (DROP TOWER).

7 DEMOLISH BLDGS 432, 433, 434, 435, 436 AND 437 AS INDICATED ON DRAWINGS.

8 REMOVE LIGHTNING POLES (4) TOTAL 4. ABANDON IN PLACE UNDERGROUND CATHODIC LIGHTNING PROTECTION.

9 DISCONNECT ALL ELECTRICAL POWER CONDUCTORS AND CONDUITS FROM POWERED MECHANICAL EQUIPMENTS IN BLDG 433.

10 REMOVE ALL ELECTRICAL ROOM EQUIPMENT, CONDUCTORS AND CONDUCTORS IN BUILDING 432, 433, 434, 435, 436 AND 437-INCLUDING CONDUITS.

11 REMOVE ALL CONDUCTORS AND CONDUITS WITHIN INDICATED CONSTRUCTION BOUNDARY.

12 REMOVE BLDG 433 SEPTIC TANK [8'-0"x5'-4" APPROX. 1000 GAL], SEWER LINE AND REINFORCED CONCRETE SEPTIC TANK LEACH LINE JUNCTION BOX. ABANDON ANY UNBROKEN SEPTIC TANK LEACH LINE UNDERGROUND.

13 SHUTOFF WATER LEADING TO BLDG 433 AND REMOVE UNDERGOUND WATER LINE TO BLDG 433.

14 INSTALL TWO BOLLARDS TO PROTECT FIRE HYDRANT #126. THE BOLLARDS SHALL BE FABRICATED FROM CONCRETE FILLED 4INCH DIAMETER SCHEDULE 40 CARBON STEEL PIPE BY 6 FEET LONG. THE BOLLARDS SHALL BE BURIED 2 FEET DEEP AND SHALL BE SPACED FOUR (4) APART AROUND THE FIRE HYDRANT PER OICC. CARE SHALL BE GIVEN IN DIGGING AROUND THE FIRE HYDRANT.

15 CAP AND ABANDON IN PLACE (E) UNDERGROUND DRAIN LINE

16 PROTECT UNDERGROUND WATER LINE ALONG 7TH STREET AS INDICATED.

17 DEMOLISH BUILDINGS 432, 433, 434, 435, 436 [DROP TOWER] AND 437. EXCAVATE BUILDING SURROUNDING INCLUDING ALL FOUNDATION FOOTING. SHALL DISPOSE OF THE EXCAVATED MATERIALS TO OFF SITE LOCATION.

18 REMOVE ALL ASPHALT PAVING AND LEVEL WITH SURROUNDING TO MAINTAIN POSITIVE DRAINAGE.

19 REMOVE APPROXIMATELY 4'-HIGH CONCRETE RETAINING WALL & FOOTING.

20 REMOVE CONCRETE WALK.

21 PROTECT IN PLACE (E) BUNKER 426.

GENERAL NOTES:

1. CONTRACTOR SHALL MARK ALL ABBANDONED UTILITIES WITH METALLIC TAPE.
2. GRADE DIRT AFTER DEMO TO PROVIDE PROPER SLOPE FOR DRAINAGE.

LEGEND:

ABANDON IN PLACE UNDERGROUND UTILITIES (MARK ALL ABANDONED UTILITIES WITH METALLIC TAPE)

GRAPHIC SCALE: 1" = 30' — 30 0 30 60 90 SCALE FEET

SITE AND UTILITY DEMOLITION PLAN BUILDINGS # 432, 433, 434, 435, 436 AND 437

SCALE: 1"=30'-0"

DEAN RYAN CORPORATION
CONSULTANTS & DESIGNERS, INC.
350 South Grand Avenue, Suite 3920
Los Angeles, California 90071
213.687.1130

IF SHEET IS LESS THAN 28"X40" IT IS A REDUCED PRINT– SCALE REDUCED ACCORDINGLY

C-1

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS		

PWO DRAWING NO.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
U.S. NAVAL WEAPONS STATION
SEAL BEACH, CALIFORNIA

DSGN. ST DR. RT CHK. ST
SECURITY DEPT.
FIRE DEPT.
SAFETY DEPT.
DEPT.

DEMO. OF BLDGS#432,433,434,435 & 436
NAVAL WEAPONS STATION
SEAL BEACH, CA

SITE & UTILITY DEMO. PLAN

APPROVED DATE
OFFICER IN CHARGE
ENGR. IN CHG. TIBERIUS LUPASH
FILE NO.

SIZE F | CODE IDENT. NO. 80091 | NAVFAC DWG. NO. 8037555
CONTR. NO. N68711-00-C-7449
SCALE AS NOTED | SPEC 11007449 | SHEET 2 OF 7

Draft

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) for Site Inspection for Munitions Response Program Sites UXO1, UXO2, UXO6, AOC1, and AOC2

Naval Weapons Station Seal Beach
Seal Beach, California

April 2009

Prepared for:
Naval Facilities Engineering Command Southwest
San Diego, California 92132

Prepared by:
ChaduxTt, a joint venture between St. George Chadux Corp and Tetra Tech EM Inc.
1230 Columbia Street, Suite 1000
San Diego, California 92101

Prepared under:
Naval Facilities Engineering Command
ChaduxTt JV Contract Number N62473-07-D-3213
Contract Task Order 0043

CHAD.3213.0043.0010

SAP WORKSHEET #1 — TITLE AND APPROVAL PAGE

Draft
SAMPLING AND ANALYSIS PLAN
(Field Sampling Plan and Quality Assurance Project Plan)

SITE INSPECTION
FOR MUNITIONS RESPONSE PROGRAM (MRP)
SITES UXO1, UXO2, UXO6, AOC1, AND AOC2
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

APRIL 2009

Prepared for:
Naval Facilities Engineering Command Southwest
1220 Pacific Highway
San Diego, California 92132-5190

Prepared by:
ChaduxTt, a joint venture between St. George Chadux Corp and Tetra Tech EM Inc.
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Prepared under:
ChaduxTt JV Contract Number N62473-07-D-3213
Contract Task Order 0043
Document Control Number CHAD.3213.0043.0010

Reviewed by: Kevin Hoch 4/7/2009
ChaduxTt JV — Date
Kevin Hoch, Program QA Manager

Approved by: 4/22/2009
Department of the Navy — Date
Narciso A. Ancog, QA Officer

EXECUTIVE SUMMARY

The Department of the Navy has tasked ChaduxTt (a joint venture between St. George Chadux Corp and Tetra Tech EM Inc.) to perform a site inspection (SI) at the Munitions Response Program (MRP) Sites UXO1, UXO2, UXO6, AOC1, and AOC2 located at Naval Weapons Station (NAVWPNSTA) Seal Beach, California. This sampling and analysis plan (SAP) identifies the proposed field activities, sampling methods, field quality control (QC) procedures, and analytical requirements for collection of these samples.

MRP Site UXO1 consists of the Primer/Salvage Yard and the Port of Long Beach (POLB) Mitigation Pond. UXO1 was actively used for ordnance storage related to rocket and projectile segregation, inspection, and repackaging. Site UXO1 was also identified as a recovered live ammunition and grenades area. The main munitions constituents (MC) of Site UXO1 are smokeless powder and black powder, non-energetic inert material, live small-caliber ammunition and grenades, and C4 explosive. In addition, the disposal of munitions has reportedly occurred at this site. Site specific information is necessary to determine (1) if the past operations at the primer/salvage area of Site UXO1 contributed to MC contamination in soil and (2) the contamination level of the POLB mitigation pond. In addition, site observations indicate the presence of MEC. The suspect MEC may present an explosive hazard; therefore, information is necessary to determine if MEC are present at Site UXO1.

MRP Site UXO2 consists of the Buildings 101 and 102 and associated settling ponds. Energetic materials containing ammonium picrate, also known as Explosive-D, trinitrotoluene (TNT), Research Department eXplosive (RDX), High Melting eXplosive (HMX), nitrocellulose, and ammonium perchlorate were processed in Buildings 101 and 102. Washwater with Explosive-D, produced from the clean-up of projectile casings, drained through a concrete trench flush with grade into a series of three connected settling ponds. The settling ponds were occasionally allowed to dry via draining and evaporation, and then were burned to control the surface accumulation of Explosive-D. Therefore, to determine the level of contamination at UXO2, approximately 50 soil samples will be analyzed for explosives, picrate (picric acid), TKN, inorganic nitrogen, ammonia, and perchlorate. Site specific information is necessary to determine if MC is present in soils and where the contamination is located at UXO2.

Site UXO6 consists of the Westminster POLB Fill Area, which was filled with an estimated 850,000 cubic yards of soil/sediment from four mitigation ponds. Potential munitions present at these ponds include live, inert, and/or damaged rockets, projectiles, grenades, obscurants, black or smokeless powders, primers, fuzes, small arms ammunition, cartridge actuated devices (CAD), propellant actuated devices (PAD), and sub-munitions. Site specific information is necessary to determine (1) if MC is present in soil and if present, the level of MC contamination in soils and (2) if suspected munitions from the POLB Mitigation Pond were transported to the Westminster POLB Fill Area.

MRP Site AOC1 consists of the Building 94 Settling Basin. During operations, Building 94 generated multiple tons of smokeless powder waste each month with small amounts of spillage

occurring. Building 94 was occasionally washed down with water to prevent the accumulation of smokeless powder dust, and the waste water that potentially contained smokeless powder, RDX, HMX, and picrate was drained through floor drains. Based on an engineering diagram, it appeared a drainpipe, likely associated with the Building 94 floor drains, extended from the east side of Building 94 to the settling basin. Site specific information is necessary to determine if MC is present in soils.

MRP Site AOC2 consists of the Explosive Drop Test Tower. Site AOC2 was used in conjunction with former Buildings 435 and 437, which lie 80 feet east, for experimental propellant testing. Site specific information is necessary to determine if MC is present and, if present, the level of MC contamination at Site AOC2.

This SAP will be used as a reference document by all field and laboratory personnel engaged in sampling and analysis for the project. The document will be provided to the personnel listed in Worksheet #4. Included in this SAP are data quality objectives, field sampling procedures, quality assurance (QA)/QC requirements, and data gathering methods that will be used during the project. This SAP is prepared in accordance with the requirements of the "Uniform Federal Policy for Quality Assurance Project Plans" (U.S. Environmental Protection Agency [EPA] 2005) and "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5" (EPA 2001).

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5 MRP Site AOC1 Proposed Sample Locations

6 MRP Site AOC2 Proposed Sample Locations

LIST OF APPENDICES

A Field Forms

ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
µg/L	Micrograms per liter
AA	Flame atomic absorption
AOC	Area of concern
APP	Accident prevention plan
asl	Above sea level
bgs	Below ground surface
CA	Corrective action
CAD	Cartridge actuated devices
Cal-Mod	California-modified
CAS	Chemical abstracts services
CCB	Continuing calibration blank
CCC	Continuing calibration check
CCV	Calibration check verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract laboratory program
COPC	Constituents of potential concern
CSM	Conceptual site model
CTO	Contract task order
DCC	Daily continuing calibration
DGPS	Differential global positioning system
DNB	Dinitrobenzene
DNT	Dinitrotoluene
DO	Dissolved oxygen
DOT	United States Department of Transportation
DQA	Data quality assessment
DQI	Data quality indicator
DQO	Data quality objective
DTSC	Department of Toxic Substances Control
EDD	Electronic data deliverable
EOD	Explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
ESS	Explosive safety submission
ESSL	Ecological soil screening level

ACRONYMS AND ABBREVIATIONS (Continued)

FS	Feasibility study
FWS	Fish and Wildlife Services
GC	Gas chromatograph
GC/MS	Gas chromatograph/mass spectrometer
GFAA	Graphite furnace atomic absorption
GPC	Gel permeation chromatography
GPS	Global positioning system
HASP	Health and safety plan
HMX	High melting explosive
HPLC	High-performance liquid chromatograph
IC	Ion chromatography
ICAL	Initial calibration
ICB	Initial calibration blank
ICP	Inductively coupled plasma
ICS	Interference check standard
ICSA	Interference check standard A
ICV	Initial calibration verification
ID	Identification
IDL	Instrument detection limit
IDW	Investigation-derived waste
IRP	Installation restoration program
IS	Internal standard
LCS	Laboratory control sample
MB	Method blank
MC	Munitions constituents
MD	Matrix duplicate
MDL	Method detection limit
MEC	Munitions and explosives of concern
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
mm	Millimeter
MQO	Measurement quality objective
MRP	Munitions Response Program
MS/MSD	Matrix spike/matrix spike duplicate

ACRONYMS AND ABBREVIATIONS (Continued)

NA	Not applicable or not available
NAVFAC SW	Naval Facilities Engineering Command Southwest
NAVWPNSTA	Naval Weapons Station
Navy	Department of the Navy
NB	Nitrobenzene
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEDD	Navy environmental data delivery
NEESA	Naval energy and environmental support activity
NFESC	Naval Facilities Engineering Service Center
NIRIS	Naval installation restoration information system
NT	Nitrotoluene
NWR	National Wildlife Refuge
ORNL	Oak Ridge National Laboratory
ORP	Oxidation-reduction potential
PAD	Propellant actuated devices
PARCC	Precision, accuracy, representativeness, completeness, and comparability
PM	Project manager
POLB	Port of Long Beach
PPE	Personal protective equipment
PQO	Project quality objective
PRG	Preliminary remediation goal
PRRL	Project-required reporting limits
PSI	Preliminary site inspection
PT	Proficiency testing (previously known as performance evaluation [PE] sample)
QA	Quality assurance
QAM	Quality Assurance Manager
QAO	Quality Assurance Officer
QAPP	Quality assurance project plan
QC	Quality control
QL	Quantitation limit
%R	Percent recovery
RCRA	Resource Conservation and Recovery Act
RDX	Research department explosive
RF	Response factor
RI	Remedial investigation

ACRONYMS AND ABBREVIATIONS (Continued)

RL	Reporting limit
RPD	Relative percent difference
RPM	Remedial Project Manager
RRF	Relative response factor
RRT	Relative retention time
RSD	Relative standard deviation
RSL	Regional screening level
RWQCB	Regional Water Quality Control Board
SAP	Sampling and analysis plan
SDG	Sample delivery group
SI	Site inspection
SOP	Standard operating procedure
SOW	Statement of work
SPCC	System performance check compound
SSC	Site Safety Coordinator
SW	Source water blank
TBD	To be determined
Tetryl	Methyl-2,4,6-trinitrophenylnitramine
TIC	Tentatively identified compounds
TKN	Total Kjeldahl nitrogen
TNB	Trinitrobenzene
TNT	Trinitrotoluene
TSA	Technical systems audit
UFP	Uniform Federal Policy
UST	Underground storage tank
UXO	Unexploded ordnance
VOA	Volatile organic analysis

SAP WORKSHEET #2 — SAP IDENTIFYING INFORMATION

Site Name/Number: Naval Weapons Station (NAVWPNSTA) Seal Beach, California
Operable Unit: Munitions Response Program (MRP) Sites UXO1, UXO2, UXO6, AOC1, and AOC2
Contractor Name: ChaduxTt JV
Contract Number: N62473-07-D-3213
Contract Title: A-E Services to Provide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Resource Conservation and Recovery Act (RCRA)/Underground Storage Tank (UST) Studies at Various Naval and Marine Corp Installations
Contract Task Order: 0043

1. This Sampling and Analysis Plan (SAP) was prepared in accordance with the requirements of the "Uniform Federal Policy for Quality Assurance Project Plans" (UFP-QAPP) (U.S. Environmental Protection Agency [EPA] 2005) and "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5" (EPA 2001).

2. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

3. This SAP is a project-specific SAP.

4. List dates of scoping sessions that were held:

Scoping Session	Date
Kick-off Meeting with Pei-Fen Tamashiro and Jennifer Sullivan	25 July 2008
ChaduxTt Proposal	25 June 2008
Department of the Navy (Navy) Approval of Proposal	03 July 2008

5. List dates and titles of any SAP documents written for previous site work that are relevant to the current investigation.

Title	Date
Site Inspection Report, Final, Weapons Support Facility, Seal Beach, Seal Beach, California, Installation Restoration Program, Operable Unit 5. Prepared by Naval Facilities Engineering Command Southwest (NAVFAC SW) & CH2M Hill.	1998
Focused Site Inspection Report, Final, Weapons Support Facility, Seal Beach, Seal Beach, California, Installation Restoration Program, Operable Units 4 and 5. Prepared by NAVFAC SW & CH2M Hill.	1998
Final Report – Focused Site Inspection Phase II, Naval Weapons Station, Seal Beach, California. Prepared by CH2M Hill.	2002

Title	Date
Subsurface Soil Investigation, Anaheim Bay Mitigation, Case Road, Perimeter Road And Seventh Avenue Site, Seal Beach, California. Prepared by Earth Technology Corporation.	1989
Addendum to the Preliminary Assessment (Initial Assessment Study), Naval Weapons Station Seal Beach, CA. Prepared by Naval Energy and Environmental Support Activity (NEESA).	1990
Installation Restoration Program Final (Revision 1) Operable Unit-4 Site Inspection Report. Prepared by NAVFAC SW & CH2M Hill.	1998

6. List organizational partners (stakeholders) and connection with lead organization:

   The NAVWPNSTA Seal Beach Site Inspection (SI) project team includes representatives from the Department of Toxic Substances Control (DTSC), the California Environmental Protection Agency's Regional Water Quality Control Board (RWQCB), and U.S. Fish and Wildlife Services (FWS).

7. Lead organization: Navy, NAVFAC SW

8. If any required SAP elements or required information are not applicable to the project or are provided elsewhere, then note the omitted SAP elements and provide an explanation for their exclusion below:

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
A. Project Management		
Documentation		
1	Title and Approval Page	
2	Table of Contents SAP Identifying Information	
3	Distribution List	
4	Project Personnel Sign-Off Sheet	
Project Organization		
5	Project Organizational Chart	
6	Communication Pathways	
7	Personnel Responsibilities and Qualifications Table	
8	Special Personnel Training Requirements Table	Not required, no specialized training is required.
Project Planning/ Problem Definition		
9	Project Planning Session Documentation (including Data Needs tables) Project Scoping Session Participants Sheet	
10	Problem Definition, Site History, and Background Site Maps (historical and present)	
11	Site-Specific Project Quality Objectives	
12	Measurement Performance Criteria (MPC) Table	
13	Sources of Secondary Data and Information Secondary Data Criteria and Limitations Table	
14	Summary of Project Tasks	
15	Reference Limits and Evaluation Table	
16	Project Schedule/Timeline Table	
B. Measurement Data Acquisition		
Sampling Tasks		
17	Sampling Design and Rationale	
18	Sampling Locations and Methods/ Standard Operating Procedure (SOP) Requirements Table Sample Location Map(s)	
19	Analytical Methods/SOP Requirements Table	
20	Field Quality Control Sample Summary Table	
21	Project Sampling SOP References Table Sampling SOPs	Not required, all sampling references are presented in WS#17.
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
Analytical Tasks		
23	Analytical SOPs Analytical SOP References Table	
24	Analytical Instrument Calibration Table	
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	
Sample Collection		
26	Sample Handling System, Documentation Collection, Tracking, Archiving and Disposal Sample Handling Flow Diagram	
27	Sample Custody Requirements, Procedures/SOPs Sample Container Identification Example Chain-of-Custody Form and Seal	
Quality Control Samples		
28	Quality Control (QC) Samples Table Screening/Confirmatory Analysis Decision Tree	
Data Management Tasks		
29	Project Documents and Records Table	
30	Analytical Services Table Analytical and Data Management SOPs	
C. Assessment Oversight		
31	Planned Project Assessments Table Audit Checklists	
32	Assessment Findings and Corrective Action Responses Table	
33	Quality Assurance (QA) Management Reports Table	
D. Data Review		
34	Verification (Step I) Process Table	
35	Validation (Steps IIa and IIb) Process Table	
36	Validation (Steps IIa and IIb) Summary Table	
37	Usability Assessment	

SAP WORKSHEET #3 — DISTRIBUTION LIST

Name of SAP Recipients	Title/Role	Organization	Telephone Number	Address	E-mail Address
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Jennifer Sullivan	Navy Remedial Project Manager (RPM)	NAVFAC SW	(619) 532-3868	1220 Pacific Highway San Diego, CA 92132-5190	jennifer.a.sullivan1@navy.mil
Pei-Fen Tamashiro	IRP/MRP Coordinator	NAVWPNSTA Seal Beach	(562) 626-7897	800 Seal Beach Boulevard Seal Beach, CA 90740	pei-fen.tamashiro@navy.mil
Dave Crawley	Environmental Coordinator	NAVWPNSTA Seal Beach	(562) 626-7964	800 Seal Beach Boulevard Seal Beach, CA 90740	david.crawley@navy.mil
Stephen Niou	Professional Engineer/ Project Manager	DTSC	(714) 484-5458	5796 Corporate Avenue Cypress, 90630-4732	SNiou@dtsc.ca.gov
Patricia Hannon	Project Manager	RWQCB	(951) 782-4498	3737 Main Street, Suite 500 Riverside, CA 92501-3339	PHannon@waterboards.ca.gov
Kevin Hoch	Program QA Manager (QAM)	ChaduxTt JV	(510) 302-6304	135 Main Street, Suite 1800 San Francisco, CA 94105	kevin.hoch@ttemi.com
David Bloom	Project Manager (PM)	ChaduxTt JV	(619) 321-6704	1230 Columbia Street, Suite 1000 San Diego, CA 92101	david.bloom@ttemi.com
Jeremiah Santini	Site Safety Coordinator (SSC)	ChaduxTt JV	(253) 880-4455	1230 Columbia Street, Suite 1000 San Diego, CA 92101	jsantini@stgcx.com
Karin Kaiser	Analytical Coordinator	ChaduxTt JV	(303) 312-8846	950 17th Street, 22nd Floor Denver, CO 80202	karin.kaiser@ttemi.com
TBD[1]	Laboratory Project Manager	TBD[1]	TBD[1]		
TBD[1]	Data Validation Project Manager	TBD[1]	TBD[1]		

Notes: [1]Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #3 will be updated.

DTSC Department of Toxic Substances Control
IRP Installation Restoration Program
MRP Munitions Response Program
NAVFAC SW Naval Facilities Engineering Command Southwest
NAVWPNSTA Naval Weapons Station
TBD To be determined

SAP WORKSHEET #4 — PROJECT PERSONNEL SIGN-OFF SHEET

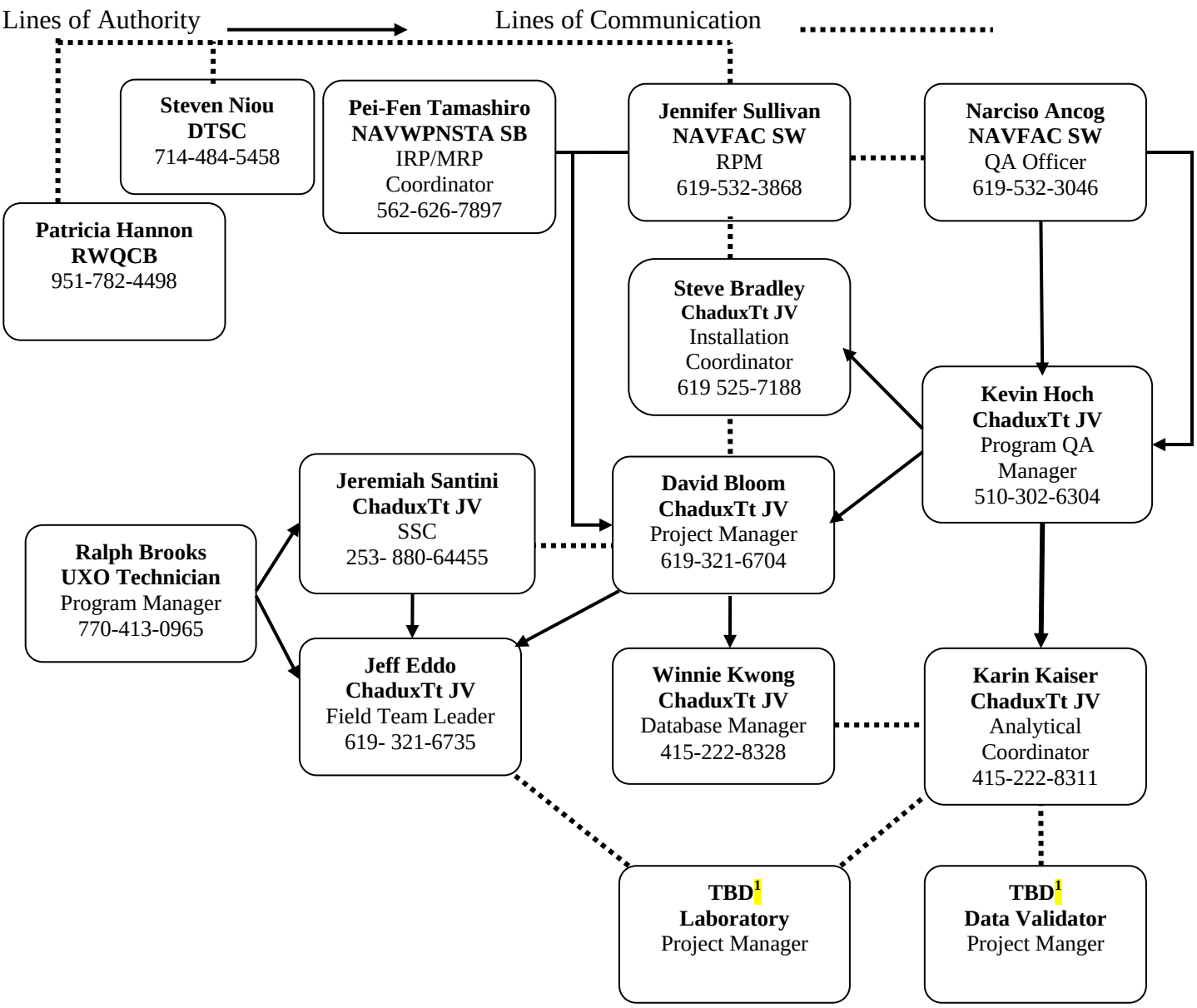
The Project Personnel Sign-Off Sheet documents that all key project personnel performing work have read this site-specific SAP and will carry out the tasks as described. The project manager, site safety coordinator (SSC), and other oversight personnel are responsible for communicating the requirements of the applicable portions of the SAP to all field personnel. To ensure that on-site field personnel have read and understood the SAP, the supervisory personnel will meet with each and review the SAP before any work is conducted on site. The sign-off sheet, which will be included in the central project file, will be signed by all on-site personnel after they read the SAP. However, if only a portion of the SAP was reviewed, then personnel will note which sections were reviewed on the sign-off sheet.

Name	Organization/Role	Telephone Number	Signature/E-Mail Receipt	SAP Worksheets Reviewed	Date SAP Read
David Bloom	ChaduxTt JV/Project Manager	(619) 321-6704		All	
Jeremiah Santini	ChaduxTt JV/ Site Safety Coordinator	(253) 880-4455		All	
Karin Kaiser	ChaduxTt JV/Analytical Coordinator	(303) 312-8846		All	
Jeff Eddo	ChaduxTt JV/Field Team Lead	(619) 321-6735		All	
Richard Knapp	ChaduxTt JV/Project Geologist and Hydrogeologist	(505) 881-3188		All	
TBD[1]	Laboratory/Project Manager	TBD[1]		12, 15, 19, 20, 23, 24, 25, 28, and 30	
TBD[1]	Data Validation Subcontractor/Project Manager	TBD[1]		12, 15, 19, 20, 23, 24, 25, 28, and 30	
TBD[1]	Drilling Subcontractor	TBD[1]			

Notes: [1]Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #4 will be updated.

SAP Sampling and Analysis Plan
TBD To be determined

SAP WORKSHEET #5 — PROJECT ORGANIZATIONAL CHART



Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #5 will be updated.

SAP WORKSHEET #6 — COMMUNICATION PATHWAYS

Communication Drivers	Responsible Affiliation	Name	Phone Number or E-Mail	Procedure
Point of contact for Navy quality issues	NAVFAC SW Quality Assurance Officer (QAO)	Narciso Ancog	(619) 532-3046	QAO will review and approve this SAP and all amendments to this SAP. Communicates with ChaduxTt Program Quality Assurance Manager (QAM) ((Kevin Hoch).
Manage all project phases	Navy RPM	Jennifer Sullivan	(619) 532-3868	Ms. Sullivan will communicate the results of the investigation to interested parties.
Waste Disposal	IRP/MRP Coordinator	Pei-Fen Tamashiro	(562) 626-7897	Ms. Tamashiro will communicate with the regulators.
Project management	ChaduxTt JV Project Manager	David Bloom	(619) 321-6704	Project manager will manage field and project personnel, and serve as liaison to the Navy, team members, and all subcontractors.
Quality control management	ChaduxTt JV Program Quality Assurance Manager (QAM)	Kevin Hoch	(510) 302-6304	QAM will ensure implementation of the SAP by performing on-site field QC audits, as appropriate. QAM will be the point of contact with the NAVFAC SW QAO for quality-related matters.
Coordination and communication of fieldwork activities related to sampling	ChaduxTt JV Field Team Lead	Jeff Eddo	(619) 321-6735	Field team lead will communicate relevant field information to the project manager and analytical coordinator. Field team lead will also report all drilling or sampling equipment problems to the project manager immediately via phone or e-mail.
Daily quality control reports	ChaduxTt JV Field Team Lead	Jeff Eddo	(619) 321-6735	Field team lead will e-mail quality control reports daily to the Navy RPM and ChaduxTt project manager.
Coordination of laboratory supplies for field activities	ChaduxTt JV Analytical Coordinator	Karin Kaiser	(303) 312-8846	The analytical coordinator will contact the laboratory to provide all necessary sample containers and appropriate shipping materials (such as coolers and bubble wrap) to be delivered on site before field sampling begins and throughout the project.
Submittal of samples to the laboratory	ChaduxTt JV Field Team Lead	Jeff Eddo	(619) 321-6735	Sampling personnel will package and ship samples in accordance with this SAP.

SAP WORKSHEET #6 — COMMUNICATION PATHWAYS (Continued)

Communication Drivers	Responsible Affiliation	Name	Phone Number or E-Mail	Procedure
Daily chain-of-custody records and shipping documentation	ChaduxTt JV Field Team Lead	Jeff Eddo	(619) 321-6735	Chain-of-custody records and shipping documentation will be submitted via fax or e-mail to the analytical coordinator at the end of each day that samples are collected.
Sample shipping/receipt issues	Laboratory Project Manager	TBD[1]	TBD[1]	The laboratory project managers will report all sample shipping and receipt issues associated with the investigation to ChaduxTt's analytical coordinator within 2 business days.
Reporting laboratory data quality issues	Laboratory Project Manager	TBD[1]	TBD[1]	All QA and QC issues will be reported by the laboratory project manager to the analytical coordinator in writing within 2 business days.
Field and analytical corrective actions	ChaduxTt JV Analytical Coordinator	Karin Kaiser	(303) 312-8846	The analytical coordinator will immediately notify the QAM in writing of any field or analytical procedures that were not performed in accordance with this SAP. The analytical coordinator, in coordination with the QAM, will complete documentation of the non-conformance and corrective actions to be taken. The analytical coordinator will verify that the corrective actions have been implemented.
Minor deviations from SAP procedures identified during field activities	ChaduxTt JV Field Team Lead	Jeff Eddo	(619) 321-6735	The field team leader will prepare a field change request for any minor changes in sampling procedures that occur as a result of conditions in the field. This request will be submitted to the QAM for approval before the change is initiated.
SAP amendments	ChaduxTt JV QAM	Kevin Hoch	(510) 302-6304	If QMA deems the changes to be other than minor, changes will be detailed in a SAP addendum that will be approved by the NAVFAC SW QAO before any field activities begin.

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #6 will be updated.

SAP WORKSHEET #7 — PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS TABLE

Name	Title/Role	Organizational Affiliation	Responsibilities
Jennifer Sullivan	Remedial Project Manager	Navy – NAVFAC SW	Responsible for reviewing and approving Work Plans; and providing management and technical oversight during data collection efforts. Actively participates in project quality objective (PQO) process.
Narciso Ancog	Navy QAO	Navy – NAVFAC SW	Responsible for all QA issues for all Navy work. Provides government oversight of the QA program including review and approval of SAPs and any future modifications to the plans; provides quality-related direction through the Navy RPM to the ChaduxTt QAM; and has authority to suspend affected project or site activities if approved quality requirements are not adequately met.
Kevin Hoch	Program QAM	ChaduxTt JV	Overall QA and QC of technical work at the site; develops and maintains a comprehensive QA program and is responsible for audits, reviews of work performed, and recommendations to project personnel regarding quality. Provides QA and QC of technical work carried out at the site; works closely with and reviews work carried out by the project team; and reviews deliverables to verify conformance with QA and QC procedures.
Steve Bradley	Installation Coordinator	ChaduxTt JV	Responsible for ensuring all ChaduxTt JV activities at this naval installation are carried out in accordance with current Navy requirements and ChaduxTt program guidance.
David Bloom	Project Manager	ChaduxTt JV	Provides management oversight and assistance in completing the technical work. Acts as liaison with Navy RPM. Oversees administrative and technical performance, and maintains compliance with schedules and budgets. Prepares or supervises preparation of the SAP. Monitors and directs field activities to ensure compliance with SAP requirements. Monitors staffing, schedules, and budget for this contract task order (CTO).
Jeremiah Santini	SSC	ChaduxTt JV	Responsible for implementing the health and safety plan and accident prevention plan; authority to correct and change site control measures and the required level of health and safety protection; and primary on-site enforcement authority for the policies and provisions of the health and safety program and health and safety plan. Conducts safety briefings for ChaduxTt and subcontractor personnel and site visitors, and can suspend operations that threaten health and safety of workers and visitors.

SAP WORKSHEET #7 — PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS TABLE (Continued)

Name	Title/Role	Organizational Affiliation	Responsibilities
Jeff Eddo	Field Team Lead	ChaduxTt JV	Directs the day-to-day field activities and oversees all subcontractors; verifies that field measurement and sampling procedures are conducted in accordance with the SAP; and reports directly to the project manager on planning, cost and schedule control, and data management information needs.
Karin Kaiser	Analytical Coordinator	ChaduxTt JV	Coordinates analytical tests with the information required from the field activity; sets up contracts with laboratories to conduct required analyses; coordinates pickup and delivery schedules with laboratories; verifies that the laboratories implement the requirements of the SAP; and reviews laboratory data before they are released.
Winnie Kwong	Database Manager	ChaduxTt JV	Responsible for developing, monitoring, and maintaining project database under guidance of ChaduxTt project manager, and works with analytical coordinator during preparation of the SAP to resolve sample identification issues.
TBD[1]	Project Manager	Laboratory Subcontractor (TBD[1])	Primary point of contact for the ChaduxTt analytical coordinator; responsible for day-to-day laboratory activities that ensure that analytical services comply with the SAP and that resulting data will meet data quality objectives (DQO); works with ChaduxTt analytical coordinator to confirm sample delivery schedules; reviews laboratory data package before it is delivered to ChaduxTt.
TBD[1]	Data Validator	Data Validator Subcontractor (TBD[1])	Primary point of contact for the ChaduxTt analytical coordinator; responsible for day-to-day activities that ensure that analytical services complied with the SAP and appropriate analytical methods.

Note: [1]Before the SAP is finalized and crews mobilize to the field, all missing information in Worksheet #7 will be updated.

SAP WORKSHEET #8 — SPECIAL PERSONNEL TRAINING REQUIREMENTS TABLE

No specialized personnel training is required for this project. Other than the health and safety training requirements, additional specialized training will not be required for this investigation. All personnel who work at hazardous waste project sites are required to meet the Occupational Safety and Health Administration training requirements defined in Title 29 Code of Federal Regulations Part 1910.120(e). These requirements include (1) 40 hours of formal off-site instruction; (2) a minimum of 3 days of actual on-site field experience under the supervision of a trained and experienced field supervisor; and (3) 8 hours of annual refresher training. Field personnel who directly supervise employees engaged in hazardous waste operations also receive at least 8 additional hours of specialized supervisor training. Site safety coordinators receive 10 hours of construction training. All members of every ChaduxTt field team will maintain current certification in the American Red Cross "Multimedia First Aid" and "Cardiopulmonary Resuscitation Modular," or equivalent. All sampling will be performed by personnel experienced with sampling procedures. In some cases, junior personnel will work alongside experienced personnel to assist in sample collection and for training.

SAP WORKSHEET #9 — PROJECT SCOPING SESSION PARTICIPANTS SHEET

Project Name: Site Inspection **Projected Date(s) of Sampling:** February – March 2009 **Project Manager:** David Bloom	**Site Name:** MRP Sites UXO1, UXO2, UXO6, AOC1, & AOC2 **Site Location:** NAVWPNSTA Seal Beach, California

Date of Sessions: July 25, 2008
Scoping Session Purpose: Kick-off meeting

Name	Title/Role	Affiliation	Phone #	E-mail Address
Jennifer Sullivan	Navy RPM	NAVFAC SW	(619) 532-3868	jennifer.a.sullivan1@navy.mil
Pei-Fen Tamashiro	IRP/MRP Coordinator	NAVWPNSTA Seal Beach	(562) 626-7897	pei-fen.tamashiro@navy.mil
Greg Swanson	QA/QC Manager	ChaduxTt JV	(619) 321-6726	greg.swanson@ttemi.com
Dave Bloom	Project Manager	ChaduxTt JV	(619) 321-6704	david.bloom@ttemi.com
Darren Knight	Program Manager	ChaduxTt JV	(619) 237-1862	dknight@stgcx.com
Jeff Eddo	Geophysicist	ChaduxTt JV	(619) 321-6735	jeff.eddo@ttemi.com

Comments/Decisions:

The kick-off meeting started with ChaduxTt personnel and Ms. Jennifer Sullivan of NAVFAC SW attending a NAVWPNSTA Seal Beach installation-specific health and safety training briefing provided by Ms. Pei-Fen Tamashiro. All subcontractors and site workers are required to receive this training. The training covered issues regarding cell phone use, photography, field investigation instrumentation approval, and Explosive Safety Submission (ESS) requirements. According to the training course, cell phones and field equipment must be pre-approved prior to use on base; a single camera must also be approved for company use during field activities; and no photography of ordnance processes/activities of any kind is allowed. Ms. Tamashiro also stated that the ESS must be completed and approved prior to any project-related field activity.

After completion of the installation-specific health and safety training course, various aspects of the Site Inspection (SI) were discussed which included biological avoidance and minimization, Data quality objectives (DQO), conceptual site models (CSM), and the general investigation approach. Site name changes were also discussed, which included changing Westminster Port of Long Beach (POLB) Fill area to UXO6, Building 94 Settling Pond Area to AOC 1, and the Explosive Drop Test Tower to AOC 2. In addition, each of the five MRP sites was briefly visited.

MRP Site UXO1 (Primer/Salvage Yard and POLB Mitigation Pond):

Reportedly, ordnance debris of all sizes exists at MRP Site UXO1. Evidence of shell casings and munitions debris exists in and along the northwest shoreline area of the pond, as well as within and adjacent to the fenced primer/salvage yard area. During the Preliminary Site Inspection (PSI) conducted earlier this year, some blow-in-place of munitions occurred during the site work. The Navy (Ms. Pei-Fen Tamashiro) requested that a 100 percent (as possible) detector-aided visual survey be conducted at the site and possibly a geophysical survey (EM 61 Mark II survey).

Action Items:

- Determine the level of effort for a detector aided visual survey of the UXO1.

MRP Site UXO2 (Buildings 101 and 102 area and Associated Evaporation Ponds):

A concrete drain line runs from Building 98 into dense brush covering the settling ponds area. The settling ponds are located on both sides of the buildings on site. Structures are not part of the SI (including the concrete drain line). However, soils around the drain line are to be included in the SI. Reportedly, the ponds have not had any fill material brought in. In addition, it was discussed that there may be more than two distinct settling ponds.

Action Items:

- Establish site boundaries.
- Investigate the extent of the drain line and evaporation ponds.

MRP Site UXO6 (Westminster POLB Fill Area):

The Westminster POLB Fill Area is referred to as MRP Site UXO6. Reportedly, the site has never been thoroughly inspected. During the site walk, Ms. Pei-Fen Tamashiro indicated the need to conduct 100 percent visual inspection. However, the ChaduxTt proposal did not include this effort in the tasks and clarifications section.

UXO6 had been filled in during the early 1990s. The fill within the site footprint is uneven to an unknown extent and may vary from 3 to 5 feet deep. Trucks containing fill material that may have been taken from the POLB mitigation pond excavations placed fill in a relatively uncontrolled fashion. Documentation describing where fill from specific pond source(s) was placed does not appear to exist. Soil sampling may be conducted in the immediate vicinity of significant magnetic anomalies identified during detector-aided visual surveys and/or in topographically low areas. In addition, grid soil sampling is proposed. However, the number of grid samples will depend on the amount of possible munitions or munitions-related items and/or significant anomalies identified (if any) during the detector-aided visual surveys.

Action Items:

- Change Westminster POLB Fill Area to MRP Site UXO6 in documents.
- Determine the level of effort required for the detector-aided visual surveys.
- Conduct aerial photo review and records research covering the time period during the fill placement.

MRP Site AOC1 (Building 94 Settling Basin):

The Building 94 Settling Basin is referred to as MRP Site AOC1. The settling basin is located east of Building 94, off of asphalt/concrete pad. Agricultural uses (farming) have been

conducted in the area since an unknown date. Beans are the current crop surrounding AOC1. Evidence of the pond is not readily visible, and the suspected area is used for agriculture. Sensitivity to the farmer and harvesting should be considered when determining sample location access. Reportedly, the pond surface may be 1 to 2 feet below cultivated land surface.

Action Items:

- Coordinate with farmers to block area of investigation from planting during next crop planting.

- Review historical aerial photos.

MRP Site AOC2 (Explosives Drop Test Tower):

Blue herons have several nests located on the explosives drop test tower within MRP Site AOC2. Munitions and explosives of concern (MEC) are not suspected at this location, and only the possibility of munitions constituents (MC) is anticipated. In addition, the SI field work at the site must be completed before or after nesting season.

Action Items:

- Determine nesting season.

Consensus Decisions:

The Navy and ChaduxTt agreed on the general plan of the SI approach for each of the five sites. The general level of effort for each of the sites was also agreed upon.

SAP WORKSHEET #10 — PROBLEM DEFINITION

10.1 PROBLEM DEFINITION

The objective of the SI for the five MRP Sites—UXO1, UXO2, UXO6, AOC1, and AOC2—is to document if MC is present in soils and if surface and subsurface evidence of MEC exist. The complete problem statement for each area of concern is included in Worksheet #11.

MRP Site UXO1 was actively used for ordnance storage related to rocket and projectile segregation, inspection, and repackaging. Site UXO1 was also identified as a recovered live ammunition and grenades area. Disposal of munitions is believed to have occurred. Reportedly, the disposal items were mixed with non-energetic inert material. Station personnel recovered unknown quantities of live, small-caliber ammunition and grenades from this area. One area of Site UXO1 was an explosive ordnance disposal (EOD) demonstration area and a safety demonstration area. This area has since been excavated and is currently occupied by the POLB mitigation pond. Site observations indicate the presence of MEC. Based on reported use of the site and reported burial of munitions, MEC are estimated to range from very low (one to two items per acre) to high (greater than 40 items per acre). The suspect MEC may present an explosive hazard. If present in soils, MC may have migrated into the groundwater.

MRP Site UXO2 consists of the Buildings 101 and 102 and associated settling ponds. Energetic materials containing ammonium picrate, also known as Explosive-D, TNT, RDX, HMX, nitrocellulose, and ammonium perchlorate, were processed in Buildings 101 and 102. Washwater with Explosive-D, produced from the clean-up of projectile casings, drained through a concrete trench flush with grade into a series of three connected settling ponds. The settling ponds were occasionally allowed to dry via draining and evaporation, and then were burned to control the surface accumulation of Explosive-D. Samples were previously collected at Site UXO2 but they were only shallow samples. Previous investigations detected ammonia as nitrogen at low concentrations and low unquantifiable concentrations of explosives. If present in soils, MC may have migrated into the groundwater.

MRP Site UXO6 was used to hold an estimated 850,000 cubic yards of fill from four mitigation ponds. Potential munitions present at these ponds include live, inert, and/or damaged rockets, projectiles, grenades, obscurants, black or smokeless powders, primers, fuzes, small arms ammunition, CAD, PAD, and sub-munitions. Suspected munitions present at the POLB Mitigation Pond potentially could have been transported in fill to the Westminster POLB Fill Area. MEC density is suspected to be very low, but suspect MEC may present an explosive hazard. If present in soils, MC may have migrated into the groundwater.

During operations at MRP Site AOC1, Building 94, a processing facility, generated multiple tons of smokeless powder waste each month with small amounts of spillage occurring. Building 94 was occasionally washed down with water to prevent the accumulation of smokeless powder dust, and the waste water that potentially contained smokeless powder, RDX, HMX, and picrate was drained through floor drains. Based on an engineering diagram, it appeared a drainpipe

extended from the east side of Building 94 to the settling basin. The former settling basin is no longer visible. In addition, if present in soils, MC may have migrated into the groundwater.

MRP Site AOC2, the Explosive Drop Test Tower, was used in conjunction with former Buildings 435 and 437 for experimental propellant testing. Although the low lying salt marsh area just north and adjacent to Site ACO2 was sampled and no explosives were detected as part of IRP Site 24, the soil underneath the tower has not been evaluated. Therefore, site-specific information is necessary to determine the level of contamination. MEC are not suspected but MC may be present in soils. If present in soils, MC may have migrated into the groundwater.

Based on the findings of the field investigation, the SI report will recommend whether further action, such as additional characterization, a remedial response, or no further action is warranted.

10.2 FACILITY AND SITE BACKGROUND

NAVWPNSTA Seal Beach was originally commissioned in 1944, at the height of World War II, as a Naval Ammunition and Net Depot. After several reorganizations between 1962 and 1998, the installation was given its current designation of Naval Weapons Station Seal Beach. It is one of several weapons stations maintained by the Navy to provide fleet combatants with ready-for-use ordnance. The station includes a waterfront, storage, testing, and production facilities, as well as a headquarters command, that support the station's mission. NAVWPNSTA Seal Beach serves as the munitions supply point for most of the operating Navy forces in the Pacific.

The mission of NAVWPNSTA Seal Beach is to provide shore-based infrastructure support to the Navy's ordnance mission and other fleet and fleet support activities. The installation is used by the Navy to receive, inspect, maintain, store, and guard large quantities of explosives and ammunition, and to distribute and deliver them as needed to other installations. Missiles, torpedoes, countermeasure devices, and conventional ammunition are loaded onto ships at the facility's 1,000-foot-long wharf. Personnel also perform maintenance on some weapons systems. Approximately 60 vessels are loaded or unloaded each year (NAVWPNSTA Seal Beach 2008).

Ordnance production and handling facilities constructed and utilized during World War II and the post-World War II era typically processed munitions containing trinitrotoluene (TNT), Research department explosive (RDX), methyl-2,4,6-trinitrophenylnitramine (Tetryl), and ammonium picrate (Explosive D). Gun propellants manufactured for World War II and throughout most of the twentieth century contained the smokeless powders nitrocellulose and nitroglycerin. Post-World War II saw the introduction of composite propellants into Naval processing facilities that typically contained ammonium perchlorate as the energetic constituent (Malcolm Pirnie, Inc. [Malcolm Pirnie] 2008).

From 1950 through 1953, during the Korean War, the handling of ammunition accelerated steadily. These operations included demilitarization of large quantities of World War II ammunition in stock. During this time, the depot constructed additional ammunition storage facilities, a static rocket test firing facility, and a fuse and detonator magazine. Between 1958 and 1962, operations

at NAVWPNSTA Seal Beach continued to shift from conventional ammunition to guided missiles and related components. This included surface-launched missiles and underwater weapons. In 1966, production of surface missile systems continued with the Terrier, Tartar, and Talos missiles being produced at Seal Beach. Between 1966 and 1970, ordnance production numbers decreased and two reductions-in-force were conducted (Malcolm Pirnie 2008).

10.3 HISTORICAL OPERATIONS OF MRP SITES

The following presents the operational history of MRP Sites UXO1, UXO2, UXO6, AOC1 and AOC2 and a physical description of each site. For the location of each site within the installation, see Figure 1. Worksheet #13 summarizes previous investigations that have occurred for the MRP sites.

10.3.1 Historical Operation of MRP Site UXO1

MRP Site UXO1 consists of the primer/salvage yard and the POLB mitigation pond. The primer/salvage yard comprises the northern portion of UXO1 and encompasses approximately 48 acres (Figure 2). The southern portion of MRP Site UXO1 is the POLB mitigation pond, which comprises approximately 39 acres of UXO1. From 1944 through the 1980s, the primer/salvage yard was actively used for ordnance storage related to rocket and projectile segregation, inspection, and repackaging. Active operations ceased for the primer/salvage yard area in the late 1990s.

As presented in the 1985 Installation Assessment Survey, three activities and zones of interest were identified at the primer/salvage yard. The first zone is the depriming area, which was used from 1944 through 1982 as a smoke pot filling station. Reportedly, smoke pots were used as obscurants and filled with roughly one quart of petroleum product consisting primarily of kerosene called “fog oil.” The amount of fog oil discharged to the soil is unknown. An estimated 10,000 smoke pots were filled with fog oil at this site (NEESA 1985). During the same period, the area was also used for depriming ordnance projectiles. Primers, whose main MC was either smokeless powder or black powder, were removed from projectiles and placed in 5-gallon powder cans until they were shipped off-station or sent to the Explosives Burning Ground for disposal (NEESA 1985).

The second zone of interest was northeast of the depriming area and identified as the recovered live ammunition and grenades area. Disposal of munitions is believed to have occurred roughly 100 feet east of Building 413 at an unknown date. Reportedly, the disposal items were mixed with non-energetic inert material (e.g., empty metal canisters, wooden packing materials, and electronics). Station personnel recovered unknown quantities of live, small-caliber ammunition and grenades from this area at an unspecified date (NEESA 1985). The 1985 report recommended further action to address these items.

The third zone of interest was an explosive ordnance disposal (EOD) demonstration area and a safety demonstration area (EOD Safety Demonstrations Area) that were reported 600 feet south

of former Building 413. This area has since been excavated and is currently occupied by the POLB mitigation pond.

10.3.2 Historical Operation of MRP Site UXO2

MRP Site UXO2 consists of Buildings 101 and 102 and associated settling ponds. The site is comprised of four unlined evaporation ponds associated with Buildings 101, 102, and 98 (Figure 3). Energetic materials containing ammonium picrate, also known as Explosive-D, TNT, RDX, High Melting eXplosive (HMX), nitrocellulose, and ammonium perchlorate were processed in Buildings 101 and 102. The complex operated from 1945 through the mid 1950s, in 1962, and in 1971 to demilitarize 5-inch projectiles. The facilities ceased operation in 1972.

When the projectiles were retired, Explosive-D (ammonium picrate) was drilled out of the casings (NEESA 1985, 1990). The drill-out procedure did not remove all of the Explosive-D from the casing, so the remaining portion was removed by rinsing with warm water and steam. Washwater with Explosive-D was generated during final steam and warm water washout of projectile casings. Washwater with Explosive-D drained through a 150-foot long concrete trench into a series of three connected evaporation ponds, which encompass approximately 2.3 acres.

From 1945 to the mid 1950s, 13 tons of Explosive-D mixed with wastewater drained into the ponds for evaporation and settling. In 1962, an additional 32 pounds of Explosive-D was drained into the ponds, and in 1971, 5 pounds was drained into the ponds. The ponds were occasionally allowed to dry via draining and evaporation, and then were burned at an unknown frequency to control the surface accumulation of Explosive-D. Post-treatment of the ponds consisted only of the controlled burns conducted while the ponds were in operation. It was reported that on one occasion, in 1948, the ponds detonated rather than burned. The last controlled burn occurred in 1962.

10.3.3 Historical Operation of MRP Site UXO6

UXO6 consists of the Westminster POLB Fill Area. The site is estimated at 1.75 miles long and 715 feet wide; it encompasses approximately 180 acres. In 1989/1990, Site UXO6 was used to place approximately 3 to 5 feet of fill that may have been excavated from the POLB mitigation pond (the southern portion of the current MRP Site UXO1), a known MEC area. A calculated 330,000 cubic yards of soil from the 7th Street POLB Mitigation Pond, excavated to an average depth of 5 feet below ground surface (bgs), was potentially placed in the Westminster POLB Fill Area.

Munitions that could have been transported to the Westminster POLB Fill Area include live, inert, and/or damaged rockets, projectiles, grenades, obscurants, black or smokeless powders, primers, fuzes, small arms ammunition, cartridge actuated devices (CAD), propellant actuated devices (PAD), and sub-munitions.

10.3.4 Historical Operation of MRP Site AOC1

MRP Site AOC1, Building 94 Settling Basin, is located east of Case Road in the central portion of the installation (Figure 5). Building 94 (gun propellant charge loading and breakdown facility) was commissioned in 1945 and operated until at least 1981 for the loading and breakdown of projectiles (NEESA 1985). Reportedly, approximately 1.5 tons of waste smokeless powder was generated per week between 1945 and 1970. Small amounts of spillage reportedly occurred during operations. To prevent smokeless powder dust accumulation, the interior of the Building 94 was occasionally washed down with water and the wash water drained through floor drains, which led to the settling basin to the east of Building 94.

Based on a 1944 engineering diagram, a drainpipe likely associated with the Building 94 floor drains originated from the east side of Building 94 to a 50- by 50-foot settling basin. The building was later redesigned to drain to the sanitary sewer system. The settling basin at Building 94 is visible in the 1947 through 1968 aerial photographs; however, it appears to have been graded over. Currently, the area is leased for farming and crop cultivation.

10.3.5 Historical Operation of MRP Site AOC2

MRP Site AOC2 consists of the Explosive Drop Test Tower (see Figure 6). Engineering diagrams show that the tower is 50 feet high, and was used from 1955 to 1977 in conjunction with former Buildings 435 and 437 to test experimental propellants. It is also possible that the tower was used to perform safety tests for explosive components applicable to the testing of anti-submarine rocket and submarine-launched rocket components.

The low-lying salt marsh area to the north of and adjacent to the Explosives Drop Test Tower was used for the disposal of waste quenching water containing RDX (NEESA, 1985). The marsh was investigated as Installation Restoration Program (IRP) Site 24 in 1990 and sampled for explosives, including HMX and RDX. IRP Site 24 was recommended for no further action because no explosives were detected. However, the area underneath the tower has not been evaluated.

10.4 SITE DESCRIPTION AND PHYSICAL SETTING

A physical description of the individual sites is provided in the work plan. A summary of the general site description and physical setting is provided in the following sections. This description includes general information on the climate, geology, and hydrology at NAVWPNSTA Seal Beach.

10.4.1 Regional Climate

The climate at NAVWPNSTA Seal Beach is typical of the maritime subclimate within the California Mediterranean climate, which includes mild winters, cool summers, high relative

humidity, and frequent early morning clouds that lead to afternoon sunshine. The annual average temperature is 74 degrees Fahrenheit (°F). Summer average high temperatures range from 77°F to 84°F, and average lows range from 60°F to 65°F. However, winters tend to have moderate temperatures, with highs typically around 65°F and average lows ranging from 45°F to 47°F. Average yearly precipitation is 13 inches per year, with February the wettest month of the year (3 inches per year) and July the driest (0.02 inch per year) (Western Regional Climate Center [WRCC] 2008). Periodically, the region will undergo El Niño conditions, which tend to bring wetter winters to the area through heavy storms. The prevailing winds are westerly with an average velocity of 10 knots. However, strong dry northeasterly winds occasionally descend the mountain slopes in the fall, winter, and early spring months. The strongest winds that occur within the region are associated with the winter and spring storms off the Pacific Ocean (Malcolm Pirnie 2008).

10.4.2 Regional and NAVWPNSTA Seal Beach Specific Geology

NAVWPNSTA Seal Beach is located on flat alluvial deposits that slope southwest from approximately 20 feet above sea level (asl) to sea level at the Seal Beach National Wildlife Refuge (NWR). The highest topographic feature on the installation is Landing Hill (50 feet asl). Landing Hill is an uplift on the southwest side of the facility along the Newport-Inglewood fault zone that extends west of NAVWPNSTA Seal Beach across Seal Beach Boulevard (NEESA 1985).

Bedrock in the area is a thick sequence of Tertiary and Quaternary sedimentary rocks deposited on a basement of pre-Tertiary metamorphic and crystalline rocks. Tertiary rocks range from Oligocene to Pliocene and include sandstone, siltstone, shale, and mudstone and are almost exclusively of marine origin (Malcolm Pirnie 2008). The Newport-Inglewood fault zone parallels the coastline and generally forms a barrier to groundwater flow. Erosion channels filled with permeable alluvium break this barrier at the Alamitos Gap (Department of Water Resources 2003).

10.4.3 Regional Hydrogeology

Hydrogeologic information pertaining to NAVWPNSTA Seal Beach obtained from previous investigations and a regional groundwater contour study by the Orange County Water District show that groundwater flow direction at the station is influenced by groundwater extraction and, in the vicinity of the Los Alamitos injection barrier, by groundwater injection.

The NAVWPNSTA Seal Beach is located in the southwest corner of the Orange County Basin, overlying important confined alluvial groundwater supply aquifers of sand, gravel, and clay deposits of Pleistocene to Pliocene age. Fresh groundwater containing less than 50 parts per million chloride is found in aquifers east of the Newport-Inglewood fault. West of the fault, groundwater is predominantly brackish to saline. In general, groundwater flows away from the Seal Beach NWR to the northeast; however, the direction may vary seasonally (NEESA 1985; NAVFAC SW 2002).

The upper aquifers (75 to 200 feet deep) are no longer used for water supply. The primary freshwater aquifers at NAVWPNSTA Seal Beach are at a depth of 600 to 1,000 feet bgs and are confined by a 100- to 200-foot-thick clay layer. The confined freshwater aquifers lie entirely inland from the Newport-Inglewood fault. Groundwater recharge is primarily from rainfall in the upgradient areas of the aquifer. Groundwater migration from the shallow semiperched aquifer to the lower aquifers is unlikely due to the thick clay layer (confining layer) separating the deeper aquifers (Malcolm Pirnie 2008).

The confined aquifers are artesian and have historically supplied potable water to NAVWPNSTA Seal Beach and surrounding communities. Currently, groundwater on NAVWPNSTA Seal Beach is used only for agricultural irrigation. Three production wells are reported to exist on NAVWPNSTA Seal Beach. The wells are located to the east of the primer/salvage yard, to the west of Westminster POLB Fill Area, and in the northeast corner of the northern half of NAVWPNSTA Seal Beach (Malcolm Pirnie 2008).

Lateral groundwater movement in the moderately permeable shallow aquifer is estimated on the order of several hundred feet per year (NEESA 1985). The hydraulic conductivity of the shallow aquifer is estimated at approximately 450 feet per day, and the maximum hydraulic gradient on the station is about 7.5 feet per mile, or 0.0014. The porosity of sand and gravel ranges from 0.25 to 0.5, with an effective porosity of 0.3. Given these parameters, the calculated velocity for groundwater in the shallow aquifer beneath the station is estimated at 2.1 feet per day or approximately 770 feet per year (NEESA 1985).

10.5 CONCEPTUAL SITE MODEL

This section provides a summary of the CSMs for each of the MRP sites addressed in this SAP. The CSMs are based on the PSI (Malcolm Pirnie 2008) and initial SI activities, including site walks. The CSMs have been developed using current knowledge of historical activities that may have affected the site and are more thoroughly presented in the work plan (see Section 2.0). The CSMs presented in the work plan include possible sources and release mechanisms, exposure pathways, and potential ecological and human receptors.

10.5.1 MRP Site UXO1 CSM Summary

MRP Site UXO1 consists of the Primer/Salvage Yard and POLB Mitigation Pond. Soil at the southern portion of UXO1 (the POLB Mitigation Pond) was excavated to roughly 6 feet bgs to create the POLB Mitigation Pond. Suspect MEC and munitions debris have been observed along banks of the pond and within the Primer/Salvage Yard area (the northern portion of UXO1), indicating that additional MEC are present below the water/ground surface (Malcolm Pirnie 2008).

Previous primer/salvage yard area SI results indicate MC likely include nickel, zinc, ammonia, and total Kjeldahl nitrogen (TKN) within the POLB Mitigation Pond (Malcolm Pirnie 2008). Black powder (potassium nitrate) and C4 explosives (RDX) were reportedly used during EOD and safety demonstrations at the POLB Mitigation Pond area. Explosive MC related to

cartridges likely include double base powders (nitrocellulose, nitroglycerin). MC related to removal of primers from projectiles at the adjacent primer/salvage yard area include black powder and smokeless powder (nitrocellulose, nitroglycerin, and nitroguanidine) and may be present within the POLB Mitigation Pond area. Metallic MC related to black and smokeless powder, include antimony, arsenic, copper, nickel, and zinc, and may also be present within the pond area. In addition, the obscurant fog oil (kerosene/mineral oil) reportedly was spilled in the vicinity, which may include part of the POLB Mitigation Pond.

The primer/salvage yard is no longer in use. Agricultural land use occurs north and east of the primer/salvage yard. Potential future land uses within the primer/salvage yard area include storage and unused land. In addition, agriculture is a potential future land use if the MEC hazard is eliminated.

The adjacent Seal Beach NWR to the south and west provides wetland habitat. The POLB Mitigation Pond is part of the Seal Beach NWR and provides protected habitat for migratory birds and for other endangered, threatened, and sensitive species. Because the area is a known MEC site, no intrusive maintenance is conducted at the site. In addition, the future land uses are expected to be the same as current uses for the POLB Mitigation Pond.

10.5.2 MRP Site UXO2 CSM Summary

The MRP Site UXO2 (Buildings 101 and 102 surroundings and associated evaporation ponds) encompasses approximately 8 acres. The site is comprised of four unlined evaporation ponds associated with Buildings 98, 101, and 102. The evaporation ponds and associated buildings within Site UXO2 are no longer in use. The evaporation ponds are maintained by NAVWPNSTA Seal Beach as part of a riparian corridor to the Seal Beach NWR (NAVWPNSTA Seal Beach 2007).

Agricultural fields lie to the south of the UXO2. Agricultural fields extend 0.3 mile to the west of Site UXO2. The east side of Site UX02 is being used to raise honey bees, and nearby surrounding land is used for agriculture activities or is unused.

Although MEC are not known or suspected to be present, Explosive D (ammonium picrate) and associated breakdown products, which may include picric acid and piramic acid, were disposed of with wash water and drained into evaporation ponds associated with UX02. Precipitates expected to form during the breakdown processes are calcium, sodium, ammonia, nickel, and zinc salts due to the relative concentrations of these metals in the soil (NEESA 1990). In addition, RDX has been identified in Buildings 101 and 102. Reportedly, the evaporation ponds have not been sampled for RDX.

Future land use at UXO2 is expected to be the same as at present. In addition, anticipated demolition of the Buildings 101 and 102 complex has been funded through Public Works. After the demolition of the buildings, agricultural use in the vicinity of the site is likely to continue.

10.5.3 MRP Site UXO6 CSM Summary

MRP Site UXO6 (Westminster POLB Fill Area) is an expanse of land occupying approximately 150 acres. A railroad spur runs along the length of UXO6. An administrative building and vehicle and railroad scales are located in the central portion of the site. Westminster Avenue lies 75 to 250 feet north of the UXO6, and bisects the northern and southern areas of NAVWPNSTA Seal Beach. Westminster Street and agricultural fields are located just the south of UXO6. Active installation offices and production buildings are west of Site UXO6. The installation's fenced boundary lies adjacent to the east of UXO6, where the installation is bordered by the City of Westminster.

UXO6 is a fill area that may contain fill material excavated from UXO1 (Primer/Salvage Yard and the POLB Mitigation Pond). The various types of munitions reported for UXO1 could be present at UXO6 if this fill material from the pond is indeed present. These munitions include live, inert, and/or damaged rockets, projectiles, grenades, obscurants, black and smokeless powders, primers, small arms ammunition, CAD, PAD, and submunitions (NEESA 1985). According to site interviews, it was reported that 3-inch rounds were seen falling off of trucks during the excavation of soil from the POLB Mitigation Pond (Malcolm Pirnie 2008).

MEC density is suspected to be very low (1 to 2 per acre) and could be buried as deep as 3 to 5 feet which is the reported depth of the fill that was emplaced at Site UXO6. MC associated with UXO6 that may have been transported to the site include nickel, zinc, ammonia, and TKN. Black powder (potassium nitrate) and C4 explosives (RDX) reportedly were also used during EOD and safety demonstrations at MRP Site UXO1. Explosive MC related to cartridges likely includes double base powders (nitrocellulose and nitroglycerin). MC related to the removal of primers from projectiles at the adjacent primer/salvage yard area also include black powder and smokeless powder including nitrocellulose, nitroglycerin, and nitroguanidine. Metal MC related to black and smokeless powder includes antimony, arsenic, copper, nickel, and zinc. In addition, the obscurant fog oil (kerosene/mineral oil) reportedly was spilled in the vicinity of the primer/salvage yard area of Site UXO1.

UXO6 is primarily unused, other than for limited railcar movement through the site and a small portion in the center of the site that is used for railroad transfer operations. Limited maintenance activities consisting of mowing the vegetation occur on a regular basis. Future land uses are expected to be the same as current use.

10.5.4 MRP Site AOC1 CSM Summary

MRP Site AOC1 (Building 94 Settling Basin) occupies approximately 0.4 acre. The former settling basin within the site footprint was 50 by 50 feet. Building 94 and its associated paint locker, smoke shack, and equipment storage buildings are the only structures adjacent to the site but are not included within the site footprint. Agricultural fields exist north of Site AOC1. Agricultural fields lie south of the Site AOC1, and the Seal Beach NWR lies about 400 yards away. The northern tip of the Seal Beach NWR is located nearby Site AOC1 to the west.

Building 94 was a processing facility for 20-millimeter (mm), 40-mm, 3-inch, and 5-inch projectiles. Reportedly, no munitions were processed in the settling basin. However, wash water with MC, which was disposed of in the settling basin, may create subsurface explosive soil conditions (i.e., explosive MC concentrations greater than 10%). The surface of the settling basin is approximately 2 to 3 feet below the current grade. Small amounts of spillage were reported for smokeless powder inside Building 94, which was drained to the settling basin. In addition, analytical sampling of floor drains inside Building 94 reported below hazard threshold concentrations of RDX, HMX, and picrate in floor drains (NAVFAC SW 2005).

MRP Site AOC1 is no longer in use. The former settling basin has been graded over and is now used for agriculture. Future land uses at the site are expected to be the same as current land uses. Additionally, Building 94, adjacent to the site, will likely be demolished, although this task is presently not funded (Malcolm Pirnie 2008).

10.5.5 MRP Site AOC2 CSM Summary

The site footprint for MRP Site AOC2 (Explosives Drop Test Tower) is approximately 0.15 acre. The tower encompasses an 11- by 11-foot area within an approximate 0.25-acre flat area surrounded by a 4-foot-high berm to the north, west, and south. The berm acts as a boundary for the Seal Beach NWR wetland area. IRP Site 24 is a lowlying area located immediately northeast of Site AOC2. Primarily bare earth extends from the site east 400 to 500 feet to a 4-foot-high soil berm that separates the area from IRP Site 6 and the Seal Beach NWR.

The installation boundary is located roughly 2.75 miles north, 1 mile west, and 0.25 mile south of AOC2.

Cartridges, which can be a minor explosion hazard, were tested at Site AOC2. Subsurface MEC are not suspected, as the bottom of the tower at Site AOC2 was reinforced with a belowground 4-inch-thick armor plate block that rested on top of a 3-foot-thick concrete block. Therefore, MEC penetration depths are not of concern.

Site AOC2 is not suspected to contain MEC based on the historical use of the explosive drop test tower. No MEC scrap was observed during a previous visual survey (Malcolm Pirnie 2008). MC are not expected at AOC2, as explosives and any potential residue would have detonated at explosion and unexploded MEC items would likely have been accounted for if they did not explode. In addition, soil samples from IRP Site 24, the closest low-lying area and adjacent to the tower, were non-detect for explosives (NAVFAC SW 1990).

The Explosives Drop Test Tower within Site AOC2 is no longer in use other than as a nesting platform for herons (NAVWPNSTA Seal Beach 2007). Future land uses for AOC2 are expected to be the same as current use (i.e., no anticipated use).

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS

(11a) MRP Site UXO1 (Primer/Salvage Yard and POLB Mitigation Pond)

STEP 1: State the Problem

1. Site observations indicate the presence of MEC. Based on reported use of the site and reported burial of munitions, MEC are estimated to range from very low (one to two items per acre) to high (greater than 40 items per acre). The suspect MEC may present an explosive hazard.
2. MC may be present in soils.
3. If present in soils, MC may have migrated into the groundwater.
4. Data gaps exist in locations where no investigations have been conducted.
5. Potentially complete pathways between human and ecological receptors exist under both current and potential future land uses.

STEP 2: Identify the Goals of the Study

(1) Are explosives, Total Kjeldahl Nitrogen (TKN), inorganic nitrogen, ammonia, or perchlorate associated with past operations at Site UXO1 present at concentrations that require further response actions or proceeding to a remediation investigation (RI)/feasibility study (FS)?

(2) Are metals associated with past operations at Site UXO1 present at concentrations that require further response actions or proceeding to a Remedial Investigation (RI)/ Feasibility Study (FS)?

(3) Are MEC present at the site in quantities that require an immediate response?

STEP 3: Identify Information Inputs

- Information from historical documents and aerial photos
- Results from visual reconnaissance of the site
- Locations, photographs, and identification (if possible) of any visually observed suspect MEC or any significant anomalies (that may indicate the presence of buried MEC)
- Geophysical survey results for northeast corner of pond and upland areas suspected to contain buried MEC
- Project-required reporting limits (PRRL) that meet screening criteria
- Background concentrations for metals in soil
- Oak Ridge National Laboratory (ORNL) Regional Screening Levels (RSL), formerly the U.S. EPA Region IX Preliminary Remediation Goals (PRG) for soil
- Ecological comparison criteria for soil
- Concentrations in surface soils and water of explosives, metals, TKN, inorganic nitrogen, ammonia, and perchlorate:
    - Existing data for soils
    - Data from new analysis
- Screening levels for explosives, metals, TKN, inorganic nitrogen, ammonia, and perchlorate to assess whether it is necessary to expand the study area and whether to proceed to the RI/FS.

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

STEP 4: Define the Boundaries of the Study

- A line of brush runs along the northern boundary of the site. Five acres of the 40-acre 7th Street POLB Mitigation Pond, which is part of the NAVWPNSTA Seal Beach, comprises the southern extent of the site. The western boundary is 7th Street. Low grasses, railroad sidings, and agricultural fields extend to the east.
- Lateral expansion of portions of the study area may be necessary if suspect MEC and/or suspect associated magnetic anomalies are identified at the lateral extent of the initial site boundary. Vertical expansion of the study area during a RI/FS to deeper subsurface soils may be necessary if MC or suspect MEC are present at 1-1.5 feet bgs.
- There are no temporal boundaries anticipated to affect the sampling of this site.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of explosives, TKN, inorganic nitrogen, ammonia, and perchlorate are below project action limits (PAL) (see Worksheet #15), then no further action is required for these chemicals.

(1b) If concentrations of explosives, TKN, inorganic nitrogen, ammonia, and perchlorate are detected at concentrations above the PAL (see Worksheet #15), then the SI report will recommend further response actions or proceeding to an RI/FS.

(2a) If concentrations of metals are below the PAL (see Worksheet #15) or background concentrations, then no further action is required for metals.

(2b) If concentrations of metals are above background and above the PAL (see Worksheet #15), then the SI report will recommend further response actions or proceeding to an RI/FS.

(3a) If a visual survey of the site by a UXO technician indicates MEC does not pose an unacceptable risk, then proceed with caution.

(3b) If a visual survey of the site by a UXO technician indicates MEC poses an unacceptable risk, then stop work and contact the site safety coordinator.

STEP 6: Specify Performance or Acceptance Criteria

- Judgmental samples will be collected based on visual observation and/or any anomalies detected; however, if visual evidence of past practices or anomalies detected are inadequate, a grid sampling approach may be substituted.
- Probability limits for false decision errors were not established because this stage of investigation is limited to screening level assessment.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

STEP 7: Develop the Plan for Obtaining Data

- A total of 20 surface sample locations will be accessed using bias and grid sampling approaches (5 from the kerosene/black powder area, 5 from the Recovered Live small arms ammo and grenade area, and 10 from the POLB Mitigation Pond). The locations of the samples will be based upon historical information and/or site observations that have been determined to be of interest.
- Two samples will be collected from each sample location (depths of 0-0.5 foot and 1.0-1.5 feet bgs) (See Figure 2).
- The 40 samples will be analyzed for explosives, perchlorate metals, TKN, inorganic nitrogen, and ammonia(see Worksheet #18).
- Five grab surface water samples will be taken from the pond. The surface water samples will be obtained using random grid sampling techniques (DGPS survey methods) using a hand transportable boat and will be analyzed for explosives, metals, TKN, inorganic nitrogen and ammonia, and perchlorate.
- The soil analytical suite is optimized based on historical information for the site.

Notes:

bgs	Below ground surface	MEC	Munitions and explosives of concern
EPA	U.S. Environmental Protection Agency	RSL	Regional Screening Level
ESSL	Ecological soil screening levels	QA	Quality assurance
DGPS	Differential Global Positioning System	RI	Remedial Investigation
FS	Feasibility Study	SI	Site Inspection
MC	Munitions constituents	UXO	Unexploded ordnance

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

(11b) MRP Site UXO2 (Building 101 and 102 Associated Evaporation Ponds)

STEP 1: State the Problem

1. Samples at Site UXO2 were collected during previous investigations at depths of 0.4, 0.5, 1.75, 2, 2.5, and 3.5 feet bgs (only shallow samples).
2. Previous investigations detected ammonia as nitrogen at low concentrations (reportedly attributed to background or agricultural practices) as well as low unquantifiable concentrations of explosives and recommended further investigation.
3. Data gaps exist in locations where MC in soil is suspected and where soil samples were not collected in previous investigations.
4. MC may be present in soils.
5. If present in soils, MC may have migrated into the groundwater.
6. Potentially complete pathways between human and ecological receptors exist under both current and potential future land uses.

STEP 2: Identify the Goals of the Study

(1) Are explosives, picrate, TKN, inorganic nitrogen, ammonia associated with past operations at Site UXO2 present at concentrations that require further response actions or proceeding to an RI/FS?

STEP 3: Identify Information Inputs

- Information from historical documents and aerial photos
- Results from visual reconnaissance of the site
- Project-required reporting limits that meet screening criteria
- ORNL RSLs for soil;
- Ecological comparison criteria for soil;
- Concentrations in surface soils of explosives, picrate, TKN, inorganic nitrogen, and ammonia:
    - Existing data for soils
    - Data from new analysis
- Screening levels for explosives, picrate, TKN, inorganic nitrogen, and ammonia to assess whether it is necessary to expand the study area and whether to proceed to the RI/FS.

STEP 4: Define the Boundaries of the Study

- The horizontal boundary is defined as the area where activities most likely took place within the site.
- The media potentially contaminated, which include surface and subsurface soils are of interest.
- Lateral expansion of the study area may be necessary if contamination is present at the lateral extent of the initial sampling pattern.
- Vertical expansion of the study area during a RI/FS to deeper subsurface soils may be necessary if contamination is present at 1-1.5 feet bgs.
- Breeding and other wildlife activities may place temporal boundaries on sampling. Field work will be coordinated with the Seal Beach Wildlife Refuge Office as discussed in Section 3.1.2 of the work plan.

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

STEP 5: Develop the Analytic Approach

(1a) If concentrations of explosives, picrate, TKN, inorganic nitrogen, and ammonia are below the PAL (see Worksheet #15), then no further action is required for these chemicals.

(1b) If concentrations of explosives, picrate, TKN, inorganic nitrogen, or ammonia are detected above the PAL (see Worksheet #15), then the SI report will recommend further response actions or proceeding to an RI/FS.

STEP 6: Specify Performance or Acceptance Criteria

- Judgmental samples will be collected based on visual observation; however, if visual evidence of past practices are inadequate, a grid sampling approach may be substituted.
- Probability limits for false decision errors were not established because this stage of investigation is limited to screening level assessment.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- A total of 25 sample locations will be accessed with two samples per location (0-0.5 and 1.0-1.5 feet bgs).
- The 50 samples will be collected using a combination of a grid pattern and biased sampling (See Figure 3).
- All 50 samples will be analyzed for explosives, picrate, TKN, inorganic nitrogen, and ammonia (see Worksheet #18).
- The soil analytical suite is optimized based on historical information for the site.

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
MC	Munitions constituents
MEC	Munitions and explosives of concern
RSL	Regional Screening Level
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
UXO	Unexploded ordnance

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

(11c) MRP Site UXO6 (Westminster PLOB Fill Area)

STEP 1: State the Problem

1. Suspected munitions present at the POLB Mitigation Pond potentially could have been transported in fill to the Westminster POLB Fill Area. MEC density is suspected to be very low. The suspect MEC may present an explosive hazard.
2. MC may be present in soils.
3. If present in soils, MC may have migrated into the groundwater.
4. No investigations have been previously conducted at the site.
5. Potentially complete pathways between human and ecological receptors could exist under both current and potential future land uses.

STEP 2: Identify the Goals of the Study

(1) Are explosives, picrate, or perchlorate at the Westminster POLB Fill Area present at concentrations that require further response actions or proceeding to an RI/FS?
(2) Are metals at the Westminster POLB Fill Area present at concentrations that require further response actions or proceeding to an RI/FS?
(3) Are MEC present at the site in quantities that require an immediate response?

STEP 3: Identify Information Inputs

- Information from historical documents and aerial photos
- Results from visual reconnaissance of the site
- Locations, photographs, and identification (if possible) of any visually observed suspect MEC or any significant anomalies (that may indicate the presence of buried MEC)
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil
- ORNL RSLs for soil
- Ecological comparison criteria for soil;
- Concentrations in surface soils of explosives, metals, picrate, and perchlorate
- Screening levels for explosives, metals, picrate, and perchlorate to assess whether it is necessary to expand the study area and proceed to the RI/FS.

STEP 4: Define the Boundaries of the Study

- The horizontal boundary is defined as the area where fill disposal activities most likely took place within the site.
- All media potentially contaminated are of interest. These media include surface and near surface soils.
- Lateral expansion of portions of the study area may be necessary if contamination is present at the lateral extent of the initial sampling pattern or suspect MEC and/or suspect associated magnetic anomalies are identified at the lateral extent of the initial site boundary.
- Vertical expansion of the study area during a RI/FS to deeper subsurface soils may be necessary if contamination is present at 1-1.5 feet bgs.
- Breeding and other wildlife activities may place temporal boundaries on sampling. Field work will be coordinated with the Seal Beach Wildlife Refuge Office as discussed in Section 3.1.2 of the work plan.

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

STEP 5: Develop the Analytic Approach

(1a) If concentrations of explosives, picrate, or perchlorate are below the PAL (see Worksheet #15), then no further action is required for these chemicals.

(1b) If concentrations of explosives, picrate, or perchlorate are detected above the PAL (see Worksheet #15), then the SI report will recommend further response actions or proceeding to an RI/FS.

(2a) If concentrations of metals are below the PAL (see Worksheet #15) or background concentrations, then no further action is required for metals.

(2b) If concentrations of metals are above the PAL (see Worksheet #15), then the SI report will recommend further response actions or proceeding to an RI/FS.

(3a) If a visual survey of the site by a UXO technician indicates MEC does not pose an unacceptable risk, then proceed with caution.

(3b) If a visual survey of the site by a UXO technician indicates MEC poses an unacceptable risk, then stop work and contact the site safety coordinator.

STEP 6: Specify Performance or Acceptance Criteria

- Judgmental samples will be collected based on visual observation and/or any anomalies detected; however, if visual evidence of past practices or anomalies detected are inadequate, a grid sampling approach may be substituted.
- Because this stage of investigation is an SI, probability limits for false decision errors were not established.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- A total of 30 surface sample locations will be accessed with two samples obtained per location (0-0.5 feet and 1.0-1.5 feet bgs).
- The 60 samples will be collected using a combination of biased and grid sampling (See Figure 4).
- The 60 samples will be analyzed for explosives, metals, picrate and perchlorate (see Worksheet #18).
- The soil analytical suite is optimized based on suspected munitions present at the POLB Mitigation Pond from which fill may have been transported.

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
MC	Munitions constituents
MEC	Munitions and explosives of concern
RSL	Regional Screening Level
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
UXO	Unexploded ordnance

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

(11d) MRP Site AOC1 (Building 94 Settling Basin)

STEP 1: State the Problem

1. Building 94 was a processing facility for 20-mm, 40-mm, 3-inch, and 5-inch projectiles. From 1945 to 1970, about 1.5 tons of waste smokeless powder was generated per week with small amounts of spillage washed down and drained through floor drains. The settling basin received suspected wash water from Building 94 that potentially contained smokeless powder, RDX, HMX, and picrate.
2. The former settling basin is no longer visible, and its location is currently graded and cultivated.
3. MC may be present in soils.
4. If present in soils, MC may have migrated into the groundwater.
5. Potentially complete pathways between human and ecological receptors exist under both current and potential future land uses.

STEP 2: Identify the Goals of the Study

(1) Are explosives or picrate associated with past operations at the Building 94 Settling Basin Site present at concentrations that require further response actions or proceeding to an RI/FS?
(2) Are metals associated with past operations at the Building 94 Settling Basin Site present at concentrations that require further response actions or proceeding to an RI/FS?

STEP 3: Identify Information Inputs

- Information from historical documents and aerial photos
- Results from visual reconnaissance of the site
- Project-required reporting limits that meet screening criteria
- ORNL RSLs for soil
- Ecological comparison criteria for soil
- Concentrations in surface soils of explosives, metals, and picrate
- Screening levels for explosives, metals, and picrate to assess whether it is necessary to expand the study area and whether to proceed to the RI/FS.

STEP 4: Define the Boundaries of the Study

- The horizontal boundary is defined as the area where activities most likely took place within the site.
- All media potentially contaminated are of interest. These media include surface and near surface soils.
- Lateral expansion of the study area may be necessary if contamination is present at the lateral extent of the initial sampling pattern.
- Vertical expansion of the study area during a RI/FS to deeper subsurface soils may be necessary if contamination is present at 1-1.5 feet bgs.
- There are no temporal boundaries anticipated to effect the sampling of this site.

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

STEP 5: Develop the Analytic Approach

(1a) If concentrations of explosives and picrate are below the PAL (see Worksheet #15), then no further action is required for these chemicals.

(1b) If concentrations of explosives and picrate are detected above the PAL (see Worksheet #15), then the SI report will recommend further response actions or proceeding to an RI/FS.

(2a) If concentrations of metals are below the PAL (see Worksheet #15) or background concentrations, then no further action is required for metals.

(2b) If concentrations of metals are above the PAL (see Worksheet #15), then the SI report will recommend further response actions or proceeding to an RI/FS.

STEP 6: Specify Performance or Acceptance Criteria

- Judgmental samples will be collected based on visual observation; however, if visual evidence of past practices are inadequate, a grid sampling approach may be substituted.
- Because this stage of investigation is an SI, probability limits for false decision errors were not established.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- A total of 10 biased sample locations (see Figure 5) will be accessed with two samples per location (0-0.5 and 1.0-1.5 feet bgs).
- The 20 samples will be analyzed for explosives, metals, and picrate (see Worksheet #18).
- The soil analytical suite is optimized based on historical information for the site.

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
MC	Munitions constituents
MEC	Munitions and explosives of concern
mm	Millimeter
RSL	Regional Screening Level
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
UXO	Unexploded ordnance

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

(11e) MRP Site AOC2 (Explosives Drop Test Tower)

STEP 1: State the Problem

1. The explosives drop test tower was used from 1955 to 1977 in conjunction with former Buildings 435 and 437, which lie 80 feet east and were used for experimental propellant testing. Although the low lying salt marsh area just north and adjacent to Site ACO2 was sampled and no explosives were detected as part of IRP Site 24, the soil underneath the tower has not been evaluated.
2. MEC are not suspected but MC may be present in soils
3. If present in soils, MC may have migrated into the groundwater.
4. Potentially complete pathways between human and ecological receptors exist under both current and potential future land uses.

STEP 2: Identify the Goals of the Study

(1) Are explosives associated with past operations at the explosives drop test tower site present at concentrations that require further response actions or proceeding to an RI/FS?
(2) Are metals associated with past operations at the explosives drop test tower site present at concentrations that require further response actions or proceeding to an RI/FS?

STEP 3: Identify Information Inputs

- Information from historical documents and aerial photos
- Results from visual reconnaissance of the site
- Project-required reporting limits that meet screening criteria
- ORNL RSLs for soil
- Ecological comparison criteria for soil;
- Concentrations in surface soils of explosives and metals
- Screening levels for explosives and metals to assess whether it is necessary to expand the study area and whether to proceed to the RI/FS.

STEP 4: Define the Boundaries of the Study

- The horizontal boundary is defined as the area where activities most likely took place within the site.
- All media potentially contaminated are of interest. These media include surface and near surface soils.
- Lateral expansion of the study area may be necessary if contamination is present at the lateral extent of the initial sampling pattern.
- Vertical expansion of the study area during a RI/FS to deeper subsurface soils may be necessary if contamination is present at 1-1.5 feet bgs.
- There are no temporal boundaries anticipated to effect the sampling of this site.

SAP WORKSHEET #11 — PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS (Continued)

STEP 5: Develop the Analytic Approach

(1a) If concentrations of explosives are below the PAL (see Worksheet #15), then no further action is required for these chemicals.

(1b) If concentrations of explosives are detected above the PAL (see Worksheet #15), then the SI report will recommend further response actions or proceeding to an RI/FS.

(2a) If concentrations of metals are below the PAL (see Worksheet #15) or background concentrations, then no further action is required for metals.

(2b) If concentrations of metals are above the PAL (see Worksheet #15), then the SI report will recommend further response actions or proceeding to an RI/FS.

STEP 6: Specify Performance or Acceptance Criteria

- Judgmental samples will be collected based on visual observation; however, if visual evidence of past practices is inadequate, a grid sampling approach may be substituted.
- Because this stage of investigation is an SI, probability limits for false decision errors were not established.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- A total of 10 sample locations will be accessed with two samples per location (0-0.5 and 1.0-1.5 feet bgs).
- All 20 samples will be collected using a combination of grid and biased sampling methods (see Figure 6).
- The 20 samples will be analyzed for explosives and metals (see Worksheet #18).
- The soil analytical suite is optimized based on historical information for the site.

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
MC	Munitions constituents
MEC	Munitions and explosives of concern
RSL	Regional Screening Level
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
UXO	Unexploded ordnance

SAP WORKSHEET #12 — MEASUREMENT PERFORMANCE CRITERIA TABLE

(12a) Measurement Performance Criteria Table – Field QC Samples

QC Sample	Analytical Group	Frequency	Data Quality Indicator (DQI)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Soil					
Equipment Rinsate	Explosives; Metals; TKN; Ammonia; Perchlorate; Picric Acid; Total Inorganic Nitrogen	1 per day	Accuracy/ Contamination	No target compounds > project required reporting limit (PRRL)	S
Source Water Blank	Explosives; Metals; TKN; Ammonia; Perchlorate; Picric Acid; Total Inorganic Nitrogen	1 per event	Accuracy/ Contamination	No target compounds > PRRL	S
Temperature Blank	NA	1 per cooler	Accuracy	Temperature = 4 degrees Celsius (°C) ± 2	S
Water					
Field Duplicate	Explosives; Metals; TKN; Ammonia; Perchlorate; Total Inorganic Nitrogen	10%	Precision-Overall	Relative percent difference (RPD)≤25% for both field duplicate samples	S & A
Equipment Rinsate	NA[a]	1 per day	Accuracy/ Contamination	No target compounds > PRRL	S
Source Blank	NA[a]	1 per event	Accuracy/ Contamination	No target compounds > PRRL	S
Temperature Blank	NA	1 per cooler	Accuracy	Temperature = 4 °C ± 2	S

Notes:

a Equipment blanks and source water blanks associated with water samples are not anticipated; water samples will be collected using dedicated equipment.

°C degrees Celsius
NA Not applicable
PRRL Project-required reporting limit
QC Quality Control

12.1 SUMMARY OF QA/QC TASKS

ChaduxTt will assess the quality of field data through regular collection and analysis of field QC samples. The following sections discuss the types and purposes of field QC samples that will be collected for this project.

12.1.1 Field Duplicates

Soil duplicate samples will not be collected for this project because these samples cannot be used directly to assess sampling precision since adjacent soil samples incorporate some spatial variability. Furthermore, it is not practical to set QC limits for the relative percent difference (RPD) of these samples, which precludes their use for QC.

For a minimum of 10% of the water samples, a duplicate will be collected. A duplicate water sample will be collected at random from one of the five water samples locations at the pond at UXO1.

12.1.2 Equipment Rinsate Samples

For non-dedicated or disposable equipment, equipment rinsate samples are generally collected at a frequency of once per day of sampling, per team, per type of tool used. One equipment rinsate sample will be generated daily during the soil investigation for this project if disposable equipment is not used. Water will be poured over or through the soil sampling equipment into a sample container and sent to the laboratory for analysis.

Analytically certified, organic-free water (or equivalent) will be used for organic parameters. Deionized or distilled water will be used for inorganic parameters. The equipment rinsate will allow for verification that the decontamination procedures were appropriately performed.

The results for the equipment rinsate samples will be used during data validation to qualify data or to evaluate the levels of analytes in the field samples collected during the sampling event.

12.1.3 Source Water Blank Samples

One source water blank will be collected for each source of water (distilled or deionized) used to decontaminate the soil sampling equipment and collect rinsate blank samples. The source-water blank sample will verify that the water used for decontamination was analyte free. It is anticipated that one source water blank will be necessary for this investigation.

12.1.4 Temperature Blanks

A temperature blank demonstrates the temperature within a cooler. The temperature blank originates in the field and is then shipped within each cooler to the laboratory. The temperature

blank is opened at the laboratory when the sample is received, and a thermometer is used to record the water temperature in the 40-milliliter vial. The receiving laboratory then records this temperature as the sample temperature for the cooler.

SAP WORKSHEET #13 — SECONDARY DATA CRITERIA AND LIMITATIONS TABLE

Secondary Data	Data Source (originating organization, report title, and date)	Data Generator(s) (originating organization, data types, data generator and collection dates)	How Data Will Be Used	Limitations on Data Use
MRP Site UXO1 Analytical data	*Site Inspection Report, Final, Weapons Support Facility, Seal Beach Seal Beach, California Installation Restoration Program, Operable Unit 5*. Prepared by NAVFAC SW & CH2M Hill. 1998b.	Soil and groundwater samples were collected and analyzed for volatile organic compounds, semivolatile organic compounds, nitrogen compounds (ammonia-N, nitrate-N, and TKN), metals, and total petroleum hydrocarbons as diesel. Copper, zinc, ammonia, and TKN were detected in soil and groundwater. In addition, pyrene, nitrate, and trichlorofluoromethane were detected in soil. Total inorganic nitrogen (nitrate/nitrite plus ammonia) inside the fenced primer/salvage yard was also detected at a concentration greater than typical for unfertilized soils and was suspected to possibly indicate explosives or explosives residue. Although not reported at IRP Site 16, high concentrations of antimony were detected in groundwater (Malcolm Pirnie 2008).	Data have been used to guide sample locations.	None
MRP Site UXO1 Analytical data	*Focused Site Inspection Report, Final, Weapons Support Facility, Seal Beach Seal Beach, California Installation Restoration Program, Operable Units 4 and 5*. Prepared by NAVFAC SW & CH2M Hill. 1998c.	Groundwater samples were collected from two groundwater monitoring wells, and surface water samples were collected near the northern bank of the POLB mitigation pond. Testing of water samples failed to detect antimony (Malcolm Pirnie 2008).	Data have been used to guide sample locations.	None
MRP Site UXO1 Analytical data	*Final Report – Focused Site Inspection Phase II, Naval Weapons Station, Seal Beach, California*. NAVFAC SW. 2002. Prepared by CH2M HILL.	Samples were collected from groundwater and analyzed for nickel and zinc (total and dissolved) and total suspended solids. In addition, three groundwater samples were analyzed for total metals. Nickel and zinc were detected at concentrations greater than ULBVs (Malcolm Pirnie 2008).	Data have been used to guide sample locations.	None
MRP Site UXO1 Analytical data	*Subsurface Soil Investigation, Anaheim Bay Mitigation, Case Road, Perimeter Road And Seventh Avenue Site Seal Beach, California*. Prepared by Earth Technology Corporation. 1989	A subsurface investigation was conducted before soil was removed to create the POLB wetland mitigation ponds. Soil samples were composited from major lithologic units (silty clay, clayey silt, and silty sand) at 1.5, 3, 6, and 9 feet bgs and analyzed for metals and organic compounds. The samples were also analyzed for metals and organic compounds. The composite samples did not exceed state or federal hazardous waste criteria for any of the parameters analyzed (Malcolm Pirnie 2008).	Data have been used to guide sample locations.	None
MRP Site UXO2 Analytical data	*Addendum to the Preliminary Assessment (Initial Assessment Study), Naval Weapons Station Seal Beach, CA*. Prepared by Naval Energy and Environmental Support Activity (NEESA). 1990	Soil samples were collected at 0.5, 2.0, and 3.5 bgs and analyzed for Explosive D breakdown products (ammonia as nitrogen, picric acid, and picramic acid). Ammonia (as nitrogen) was the only analyte detected at low concentrations, which was attributed to background or agricultural practices (Malcolm Pirnie 2008).	Data have been used to guide sample locations.	None

Secondary Data	Data Source (originating organization, report title, and date)	Data Generator(s) (originating organization, data types, data generator and collection dates)	How Data Will Be Used	Limitations on Data Use
MRP Site UXO2 Analytical data	*Installation Restoration Program Final (Revision 1) Operable Unit-4 Site Inspection Report*. Prepared by NAVFAC SW & CH2M Hill. 1998a.	The IRP Sites 2 and 3 evaporation ponds (at approximately 0.5 and 1.75 feet bgs) and the concrete settling basin behind Building 98 (at 0.4 and 2.5 feet bgs) were sampled for explosives (naphthalic acid, nitrocellulose, nitroglycerine, nitroguanidine, and picric acid) and nitrogen compounds (ammonia-N, nitrate-N, and TKN). No explosive compounds were detected, and nitrogen compounds were not present in soil at concentrations of concern (Malcolm Pirnie 2008).	Data have been used to guide sample locations.	None

SAP WORKSHEET #14 — SUMMARY OF PROJECT TASKS

14.1 PROJECT OBJECTIVES

As stated on Worksheet #10, the primary objectives of the Site Inspection for MRP Sites UXO1, UXO2, UXO6, AOC1, and AOC2 is to document surface and subsurface evidence of MEC. To meet the project objectives, the following activities are planned at each site:

UXO1 (Primer/Salvage Yard and POLB Mitigation Pond):

- Conduct detector-aided visual surveys using a GPS when accessing sample locations and traversing the site to evaluate the presence of MEC.
- 20 soil sample locations, two sample depths (0-0.5 feet bgs and 1.0-1.5 feet bgs) per location, will be accessed using a biased sampling approach for a total of 40 soil samples (See Figure 2):
  - Five sample locations from the kerosene/black powder area,
  - Five sample locations from the recovered live ammunition and grenades area,
  - 10 sample locations from the POLB Mitigation Pond; nine of which will be random grid sample locations.
- Five grab water samples will be collected from the mitigation pond using a hand transportable boat. The samples will be collected based on a random sampling grid.
- Analyze soil and water samples for explosives, metals, TKN, inorganic nitrogen and ammonia, and perchlorate (see Worksheet #18).
- Fieldwork is estimated to take place over a period of five (5) days.

UXO2 (Building 101 and 102 Associated Evaporation Ponds):

- 25 sample locations, two sample depths (0-0.5 foot bgs and 1.0-1.5 feet bgs) per location, will be accessed for a total of 50 soil samples (See Figure 3).
- Analyze soil samples for explosives, picrate, TKN, inorganic nitrogen, and ammonia (see Worksheet #18).
- Fieldwork is estimated to take place over a period of three (3) days.

UXO6 (Westminster POLB fill area):

- Conduct detector-aided visual surveys using a GPS when accessing sample locations and traversing the site to evaluate the presence of MEC.
- 30 sample locations, two sample depths (0-0.5 foot bgs and 1.0-1.5 feet bgs) per location, will be accessed for a total of 60 soil samples (See Figure 4).
- Analyze soil samples for explosives, metals, picrate, and perchlorate (see Worksheet #18).
- Fieldwork is estimated to take place over a period of five (5) days.

AOC1 (Building 94 Settling Basin):

- 10 sample locations, two sample depths (0-0.5 foot bgs and 1.0-1.5 feet bgs) per location, will be accessed for a total of 20 soil samples (See Figure 5).
- Analyze soil samples for explosives, metals, and picrate (see Worksheet #18).
- Fieldwork is estimated to take place over a period of three (3) days.

AOC2 (Explosives drop test tower):

- 10 sample locations, two sample depths (0-0.5 foot bgs and 1.0-1.5 feet bgs) per location, will be accessed for a total of 20 soil samples (See Figure 6).
- Analyze soil samples for explosives and metals (see Worksheet #18).
- Fieldwork is estimated to take place over a period of two (2) days.

14.2 SUMMARY OF QUALITY ASSURANCE AND QUALITY CONTROL TASKS

ChaduxTt will assess the quality of field data through regular collection and analysis of field quality control (QC) samples. Worksheet #12 discusses the types and purposes of field QC samples that will be collected for this project. QC will also be evaluated through data assessments (Worksheet #34) and data validation (Worksheet #36).

14.3 SUMMARY OF SURVEYS, INVESTIGATION-DERIVED WASTE, SAMPLING, AND EQUIPMENT DECONTAMINATION

The following subsections describe utility and sample location surveys, management of investigation-derived waste (IDW), soil and water sampling, and equipment decontamination procedures for this investigation.

14.3.1 Underground Utilities

The Navy will provide the location of utilities for each site to ChaduxTt to clear and mark in the soil sampling locations. In areas where utilities are present in dense quantities, an alternative location may be identified in the field.

14.3.2 Sample Location Surveying

Sample locations will be identified using a global positioning system (GPS). Locations will be obtained to a horizontal accuracy of at least 1.0 meter using differential GPS equipment capable of average horizontal accuracy of 1.0 centimeter or less. The easting and northing coordinates and elevation will be provided for each sampling location precise to 0.01 foot.

A map and spreadsheet will be prepared for each site using reference information provided by the Navy. Only reconnaissance level visual surveys will be completed while accessing the sites for samples. A UXO technician will be on-site throughout field activities at UXO1 and UXO6 to conduct the surface clearance of the sample locations. UXO clearance will include screening the sample locations with a hand-held magnetic gradiometer or equivalent. The UXO technician and field team member(s) will identify and survey, using a differential global positioning system (DGPS), any observed suspect MEC or MC within the sites.

14.3.3 Soil and Water Sampling

Surface soil and surface water samples will be collected for this project. Once collected, samples will be labeled, placed in secondary plastic bags, and placed on ice for transportation to a Navy-approved California-certified laboratory under chain-of-custody protocol.

Surface soil samples from depths of 0-0.5 feet bgs and 1-1.5 feet bgs will be collected as discrete samples from the identified depth intervals. A combination of biased and grid sampling approaches will be used at each of the sites except AOC1, where only biased sampling is planned. If no specific munitions targets are identified for the proposed biased sampling during the detector-aided visual surveying at UXO1 and UXO6, baseline sampling locations will be selected at the sites. Soil samples will be collected using dedicated sampling equipment such as plastic scoops, or hand auger or similar equipment decontaminated between samples.

Surface water samples will be collected from the UXO1 POLB Mitigation Pond to evaluate the presence of MC. Surface water samples will be collected from discrete locations determined using a random number generator on a grid. The POLB Mitigation Pond sampling grid is depicted on Figure 2.

Water quality measurements will be made from each sampling location prior to collecting surface water grab samples using a portable, field-calibrated, hand-held water quality meter. Water quality parameters that will be measured at each sampling location include pH, conductivity, oxidation-reduction potential, dissolved oxygen, and temperature.

Surface water samples will be collected using a pond sampler (dipper). The sampler consists of a polyethylene beaker attached to the end of an adjustable-length pole. All water samples collected from the POLB Mitigation Pond will be collected just below the water surface. The sampler will be extended to the sample location from the boat, lowered into the water, allowed to fill with water just below the water surface, then transferred to appropriate sample containers.

14.3.4 Equipment Decontamination

All non-dedicated equipment will be decontaminated according to the following procedures. All sampling tools will be decontaminated before sampling begins and between sample locations. Soil sampling tools will be decontaminated by scrubbing in a solution of potable water and nonphosphate detergent (e.g., Alconox or Liquinox). The tools will then be double-rinsed with distilled water. Sampling tools that are not used immediately after decontamination will be allowed to air dry and wrapped in plastic.

14.3.5 Management of Investigated-Derived Waste

IDW will consist of decontamination water, soil cuttings, personal protective equipment (PPE), and miscellaneous solid waste. Disposable equipment will be used to the maximum extent possible to limit the amount of IDW generated from the equipment decontamination process. Equipment wash and rinsate water generated during the investigation will be placed in United States Department of Transportation (DOT) compliant drums, labeled with the accumulation start date and all other appropriate information, and temporarily staged on site pending sample analysis results.

Soil cuttings generated from hand augering shallow soil borings to 1.5 feet bgs depths for each sample location will be returned to each borehole unless visual or olfactory observation indicates potential contamination with a potential risk of exposure pathways to human or ecological receptors. If contamination, as well as risk to human or ecological receptors, is suspected, the soil cuttings from the bore hole will be containerized in a DOT compliant drum, and a waste characterization sample will be collected and analyzed for the applicable COPCs. The drum will be labeled and temporarily staged on site pending the waste characterization results. If field observations indicate potential contamination with a potential risk of exposure pathways to human or ecological receptors, the borehole will be backfilled with bentonite chips and hydrated.

Upon receipt of the laboratory results, Chadux Tt will arrange for the removal and disposal of the containerized IDW according to all applicable federal, state, and local regulations, and NAVWPNSTA Seal Beach policy. A representative from the NAVWPNSTA Seal Beach will be responsible as the generator for signing all waste profiles and disposal manifests. Soil cuttings that do not meet state or federal hazardous waste criteria and that do not pose human health or ecological concern will be spread on site.

PPE and miscellaneous non hazardous solid waste from field sampling activities will be placed in garbage bags, sealed, and disposed of in on-site trash receptacles.

14.4 DOCUMENTS AND RECORDS

Documentation is critical for evaluating the success of any environmental data collection activity. The following sections discuss the requirements for documenting field activities and for preparing laboratory data packages. This section also describes reports that will be generated as a result of this project.

14.4.1 Field Documentation

Complete and accurate documentation is essential to demonstrate that field measurement and sampling procedures are carried out as described in the SAP. Field personnel will use permanently bound field logbooks with sequentially numbered pages to record and document field activities. The logbook will list the contract name and number, the CTO number, the site name, and the names of subcontractors, the service client, and the project manager. At a minimum, the following information will be recorded in the field logbook:

- Name and affiliation of all on-site personnel or visitors
- Weather conditions during the field activity
- Summary of daily activities and significant events
- Notes of conversations with coordinating officials
- References to other field logbooks or forms that contain specific information
- Discussions of problems encountered and their resolution
- Discussions of deviations from the SAP or other governing documents
- Descriptions of all photographs taken.

The field team will also use the various field forms included in Appendix A to record field activities.

14.4.2 Summary Data Package

The summary data package will consist of a case narrative, copies of all associated chain-of-custody records, sample results, and QA/QC summaries. The case narrative will include the following information:

- Subcontractor name, project name, CTO number, project order number, sample delivery group (SDG) number, and a table that cross-references client and laboratory sample identification (ID) numbers

- Detailed documentation of all sample shipping and receiving, preparation, analytical, and quality deficiencies

- A list of each instance of manual integration or other manual data interpretations on the part of the analyst in the case narrative, and a statement that each such instance of manual interpretation or analyst judgment was approved by a supervisor

- Copies of all associated nonconformance and corrective action forms that will describe the nature of the deficiency and the corrective action taken

- Copies of all associated sample receipt notices.

Additional requirements for the summary data package are outlined in Worksheet #30. The subcontracting laboratory will provide ChaduxTt with two copies of the summary data package within 35 days after it receives the last sample in the SDG.

14.4.3 Full Data Package

When a full data package is required, the laboratory will prepare data packages in accordance with the instructions provided in the EPA Contract Laboratory Program (CLP) statements of work (SOW) (EPA 1999a, 2000a). Full data packages will contain all of the information from the summary data package and all associated raw data. Full data package requirements are outlined in Worksheet #30. Full data packages are due to ChaduxTt within 35 days after the last sample in the SDG is received. Unless otherwise requested, the subcontractor will deliver one copy of the full data package.

14.4.4 Electronic Data Package Format

The subcontracted laboratory will provide electronic data deliverables (EDD) for all analytical results. An automated laboratory information management system must be used to produce the EDDs. Manual creation of the deliverable (data entry by hand) is unacceptable. The laboratory will verify EDDs internally before they are issued. The EDDs will correspond exactly to the hard-copy data. No duplicate data will be submitted. EDDs will be delivered in a format compatible with the Navy Environmental Data Delivery (NEDD) format for import into the Naval Installation Restoration Information System (NIRIS). Results that should be included in all EDDs are as follows:

- Target analyte results for each sample and associated analytical methods requested on the chain-of-custody form

- Method and instrument blanks and preparation and calibration blank results reported for the SDG

- Percent recoveries for the spike compounds in the matrix spike (MS), matrix spike duplicates (MSD), blank spikes, or laboratory control samples (LCS)

- Matrix duplicate results reported for the SDG
- All re-analysis, re-extractions, or dilutions reported for the SDG, including any associated with samples and the specified laboratory QC samples.

Electronic and hard-copy data must be retained for a minimum of 3 and 10 years, respectively, after final data have been submitted. The subcontractor will use an electronic storage device capable of recording data for long-term, off-line storage. Raw data will be retained on an electronic data archival system. The NAVFAC Southwest Administrative Record will also retain a copy of the hard-copy data.

14.4.5 Reports Generated

An SI report will be prepared to present the results from this investigation at MRP Sites UXO1, UXO2, UXO6, AOC1, and AOC2. The report will include a summary of the results of previous related activities, field and sampling procedures for this investigation, target analyte concentrations and associated QC data, updated site maps, comparisons to ecological screening levels, conclusions, and recommendations for each site.

14.4.6 Data Management

Field and analytical data collected from this project and other environmental investigations at NAVWPNSTA Seal Beach are critical to site characterization efforts, development of the comprehensive CSM, risk assessments, and selection of remedial actions to protect human health and the environment. An information management system is necessary to ensure efficient access so that decisions based on the data can be made in a timely manner.

After the field and laboratory data reports are reviewed and validated, the data will be entered into ChaduxTt's database for NAVWPNSTA Seal Beach. The database contains data for: (1) summarizing observations on contamination and geologic conditions, (2) preparing reports and graphics, (3) using with geographic information systems, and (4) transmitting in an electronic format compatible with NEDD and NIRIS. ChaduxTt's data tracking procedures, data pathways, and overall data management strategy for NAVWPNSTA Seal Beach are described in the following paragraphs.

14.4.7 Data Tracking Procedures

All data that are generated in support of the Navy program at NAVWPNSTA Seal Beach are tracked through a database created by ChaduxTt. Information related to the receipt and delivery of samples, project order fulfillment, and invoicing for laboratory and validation tasks is stored in the ChaduxTt database. All data are filed according to the document control number.

14.4.8 Data Pathways

Data are generated from three primary pathways at NAVWPNSTA Seal Beach: data derived from field activities, laboratory analytical data, and validated data. Data from all three pathways must be entered into the NAVWPNSTA Seal Beach database. Data pathways must be established and well documented to evaluate whether the data have been accurately loaded into the database in a timely manner.

Data generated during field activities are recorded using field forms (Appendix A). The analytical coordinator or field team leader reviews these forms for completeness and accuracy. Data from the field forms, including the chain-of-custody record, are entered into the database according to the document control number.

Data generated during laboratory analysis are recorded in hard copy and in EDDs after the samples have been analyzed. The laboratory will send the hard copy and EDD records to the analytical coordinator. The analytical coordinator reviews the data deliverable for completeness, accuracy, and format. After the format has been approved, the electronic data are manipulated and downloaded into the NAVWPNSTA Seal Beach database. ChaduxTt data entry personnel will then update the database with the total number of samples received and number of days required to receive the data.

After validation, the analytical coordinator reviews the data for accuracy. ChaduxTt will then update the NAVWPNSTA Seal Beach database with the appropriate data qualifiers. The database is also updated to record associated laboratory and data validation costs.

14.4.9 Data Management Strategy

ChaduxTt's short- and mid-term data management strategies require that the database for NAVWPNSTA Seal Beach will be updated monthly. The data consist of chemical and field data from Navy contractors, entered into an Oracle (Version 7.3) database. The database can be used to generate reports using available computer-aided drafting and design and contouring software. All electronic data from this database will be stored and maintained in a format compatible with the NEDD. Following updated Navy Environmental Work Instruction #6, data will be transmitted to NIRIS within 30 days after the final validation report is received.

The data will be loaded into the database at ChaduxTt for storage, further manipulation, and retrieval after laboratory and field reports are reviewed and validated to satisfy long-term data management goals. The database will be used to provide data for chemical and geologic analysis and for preparing reports and graphic representations of the data. Additional data acquired from field activities are recorded on field forms (see Appendix A), which are reviewed for completeness and accuracy by the analytical coordinator or field team leader (Worksheet #34). Hard copies of forms, data, and chain-of-custody records are filed in a secure storage area according to project and document control numbers. Laboratory data packages and reports will be archived at ChaduxTt or Navy offices. Laboratories that generated the data will archive hard-

copy data for a minimum of 10 years (Worksheet #30). Hard-copy analytical data will also be stored at the NAVFAC Southwest Administrative Record.

14.5 DATA VALIDATION

Analytical data will be validated by an independent third-party contractor in accordance with current EPA National Functional Guidelines (EPA 1999b, 2004a), the listed analytical methods, and this SAP. Validation procedures are detailed in Worksheet #36.

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE

(15a) Matrix: Soil
Analytical Group: Explosives including Picric Acid (EPA 8330)

Chemical	CAS Number	Residential Soil RSL[a] (mg/kg)	ECO SSL[b] (mg/kg)	Project Action Limit[c] (mg/kg)	Project Action Level Reference	Project Quantitation Limit Goal mg/kg)	Laboratory-Specific	
							Quantitation Limit (QL) (mg/kg)	Method Detection Limit (MDL) (mg/kg)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) (also known as High melting explosive)	2691-41-0	3,800	NA	3,800	Residential RSL	0.005	TBD[2]	TBD[2]
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) (also known as Research department explosive	121-82-4	5.5	NA	5.5	Residential RSL	0.25	TBD[2]	TBD[2]
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	2200	40	40	Eco SSL	0.25	TBD[2]	TBD[2]
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	6.1	NA	6.1	Residential RSL	0.25	TBD[2]	TBD[2]
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	240	25	25	Eco SSL	0.25	TBD[2]	TBD[2]
Nitrobenzene (NB)	98-95-3	31	40	31	Residential RSL	0.25	TBD[2]	TBD[2]
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	19	NA	19	Residential RSL	0.25	TBD[2]	TBD[2]
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	1946-51-0	NA	NA	TBD[2]	Laboratory QL[1]	0.25	TBD[2]	TBD[2]
2-Amino-4, 6-dinitrotoluene (2-Am-DNT)	35572-78-2	150	80	80	Eco SSL	0.25	TBD[2]	TBD[2]
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	120	NA	120	Residential RSL	0.25	TBD[2]	TBD[2]
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	61	0.9	0.9	Eco SSL	0.25	TBD[2]	TBD[2]
2-Nitrotoluene (2-NT)	88-72-2	2.9	NA	2.9	Residential RSL	0.25	TBD[2]	TBD[2]
3-Nitrotoluene (3-NT)	99-08-1	1200	NA	1200	Residential RSL	0.25	TBD[2]	TBD[2]
4-Nitrotoluene (4-NT)	99-99-0	30	NA	30	Residential RSL	0.25	TBD[2]	TBD[2]
2,4,6-trinitrophenol (Picric Acid)	88-89-1	NA	NA	TBD[2]	Laboratory QL	1.0	TBD[2]	TBD[2]

Notes:

a RSL s are from http://www.epa.gov/region09/waste/sfund/prg/
b ECO SSLs for explosives from http://rais.ornl.gov/tools/eco_search.php or Talmage and others 1999.
c The project action limit is the lowest concentration between the residential RSL and lowest ECO SSL for soil.

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE (Continued)

(15a) Matrix: Soil (continued)
Analytical Group: Explosives (EPA 8330)

1 No criteria exist; therefore, the lab reporting limit will be used as the screening goal for the project.

2 Before the SAP is finalized and crews mobilize to the field, all missing information in Worksheet #15 will be updated.

CAS	Chemical Abstracts Services
EPA	U.S. Environmental Protection Agency
Eco SSL	Soil Screening Level for ecological receptors
mg/kg	Milligrams per kilogram
NA	Not available
ORNL	Oak Ridge National Laboratory (Efroymson, et al. 1997)
RECT	Talmage et al. (1999)
RSL	Regional Screening Level
TBD	To be determined

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE (Continued)

(15b) Matrix: Soil
Analytical Group: Metals (EPA 6010B/7000A)

Chemical	CAS Number	Background Values[a] (mg/kg)	Residential Soil RSL[b] (mg/kg)	ECO SSL[c] (mg/kg)	Project Action Limit[d] (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-Specific	
								Quantitation Limit (QL) (mg/kg)	Method Detection Limit (MDL) (mg/kg)
Aluminum	7429-90-5	36,271	77,000	NA	77,000	Residential RSL	20	TBD[1]	TBD[1]
Antimony	7440-36-0	NA	31	0.27	0.27	ECO-SSL	10	TBD[1]	TBD[1]
Arsenic	7440-38-2	15.38	0.39	46	46	ECO- RSL	1	TBD[1]	TBD[1]
Barium	7440-39-3	NA	15,000	2,000	2,000	ECO-SSL	1	TBD[1]	TBD[1]
Beryllium	7440-41-7	2.11	160	21	21	ECO-SSL	1	TBD[1]	TBD[1]
Cadmium	7440-43-9	2.22	70	0.36	0.36	ECO-SSL	1	TBD[1]	TBD[1]
Chromium (total)	7440-47-3	46.24	280	34	46.24	Background	2	TBD[1]	TBD[1]
Cobalt	7440-48-4	NA	900	230	230	ECO-SSL	2	TBD[1]	TBD[1]
Copper	7440-50-8	39.04	3,100	51	51	ECO-SSL	2	TBD[1]	TBD[1]
Lead	7439-92-1	35.7	400	56	56	ECO-SSL	1	TBD[1]	TBD[1]
Manganese	7439-96-5	1,103	1,800	NA	1,800	Residential RSL	1	TBD[1]	TBD[1]
Mercury	7487-94-7	0.30	23	NA	23	Residential RSL	0.1	TBD[1]	TBD[1]
Nickel	7440-02-0	32.49	1,600	NA	1,600	Residential RSL	2	TBD[1]	TBD[1]
Selenium	7782-49-2	0.44	390	NA	390	Residential RSL	1	TBD[1]	TBD[1]
Silver	7440-22-4	NA	390	NA	390	Residential RSL	2	TBD[1]	TBD[1]
Thallium	7440-28-0	NA	5.1	NA	5.1	Residential RSL	1	TBD[1]	TBD[1]
Vanadium	7440-62-2	85.95	550	280	280	ECO-SSL	2	TBD[1]	TBD[1]
Zinc	7440-66-6	177.17	23,000	NA	23,000	Residential RSL	1	TBD[1]	TBD[1]

Notes:

a Background values from NAVFAC SW 1997.
b RSL s are from http://www.epa.gov/region09/waste/sfund/prg/
c ECO SSLs for explosives from http://rais.ornl.gov/tools/eco_search.php or Talmage and others 1999.

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE (Continued)

(15b) Matrix: Soil
Analytical Group: Metals (EPA 6010B/7000A)

d	The project action limit is the lowest concentration between background, residential RSL and ECO SSL for soil.
1	Before the SAP is finalized and crews mobilize to the field, all missing information in Worksheet #15 will be updated.
Cal-Mod	California-modified PRG
CAS	Chemical Abstracts Services
EPA	U.S. Environmental Protection Agency
CAS	Chemical Abstracts Services
mg/kg	Milligrams per kilogram
NA	Not available or not applicable
RSL	Regional Screening Level
TBD	To be determined

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE (Continued)

(15c) Matrix: Soil
Analytical Group: TKN, Ammonia, Perchlorate, and Nitrogen

Chemical	CAS Number	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-Specific	
					Quantitation Limit (QL) (mg/kg)	Method Detection Limit (MDL) (mg/kg)
Total Kjeldahl Nitrogen[1] (EPA 351.2)	7727-37-9 (as Nitrogen)	NA	NA	TBD[2]	TBD[2]	TBD[2]
Ammonia as Nitrogen (EPA 350.3)	7664-41-7	NA	NA	TBD[2]	TBD[2]	TBD[2]
Perchlorate (EPA 6850)	7601-90-3	7.8	Residential RSL	0.005	TBD[2]	TBD[2]
Total Inorganic Nitrogen (EPA 300.0)	7727-37-9 (as Nitrogen)	NA	NA	TBD[2]	TBD[2]	TBD[2]

Notes:

a RSL s are from http://www.epa.gov/region09/waste/sfund/prg/
b ECO SSLs for explosives from http://rais.ornl.gov/tools/eco_search.php.

1 Total Kjeldahl nitrogen is defined as the sum of free ammonia and of organic nitrogen compounds which are converted to $(NH_4)_2SO_4$ under the conditions of digestion
2 Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #15 will be updated.

mg/kg Milligrams per kilogram
CAS Chemical Abstracts Services
EPA U.S. Environmental Protection Agency
NA Not available or not applicable. For unavailable toxicity information, at this phase (SI) the laboratory reporting limit is sufficiently low to make project decisions.
RSL Regional Screening Level
TBD To be determined

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE (Continued)

(15d) Matrix: Water
Analytical Group: Explosives including Picric Acid (EPA 8330)

Chemical	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-Specific	
					Quantitation Limit (QL) (µg/L)	Method Detection Limit (MDL) (µg/L)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	1,800	Tap Water RSL	0.25	TBD[1]	TBD[1]
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	0.61	Tap Water RSL	0.25	TBD[1]	TBD[1]
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	1,100	Tap Water RSL	0.25	TBD[1]	TBD[1]
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	3.6	Tap Water RSL	0.25	TBD[1]	TBD[1]
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	360	Tap Water RSL	0.25	TBD[1]	TBD[1]
Nitrobenzene (NB)	98-95-3	3.4	Tap Water RSL	0.25	TBD[1]	TBD[1]
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	2.2	Tap Water RSL	0.25	TBD[1]	TBD[1]
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	1946-51-0	TBD[1]	Laboratory QL[2]	0.25	TBD[1]	TBD[1]
2-Amino-4, 6-dinitrotoluene (2-Am-DNT)	355-72-78-2	TBD[1]	Laboratory QL[2]	0.25	TBD[1]	TBD[1]
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	73	Tap Water RSL	0.25	TBD[1]	TBD[1]
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	360	Tap Water RSL	0.25	TBD[1]	TBD[1]
2-Nitrotoluene (2-NT)	88-72-2	0.049	Tap Water RSL	0.25	TBD[1]	TBD[1]
3-Nitrotoluene (3-NT)	99-08-1	120	Tap Water RSL	0.25	TBD[1]	TBD[1]
4-Nitrotoluene (4-NT)	99-99-0	0.66	Tap Water RSL	0.25	TBD[1]	TBD[1]
Picric Acid	88-89-1	TBD[1]	Laboratory QL[2]	0.25	TBD[1]	TBD[1]

Notes:

a U.S. EPA National Recommended Ambient Water Quality Criteria for Salt Water Aquatic Life Protection toxicity data are available for these compounds. However, the concentrations are greater than those for the listed tap water RSL. Therefore, the more protective value was used.

1 Before the SAP is finalized and crews mobilize to the field, all missing information in Worksheet #15 will be updated.

2 No criteria exist; therefore, the lab reporting limit will be used as the screening goal for the project.

µg/L Micrograms per liter
CAS Chemical Abstracts Services
EPA U.S. Environmental Protection Agency

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE (Continued)

(15d) Matrix: Water (continued)
Analytical Group: Explosives including Picric Acid (EPA 8330)

NA	Not available or not applicable. For unavailable toxicity information, at this phase (SI), the laboratory reporting limit is sufficiently low to make project decisions.
RSL	Regional Screening Level
TBD	To be determined

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE (Continued)

(15e) Matrix: Water
Analytical Group: Metals (EPA 6010B/7000A)

Chemical	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-Specific	
					Quantitation Limit (QL) (µg/L)	Method Detection Limit (MDL) (µg/L)
Aluminum	7429-90-5	36,000	Tap Water RSL	200	TBD[1]	TBD[1]
Antimony	7440-36-0	15	Tap Water RSL	6	TBD[1]	TBD[1]
Arsenic	7440-38-2	0.045	Tap Water RSL	TBD	TBD[1]	TBD[1]
Barium	7440-39-3	2600	Tap Water RSL	2000	TBD[1]	TBD[1]
Beryllium	7440-41-7	73	Tap Water RSL	TBD	TBD[1]	TBD[1]
Cadmium	7440-43-9	18	Tap Water RSL	5	TBD[1]	TBD[1]
Chromium	7440-47-3	NA	NA	100	TBD[1]	TBD[1]
Cobalt	7440-48-4	730	Tap Water RSL	TBD	TBD[1]	TBD[1]
Copper	7440-50-8	1500	Tap Water RSL	1000	TBD[1]	TBD[1]
Iron	7439-89-6	11,000	Tap Water RSL	300	TBD[1]	TBD[1]
Lead	7439-92-1	NA	NA	15	TBD[1]	TBD[1]
Manganese	7439-96-5	880	Tap Water RSL	50	TBD[1]	TBD[1]
Mercury	7487-94-7	11	Tap Water RSL	TBD	TBD[1]	TBD[1]
Nickel	7440-02-0	730	Tap Water RSL	TBD	TBD[1]	TBD[1]
Selenium	7782-49-2	180	Tap Water RSL	TBD	TBD[1]	TBD[1]
Silver	7440-22-4	180	Tap Water RSL	TBD	TBD[1]	TBD[1]
Thallium	7440-28-0	2.4	Tap Water RSL	2	TBD[1]	TBD[1]
Vanadium	7440-62-2	36	Tap Water RSL	TBD	TBD[1]	TBD[1]
Zinc	7440-66-6	11,000	Tap Water RSL	5,000	TBD[1]	TBD[1]

Notes: For unavailable toxicity information, at this phase (SI), the laboratory reporting limit is sufficiently low to make project decisions.

1 Before the SAP is finalized and crews mobilize to the field, all missing information in Worksheet #7 will be updated.

µg/L Micrograms per liter
RSL Regional Screening Level
CAS Chemical Abstracts Services
EPA U.S. Environmental Protection Agency

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE (Continued)

(15e) Matrix: Water (continued)
Analytical Group: Metals (EPA 6010B/7000A)

NA Not available or not applicable.

SAP WORKSHEET #15 — REFERENCE LIMITS AND EVALUATION TABLE (Continued)

(15f) Matrix: Water
Analytical Group: TKN, Ammonia, Perchlorate, and Nitrogen

Chemical	CAS Number	Project Action Limit (mg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/L)	Laboratory-Specific	
					Quantitation Limit (QL) (mg/L)	Method Detection Limit (MDL) (mg/L)
Total Kjeldahl Nitrogen[1] (EPA 351.2)	7727-37-9 (as Nitrogen)	NA	NA	TBD[1]	TBD[1]	TBD[1]
Ammonia as Nitrogen (EPA 350.3)	7664-41-7	NA	NA	TBD[1]	TBD[1]	TBD[1]
Perchlorate (EPA 6850)	7601-90-3	3.6	Tap Water RSL	3.6	TBD[1]	TBD[1]
Total Inorganic Nitrogen	7727-37-9 (as Nitrogen)	NA	NA	TBD[1]	TBD[1]	TBD[1]

Notes: For unavailable toxicity information, at this phase (SI), the laboratory reporting limit is sufficiently low to make project decisions.

1 Before the SAP is finalized and crews mobilize to the field, all missing information in Worksheet #7 will be updated.

mg/L Milligrams per liter
CAS Chemical Abstracts Services
EPA U.S. Environmental Protection Agency
NA Not available or not applicable. For unavailable toxicity information, at this phase (SI) the laboratory reporting limit is sufficiently low to make project decisions.
RSL Regional Screening Level
TBD To be determined

SAP WORKSHEET #16 — PROJECT SCHEDULE / TIMELINE TABLE

Activities	Organization	Deliverable	
		Anticipated Date of Completion	Version
Work Plan/SAP	ChaduxTt JV	16-Dec-08	Preliminary Draft
Government Review of Internal Draft Work Plan	Navy	30-Dec-08	N/A
Accident Prevention Plan (APP)	ChaduxTt JV	07-Nov-08	Draft
Health and Safety Plan (HASP)	ChaduxTt JV	07-Nov-08	Draft
Internal Draft Work Plan/SAP Response to Comments	ChaduxTt JV	10-Jan-09	N/A
Government Review of Draft APP	Navy	18-Dec-08	N/A
Government Review of Draft HASP	Navy	18-Dec-08	N/A
APP Response to Comments	ChaduxTt JV	12-Jan-09	N/A
HASP Response to Comments	ChaduxTt JV	12-Jan-09	N/A
Work Plan/SAP	ChaduxTt JV	02-Feb-09	Draft
APP	ChaduxTt JV	12-Jan-09	Final
HASP	ChaduxTt JV	12-Jan-09	Final
Regulatory Review of Draft Work Plan	Agencies	17-Jul-09	N/A
Draft Work Plan/SAP Response to Comments	ChaduxTt JV	31-Jul-09	N/A
Work Plan/SAP	ChaduxTt JV	14-Aug-09	Final
Site Inspection Report	ChaduxTt JV	13-Nov-09	Preliminary Draft
Government Review of Internal Draft Site Inspection Report	Navy	04-Dec-09	N/A
Internal Draft Site Inspection Report Response to Comments	ChaduxTt JV	11-Dec-09	N/A
Site Inspection Report	ChaduxTt JV	24-Dec-09	Draft
All Review of Draft SI Report	Navy & Agencies	12-Feb-10	N/A
Draft Site Inspection Report Response to Comments	ChaduxTt JV	26-Feb-10	N/A
Site Inspection Report	ChaduxTt JV	12-Mar-10	Final

SAP WORKSHEET #17 — SAMPLING DESIGN AND RATIONALE

17.1 SAMPLING PROCESS DESIGN

This section describes the sampling design and rationale in terms of the media that will be sampled, the analytical groups that will be analyzed for, the sampling methods and locations, the number of samples to be collected, and the sampling frequency. The history of MRP Sites UXO1, UXO2, UXO6, AOC1, and AOC2 is described in Worksheet #10.

17.1.1 MRP Site UXO1 (Primer/Salvage Yard and POLB Mitigation Pond)

Site observations indicate the presence of MEC, which may present an explosive hazard. Based on reported use of the site and reported burial of munitions, the presence of MEC is estimated to range from minimal to extensive. MC may be present in soils. If present in soils, MC may have migrated into the groundwater.

Surface soil and surface water samples will be collected at MRP Site UXO1 to determine if explosives and metals are present at concentrations that require further response actions. The sample locations will be based on visual observations and/or the detection of magnetic anomalies during visual surveys. However, if visual evidence or magnetic anomalies detected are inadequate, then a grid sampling approach may be substituted. The initial proposed sample locations for UXO1 are depicted in Figure 2.

A total of 20 sample locations at UXO1 will be accessed and sampled from 0-0.5 foot bgs and 1-1.5 feet bgs. A total of 40 soil samples collected from Site UXO1 will be analyzed for explosives, perchlorate metals, TKN, inorganic nitrogen, and ammonia. The soil analytical suite is optimized based on historical information for the site. In addition to the soil samples, five surface water samples will be collected from the POLB mitigation pond and analyzed for explosives, metals, TKN, inorganic nitrogen, ammonia, and perchlorate. The water samples will be obtained using a random grid sampling technique using a hand transportable boat.

17.1.2 MRP Site UXO2 (Building 101 and 102 and Associated Evaporation Ponds)

Soil samples previously collected at MRP Site UXO2 indicated low levels of ammonia as nitrogen, which could be a result of background or agricultural practices, and low levels of explosives. Therefore, MC may be present in soils. If present in soils, MC may have migrated into the groundwater.

Soil samples will be collected at MRP Site UXO2 to determine if MC are present at concentrations that require further response actions. Judgmental samples will be collected based on visual observation. However, if visual evidence of past practices is insufficient, a grid

sampling approach may be substituted. The initial proposed sample locations for Site UXO2 are shown in Figure 3.

A total of 25 sample locations within Site UXO2 will be accessed and sampled from 0-0.5 foot bgs and 1-1.5 feet bgs. A total of 50 soil samples will be collected from Site UXO2. All samples will be analyzed for explosives, picrate, TKN, inorganic nitrogen, and ammonia.

17.1.3 MRP Site UXO6 (Westminster POLB Fill Area)

Possibly, the suspected munitions present in the material excavated to form the 7th Street POLB mitigation pond were transported to the Westminster POLB fill area. MEC density is suspected to be very low (one to two items per acre). The suspect MEC may present an explosive hazard. MC may be present in soils. If present in soils, MC may have migrated into the groundwater.

No soil sampling and testing have been conducted at MRP Site UXO6. Consequently, to determine if explosives, metals, and perchlorate are present at concentrations that require further response actions, judgmental and grid soil samples will be collected. Biased sample locations will be based on visual observation and/or the detection of magnetic anomalies suspected to be MEC. However, if magnetic anomalies detected or visual evidence of past operation is inadequate, then a grid sampling approach may be substituted. Initial proposed sampling locations are provided in Figure 4.

A total of 30 sample locations at UXO6 will be accessed and sampled from 0-0.5 foot bgs and 1-1.5 feet bgs. A total of 60 soil samples will be collected at Site UXO6. The samples will be analyzed for explosives, metals, picrate, and perchlorate.

17.1.4 MRP Site AOC1 (Building 94 Settling Basin)

From 1945 to 1970, Building 94 was operated as a processing facility for ammunition. Approximately 1.5 tons of smokeless powder waste was generated each week during this time period, and small amounts of spillage were washed down through the floor drains. The settling basin received this wash water from Building 94, which potentially contained smokeless powder, RDX, HMX, and picrate. The former settling basin is no longer visible, and the location is graded and cultivated.

Soil samples will be collected at MRP Site AOC1 to determine if explosives, picrate, or metals associated with past operations are present at concentrations that require further response actions. The samples will be collected based on visual observations. However, if visual evidence of past processes is inadequate, then a grid sampling approach may be substituted. The initial proposed sample locations for AOC1 are depicted in Figure 5.

A total of 10 sample locations within AOC1 will be accessed and sampled from 0-0.5 foot bgs and 1-1.5 feet bgs. A total of 20 soil samples will be collected at AOC1. All samples will be

analyzed for explosives, metals, and picrate. The soil analytical suite is based on historical information for the site.

17.1.5 MRP Site AOC2 (Explosives Drop Test Tower Site)

The explosives drop test tower was used from 1955 to 1977 in conjunction with former Buildings 435 and 437, which were used for experimental propellant testing. The low lying salt marsh area, which is adjacent and north of the tower, was sampled; the results of that sampling indicated no explosives were present. However, the soil below the tower has not been evaluated. MEC are not suspected but MC may be present in soils. If present in soils, MC may have migrated into the groundwater.

Soil samples will be collected at MRP Site AOC2 to determine if explosives or metals associated with past operations at the Explosives Drop Test Tower Site are present at concentrations that require further response actions. Judgmental soil samples will be collected based on visual observations. However, if visual evidence of past processes is inadequate, then a grid sampling approach may be substituted. Initial proposed sampling locations for AOC2 are depicted in Figure 6.

Approximately 10 sample locations within AOC2 will be accessed and sampled from 0-0.5 foot bgs and 1-1.5 feet bgs. A total of 20 samples will be collected at Site AOC2 using a combination of grid and biased sampling methods. All samples will be analyzed for explosives and metals. The soil analytical suite is based on historical information for the site.

17.2 SAMPLE PROCEDURES

The following sections describe the procedures for sampling, including surface and subsurface soil sampling, and surface water sampling.

17.2.1 Soil Sampling

Surface and subsurface soil samples will be collected at 0-0.5-foot bgs and 1.0-1.5 feet bgs, respectively. The shallower depths are planned at range-type areas because most energetic material and munitions residue is deposited at the ground surface as particles (Jenkins and others 2001). All soil samples at the MRP sites will be collected as discrete samples. A hand-held disposable trowel will be used to reach the surface depth of the sample at the MRP sites. A stainless steel hand auger or similar device will be used to advance borings to reach the subsurface depth. A disposable scoop will be used to collect the surface samples, as well as collecting the samples from the center of the hand auger for the subsurface samples. If the soil is too compacted to use a trowel, a percussion-type, hand-held drive sampler equipped with a removable sampling sleeve will be used.

All soil samples will be labeled and placed in a cooler with ice. After the samples have been collected from each location, soil borings will be properly plugged. The soil cuttings for borings

hand augered to 1.5 feet will be returned to the hole unless visual observations indicate potential contamination. If contamination is suspected and returning soil to the boring would pose a risk to human health or the environment, then the cuttings will be containerized and the boring backfilled with a suitable material such as concrete or bentonite. All sample locations will then be marked and located using a GPS unit.

17.2.2 Water Sampling

According to records of past practices at the EOD Safety Demonstrations Area (currently the POLB Mitigation Pond) and visual observation of munitions burial along the northern bank of the pond, MC could have been released into the pond water. As a result, a total of five surface water grab samples will be collected from the POLB Mitigation Pond located on the southern portion of the UXO1 to evaluate the presence of MC. Surface water sample locations will be determined using a random grid sampling methods. The POLB Mitigation Pond sampling grid is depicted on Figure 2.

Water quality measurements will be made from each sampling location prior to collecting surface water grab samples using a portable, field-calibrated, hand-held water quality meter. Water quality parameters that will be measured at each sampling location include pH, conductivity, oxidation-reduction potential, dissolved oxygen, and temperature.

Surface water samples will be collected using a pond sampler (dipper). The pond sampler consists of a polyethylene beaker attached to the end of an adjustable length pole. All water samples collected from the POLB Mitigation Pond will be collected from just below water's surface. The sampler will be extended to the sample location from the boat, lowered into the water, allowed to fill with water just below the water surface, then transferred to the appropriate sample containers. The sampler will be decontaminated after each use with an Alconox and water mix, then triple-rinsed with distilled water.

All samples will be labeled, placed in secondary plastic bags, and placed on ice for transportation to a California-certified laboratory under chain of custody protocol. Surface water samples will be analyzed for explosives, metals, TKN, inorganic nitrogen, ammonia, and perchlorate within the applicable holding times.

SAP WORKSHEET #18 — SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE

Sampling Location/ ID Number	Matrix	Depth (feet bgs)	Analytical Group (Method)	Number of Samples[1]	Sampling SOP Reference[2]
MRP UXO1					
043UXO1SB001	Soil	0.0 to 0.5	Explosives (SW-846 Method 8330), Metals (SW-846 Method 6010/7000A), Perchlorate (SW-846 Method 6850), Ammonia (EPA 350.3), TKN (SM 4500-N or EPA 351.2), and Inorganic Nitrogen (EPA 300.0)	1	Worksheet #17
043UXO1SB002	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB003	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB004	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB005	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB006	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB007	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB008	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB009	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB010	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB011	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB012	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB013	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB014	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB015	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB016	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB017	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB018	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB019	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB020	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB021	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB022	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB023	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB024	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB025	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB026	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB027	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB028	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB029	Soil	0.0 to 0.5		1	Worksheet #17

SAP WORKSHEET #18 – SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE (Continued)

Sampling Location/ ID Number	Matrix	Depth (feet bgs)	Analytical Group (Method)	Number of Samples[1]	Sampling SOP Reference[2]
043UXO1SB030	Soil	1.0 to 1.5	Explosives (SW-846 Method 8330), Metals (SW-846 Method 6010/7000A), Perchlorate (SW-846 Method 6850), Ammonia (EPA 350.3), TKN (SM 4500-N or EPA 351.2), and Inorganic Nitrogen (EPA 300.0)	1	Worksheet #17
043UXO1SB031	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB032	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB033	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB034	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB035	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB036	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB037	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB038	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SB039	Soil	0.0 to 0.5		1	Worksheet #17
043UXO1SB040	Soil	1.0 to 1.5		1	Worksheet #17
043UXO1SW001	Water	Surface	Explosives (SW-846 Method 8330), Metals (SW-846 Method 6010/7000A), Perchlorate (SW-846 Method 6850), Ammonia (EPA 350.3), TKN (SM 4500-N or EPA 351.2), and Inorganic Nitrogen (EPA 300.0)	1	Worksheet #17
043UXO1SW002	Water	Surface		1	Worksheet #17
043UXO1SW003	Water	Surface		1	Worksheet #17
043UXO1SW004	Water	Surface		1	Worksheet #17
043UXO1SW005	Water	Surface		1	Worksheet #17
MRP SITE UXO2					
043UXO2SB001	Soil	0.0 to 0.5	Explosives and Picrate (SW-846 Method 8330), TKN (SM 4500-N or EPA 351.2), Ammonia (EPA 350.3), and Inorganic Nitrogen (EPA 300.0)	1	Worksheet #17
043UXO2SB002	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB003	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB004	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB005	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB006	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB007	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB008	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB009	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB010	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB011	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB012	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB013	Soil	0.0 to 0.5		1	Worksheet #17

SAP WORKSHEET #18 – SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE (Continued)

Sampling Location/ ID Number	Matrix	Depth (feet bgs)	Analytical Group (Method)	Number of Samples[1]	Sampling SOP Reference[2]
043UXO2SB014	Soil	1.0 to 1.5	Explosives and Picrate (SW-846 Method 8330), TKN (SM 4500-N or EPA 351.2), Ammonia (EPA 350.3), and Inorganic Nitrogen (EPA 300.0)	1	Worksheet #17
043UXO2SB015	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB016	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB017	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB018	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB019	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB020	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB021	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB022	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB023	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB024	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB025	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB026	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB027	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB028	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB029	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB030	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB031	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB032	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB033	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB034	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB035	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB036	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB037	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB038	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB039	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB040	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB041	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB042	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB043	Soil	0.0 to 0.5		1	Worksheet #17

SAP WORKSHEET #18 – SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE (Continued)

Sampling Location/ ID Number	Matrix	Depth (feet bgs)	Analytical Group (Method)	Number of Samples[1]	Sampling SOP Reference[2]
043UXO2SB044	Soil	1.0 to 1.5	Explosives and Picrate (SW-846 Method 8330), TKN (SM 4500-N or EPA 351.2), Ammonia (EPA 350.3), and Inorganic Nitrogen (EPA 300.0)	1	Worksheet #17
043UXO2SB045	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB046	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB047	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB048	Soil	1.0 to 1.5		1	Worksheet #17
043UXO2SB049	Soil	0.0 to 0.5		1	Worksheet #17
043UXO2SB050	Soil	1.0 to 1.5		1	Worksheet #17
MRP SITE UXO6					
043UXO6SB001	Soil	0.0 to 0.5	Explosives and Picrate (SW-846 Method 8330), Metals (SW-846 Method 6010/7000A), and Perchlorate (SW-846 Method 6850)	1	Worksheet #17
043UXO6SB002	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB003	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB004	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB005	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB006	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB007	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB008	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB009	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB010	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB011	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB012	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB013	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB014	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB015	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB016	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB017	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB018	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB019	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB020	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB021	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB022	Soil	1.0 to 1.5		1	Worksheet #17

SAP WORKSHEET #18 – SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE (Continued)

Sampling Location/ ID Number	Matrix	Depth (feet bgs)	Analytical Group (Method)	Number of Samples[1]	Sampling SOP Reference[2]
043UXO6SB023	Soil	0.0 to 0.5	Explosives and Picrate (SW-846 Method 8330), Metals (SW-846 Method 6010/7000A), and Perchlorate (SW-846 Method 6850)	1	Worksheet #17
043UXO6SB024	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB025	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB026	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB027	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB028	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB029	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB030	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB031	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB032	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB033	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB034	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB035	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB036	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB037	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB038	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB039	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB040	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB041	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB042	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB043	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB044	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB045	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB046	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB047	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB048	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB049	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB050	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB051	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB052	Soil	1.0 to 1.5		1	Worksheet #17

SAP WORKSHEET #18 – SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE (Continued)

Sampling Location/ ID Number	Matrix	Depth (feet bgs)	Analytical Group (Method)	Number of Samples[1]	Sampling SOP Reference[2]
043UXO6SB053	Soil	0.0 to 0.5	Explosives and Picrate (SW-846 Method 8330), Metals (SW-846 Method 6010/7000A), and Perchlorate (SW-846 Method 6850)	1	Worksheet #17
043UXO6SB054	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB055	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB056	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB057	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB058	Soil	1.0 to 1.5		1	Worksheet #17
043UXO6SB059	Soil	0.0 to 0.5		1	Worksheet #17
043UXO6SB060	Soil	1.0 to 1.5		1	Worksheet #17
MRP SITE AOC1					
043AOC1SB001	Soil	0.0 to 0.5	Explosives and Picrate (SW-846 Method 8330) and Metals (SW-846 Method 6010/7000A)	1	Worksheet #17
043AOC1SB002	Soil	1.0 to 1.5		1	Worksheet #17
043AOC1SB003	Soil	0.0 to 0.5		1	Worksheet #17
043AOC1SB004	Soil	1.0 to 1.5		1	Worksheet #17
043AOC1SB005	Soil	0.0 to 0.5		1	Worksheet #17
043AOC1SB006	Soil	1.0 to 1.5		1	Worksheet #17
043AOC1SB007	Soil	0.0 to 0.5		1	Worksheet #17
043AOC1SB008	Soil	1.0 to 1.5		1	Worksheet #17
043AOC1SB009	Soil	0.0 to 0.5		1	Worksheet #17
043AOC1SB010	Soil	1.0 to 1.5		1	Worksheet #17
043AOC1SB011	Soil	0.0 to 0.5		1	Worksheet #17
043AOC1SB012	Soil	1.0 to 1.5		1	Worksheet #17
043AOC1SB013	Soil	0.0 to 0.5		1	Worksheet #17
043AOC1SB014	Soil	1.0 to 1.5		1	Worksheet #17
043AOC1SB015	Soil	0.0 to 0.5		1	Worksheet #17
043AOC1SB016	Soil	1.0 to 1.5		1	Worksheet #17
043AOC1SB017	Soil	0.0 to 0.5		1	Worksheet #17
043AOC1SB018	Soil	1.0 to 1.5		1	Worksheet #17
043AOC1SB019	Soil	0.0 to 0.5		1	Worksheet #17
043AOC1SB020	Soil	1.0 to 1.5		1	Worksheet #17

SAP WORKSHEET #18 – SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE (Continued)

Sampling Location/ ID Number	Matrix	Depth (feet bgs)	Analytical Group (Method)	Number of Samples[1]	Sampling SOP Reference[2]
MRP SITE AOC2					
043AOC2SB001	Soil	0.0 to 0.5	Explosives (SW-846 Method 8330) and Metals (SW-846 Method 6010/7000A)	1	Worksheet #17
043AOC2SB002	Soil	1.0 to 1.5		1	Worksheet #17
043AOC2SB003	Soil	0.0 to 0.5		1	Worksheet #17
043AOC2SB004	Soil	1.0 to 1.5		1	Worksheet #17
043AOC2SB005	Soil	0.0 to 0.5		1	Worksheet #17
043AOC2SB006	Soil	1.0 to 1.5		1	Worksheet #17
043AOC2SB007	Soil	0.0 to 0.5		1	Worksheet #17
043AOC2SB008	Soil	1.0 to 1.5		1	Worksheet #17
043AOC2SB009	Soil	0.0 to 0.5		1	Worksheet #17
043AOC2SB010	Soil	1.0 to 1.5		1	Worksheet #17
043AOC2SB011	Soil	0.0 to 0.5		1	Worksheet #17
043AOC2SB012	Soil	1.0 to 1.5		1	Worksheet #17
043AOC2SB013	Soil	0.0 to 0.5		1	Worksheet #17
043AOC2SB014	Soil	1.0 to 1.5		1	Worksheet #17
043AOC2SB015	Soil	0.0 to 0.5		1	Worksheet #17
043AOC2SB016	Soil	1.0 to 1.5		1	Worksheet #17
043AOC2SB017	Soil	0.0 to 0.5		1	Worksheet #17
043AOC2SB018	Soil	1.0 to 1.5		1	Worksheet #17
043AOC2SB019	Soil	0.0 to 0.5		1	Worksheet #17
043AOC2SB020	Soil	1.0 to 1.5		1	Worksheet #17

Notes:

1	One sample per sampling location		
2	SAP section that describes the sample collection procedures		
bgs	Below ground surface	MRP	Munitions Response Program
EPA	U.S. Environmental Protection Agency	SAP	Sampling and analysis plan
ID	Identification	TKN	Total Kjeldahl Nitrogen

SAP WORKSHEET #19 — ANALYTICAL SOP REQUIREMENTS TABLE

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference (TBD[1])	Sample Volume Containers	Preservation Requirements	Maximum Holding Time (Preparation / Analysis)
Soil	Explosives	SW-846 EPA 8330	8-ounce glass jar	Cool, 4 degrees Celsius (°C) ± 2	14 days/40 days
Soil	Metals	SW-846 EPA 6010B / 7000A	8-ounce glass jar	Cool, 4°C ± 2	180 days (28 days mercury)
Soil	Total Kjeldahl Nitrogen (TKN)	SM 4500-N or EPA 351.2	8-ounce glass jar	Cool, 4°C ± 2	28 days
Soil	Ammonia as Nitrogen	EPA 350.3	8-ounce glass jar	Cool, 4°C ± 2	28 days
Soil	Perchlorate	SW-846 EPA 6850	4-oz amber glass jar	Cool, 4°C ± 2	28 days
Soil	Picric Acid	SW-846 EPA 8330	8-ounce glass jar	Cool, 4°C ± 2	14 days/40 days
Soil	Total Inorganic Nitrogen	EPA 300.0	8-ounce glass jar	Cool, 4°C ± 2	28 days
Water	Explosives	SW-846 EPA 8330	2 1-L amber glass bottles with Teflon lids	Cool, 4°C ± 2	7 days/40 days
Water	Metals	SW-846EPA 6010B/7000A	250 mL polyethylene bottle	HNO3, Cool, 4°C ± 2	6 months
Water	TKN	SM 4500-N or EPA 351.2	1 L polyethylene bottle	H2SO4, Cool, 4°C ± 2	28 days
Water	Ammonia as Nitrogen	EPA 350.3	1 L polyethylene bottle	H2SO4, Cool, 4°C ± 2	28 days
Water	Perchlorate	SW-846 EPA 6850	250 mL polyethylene bottle	Cool, 4°C ± 2	28 days
Water	Total Inorganic Nitrogen	EPA 300.0	1 L polyethylene bottle	Cool, 4°C ± 2	28 days

Notes: See Worksheet #23 for analytical standard operating procedure references

1 SOP references to be determined for the final SAP after the selection of the laboratory

SAP WORKSHEET #20 — FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE

Matrix	Analytical Group	No. of Samples	No. of Field Duplicates[a]	No. of MS/MSD[b]	No. of Equip. Blanks[c]	No. of Trip Blanks[d]	Total No. of Samples to Laboratory
Soil	Explosives	190	NA	10	10	NA	210
Soil	Metals	140	NA	7	7	NA	154
Soil	Total Kjeldahl Nitrogen (TKN)	90	NA	5	5	NA	100
Soil	Ammonia	90	NA	5	5	NA	100
Soil	Perchlorate	100	NA	5	5	NA	110
Soil	Picric Acid	130	NA	7	7	NA	144
Soil	Total Inorganic Nitrogen	90	NA	5	5	NA	100
Water	Explosives	5	1	1	NA	NA	7
Water	Metals	5	1	1	NA	NA	7
Water	TKN	5	1	1	NA	NA	7
Water	Ammonia	5	1	1	NA	NA	7
Water	Perchlorate	5	1	1	NA	NA	7
Water	Total Inorganic Nitrogen	5	1	1	NA	NA	7

Notes:

a Soil duplicates will not be collected for this project because they cannot be used directly to assess sampling precision since adjacent soil samples incorporate some spatial variability. Furthermore, it is not practical to set QC limits for the relative percent difference of these samples, which precludes their use for QC.

b Although the MS/MSD is not typically considered a field QC, it is included here because location determination is often established in the field.

c The number of equipment rinsates associated with soil sampling is estimated. The actual number will depend on the number of sampling days. Equipment blanks and source water blanks associated with water samples are not anticipated; water samples will be collected from dedicated equipment.

d Trip blanks will not be collected.

MS/MSD Matrix spike/matrix spike duplicate

QC Quality control

SAP WORKSHEET #21 — PROJECT SAMPLING SOP REFERENCES TABLE

SOP references are not required because all sampling procedures are described in Worksheet #17.

SAP WORKSHEET #22 — FIELD EQUIPMENT CALIBRATION, MAINTENANCE, TESTING, AND INSPECTION TABLE

Field Equipment	Activity	Frequency	Acceptance Criteria	Corrective Action	Resp. Person	SOP Reference	Comments
Water Quality Meter	Calibration	Once per day	Per manufacturer's instructions	Recalibrate	Field Team Lead	Manufacturer's SOP	Used to measure pH, turbidity, ORP, DO, and temperature

Notes:

DO Dissolved oxygen
ORP Oxidation-reduction potential
SOP Standard operating procedure

SAP WORKSHEET #23 — ANALYTICAL SOP REFERENCES TABLE

Laboratory SOP Number	Title, Revision Date, and Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
TBD[1]	TBD[1]	Definitive Data	Soil - Explosives	HPLC	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Soil - Metals	ICP	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Soil - TKN	Semiautomated colorimetry	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Soil - Ammonia	Potentiometry	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Soil - Perchlorate	HPLC	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Soil - Picric Acid	HPLC	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Soil - Total Inorganic Nitrogen	IC	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Water - Explosives	HPLC	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Water - Metals	ICP	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Water - TKN	Semiautomated colorimetry	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Water - Ammonia	HPLC	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Water - Perchlorate	HPLC	TBD[1]	TBD[1]
TBD[1]	TBD[1]	Definitive Data	Water - Total Inorganic Nitrogen	IC	TBD[1]	TBD[1]

Notes: [1]Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #23 will be updated.

HPLC High Performace Liquid Chromatography
IC Ion Chromatography
ICP Inductively Coupled Plasma
TBD To be determined
TKN Total Kjeldahl Nitrogen

SAP WORKSHEET #24 — ANALYTICAL INSTRUMENT CALIBRATION TABLE

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS	ICAL	Initially; as needed	SPCCs average RF ± 0.050 and %RSD for RFs for CCCs < 30% and one option below (1). linear – mean RSD for all analytes <15% (2). linear – least squares regression r > 0.995, when RSD >15% (3). non-linear – r^2 > 0.990 (6 points shall be used for second order, 7 points shall be used for third	If SPCC is non-compliant, it could be a result of standard degradation or active presence to active sites in the system. Correct the problem and repeat calibration. If CCC is non-compliant, it could be a result of system leaks, or reactive column sites or standard degradation. Correct the problem and recalibrate. If RSD is non-compliant, check for outlier and repeat that ICAL point; otherwise perform instrument troubleshooting and repeat calibration	Laboratory Analyst	TBD[1]
GC/MS	ICV	After Every ICAL	All analytes within ±25% of expected value [poor performers within ±35% of expected value]	If no data quality indicators are observed in the ICAL, it is indicative of standard degradation. Prepare a new standard and reanalyze ICV. Otherwise check and correct probable cause of problem and repeat ICAL.	Laboratory Analyst	TBD[1]
GC/MS	DCC	Every 12 hours	SPCCs average RF > 0.050; and CCCs < 20% difference (when using RFs) or drift (when using least squares regression or non-linear calibration)	If SPCC is non-compliant, it could be a result of standard degradation or active presence to active sites in the system. Correct the problem and repeat calibration. If CCC is non-compliant, it could be a result of system leaks, or reactive column sites or standard degradation. Correct the problem and recalibrate.	Laboratory Analyst	TBD[1]
GC/HPLC/IC	ICAL	Initially; as needed	(1) RSD for all analytes ≤20% (2) linear – least squares regression r > 0.995 (3) non-linear – r^2 > 0.990 (6 points shall be used for second order, 7 points shall be used for third order)	Locate the source of the problem. If expected RSD is not met, check for standard degradation or perform instrument adjustment and/or maintenance to correct the problem; then repeat initial calibration	Laboratory Analyst	TBD[1]

SAP WORKSHEET #24 — ANALYTICAL INSTRUMENT CALIBRATION TABLE (continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/HPLC/IC	ICV	after Every ICAL	All analytes within ±15% of expected value	Prepare fresh standard and re-analyze ICV to rule out standard degradation or inaccurate injection. If problem persists, perform instrument adjustment and/or maintenance to correct the problem and repeat ICAL.	Laboratory Analyst	TBD[1]
GC/HPLC/IC	DCC	Every 12 hours	All analytes within ±15% of expected value	Prepare fresh standard and re-analyze CCV to rule out standard degradation or inaccurate injection. If problem persists, perform instrument adjustment and/or maintenance to correct the problem and repeat ICAL.	Laboratory Analyst	TBD[1]
ICP	ICAL	Daily	Acceptable ICV	Troubleshoot the problem following the SOP. Once the problem has been identified and corrected, repeat the initial calibration.	Laboratory Analyst	TBD[1]
ICP	ICV	After ICAL	All analytes within + 10% of expected value RSD of Replicate integrations: < 5%	Troubleshoot the problem following the SOP. Once the problem has been identified and corrected, repeat the initial calibration.	Laboratory Analyst	TBD[1]
ICP	CCV	Daily before sample analysis, every 10 samples and at end of the analysis sequence	All analytes within + 10% of expected value RSD of replicate integrations: < 5%	Troubleshoot the problem following the SOP. Once the problem has been identified and corrected, repeat the initial calibration and reanalyze all samples since last successful calibration.	Laboratory Analyst	TBD[1]

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #24 will be updated.

%	Percent
CCV	Calibration check verification
DCC	Daily continuing calibration
GC	Gas chromatograph
GC/MS	Gas chromatograph /mass spectrometry
GFAA	Graphite furnace atomic absorption
HPLC	High-performance liquid chromatograph
IC	Ion chromatography
ICAL	Initial calibration
ICP	Inductively coupled plasma
ICV	Initial calibration verification
IS	Internal standard
RF	Response factor
RRF	Relative response factor
RRT	Relative retention time
RSD	Relative standard deviation
SOP	Standard operating procedure
SPCC	System performance check compounds

SAP WORKSHEET #25 — ANALYTICAL INSTRUMENT AND EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE

Instrument / Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GCMS GC HPLC ICP IC	Parameter Setup	Physical check	Physical check	Initially; prior to DCC	Parameters must match those specified in the SOP	If incorrect, reset instrument parameters to those specified in the SOP.	Laboratory Analyst	TBD[1]
GCMS	Tune Check	Instrument Performance	Conformance to instrument tuning.	Initially; prior to DCC	Compliance to ion abundance criteria	Troubleshoot the problem following procedures set forth in the SOP. Once the problem has been identified and corrected, repeat tune check	Laboratory Analyst	TBD[1]
ICP	ICS/ICSA	Instrument Performance	Conformance to interference check	Prior to sample analysis	Within + 20% of expected value	Terminate analysis and troubleshoot the problem following the SOP. Once the problem has been identified and corrected, reanalyze ICS, and reanalyze all affected samples	Laboratory Analyst	TBD[1]
ICP	ICB/CCB	Instrument Performance	Instrument contamination check	After every calibration verification	No analytes detected > 3X IDL	Troubleshoot the problem following the SOP. Once the problem has been identified and corrected then reanalyze calibration blank and previous samples.	Laboratory Analyst	TBD[1]
GFAA	Check tube, contacts, gas pressure, recirculator pump, sampler arm. Clean optic windows.	Calibration	Check for gas and coolant leaks.	Daily	Acceptable calibration	Repair as warranted.	Analyst	TBD[1]

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #25 will be updated.

CCB Continuing calibration blank

SAP WORKSHEET #25 — ANALYTICAL INSTRUMENT AND EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE (Continued)

CCV	Calibration check verification
DCC	Daily continuing calibration
GC	Gas chromatograph
GC/MS	Gas chromatograph /mass spectrometry
GFAA	Graphite furnace atomic absorption
HPLC	High-performance liquid chromatograph
IC	Ion chromatography
ICB	Initial calibration blank
ICP	Inductively coupled plasma
ICS	Interference check standard
ICSA	Interference check standard A
IDL	Instrument detection limit

SAP WORKSHEET #26 — SAMPLE HANDLING SYSTEM

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Field Team/ChaduxTt JV
Sample Packaging (Personnel/Organization): Field Team/ ChaduxTt JV
Coordination of Shipment (Personnel/Organization): Field Team/ ChaduxTt JV
Type of Shipment/Carrier: Federal Express Priority Overnight
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Laboratory sample custodian/TBD[1]
Sample Custody and Storage (Personnel/Organization): Laboratory sample custodian/TBD[1]
Sample Preparation (Personnel/Organization): Analyst/TBD[1]
Sample Determinative Analysis (Personnel/Organization): Analytical Chemist/TBD[1]
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): 30 days after delivery of the data package
Sample Extract/Digestate Storage (No. of days from extraction/digestion): 30 days after delivery of the data package
Biological Sample Storage (No. of days from sample collection): Not applicable
SAMPLE DISPOSAL
Personnel/Organization: Laboratory sample custodian/TBD[1]
Number of Days from Analysis: 30 days after delivery of the data package

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #26 will be updated.

SAP WORKSHEET #27 — SAMPLE CUSTODY REQUIREMENTS

27.1 SAMPLE HANDLING AND CUSTODY

The following sections describe sample handling procedures, including sample ID and labeling, documentation, chain-of-custody, and shipping.

27.1.1 Sample Identification

Specific sampling location identifiers (known as point names) have been assigned to all samples collected for this project. Point names are presented on Worksheet #18. For this investigation, the point names will also be used as the sample ID. Sample IDs will be listed on the chain-of-custody forms submitted to the laboratory.

QC samples for this investigation will also be assigned specific sample IDs. The following system will be used for each QC sample.

Source water blank (SW)	=	SW01 though SWXX
Equipment blank	=	EB01 through ERXX

27.1.2 Sample Labels

A sample label will be affixed to all sample containers. The label will be completed with the following information written in indelible ink:

- Project name and location
- Sample ID number
- Date and time of sample collection
- Preservative used
- Sample collector's initials
- Analysis required.

After it is labeled, each sample will be refrigerated or placed in a cooler that contains ice to maintain the sample temperature at 4°C ±2.

SAP WORKSHEET #27 — SAMPLE CUSTODY REQUIREMENTS (Continued)

27.1.3 Sample Documentation

Documentation during sampling is essential to ensure proper sample identification. ChaduxTt personnel will adhere to the following general guidelines for maintaining field documentation:

- Documentation will be completed in permanent black ink.
- All entries will be legible.
- Errors will be corrected by crossing out with a single line and then dating and initialing the lineout.
- Any serialized documents will be maintained at Tetra Tech and referenced in the site logbook.
- Unused portions of pages will be crossed out, and each page will be signed and dated.

27.1.4 Chain of Custody

ChaduxTt JV will use standard sample custody procedures to maintain and document sample integrity during collection, transportation, storage, and analysis. A sample will be considered to be in custody if one of the following statements applies:

- It is in a person's physical possession or view.
- It is in a secure area with restricted access.
- It is placed in a container and secured with an official seal such that the sample cannot be reached without breaking the seal.

Chain-of-custody procedures provide an accurate written record that traces the possession of individual samples from the time they are collected in the field to the time they are accepted at the laboratory. The chain-of-custody record (see Appendix A) also will be used to document all samples collected and the analysis requested. Information that the field personnel will record on the chain-of-custody record includes the following:

- Project name and number
- Sampling location
- Name and signature of sampler

SAP WORKSHEET #27 — SAMPLE CUSTODY REQUIREMENTS (Continued)

- Destination of samples (laboratory name)
- Sample ID number
- Date and time of collection
- Depth of collection
- Number and type of containers filled
- Analysis requested
- Preservatives used (if applicable)
- Filtering (if applicable)
- Sample designation (grab or composite)
- Signatures of individuals involved in custody transfer, including the date and time of transfer
- Airbill number (if applicable)
- Project contact and phone number.

Unused lines on the chain-of-custody record will be crossed out. Field personnel will sign chain-of-custody records that are initiated in the field, and the airbill number will be recorded. The record will be inserted in a waterproof plastic bag and taped to the inside of the shipping container used to transport the samples. Signed airbills will serve as evidence of custody transfer between field personnel and the courier, and between the courier and the laboratory. Copies of the chain-of-custody record and the airbill will be retained and filed by field personnel before the containers are shipped.

Laboratory chain-of-custody begins when samples are received and continues until samples are discarded. The laboratory should designate a specific individual as the sample custodian. The custodian will receive all incoming samples, sign the accompanying custody forms, and retain copies of the forms as permanent records. The laboratory sample custodian will record all pertinent information on the samples, including the persons who delivered the samples, the date and time received, sample condition at the time of receipt (sealed, unsealed, or broken container; temperature; or other relevant remarks), the sample ID numbers, and any unique laboratory ID numbers for the samples. This information should be entered into a computerized laboratory information management system. When the sample transfer process is complete, the custodian is responsible for maintaining internal logbooks, tracking reports, and retaining other records necessary to maintain custody throughout sample preparation and analysis.

SAP WORKSHEET #27 — SAMPLE CUSTODY REQUIREMENTS (Continued)

The laboratory will provide a secure storage area for all samples. Access to this area will be restricted to authorized personnel. The custodian will ensure that samples that require special handling—including samples that are heat- or light-sensitive, radioactive, or have other unusual physical characteristics—will be properly stored and maintained prior to analysis.

27.1.5 Sample Shipment

The following procedures will be implemented when samples collected during this project are shipped:

- The cooler will be filled with bubble wrap, sample bottles, and packing material. Sufficient packing material will be used to prevent sample containers from breaking during shipment. Enough ice will be added to maintain the sample temperature of below 4°C ± 2.
- The chain-of-custody records will be placed inside a plastic bag. The bag will be sealed and taped to the inside of the cooler lid. The air bill, if required, will be filled out before the samples are handed over to the carrier. The laboratory will be notified if the sampler suspects that the sample contains any substance that would require laboratory personnel to take safety precautions.
- The cooler will be closed and taped shut with strapping tape around both ends. If the cooler has a drain, it will be taped shut both inside and outside of the cooler.
- Signed and dated custody seals will be affixed on the front and side of each cooler. Wide clear tape will be placed over the seals to prevent accidental breakage.
- The chain-of-custody record will be transported within the taped sealed cooler. When the cooler is received at the analytical laboratory, laboratory personnel will open the cooler and sign the chain-of-custody record to document transfer of samples.

Multiple coolers may be sent in one shipment to the laboratory. The outside of the coolers will be marked to indicate the number of coolers in the shipment.

EXAMPLE SAMPLE LABEL:

Company: ChaduxTt	**Project Name and Location:** MRP Sites UXO1, UXO2, UXO6, AOC1, and AOC2 NAVWPNSTA Seal Beach, California
Sampler:	**Sample ID:**
Date:	**Time:**
Analysis:	**Preservative:**

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE

Matrix	Soil
Analytical Group	Explosives (including Picric Acid)
Analytical Method / SOP Reference	EPA 8330/TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes <1/2 QLs	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/bias-contamination	All analytes <1/2 QLs
LCS	One in absence of MS/MSD	% Recovery 80-120	Reprep and reanalyze LCS and all samples processed with non-conforming LCS	Laboratory Analyst	Accuracy/bias	% Recovery 80-120
Surrogates	Spiked into every sample and QC sample	% Recovery 75 to 125	Reprep and reanalyze samples, or assess the effects of interferences or dilution	Laboratory Analyst	Accuracy/Bias	% Recovery 75-125
MS/MSD	One per 20 samples	% Recovery 75-125 RPD ± 20%	Discuss in case narrative	Laboratory Analyst	Interferences-Accuracy/bias - precision	% Recovery 75-125 RPD ± 20%

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Soil
Analytical Group	Metals
Analytical Method / SOP Reference	EPA 6010/TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes ≤1/2 QLs	Reprep and reanalyze method blank (MB) and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias-Contamination	No Target Compounds>RL
LCS	One in the absence of MS/MSD or MS/matrix duplicate (MD)	80-120% Recovery	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	80-120 % Recovery RPD 20
MS/MSD or MS/MD	One per 20 samples	75-125% Recovery	Discuss in the case narrative.	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	75-125% Recovery RPD 20
Dilution Test	Per sample preparation batch.	1:5 dilution must agree within + 10% of the original determination	Perform post-digestion spike addition	Laboratory Analyst	Accuracy/Bias	1:5 dilution must agree within + 10% of the original determination
Analytical Spike	When MS/MSD or MS/MD failed	Recovery within 75-125% of expected value	Discuss in the case narrative.	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	75-125% Recovery

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Soil
Analytical Group	Perchlorate
Analytical Method / SOP Reference	EPA 6850/ TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes <1/2 QL	Reprep and reanalyze MB and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias - Contamination	All analytes <1/2 QL
LCS	One in absence of MS/MSD	80-120% Recovery	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	80-120% Recovery
MS	One per 20 samples	(soil) 70-130% Recovery; (water) 80-120% Recovery	Discuss in case narrative	Laboratory Analyst	Interferences-Accuracy/Bias	(soil) 70-130% Recovery; (water) 80-120% Recovery
MSD	One per 20 samples	RPD 15	Discuss in case narrative	Laboratory Analyst	Interferences-Accuracy/Bias-Precision	RPD 20

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Soil
Analytical Group	TKN
Analytical Method / SOP Reference	EPA 351.2/TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes ≤1/2 QLs	Reprep and reanalyze MB and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias - Contamination	No Target Compounds>RL
LCS	One per sample preparation batch	RPD 20	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	RPD 20
MS	One per 20 samples	RPD ± 25%	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/bias	RPD ± 25%

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Soil
Analytical Group	Ammonia
Analytical Method / SOP Reference	EPA 350.3/TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes ≤1/2 QLs	Reprep and reanalyze MB and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias - Contamination	No Target Compounds>RL
LCS	One in the absence of MS/MSD	80-120% Recovery	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	80-120% Recovery
MS	One per 20 samples	75-125% Recovery RPD 20	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/Bias	75-125% Recovery RPD 20
MD	One per 20 samples	RPD 20	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/Bias-Precision	RPD 20

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Soil
Analytical Group	Total Inorganic Nitrogen
Analytical Method / SOP Reference	EPA 300.0 /TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes <1/2 QLs	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/bias-contamination	All analytes <1/2 QLs
LCS	One in the absence of MS/MD	% Recovery 80-120	Reprep and reanalyze LCS and all samples processed with non-conforming LCS	Laboratory Analyst	Accuracy/bias	% Recovery 80-120
MS	One per 20 samples	% Recovery 75-125 RPD ± 20%	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/bias	% Recovery 75-125 RPD ± 20%
MD	One per 20 samples	RPD ± 20%	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/bias-precision	RPD ± 20%

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Water
Analytical Group	Explosives (including Picric Acid)
Analytical Method / SOP Reference	EPA 8330/TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes <1/2 QLs	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/bias-contamination	All analytes <1/2 QLs
LCS	One in absence of MS/MSD	% Recovery 80-120	Reprep and reanalyze LCS and all samples processed with non-conforming LCS	Laboratory Analyst	Accuracy/bias	% Recovery 80-120
Surrogates	Spiked into every sample and QC sample	% Recovery 75 to 125	Reprep and reanalyze samples, or assess the effects of interferences or dilution	Laboratory Analyst	Accuracy/Bias	% Recovery 75-125
MS/MSD	One per 20 samples	% Recovery 75-125 RPD ± 20%	Discuss in case narrative	Laboratory Analyst	Interferences-Accuracy/bias - precision	% Recovery 75-125 RPD ± 20%

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Water
Analytical Group	Metals
Analytical Method / SOP Reference	EPA 6010/TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes ≤1/2 QLs	Reprep and reanalyze method blank (MB) and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias-Contamination	No Target Compounds>RL
LCS	One in the absence of MS/MSD or MS/matrix duplicate (MD)	80-120% Recovery	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	80-120 % Recovery RPD 20
MS/MSD or MS/MD	One per 20 samples	75-125% Recovery	Discuss in the case narrative.	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	75-125% Recovery RPD 20
Dilution Test	Per sample preparation batch.	1:5 dilution must agree within + 10% of the original determination	Perform post-digestion spike addition	Laboratory Analyst	Accuracy/Bias	1:5 dilution must agree within + 10% of the original determination
Analytical Spike	When MS/MSD or MS/MD failed	Recovery within 75-125% of expected value	Discuss in the case narrative.	Laboratory Analyst	Interferences - Accuracy/Bias - Precision	75-125% Recovery

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Water
Analytical Group	Perchlorate
Analytical Method / SOP Reference	EPA 6850/ TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes <1/2 QL	Reprep and reanalyze MB and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias - Contamination	All analytes <1/2 QL
LCS	One in absence of MS/MSD	80-120% Recovery	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	80-120% Recovery
MS	One per 20 samples	(soil) 70-130% Recovery; (water) 80-120% Recovery	Discuss in case narrative	Laboratory Analyst	Interferences-Accuracy/Bias	(soil) 70-130% Recovery; (water) 80-120% Recovery
MSD	One per 20 samples	RPD 15	Discuss in case narrative	Laboratory Analyst	Interferences-Accuracy/Bias-Precision	RPD 20

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Water
Analytical Group	TKN
Analytical Method / SOP Reference	EPA 351.2/TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes ≤1/2 QLs	Reprep and reanalyze MB and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias - Contamination	No Target Compounds>RL
LCS	One per sample preparation batch	RPD 20	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	RPD 20
MS	One per 20 samples	RPD ± 25%	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/bias	RPD ± 25%

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Water
Analytical Group	Ammonia
Analytical Method / SOP Reference	EPA 350.3/TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes ≤1/2 QLs	Reprep and reanalyze MB and all samples processed with the non-conforming MB.	Laboratory Analyst	Accuracy/Bias - Contamination	No Target Compounds>RL
LCS	One in the absence of MS/MSD	80-120% Recovery	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/Bias	80-120% Recovery
MS	One per 20 samples	75-125% Recovery RPD 20	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/Bias	75-125% Recovery RPD 20
MD	One per 20 samples	RPD 20	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/Bias-Precision	RPD 20

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #28 — LABORATORY QC SAMPLES TABLE (Continued)

Matrix	Water
Analytical Group	Total Inorganic Nitrogen
Analytical Method / SOP Reference	EPA 300.0 /TBD[1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch	All analytes <1/2 QLs	Reprep and reanalyze LCS and all samples processed with the non-conforming LCS.	Laboratory Analyst	Accuracy/bias-contamination	All analytes <1/2 QLs
LCS	One in the absence of MS/MD	% Recovery 80-120	Reprep and reanalyze LCS and all samples processed with non-conforming LCS	Laboratory Analyst	Accuracy/bias	% Recovery 80-120
MS	One per 20 samples	% Recovery 75-125 RPD ± 20%	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/bias	% Recovery 75-125 RPD ± 20%
MD	One per 20 samples	RPD ± 20%	No specific corrective action is warranted. Deviations will be discussed in the case narrative.	Laboratory Analyst	Interferences-Accuracy/bias-precision	RPD ± 20%

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #28 will be updated.

SAP WORKSHEET #29 — PROJECT DOCUMENTS AND RECORDS TABLE

Document	Where Maintained
SAP, Work Plan, Accident and Prevention Plan, and HASP	Field office, Project file
Field notes/logbook	Project file
Chain-of-custody records	Project file
Field forms	Project file
Laboratory raw data package (hard copy)	Project file, NAVFAC SW Administrative Record
Audit/assessment checklists/reports	Project file and laboratory
Corrective action forms/reports	Project file and laboratory
Laboratory equipment calibration logs	Laboratory
Sample preparation logs	Laboratory
Run logs	Laboratory
Sample disposal records	Laboratory
Validated data	Project file, NAVFAC SW Administrative Record

SAP WORKSHEET #30 — ANALYTICAL SERVICES TABLE

Matrix	Analytical Group	Sample Locations / ID Number	Analytical Method	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory / Organization (name and address, contact person and telephone number)
Soil/Water	Explosives	All	EPA 8330	35 days	TBD[1]	TBD[1]
Soil/Water	Metals		EPA 6010			
Soil/Water	Total Kjeldahl Nitrogen (TKN)		EPA 351.2			
Soil/Water	Ammonia		EPA 350.3			
Soil/Water	Perchlorate		EPA 6850			
Soil	Picric Acid		EPA 8330			
Soil/Water	Total Inorganic Nitrogen		EPA 300.0			

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #30 will be updated.

SAP WORKSHEET #30 — ANALYTICAL SERVICES TABLE (Continued)

Requirements for Summary Data Packages – Organic Analysis	Requirements for Summary Data Packages – Inorganic Analysis
Section I **Case Narrative**	**Section I** **Case Narrative**
1. Case narrative	1. Case narrative
2. Copies of nonconformance and corrective action forms	2. Copies of nonconformance and corrective action forms
3. Chain-of-custody forms	3. Chain-of-custody forms
4. Copies of sample receipt notices	4. Copies of sample receipt notices
5. Internal tracking documents, as applicable	5. Internal tracking documents, as applicable
Section II **Sample Results – Form I for the following:**	**Section II** **Sample Results – Form I for the following:**
1. Environmental samples, including dilutions and re-analysis	1. Environmental sample including dilutions and re-analysis
2. Explosives, metals, picrate, perchlorate, total inorganic nitrogen, ammonia, total Kjeldahl nitrogen	
Section III **Quality Assurance/Quality Control (QA/QC) Summaries – Forms II through XI for the following:**	**Section III** **QA/QC Summaries – Forms II through XIV for the following:**
1. System monitoring compound and surrogate recoveries (Form II)	1. Initial and continuing calibration verifications (Form II)
2. Matrix spike (MS) and matrix spike duplicate (MSD) recoveries and relative percent differences (RPD) (Forms I and III)	2. Project-required reporting limit (PRRL) standard (Form II)
3. Blank spike or laboratory control sample (LCS) recoveries (Forms I and III-Z)	3. Detection limit standard (Form II-Z)
4. Method blanks (Forms I and IV)	4. Method blanks, continuing calibration blanks, and preparation blanks (Form III)
5. Performance check (Form V)	5. Inductively coupled plasma (ICP) interference-check samples (Form IV)
6. Initial calibrations with retention time information (Form VI)	6. MS and post-digestion spikes (Forms V and V-Z)
7. Continuing calibrations with retention time information (Form VII)	7. Sample duplicates (Form VI)
8. Quantitation limit standard (Form VII-Z)	8. LCSs (Form VII)
9. Internal standard areas and retention times (Form VIII)	9. Method of standard additions (Form VIII)
10. Analytical sequence (Forms VIII-D and VIII-Z)	10. ICP serial dilution (Form IX)
11. Gel permeation chromatography (GPC) calibration (Form IX)	11. Instrument detection limit (IDL) (Form X)
12. Single component analyte identification (Form X)	12. ICP interelement correction factors (Form XI)
13. Multicomponent analyte identification (Form X-Z)	13. ICP linear working range (Form XII)
14. Matrix-specific method detection limit (MDL) (Form XI-Z)	
Sections I, II, and III **Summary Package**	**Sections I, II, III** **Summary Package**

SAP WORKSHEET #30 — ANALYTICAL SERVICES TABLE (Continued)

Requirements for Summary Data Packages – Organic Analysis	Requirements for Summary Data Packages – Inorganic Analysis
Section IV **Sample Raw Data – indicated form, plus all raw data**	**Section IV** **Instrument Raw Data - Sequential measurement readout records for ICP, graphite furnace atomic absorption (GFAA), flame atomic absorption (AA), cold vapor mercury, cyanide, and other inorganic analyses, which will contain the following information:**
1. Analytical results, including dilutions and re-analysis (Forms I and X)	1. Environmental samples, including dilutions and re-analysis
2. TICs (Form I — volatile organic analysis [VOA])	2. Initial calibration
	3. Initial and continuing calibration verifications
Section V **QC Raw Data – indicated form, plus all raw data**	4. Detection limit standards
1. Method blanks (Form I)	5. Method blanks, continuing calibration blanks, and preparation blanks
2. MS and MSD samples (Form I)	6. ICP interference check samples
3. Blank spikes or LCSs (Form I)	7. MS and post-digestion spikes
	8. Sample duplicates
Section VI **Standard Raw Data – indicated form, plus all raw data**	9. LCSs
1. Performance check (Form V)	10. Method of standard additions
2. Initial calibrations, with retention-time information (Form VI)	11. ICP serial dilution
3. Continuing calibrations, with retention-time information (Form VII)	**Section V** **Other Raw Data**
4. Quantitation-limit standard (Form VII-Z)	1. Percent moisture for soil samples
5. GPC calibration (Form IX)	2. Sample digestion, distillation, and preparation logs, as necessary
Section VII **Other Raw Data**	3. Instrument analysis log for each instrument used
1. Percent moisture for soil samples	4. Standard preparation logs, including initial and final concentrations for each standard used
2. Sample extraction and cleanup logs	5. Formula and a sample calculation for the initial calibration
3. Instrument analysis log for each instrument used (Form VIII-Z)	6. Formula and a sample calculation for soil sample results
4. Standard preparation logs, including initial and final concentrations for each standard used	
5. Formula and a sample calculation for the initial calibration	
6. Formula and a sample calculation for soil sample results	

30.1 SELECTION OF ANALYTICAL LABORATORIES

Laboratories for this investigation have been selected from a list of prequalified laboratories developed by ChaduxTt to support Navy contracts. Prequalification streamlines laboratory selection by reducing the need to compile and review detailed bid and qualification packages for each investigation. Prequalification also improves flexibility in the program by allowing analysis to be directed to a number of different capable laboratories with available capacity when samples are collected.

ChaduxTt's laboratory prequalification and selection process relies on (1) a standard procedure to evaluate and prequalify laboratories for work under the contract, and (2) the "Tetra Tech EM Inc. Laboratory Analytical Statement of Work" for Navy contracts (Tetra Tech 2002), a contractual document that specifies standard requirements for analyses that are routinely conducted. ChaduxTt establishes a basic ordering agreement that incorporates and enforces the laboratory SOW with each prequalified laboratory. Individual purchase orders can then be written for specific investigations. These aspects of laboratory selection are further described in the following sections, along with ChaduxTt's procedures for selecting laboratories when the laboratory SOW does not specifically address project-specific analytical methods or QC requirements.

30.2 LABORATORY EVALUATION AND PREQUALIFICATION

Laboratories that support the Navy directly or through subcontracts are evaluated and approved for Navy use by the Naval Facilities Engineering Service Center (NFESC). Laboratories that support ChaduxTt under Navy contracts have been selected from the list of laboratories approved by NFESC and evaluated by ChaduxTt to assure that the laboratory can meet the technical requirements of the laboratory SOW and produce data of acceptable quality. The laboratories are evaluated in accordance with the NFESC *Installation Restoration Chemical Data Quality Manual* (NFESC 1999). The laboratory evaluation includes the following elements:

- **Certification and approval**. Laboratories must be currently certified by the California State Health Department, Environmental Laboratory Accreditation Program, for analysis via each method specified. Laboratories must be currently approved by NFESC. The NFESC approval must be obtained before the laboratory begins work.

- **Performance evaluation samples**. Each laboratory must initially and yearly demonstrate its ability to satisfactorily analyze single-blind performance evaluation samples for all analytical services it will provide under Navy contracts. At its discretion, ChaduxTt may submit one or more double-blind performance evaluation samples at ChaduxTt cost. When the results for the performance evaluation sample are deficient, the laboratory must correct any problems and analyze (at its own cost) a subsequent round of performance evaluation samples for the deficient analysis.

- **Audits**. Laboratories must initially and yearly demonstrate their qualifications by submitting to one or more audits by ChaduxTt. The audits may consist of (1) an on-site review of laboratory facilities, personnel, documentation, and procedures, or (2) an off-site review of hard copy and electronic deliverables, or magnetic tapes. When deficiencies are identified, the laboratory must correct the problem and provide ChaduxTt with a written summary of the corrective action that was taken.

SAP WORKSHEET #31 — PLANNED PROJECT ASSESSMENTS TABLE

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Action	Person(s) Responsible for Monitoring Effectiveness of Corrective Action
Field Readiness Review	Before mobilization for the project and before major phases of work are initiated	Internal	ChaduxTt JV	Project Manager, ChaduxTt JV	Field Team Leader, ChaduxTt JV	Project Manager, ChaduxTt JV	Project QAM, ChaduxTt JV
Field Sampling Surveillance	Once at the beginning of field sampling	Internal	ChaduxTt JV	Analytical Coordinator, ChaduxTt JV	Field Team Leader, ChaduxTt JV	Project Manager, ChaduxTt JV	Project QAM and Analytical Coordinator, ChaduxTt JV

SAP WORKSHEET #32 — ASSESSMENT FINDINGS AND CORRECTIVE ACTION RESPONSES

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response	Timeframe for Response
Field Readiness Review	Readiness Review Report	Project Manager, Project QAM, Field Team Lead, and Analytical Coordinator, ChaduxTt JV	2 days	Email	Project Manager and QAM, ChaduxTt JV	2 days
Field Sampling Surveillance	Technical Systems Audit (TSA) Report	Project Manager, Project QAM, Field Team Lead, ChaduxTt JV	2 days	Email	Project Manager and QAM, ChaduxTt JV	2 days

SAP WORKSHEET #33 — QA MANAGEMENT REPORTS TABLE

Type of Report	Frequency	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation	Report Recipient(s)
Daily Progress Report	Daily	At the end of each field day	Field Team Lead, ChaduxTt JV	Project Manager, ChaduxTt JV RPM, NAVFAC
Monthly Status Report	Monthly	At the end of each month	Project Manager, ChaduxTt JV	QA Manager, ChaduxTt JV RPM, NAVFAC
Quality Control Summary Report	With Report Submittal	Submitted in Final Report	Project Manager, ChaduxTt JV	RPM, NAVFAC

SAP WORKSHEET #34 — VERIFICATION (STEP I) PROCESS TABLE

Verification Input	Description	Internal (I)/ External (E)	Responsible for Verification (Name, Organization)
Audit reports	When the report is complete, a copy of all audit reports will be placed in the project file. If corrective actions are required, a copy of the documented corrective action taken will be attached to the appropriate audit report in the project file. At the beginning of each week and at the completion of the site work, project file audit reports will be reviewed internally to ensure that all appropriate corrective actions have been taken and that corrective action reports are attached. If corrective actions have not been taken, the project manager will be notified to ensure action is taken.	I	Project Manager, ChaduxTt JV
Field notes/logbook	Field notes will be reviewed internally and placed in the project file. A copy of the field notes will be attached to the final report.	I	Field team lead, ChaduxTt JV
Sample receipt	For samples shipped via commercial carrier, the analytical coordinator will verify receipt of samples by the laboratory the day following shipment.	I	Analytical coordinator, ChaduxTt JV
Sample logins	Sample login information will be reviewed and verified for completeness in accordance with the chain-of-custody forms.	I,E	Analytical coordinator, ChaduxTt JV Laboratory Project Manager, TBD[1]
Chain-of-custody records	Chain-of-custody forms will be reviewed internally when they are completed and verified against the packed sample coolers they represent. The shipper's signature on the chain-of-custody form should be initialed by the reviewer, a copy of the chain-of-custody form will be retained in the project file, and the original and remaining copies will be taped inside the cooler for shipment.	I	Field team lead, ChaduxTt JV
Laboratory data prior to release	Laboratory data will be reviewed and verified for completeness against analyses requested on the chain-of-custody forms.	E	Laboratory Project Manager, TBD[1]
Laboratory data due at turnaround time listed on chain of custody	Laboratory data will be verified that the analyses reported are consistent with the analytical suite requested on the chain-of-custody forms.	I	Analytical coordinator, ChaduxTt JV
Laboratory data packages	All laboratory data packages will be verified for completeness by the laboratory performing the work. Data packages will then be reviewed by the analytical coordinator for completeness. Subsequently, data packages will be evaluated externally by undergoing data validation.	I,E	Laboratory Project Manager, TBD[1] Analytical coordinator, ChaduxTt JV Third-party data validator, TBD[1]

SAP WORKSHEET #34 — VERIFICATION (STEP I) PROCESS TABLE (Continued)

Verification Input	Description	Internal (I)/ External (E)	Responsible for Verification (Name, Organization)
Laboratory data	All laboratory data packages will be verified for completeness and technical accuracy internally by the laboratory performing the work before they are submitted. All received data packages will be verified externally according to the data validation procedures specified in Worksheet #36.	I, E	Laboratory Project Manager, TBD[1] Third-party data validator, TBD[1]
Field and electronic data	One hundred percent of manual entries will be reviewed against the hardcopy information, and 10 percent of electronic uploads will be checked against the hardcopy.	I	Analytical coordinator, ChaduxTt JV

Note: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #34 will be updated.

SAP WORKSHEET #35 — VALIDATION (STEPS IIA AND IIB) PROCESS TABLE

Step IIa / IIb[1]	Validation Input	Description	Responsible for Validation (name, organization)
IIa	Field logbook	Field logbooks will be reviewed weekly for accuracy associated with each sampling event. The inspection will be documented in daily QC reports.	Project Manager, ChaduxTt JV
IIa	Chain-of-custody forms	Chain-of-custody forms will be reviewed daily to ensure that project information, sample analyses requested, number of field QC samples collected, and percent level III or IV validation chosen are accurate and in accordance with the requirements in this SAP.	Analytical Coordinator, ChaduxTt JV
IIa	Sample receipt	The sample cooler will be checked for compliance with temperature and packaging requirements.	Laboratory sample custodian, TBD[1]
IIa	Sample logins	Sample login will be reviewed for accuracy against the chain-of-custody form.	Analytical Coordinator, ChaduxTt JV Laboratory Project Manager, TBD[1]
IIa	Laboratory data prior to release	Laboratory data will be reviewed to ensure that the data are accurate and meet the requirements in this SAP. Before they are released, data will be validated as follows:	Laboratory Project Manager, TBD[1]
		100 percent of the data comply with the method- and project-specific requirements; any deviations or failure to meet criteria are documented for the project file.	Laboratory Analyst, TBD[1]
		100 percent of manual entries are free of transcription errors and manual calculations are accurate; computer calculations are spot-checked to verify program validity; data reported are compliant with method- and project-specific QC requirements; raw data and supporting materials are complete; spectral assignments are confirmed; descriptions of deviations from method or project requirements are documented; significant figures and rounding have been appropriately used; reported values include dilution factors; and results are reasonable.	Laboratory Peer Analyst, TBD[1]
		Data reported comply with method- and project-specific QC requirements; the reported information is complete; the information in the report narrative is complete and accurate; and results are reasonable.	Laboratory Supervisor, TBD[1]

SAP WORKSHEET #35 — VALIDATION (STEPS IIA AND IIB) PROCESS TABLE (Continued)

Step IIa / IIb[1]	Validation Input	Description	Responsible for Validation (name, organization)
IIa	Laboratory data prior to release	Data reported comply with method- and project-specific QC; analytical methods are performed in compliance with approved SOPs. This review may be conducted after release of data since they are done only on 10 percent of the data.	Laboratory Quality Assurance Manager, TBD[1]
IIa	Laboratory data due at turnaround time listed on chain of custody	Laboratory data will be reviewed to ensure that the data reported met the analyte list and limits listed in Worksheet #15.	Analytical Coordinator, ChaduxTt JV
	Laboratory data packages	All laboratory data packages will be validated by the laboratory performing the work for technical accuracy before it is submitted.	Laboratory Project Manager, TBD[1]
		Data packages will then be reviewed for accuracy against the laboratory data that was faxed or e-mailed at the turnaround time listed on the chain-of-custody.	Analytical Coordinator, ChaduxTt JV
		Data packages will be evaluated externally by undergoing data validation.	Third-party data validator, TBD[1]
IIb	Data validation reports	Data validation reports will be reviewed in conjunction with the project DQOs and data quality indicators.	Analytical Coordinator, ChaduxTt JV

Notes: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #35 will be updated.

1 IIa=compliance with methods, procedures, and contracts [see Table 10, page 117, UFP-QAPP manual, V.1, March 2005.]
IIb=comparison with measurement performance criteria in the SAP [see Table 11, page 118, UFP-QAPP manual, V.1, March 2005]

SAP WORKSHEET #36 — ANALYTICAL DATA VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (title and organizational affiliation)
IIa	Soil/Water	Explosives	In accordance with EPA 8330 / Laboratory SOP TBD[1]	QA Manager, TBD[1]
IIa	Soil/Water	Metals	In accordance with EPA 6010 / Laboratory SOP TBD[1]	QA Manager, TBD[1]
IIa	Soil/Water	Total Kjeldahl Nitrogen (TKN)	In accordance with EPA 351.2 / Laboratory SOP TBD[1]	QA Manager, TBD[1]
IIa	Soil/Water	Ammonia	In accordance with EPA 350.3 / Laboratory SOP TBD[1]	QA Manager, TBD[1]
IIa	Soil/Water	Perchlorate	In accordance with EPA 6850 / Laboratory SOP TBD[1]	QA Manager, TBD[1]
IIa	Soil	Picric Acid	In accordance with EPA 8330 / Laboratory SOP TBD[1]	QA Manager, TBD[1]
IIa	Soil/Water	Total Inorganic Nitrogen	In accordance with EPA 300.0 / Laboratory SOP TBD[1]	QA Manager, TBD[1]
IIb	Soil/Water	Explosives	In accordance with EPA 8330 / Laboratory SOP TBD[1]	Project Manager, Data Validator TBD[1]
IIb	Soil/Water	Metals	In accordance with EPA 6010 / Laboratory SOP TBD[1]	Project Manager, Data Validator TBD[1]
IIb	Soil/Water	TKN	In accordance with EPA 351.2 / Laboratory SOP TBD[1]	Project Manager, Data Validator TBD[1]
IIb	Soil/Water	Ammonia	In accordance with EPA 350.3 / Laboratory SOP TBD[1]	Project Manager, Data Validator TBD[1]
IIb	Soil/Water	Perchlorate	In accordance with EPA 6850 / Laboratory SOP TBD[1]	Project Manager, Data Validator TBD[1]
IIb	Soil	Picric Acid	In accordance with EPA 8330 / Laboratory SOP TBD[1]	Project Manager, Data Validator TBD[1]
IIb	Soil/Water	Total Inorganic Nitrogen	In accordance with EPA 300.0 / Laboratory SOP TBD[1]	Project Manager, Data Validator TBD[1]

Note: [1] Before the SAP is finalized and crews mobilize to the field, all TBDs in Worksheet #36 will be updated.

SAP WORKSHEET #36 — ANALYTICAL DATA VALIDATION (Continued)

36.1 DATA VALIDATION AND USABILITY

This section describes the procedures that are planned to review, verify, and validate field and laboratory data. This section also discusses procedures for verifying that the data are adequate to meet PQOs and measurement quality objectives (MQO) for the project.

36.1.1 Data Review, Verification, and Validation

Validation and verification of the data generated during field and laboratory activities are essential to obtaining defensible data of acceptable quality. Verification and validation methods for field and laboratory activities are presented below.

36.1.2 Field Data Verification

Project personnel will verify field data through reviews of data sets to identify inconsistencies or anomalous values. Any inconsistencies discovered will be resolved as soon as possible by seeking clarification from field personnel responsible for data collection. All field personnel will be responsible for following the sampling and documentation procedures described in this SAP so that defensible and justifiable data are obtained.

Data values that are significantly different from the population are called "outliers." A systematic effort will be made to identify any outliers or errors before field personnel report the data. Outliers can result from improper sampling or measurement methodology, data transcription errors, calculation errors, or natural causes. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in sampling, measurement, transcription, or calculation will be clearly identified in project reports.

36.1.3 Laboratory Data Verification

Laboratory personnel will verify analytical data at the time of analysis and reporting, and through subsequent reviews of the raw data for any nonconformances to the requirements of the analytical method. Laboratory personnel will make a systematic effort to identify any outliers or errors before they report the data. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in analysis, transcription, or calculation will be clearly identified in the case narrative section of the analytical data package.

SAP WORKSHEET #36 — ANALYTICAL DATA VALIDATION (Continued)

36.1.4 Laboratory Data Validation

An independent third-party contractor will validate all laboratory data in accordance with current EPA national functional guidelines (EPA 1999b, 2004a). The data validation strategy will be consistent with Navy guidelines. Ninety percent of the data for contaminants of concern will undergo cursory validation (Level 3), and 10 percent of the data for contaminants of concern will undergo full validation (Level 4) for this project. Requirements for cursory and full validation are listed below.

36.1.5 Data Validation Criteria

Worksheets #12, #24, #25, #28, and #36 list the QC criteria that will be included in the reviews for both cursory and full data validation. The data validation will be consistent with the project-specific analytical methods referenced in Worksheet #19 and the laboratory-specific SOPs.

SAP WORKSHEET #37 — USABILITY ASSESSMENT

37.1 MEASUREMENT QUALITY OBJECTIVES

All analytical results will be evaluated in accordance with precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters to document the quality of the data and to ensure that the data are of sufficient quality to meet the project objectives. Of these PARCC parameters, precision and accuracy will be evaluated quantitatively by collecting the QC samples listed in Worksheet #12.

The following subsections describe each of the PARCC parameters and how they will be assessed within this project.

37.1.1 Precision

Precision is the degree of mutual agreement between individual measurements of the same property under similar conditions. Usually, combined field and laboratory precision are evaluated by collecting and analyzing field duplicates and then calculating the variance between the samples, typically as an RPD:

$$RPD = \frac{|A-B|}{(A+B)/2} \quad x \quad 100\%$$

where:

A	=	First duplicate concentration
B	=	Second duplicate concentration

Field sampling precision is evaluated by analyzing field duplicate samples.

Laboratory analytical precision is evaluated by comparing analytical results of field samples with those of field duplicates or laboratory matrix duplicates, or by analyzing MSs of field samples along with MSDs. For this project, MS/MSD samples will be generated for all organic analytes. MS/MSDs or matrix duplicates will be used to assess precision for inorganic analytes. The results of the analysis of each MS/MSD or duplicate pair will be used to calculate an RPD for evaluating precision. Worksheet #28 presents the precision goals for this project.

37.1.2 Accuracy

Field accuracy will be assessed by collecting and analyzing equipment rinsate and source water blank QC samples. These QC samples will be used to evaluate the potential for target analytes to enter samples as a result of sampling processes.

SAP WORKSHEET #37 — USABILITY ASSESSMENT (Continued)

A program of sample spiking will be conducted to evaluate laboratory accuracy. This program includes analysis of the MS and MSD samples, LCS or blank spikes, surrogate standards, and method blanks. MS samples will be prepared and analyzed at a frequency of 5 percent for samples that will require analysis for inorganic chemicals. LCS or blank spikes are also analyzed at a frequency of 5 percent or per extraction batch, whichever is most frequent. Surrogate standards, where available, are added to every sample analyzed for organic constituents. The results of the spiked samples are used to calculate the percent recovery (%R) for evaluating accuracy.

$$Percent\ \ Recovery \ = \ \frac{S - C}{T} \ \ x \ \ 100$$

where:

S	=	Measured spike sample concentration
C	=	Sample concentration
T	=	True or actual concentration of the spike

Worksheet #28 presents accuracy goals for this investigation based on the percent recovery of laboratory, matrix, and surrogate spikes. Results that fall outside the accuracy goals will be evaluated further on the basis of the results of other QC samples.

37.1.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in a parameter at a sampling point, or an environmental condition that they are intended to represent. For this project, representative data will be obtained through careful selection of sampling locations and analytical parameters. Representative data will also be obtained through proper collection and handling of samples to avoid interference and minimize contamination.

Representativeness of data will also be ensured through consistent application of established field and laboratory procedures. Laboratory blank samples will be evaluated for the presence of contaminants to aid in evaluating the representativeness of sample results. Data determined to be nonrepresentative, by comparison with existing data, will be used only if accompanied by appropriate qualifiers and limits of uncertainty.

37.1.4 Completeness

Completeness is a measure of the percentage of project-specific data that are valid. Valid data are obtained when samples are collected and analyzed in accordance with QC procedures outlined in this SAP, and when none of the QC criteria that affect data usability are exceeded.

SAP WORKSHEET #37 — USABILITY ASSESSMENT (Continued)

When all data validation is completed, the percent completeness value will be calculated by dividing the number of useable sample results by the total number of sample results planned for this investigation.

As discussed further in Section 37.2, completeness will also be evaluated as part of the data quality assessment (DQA) process (EPA 2000b). This evaluation will help determine whether any limitations are associated with the decisions to be made based on the data collected.

37.1.5 Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability of data will be achieved by consistently following standard field and laboratory procedures and by using standard measurement units in reporting analytical data. Field procedures will be standardized to ensure comparability. The comparability of laboratory data will be assured by use of established and approved analytical methods, consistency in the basis of analysis (wet weight, volume, or similar units), and consistency in reporting units (parts per million, parts per billion, and so forth).

37.1.6 Detection and Quantitation Limits

The method detection limit (MDL) and instrument detection limit (IDL) are the minimum concentration of an analyte that can be reliably distinguished from background noise for a specific analytical method. The quantitation limit (QL) represents the lowest concentration of an analyte that can be accurately and reproducibly quantified in a specific sample matrix. PRRLs are contractually specified maximum QLs for specific analytical methods and sample matrices, such as soil or water, and are typically several times higher than the MDL to allow for matrix effects. PRRLs are set to establish minimum criteria for laboratory performance; actual laboratory QLs may be substantially lower.

Analytical methods have been selected for this project so that the PRRL for each target analyte is below the applicable comparison criteria wherever practical. Worksheet #15 compares the PRRLs for the selected analytical methods with comparison criteria. This comparison shows that the analytical methods selected and the associated PRRLs are capable of quantifying the contaminants of concern at concentrations below the applicable screening criteria, in most cases. The PRRL listed reflects the maximum sensitivity of current, routinely used analytical methods. The listed PRRLs will be used as the project screening criteria unless reasonable grounds are established for pursuing non-routine methods. All analytes will be reported as estimated values if concentrations are less than PRRLs but greater than MDLs or IDLs, as appropriate. This procedure is being adopted to help ensure that analytical results can effectively be compared with comparison criteria for certain compounds where the screening criteria are near or below the PRRL. This procedure also will help to ensure that subsequent statistical evaluations of the data will not be biased by high-value nondetect results.

SAP WORKSHEET #37 — USABILITY ASSESSMENT (Continued)

37.2 RECONCILIATION WITH USER REQUIREMENTS

After environmental data have been reviewed, verified, and validated in accordance with the procedures, the data must be further evaluated to determine whether project quality objectives (PQO) have been met.

To the extent possible, ChaduxTt will follow EPA's DQA process to verify that the type, quality, and quantity of data collected are appropriate for their intended use. DQA methods and procedures are outlined in EPA's "Guidance for Data Quality Assessment, Practical Methods for Data Analysis" (EPA 2000b). The DQA process includes five steps: (1) review the PQOs and sampling design; (2) conduct a preliminary data review; (3) select a statistical test; (4) verify the assumptions of the statistical test; and (5) draw conclusions from the data.

ChaduxTt will systematically assess data quality and data usability when the five-step DQA process is not completely followed because the PQOs are qualitative. This assessment will include the following:

- A review of the sampling design and sampling methods to verify that these were implemented as planned and are adequate to support project objectives
- A review of project-specific data quality indicators for PARCC and quantitation limits to evaluate whether acceptance criteria have been met
- A review of project-specific PQOs to determine whether they have been achieved by the data collected
- An evaluation of any limitations associated with the decisions to be made based on the data collected.

The final report for the project will discuss any potential impacts of these reviews on data usability and will clearly define any limitations associated with the data.

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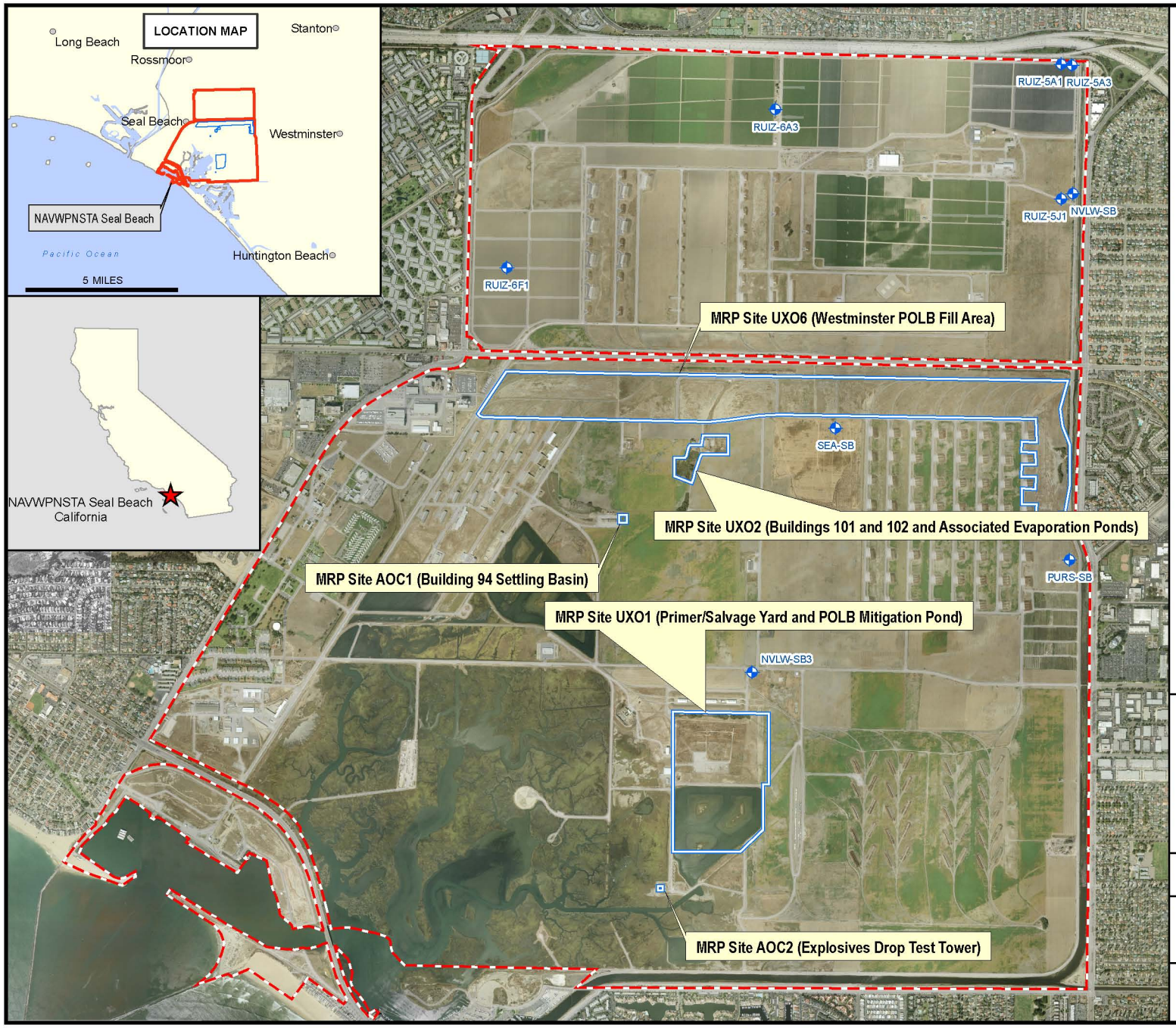
FIGURES



LEGEND

- Installation Area
- MRP Sites
- Roads
- Fences
- Agricultural Wells

NOTES:
MRP = MUNITIONS RESPONSE PROGRAM
POLB = PORT OF LONG BEACH

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 2,500 FEET

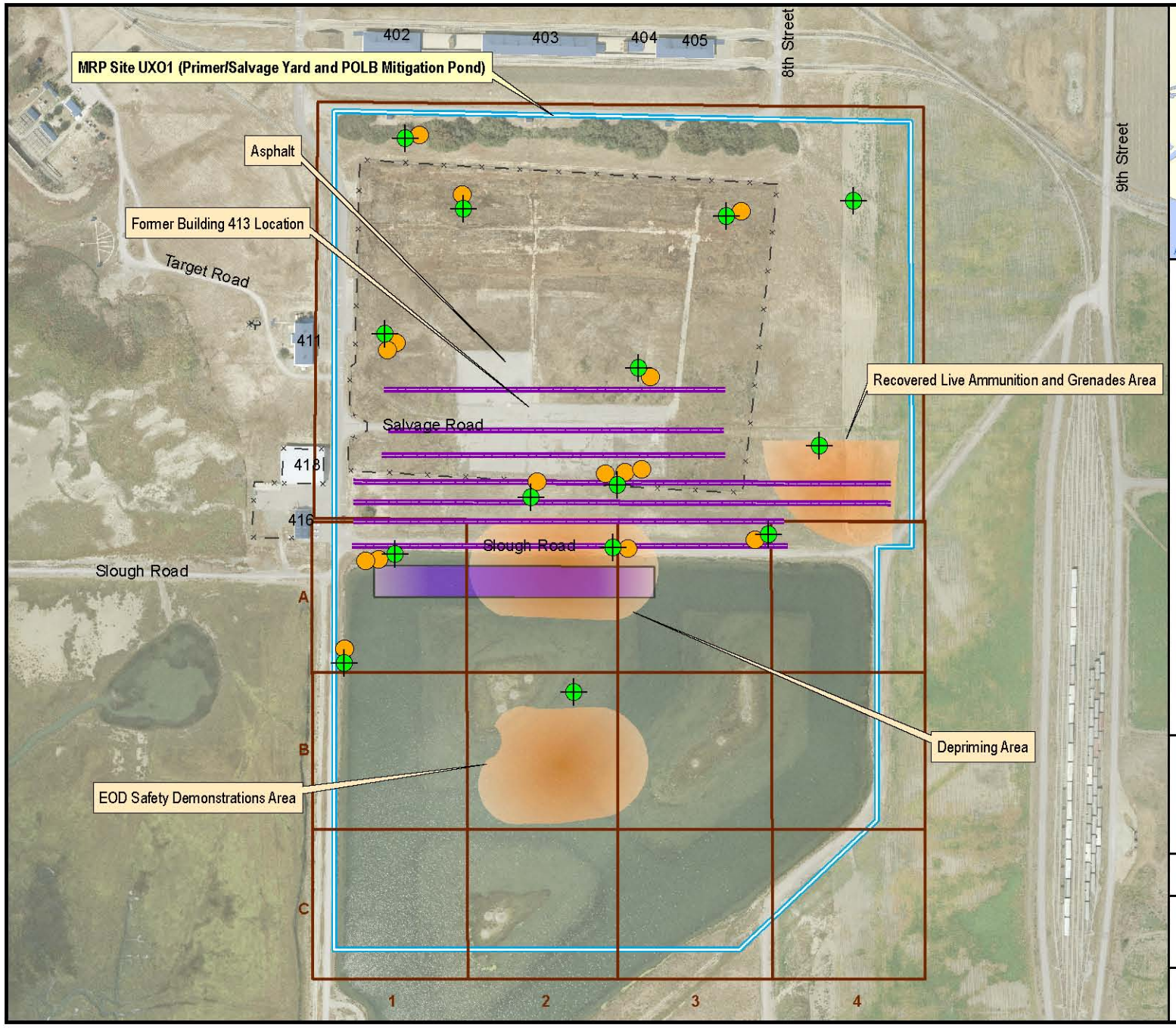
1 INCH = 2,500 FEET

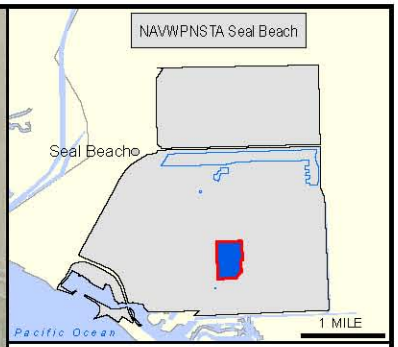
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 1
SITE LOCATION MAP

MAP PRODUCED BY TTEM, INC.
NOVEMBER 25, 2008
FILE: Figure1-Seal Beach All Sites.mxd

ChaduxTt JV
Consulting Engineers and Scientists





LEGEND

- MRP Site
- Buildings
- Roads
- Fences
- Proposed Geophysical Transect
- Proposed Geophysical Survey Area*
- Proposed Soil Sample Location
- Evidence of Munitions Use, Approx. (Malcolm Pirnie, 2008)
- Soil and Surface Water Sampling Grid

NOTES:
* SURVEY LINE SPACING APPROXIMATELY 5 FEET
MRP = MUNITIONS RESPONSE PROGRAM
POLB = PORT OF LONG BEACH

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 500 FEET

1 INCH = 450 FEET

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 2
MRP SITE UXO1
(PRIMER/SALVAGE YARD AND POLB MITIGATION POND)

MAP PRODUCED BY TTEM, INC.
NOVEMBER 25, 2008
FILE: Figure2-UXO1 Sample Locations.mxd

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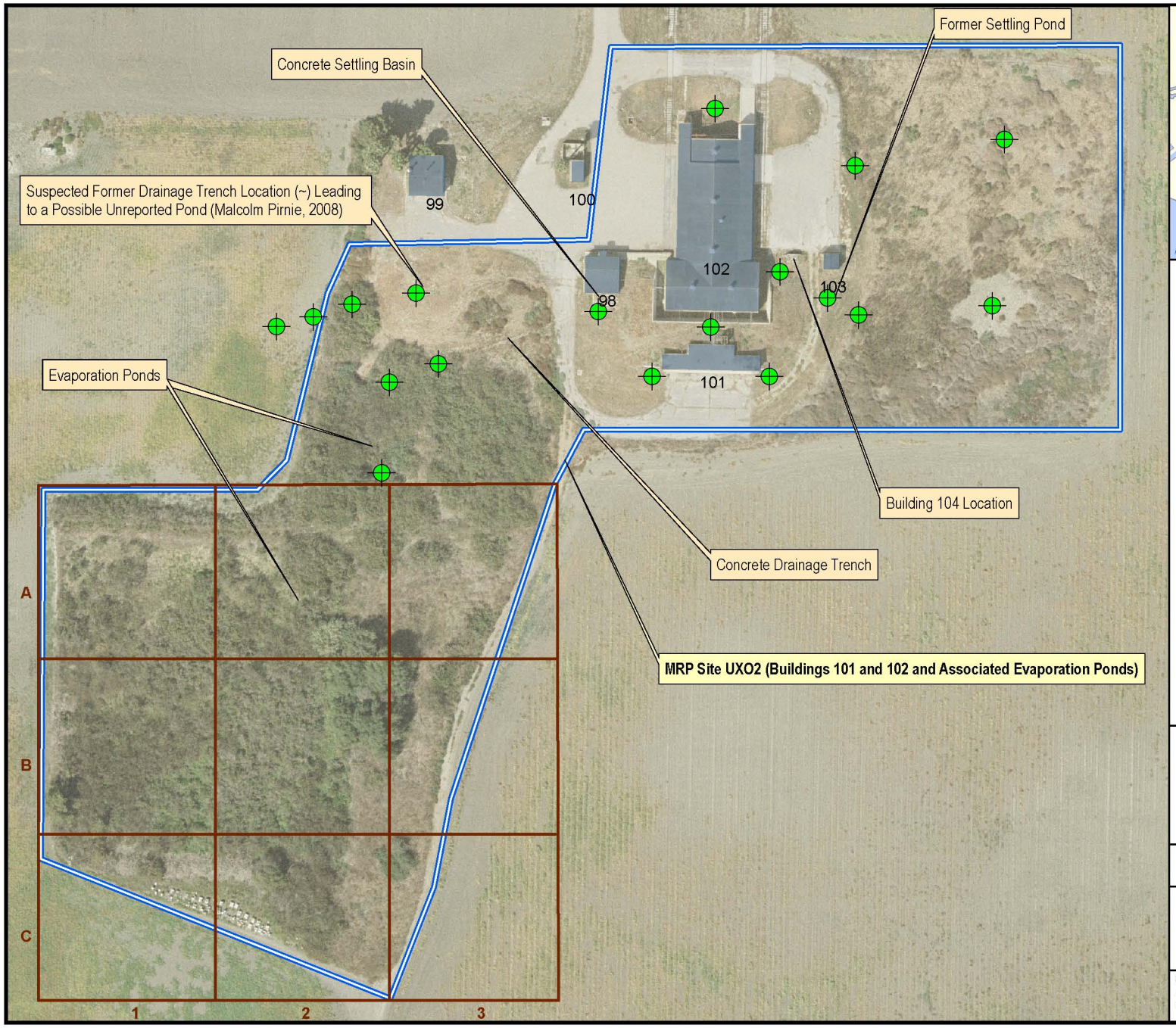

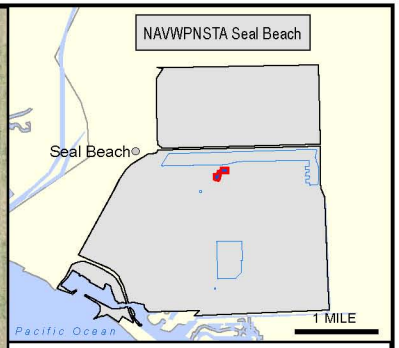

Legend

- MRP Site
- Buildings
- Roads
- Proposed Soil Sample Location (~)
- Soil Sampling Grid

NOTES:
* SURVEY LINE SPACING APPROXIMATELY 5 FEET
MRP = MUNITIONS RESPONSE PROGRAM
POLB = PORT OF LONG BEACH

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 150 Feet

1 INCH = 125 FEET

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 3
MRP SITE UXO2
(BUILDINGS 101 AND 102 AND ASSOCIATED EVAPORATION PONDS)

MAP PRODUCED BY TTEM, INC.
DECEMBER 1, 2008
FILE: Figure3-UXO2 Sample Locations.mxd

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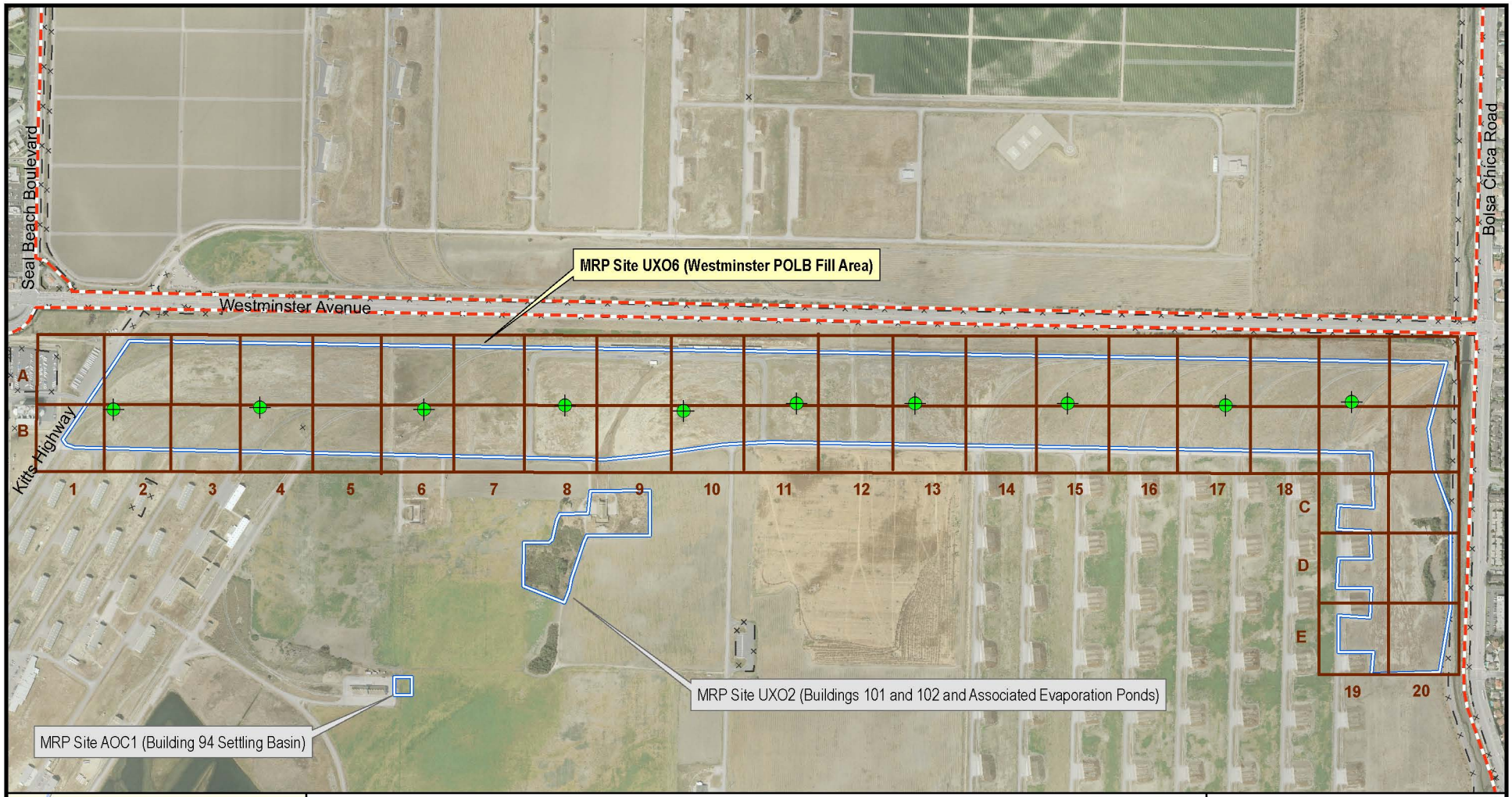
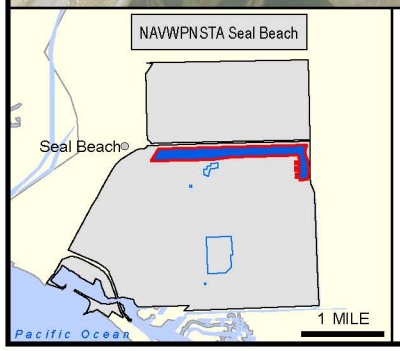
Consulting Engineers and Scientists





0 1,500 Feet

1 in = 1,100 feet

Legend

- Installation Area
- MRP Site
- Roads
- Fences
- Proposed Soil Sample Location (~)
- Soil Sampling Grid

NOTES:
MRP = MUNITIONS RESPONSE PROGRAM
POLB = PORT OF LONG BEACH

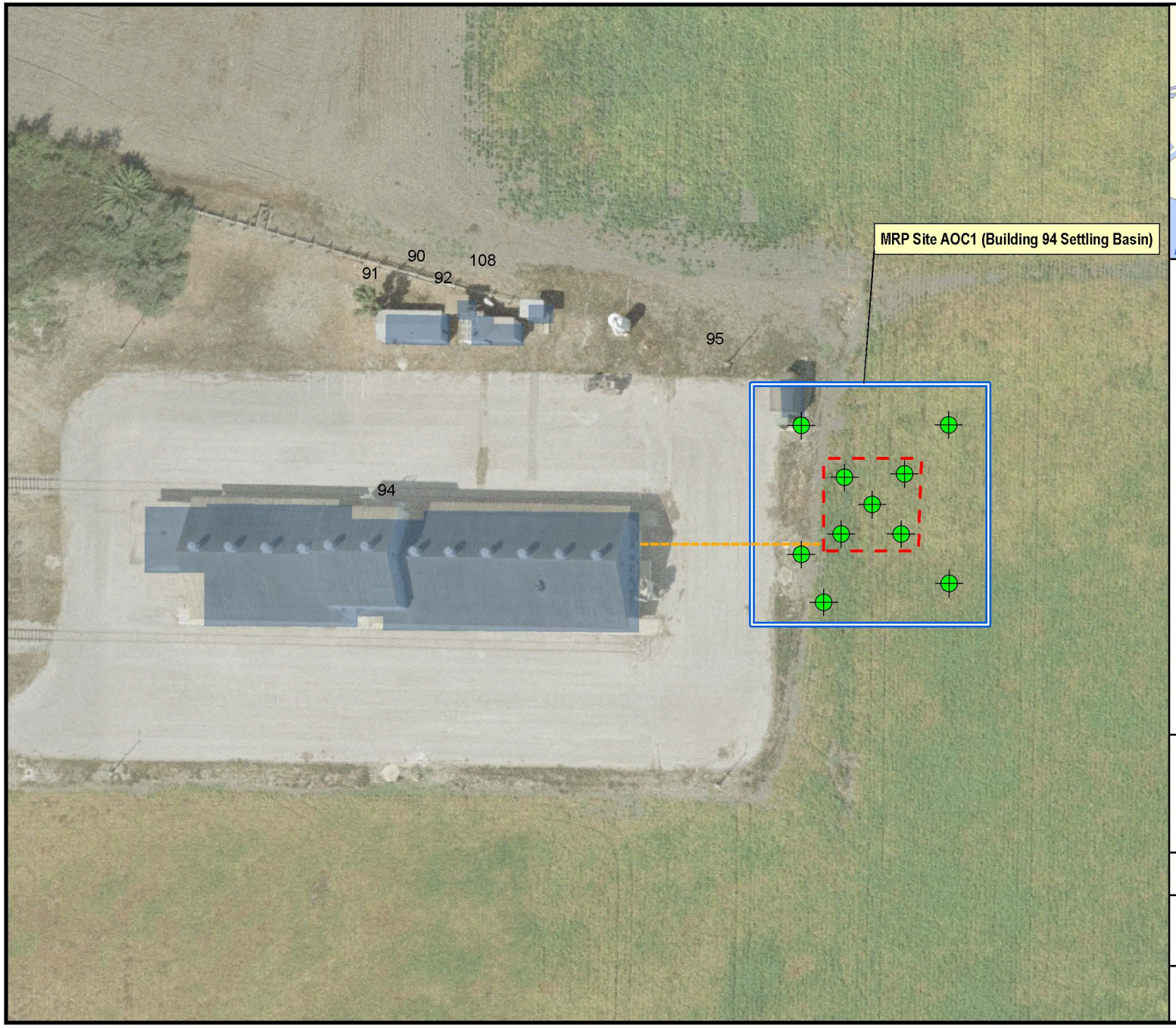
REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 4
MRP SITE UXO6
(WESTMINSTER POLB FILL AREA)

MAP PRODUCED BY TTEM, INC.
JANUARY 15, 2009
FILE: Figure4-UXO6 SampleLocations.mxd

ChaduxTt JV
Consulting Engineers and Scientists



Legend

- MRP Site
- Buildings
- Roads
- Proposed Soil Sample Location (~)
- Former Settling Basin Location (~) From 1947 Aerial Photo and 1944 Engineering Diagram
- Former Drain Pipe Location (~) From 1944 Engineering Diagram

NOTES:
MRP = MUNITIONS RESPONSE PROGRAM

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 100 Feet

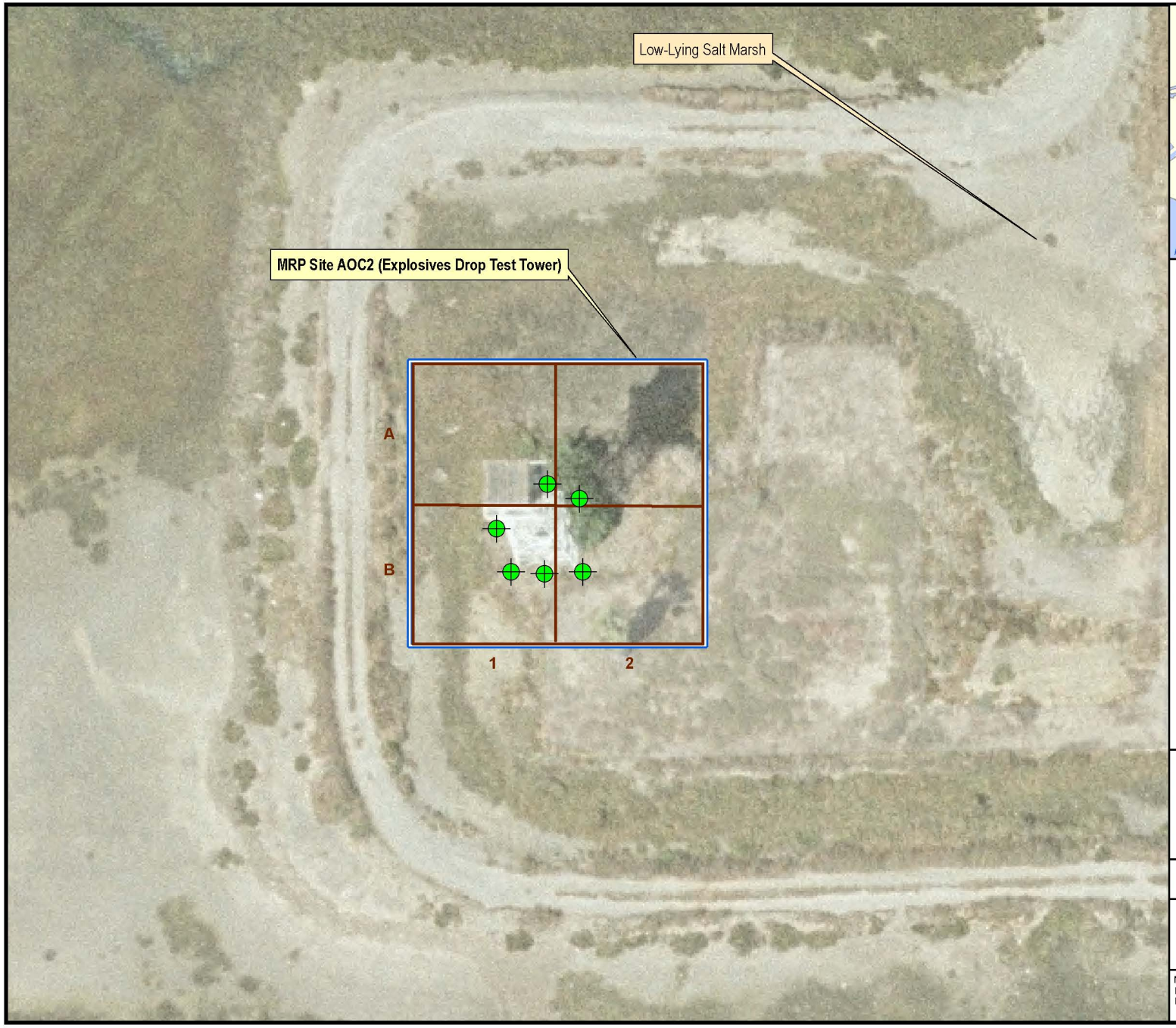
1 INCH = 80 FEET

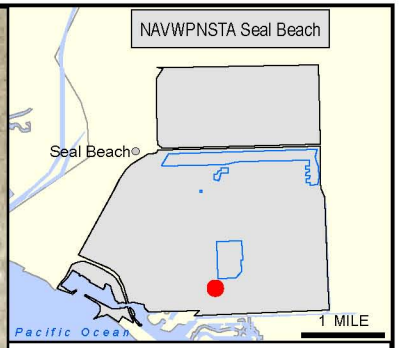
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 5
MRP SITE AOC1
(BUILDING 94 SETTLING BASIN)

MAP PRODUCED BY TTEM, INC.
DECEMBER 1, 2008
FILE: Figure5-AOC1 Sample Locations.mxd

ChaduxTt JV
Consulting Engineers and Scientists





Legend

- MRP Site
- Buildings
- Roads
- Proposed Soil Sample Location (~)
- Soil Sampling Grid

NOTES:
MRP = MUNITIONS RESPONSE PROGRAM

REFERENCE: INSTALLATION DATA PROVIDED BY NAVFAC SOUTHWEST. AERIAL PHOTOGRAPHY DATED SEPTEMBER 23, 2005.

N

0 40 Feet

1 INCH = 40 FEET

NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FIGURE 6
MRP SITE AOC2
(EXPLOSIVES DROP TEST TOWER)

MAP PRODUCED BY TTEM, INC.
DECEMBER 1, 2008
FILE: Figure6-AOC2 Sample Locations.mxd

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APPENDIX A
FIELD FORMS

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Consulting Engineers and Scientists

DESTINATION: _____

CHAIN-OF-CUSTODY #:_____ DATE: _____ PAGE _____ OF _____

Project Name:	**Project Charge No.:**
Sampler(s): Printed name and signature	**Technical Contact:**

Sample ID	**Date of Collection**	**Time of Collection**	**Sample Medium**	**No. and Type of Containers**	**Preservatives**	**Analysis Required**

	SIGNATURE	**NAME (print)**	**COMPANY**	**DATE**	**TIME**
Relinquished by:					
Received by:					
Relinquished by:					
Received by:					
Relinquished by:					
Received by:					

REMARKS: (Note: Identify samples for which extra volume was collected for MS/MSD and record air bill number and any other pertinent information.)		TURNAROUND TIME
AIRBILL NO:	**PO#**	

Instructions: Under "Analysis Required" and "Field Sample Preparation", enter only one of the following two codes for each analysis requested and each sample listed:
U = UNPRESERVED SAMPLE; P = PRESERVED; F= FILTERED; B= FILTERED AND PRESERVED

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Consulting Engineers and Scientists

DAILY SITE LOG

Site Name:_____ Date: _____

Name (print)	Company	Time	
		In	Out

Comments:

_____

_____

_____

_____

Daily Quality Control Report

ChaduxTt JV
Consulting Engineers and Scientists

Project Name:	Seal Beach MRP SI	**Date:**	
Project Number:	103DG9024043	**Day:**	
Weather:		**Wind:**	
Temperature:		**Humidity:**	

Personnel On Site:

Field Team Leader:

Subcontractors on Site:

Equipment on Site:

Work Performed (including sampling):

Quality Control Activities:

Health and Safety Levels and Activities:

Problems Encountered / Corrective Action Taken:

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Consulting Engineers and Scientists

Daily Quality Control Report

Deviations from Field Work Plan:

Additional Notes:

Anticipated Activities for Tomorrow:

Distribution:	**Submitted By:**
	Signature **Date**

Corrective Action Request Form

(Page 1 of 2)

Project Name: NAVWPNSTA Seal Beach MRP SI **Date:** _____

Project No.: 103DG9024043 **Project Manager:** _____

Location: _____

To (Project Manager): _____

From (Audit Team Members): _____

Description of Problem:

_____

_____

_____

_____

Corrective Action Required:

_____

_____

_____

_____

The above corrective action must be completed by (Date): _____

Acknowledgement of Receipt

_____

(Signature and Date)

Corrective Action Request Form

Corrective Action Taken:

_____

_____

_____

_____

Project Manager: _____

(Signature and Date)

Audit Team Members:

Corrective Action *is* / *is not* satisfactory

_____

(Date and Initial)

Remarks: _____

_____

_____

_____

_____

QC Coordinators:

Corrective Action *is* / *is not* satisfactory

_____

(Date and Initial)

Remarks: _____

_____

_____

_____

_____

cc: **Program QA Manager**

Audit Report

Project Name: NAVWPNSTA Seal Beach MRP SI **Date of Audit:** _____

Project No.: 103DG9024043 **Project Manager:** _____

Audit Team Members: _____

Brief Description of Project:

_____

_____

Audit Summary:

_____

_____

Corrective Action Required:

_____

_____

Quality Improvement Opportunities:

_____

_____

Remarks:

_____

_____

Auditor Signature: _____ **Date:** _____

cc: **ChaduxTt Program QA Manager**