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Final - Addendum



**PHASE II REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
DEPARTMENT OF DEFENSE OPERABLE UNIT**

**FORT SHERIDAN
Delivery Order 0002
Contract Number DACA31-94-D-0066**

TECHNICAL PLAN ADDENDUM

Prepared for:

DMIC QUALITY INSPECTED 2

**U.S. Army Environmental Center
Base Closure Division
Aberdeen Proving Ground, Maryland 21010-5401**

Prepared by:

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SAIC Project No. 01-0827-07-3652-015

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LIST OF ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-containing Material
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
ATTIC	Alternative Treatment Technology Information Center
AWQC	Ambient Water Quality Criteria
BBS	Bulletin Board System
BCF	Bioconcentration Factor
BCT	BRAC Cleanup Team
BERA	Baseline Ecological Risk Assessment
BLS	Below Land Surface
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CCV	Continuing Calibration Verification
CDC	Centers for Disease Control
CEC	Cation Exchange Capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
COC	Chemical of Concern
COD	Chemical Oxygen Demand
COPC	Chemical of Potential Concern
CPF	Carcinogen Potency Factor
CRF	Central Records Facility
CSA	Coal Storage Area
CSF	Cancer Slope Factor
CTE	Central Tendency Exposure
CWA	Clean Water Act
DA	Department of the Army
DCL	DataChem Laboratories
DCN	Document Control Number
DO	Decision Document
DOD	U.S. Department of Defense
DMP	Data Management Plan

LIST OF ACRONYMS AND ABBREVIATIONS
(continued)

DPDO	Defense Property Disposal Office
DQO	Data Quality Objective
DRMO	Defense Reutilization Marketing Office
ecoCOC	Ecological Chemical of Concern
ecoCOPC	Ecological Chemical of Potential Concern
EE/CA	Engineering Evaluation/Cost Analyses
ELCR	Excess Lifetime Cancer Risk
EM	Electromagnetic
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
ERA	Ecological Risk Assessment
ESE	Environmental Science & Engineering, Inc.
ETC	Earth Technology Corporation
FID	Flame Ionization Detector
FR	Federal Register
FS	Feasibility Study
GC/MS	Gas Chromatography/Mass Spectrometry
GFD	Geotechnical Field Drilling
GGS	Geotechnical Groundwater Stabilized
gpm	Gallons per Minute
GPS	Global Positioning System
GWC	Geotechnical Well Construction
HA	Health Advisory
HASP	Health and Safety Plan
HEAST	Hazard Evaluation Assessment Summary Tables
HI	Hazard Index
HQ	Hazard Quotient
HSO	Health and Safety Officer
ICAP	Inductively Coupled Argon Plasma
ICV	Initial Calibration Verification
ID	Inside Diameter

LIST OF ACRONYMS AND ABBREVIATIONS
(continued)

IDW	Investigation-derived Waste
IEPA	Illinois Environmental Protection Agency
IRCC	Installation Restoration Control Chart
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
LOAEL	Lowest-Observable-Adverse-Effect Level
MCL	Maximum Contaminant Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
msl	Mean Sea Level
NAD	North American Datum
NCO	Non-Commissioned Officer
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NIST	National Institute of Standards and Technology
NOAEL	No-Observable-Adverse-Effect Level
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	National Research Council
NSSD	North Shore Sanitary District
NTAM	Non-USAEC Method
O&M	Operation and Maintenance
OD	Outside Diameter
ODW	Office of Drinking Water
OQAPP	Overall Quality Assurance Project Plan
ORD	Office of Research and Development
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
OVA	Organic Vapor Analyzer
OWS	Oil/Water Separator

LIST OF ACRONYMS AND ABBREVIATIONS
(continued)

PAH	Polycyclic Aromatic Hydrocarbon
PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
PC	Personal Computer
PCB	Polychlorinated Biphenyl
PMP	Project Management Plan
ppm	Parts per Million
PRG	Preliminary Remediation Goal
PRI	Potomac Research, Inc.
PVC	Polyvinyl Chloride
PWC	Public Works Center
QA	Quality Assurance
QAO	Quality Assurance Objective
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RA	Risk Assessment
RACER	Remedial Action Cost Engineering and Requirements
RAGS	Risk Assessment Guidance for Superfund
RCP	Reinforced Concrete Pipe
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RGO	Remediation Goal Option
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
ROD/DD	Record of Decision/Decision Document
ROM	Rough Order of Magnitude
RPD	Relative Percent Difference
RREL	Risk Reduction Engineering Laboratory
RSD	Relative Standard Deviation
SAIC	Science Applications International Corporation

LIST OF ACRONYMS AND ABBREVIATIONS
(continued)

SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SCS	Soil Conservation Service
SDWA	Safe Drinking Water Act
SOP	Standard Operating Procedure
SOW	Statement of Work
STP	Sewage Treatment Plant
STS	Sample Tracking System
SVOC	Semivolatile Organic Compound
T&E	Threatened and Endangered
TACO	Tiered Approach to Cleanup Objectives
TAL	Target Analyte List
TBC	To Be Considered
TBD	To Be Determined
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TSCA	Toxic Substances Control Act
UCL	Upper Confidence Limit
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USDA	U.S. Department of Agriculture
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VES	Vehicle and Equipment Storage
VISITT	Vendor Information System for Innovative Treatment Technologies
VOC	Volatile Organic Compound

**Table 1-1. Additional Study Areas to be Investigated Under DOD OU RI/FS Program
Fort Sheridan, Illinois**

Building 378 Acid Pit
Building 379
Former Ammunition Storage Buildings 384, 389/390
Former CAC Firing Point Magazines
Lake Michigan
Building 564/565 Fill Area
Wells Ravine Storm Sewer
Shenck Ravine Fill Area
Regional Sand Aquifer

2.6 STUDY AREA DESCRIPTIONS

The additional study areas to be investigated under the Fort Sheridan DOD OU RI/Feasibility Study (FS) are described in the following sections. The locations of the study areas are shown in Figure 2-1. The study area descriptions summarize the known history and principal findings at each study area from previous investigations. The primary sources of historical information include the *Final Archives Search Report* (ACE 1996), aerial photographs, discussions with project personnel, and review of historical maps and data obtained from Fort Sheridan.

2.6.20 *Building 378 Acid Pit*

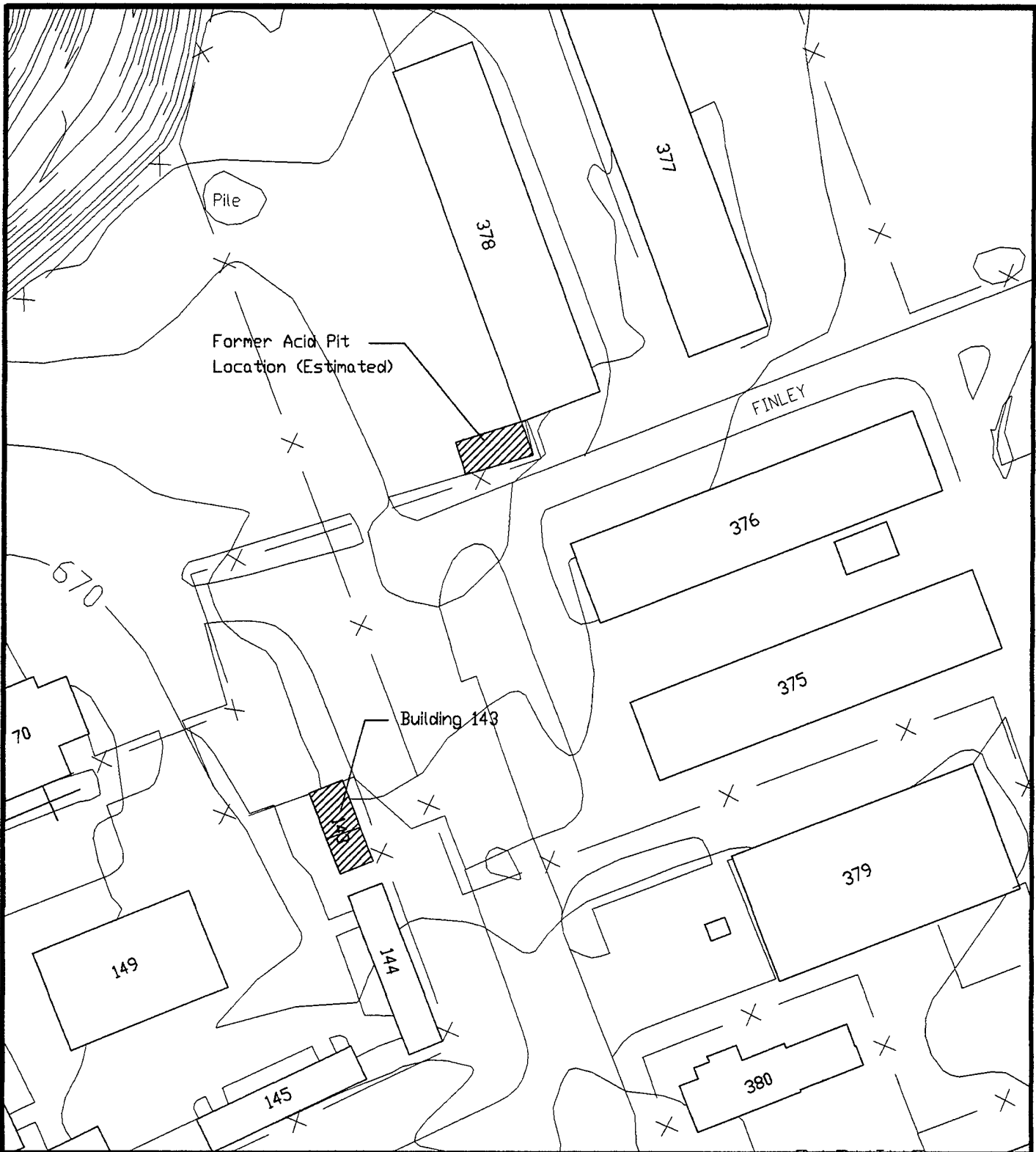
The Preliminary Site Assessment Report (Argonne 1989) identified that a limestone-lined sump located adjacent to Building 378 (former DEH maintenance shop) was used for the disposal of acid wastes generated from maintenance activities. The precise location of the sump is not shown on site drawings and the area surrounding Building 378 is covered by concrete or asphalt except for a grassed area the width of the building at its southern end. A possible location for the sump adjacent to the southwestern corner of Building 378 has been identified based on the presence of an approximately 25 by 50 foot bermed concrete pad (Figure 2-19). Prior to the bermed area being filled with concrete, its last known use was as a sump for washing vehicles (P. Day, written communication 1997). The acid pit area was not investigated during the Phase I RI.

2.6.21 *Building 143*

Building 143 (Figure 2-19) is an approximately 18 by 45 foot corrugated metal storage building located adjacent to Building 124 (former POL station [removed]) and Buildings 144 (storage), 145 (storage), and 149 (lumber storage). The building is marked with hazardous materials placards and is in a general state of disrepair with collapsing siding. The building was included for investigation based on its history as a storage area and the observed hazardous materials placards.

2.6.22 *Former Ammunition Storage Buildings 384, 388, 389, 390, CAC Firing Point*

Several buildings located on the DOD OU formerly were used for the storage of small arms and small caliber ammunition prior to the 1960's (Earth Technology Corporation 1994). Adjoining



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**FORMER ACID PIT BUILDING 378 & FORMER
 CHEMICAL STORAGE BUILDING 143
 FORT SHERIDAN, ILLINOIS**

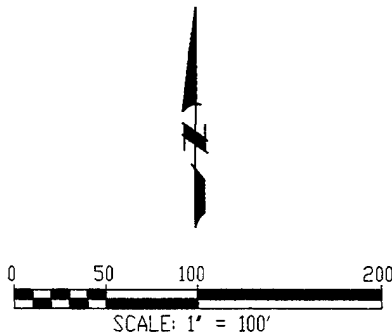
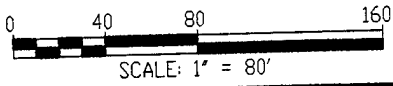
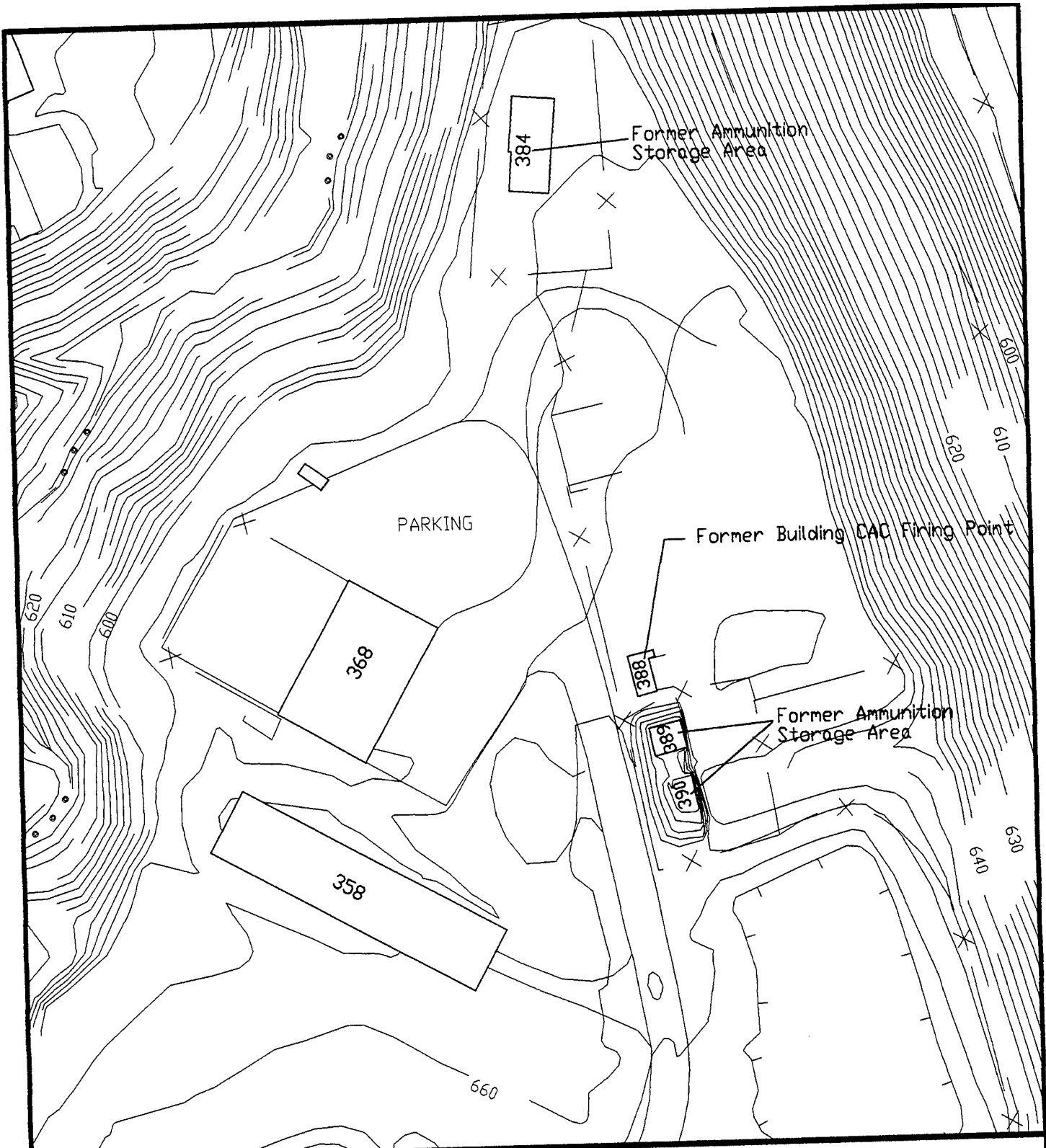


Figure:	Project:	File Name:	Date:
2-19	01-0827-07-3652-015	/DWGS/BLDG143	06-12-97

Buildings 389 and 390 are earthen-covered, cement and cinder block constructed structures located east of Building 368 adjacent to Van Horne Ravine. Building 388 is north of Buildings 389 and 390 and is of concrete construction. The *Final Archives Search Report for Fort Sheridan* (ACE 1996) indicates that temporary ammunition storage buildings were constructed on the bluff near the former Coastal Artillery Corps (CAC) firing point ("B" in ACE 1996 and Building 388 on Post maps) as part of the Armour Research test firing operations. Access to Building 384 is gained through each of five steel doors which open into isolated chambers that are joined at the rear of the building by a maintenance corridor. An oil burning furnace is vented by a brick stack located at the rear northwestern corner of the structures and each room has air vents to the outside. A concrete apron is present in the front of the building along the access corridor and extends approximately 15 feet from the building.

Two underground ammunition storage magazines (Buildings 389 and 390) located adjacent to the former CAC firing point east of Building 368 were constructed in the late 1950's to early 1960's according to aerial photographs of Fort Sheridan taken in 1952 and 1962. Proposals for construction of the additional ammunition storage date back to 1951. Training from the CAC firing point (Building 388) dates to the 1930's (pre-dating the underground storage bunkers) and utilized 3 inch, 37mm, 40mm, 90mm, and 120mm guns. The firing points on the DOD OU were located along the top of the bluff. Concrete structures were constructed along the top of the bluff between 1952 and 1962 and are still present on the former firing point. The types of ammunition stored on Fort Sheridan at the time the bunkers were proposed included fused HE M73 shells, 75mm ammunition, TNT, nitrostarch, hand and rifle grenades, smoke grenades, rockets, and small arms. A precise inventory of ordnance stored in the underground magazines was not identified in the 1996 archive search. The magazines apparently were constructed during a time when anti-aircraft guns were being phased out (mid-1950's) in favor of guided missiles (ACE 1996). The former ammunition storage buildings and magazines (Figure 2-20) were not investigated during the Phase I RI.



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**FORMER AMMUNITION STORAGE BUILDINGS
FORT SHERIDAN, ILLINOIS**

Figure:	Project:	File Name:	Date:
2-20	01-0827-07-3652-015	/DWGS/STORAGE	06-12-97

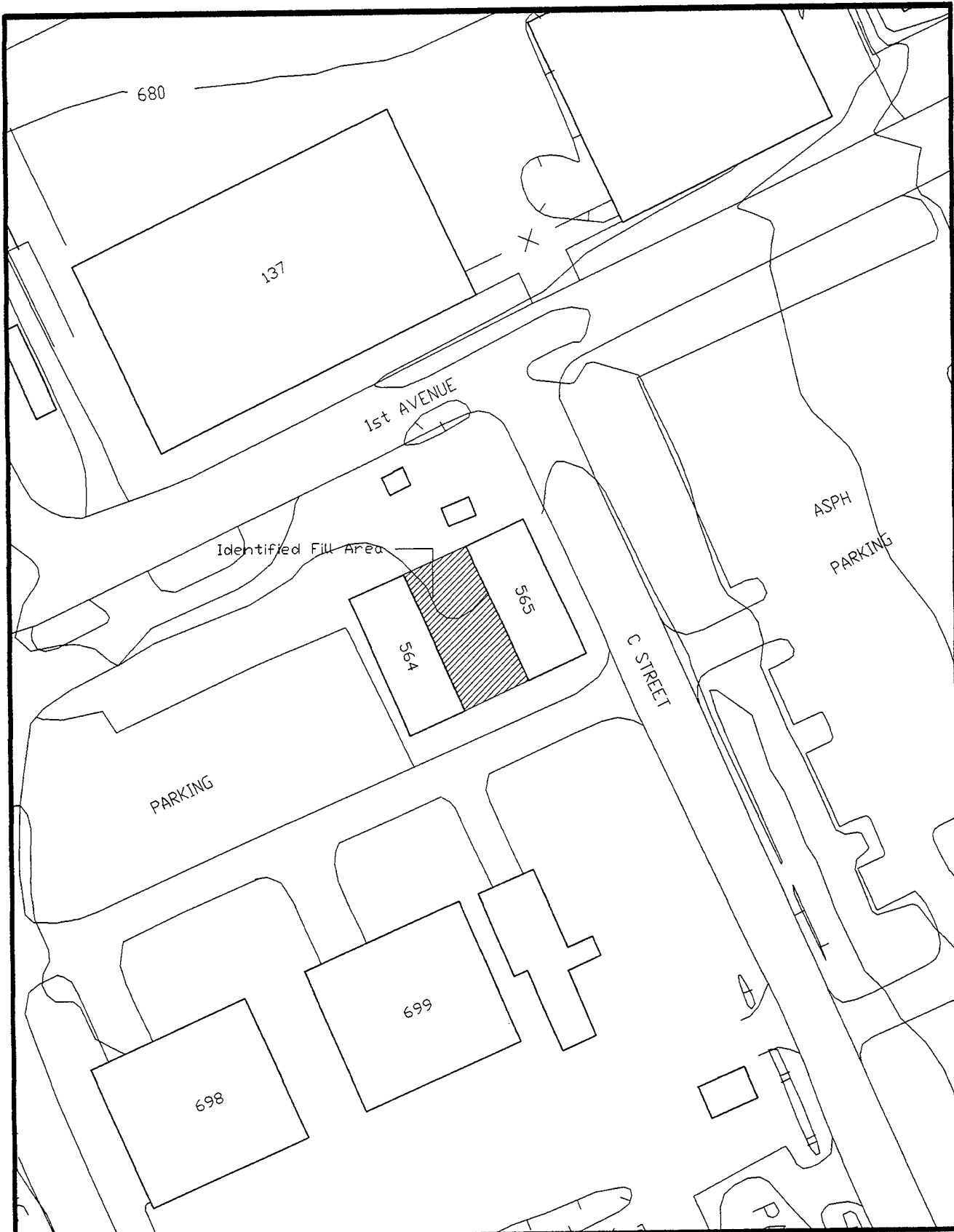
2.6.23 Lake Michigan

Fort Sheridan is bounded to the east by the western shore of Lake Michigan, which provided potable water to the Post during its period of operation and provides water for fire protection and general usage. Water treatment facilities on the Post have been discontinued. Because discharges from Fort Sheridan and points west of Fort Sheridan drain toward Lake Michigan through storm sewer discharges, open ravine discharges, and surface runoff, the lake is a potential receptor for chemical discharges from the Post and surrounding area. The eastern portion of Fort Sheridan from the base of the bluff is bounded by sandy lake shore of variable width and is dependent on the effects of storm surges and prevailing wind directions. The shoreline is characterized by high (up to 80 feet) steep-faced bluffs exposing glacial deposits consisting predominantly of till. The lake shore has been engineered with protective groins to reduce the erosive impact of longshore drift, which degrades the available beach area. The lake elevation is approximately 580 feet above mean sea level. Limited sampling has been conducted in Lake Michigan during Phase II investigations of the Surplus OU; however, lake sampling was not conducted during the Phase I RI of the DOD OU.

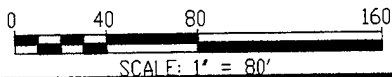
2.6.24 Building 564/565 Fill Area

Building 564 (former thrift shop) and Building 565 (former AAFES Service) are located near the western boundary of Fort Sheridan south of Building 137 (Figure 2-21). A former Post service station (Building 125) was located northwest of Building 565 and was demolished in 1993 when the associated USTs were removed. Buildings 564 and 565 were not observed on the 1925 map of Fort Sheridan (ACE 1996), but are located on a 1946 water utility map of the Post and are visible on 1952 (and subsequent) aerial photographs of the Post. The building area appears to have been filled in the early 1900's and may have been used as a wagon staging area (complete with wash rack) as documented on maps from 1900 to 1925 (ACE 1996). The site area has shown little additional disturbance between the 1952 photography and the present.

Exploratory trenches in the area between Buildings 564 and 565 was conducted by Fort Sheridan in 1997 (P. Day, written communication 1997) to assess the extent of hydrocarbon contamination that was observed during routine utility work associated with Building 564. Soil fill



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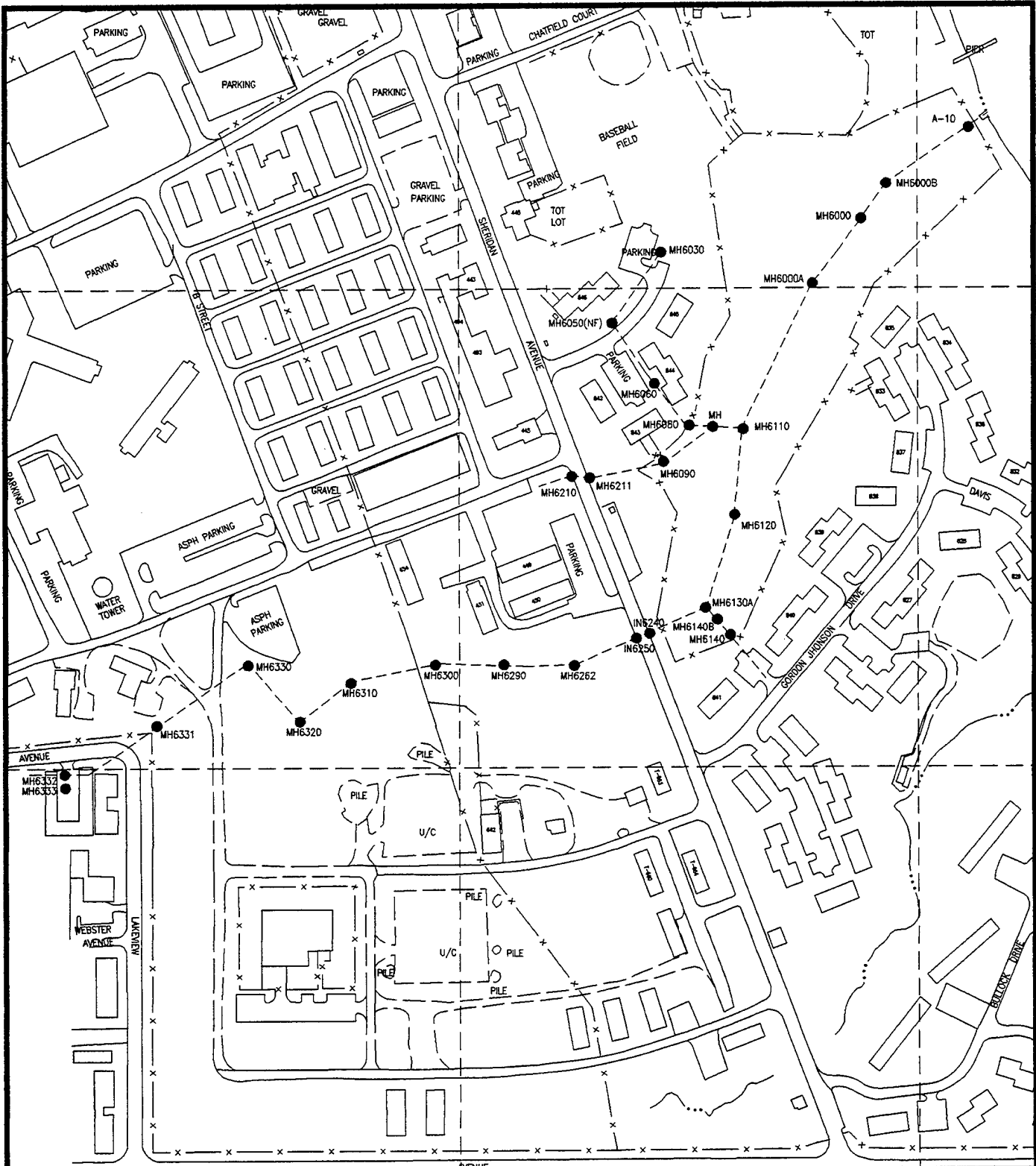
**BUILDING 564 FILL AREA
 FORT SHERIDAN, ILLINOIS**

Figure	Project	File Name	Date
2-21	01-0827-07-3652-015	/DWGS/BLDG564A	06-12-97

including a 2- to 3-foot thick layer of ash, was excavated on the west side of Building 564 and had a strong fuel odor. The fill contained bricks, bottles, horseshoes, a shovel, a urinal, and other debris (P. Day, written communication 1997). Additional trenching between the buildings identified clay fill to 3 feet below land surface (BLS) overlying saturated gray ash, slag, burnt wood, bottles, and broken glass to a depth of 5 feet. A slight oil sheen was observed on water collected in test pits between the buildings without the odor of petroleum.

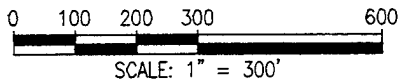
2.6.25 Wells Ravine Storm Sewer

Prior to the filling of Wells Ravine, a 42-inch diameter reinforced concrete pipe (RCP) storm sewer was installed along the ravine alignment (Figure 2-22). The storm sewer collects discharges from the city of Highwood located west of Fort Sheridan and from locations along the alignment of Wells Ravine on Fort Sheridan and directs them to an outfall at Lake Michigan. The storm sewer is beneath approximately 10 feet of municipal landfill waste on the west end of the alignment and is beneath more than 50 feet of municipal landfill waste at the eastern end of the landfill. The storm sewer segment underlying waste materials in former Landfills 6 and 7 extends from approximately manhole #6330 to the outfall at Lake Michigan for a total of approximately 2,320 linear feet. The storm sewer accepts influx discharges from four lateral extensions into manhole #6330 ranging in diameter from 12- to 30-inches and draining areas of the U.S. Army Reserve property on the southwestern portion of the Post. Manhole #6320 on the storm sewer alignment accepts surface runoff from the area near the intersection of 10th and H Streets on the Army Reserve property on the southwestern corner of the Post. The general storm sewer drainage map of Fort Sheridan (1981) shows three 12- to 18-inch diameter laterals intersecting the storm sewer alignment approximately where the alignment crosses Patten Road. Additional laterals (18-inch diameter) connect at manholes #6130 and #6110 (10- to 12-inch diameter) and drain housing areas north and south of the storm sewer alignment. Breaches in the storm sewer near manhole #6130 have been cited (ESE 1996) as a possible reason for lowered groundwater elevations in the southwestern portion of former Landfill #7.



LEGEND:

- Manhole Location
- - - - - 42" RCP Storm Sewer Alignment



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**WELLS RAVINE STORM SEWER ALIGNMENT
FORT SHERIDAN, ILLINOIS**

Figure No.	Project No.	File Name	Date
2-22	01-0827-07-3652-015	\\DWGS\STORMDRN	02-12-97

2.6.26 Shenck Ravine Fill Area

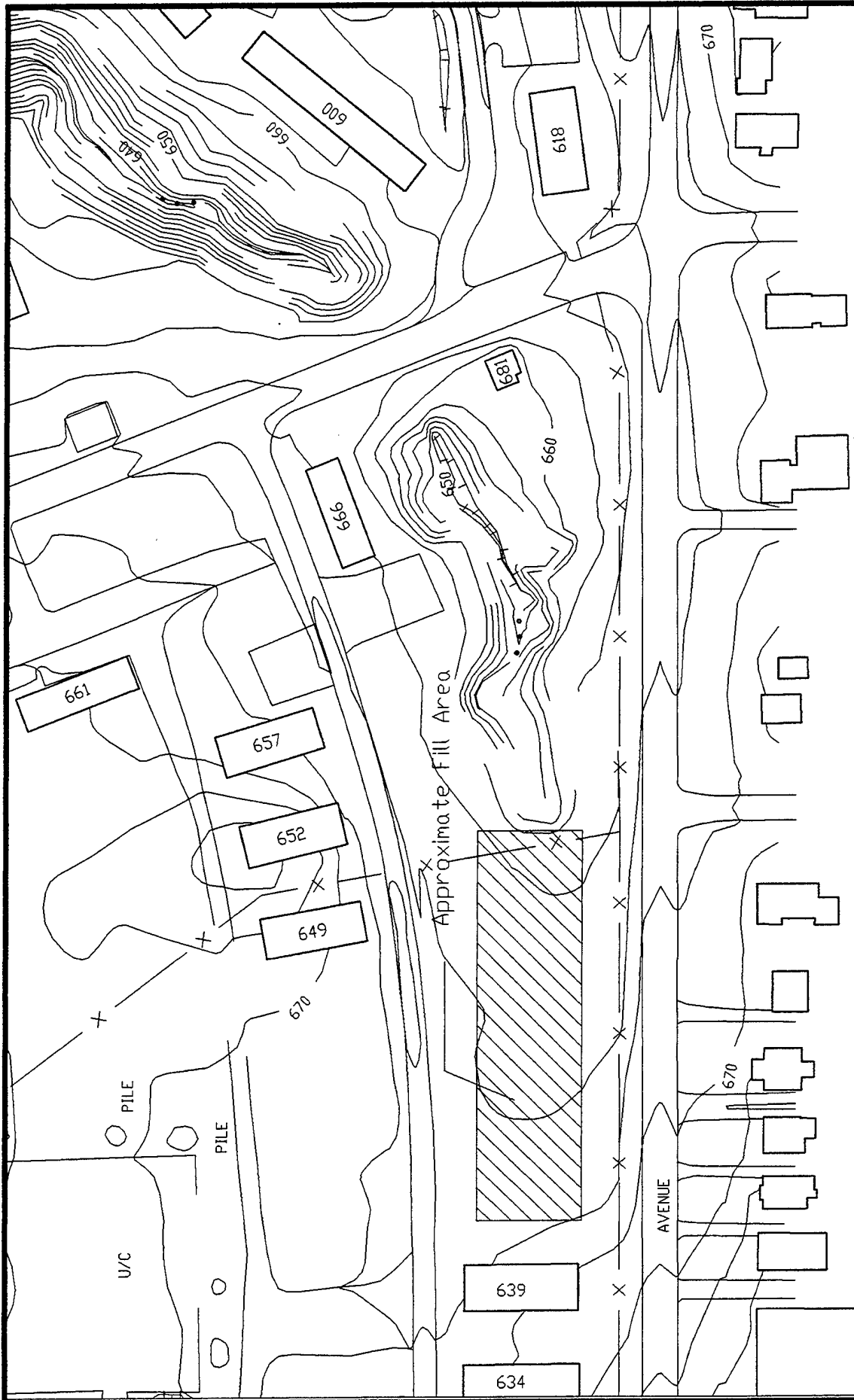
Shenck Ravine is the southernmost ravine occurring on Fort Sheridan. The ravine formerly extended approximately 600 feet west of Patten Road with map indications that portions adjacent to Patten Road were filled (see 1946 water distribution map [H-6], ACE 1996). Historical maps of Fort Sheridan (ACE 1996) indicate that Shenck Ravine extended across Patten Road up to 1946. Reservation maps from 1967 and 1976 (ACE 1996) do not show the ravine extending west of Patten Road. Historical maps for the period between 1946 and 1967 are not available for the Post. The U.S. Geological Survey map of Highland Park (1963, with photo revisions in 1972 and 1978) shows a topographic swale extending across Patten Road. Aerial photography interpreted by EPA (1990) shows Shenck Ravine extending across Patten Road in photographs taken in 1952, 1962, 1972, and 1976. The conflicting map and aerial photography information indicate that the ravine extension west of Patten Road was filled sometime after World War II and prior to 1967. Recent aerial mapping of Fort Sheridan (SAIC 1996) shows that a 90-foot area of the ravine is filled in the vicinity of Patten Road (including approximately 45 feet west of Patten Road). A portion of unfilled ravine extends to approximately 420 feet west of Patten Road and terminates near the fence separating the Army Reserve property from the Navy property. The former ravine is filled to the west of the property boundary fence up to Building 639 (Figure 2-23). Construction debris has been observed at the ground surface in the area of the filled ravine. The western extension of Shenck Ravine was not investigated previously during the Phase I RI.

2.6.27 Regional Sand Aquifer

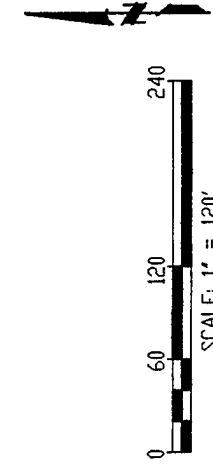
Previous drilling (boring SB-LF7-06D) during the Phase II RI east of Landfill #7 encountered a sand and gravel deposit east of the landfill at an elevation of approximately 528 feet msl. The boring penetrated sand between elevation 528 and 494 feet msl and was completed in sand at the limit of the drilling equipment. The thickness (> 34 feet) of the encountered sand and the potential for groundwater production indicates that the layer represents a Class I aquifer. The Illinois Geological Survey (Larson 1973) has mapped a subsurface sand/gravel deposit at the approximate elevation of the layer encountered at Fort Sheridan, indicating that the sand is laterally extensive. The width of the sand deposit and the continuity between the widely spaced (miles) ISGS reference borings is not confirmed.

2.6.28 Building 379

Building 379 is the electronic equipment repair shop, consisting of a single-story structure containing machine shops, repair shops, a spray painting area, a sanding area, an electric kiln, and office space. The building area has not been investigated previously during the Phase I study of the DOD OU. The previous building operations history and waste handling protocols are not known. Current procedure is to relocate spent solvents to Safety-Kleen waste containers at the vehicle maintenance shop. The building is surrounded by grassed and asphalt paved areas.



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SHENCK RAVINE FILL
 FORT SHERIDAN, ILLINOIS

Figure	2-23	Project	01-0827-07-3652-015	File Name	/DWGS/SHENCKRV	Date	02-11-97
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6. STUDY AREA-SPECIFIC RI FIELD ACTIVITIES

Information regarding sample locations, media to be sampled, and analyses to be conducted for the supplemental Phase II Remedial Investigation (RI) at the U.S. Department of Defense (DOD) Operable Unit (OU) at Fort Sheridan is provided in the following sections. The following sections summarize the supplemental Phase II RI tasks and describe the study area-specific sampling programs. Table 6-1 summarizes sample matrices and their associated analytes for each of the study areas. Additional study area-specific investigative activities are presented in the following sections.

6.21 BUILDING 378 ACID PIT

The Phase II RI activities in the vicinity of the suspected sump area will consist of a hand auger boring into a manhole within the inferred pad area, and three soil borings adjacent to the manhole both within the bermed area and outside the bermed area. The soil boring within the bermed area will be extended to 30 feet to investigate for the presence of a concrete vault structure. Because the pit reportedly was filled with limestone or other materials, there will be no attempt to excavate the sump materials should they be located beneath the slab. Two soil samples will be obtained from the inferred acid pit area for the analysis of VOCs, SVOCs, and metals. The locations of all proposed sampling points at the potential sump area are shown in Figure 6-21.

6.22 BUILDING 143

Phase II RI sampling at Building 143 will consist of collecting and compositing surface (0- to 1-foot) and subsurface (2- to 3-foot) soil samples near two points of ingress/egress from the east and west sides of the building for analysis of VOCs, SVOCs, metals, pesticides/PCBs, and herbicides. The samples will be composited by depth on each side of the building and four samples (one from each side of the building for each sampled depth) will be submitted for analysis. The representative VOC fraction will be submitted from each side of the building and from each depth and will not be composited. The locations of the sampling points for compositing are shown in Figure 6-21.

**Table 6-1a. Summary of Additional Soil Samples and Analyses on the DOD OU
Fort Sheridan, Illinois**

SAMPLES			SOIL ANALYSES									
Study Area	Site Type	Site ID	TOC	CEC	VOC	SVOC	Metals	PEST/P CBs	EXP	Wet Density	pH	IDW TCLP
378	BORE	SB-378-01	X		X	X	X	X			X	X
378	BORE	SB-ACID-01	X		X	X	X	X			X	
378	BORE	SB-ACID-02	X		X	X	X	X			X	
378	BORE	SB-ACID-03	X		X	X	X	X			X	
379	BORE	SB-379-01-01	X		X	X	X	X			X	X
379	BORE	SB-379-01-02	X		X	X	X	X			X	
379	BORE	SB-379-02-01	X		X	X	X	X			X	
379	BORE	SB-379-02-02	X		X	X	X	X			X	
379	BORE	SB-379-03-01	X		X	X	X	X			X	
379	BORE	SB-379-03-02	X		X	X	X	X			X	
379	BORE	SB-379-04-01	X		X	X	X	X			X	
379	BORE	SB-379-04-02	X		X	X	X	X			X	
379	BORE	SB-379-05-01	X		X	X	X	X			X	
379	BORE	SB-379-05-02	X		X	X	X	X			X	
384	SURF	SS-AMMO-01	X			X	X		X		X	
384	SURF	SS-AMMO-02	X			X	X		X		X	X
384	SURF	SS-AMMO-03	X			X	X		X		X	
388	SURF	SS-CAC-01	X			X	X		X		X	
388	SURF	SS-CAC-02	X			X	X		X		X	
389	SURF	SS-389-01	X			X	X		X		X	
389	SURF	SS-389-02	X			X	X		X		X	
390	SURF	SS-390-01	X			X	X		X		X	
390	SURF	SS-390-01	X			X	X		X		X	
564/565	BORE	SB-564-01-01	X		X	X	X				X	
564/565	BORE	SB-564-01-02	X		X	X	X				X	X
564/565	BORE	SB-564-02-01	X		X	X	X				X	
564/565	BORE	SB-564-02-02	X		X	X	X				X	
564/565	BORE	SB-564-03-01	X		X	X	X				X	
564/565	BORE	SB-564-03-02	X		X	X	X				X	
564/565	BORE	SB-564-04-01	X		X	X	X				X	
564/565	BORE	SB-564-04-02	X		X	X	X				X	X
564/565	BORE	SB-564-05-01	X		X	X	X				X	
564/565	BORE	SB-564-05-02	X		X	X	X				X	
564/565	BORE	SB-564-06-01	X		X	X	X				X	
564/565	BORE	SB-564-06-02	X		X	X	X				X	
564/565	BORE	SB-564-07-01	X		X	X	X				X	
564/565	BORE	SB-564-07-02	X		X	X	X				X	X
564/565	BORE	SB-564-08-01	X		X	X	X				X	
564/565	BORE	SB-564-08-02	X		X	X	X				X	
564/565	BORE	SB-564-09-01	X		X	X	X				X	
564/565	BORE	SB-564-09-02	X		X	X	X				X	
564/565	BORE	SB-564-10-01	X		X	X	X				X	
564/565	BORE	SB-564-10-02	X		X	X	X				X	
564/565	BORE	SB-564-11-01	X		X	X	X				X	
564/565	BORE	SB-564-11-02	X		X	X	X				X	X
564/565	BORE	SB-564-12-01	X		X	X	X				X	
564/565	BORE	SB-564-12-02	X		X	X	X				X	
564/565	BORE	SB-564-13-01	X		X	X	X				X	
564/565	BORE	SB-564-13-02	X		X	X	X				X	
NORTH	LAKE	SD-NORTH-1			X	X	X	X	X			
NORTH	LAKE	SD-NORTH-2			X	X	X	X	X			
NORTH	LAKE	SD-NORTH-3			X	X	X	X	X			
NORTH	LAKE	SD-NORTH-4			X	X	X	X	X			
NORTH	LAKE	SD-NORTH-5			X	X	X	X	X			
NORTH	LAKE	SD-NORTH-6			X	X	X	X	X			
SOUTH	LAKE	SD-SOUTH-1			X	X	X	X	X			
SOUTH	LAKE	SD-SOUTH-2			X	X	X	X	X			
SOUTH	LAKE	SD-SOUTH-3			X	X	X	X	X			
SOUTH	LAKE	SD-SOUTH-4			X	X	X	X	X			
LF7	LAKE	SD-LMLF7-1			X	X	X	X	X			
LF7	LAKE	SD-LMLF7-2			X	X	X	X	X			
LF7	LAKE	SD-LMLF7-3			X	X	X	X	X			
LF7	LAKE	SD-LMLF7-4			X	X	X	X	X			
LF7	LAKE	SD-LMLF7-5			X	X	X	X	X			

**Table 6-1a. Summary of Additional Soil Samples and Analyses on the DOD OU
Fort Sheridan, Illinois**

SAMPLES			SOIL ANALYSES									
Study Area	Site Type	Site ID	TOC	CEC	VOC	SVOC	Metals	PEST/P CBs	EXP	Wet Density	pH	IDW TCLP
LF7	LAKE	SD-LMLF7-6			X	X	X	X	X			
JANES	LAKE	SD-LMJAN-1			X	X	X	X	X			
HUTCH	LAKE	SD-LMHUT-1			X	X	X	X	X			
BART	LAKE	SD-LMBAR-1			X	X	X	X	X			
VHRN	LAKE	SD-LMVHR-1			X	X	X	X	X			
SHENCK	EXCV	TP-SHEN-01-01	X	X	X	X	X	X				X
SHENCK	EXCV	TP-SHEN-01-02	X	X	X	X	X	X		X	X	
SHENCK	EXCV	TP-SHEN-01-03	X	X	X	X	X	X				
SHENCK	EXCV	TP-SHEN-01-04	X	X	X	X	X	X				
SHENCK	EXCV	TP-SHEN-02-01	X	X	X	X	X	X				
SHENCK	EXCV	TP-SHEN-02-02	X	X	X	X	X	X				
SHENCK	EXCV	TP-SHEN-02-03	X	X	X	X	X	X				X
SHENCK	EXCV	TP-SHEN-02-04	X	X	X	X	X	X				
SHENCK	EXCV	TP-SHEN-03-01	X	X	X	X	X	X				
SHENCK	EXCV	TP-SHEN-03-02	X	X	X	X	X	X				
SHENCK	EXCV	TP-SHEN-03-03	X	X	X	X	X	X				
SHENCK	EXCV	TP-SHEN-03-04	X	X	X	X	X	X				
			61	12	72	81	81	46	29	1	50	9

LEGEND:

* Denotes well or piezometer to be installed.

SB=Soil Boring

SD=Sediment

SW=Surface Water

SS=Surface Soil

TP=Test Pit

BORE=Soil Boring

SURF=Surface Soil

EXCV=Excavation

VOC=Volatile Organic compound

SVOC=Semivolatile Organic compound

EXP=Explosives

TOC=Total Organic Carbon

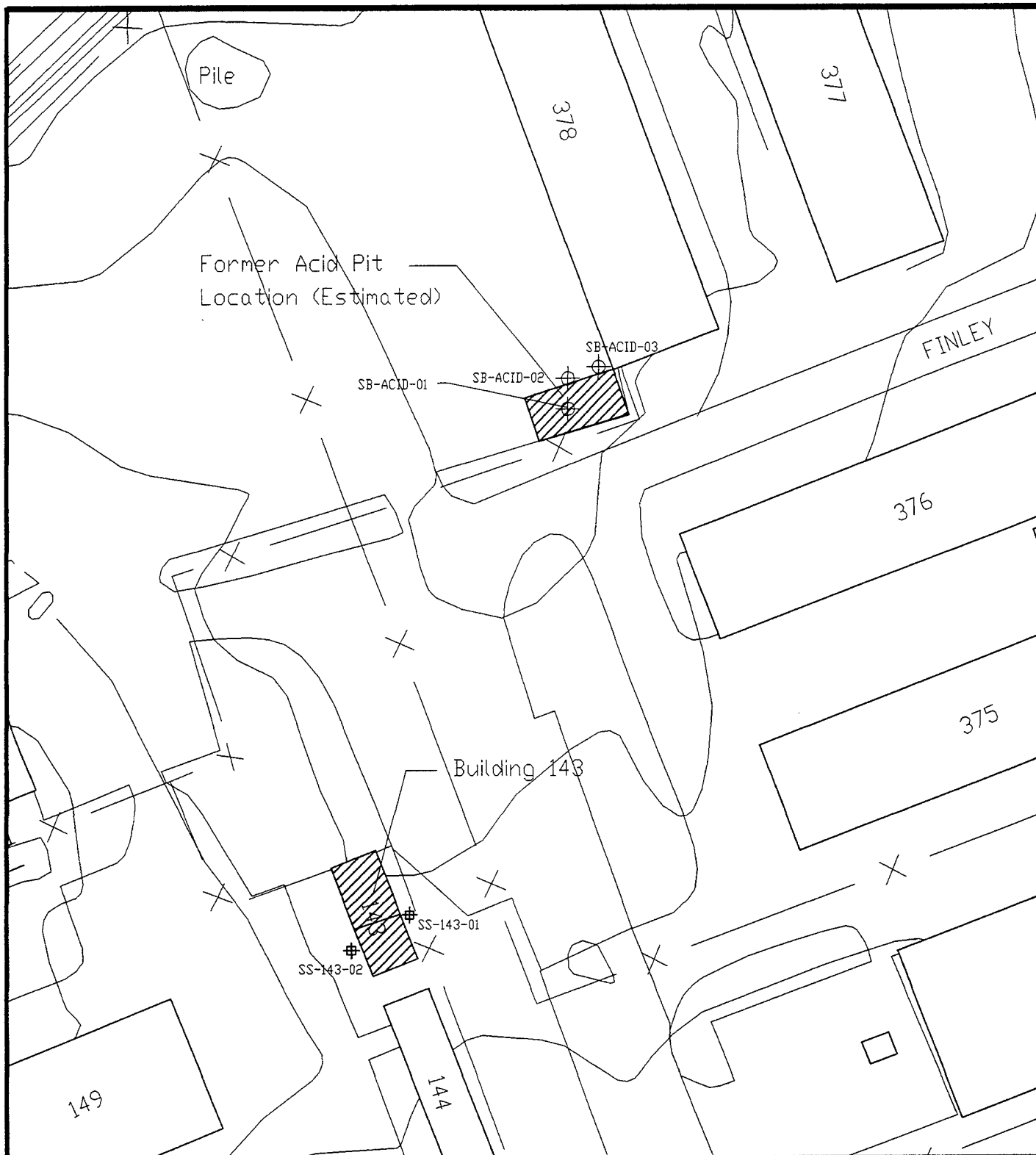
CEC=Cation Exchange Capacity

**Table 6-1b. Summary of Additional Water Samples and Analyses on the DOD OU
Fort Sheridan, Illinois**



SAMPLES			WATER ANALYSES														
Study Area	Site Type	Site ID	Nitrite/ Nitrate	Hardness	COD	TOC	Alkalinity	TDS	Anions	TCL VOC	TCL SVOC	Metals (unfiltered)	Metals (filtered)	PEST/ PCB's	Herb.	TCL Explosive	IDW TCLP
564/565	WELL	PZ-564-01							X	X	X	X	X				X
NORTH	LAKE	GW-LMNOR-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NORTH	LAKE	GW-LMNOR-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NORTH	LAKE	GW-LMNOR-3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NORTH	LAKE	GW-LMNOR-4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NORTH	LAKE	GW-LMNOR-5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NORTH	LAKE	GW-LMNOR-6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SOUTH	LAKE	GW-LMSOU-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SOUTH	LAKE	GW-LMSOU-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SOUTH	LAKE	GW-LMSOU-3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SOUTH	LAKE	GW-LMSOU-4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LF7	LAKE	GW-LMLF7-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LF7	LAKE	GW-LMLF7-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LF7	LAKE	GW-LMLF7-3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LF7	LAKE	GW-LMLF7-4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LF7	LAKE	GW-LMLF7-5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LF7	LAKE	GW-LMLF7-6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
JANES	LAKE	GW-LMJAN-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
HUTCH	LAKE	GW-LMHUT-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BART	LAKE	GW-LMBAR-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VHRN	LAKE	GW-LMVHR-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LF7	WELL	GW-LF7-34	X	X		X	X	X	X	X	X	X	X	X	X		
LF7	WELL	GW-LF7-35	X	X		X	X	X	X	X	X	X	X	X	X		
LF7	LAKE	SW-LF7-01	X		X	X	X	X	X	X	X	X	X	X		X	
NORTH	LAKE	SW-NORTH-1	X		X	X	X	X	X	X	X	X	X	X		X	
SOUTH	LAKE	SW-SOUTH-1	X		X	X	X	X	X	X	X	X	X	X		X	

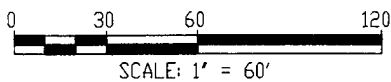
LEGEND:

SW=Surface Water
 COD=Chemical Oxygen Demand
 TOC=Total Organic Carbon
 TDS=Total Dissolved Solids
 TCL=Target Compound List
 VOC=Volatile Organic Compound
 SVOC=Semi-volatile Organic Compound
 PCB=Polychlorinated biphenyl
 IDW=Investigation Derived Waste
 TCLP=Toxicity Characteristic Leaching Procedure



LEGEND

-  SURFACE SAMPLE LOCATION
-  SOIL BORING LOCATION



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**FORMER ACID PIT BUILDING 378 & FORMER
CHEMICAL STORAGE BUILDING 143
FORT SHERIDAN, ILLINOIS**

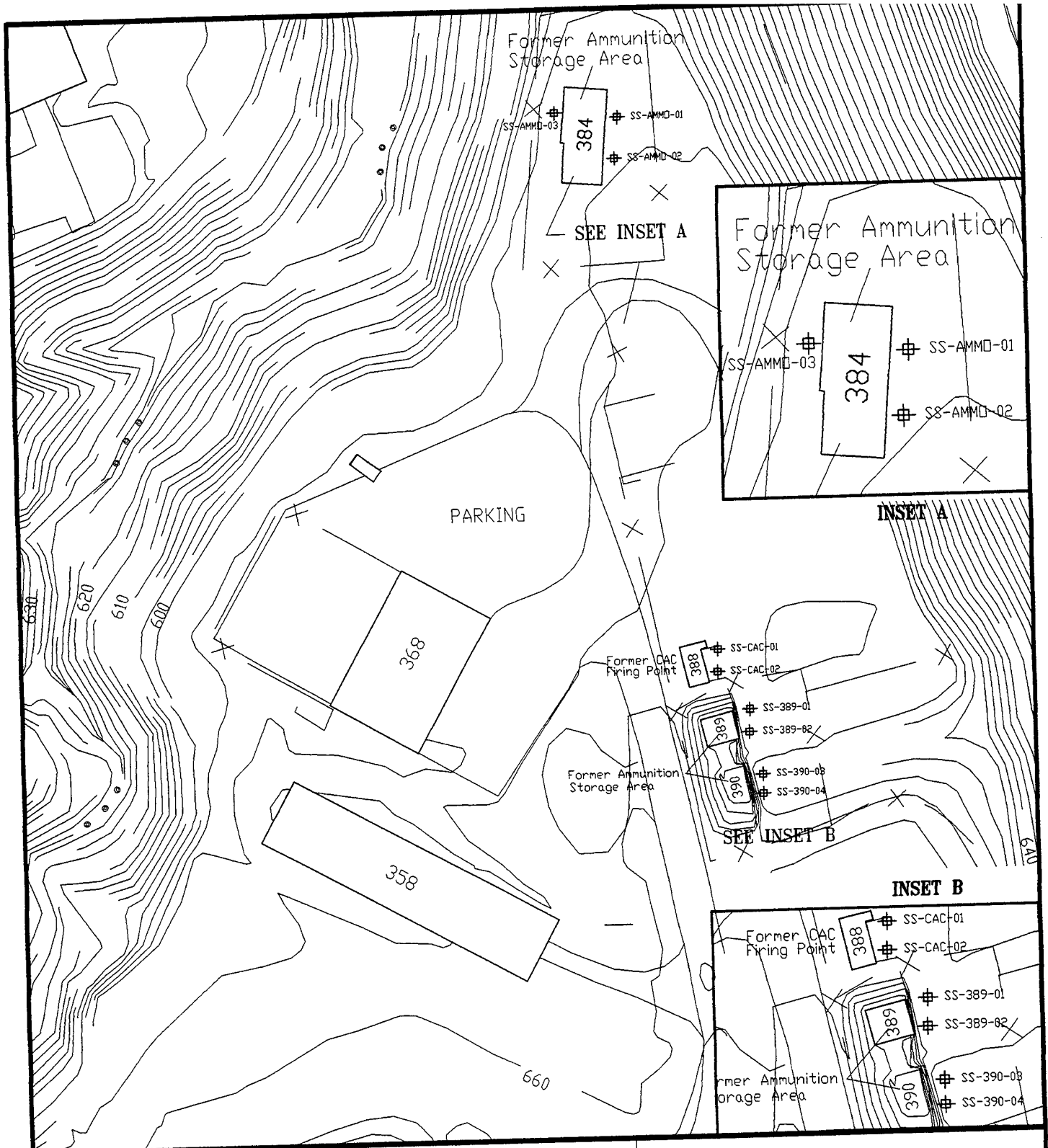
Figure:	Project:	File Name:	Date:
6-21	01-0827-07-3652-015	/DWGS/FIG6-21	06-12-97

6.23 FORMER AMMUNITION STORAGE BUILDINGS 384, 389, 390, CAC FIRING POINT (BUILDING 388)

Phase II sampling of the former ammunition storage buildings and magazines will be conducted consistent with sampling conducted at similar sites on the Surplus OU. Two surface samples (0- to 1-foot) will be composited from five points of ingress/egress at Building 384 for the analysis of explosives and metals. A sample also will be obtained from soils located immediately beneath drain pipes located in the rear of Building 384. Two soil samples will be sampled similarly from Buildings 388, 389, and 390 at each of the of ingress/egress points from the magazines. The samples will be analyzed for SVOCs, explosives, and metals. The locations of the proposed sample points are shown in Figure 6-22. Sample matrices and their associated analyses are summarized in Table 6-1.

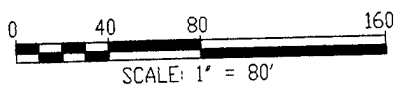
6.24 LAKE MICHIGAN

Phase II sampling of Lake Michigan will consist of the collection and analysis of 20 groundwater samples to be obtained at or below the lake sediment/glacial deposits interface, and 20 sediment samples obtained near the groundwater sampling locations. The locations of the proposed samples are shown in Figure 6-23. Six samples will be obtained in the vicinity of Landfill #7 with samples to be collected 30 and 70 feet offshore. A similar approach will be used to obtain six samples offshore from the Lake Forest Nature Preserve. Four additional samples will be collected (30 and 70 feet offshore) south of Landfill #7 and the remaining four samples will be collected 30 feet offshore from Janes Ravine, Hutchinson Ravine, Bartlett Ravine, and Van Horne Ravine. Samples from each of these locations will be analyzed for VOCs, SVOCs, metals, pesticides/PCBs, herbicides, and explosives. Three surface water samples will be obtained from the lake at the northern and southern boundaries of Fort Sheridan and offshore from Landfill #7. Groundwater and surface water samples will be analyzed for the above analytical suite and including water quality parameters (pH, conductivity, temperature) and common anions.



LEGEND

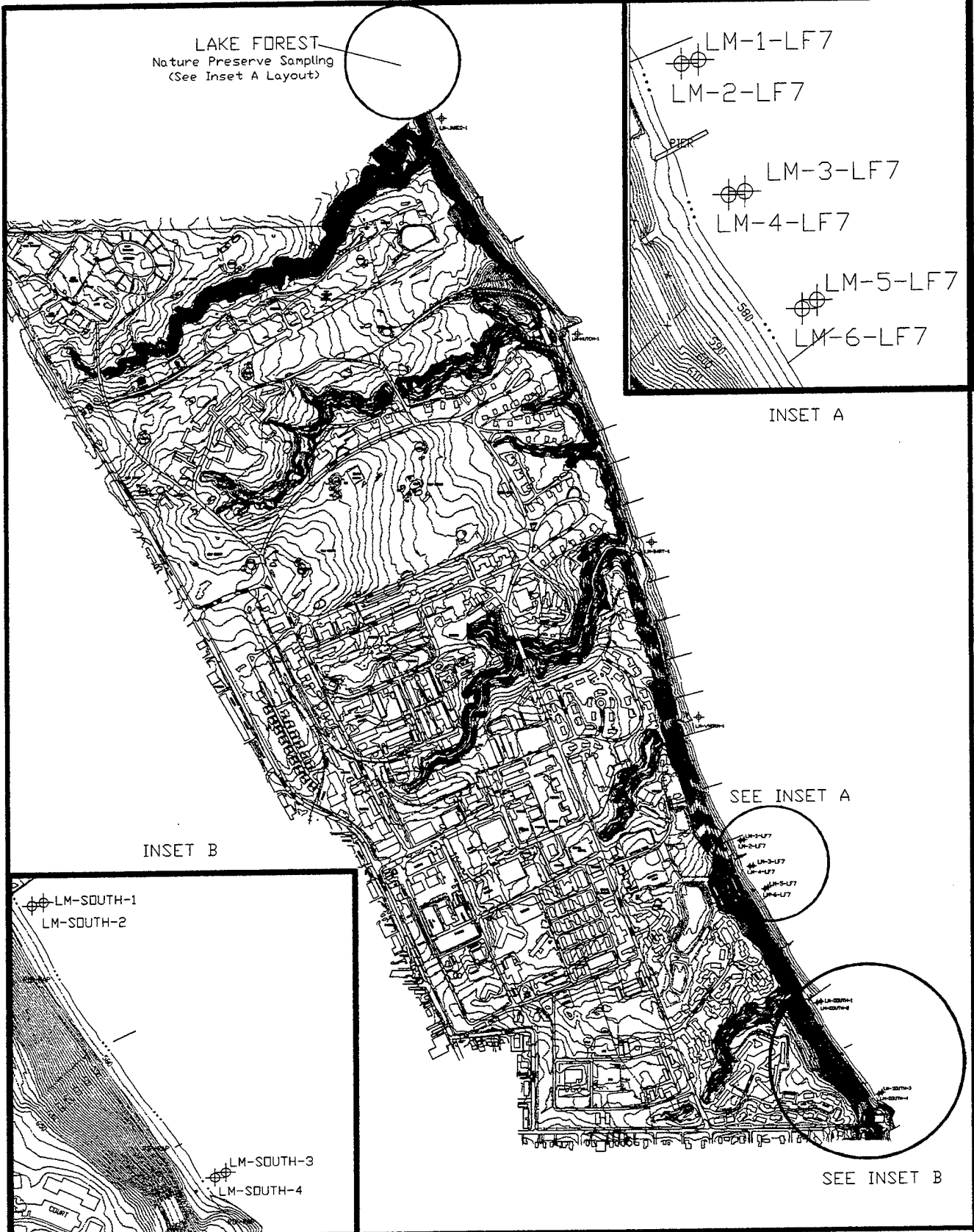
⊕ SURFACE SAMPLE LOCATION



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**FORMER AMMUNITION STORAGE BUILDINGS
 FORT SHERIDAN, ILLINOIS**

Figure:	Project:	File Name:	Date:
6-22	01-0827-07-3652-015	/DWGS/FIG6-22	02-11-97



LAKE FOREST
Nature Preserve Sampling
(See Inset A Layout)

LM-1-LF7
LM-2-LF7

LM-3-LF7
LM-4-LF7

LM-5-LF7
LM-6-LF7

INSET A

INSET B

LM-SOUTH-1
LM-SOUTH-2

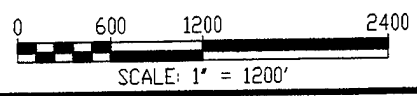
LM-SOUTH-3
LM-SOUTH-4

SEE INSET A

SEE INSET B

LEGEND

⊕ GROUNDWATER / SEDIMENT SAMPLING LOCATIONS



U.S. ARMY ENVIRONMENTAL CENTER
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**LAKE MICHIGAN SAMPLING LOCATIONS
FORT SHERIDAN, ILLINOIS**

Figure	Project	File Name	Date
6-23	01-0827-07-3652-015	/DWGS/FIG6-23	06-12-97

6.25 BUILDING 564/565 FILL AREA

The Phase II investigation of the fill area beneath Buildings 564/565 will include the drilling and continuous lithologic sampling of 12 shallow soil borings to be drilled until natural soil is encountered (estimate 10 feet). Analytical samples from the borings will consist of the collection of a surface sample (0- to 1-foot) and a sample collected within the fill material (3- to 5-feet) at each boring location. The samples will be analyzed for VOCs, SVOCs, metals, and TCLP parameters consistent with investigations at the VES areas. The locations of the existing test pits and the proposed soil borings in the vicinity of Buildings 564/565 are shown in Figure 6-24. A shallow piezometer will be installed to assess potential impacts to groundwater. The proposed piezometer location is shown on Figure 6-24. Groundwater from the site will be sampled for VOCs, SVOCs, and metals.

6.26 WELLS RAVINE STORM SEWER

The Phase II investigation of the Wells Ravine storm sewer will consist of a video survey extending from manhole #6330 to the Lake Michigan outfall. The video survey will document the physical condition of the 42-inch storm sewer by recording continuous color images of the interior of the storm sewer onto VHS tape with continuous readout of survey location in linear feet superimposed on the tape. The video survey will be sufficient to document the locations of cracks, staining, or other indications of leakage or degraded structural integrity along the sewer alignment.

6.27 SHENCK RAVINE FILL AREA

Three test pits will be excavated perpendicular to the former alignment of Shenck Ravine west of Patten Road to investigate the fill materials in the ravine. Consistent with test pit sampling on the Surplus OU, test pits encountering landfill waste will be sampled at the surface, within the encountered waste, immediately beneath the encountered waste, and at a lateral contact with the waste. The test pits will be excavated at the locations shown in Figure 6-25. Soil samples from the test pits will be analyzed for VOCs, SVOCs, pesticides/PCBs, metals, and herbicides. A TCLP sample of composited materials excavated from the three test pits will be obtained for analysis.

6.28 REGIONAL SAND AQUIFER

Boring SB-LF7-06D located at the east end of Landfill #7 penetrated 34 feet of saturated sand between depths of 72 and 106 feet BLS. The boring was drilled from an approximate surface

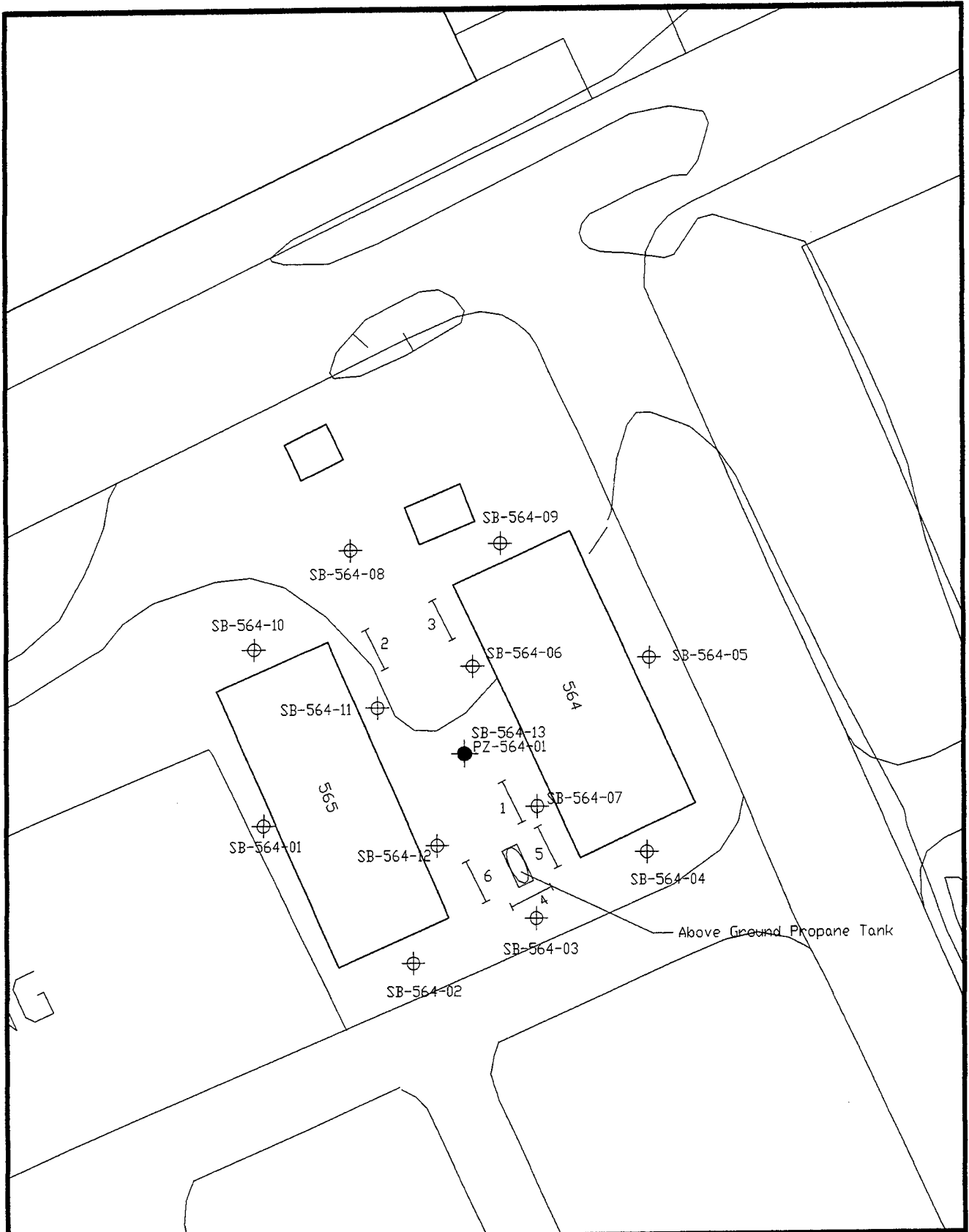
sand between depths of 72 and 106 feet BLS. The boring was drilled from an approximate surface elevation of 600 feet msl (on the easternmost terrace on the landfill face) and extended to approximately elevation 494 feet msl (106 feet depth). The well penetrated sand between elevation 528 and 494 feet msl and ended in sand at the limit of the drilling equipment. Because the encountered sand represents a Class I aquifer underlying Landfills #6 and #7 on Fort Sheridan, two additional borings will be drilled from approximately elevation 660 feet msl (southern portion of Landfill #7) to investigate the lateral extent of the sand layer and to install groundwater monitoring wells for hydrogeologic and hydrochemical evaluation. The two locations, in addition to existing well GW-LF7-06D, will triangulate the ravine area, near Landfill #7. Figure 6-26 shows the locations of the proposed borings.

A small diameter pilot boring (~4 inch OD) will be drilled at each location to tag the top of the sand layer, anticipated at an approximate depth of 132 feet BLS [~ elevation 528 msl], to investigate for the presence of productive, water-bearing zones in the overlying till. Based on the field identification of the groundwater during the pilot boring, a surface casing will be extended to the depth of observed groundwater production and grouted in place. The casing will be allowed to set for 48 hours prior to enlarging the boring through the till and continuing into the sand layer. Geologic information indicates that the sand layer is 30 to 35 feet thick; therefore, a target completion depth of approximately 167 feet BLS (elevation 493) is estimated. Because these depths are prohibitive for auger drilling in the clayey till, the borings likely will be advanced using air methods. Continuous sampling equipment using a 5-foot coring shoe or equivalent will be used to obtain a continuous lithologic profile in the borings.

A 4-inch diameter groundwater monitoring well will be installed in each of the two borings to screen the upper 10 feet of the sand aquifer. The rationale for screening the upper 10 feet is to detect potential downward migrating groundwater at the base of the till nearest to the Class I aquifer. The monitoring well completion will be in accordance with the OQAPP. The completed wells will be incorporated into the chemical and hydrogeologic monitoring program for Landfill #7.

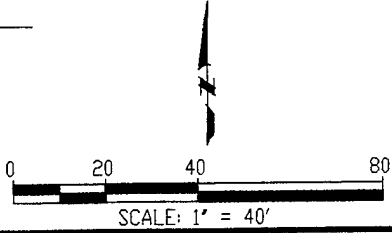
6.29 BUILDING 379

Phase II RI sampling at Building 379 will consist of collecting surface (0- to 1-foot) and subsurface (3- to 5-feet) soil samples near five points of ingress/egress or possible discharges around the building. The sampling locations are selected to evaluate potential areas of chemical release from the building. Because of the history of equipment maintenance (possible solvent usage), spray painting, grinding, and sanding conducted in the building, chemical analysis of the samples will be conducted for VOCs, SVOCs, and metals. The locations of the sampling points are shown in Figure 6-27.



LEGEND

- ⊕ Salt Boring
- Piezometer
- I Existing Test Pit



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**BUILDING 564, 565 FILL AREA
 FORT SHERIDAN, ILLINOIS**

Figure	Project	File Name	Date
6-24	01-0827-07-3652-015	/DWGS/FIG6-24	06-12-97



LEGEND

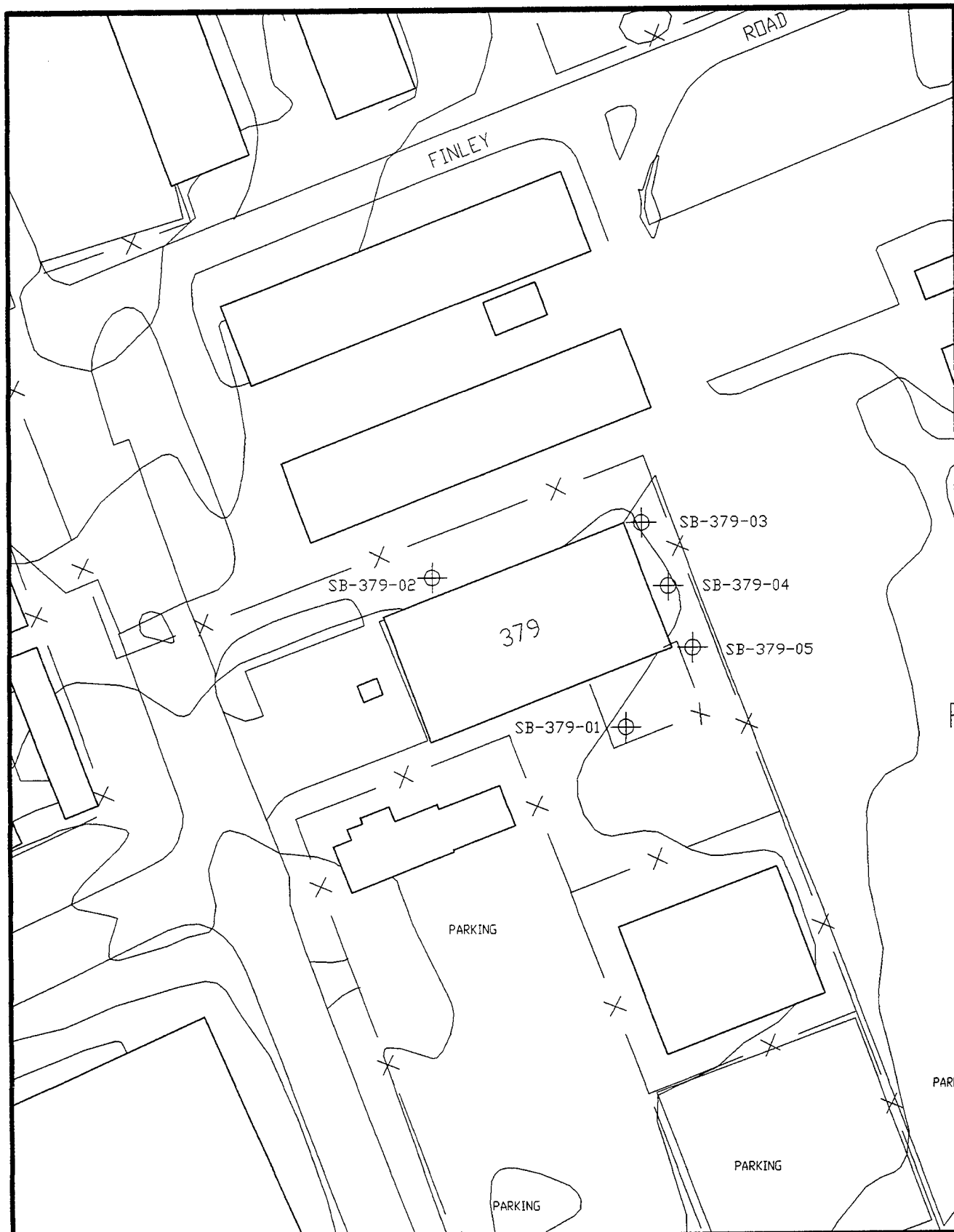
— Proposed Test Pit Location



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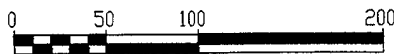
SHENCK RAVINE FILL
 FORT SHERIDAN, ILLINOIS

Figure	6-25	Project	01-0827-07-3652-015	File Name	/DWGS/FIG6-25	Date	06-12-97
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LEGEND

⊕ SOIL BORING LOCATIONS



SCALE: 1" = 100'



U.S. ARMY ENVIRONMENTAL CENTER
ABERDEEN PROVING GROUND, MARYLAND

**BUILDING 379 SAMPLING LOCATIONS
FORT SHERIDAN, ILLINOIS**

Figure	Project	File Name	Date
6-27	01-0827-07-3652-015	/DWGS/FIG6-27	06-12-97

7. REMEDIAL INVESTIGATION FIELD PROCEDURES

7.4 SOIL/SEDIMENT SAMPLING

7.4.5 *Lake Michigan Sediment Sample Collection*

Sediment samples will be collected from 20 locations in Lake Michigan from water depths between 10 and 15 feet deep and at distances 30 to 70 feet off shore. Depending on conditions encountered in the lake at the time of sampling, sediments will be obtained using either a piston-type sampling device, a gravity corer, or a sampling dredge to obtain the necessary sample volumes. Chemical constituents associated with bottom material may reflect an integration of chemical and biological processes. Bottom samples reflect the historical input to streams, lakes, and estuaries with respect to time, application of chemicals, and land use. Bottom sediments, especially fine-grained material, may help act as a sink or reservoir for adsorbed heavy metals and organic contaminants, even if the water column concentrations are below detection limits. It is important to minimize the loss of low-density fines during any sampling process.

7.4.5.1 Scoop Sampler

A scoop sampler consists of a pole to which a jar or scoop is attached. The pole may be constructed of bamboo, wood, or aluminum, and be either telescoping or of fixed length. The stainless steel scoop or jar at the end of the pole usually is attached using a clamp. If the water body can be sampled from the shore or if it can be waded, the simplest way to collect a sediment sample is to use a scoop sampler. This reduces the potential for cross-contamination. This method is accomplished by reaching over or wading into the water body and, while facing upstream (i.e., into the current), scooping the sample along the bottom in the upstream direction. It is very difficult not to disturb fine-grained materials of the sediment-water interface when using this method.

7.4.5.2 Core Samplers

Core samplers are used to sample vertical columns of sediment. They are useful when a historical record of sediment deposition is desired, because they preserve the sequential layering of the deposit. Coring devices are particularly useful for sediments because the disturbance created by descent is minimal, thus the fines at the sediment-water interface are not disturbed. The sample is withdrawn intact, permitting the removal of only those layers of interest. Core liners manufactured of glass, Teflon®, brass, or stainless steel can be purchased, thus reducing possible sample contamination. The disadvantage of coring devices is that a relatively small surface area and

sample size is obtained, necessitating repetitive sampling to obtain large amounts of sample needed for some analyses.

Many types of coring devices have been developed to address varying depths of water from which the sample is to be obtained, the nature of the bottom material, and the length of the core to be collected. In shallow waters, the direct use of a chemically inert core liner is recommended. Core sampler tubes or liners will be approximately 12 inches long, since only recently deposited sediments, 8 inches or less, are to be sampled. Soft or semi-consolidated sediments, such as mud and clays have a greater adherence to the inside of the tube, and can be sampled with larger diameter tubes. However, because coarse or unconsolidated sediments, such as sand and gravel tend to fall out of the tube, a small diameter is required. A tube approximately 2 inches in diameter is usually sufficient.

7.4.5.3 Hand Operated Gravity Corers

Hand corers generally are constructed of an outer rigid metal tube into which a 2 inch ID, core sleeve fits with minimal clearance. The cutting edge of the corer has a recessed lip on which the core sleeve rests and which accommodates a plastic core catcher. The core catcher is composed of intermeshing prongs that point upward into the core sleeve so that when the sampler is pressed into the sediment, the core is free to move past the catcher, but the core cannot fall through the catcher upon removal of the sampler from the sediment. Use of hand corers or liners involves pushing the device into the substrate until only 4 inches or less is above the sediment-water interface. When sampling hard or coarse substrates, a gentle rotation of the corer while it is pushed will facilitate greater penetration and cut down on core compaction. The liner is then capped with a Teflon® plug or a sheet of Teflon® held in place by a plastic cap and Teflon® tape. After capping, the corer is extracted slowly, the negative pressure and core catcher (if used) keeping the sample in the liner. The bottom part of the liner is capped as it emerges from the water. If the top or bottom of the liner contains water or air, the caps should be removed and the water carefully decanted, avoiding removal of surface sediments. The caps are then replaced and secured with friction tape.

Gravity corers are used to obtain sediment samples in bodies of water deeper than 3 to 5 feet. These samplers can be used for collecting 1- to 2-foot cores, with a 2-inch ID, of surface sediments at depths of up to several hundred feet beneath the water surface. Because of their small diameter, gravity corers are not suitable for obtaining coarse-grained samples, but are excellent for obtaining fine-grained materials. The gravity core sampler operates in a manner similar to the hand

operated core. A liner, 2- inch ID, fits within a metal core housing fitted with a cutting edge. Core-catchers are used to retain the core within the liner. An opening exists above the liner to allow free flow of water through the corer as it moves vertically through the water and into the sediment. The sampler has a messenger-activated valve assembly, which seals the opening above the line following sediment penetration, creating a partial vacuum to assist in sample retention during retrieval.

Samples are obtained by allowing the sampler, which is attached to sufficient length of stainless steel cable, to drop to the bottom. The weight of the sampler drives the core into the sediment to various depths depending on the characteristics of the sediments. The messenger is then dropped and the sampler carefully retrieved. Upon retrieval, treatment is similar to that described for hand corers.

7.4.5.4 Dredges

Dredges generally are used to sample sediments that cannot be obtained easily using coring devices (i.e., coarse-grained or partially cemented materials) or when large quantities of materials are required. Dredges generally consist of a clam shell arrangement of two buckets. The buckets either may close upon impact or be activated by use of a messenger. Most dredges are heavy, up to several hundred pounds, and require use of a winch and crane assembly for sample retrieval. The three major types of dredges are Peterson, Eckman, and Ponar dredges.

The Peterson dredge is used when the bottom is rocky, in very deep water, or when the flow velocity is high. The dredge should be lowered very slowly as it approaches bottom, because it can force out and miss lighter materials if allowed to drop freely. The Eckman dredge has only limited usefulness. It performs well where bottom material is unusually soft, as when covered with organic sludge or light mud. It is unsuitable, however, for sandy, rocky, and hard bottoms and is too light for use in streams with high flow velocities. The Ponar dredge is a Peterson dredge modified by the addition of side plates and a screen on the top of the sample compartment. The screen over the sample compartment permits water to pass through the sampler as it descends, thus reducing the impact to the water column and permitting direct access to the secured sample without opening the closed jaws. The Ponar dredge is easily operated by one person in the same fashion as the Peterson dredge. The Ponar dredge is one of the most effective samplers for general use on all types of substrates.

7.5 GROUNDWATER/SURFACE WATER SAMPLING

7.5.3 Lake Michigan Groundwater Sample Collection

Groundwater samples will be collected for chemical analysis from 20 locations in Lake Michigan from below the bottom sediments/glacial drift contact interface. The sample locations will be below approximately 10 to 15 feet of surface water with potentially up to 2 to 4 feet of lake bottom sediments to be penetrated. A key issue associated with collection of a groundwater sample below the lake bottom is isolation of the sampling zone from the influence of Lake Michigan water. The groundwater sampling zone will be isolated by driving 2-inch diameter steel casing to a depth approximately 2 feet below the lake bottom. Surface water in the casing will be removed following installation of the casing. Because of the difficulty associated with obtaining a seal around the casing in the lake environment, field observations of water recovery in the casing will be used to assess the impact of lake water influx. A geoprobe device will be driven approximately 2 feet below the bottom of the casing and attempts will be made to obtain groundwater samples from the glacial deposits. After obtaining sufficient sample volume, the geoprobe will be retracted and the casing removed. The geoprobe will undergo decontamination prior to sampling attempts at the next sampling location.

7.10 STORM SEWER REMOTE INSPECTION

Remote inspection of underground utilities will be conducted for the 42-inch reinforced concrete pipe (RCP) underlying former Landfills #6 and 7 within the former Wells Ravine alignment. Inspection of the RCP will be conducted using a mobile remotely-operated, closed-circuit television camera to obtain a 360°, real-time color view of the pipe interior. The camera view will have a distance locator (from the starting point of the survey) superimposed on the surface display with an accuracy within 5 feet lateral distance. A remote, preliminary survey of the storm sewer will be conducted to evaluate the need for interior flushing or cleaning of the RCP prior to the detailed inspection. The remote inspection will be recorded in color on VHS-format videotape to document the physical condition of the storm sewer. The following protocols will be implemented during the survey:

- All manholes along the storm sewer alignment will be physically located prior to the initiation of the survey. Known lateral connection locations will be reviewed from Fort Sheridan utility drawings.

- If the pipe requires cleaning, a high-pressure jetting system will be used to remove blockages from the pipe. The system will jet with sufficient water volume and pressure to remove blockages and sidewall material while taking care not to damage the RCP. Solid waste generated during the cleaning process will be containerized at the downstream effluent location on Lake Michigan.
- If physical flushing or cleaning of the storm sewer is not required, a mobile, closed-circuit television camera will be placed into the 42-inch RCP either at upgradient manhole 6330 or at the downgradient outfall location at Lake Michigan. A self-propelled camera will be used to inspect the entire length (approximately 2,320 feet) of the RCP pipe between H Street and Lake Michigan.
- The operator will record observations on tape as the camera progresses through the pipe. Distance (linear feet) from the starting point of the survey will be displayed on the television screen at all times.
- The locations of observed defects in the pipe condition including cracks, leaks, displacements, offsets, pipe joint separation, holes, broken zones, cement washouts, and other physically observable phenomena, will be recorded during the survey and the distance annotated on the videotape record. The locations of lateral connections also will be observed and noted.
- Following the completion of the television survey, the locations of observed anomalies will be shown on a scaled site drawing to delineate zones of reduced pipe performance.

Table 7-3. Number of Boreholes, Test Pits, and Monitoring Wells, Fort Sheridan, Illinois

Study Area	New Wells/ Piezometers	Borings	Test Pits	Surface Sample
Building 378 Acid Pit	0	4	0	0
Building 379	0	5	0	0
Building 143	0	5	0	5
Building 384	0	0	0	6
Buildings 389, 390	0	0	0	4
CAC Magazine	0	0	0	2
Lake Michigan	0	20	0	0
Building 564/565	1	13	0	0
Wells Ravine Storm Sewer	0	0	0	0
Shenck Ravine Fill Area	0	0	3	0
Regional Sand Aquifer	2	2	0	0
Total	3	49	3	17

**Table 7-4. Additional Groundwater Locations to be Sampled During Phase II RI
Fort Sheridan, Illinois**

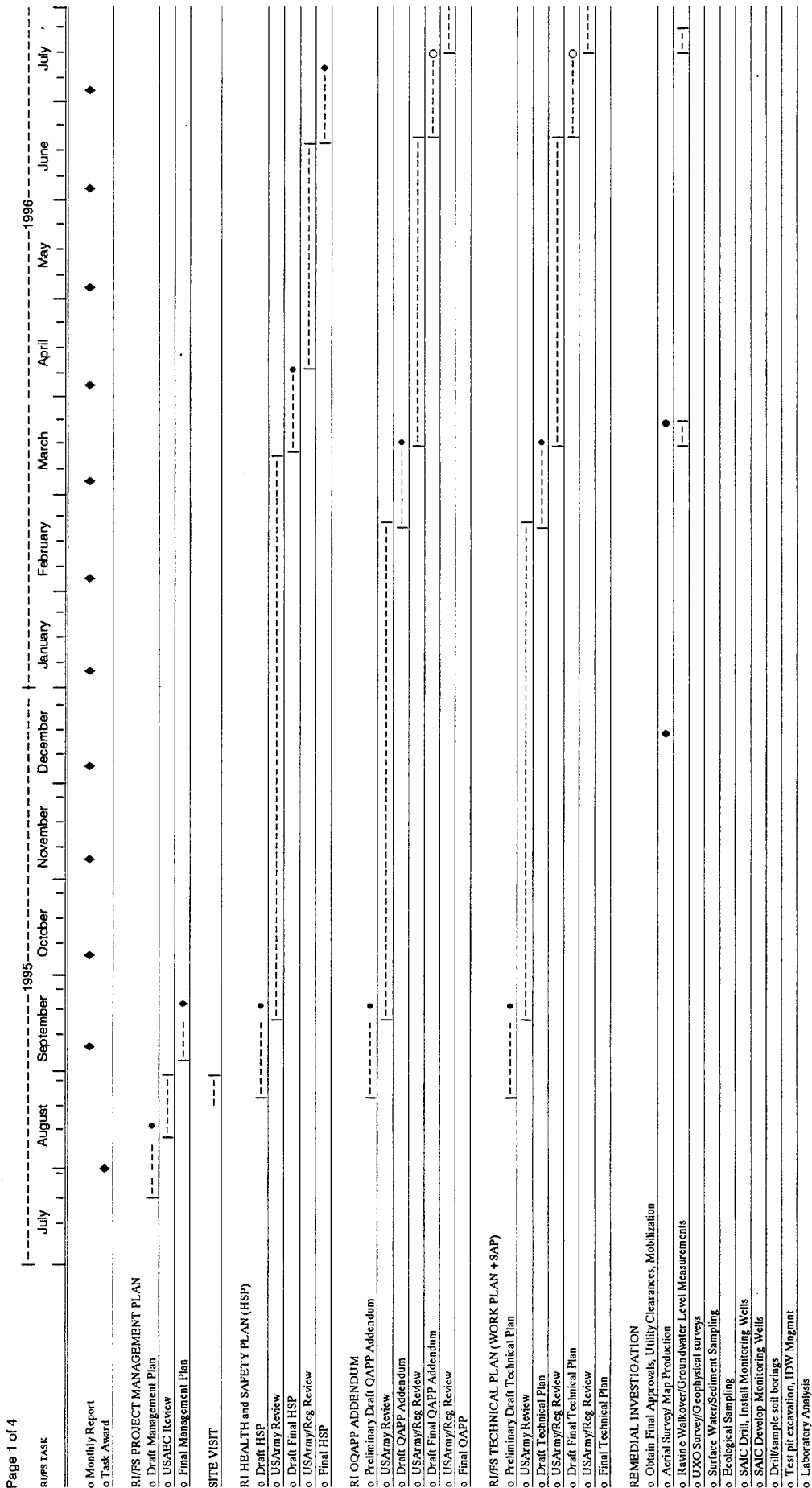
Study Area	New Wells/Piezometers	Existing Wells/Piezometers	Total
Building 378 Acid Pit	0	0*	0
Building 379	0	0*	0
Building 143	0	0*	0
Building 384	0	0	0
Buildings 389,390	0	0	0
CAC Magazines	0	0	0
Lake Michigan	20***	0	20
Building 564/565	1	0**	1
Wells Ravine Storm Sewer	0	0	0
Shenck Ravine Fill Area	0	0	0
Regional Sand Aquifer	2	0	2
Total	23	0	23

*Near Landfill #5 monitoring locations

** Near Building 125 monitoring locations

*** Temporary well samples

Figure 10-1. Schedule for Fort Sheridan DOD OU Remedial Investigation/ Feasibility Study



○ = Draft Deliverable Due
 ◆ = Delivered
 ◆ = Final Deliverable Due

Figure 10.1. Schedule for Fort Sheridan DOD OU Remedial Investigation/ Feasibility Study (Cont)

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R/FS TASK	1996												1997			
	July	August	September	October	November	December	January	February	March	April	May	June	July			
Monthly Report	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
R/FS TECHNICAL PLAN																
o US/Army/Reg Review																
o Response to Comments																
o Final Technical Plan																
REMEDIAL INVESTIGATION																
o Obtain Final Approvals, Utility Clearances, Mobilization																
o Ravine Walkover/Groundwater Level Measurements																
o Soil Gas Survey																
o UXO Survey/Geophysical surveys																
o Surface Water/Sediment Sampling																
o Ecological Sampling																
o SAIC Drill, Install Monitoring Wells																
o SAIC Develop Monitoring Wells																
o Drill/sample soil borings																
o Test pit excavation																
o Storm Sewer Video Survey																
o Groundwater Sampling																
o Supplemental RI Investigation																
o IDW Management																
o Slug Testing																
o Laboratory Analyzes																
o Laboratory Data Validation																
o Draft ARAR Report																
o US/Army/Reg Review																
o Final ARAR Report																◆

◆ Delivered. ◆ Deliverable due. ○ Draft deliverable due.

Figure 10-1. Schedule for Fort Sheridan Remedial Investigation/ Feasibility Study (Cont)

