FINAL

IMA

ADDENDUM #16
TO
WORK PLAN

FOR

3d Inf Div (Mech)

PRELIMINARY GROUNDWATER AND CORRECTIVE ACTION PLAN–PART A/PART B INVESTIGATIONS AT FORMER UNDERGROUND STORAGE TANK SITES HUNTER ARMY AIRFIELD AND FORT STEWART, GEORGIA

Prepared for

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

Contract No. DACA21-02-D-0004
Delivery Order 28

September 2003

SAIC®

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FORMER UNDERGROUND STORAGE TANK SITES
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AND
FORT STEWART, GEORGIA

Prepared for

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Prepared by

Science Applications International Corporation
151 Lafayette Drive
Oak Ridge, TN 37830

September 2003

APPROVALS

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AT
FORMER UNDERGROUND STORAGE TANK SITES
HUNTER ARMY AIRFIELD
AND
FORT STEWART, GEORGIA

Greg Grim, Program Manager — Date: 9/4/03

Patricia Stoll, Project Manager — Date: 9/4/03

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List of Abbreviations and Acronyms

BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Corrective Action Plan
CPT	cone penetrometer technology
CQC	chemical quality control
DAACG	Departure/Arrival Air Control Group
HAAF	Hunter Army Airfield
PDO	Old Property Disposal
QA	quality assurance
QC	quality control
Redox	oxidation-reduction potential
SAIC	Science Applications International Corporation
TBD	to be determined
UST	underground storage tank

1.0 INTRODUCTION

This addendum supplements the following work plan: *Sampling and Analysis Plan for Corrective Action Plan–Part A and B Investigations for Former Underground Storage Tanks at Hunter Army Airfield, Georgia* (SAIC 1998). It presents changes to the work plan and the specific sampling requirements for the performance of additional investigations to support the various Corrective Action Plans (CAPs). Investigations are required at additional underground storage tank (UST) sites in response to comments received from the Georgia Department of Natural Resources, UST Management Program Branch, on several CAP–Part A and CAP–Part B reports.

Seven sites at Hunter Army Airfield (HAAF) were identified as requiring additional investigations based on analytical results obtained during previous investigations. These sites are Building 728, the Old Property Disposal (PDO) Yard, Pumphouse #1, Pumphouse #2, the MCA Barracks, USTs 25 & 26, and the Departure/Arrival Air Control Group (DAACG). Table 1 identifies general site-specific information and presents the proposed activities for each site.

2.0 PROJECT ORGANIZATION

The organizational chart for the HAAF investigations is presented in Figure 1.

3.0 FIELD ACTIVITIES

At Building 728 five shallow piezometers will be installed around existing monitoring point D-9 to delineate the groundwater contamination in that area. One groundwater sample will be collected from each of the five piezometers during installation and sent to an off-site laboratory for benzene, toluene, ethylbenzene, and xylenes (BTEX) analysis. Based on the results of the groundwater samples collected from the piezometers, two of the five piezometers will be added to the quarterly monitoring program that is currently under way. Five oxygen injectors will also be installed based on the results of the groundwater samples collected from the five piezometers. Two rounds of quarterly sampling of 18 existing wells will be conducted as part of the ongoing pilot study monitoring program at the site. The proposed piezometer installation locations and the sampling locations for the site are presented in Appendix A, Figure A-1.

Ten wells will be sampled at the PDO Yard during two rounds of semiannual sampling for tetrachloroethene. The sampling locations for the site are presented in Appendix A, Figure A-2.

At Pumphouse #1 in the product area around the DAACG, 40 cone penetrometer technology (CPT) borings will be installed. These CPT borings will use a fluorescent detection devise to identify free product below the ground surface. Eleven borings will be installed at 100-ft intervals along a transect that will run through D-MW-35 toward D-MW-20. Sixteen borings will be installed along a second transect perpendicular to the first transect at 100-ft intervals. An addition 13 CPT borings will be installed based on the results of the initial 27 CPT borings. Following pushing of the CPT and reading of the data, 2-in. monitoring wells will be installed in the CPT boreholes. The proposed CPT boring locations for the site are presented in Appendix A, Figure A-3.

Twenty CPT borings will be installed at Pumphouse #1 in the product area around D-MW-5 in the taxiway near the pumphouse. These CPT borings will use a fluorescent detection devise to identify free product below the ground surface. Seven borings will be installed at 50-ft intervals along a transect that will run through D-MW-5 and P1-MW-22. Based on the results of the first transect, a perpendicular transect will be run through the CPT boring with the most contamination. Four CPT borings will be installed along the second transect at 50-ft intervals. An additional 9 CPT borings will be installed based on the results from these 11 borings. Following pushing of the CPT and reading of the data, 2-in. monitoring wells will be installed in the CPT boreholes. The proposed CPT boring locations for the site are presented in Appendix A, Figure A-4.

Eight CPT borings will be installed at Pumphouse #1 in the product area around P1-MW-02 at 25-ft intervals on a grid around P1-MW-02 to determine the extent of product in this area. Following pushing of the CPT and reading of the data, 2-in. monitoring wells will be installed in the CPT boreholes. The proposed CPT boring locations for the site are presented in Appendix A, Figure A-5.

Field activities at Pumphouse #2 will consist of two semiannual sampling rounds of 11 existing wells as part of the pilot study monitoring program for BTEX. The sampling locations for the site are presented in Appendix A, Figure A-6.

At the MCA Barracks site, water-level measurements will be collected in all of the monitoring wells located within 1,000 ft of the identified solvent plume to prepare potentiometric surface maps for both the shallow and deep aquifers. The well locations for the site are presented in Appendix A, Figure A-7.

Six vertical profiles will be installed in the area upgradient of the former UST pit at the USTs 25 & 26 site. Groundwater samples will be collected every 5 ft to a depth of approximately 50 ft below ground surface and sent to the laboratory for volatile organic compound analysis. The proposed vertical-profile locations are presented in Appendix A, Figure A-8.

Table 1 presents the site-specific investigation events. Table 2 presents the sample numbering system that will be used for these investigations. Table 3 presents a summary of the field and quality control (QC) soil and groundwater samples to be collected during the investigations.

3.1 PIEZOMETER INSTALLATION

Piezometers will be installed using a Geoprobe rig and following the procedures presented in the work plan (SAIC 1998).

3.2 MONITORING WELL INSTALLATION

Sixty-eight 2-in. monitoring wells will be installed at the Pumphouse #1 site in the CPT boreholes. The CPT rig will create a 3-in.-diameter borehole when it pushes the fluorescence detection tool. Once the tool is removed from the borehole, a 2-in. polyvinyl chloride well will be installed with a 10-ft, 10-slot screen. No analytical soil samples will be collected during the installation of the 2-in. monitoring wells.

The monitoring wells will be developed in accordance with the procedures and methodology presented in the work plan (SAIC 1998). Groundwater field measurements performed during the investigations will include pH, specific conductance, and temperature.

3.3 GROUNDWATER SAMPLING

Low-flow techniques will be used to collect groundwater samples from all 2-in. monitoring wells. Field measurements performed during the investigations will include pH, specific conductance, temperature, oxidation-reduction potential (Redox), and dissolved oxygen. Procedures and equipment for measurement of pH, specific conductance, temperature, Redox, and dissolved oxygen are presented in the work plan (SAIC 1998).

Groundwater samples will be collected from the 3/4-in. monitoring wells and piezometers using peristaltic pumps for purging and disposable bailers for sampling. Field measurements performed during the investigations will include pH, specific conductance, temperature, Redox, and dissolved oxygen. Procedures and equipment for measurement of pH, specific conductance, temperature, Redox, and dissolved oxygen are presented in the work plan (SAIC 1998).

3.4 WATER-LEVEL MEASUREMENT

Before the sampling team leaves the sites, a complete set of water-level measurements will be collected from all wells at each site. Procedures and equipment for water-level measurements are presented in the work plan (SAIC 1998).

4.0 REFERENCES

SAIC (Science Applications International Corporation) 1998. *Sample and Analysis Plan for Corrective Action Plan–Part A and B Investigations for Former Underground Storage Tanks at Hunter Army Airfield, Georgia*.

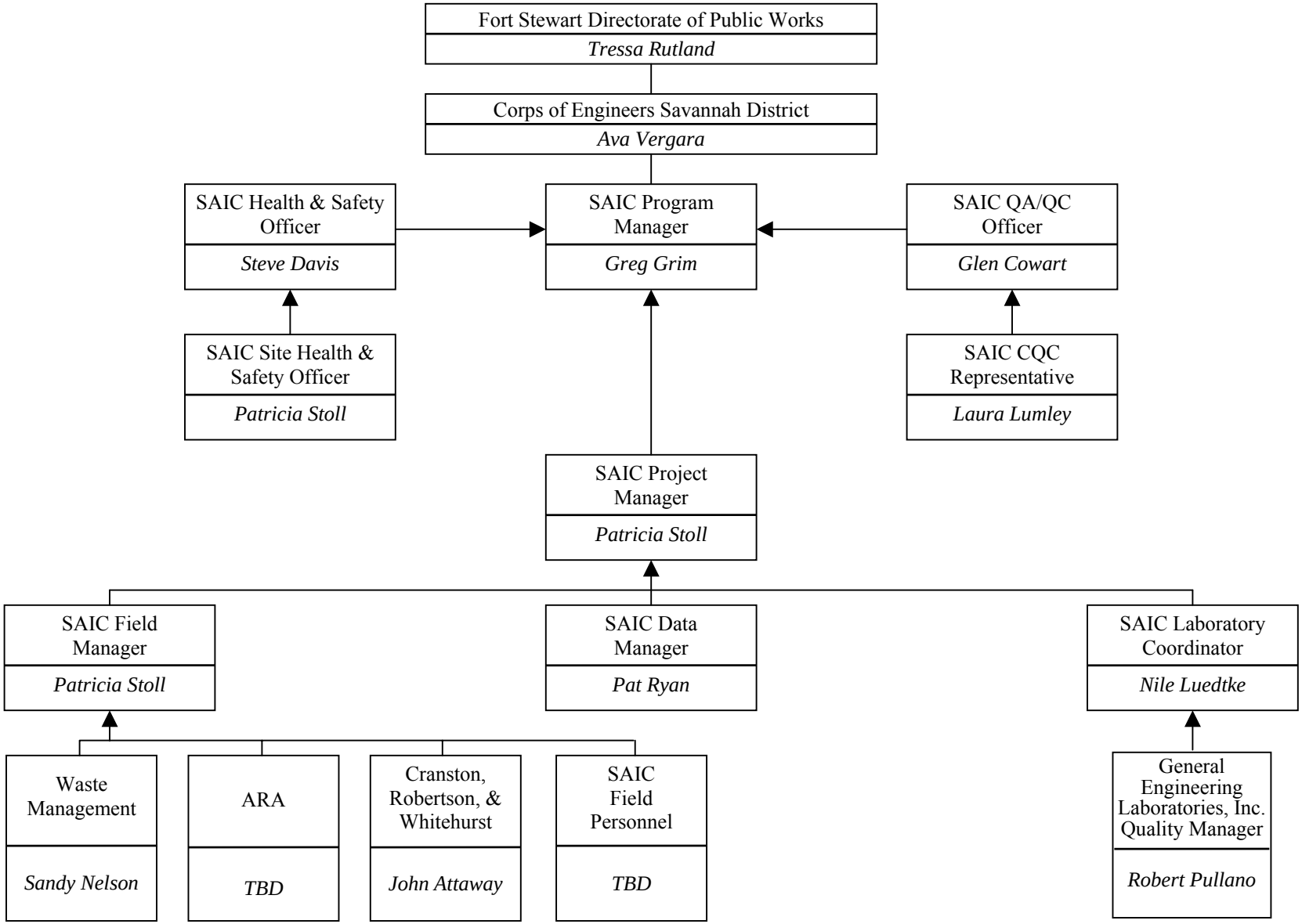


Figure 1. Revised Organizational Chart for Fort Stewart/Hunter Army Airfield Investigations

Table 1. Proposed Fort Stewart/Hunter Army Airfield Investigations

Site Name	Facility ID #	Bldg.	Unit	Type of Tank	Piezometer/ CPT/Vertical-Profile Installation	Lab Analysis	Wells to Be Sampled	Lab Analysis	Other Activities	Sample Times
Bldg. 728	9-025008	728		Gas/diesel	AE-D25, AE-D26, AE-D27, AE-D28, (5) AE-J28, AE-J29, AE-J30, AE-J31, AE-J32 (5)	GW: BTEX (5)	AE-MW-08, AE-MW-60, AE-MW-61, AE-PR-06, AE-D2, AE-D4, AE-D6, AE-D8, AE-D7, AE-D9, AE-D10, AE-D11, AE-D12, AE-D13, AE-D14, AE-D19, and 2 additional locations TBD (18)	GW: BTEX		Installation: September 2003 GW sampling: January 2004 April 2004
PDO Yard		726					MW-02, MW-03, MW-05, MW-10, MW-11, MW1-24, MW-26, MW-27, MW-28, MW-29 (10)	GW: PCE		January 2004 June 2004
Pumphouse #1 (product area near the DAACG)	9-025085	8060		JP-8	D-CPT-01 through D-CPT-40					CPT installation: September 2003
Pumphouse #1 (product area near Pumphouse #1 in taxiway)	9-025085	8060		JP-8	P1-CPT-01 through P1-CPT-20					CPT installation: September 2003
Pumphouse #1 (product area around P1-MW-02)	9-025085	8060		JP-8	P1-CPTC-21 through P1- CPT-28					CPT installation: September 2003
Pumphouse #2							TMP-01 through TMP-11	GW: BTEX		September 2003 March 2004

Table 1. Proposed Fort Stewart/Hunter Army Airfield Investigations (continued)

Site Name	Facility ID #	Bldg.	Unit	Type of Tank	Piezometer/ CPT/Vertical-Profile Installation	Lab Analysis	Wells to Be Sampled	Lab Analysis	Other Activities	Sample Times
MCA Barracks									Water levels collected in 2-in. wells at the MCA Barracks site, the SOF site, the Bldg. 728 site, the Bldg. 133 site, and the PDO Yard	September 2003
USTs 25 & 26	9-025008	1343	260th Quarter-master	Gas/diesel	AF-73, AF-74, AF-75, AF-76, AF-77, AF-78 (6)	GW: VOC				October 2003

BTEX = Benzene, toluene, ethylbenzene, and xylenes.
CPT = Cone penetrometer technology.
DAACG = Departure/Arrival Air Control Group.
GW = Groundwater.
PCE = Tetrachloroethene.
PDO = Old Property Disposal.
TBD = To be determined.
UST = Underground storage tank.
VOC = Volatile organic compound.

Table 2. Sample Number System for Fort Stewart/Hunter Army Airfield Activities

Sample Identification: XX##NT	
XX = Area Designator	Area designators used for the project will be the data-cluster identifiers presented in Table 1-1 of the project work plan (SAIC 1998) Examples: Hunter Army Airfield AE = INV – AE (Former Building 728) AF = INV – AF (USTs 25 & 26) AM = INV – AM (Pumphouse #2) AN = INV – AN (Pumphouse #1) AP = INV – AP (PDO Yard) XX = INV – XX (MCA Barracks)
## = Sample Location	Sample locations will be consecutive starting from the last sample location. Example 05 = Monitoring well 05
N = Sample Depth	Sample depth will be represented by a number for each laboratory sample. Examples 1 = First interval 2 = Second interval
T = Sample Type	Examples 1 = Soil sample 2 = Groundwater sample 3 = Soil duplicate 4 = Groundwater duplicate 5 = Rinsate blank (soil equipment) 6 = Rinsate blank (groundwater equipment) 7 = Soil QA split sample 8 = Groundwater QA split sample 9 = Surface water sample 0 = Sediment sample A = Vertical-profile groundwater sample

All trip blank samples used during the project will be consecutively identified.
PDO = Old Property Disposal.
QA = Quality assurance.
UST = Underground storage tank.

Table 3. Summary of Analytical Samples to Be Collected during Fort Stewart/Hunter Army Airfield Investigations

Matrix	Analysis	Analytical Procedures	No. Field Samples	QC Dups[a]	Field Rnsts[b]	QC Trip Blanks	Total Samples	Holding Time	Preservation Requirements	Sample Containers
Groundwater	BTEX	EPA 8260B	63	6	3	6	78	14 days	Cool 4°C[c] HCl pH <2	Two 40-mL GSV
	VOC	EPA 8260B	60	6	3	5	77	14 days	Cool 4°C[c] HCl pH <2	Two 40-mL GSV
	PCE	EPA 8260B	20	2	1	5	28	14 days	Cool 4°C[c] HCl pH <2	Two 40-mL GSV
IDW Water	VOC	EPA 8260B	4	0	0	0	4	14 days	Cool 4°C[c] HCl pH <2	Two 40-mL GSV
	Oil & Grease	EPA 413.2	4	0	0	0	4	28 days	Cool 4°C H_2SO_4 pH<2	Two 1-L AG
	Total Phenols	EPA 420.1/420.2	4	0	0	0	4	28 days	Cool 4°C H_2S0_4 pH<2	Two 1-L AG
	pH	EPA 150.1	4	0	0	0	4	ASAP	Cool 4°C	One 250-mL HDPE

AG = Amber glass.
ASAP = As soon as possible.
BTEX = Benzene, toluene, ethylbenzene, and xylenes.
EPA = U.S. Environmental Protection Agency.
GSV = Glass septa vial.
HDPE = High-density polyethylene.
IDW = Investigation-derived waste.
PCE = Tetrachloroethene.
QC = Quality control.
VOC = Volatile organic compound.

(This table is in conformance with EM200-1-3).

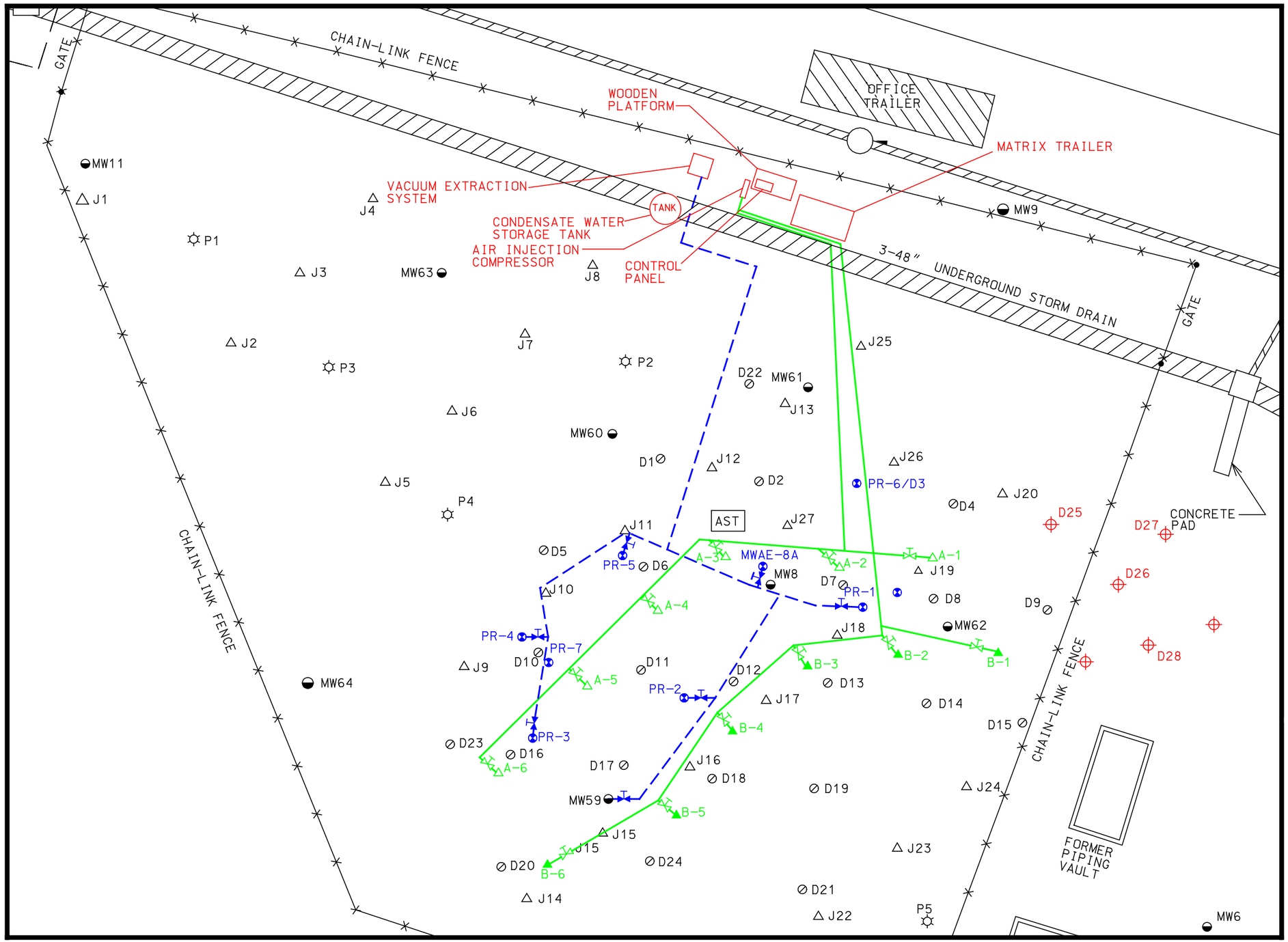
[a] The number of QC duplicate samples represents a 10% distribution between the different types of investigations to be conducted; however, the actual number of duplicates collected for each investigation type might vary slightly from the distribution presented.

[b] The number of QC rinsate blank samples represents a 5% distribution between the different types of investigations to be conducted; however, the actual number of blanks collected for each investigation type might vary slightly from the distribution presented.

[c] Sample containers will be filled so that no headspace is present.

APPENDIX A

PROPOSED SAMPLING LOCATIONS FOR HUNTER ARMY AIRFEILD INVESTIGATIONS



LEGEND

- CAP-PART B MONITORING WELLS
- OBSERVATION POINTS
- PRODUCT RECOVERY & VACUUM EXTRACTION WELL
- FLOW ADJUST VALVE & VACUUM GAUGE
- 2" DIA. PIPE
- A-1 AIR INJECTION WELL (A MANIFOLD)
- B-1 AIR INJECTION WELL (B MANIFOLD)
- FLOW ADJUST VALVE & PRESSURE GAUGE
- 1" DIA. PIPE
- OXYGEN INJECTION POINTS
- PRODUCT DELINEATION POINTS
- PROPOSED PRODUCT DELINEATION POINTS

NOTES:

1. OXYGEN INJECTION POINTS J25, J26, & J27 WERE INSTALLED IN DECEMBER 2000. ALL OTHER OXYGEN INJECTION POINTS WERE INSTALLED IN MAY 1999.
2. PRODUCT RECOVERY WELLS PR-6 AND PR-7 WERE INSTALLED IN APRIL 2001. ALL OTHER PRODUCT RECOVERY WELLS WERE INSTALLED IN OCTOBER 1999.

N

0 5 10 20 40

SCALE: 1" = 20'

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FORMER BUILDING 728
FACILITY ID: 9-025049
OXYGEN INJECTION/PRODUCT RECOVERY SITE LOCATION PLAN

DRAWN BY:	REV. NO./DATE:	CAD FILE:
J.LAMB	0/08/06/03	97028/DGNS/E585035PC.DGN

Figure A-1. Site Location Map of Building 728

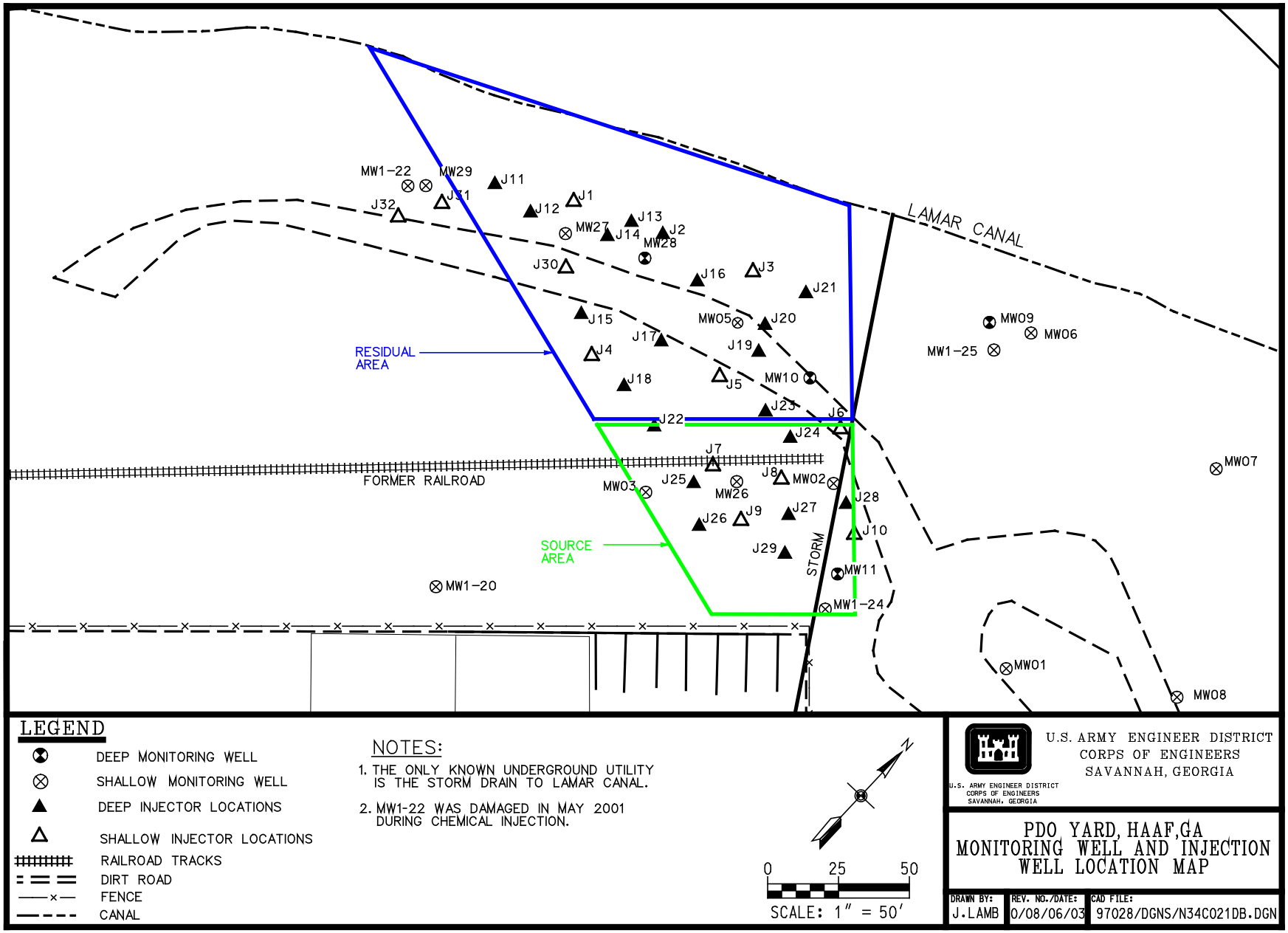
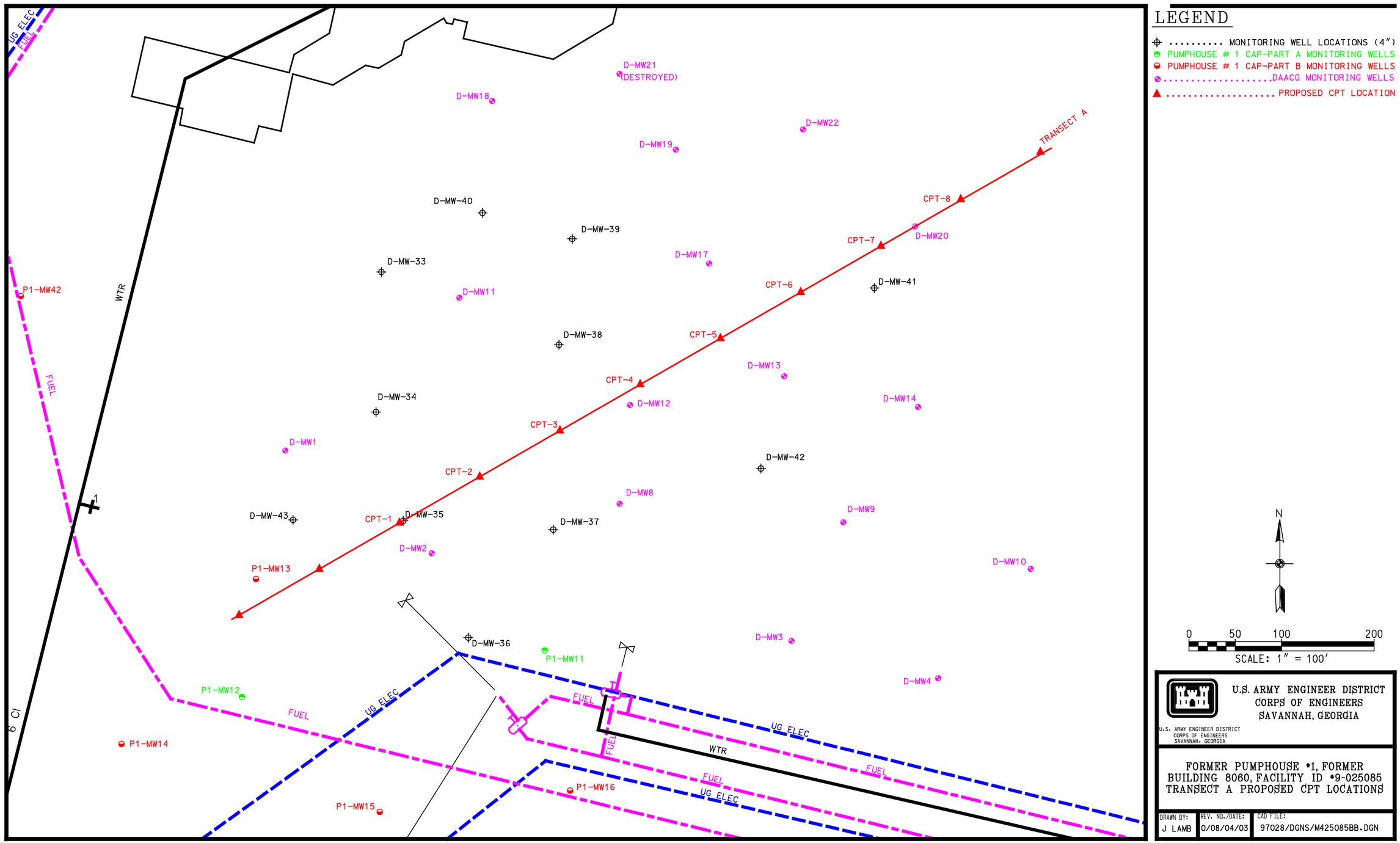


Figure A-2. Site Location Map of the PDO Yard



LEGEND

- ..... MONITORING WELL LOCATIONS (4")
- PUMPHOUSE # 1 CAP-PART A MONITORING WELLS
- PUMPHOUSE # 1 CAP-PART B MONITORING WELLS
- .....DAACG MONITORING WELLS
- ..... PROPOSED CPT LOCATION

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FORMER PUMPHOUSE #1, FORMER
BUILDING 8060, FACILITY ID #9-025085
TRANSECT A PROPOSED CPT LOCATIONS

DRAWN BY:	REV. NO./DATE:	CAD FILE:
J LAMB	0/08/04/03	97028/DGNS/M425085BB.DGN

Figure A-3. Site Location Map of Former Pumphouse #1 (DAACG Area)

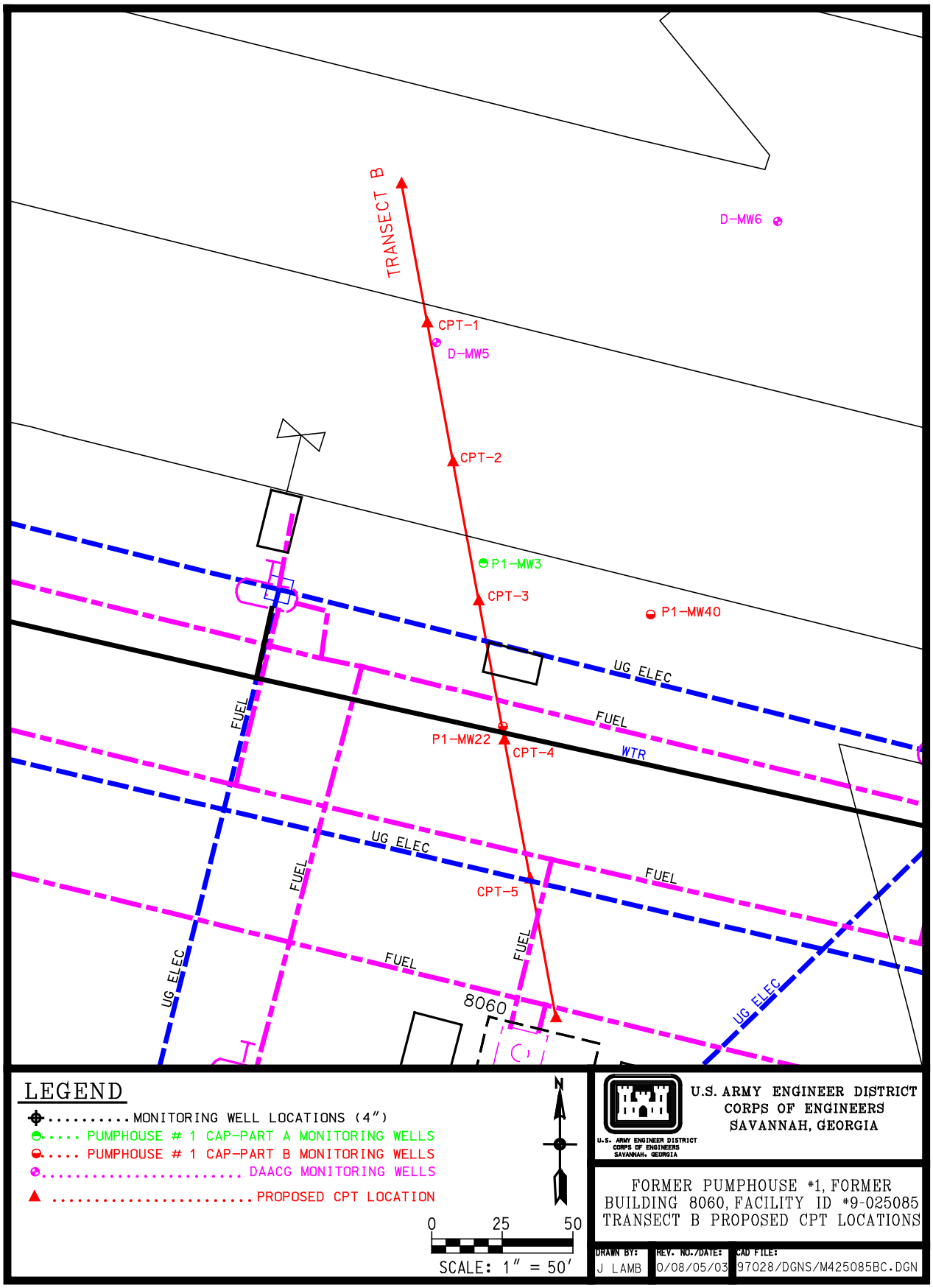


Figure A-4. Site Location Map of Former Pumphouse #1 (near Pumphouse #1 in the Taxiway)

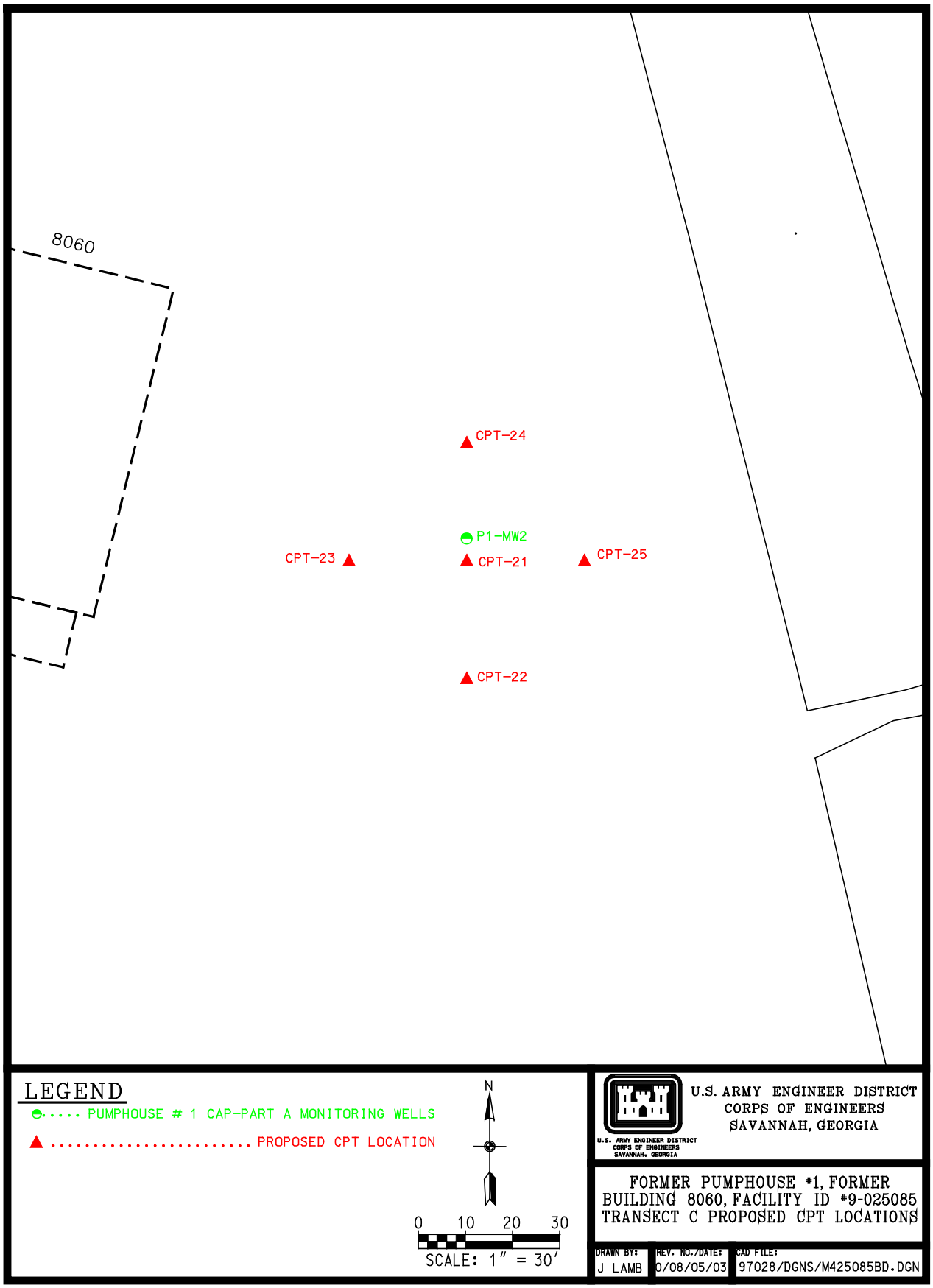
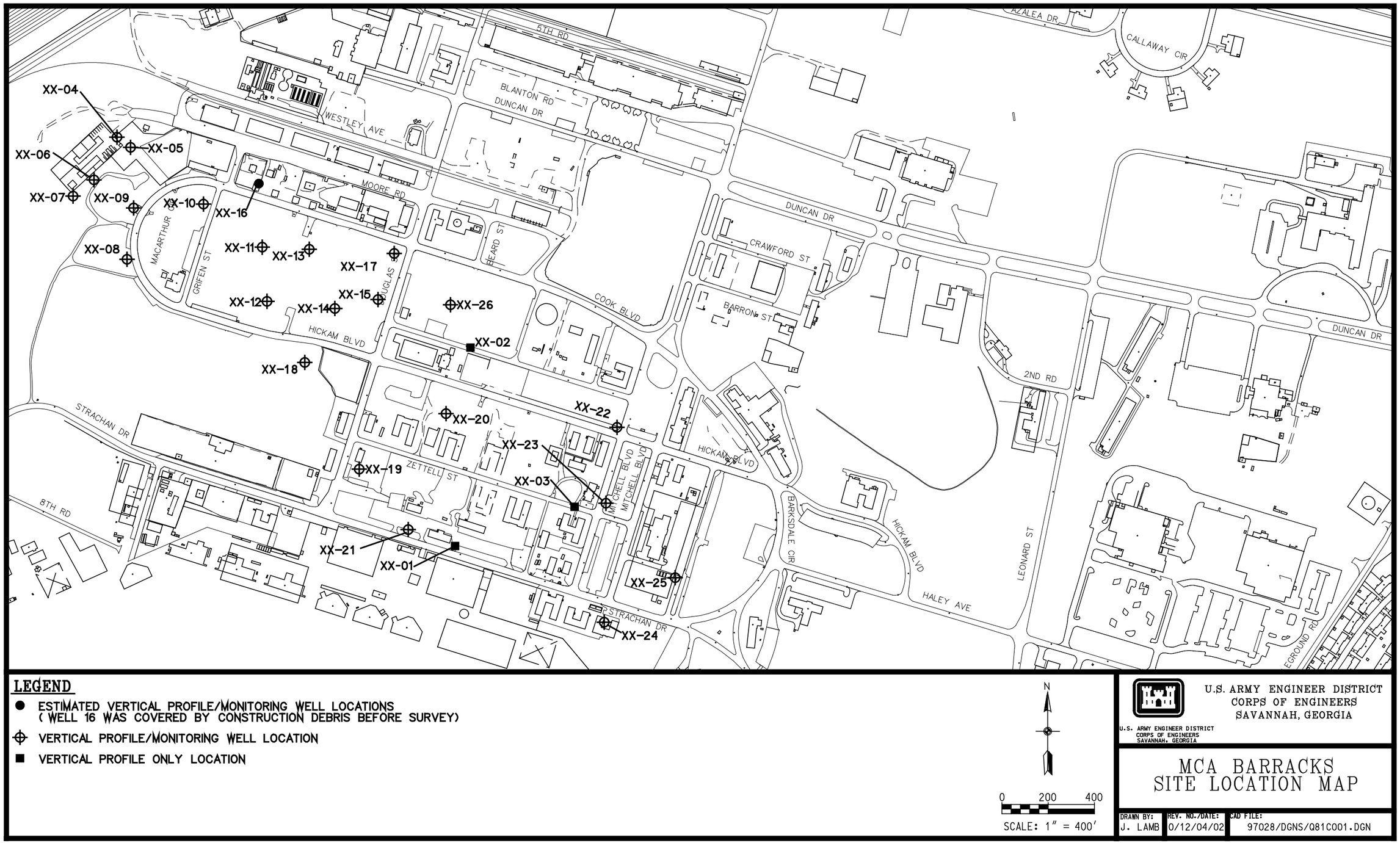


Figure A-5. Site Location Map of Former Pumphouse #1 (around P1-MW-02)



LEGEND

- ESTIMATED VERTICAL PROFILE/MONITORING WELL LOCATIONS (WELL 16 WAS COVERED BY CONSTRUCTION DEBRIS BEFORE SURVEY)
- VERTICAL PROFILE/MONITORING WELL LOCATION
- VERTICAL PROFILE ONLY LOCATION

N

0 200 400

SCALE: 1" = 400'

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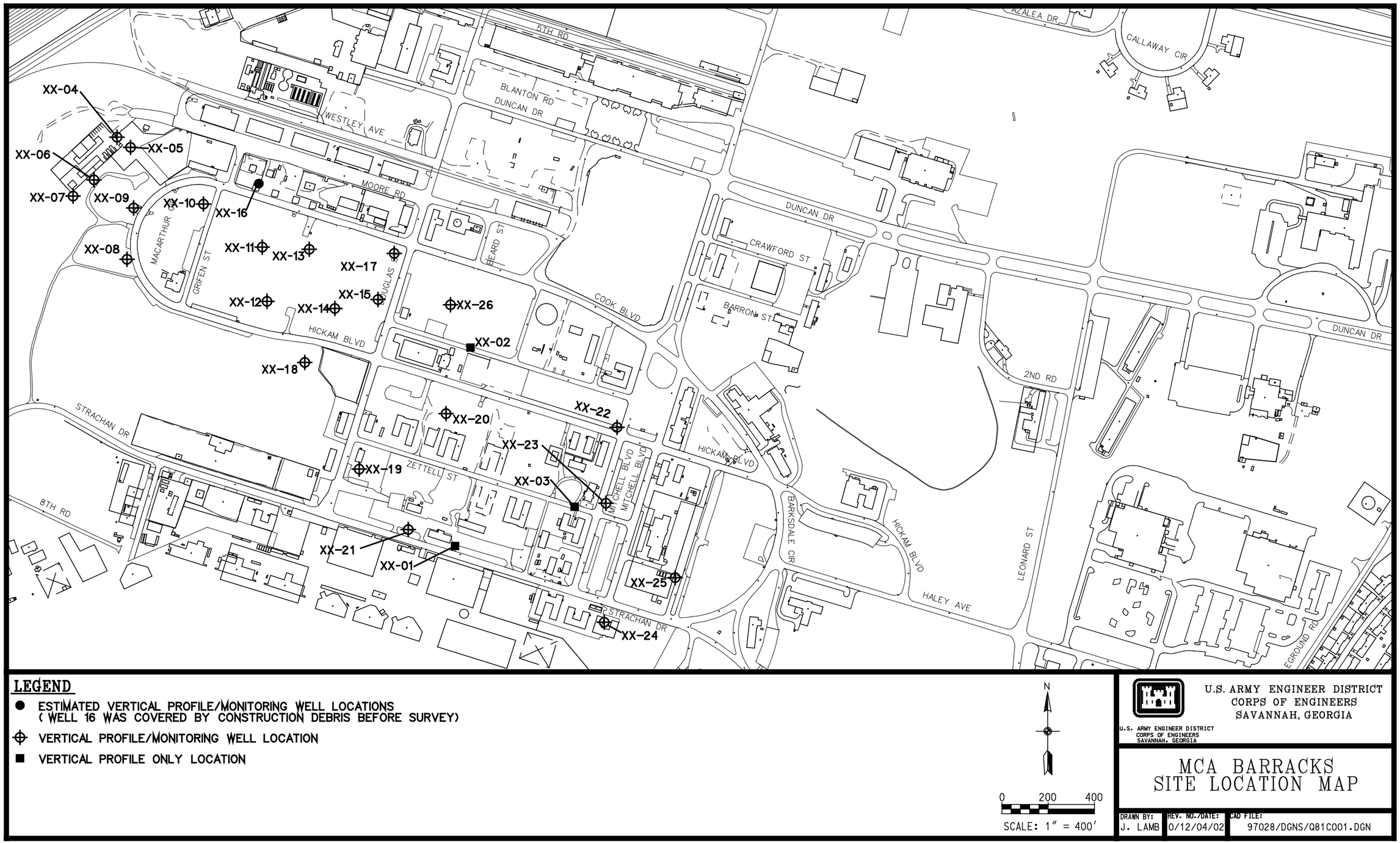
MCA BARRACKS
SITE LOCATION MAP

DRAWN BY:	REV. NO./DATE:	CAD FILE:
J. LAMB	0/12/04/02	97028/DGNS/Q81C001.DGN

Figure A-7. Site Location Map of the MCA Barracks



LEGEND

- ESTIMATED VERTICAL PROFILE/MONITORING WELL LOCATIONS (WELL 16 WAS COVERED BY CONSTRUCTION DEBRIS BEFORE SURVEY)
- VERTICAL PROFILE/MONITORING WELL LOCATION
- VERTICAL PROFILE ONLY LOCATION

N

0 200 400

SCALE: 1" = 400'

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MCA BARRACKS
SITE LOCATION MAP

DRAWN BY:	REV. NO./DATE:	CAD FILE:
J. LAMB	0/12/04/02	97028/DGNS/Q81C001.DGN

Figure A-7. Site Location Map of the MCA Barracks

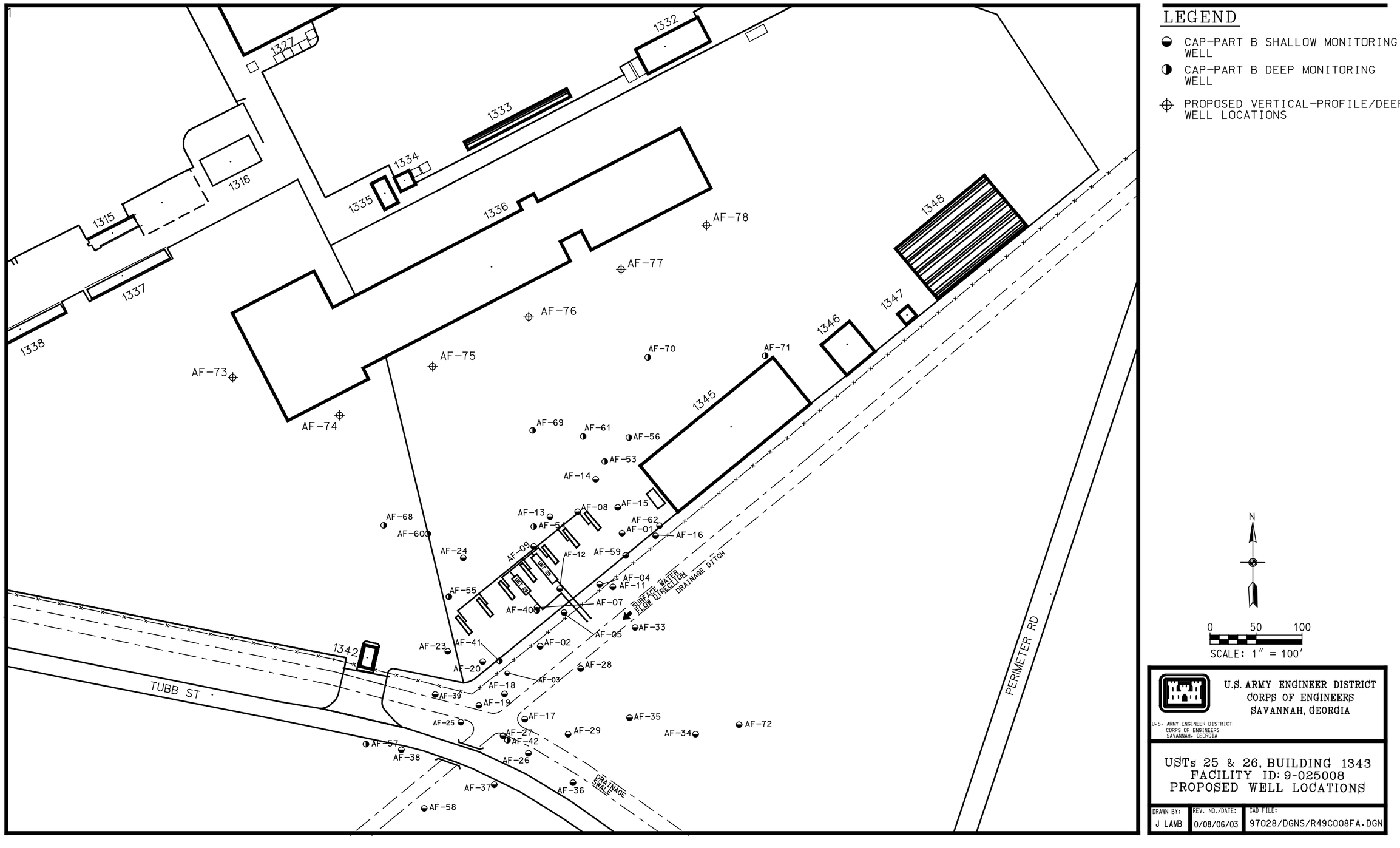

Figure A-8. Site Location Map of USTs 25 & 26