GSI

GeoStrategies Inc. — **LETTER OF TRANSMITTAL**

Environmental Consulting
Engineering and Geologic Services

DATE 3/5/93

TO: MS. JULIET SHIN
~~(CERTIFIED MAIL)~~ ALAMEDA COUNTY HEALTH AGENCY
HAND DELIVERED HAZARDOUS MATERIAL DIVISION
80 SWAN WAY Rm. 200
OAKLAND, CA. 94621

PROJECT NO. 7926
SUBJECT: WORK PLAN
ARCO SERVICE STATION #5387
20200 HESPERIAN BLVD.
SAN LORENZO, CA.

THE FOLLOWING ITEMS ARE:

☑ ATTACHED ☐ FORWARDED SEPARATELY VIA _____

QUANTITY	PROJECT NO.	DATE	DESCRIPTION
1	7926	3/4/93	WORK PLAN

THESE ARE TRANSMITTED as checked below:

☐ For approval
☑ For your use
☐ As requested
☐ For review and

☐ Approved
☐ Approved as noted
☐ Returned for
☐ Other _____

COMMENTS:

Signed: Robert C. Mallory

☑ 2140 W. Winton Avenue, Hayward, CA 94545
(510) 352-4800 - FAX (510) 783-1089

☐ 601 University Avenue, Suite 150, Sacramento, CA 95825
(916) 568-7500 - FAX (916) 568-7504

Copies To:

MR. MICHAEL WHELAN, ARCO PRODUCTS CO.
MR. H. C. WINSOR, ARCO PRODUCTS CO.
MR. RICHARD HIETT, RWQCB - S.F. REGION (CERTIFIED MAIL)

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GeoStrategies Inc.

WORK PLAN

ARCO Service Station No. 5387
20200 Hesperian Boulevard
San Lorenzo, California

792608-10

March 4, 1993

GeoStrategies Inc.

March 4, 1993

ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

Attn: Mr. Michael Whelan

Re: WORK PLAN
ARCO Service Station No. 5387
20200 Hesperian Boulevard
San Lorenzo, California

Gentlemen:

This Work Plan by GeoStrategies Inc. (GSI) describes the next phase of work required to assess the feasibility of vapor extraction/air sparging at the above referenced site (Plate 1). **The proposed scope of work includes the installation of up to three vapor extraction wells if warranted by field screening of soil samples collected from exploratory borings A-A, A-B, and A-C, one groundwater extraction well, one air sparging/vapor extraction well and one air sparging well.** An air sparging/vapor extraction test will be performed to assess the feasibility of these technologies to address the petroleum hydrocarbons beneath the site. The locations of proposed wells are shown on Plate 2. This scope of work was prepared at the request of ARCO Products Company in order to implement previously submitted Remedial System Timeline. Field work and laboratory analysis methods will be performed to comply with current State of California Water Resources Control Board (SWRCB) and Alameda County Health Agency guidelines. In addition, standard Gettler-Ryan Inc. and GSI Field Methods and Procedures were presented in a GSI Work Plan dated April 26, 1991.

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SITE BACKGROUND

In August 1986, ARCO Products Company (ARCO) retained Groundwater Technology Inc. (GTI) to conduct an environmental investigation at the site. GTI drilled four soil borings designated SB-1 through SB-4 and converted three of the four borings into groundwater monitoring wells designated MW-1 through MW-3. Total petroleum hydrocarbons were detected in soil in borings SB-2, SB-3, and SB-4 at concentrations of 49 parts per million (ppm), 42 ppm, and 20 ppm, respectively. Petroleum hydrocarbons were detected in groundwater samples from the three wells ranging from 2.9 to 14 ppm. Results were presented in a GTI report dated August 21, 1986.

In October and December 1991, GSI installed four additional groundwater wells designated A-4 through A-7. Total petroleum hydrocarbons were detected in soil only from Boring A-4. Groundwater samples collected from the entire monitoring network detected petroleum hydrocarbons in six of the seven wells ranging in concentrations from 1,600 ppb to 23,000 ppb. Results were presented in a GSI report dated March 6, 1992.

In August 1992, GSI installed two groundwater monitoring wells (A-8 and A-9) and one groundwater recovery well (AR-1) at the site. TPH-Gasoline was detected in the soil samples from Boring AR-1 collected at depths of 10.0 and 14.5 feet below grade at concentrations of 1.0 ppm and 8.8 ppm, respectively. TPH-Gasoline was reported as ND for soil samples collected from Borings A-8 and A-9. Groundwater samples collected from each well were analyzed for TPH-Gasoline and BTEX. TPH-Gasoline was detected in Well AR-1 at a concentrations of 820 ppb and reported as ND for Wells A-8 and A-9. Results of this investigation are presented in a GSI Continuing Site Assessment/Quarterly Monitoring Report dated December 21, 1992.

In October 1992, GSI performed a 4-hour step-drawdown and 24-hour constant-rate aquifer tests at the site. The tests were performed to assess the feasibility of utilizing recovery well AR-1 as an extraction well and to assess groundwater flow parameters of the uppermost aquifer beneath the site. Results of these tests are also presented in the GSI Continuing Site Assessment/Quarterly Monitoring Report dated December 21, 1992.

In November 1992, GSI installed one offsite groundwater monitoring well (A-10) downgradient of the site. TPH-Gasoline was reported as ND in soil samples submitted from Boring A-10. Soil samples were collected at depths of 13.0 and 16.5 feet below grade (fbg). TPH-Gasoline was detected in the groundwater sample collected from Well A-10 at a concentrations of 660 ppb. Results are presented in GSI Quarterly Monitoring/Well Installation Report dated January 29, 1993.

Quarterly groundwater monitoring and sampling of site wells began in December 1991. Groundwater samples are currently analyzed for TPH-Gasoline according to EPA Method 8015 (Modified) and BTEX according to EPA Method 8020.

HYDROGEOLOGIC CONDITIONS AND SITE GEOLOGY

The site is located within the San Francisco bay plain approximately 2.5 miles east of the San Francisco Bay and approximately 0.2 miles north of Sulphur Creek. The area is underlain by Holocene-age alluvial deposits consisting of unconsolidated, moderately sorted, fine grain sand and silt, with clayey silt and occasional thin beds of coarse sand (Helley, E. J. and others., 1972).

Based on available boring logs, the unsaturated zone consists primarily of clay and silts. The first encountered saturated zone was observed in the borings between 17 and 18.5 fbg. The saturated zone grades into coarser grain materials with depth. Coarse grain silty sand, sand and gravelly sand were observed in Borings A-4 through A-6 to the total explored depth of 35 fbg. A distinct basal aquitard was not observed in any of the borings.

The shallow aquifer appears to be unconfined with the estimated flow direction to the northwest at a calculated gradient of 0.003.

HYDROCARBON DISTRIBUTION

There are currently six groundwater monitoring wells on-site and four groundwater monitoring wells off-site. Analysis of groundwater samples collected in the fourth quarter of 1992 found detectable levels of TPH-Gasoline at concentrations ranging from 140 ppb (Well AR-1) to 16,000 ppb (Well MW-2, Plate 3). Wells A-6, A-8 and A-9 were reported as none detected (ND) for TPH-Gasoline. Benzene concentrations ranged from 7.2 ppb (well A-4) to 3800 ppb (Well MW-2) (Plate 4). Benzene was reported as ND in Wells A-6, A-8, and A-9. Petroleum hydrocarbons generally occur in wells located downgradient and crossgradient of the fuel tanks and service islands. The lateral extent of hydrocarbon impact to the soil beneath the site appears to be limited to areas adjacent to the existing underground storage tank (UST) complex and Well A-5 (Plate 5). Elsewhere, hydrocarbons impacting the soil appear to be limited to the capillary fringe above the hydrocarbon plume.

TECHNICAL RATIONALE

Based on a review of available soil chemical analytical data for this site, additional soil characterization is required to reasonably evaluate potential hydrocarbon impact to in the soil adjacent to and downgradient of the underground storage tank (UST) complex. Three exploratory soil borings are proposed in the vicinity of the UST complex, and may be completed as wells, as described below.

Results of aquifer testing indicate that a second recovery well is required to hydrodynamically control and capture dissolved hydrocarbons in shallow groundwater. The proposed groundwater recovery well will be located adjacent to Well MW-2 and will be constructed as a dual vapor/groundwater extraction well. The vapor extraction mode of this well may be used to address impacted soil as identified in samples from Well A-5.

To evaluate the feasibility of remediating potential impacted soil and enhancing the proposed groundwater extraction system, an air sparging/vapor extraction test is proposed. One dual completion air sparging/vapor extraction well and one air sparging well will be installed for use during the test. Soil samples collected from these borings will be used to evaluate soil conditions downgradient of the UST complex. The proposed boring and well locations are shown on Plate 2.

SCOPE OF WORK

The following tasks are proposed:

TASK 1: Three 8-inch-diameter exploratory borings (A-A, A-B, and A-C) will be drilled to 1-foot below first encountered water, at an anticipated depth of approximately 17 fbg. Conventional hollow-stem auger techniques will be used to advance the borings.

TASK 2: Soil samples will be collected using a Modified California split-barrel sampler equipped with pre-cleaned stainless steel liners advanced ahead of the drill bit. **Soil samples will be collected at five-foot intervals and at significant lithologic changes, at a minimum, for lithologic identification, the borings will be logged by a GSI geologist using the Unified Soil Classification System (ASTM-D2488-84) and the Munsell Soil Color Chart. Selected soil samples will be field screened for the presence of hydrocarbons. Borings that screen positive for hydrocarbons will be completed as vapor extraction wells.**

Vapor extraction wells will be constructed of 4-inch Schedule 40 PVC casing and 0.06-inch continuous wrap PVC well screen.

TASK 3: **Drill three 8-inch-diameter exploratory borings to approximately 35 fbg.** Collect samples as stated above. Selected soil samples will be labeled, placed in a cooler with blue ice and transported under Chain-of-Custody to a California State-certified analytical laboratory for analysis.

TASK 4: **Two exploratory borings will be reamed to 12 inches in diameter and completed as one 6-inch groundwater extraction well (AR-2), and one dual completion air sparging/vapor extraction well (AS-1). One 1-inch air sparging well (AS-2) will be completed in the remaining 8-inch-diameter boring.** The wells will be constructed per the well construction details (Appendix A) and GSI Field Methods and Procedures.

TASK 5: Recovery well AR-2 will be properly developed. Following well development, the wells will be sampled for parameters listed in Task 6.

TASK 6: Soil and ground-water samples will be analyzed for TPH-Gasoline using EPA Method 8015 (Modified); and Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) using EPA Method 8020/602.

TASK 7: Perform an 8-hour air sparging/vapor extraction test to evaluate the feasibility of using air sparging to enhance groundwater remediation and vapor extraction as a soil remediation technique.

TASK 8: Upon completion of field work and receipt of chemical analytical data, a report will be prepared presenting the field and laboratory data, including copies of the exploratory borings logs, certified analytical reports, and the results of the air sparging/vapor extraction test. This report will be prepared under the supervision of a State of California Registered Geologist. The testing equipment will be either and internal combustion engine or blower and activated carbon skid.

If you have any questions, please call.

GeoStrategies Inc. by,

Cliff M. Garratt
Hydrogeologist

John F. Vargas
Senior Geologist
R.G. 5046

C.E.G. 1351
Exp: 6-30-94

CMG/JFV/rt

Plate 1. Vicinity Map
Plate 2. Site Plan
Plate 3. Fourth Quarter TPH-G Isoconcentration Map
Plate 4. Fourth Quarter Benzene Isoconcentration Map
Plate 5. Soil Hydrocarbon Map

Appendix A: Well Construction Details

QC Review: nem

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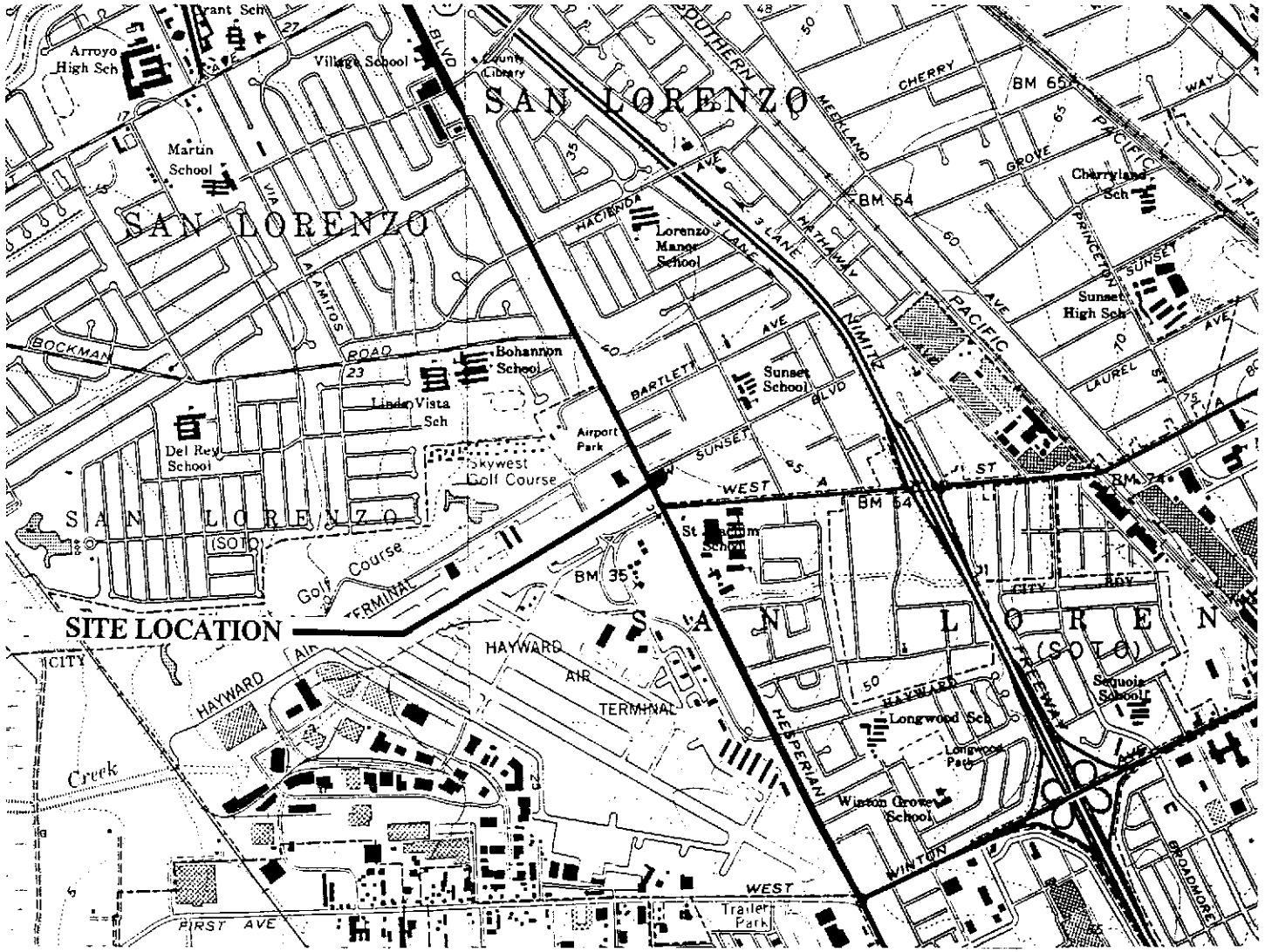
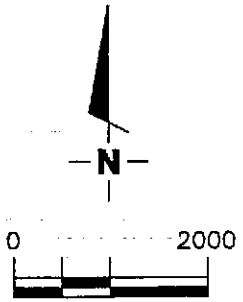




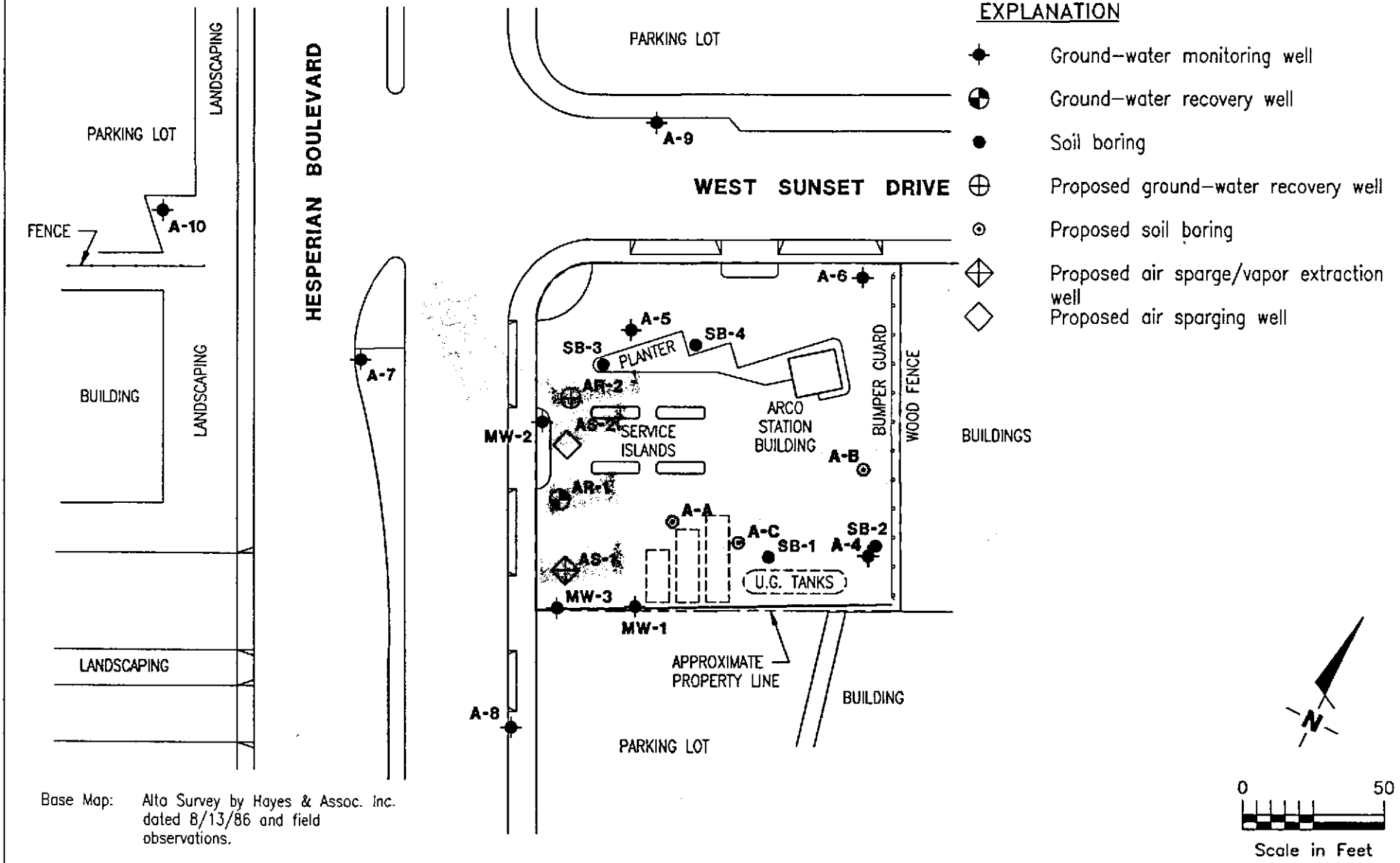
Base Map: USGS Topographic Map

GeoStrategies Inc.

VICINITY MAP
ARCO Service Station #5387
20200 Hesperian Boulevard
San Lorenzo, California

PLATE **1**

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
7926		11/91	



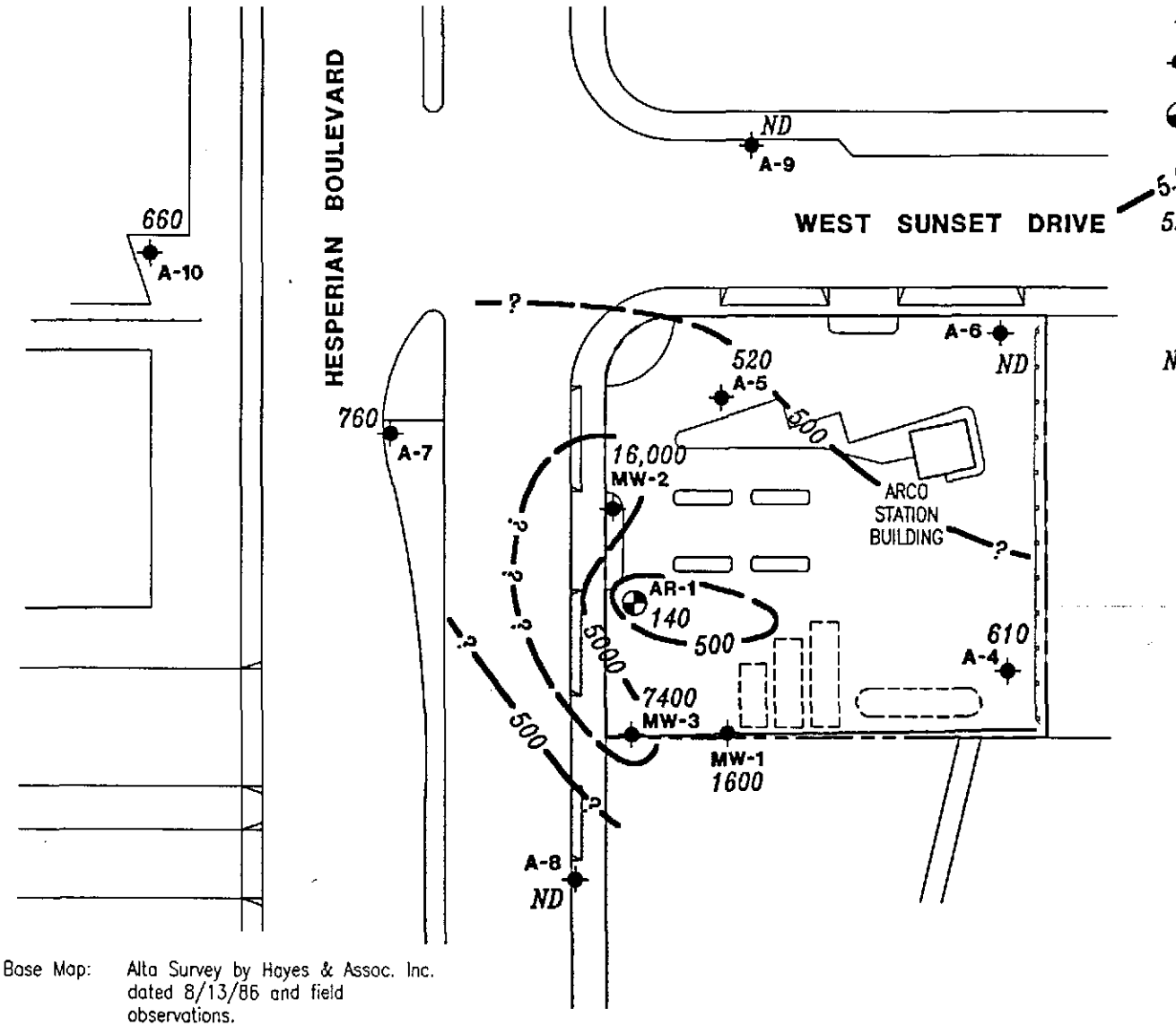
Base Map: Alta Survey by Hayes & Assoc. Inc. dated 8/13/86 and field observations.

GeoStrategies Inc.

SITE PLAN
ARCO Service Station #5387
20200 Hesperian Boulevard
San Lorenzo, California

PLATE
2

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
7926		2/93	



EXPLANATION

- Ground–water monitoring well
- Ground–water recovery well
- 5.00 — TPH–G isoconcentration contour
- 5.0 — TPH–G (Total Petroleum Hydrocarbons calculated as Gasoline) concentration in ppb sampled on November 12, 1992
- ND — Not Detected (See laboratory reports for detection limits)

NOTES: 1. Well A–10 was installed on 11–18–92 and is not used in contouring this quarter.

Base Map: Alta Survey by Hayes & Assoc. Inc. dated 8/13/86 and field observations.

N

0 50

Scale in Feet

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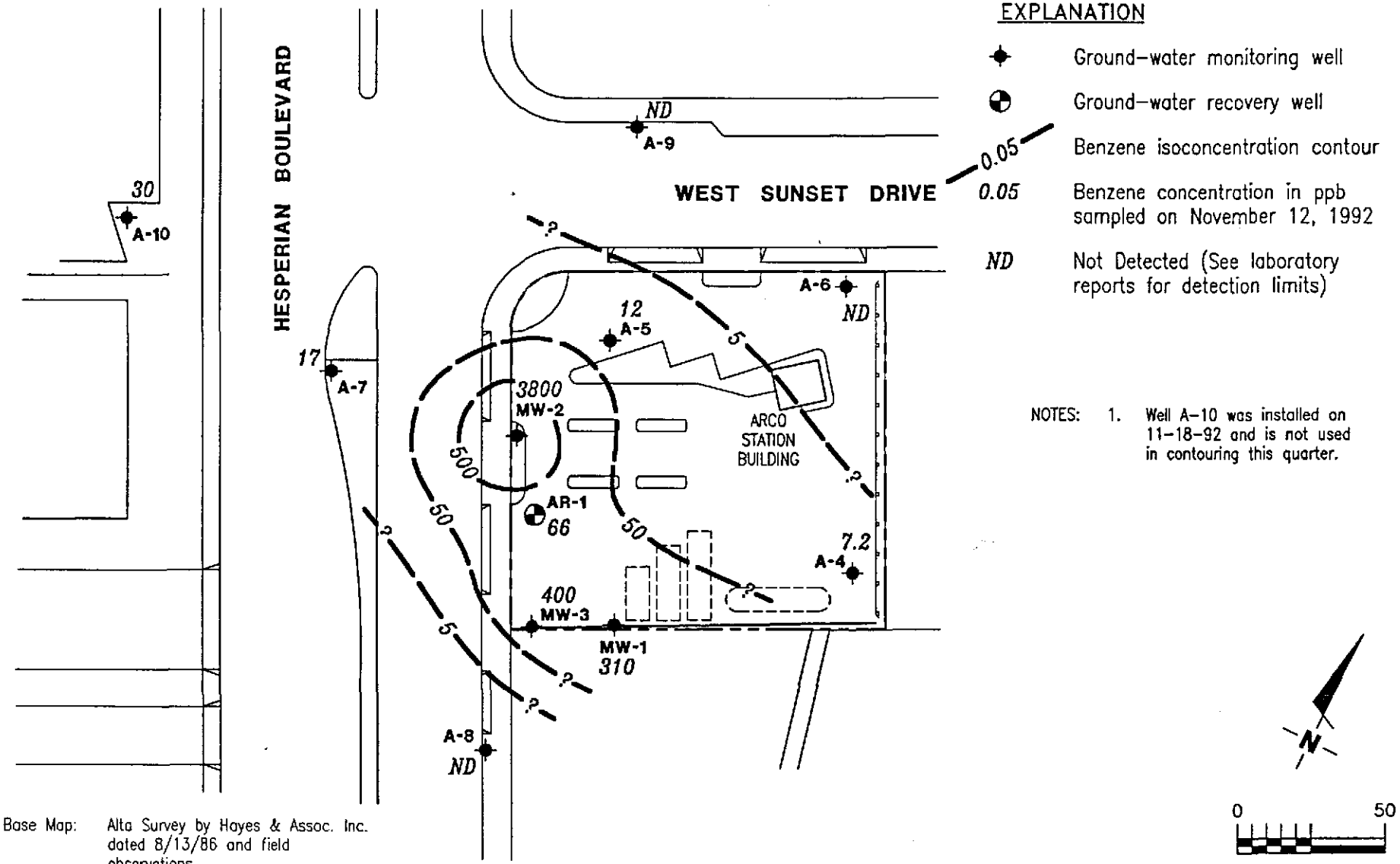
TPH–G ISOCONCENTRATION MAP
ARCO Service Station #5387
20200 Hesperian Boulevard
San Lorenzo, California

PLATE 3

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
792608–10		1/93	



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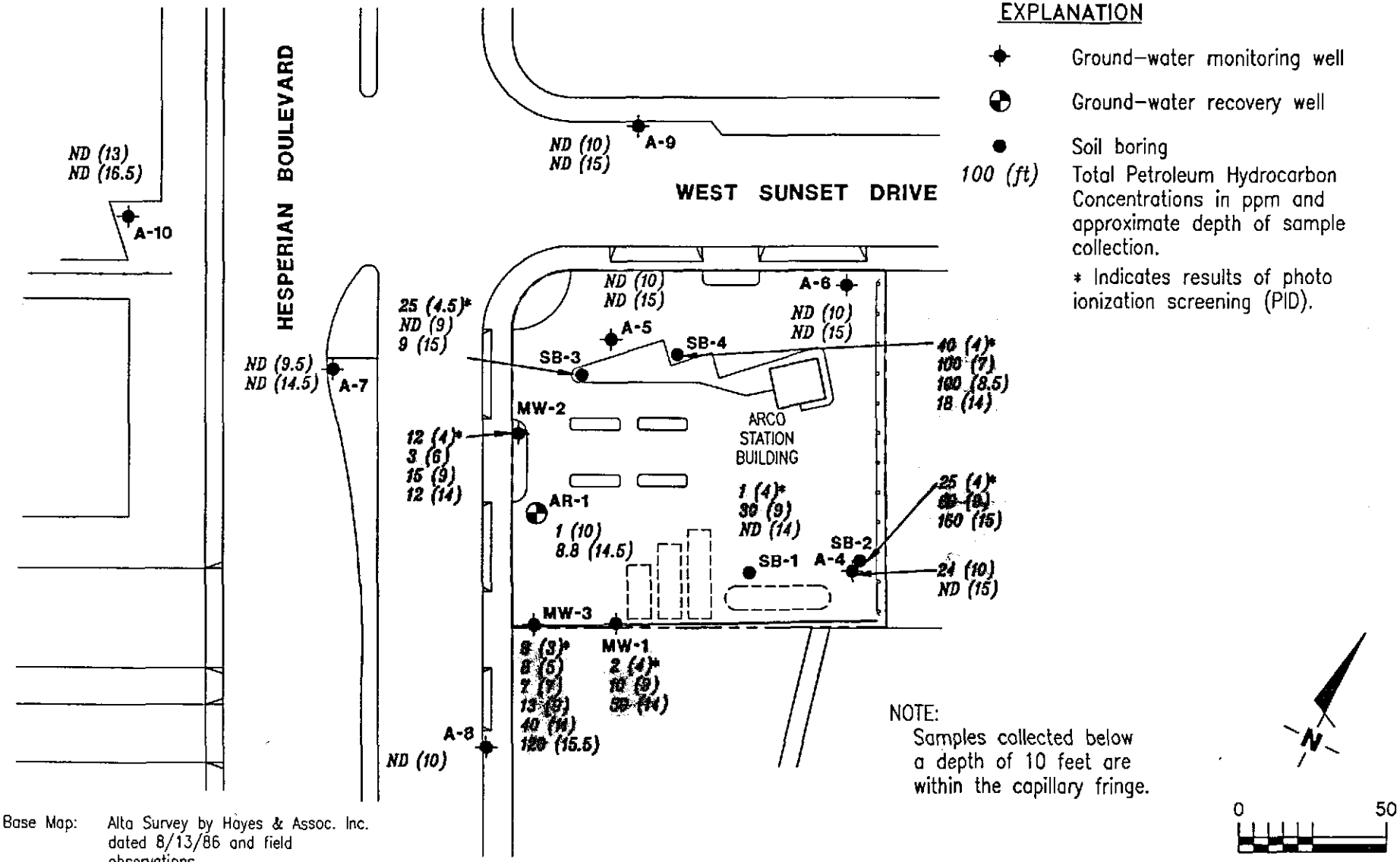
BENZENE ISOCONCENTRATION MAP
ARCO Service Station #5387
20200 Hesperian Boulevard
San Lorenzo, California

PLATE 4

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
792608-10		2/93	



Base Map: Alta Survey by Hayes & Assoc. Inc. dated 8/13/86 and field observations.

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SOIL HYDROCARBON MAP
ARCO Service Station #5387
20200 Hesperian Boulevard
San Lorenzo, California

PLATE 5

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
792608–10	RCM	2/93	

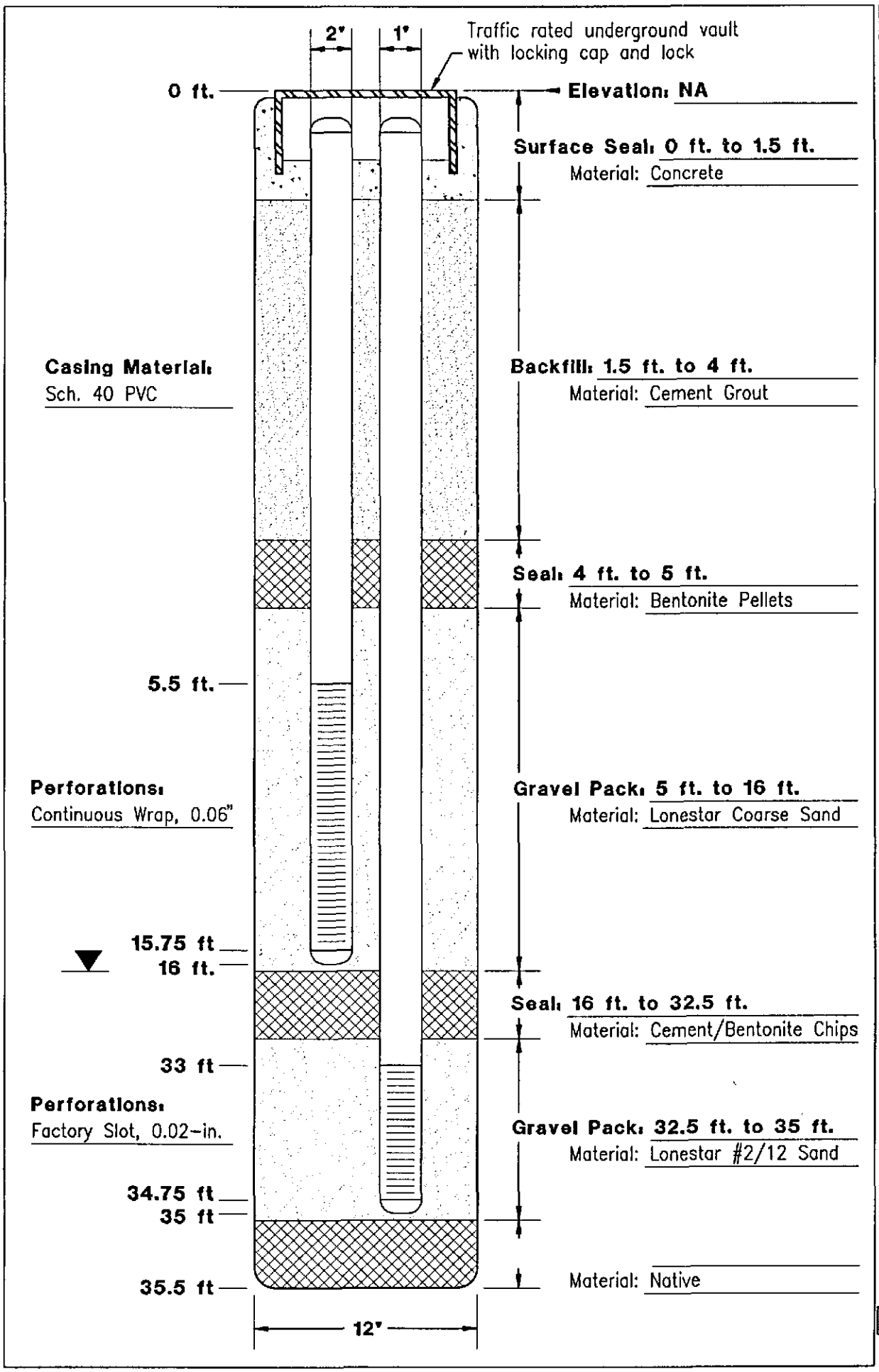

PLATE AS-1

WELL CONSTRUCTION DETAIL
Dual Completion Air sparge/Vapor Extraction

GeoStrategies Inc.

DATE 2/93

REVISED DATE

REVIEWED BY WCM

JOB NUMBER 792608-10

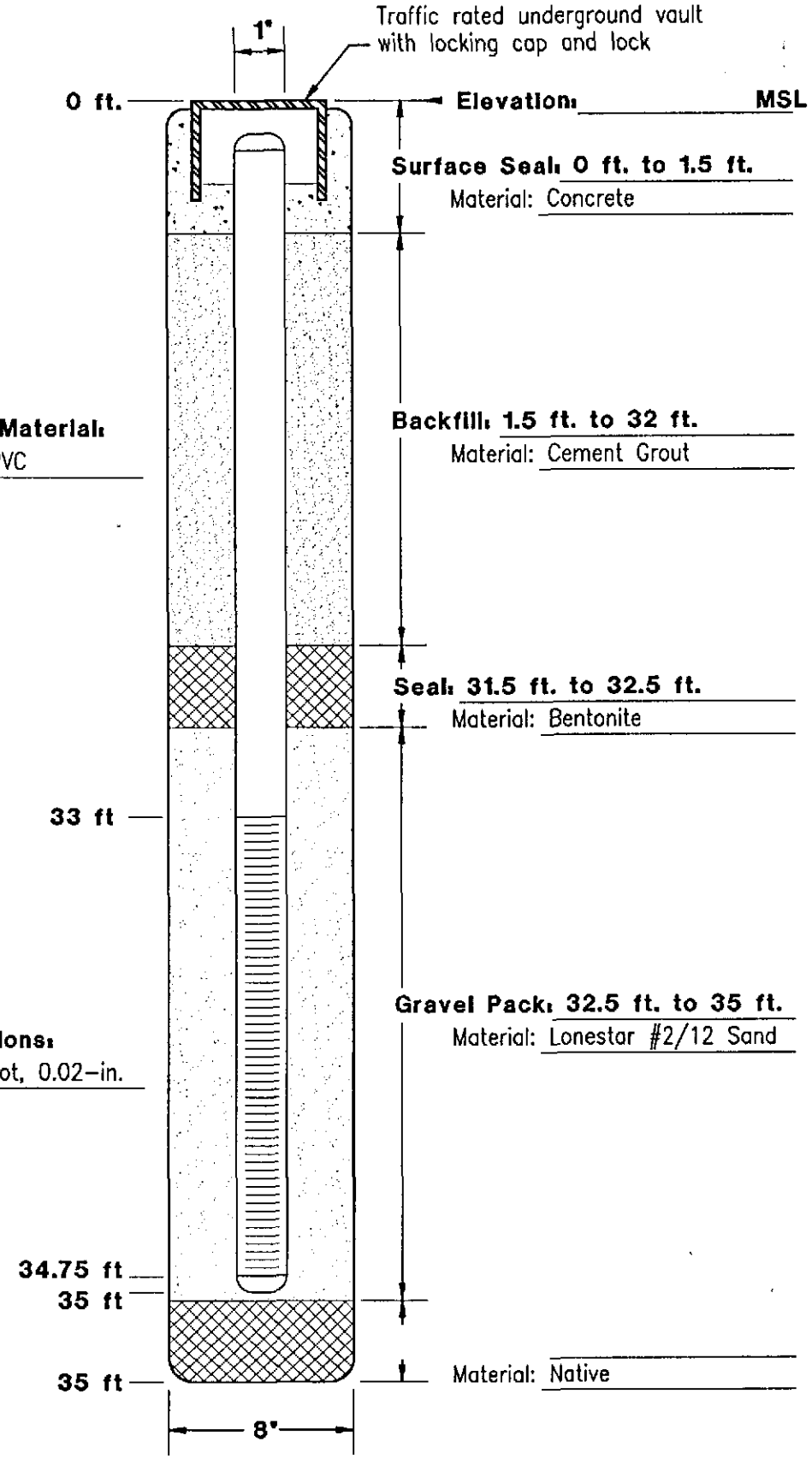

PLATE
AS-2

WELL CONSTRUCTION DETAIL
Air Sparging

REVISED DATE

DATE
2/93

REVIEWED BY

JOB NUMBER
792608-10

GeoStrategies Inc.

GSI

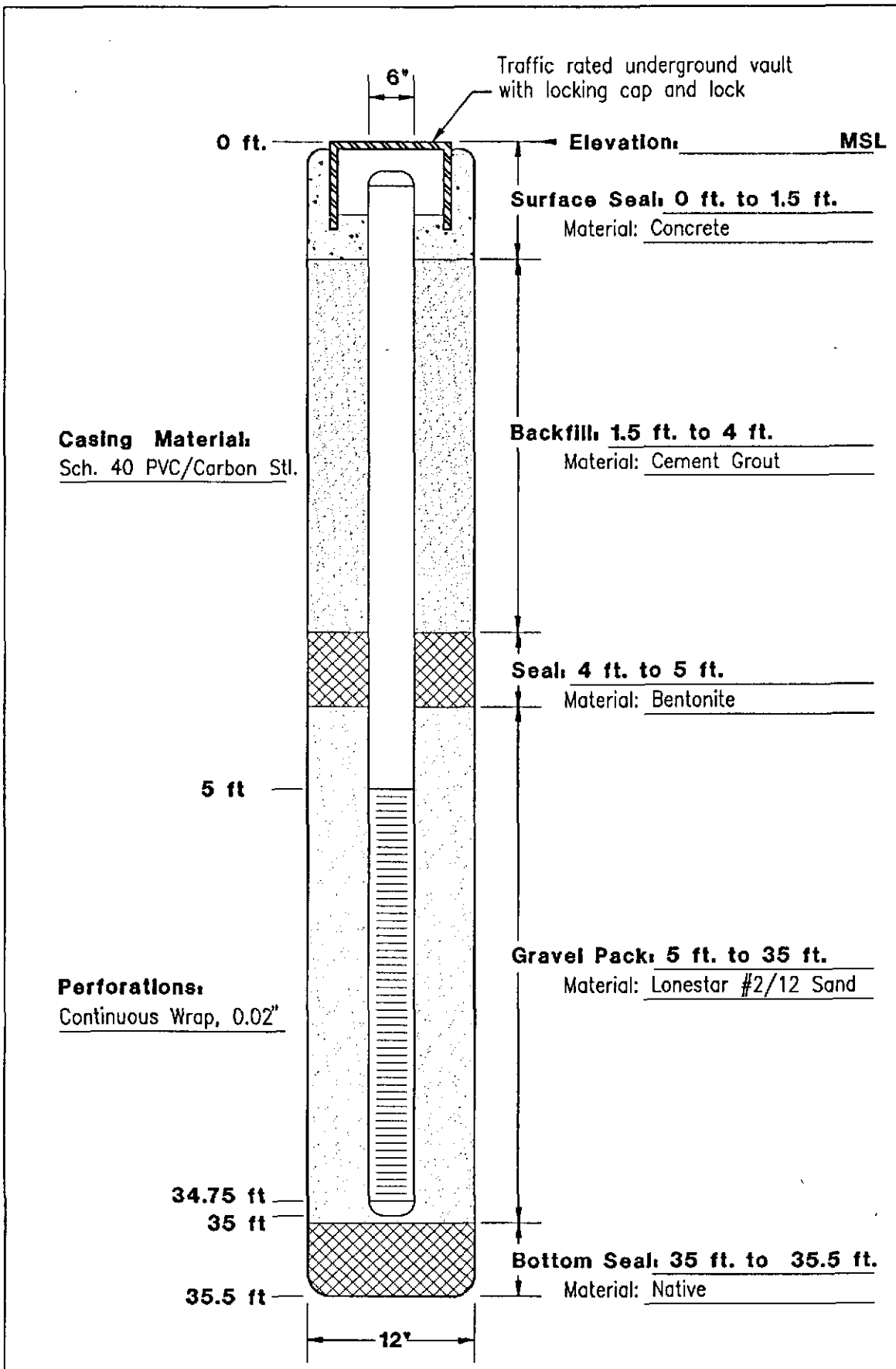

PLATE **AR-2**

WELL CONSTRUCTION DETAIL
Vapor/Groundwater Extraction

REVISED DATE

DATE 2/93

REVIEWED BY

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JOB NUMBER 792608-10

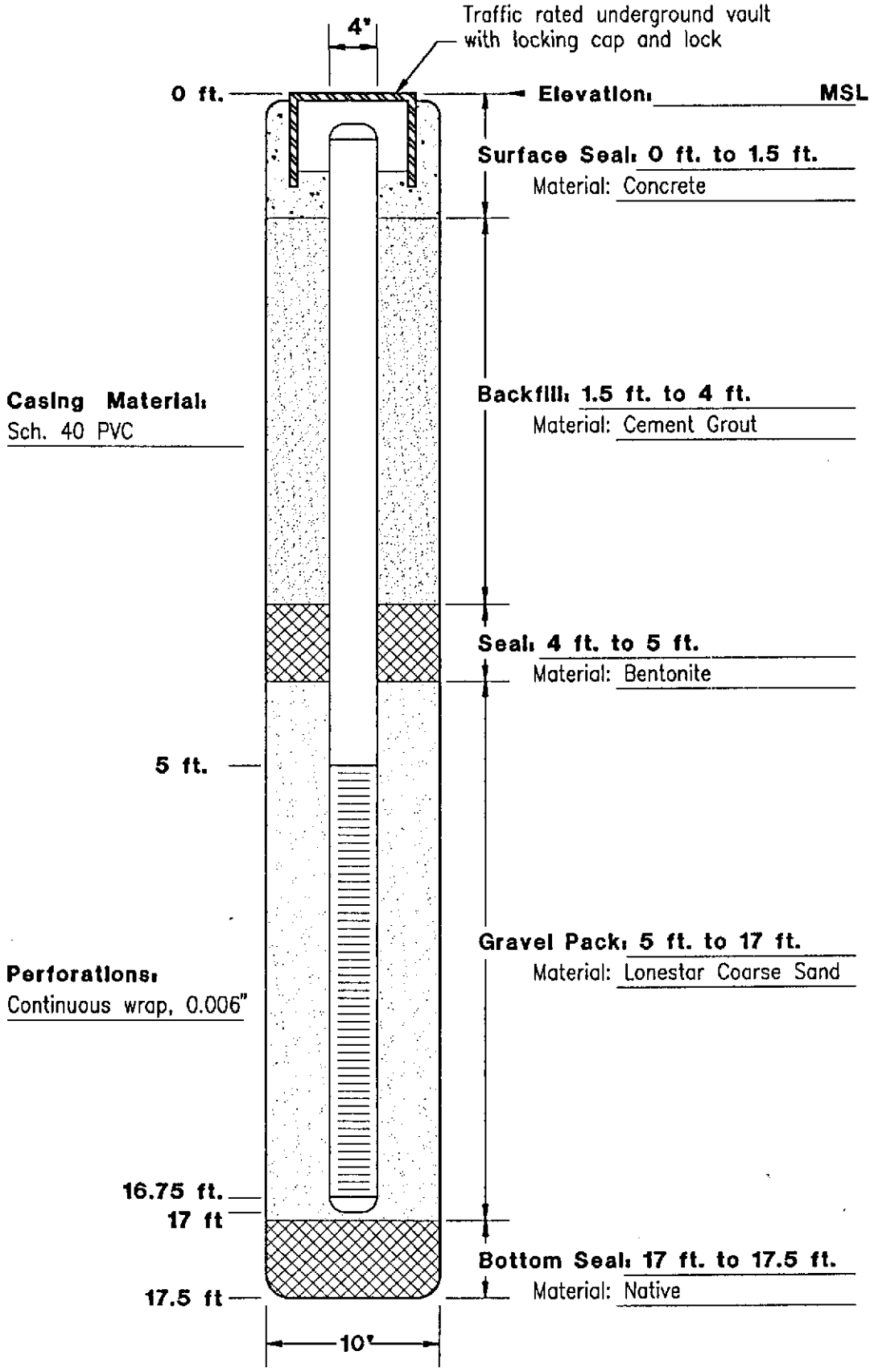

PLATE VE

WELL CONSTRUCTION DETAIL
Vapor Extraction

REVISED DATE

DATE 2/93

REVIEWED BY

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JOB NUMBER 792608-10