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GEOMATRIX

3 December 1996
Project 2906

Ms. Nancy Hendrickson
Pacific Gas & Electric Company
77 Beale Street
San Francisco, California 94106

Subject: Soil Boring and Shallow Groundwater Investigation Work Plan
PG&E Substation "J" and East Bay Municipal Utility District Property
Oakland, California

Dear Ms. Hendrickson:

At your request, Geomatrix Consultants, Inc. (Geomatrix), has prepared this work plan on behalf of Pacific Gas & Electric Company (PG&E) to perform a soil boring and shallow groundwater investigation at the PG&E Substation J property and at the East Bay Municipal Utility District (EBMUD) property in Oakland, California (Figure 1). It is our understanding that the work plan will be submitted to the Alameda County Department of Health Services (ACDHS) for approval. The objectives of the investigation, the field methods, reporting, and schedule are discussed below.

OBJECTIVES

The investigation includes an evaluation of two properties adjacent to the PG&E property located at 5051 Coliseum Way: PG&E Substation J located to the northwest of 5051 Coliseum Way and the EBMUD property located southeast of 5051 Coliseum Way. The objectives of the Substation J investigation are to evaluate the potential occurrence of waste material at the Substation J site; to assess the vertical and lateral extent of the waste material if present; and to evaluate groundwater quality in the vicinity of the waste material if present. The current site configuration is shown on Figure 1, overlaying a 1950 aerial photograph of the site and its vicinity. This figure illustrates that the drainage channel was relocated during an expansion of the Substation J. The photo also indicates that waste material known to occur at the 5051 Coliseum Way property (documented in the Site Characterization Report for the 5051 Coliseum Way property prepared by Geomatrix in July 1996 and submitted to the ACDHS) may occur under a portion of the Substation J property. This portion of the investigation has been designed to evaluate the possible presence of this waste material at the Substation J site and its potential impacts.

The objective of the investigation at the EBMUD property is to determine whether shallow groundwater discharges to the drainage ditch on the southeast side of the property. A potentiometric surface map (Figure 2) suggests that groundwater may flow towards the drainage ditch.

FIELD METHODS

Geomatrix will advance a total of six soil borings at the Substation J site adjacent to the drainage channel and two borings at the EBMUD property (Figure 1). Soil boring locations are limited at the Substation J site due to the presence of high voltage transformers and electrical lines. Prior to drilling, the soil boring locations will be cleared by a private underground utility locator and by notifying USA. In addition, soil boring permits will be obtained from the Alameda County Flood Control and Water Conservation District, Zone 7. Borings at the Substation J site will be advanced using a hydraulically driven core barrel and drive sampler at each sampling location to approximately 5 feet below the water table. Borings at the EBMUD property will be advanced using a hollow-stem auger drill rig. The total depth of boring at each location is expected to be between 15 and 20 feet. A continuous core of the subsurface material will be collected, examined, and logged at each boring location.

Soil samples will be collected for chemical analysis in the borings at approximately 2 feet below ground surface, in the waste material if observed or in the soil immediately above the Bay Mud, and approximately 1 to 2 feet below the top of the Bay Mud. In addition, if the fill unit above the waste is greater than 6 feet in thickness, a second sample within the lower portion of the unit will be collected for chemical analysis. Soil samples will be collected in brass sleeves and sealed with Teflon sheets, end caps, and tape.

A grab groundwater sample will be collected from each boring at the Substation J site. A 1-inch-diameter PVC well screen and casing will be installed in the boring and when sufficient groundwater has entered the screen, a groundwater sample will be collected using a clean Teflon bailer. Following sample collection, the PVC casing will be removed and the boreholes will be filled with grout.

Groundwater monitoring wells will be installed in the two borings at the EBMUD property. The monitoring wells will be constructed of 2-inch-diameter PVC and are expected to be screened between the depths of 9 and 19 feet (screens will be placed to intersect the water table). A sand filter pack will be placed in each borehole from the bottom of the borehole to approximately 1 foot above the well screen. A 1-foot bentonite seal will be placed above the sand filter pack. A cement-bentonite grout will be placed in the remaining annular space. Following well installation, Geomatrix will develop the wells and collect groundwater samples from the wells. Groundwater samples will be collected using clean Teflon bailers.

All groundwater samples (grab and from the wells) will be tested in the field for pH and conductivity. Samples for metals analysis will be filtered using a 0.45 micron filter prior to placement in the sample bottles. The samples for metals analysis will also be acidified with nitro acid to pH less than 2. All groundwater samples will be placed in United States Environmental

Protection Agency (EPA) approved sample containers. Soil and groundwater samples will be stored in an ice cooled chest and delivered to a state-certified analytical laboratory under Geomatrix chain-of-custody procedures.

Soil samples will be analyzed for CAM 17 metals by EPA Method Series 6000/7000 and pH by EPA Method 9045. Groundwater samples will be analyzed for CAM 17 metals by EPA Method Series 6000/7000 and for total dissolved solids by EPA Method 160.1.

REPORT PREPARATION

Geomatrix will prepare a report which summarizes the methodologies and the field investigation and laboratory analyses. This report will be submitted to ACDHS.

SCHEDULE

Geomatrix anticipates that the field work at the Substation J site will commence on 10 December 1996, pending approval from the ACDHS. The chemical analytical results should be available within two weeks following the sample collection. Installation of monitoring wells will commence in four to six weeks, pending approval from ACDHS and an access agreement with EBMUD. Our final report should be available within one month of the receipt of the analytical data.

We look forward to working with you on this project. Please contact either of the undersigned if you have any questions or require additional information.

Sincerely,

GEOMATRIX CONSULTANTS, INC.

Michael R. Keim
Project Scientist

Sally Goodin
Principal Geologist

MRK/SG/dmm
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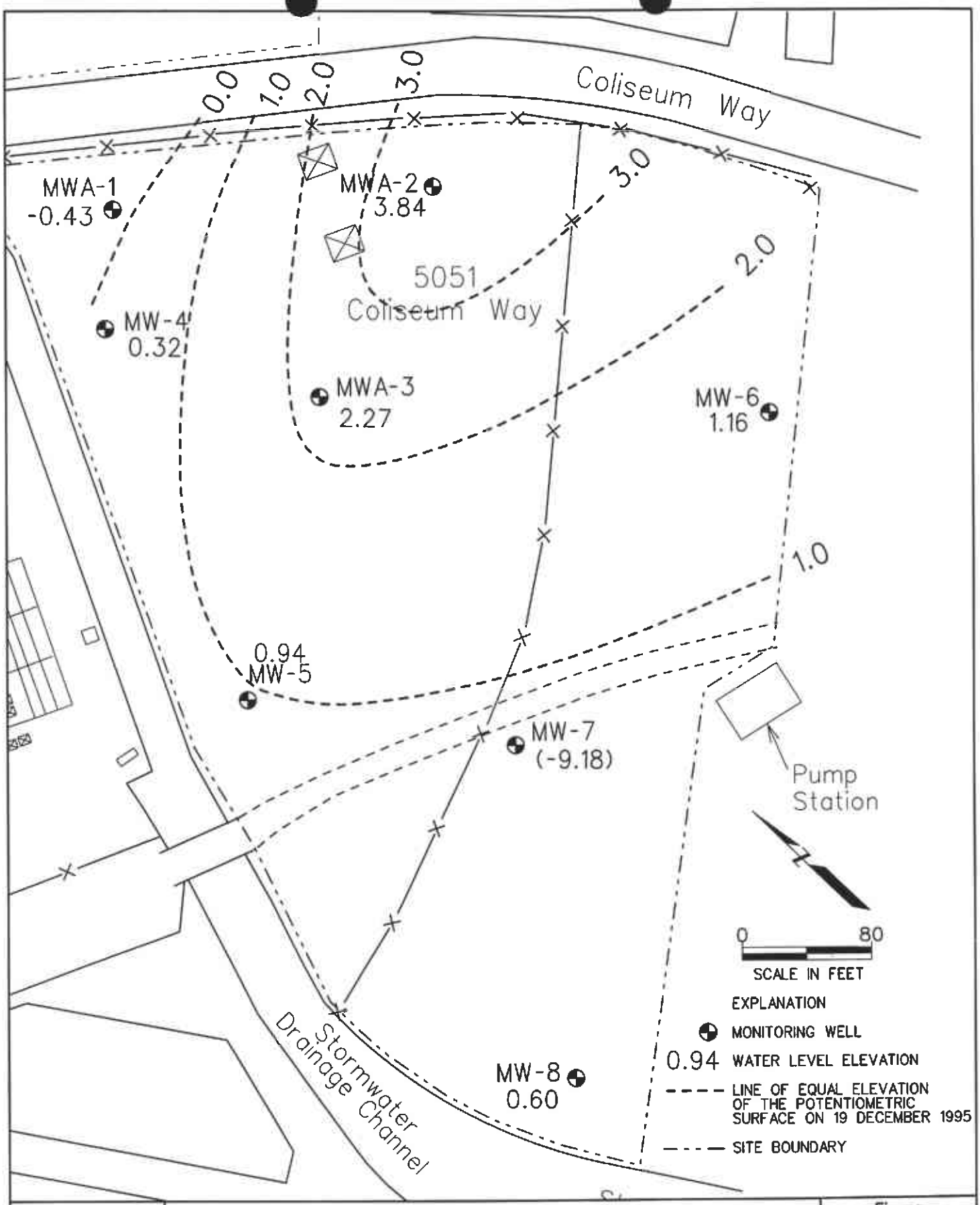
EXPLANATION

- Proposed boring location
- Proposed monitoring well location

PROPOSED BORING LOCATIONS
1950 PHOTO
PG&E Substation "J"
Oakland, California

GEOMATRIX	Project No. 2906	Figure 1



GEOMATRIX

POTENTIOMETRIC SURFACE MAP (HIGH TIDE)
19 DECEMBER 1995
5051 Coliseum Way
Oakland, California

Figure
2

Project No.
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TABLE 4

COST[1] SUMMARY
5051 Coliseum Way
Oakland, California

Option	Description	Total Cost[2] ($)
Option 1	Groundwater monitoring	466,000
Option 2	Groundwater monitoring and cap construction	1, 757,000
Option 3	Channel repair and groundwater monitoring	701,000
Option 4A	Channel repair and extension, ditch extension, cap construction and groundwater monitoring – length of extension = 250 feet	2,700,000
Option 4B	Channel repair and extension, ditch extension, cap construction and groundwater monitoring – length of extension = 900 feet	4,021,000
Option 5A	Groundwater extraction and treatment, groundwater monitoring and cap construction – treatment using evaporation/drying	7,683,000[3]
Option 5B	Groundwater extraction and treatment, groundwater monitoring and cap construction – treatment using membrane filtration	6,514,000[3]
Option 5C	Groundwater extraction and treatment, groundwater monitoring and cap construction – treatment using Unipure system	6,344,000[3]
Option 6	Slurry wall construction, groundwater extraction and treatment, cap construction and groundwater monitoring	7,788,000[4]
Option 7	Iron wall construction, cap construction and groundwater monitoring	3,204,000[4]
Option 8A	Ex-situ stabilization and groundwater monitoring	10,750,000[4]
Option 8B	In-situ stabilization, cap construction and groundwater monitoring	12,866,000[4]
Option 9	Excavation and removal of soil with elevated levels of metals and groundwater monitoring	16,516,600[4,5]

Notes:

1 Cost estimates do not include costs for community acceptance or any remediation which may be required off of the 5051 Coliseum Way property.
2 Cost represents 30-year present value cost.
3 If excavated lithopone waste were a RCRA hazardous material, costs would increase by approximately 5 to 10%
4 Costs do not include cost for possible removal of PG&E power lines and towers.
5 If excavated lithopone waste were a RCRA hazardous material, costs would increase by approximately 35%.

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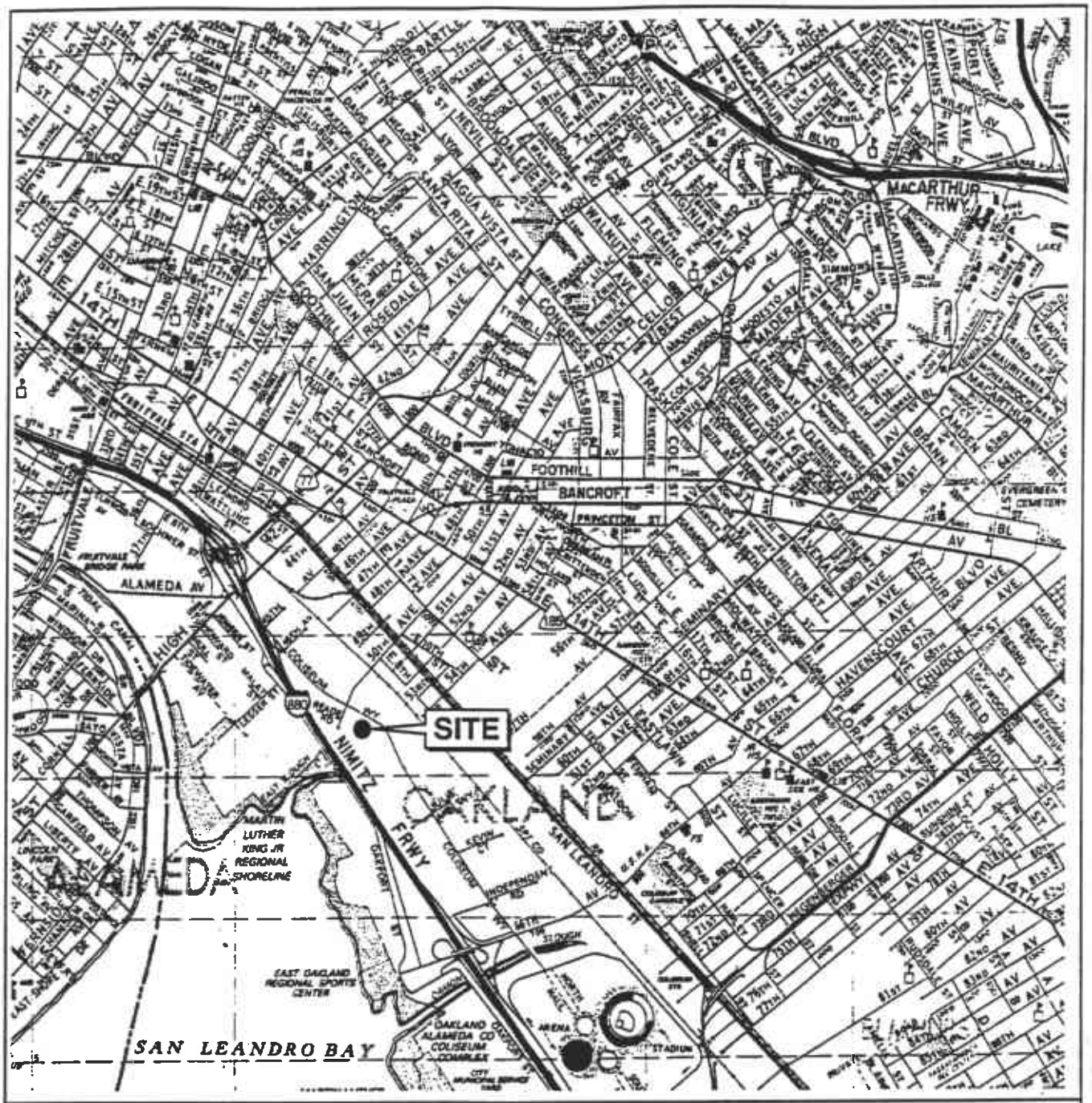
TABLE 5

SUMMARY OF INCREMENTAL COSTS[1]
SUBSTATION J
5051 Coliseum Way
Oakland, California

Option	Description	Total Cost[2]($)
Options 1 and 3	Groundwater monitoring/channel repair	161,000
Options 2 and 4	Groundwater monitoring and cap construction/channel repair and extension	252,000
Option 5	Groundwater extraction and treatment, groundwater monitoring and cap construction	516,000
Option 8A	Ex-situ stabilization and groundwater monitoring	869,000[3]
Option 8B	In-situ stabilization, cap construction and groundwater monitoring	827,000[3]
Option 9	Excavation and removal of soil with elevated levels of metals and groundwater monitoring	1,039,000[3,4]

Notes:

1 These costs represent the amounts which would be added to the costs for 5051 Coliseum Way in order to remediate Substation J, if necessary.
2 Cost represents 30-year present value cost.
3 Costs do not include cost for removal and replacement or relocation of electrical equipment at Substation J.
4 If excavated lithopone waste were a RCRA hazardous material, costs would increase by approximately 35%.



GEOMATRIX

SITE LOCATION MAP
5051 Coliseum Way
Oakland, California

Figure
1

Project No.
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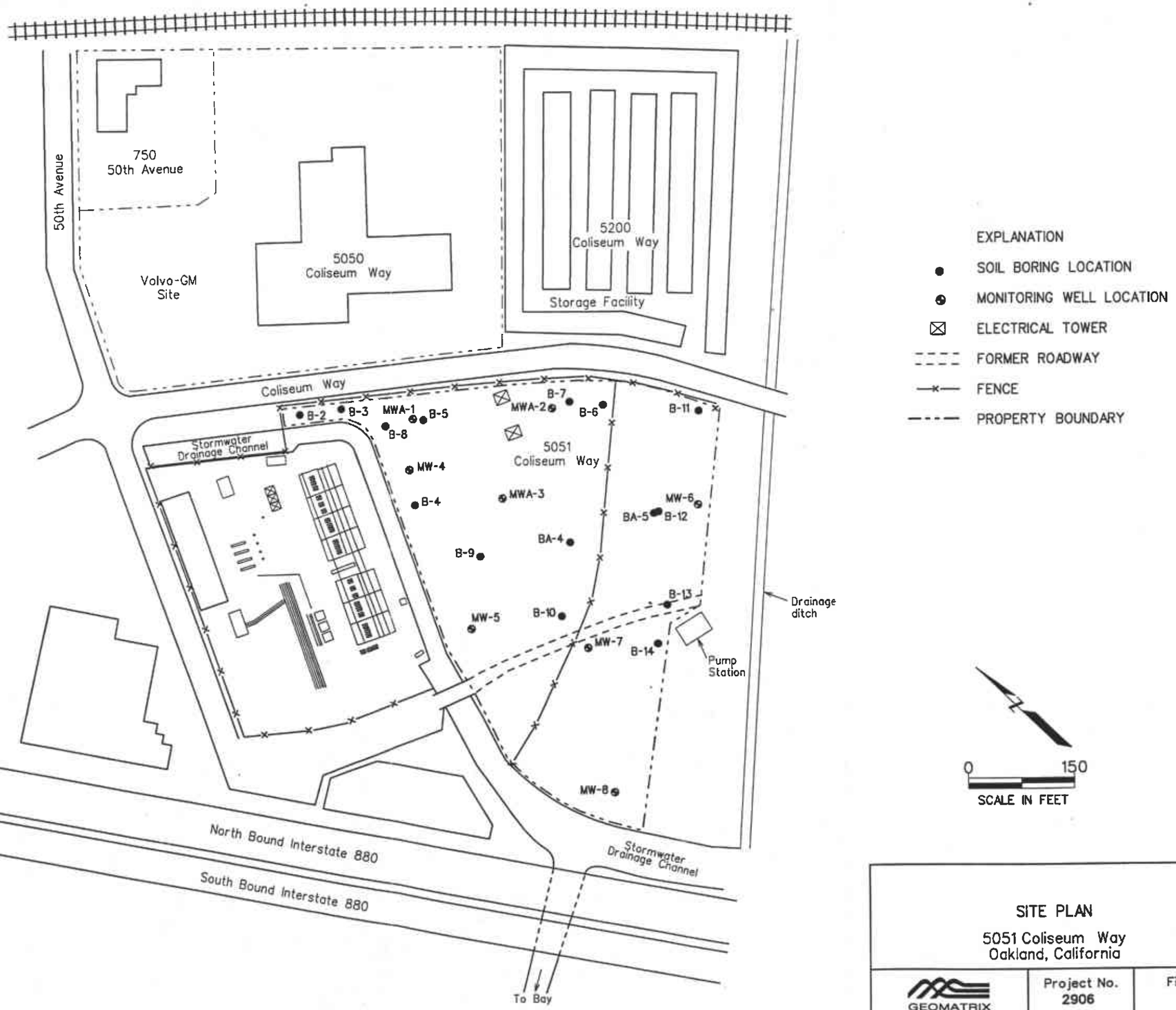
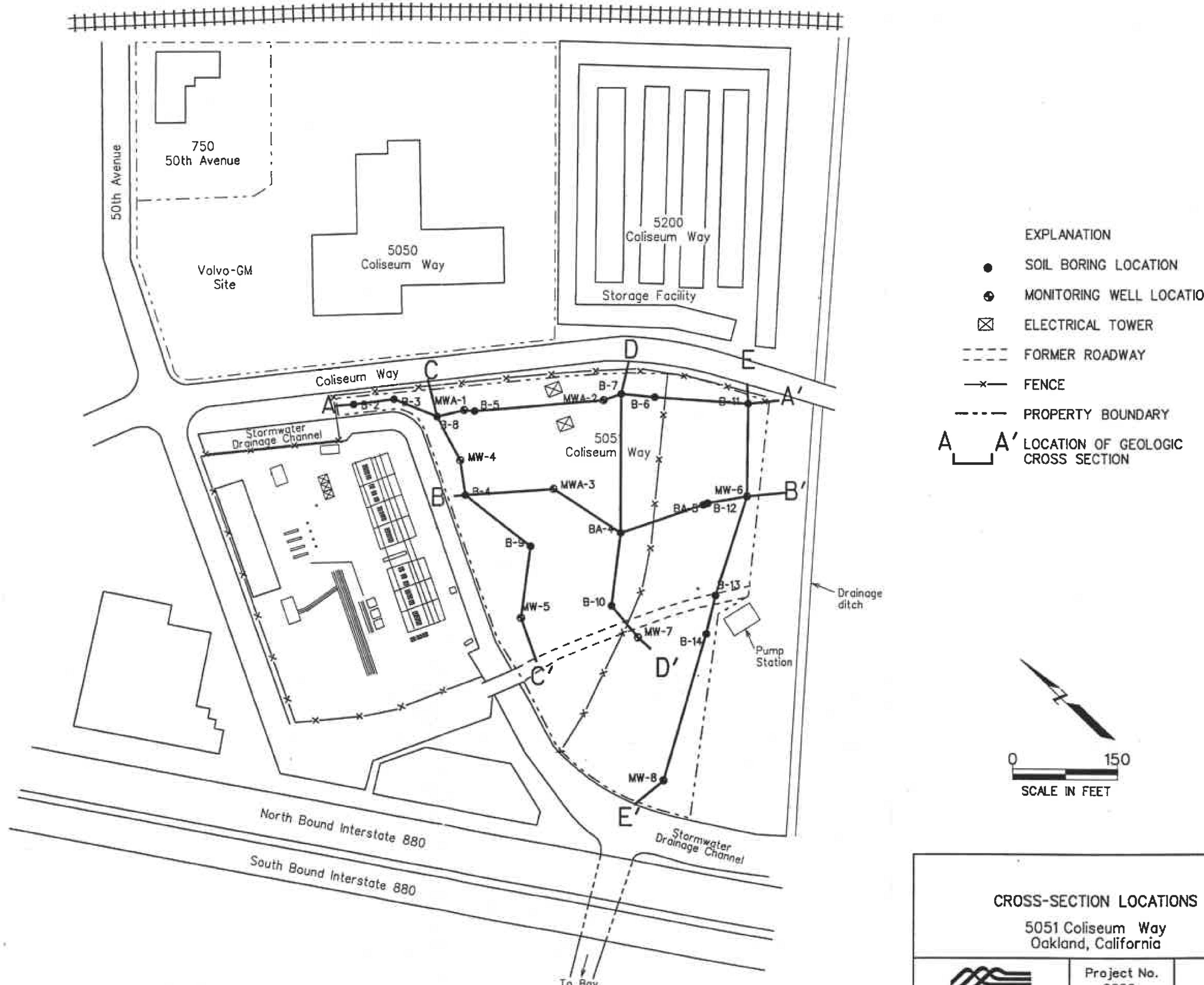


SITE PLAN

5051 Coliseum Way
Oakland, California

GEOMATRIX	Project No. 2906	Figure 2



CROSS-SECTION LOCATIONS

5051 Coliseum Way
Oakland, California

GEOMATRIX	Project No. 2906	Figure 4

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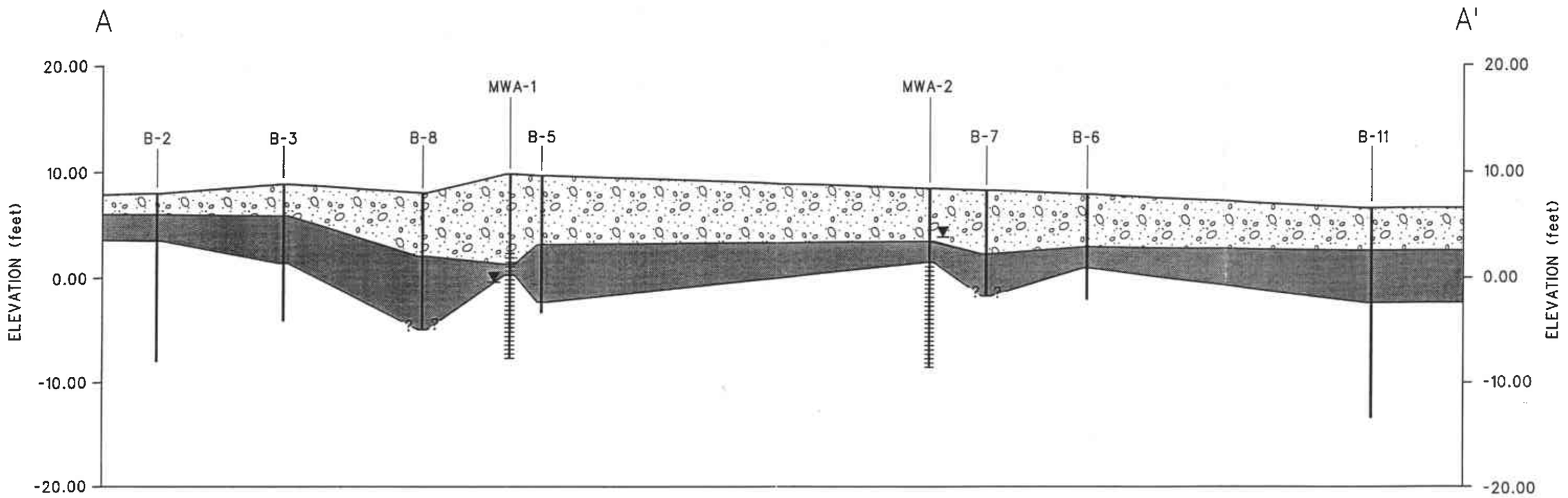


NOTES:

1. The geologic units connected between borings have been inferred and are based on interpolation between widely spaced points. For clarity, solid lines are used to represent contacts between these units, but these are not meant to imply certainty.
2. Cross-Section shown on Figure 2.
3. Elevations are in feet, msl.

EXPLANATION

- FILL
- WASTE
- NATIVE SOIL
- BORING LOCATION AND DEPTH
- SCREENED INTERVAL
- WATER LEVEL MEASURED ON 19 DECEMBER 1996

10'

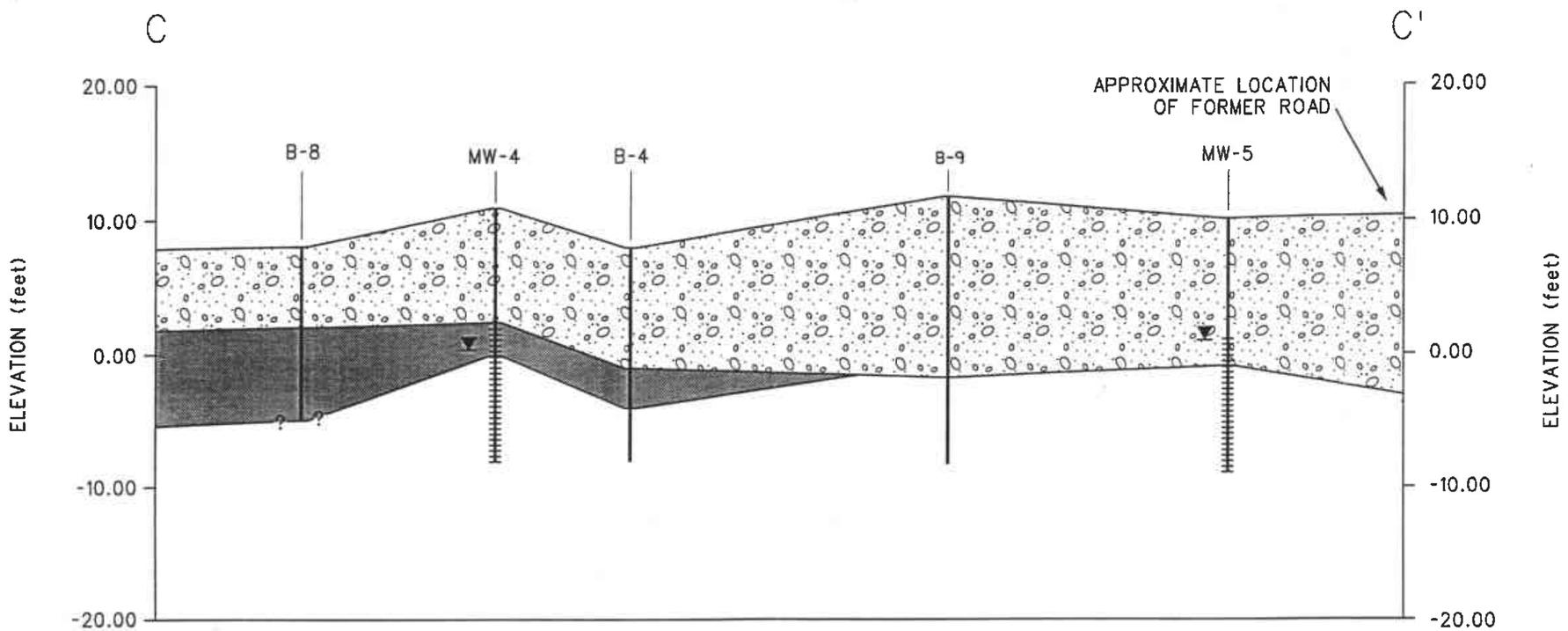
VERTICAL EXAGGERATION: 5x

50'

CROSS-SECTION A-A'

5051 Coliseum Way
Oakland, California

GEOMATRIX	Project No. 2906	Figure 5



NOTES:

1. The geologic units connected between borings have been inferred and are based on interpolation between widely spaced points. For clarity, solid lines are used to represent contacts between these units, but these are not meant to imply certainty.

2. Cross-Section shown on Figure 2.

3. Elevations are in feet, msl.

EXPLANATION

- FILL
- WASTE
- NATIVE SOIL
- BORING LOCATION AND DEPTH
- SCREENED INTERVAL
- WATER LEVEL MEASURED ON 19 DECEMBER 1996

10'

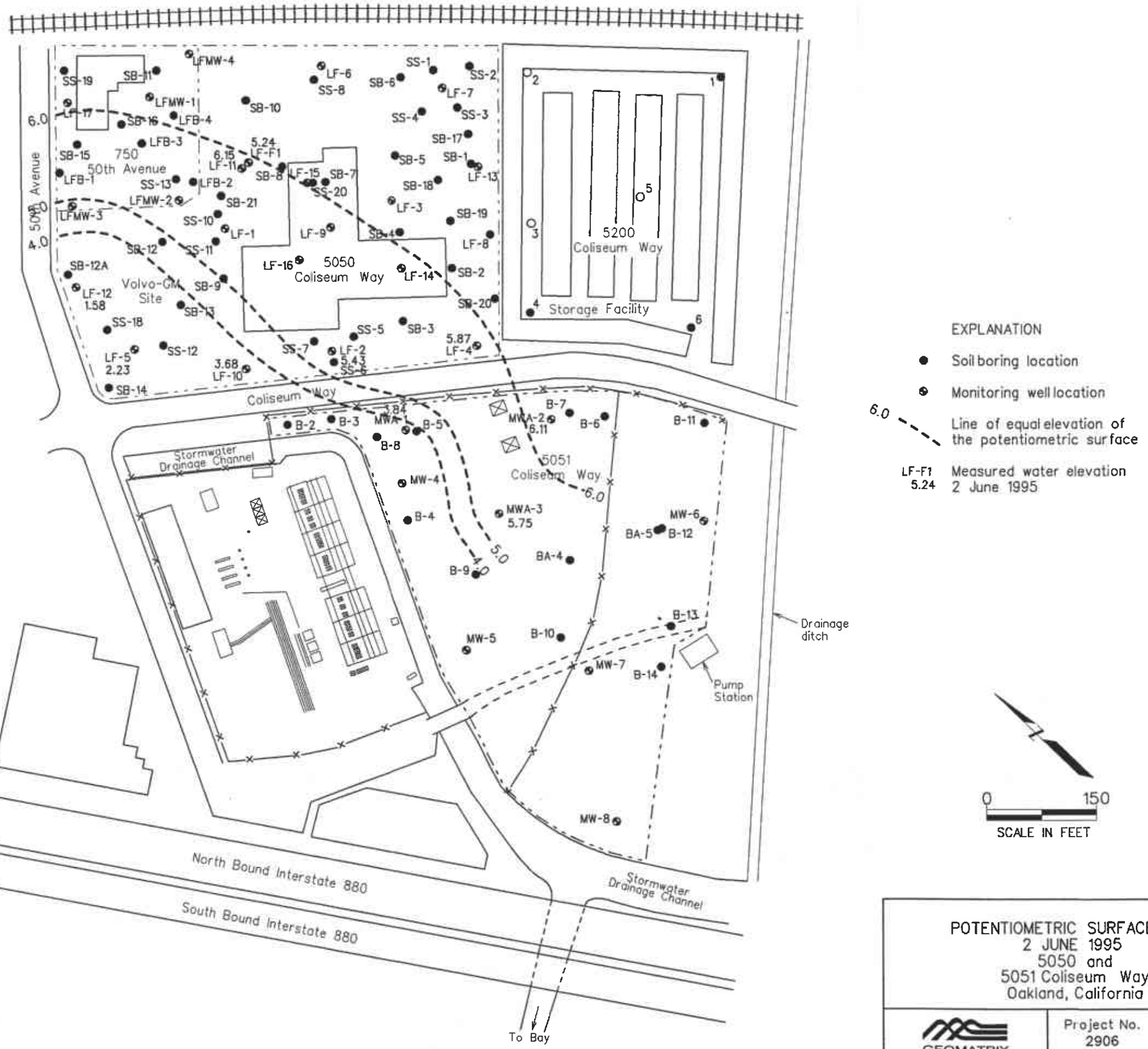
VERTICAL EXAGGERATION: 5x

50'

CROSS-SECTION C-C'

5051 Coliseum Way
Oakland, California

GEOMATRIX	Project No. 2906	Figure 7



POTENTIOMETRIC SURFACE MAP
2 JUNE 1995
5050 and
5051 Coliseum Way
Oakland, California

GEOMATRIX	Project No. 2906	Figure 10

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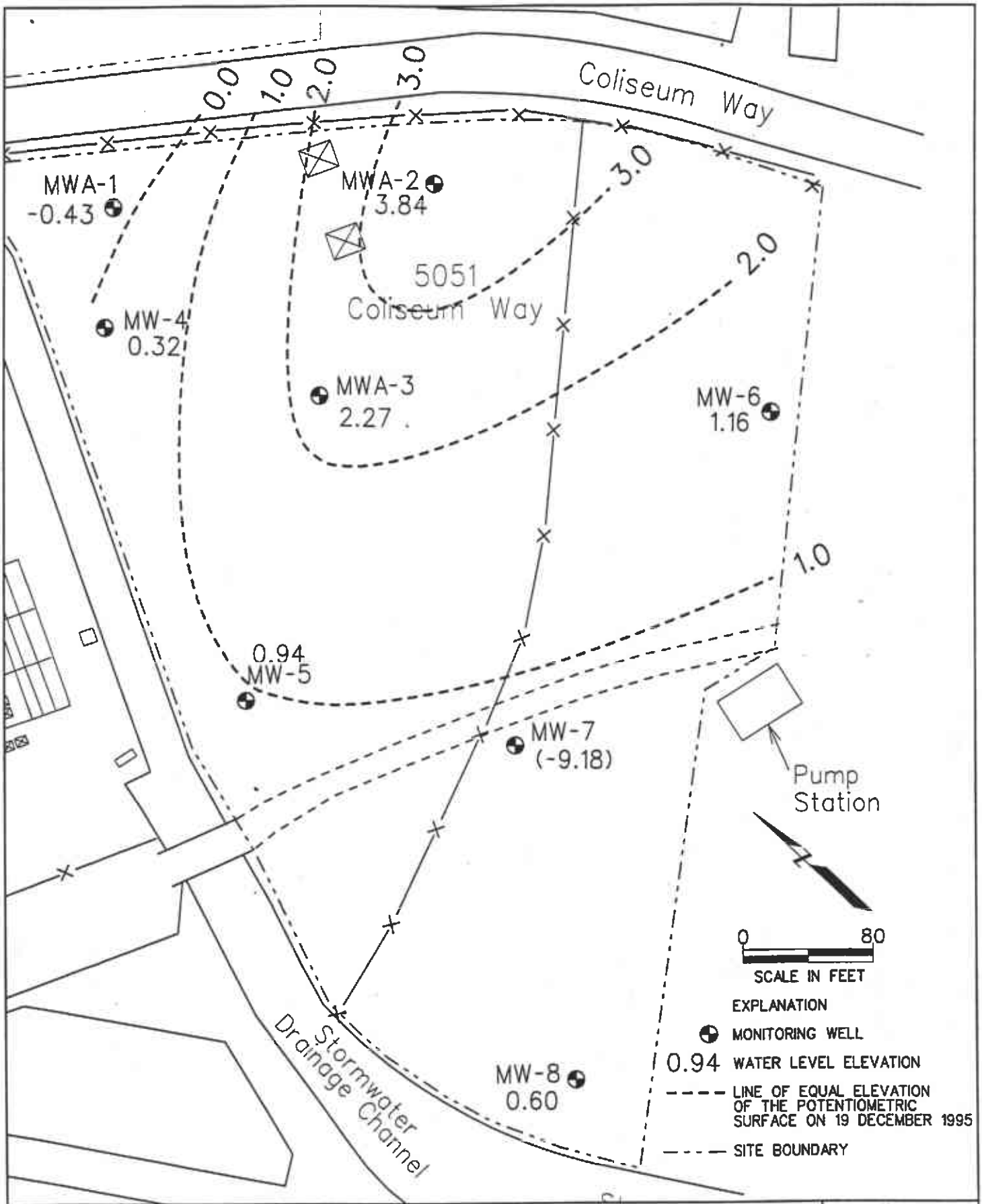

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POTENTIOMETRIC SURFACE MAP (HIGH TIDE)
19 DECEMBER 1995
5051 Coliseum Way
Oakland, California

Figure
11

Project No.
2906

TABLE 7

MAXIMUM METALS CONCENTRATIONS AND pH RANGE IN THREE WASTE AREAS

5051 Coliseum Way
Oakland, California

(Results in mg/kg or pH units)

	Northern Waste Area	Central Waste Area	Southern Waste Area
Arsenic	1500	1200	23
Barium	1900	1900	100,000
Cadmium	2100	180	4.6
Copper	3800	4100	410
Mercury	65	18	2.3
Lead	30,000	42,000	84
Antimony	610	850	2
Zinc	54,000	42,000	2000
pH	4.5 - 6.2	6.1 - 8.2	8.5 - 11.2

TABLE 8

MAXIMUM REPORTED METALS CONCENTRATIONS IN GROUNDWATER

5051 Coliseum Way
Oakland, California

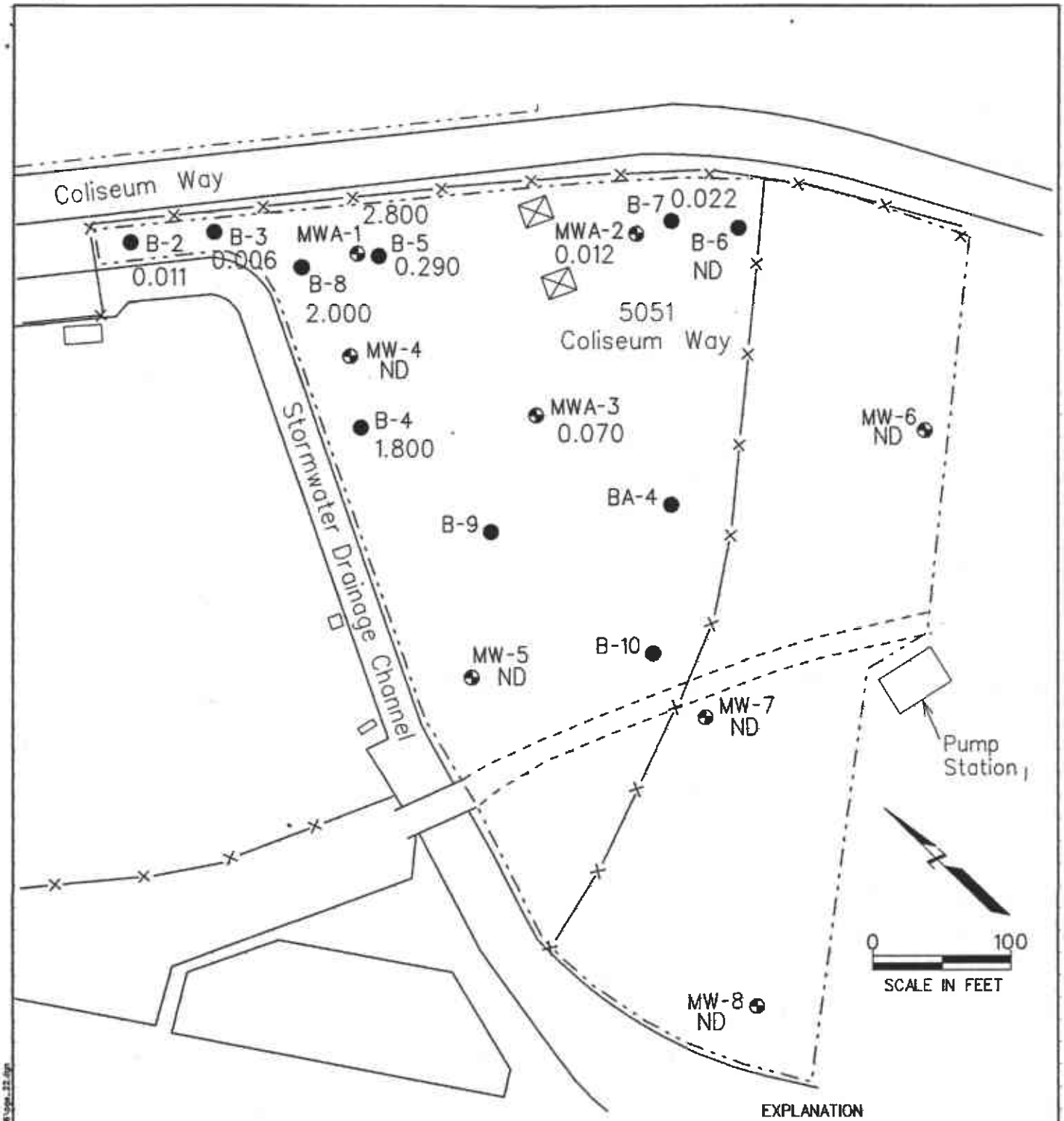
(Results in mg/l)

	5051 Coliseum Way	750 - 50th Avenue and 5050 Coliseum Way[1]	5200 Coliseum Way[2]
Arsenic	1.1	7.3	3.4
Antimony	0.06	0.03	<0.06
Barium	200	0.77	2600
Cadmium	2.8	120	0.014
Lead	0.6	6	0.004
Nickel	3	28	0.074
Selenium	0.013	0.027	<0.005
Thallium	0.12	0.9	<0.005
Zinc	1000	47,000	0.053

Notes:

1 Maximum metals concentrations obtained from the Preliminary Remedial Alternatives Evaluation Report, dated 23 November 1994 or the Remedial Investigation Report dated 19 September 1994, both prepared by Levine-Fricke.

2 Maximum metals concentrations obtained from the Limited Soil and Groundwater Investigation Report, dated 22 March 1995, prepared by Subsurface Consultants, Inc.



EXPLANATION

- Monitoring well location
- Grab groundwater sampling point
- 0.030 Concentration of Cadmium in groundwater (mg/l)
- ND Not detected

Note:
Concentrations above the MCL are red.

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CADMIUM IN GROUNDWATER
5051 Coliseum Way
Oakland, California

Figure
22

Project No.
2906