Appendix C-8

ERM 2000a: Conceptual Proposal for No Further Action Determination at the Boeing Isaacson Property

ENVIRONMENTAL RESOURCES MANAGEMENT

FINAL TECHNICAL MEMORANDUM

The Boeing Company

Conceptual Proposal For No Further Action Determination at the Boeing Isaacson Property

April 2000

Environmental Resources Management
915 118th Avenue S.E., Suite 130
Bellevue, WA 98005

ERM

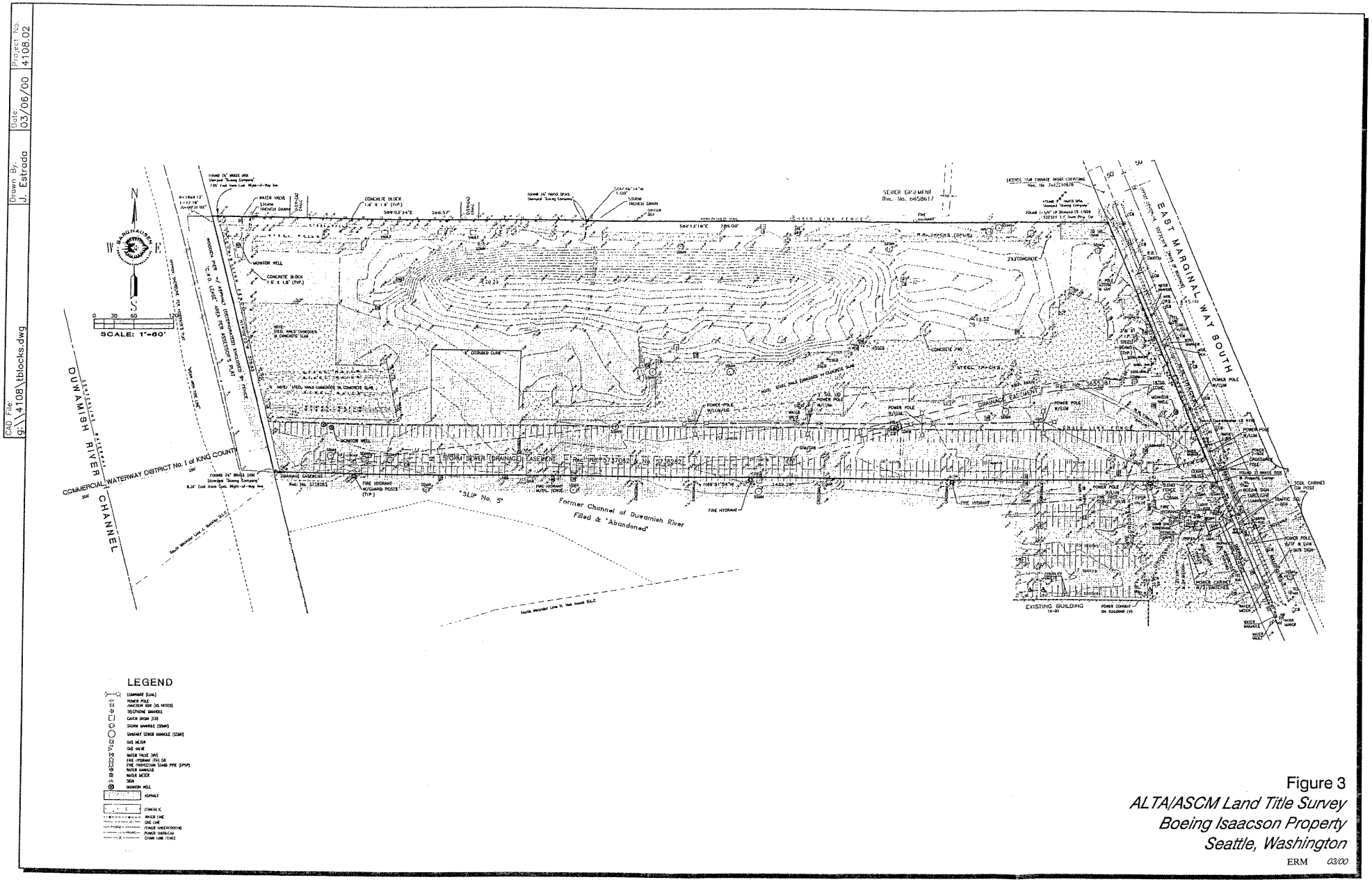
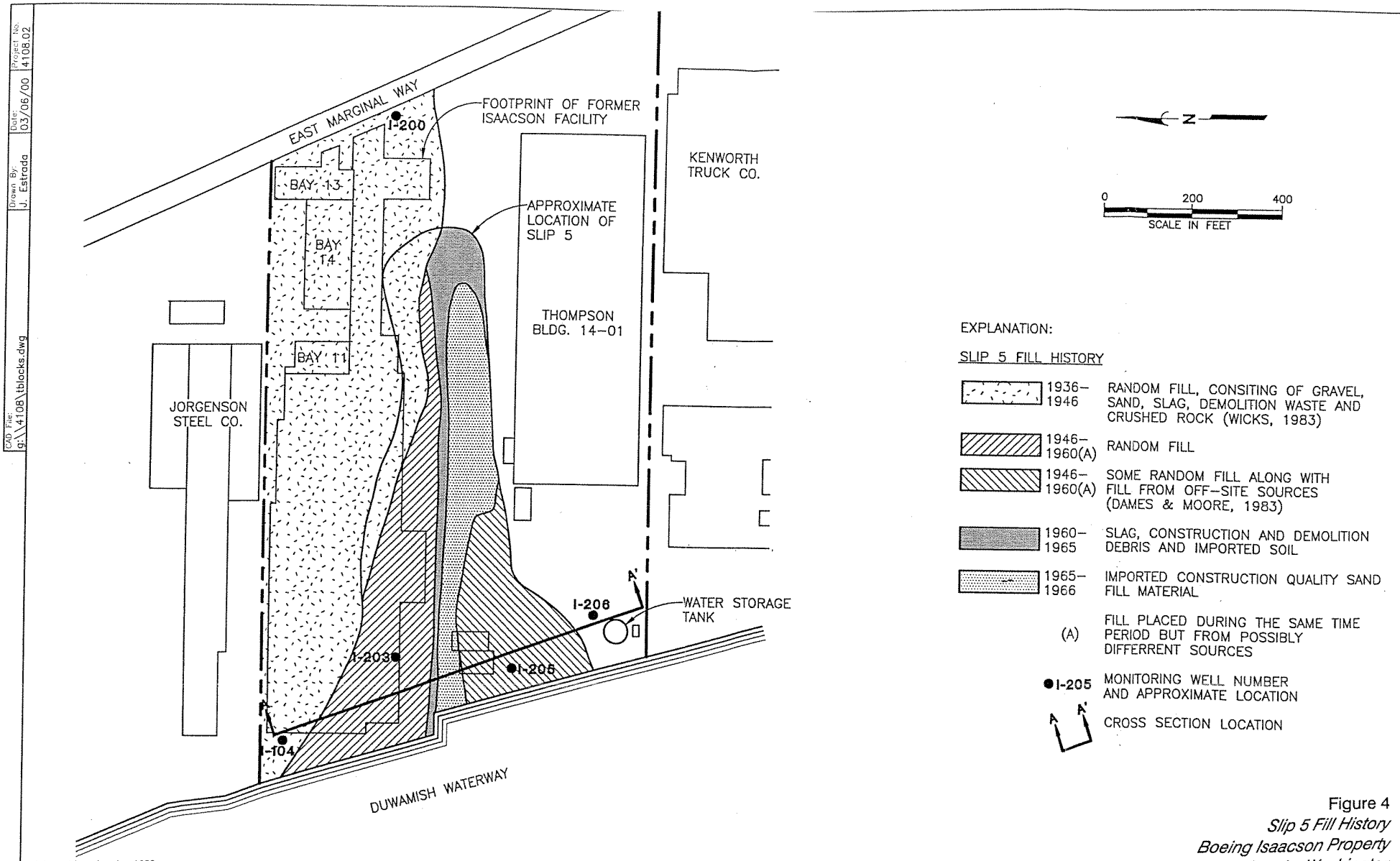


Figure 3
ALTA/ASCM Land Title Survey
Boeing Isaacson Property
Seattle, Washington
ERM 03/00



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Drawn By: J. Estrada
Date: 03/06/00
Project No: 4108.02

Adapted from Landau 1988

Reference: Base drawing information from "DATA REPORT BUILDING 14-09 THOMPSON-ISAACSON SITE INVESTIGATION" by Landau Associates Incorporated dated 5/14/88.

Figure 4
Slip 5 Fill History
Boeing Isaacson Property
Seattle, Washington
ERM 03/00

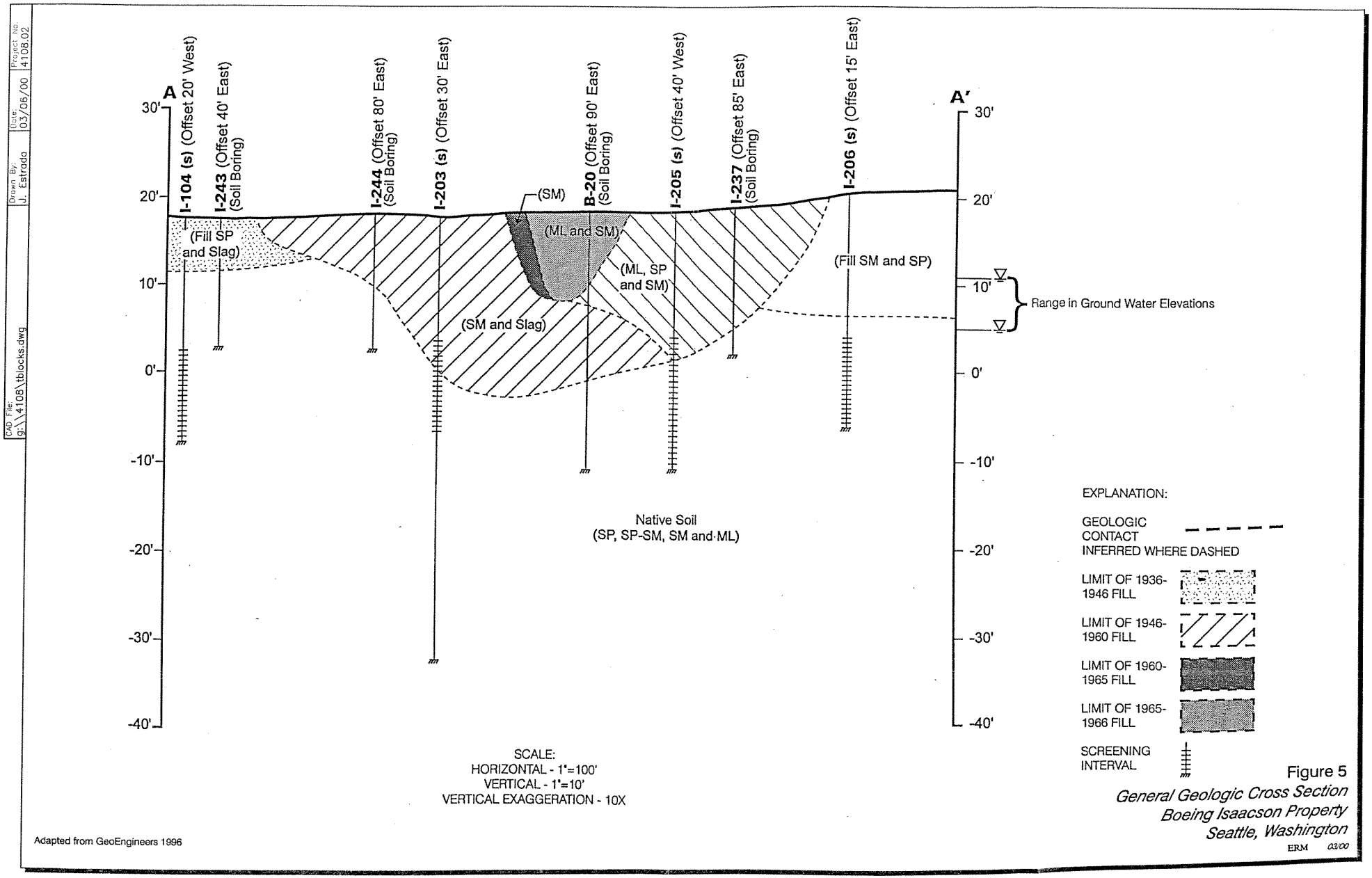


Figure 5

General Geologic Cross Section
Boeing Isaacson Property
Seattle, Washington

ERM 03/00

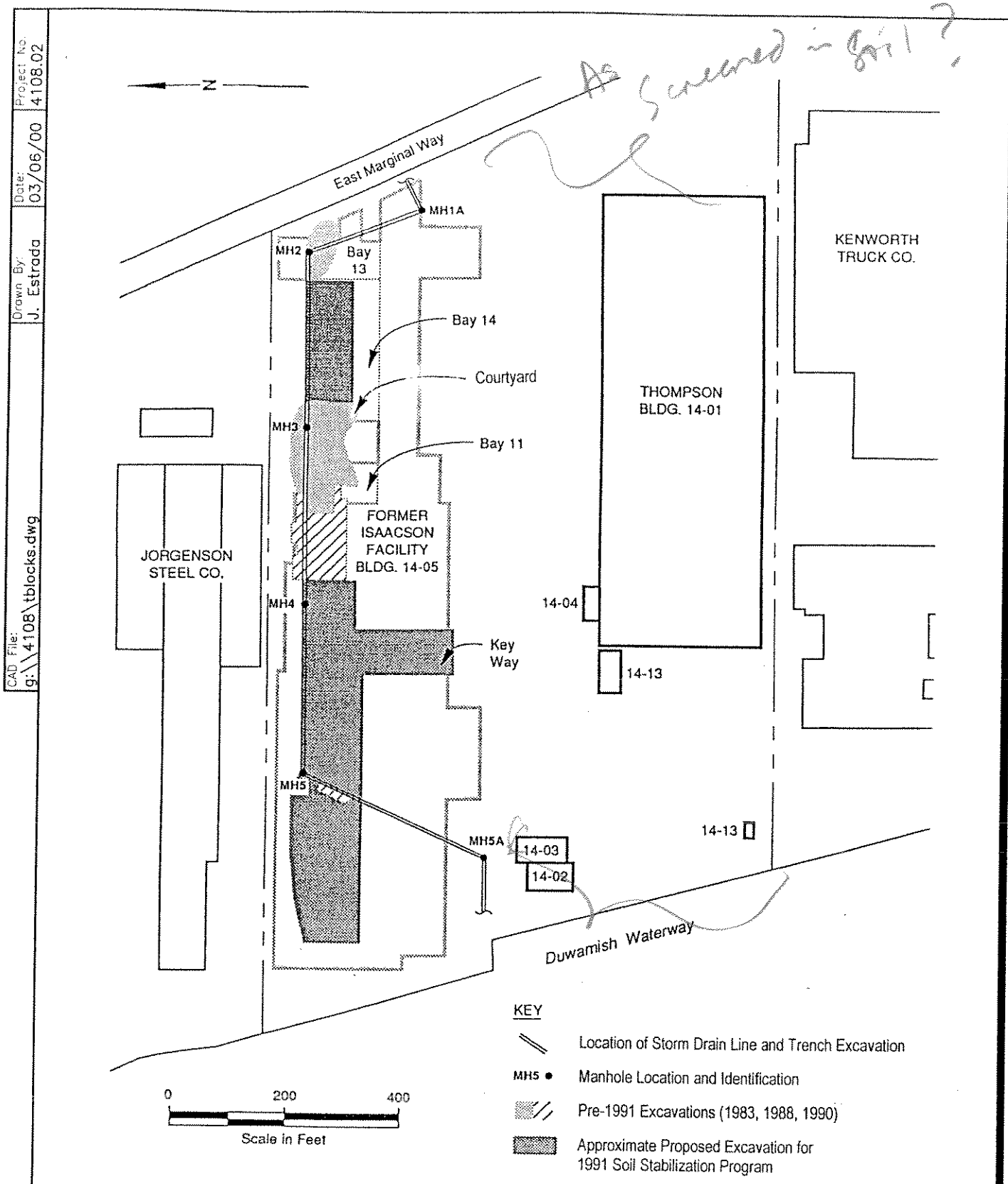


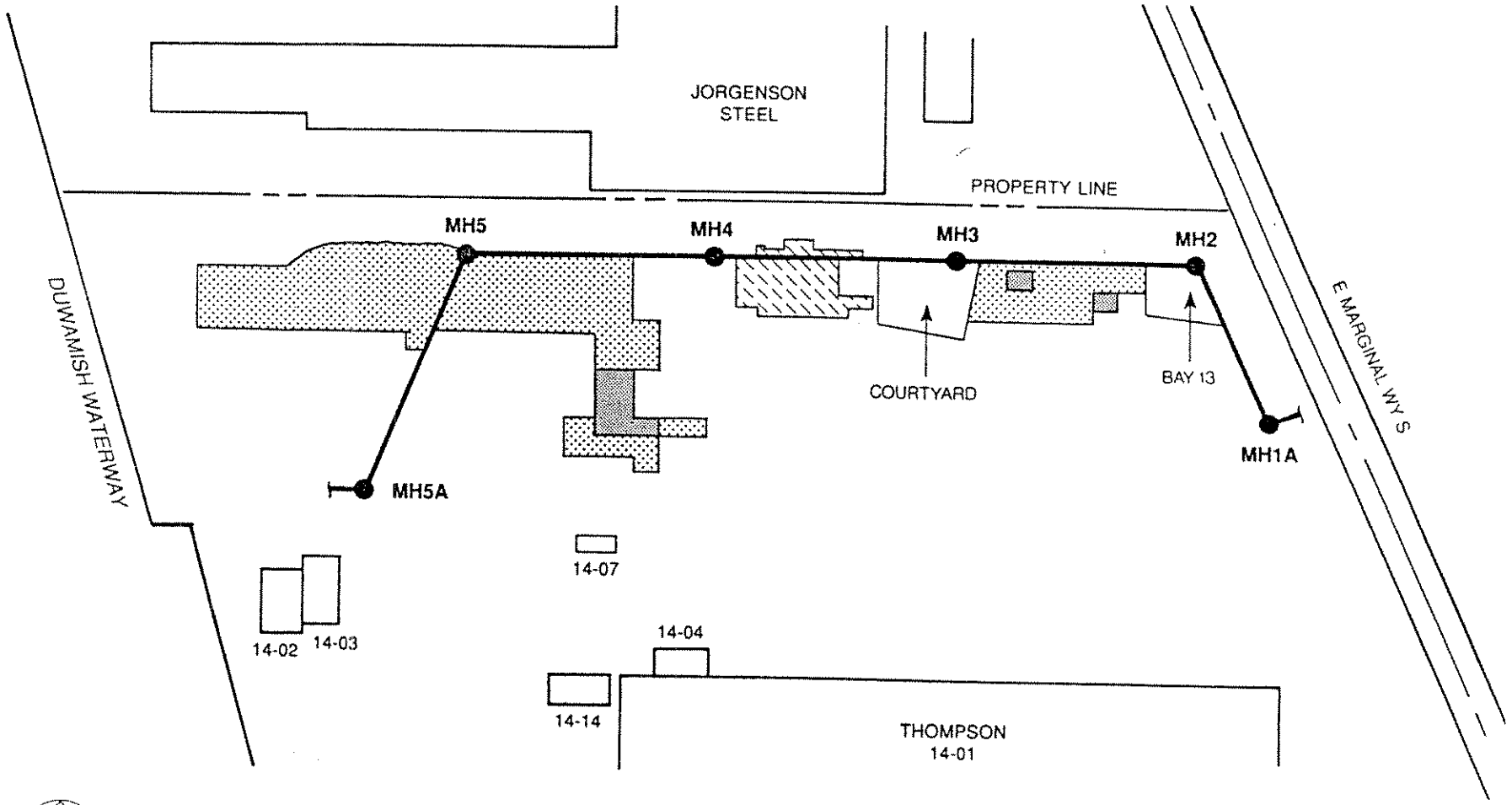
Figure 6

Location of Previous Remedial Actions
Boeing Isaacson Property
Seattle, Washington

Adapted from Landau 1990

ERM 03/00

CAD File:	Drawn By:	Date:	Project No.
g:\\4108\tblocks.dwg	J. Estrada	03/06/00	4108.02

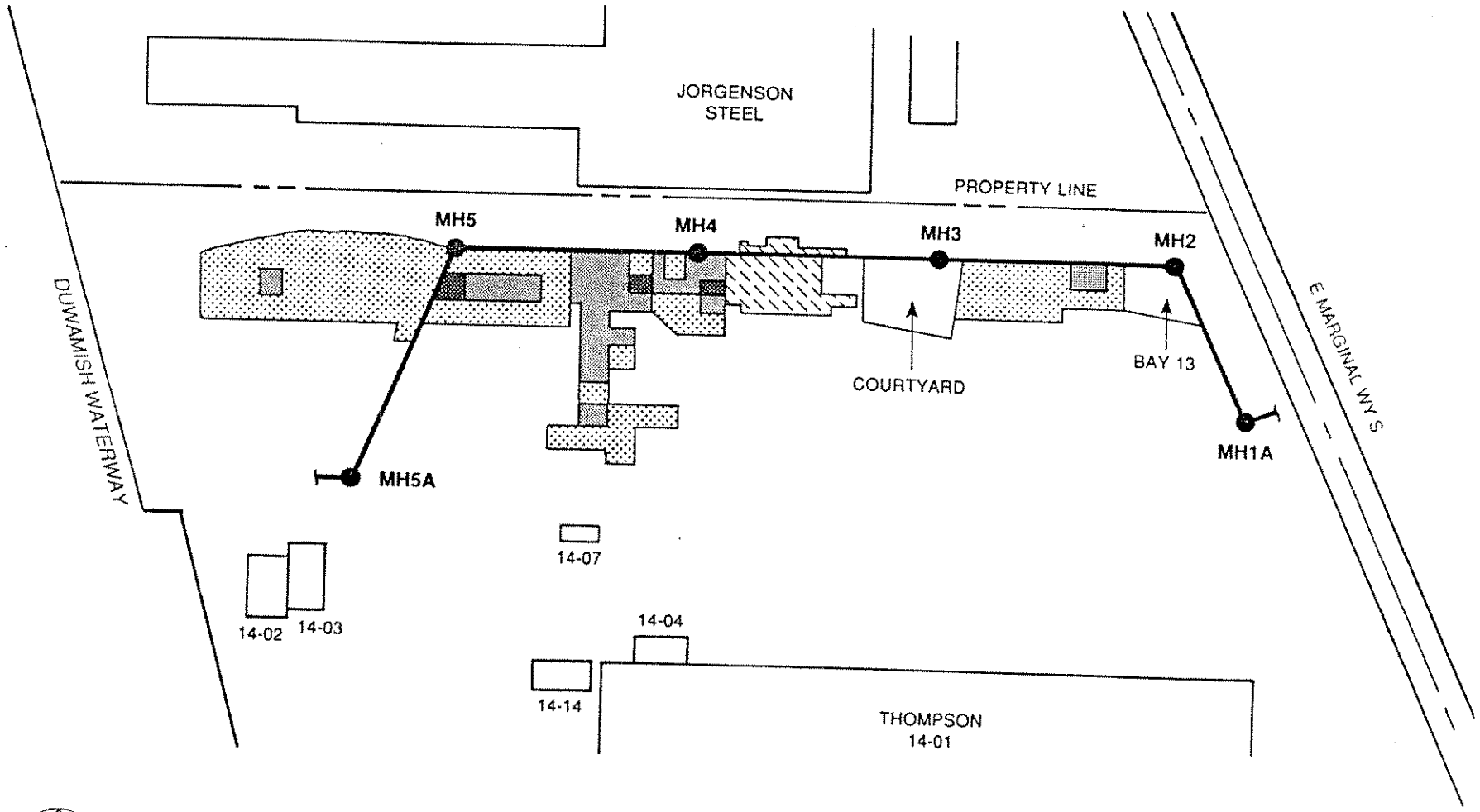


Adapted from Landau 1990

Figure 7
Arsenic Distribution in Soil 1-3 Foot Depth
Boeing Isaacson Property
Seattle, Washington

ERM 03/00

CAD File:	Drawn By:	Date:	Project No.
g:\\4108\tblocks.dwg	J. Estrada	03/06/00	4108.02



N

0 100 200

SCALE IN FEET

Adapted from Landau 1990

Legend

- <200 ppm
- ≥ 200 ppm to 5,000ppm
- > 5,000 ppm
- Excavated area

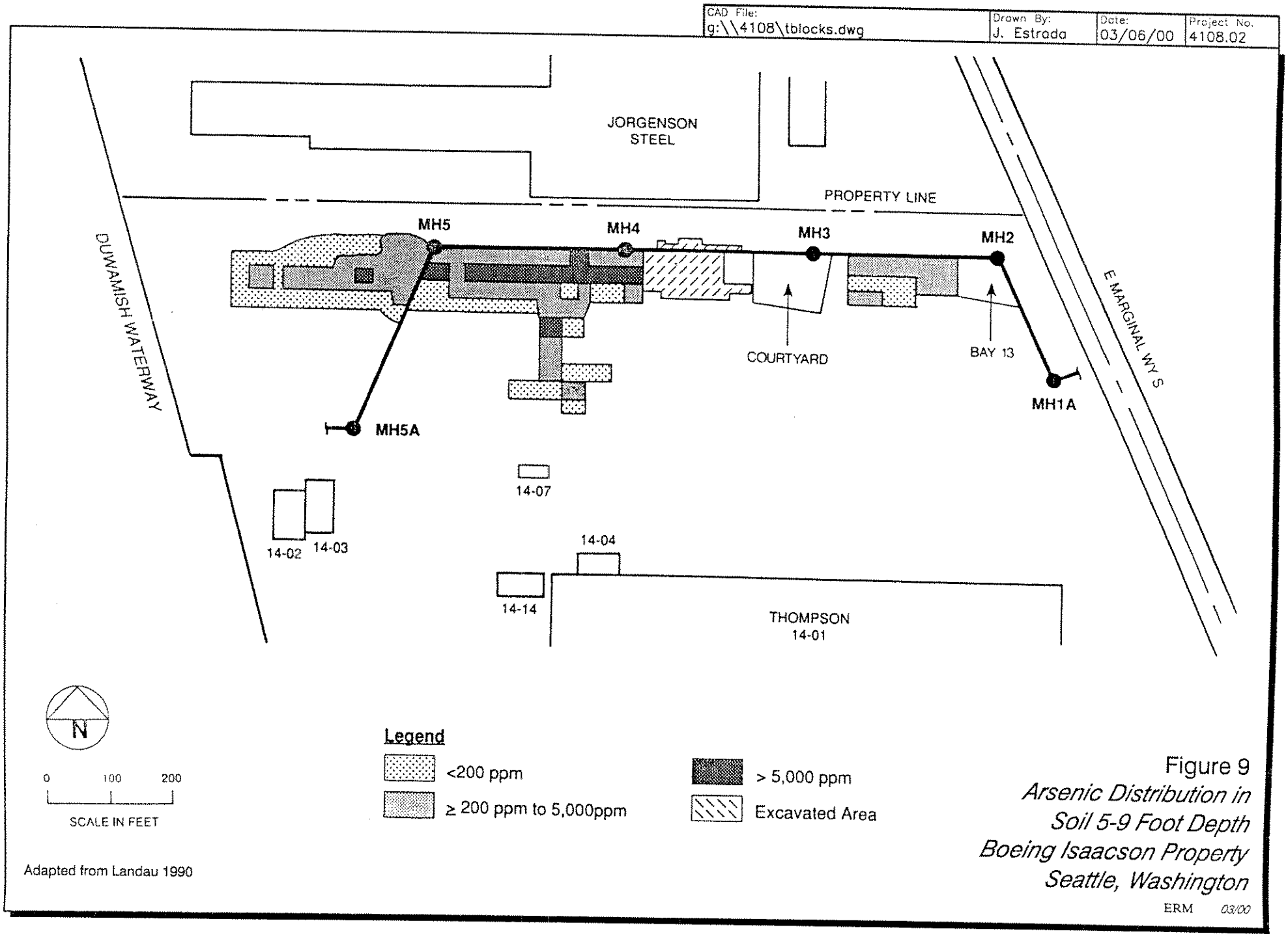
Figure 8

Arsenic Distribution in Soil 3-5 Foot Depth

Boeing Isaacson Property

Seattle, Washington

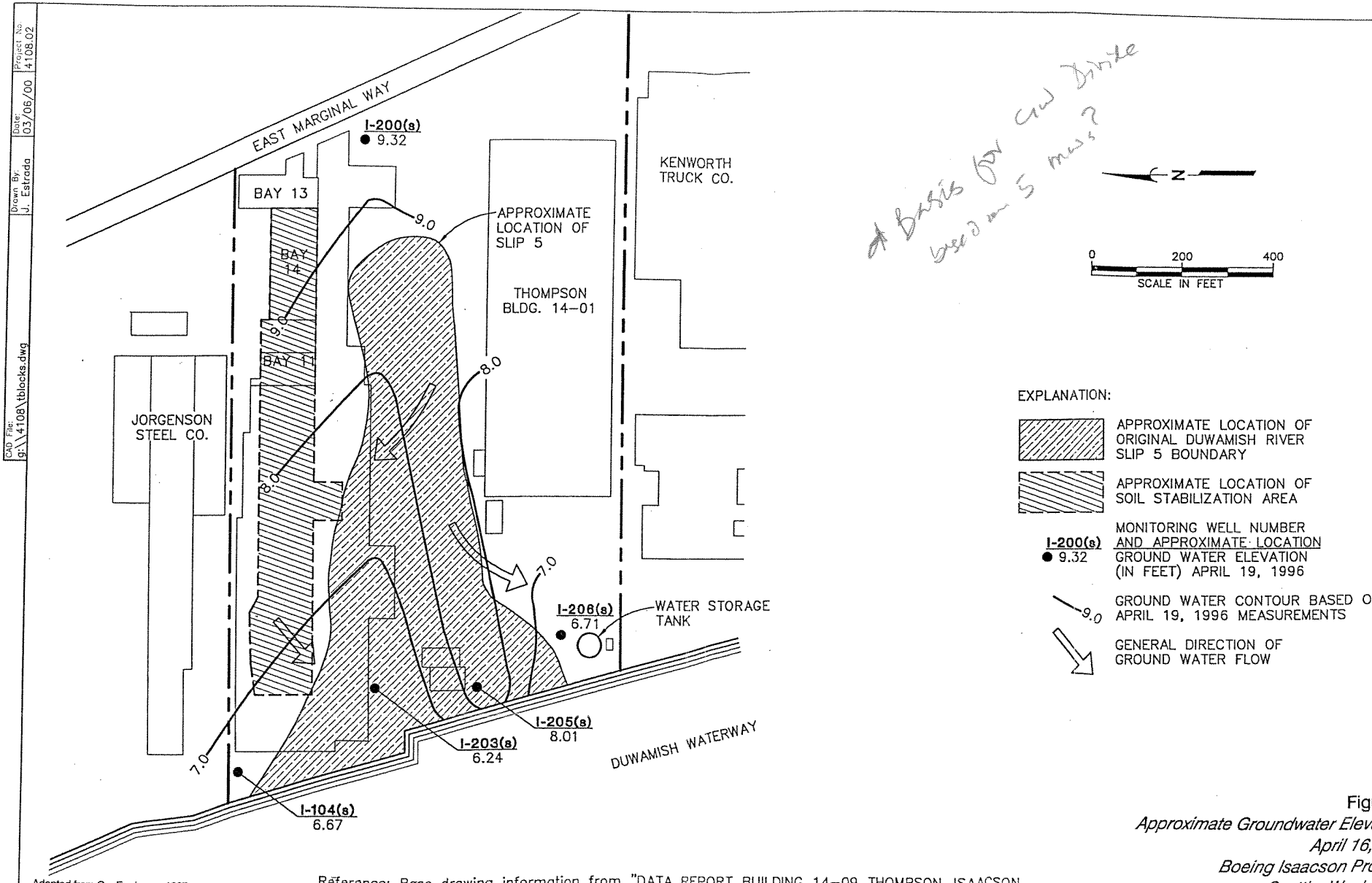
ERM 03/00



Adapted from Landau 1990

Figure 9
Arsenic Distribution in Soil 5-9 Foot Depth
Boeing Isaacson Property
Seattle, Washington

ERM 03/00



Adapted from GeoEngineers 1997

Reference: Base drawing information from "DATA REPORT BUILDING 14-09 THOMPSON-ISAACSON SITE INVESTIGATION" by Landau Associates Incorporated dated 5/14/88.

Figure 10
Approximate Groundwater Elevations
April 16, 1996
Boeing Isaacson Property
Seattle, Washington
ERM 03/00

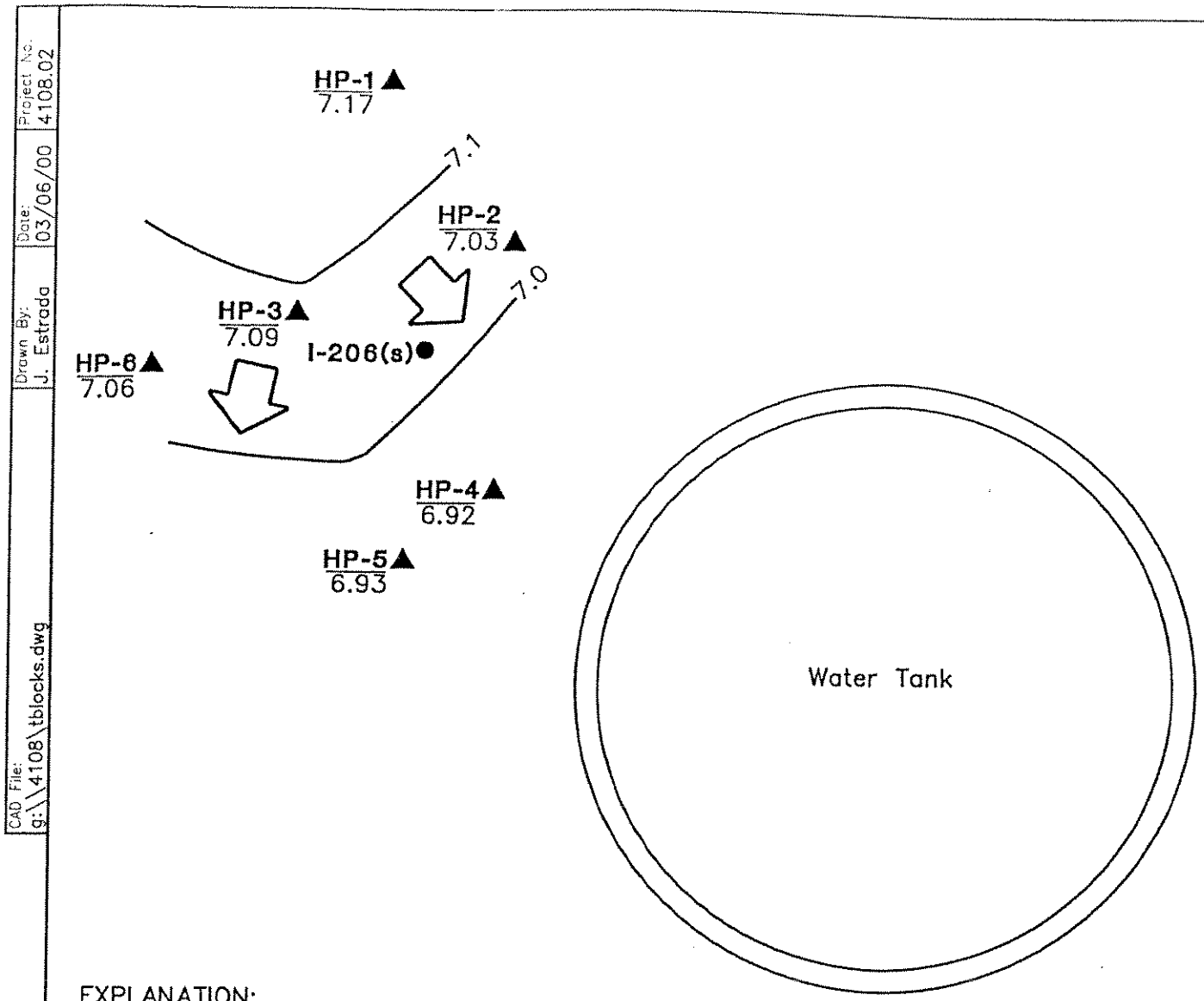


Figure 11
Site Plan Strataprobe Locations
Boeing Isaacson Property
Seattle, Washington

Adapted from GeoEngineers 1997

ERM 03/00

Appendix C-9

ERM 2000d: Request for Groundwater NFA Determination, Hydrogeologic Investigation and Site-Specific Action Level for Arsenic in Groundwater, Boeing Isaacson Site, VCP ID# NW0453

DRAFT

The Boeing Company

Request for Groundwater NFA Determination Hydrogeologic Investigation and Site-Specific Action Level for Arsenic in Groundwater Boeing Isaacson Site VCP ID# NW0453

November 2000

Environmental Resources Management
915-118th Avenue S.E., Suite 130
Bellevue, WA 98005

Exponent
15375 S.E. 30th Place, Suite 250
Bellevue, WA 98007

ERM

ENVIRONMENTAL RESOURCES MANAGEMENT

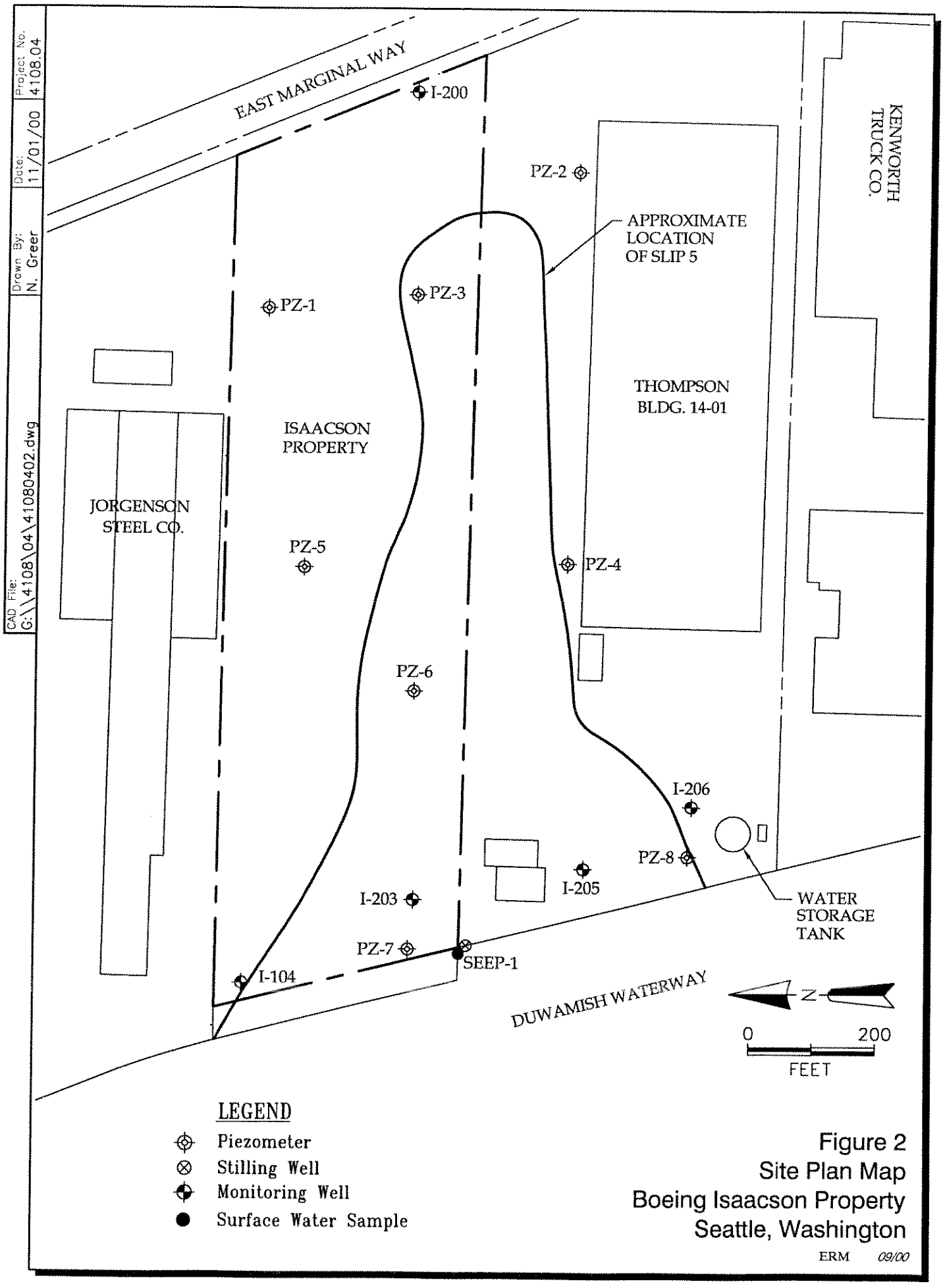


Figure 2
Site Plan Map
Boeing Isaacson Property
Seattle, Washington

ERM 09/00

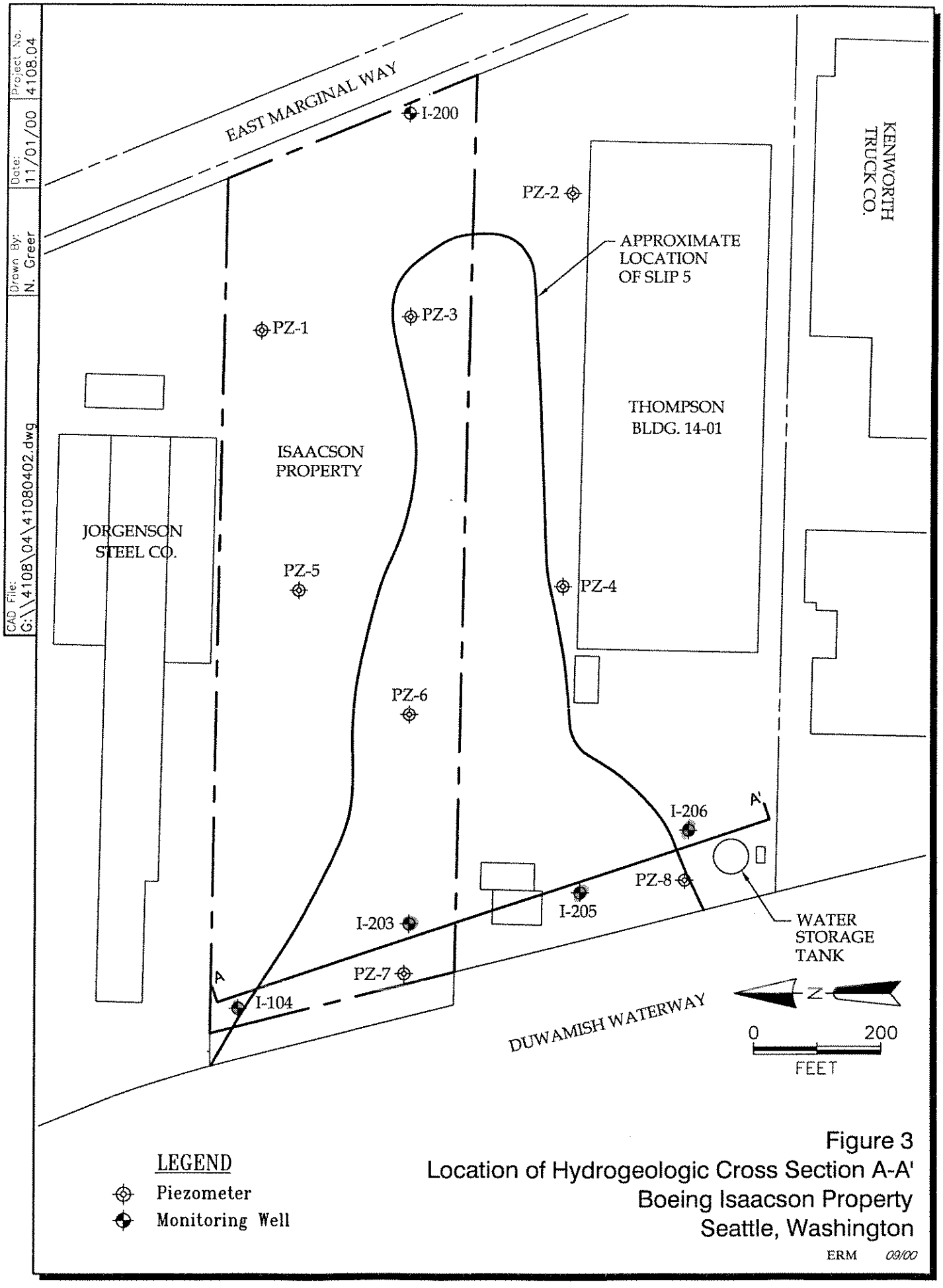
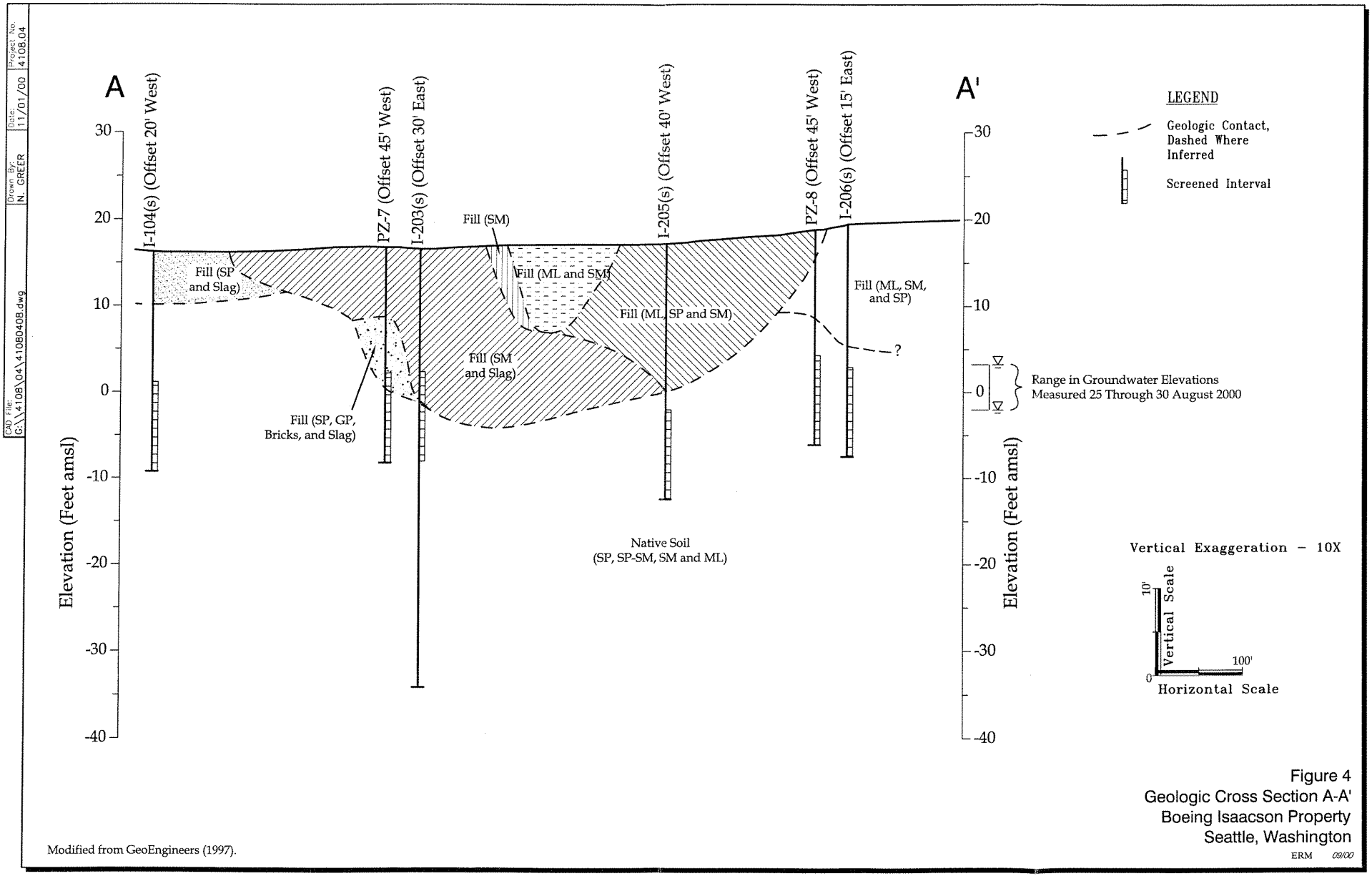


Figure 3
Location of Hydrogeologic Cross Section A-A'
Boeing Isaacson Property
Seattle, Washington

ERM 09/00



Modified from GeoEngineers (1997).

Figure 4
Geologic Cross Section A-A'
Boeing Isaacson Property
Seattle, Washington

ERM 09/00

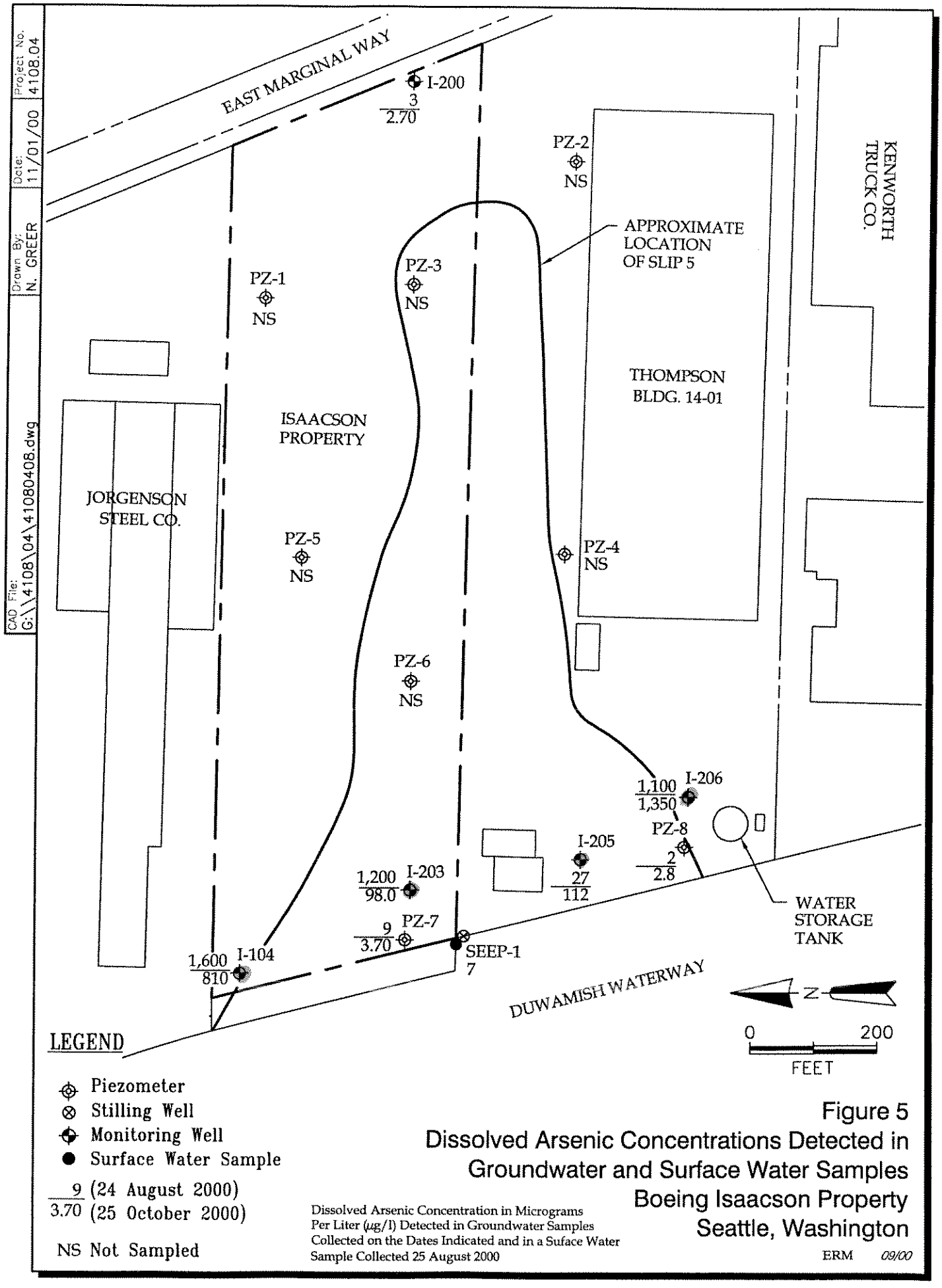


Figure 5
Dissolved Arsenic Concentrations Detected in Groundwater and Surface Water Samples
Boeing Isaacson Property
Seattle, Washington

ERM 09/00

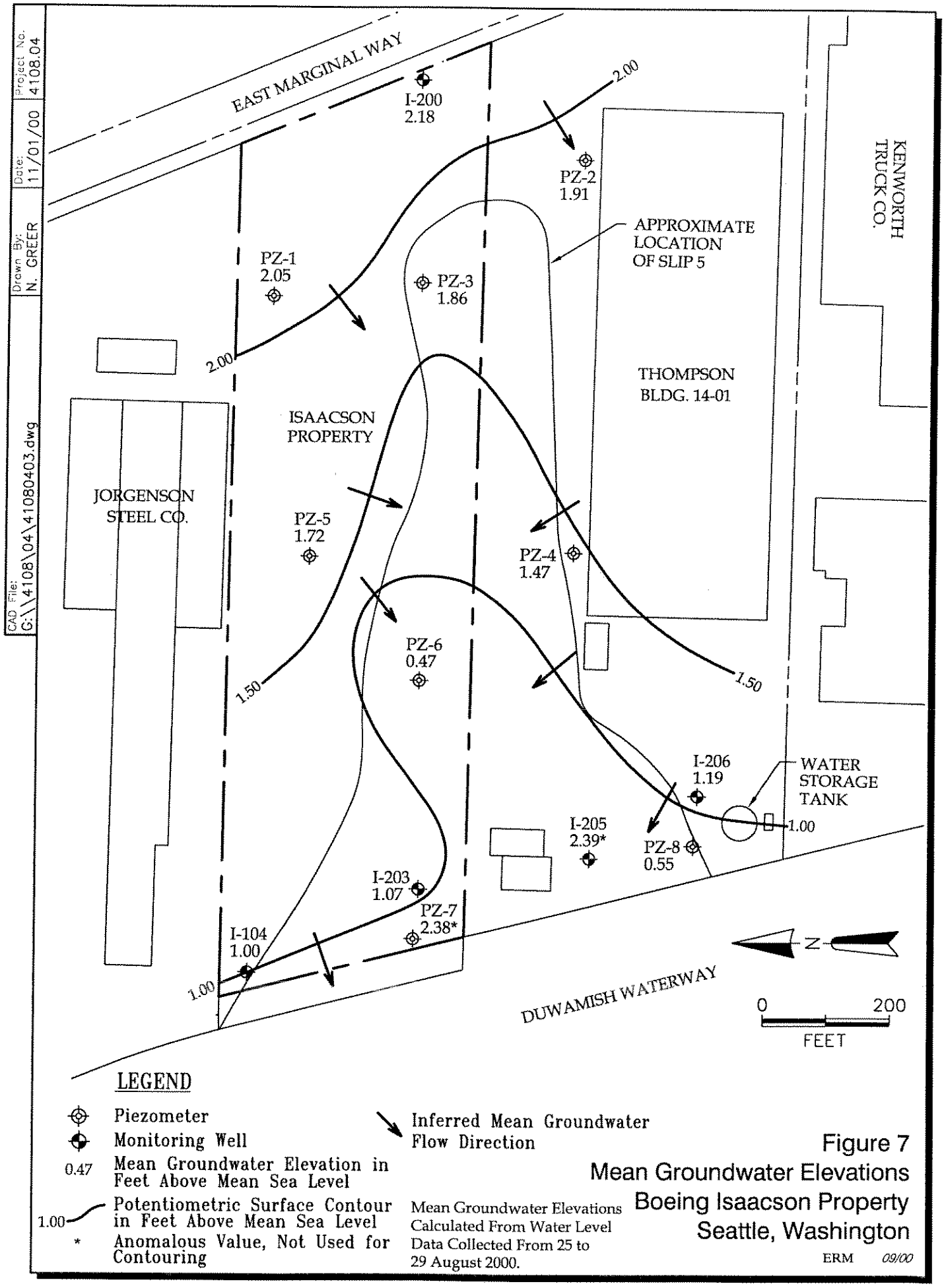


Figure 7
Mean Groundwater Elevations
Boeing Isaacson Property
Seattle, Washington

ERM 09/00

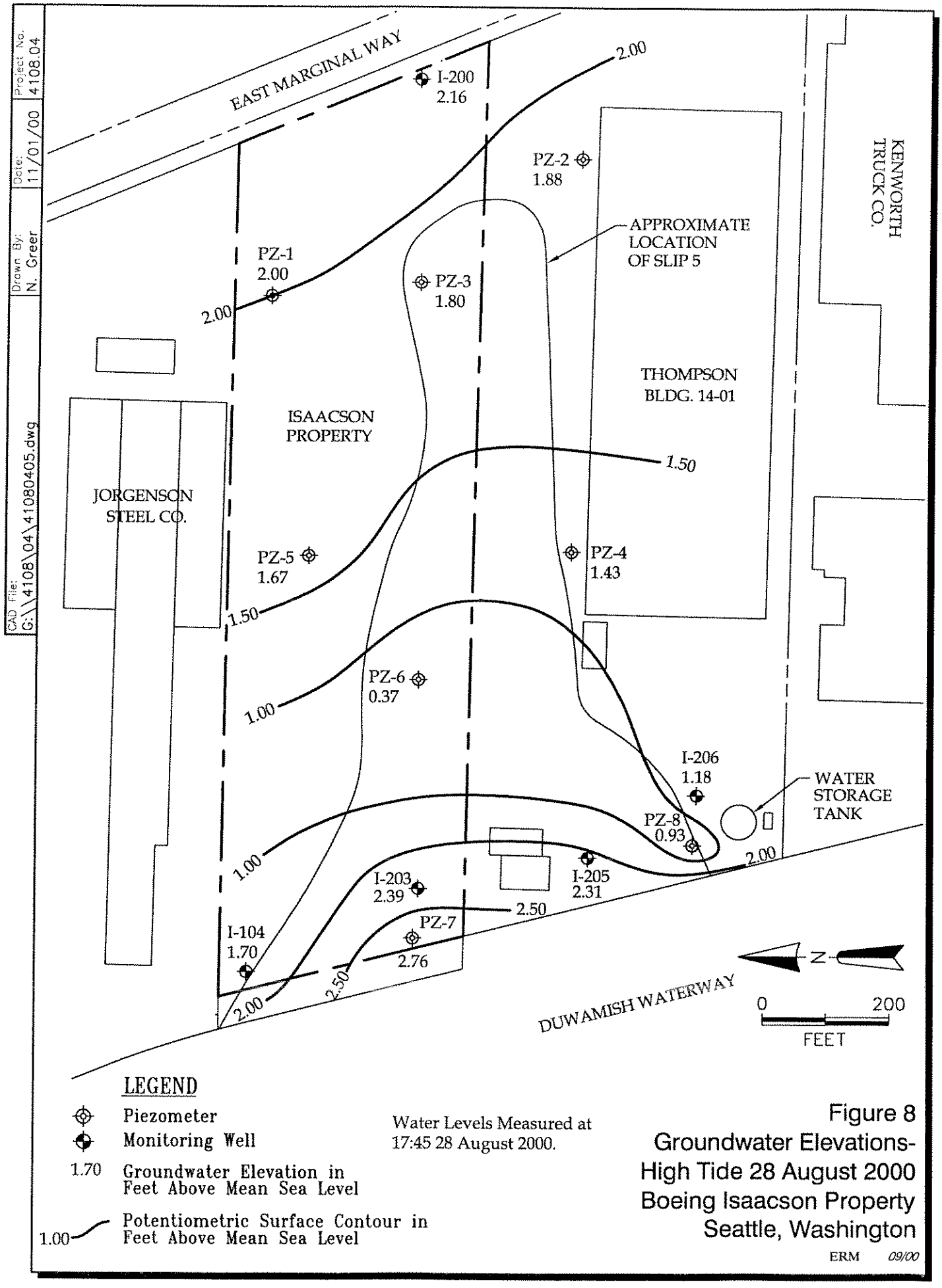
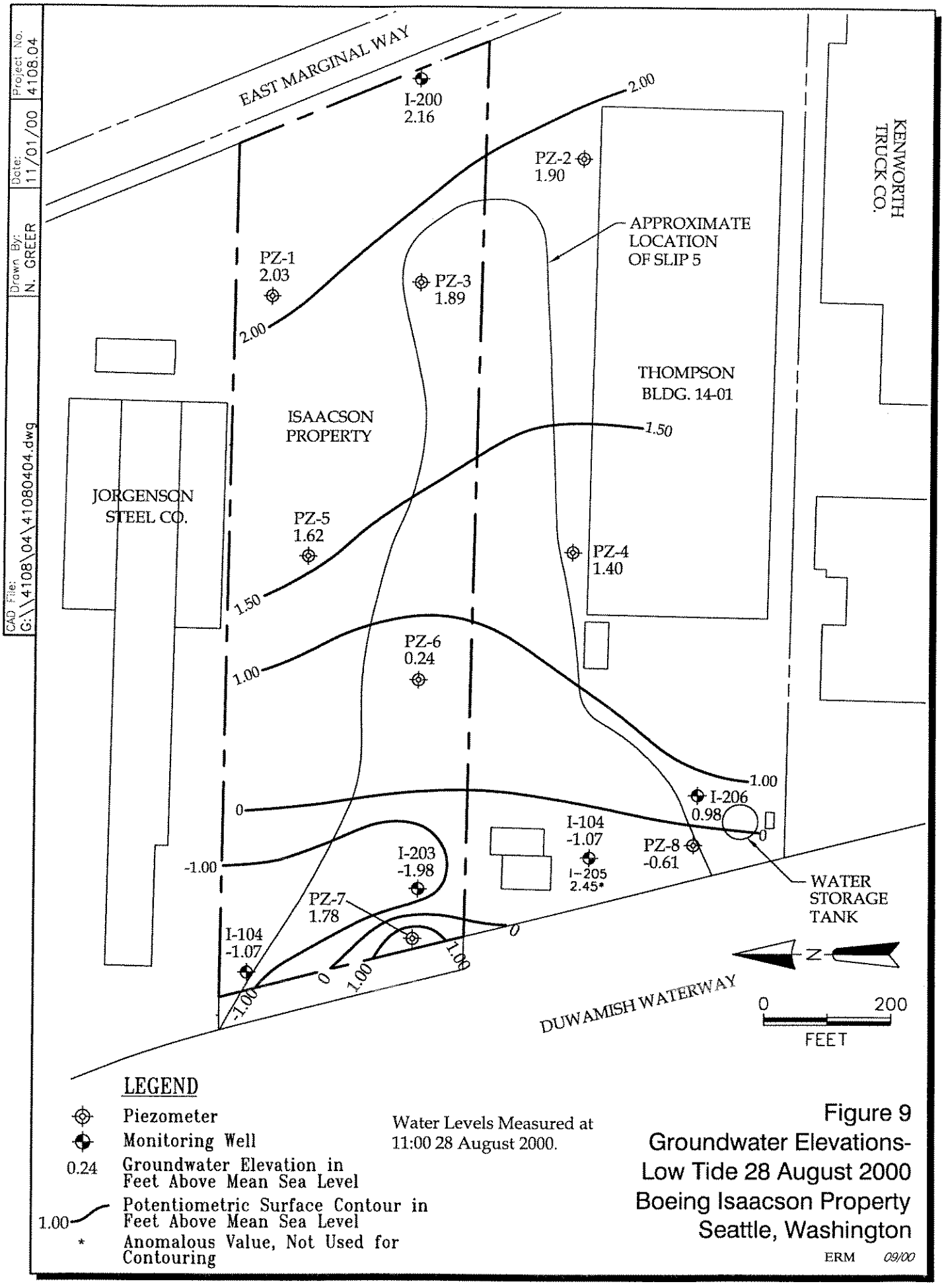


Figure 8
Groundwater Elevations-
High Tide 28 August 2000
Boeing Isaacson Property
Seattle, Washington

ERM 09/00


CAD File: G:\4108\04\41080404.dwg
Drawn By: N. GREER
Date: 11/01/00
Project No. 4108.04
EAST MARGINAL WAY
I-200 2.16
PZ-2 1.90
PZ-1 2.03
PZ-3 1.89
APPROXIMATE LOCATION OF SLIP 5
KENWORTH TRUCK CO.
THOMPSON BLDG. 14-01
ISAACSON PROPERTY
JORGENSON STEEL CO.
PZ-5 1.62
PZ-4 1.40
PZ-6 0.24
I-206 0.98
I-104 -1.07
I-205 2.45*
PZ-8 -0.61
I-203 -1.98
PZ-7 1.78
I-104 -1.07
WATER STORAGE TANK
DUWAMISH WATERWAY
2.00
1.50
1.00
0
-1.00
N
0
200
FEET
LEGEND
Piezometer
Monitoring Well
0.24 Groundwater Elevation in Feet Above Mean Sea Level
1.00 Potentiometric Surface Contour in Feet Above Mean Sea Level
* Anomalous Value, Not Used for Contouring
Water Levels Measured at 11:00 28 August 2000.
Figure 9
Groundwater Elevations-
Low Tide 28 August 2000
Boeing Isaacson Property
Seattle, Washington
ERM 09/00

DRAFT

TABLE 1

Monitoring Well and Piezometer Construction Summary
Boeing Isaacson Property
Seattle, Washington

Monitoring Well/ Piezometer	Date Completed	Top of Casing Elevation (feet amsl)	Total Borehole Depth (feet bgs)	Depth of Casing (feet btoc)	Casing Diameter/ Material	Wellhead Completion	Screen Slot Size (inches)	Screened Interval (feet bgs)
PZ-1	8/16/00	13.38	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-2	8/17/00	14.33	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-3	8/17/00	13.46	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-4	8/17/00	14.16	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-5	8/16/00	18.39	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-6	8/16/00	14.45	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-7	8/16/00	13.75	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-8	8/17/00	15.22	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
I-104	1984	13.67	25.5	25.0	2-inch PVC	Flush-with-grade	0.010	15.0-25.0
I-200	1988	14.12	25.0	24.0	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
I-203	1988	13.62	51.0	26.5	2-inch PVC	Flush-with-grade	0.010	16.0-26.5
I-205	1988	14.64	29.5	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.5
I-206	1988	14.83	27.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.5

amsl = Above mean sea level
bgs = Below ground surface
btoc = Below top of casing

TABLE 3

Summary of Water Quality Data

Boeing Isaacson Property

Seattle, Washington

Sampling Point	Date Sampled	Dissolved Arsenic[1] (µg/l)	Temperature[2] (degrees Celsius)	pH[2]	Conductivity[2] (microSiemens)	Dissolved Oxygen[2] (mg/l)	Reduction/Oxidation Potential[2] (millivolts)	Turbidity[2] (NTU)	Total Organic Carbon[3] (mg/l)	Total Iron[4] (mg/l)	Ferrous Iron[5] (mg/l)
PZ-4	8/24/00	--	17.9	6.31	809	0.79	-59	98.4	12	--	31
PZ-5	8/24/00	--	17.3	6.28	817	0.24	-46	150	27	--	44
PZ-7	8/24/00	9	16.5	9.06	12,400	0.54	-94	37.5	3.0	<0.02	3.1
	10/25/00	3.70	16.0	8.80	1,520	--	--	20.0	--		--
PZ-8	8/24/00	2	16.8	6.56	1,660	1.89	-95	38.2	7.0	12.1	12
	10/25/00	2.80	15.9	5.90	220	--	--	26.7	--	--	--
I-104	8/24/00	1,600	19.3	6.71	811	0.77	-113	20.2	--	11.3	--
	10/25/00	810	15.5	6.65	59,400	--	--	40.2	--	--	--
I-200	8/24/00	3	17.4	6.13	89.3	0.73	4	5.1	<1.5	6.32	6.7
	10/25/00	2.70	15.6	6.50	12.9	--	--	77.2	--	--	--
I-203	8/24/00	1,200	17.8	--	--	0.48	--	14.8	--	7.73	--
	10/25/00	98.0	13.9	6.79	465	--	--	5.4	--	--	--
I-205	8/24/00	27	20.8	6.13	992	0.72	-60	17.2	--	22.2	--
	10/25/00	112	18.9	6.53	115	--	--	3.7	--	--	--
I-206	8/24/00	1,100	19.3	6.66	839	0.89	-147	59.2	--	24.1	--
	10/25/00	1,350	16.13	6.34	87,300	--	--	31.2	--	--	--
SEEP-1	8/24/00	7	--	--	--	--	--	--	--	--	--

Notes:

[1]By USEPA Method 7060.

[2]Measured in the field using a Minisonde Water Quality Multiprobe.

[3]By USEPA Method 415.1.

[4]By USEPA Method 6010.

[5]By USEPA Method SM4500 FeD.

mg/l = Milligrams per liter

µg/l = Micrograms per liter

NTU = Nephelometric turbidity units

-- = not tested

TABLE 5

Summary of Mean Groundwater Elevation Data

Boeing Isaacson Property

Seattle, Washington

Well/Piezometer Number	Top of Casing Elevation[1] (feet)	Average Depth to Groundwater (feet below top of casing)	Mean Groundwater Elevation[2] (feet amsl)
PZ-1	13.38	11.33	2.05
PZ-2	14.33	12.42	1.91
PZ-3	13.46	11.60	1.86
PZ-4	14.16	12.69	1.47
PZ-5	18.39	16.67	1.72
PZ-6	14.45	13.98	0.47
PZ-7	13.75	11.37	2.38
PZ-8	15.22	14.67	0.55
I-104	13.67	12.67	1.00
I-200	14.12	11.94	2.18
I-203	13.62	12.55	1.07
I-205	14.64	12.25	2.39
I-206	14.83	13.64	1.19

Notes:

[1]Elevations based on a site datum referenced to mean sea level.

[2]Calculated from water level data collected 25 to 29 August 2000.