DocID 4901

Source: Kenmore Building Department

(ID#1) _____

(ID#2) _____

Site Address 6719 NE 175th St

Date Copied 10/01 By JKC

- ☒ **Title page with the following information:**
  - *Company (Author) name*
  - *Report date*
  - *Project Name*
  - *Company's job number*
  - *Site address*
- ☒ Executive Summary / Introduction of the report
- ☒ Table of contents
- ☒ Project Location Map / Vicinity Map
- ☒ **Site / Exploration Plans, Boring Location Plans**
- ☐ Cross-sections / Subsurface profiles
- ☒ **Exploration Logs**
- ☐ Monitoring Well Logs
- ☐ Cone Penetrometer Logs
- ☐ Groundwater Elevation Tables / Data

☐ Includes data from Previous Reports

☐ No new data / data review

☐ Missing Data / Illegible Data
Explanation _____

Comments: _____

4901

GEOTECHNICAL REPORT
GENERATOR BUILDING AND CHEMICAL INJECTION
KENMORE, WASHINGTON

HWA Project No. 99072

August 13, 1999

Prepared for:

Black & Veatch
720 Third Avenue, Suite 1100
Seattle, Washington 98104

HWA GEOSCIENCES INC.

HWA GEOSCIENCES INC.
19730-64TH AVE. W., SUITE 200
LYNNWOOD, WA 98036-5957
TEL. 425-774-0106
FAX. 425-774-2714
E-MAIL hwa@hongwest.com

August 13, 1999
HWA Project No. 99072

Black & Veatch
720 Third Avenue, Suite 1100
Seattle, Washington 98104

Attention: Mr. Alex Chen, P.E.

Subject: **GEOTECHNICAL REPORT**
Generator Building and Chemical Injection
Kenmore Pump Station Facility
Kenmore, Washington

Dear Mr. Chen:

In accordance with your request, HWA GeoSciences completed a geotechnical engineering study in support of the proposed improvements at the Kenmore Pump Station Facility in Kenmore, Washington. Results of our investigation and geotechnical recommendations pertinent to the proposed building are included in the accompanying report. Previously, HWA prepared a technical memorandum, dated May 13, 1999, that included preliminary results and recommendations. Our draft version of this report subsequently followed on May 20, 1999. Black & Veatch's comments on the technical memorandum and draft report have been incorporated into the accompanying report.

We appreciate the opportunity to provide geotechnical services on this project. Please call if you have any questions or comments concerning our report, or if we may be of further service.

Sincerely,

HWA GEOSCIENCES INC.

Ralph N. Boirum, P.E.
Vice President

DLS:RNB:dls

Enclosure: Geotechnical Report

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1
- 1.1 General 1
- 1.2 Project Description 1
- 1.3 Scope of Services and Authorization 1

2.0 FIELD AND LABORATORY INVESTIGATIONS 2
- 2.1 Field Investigation 2
- 2.2 Laboratory Investigation 2

3.0 SITE CONDITIONS 3
- 3.1 Surface Conditions 3
- 3.2 General Geologic Conditions 3
- 3.3 Subsurface Conditions 3
- 3.4 Groundwater Conditions 4

4.0 CONCLUSIONS AND RECOMMENDATIONS 4
- 4.1 Generator Building 5
  - 4.1.1 Pile Foundation Support 5
  - 4.1.2 Concrete Slabs-on-Grades 6
- 4.2 Seismic Considerations 6
  - 4.2.1 General 6
  - 4.2.2 Soil Liquefaction 7
- 4.3 Chemical Injection Tank 7
  - 4.3.1 General 7
  - 4.3.2 Tank Support 8
- 4.4 Site Earthwork 8
  - 4.4.1 Subgrade Preparation 8
  - 4.4.2 Excavations and Temporary Cut Slopes 8
  - 4.4.3 Fill Placement and Materials 9
- 4.5 Site Drainage 9
- 4.6 Dewatering 10
- 4.7 Erosion Considerations 10

5.0 UNCERTAINTY AND LIMITATIONS 11

List of Figures (Following Text)

Figure 1. Vicinity Map
Figure 2. Site and Exploration Plan
Figure 3. Generalized Subsurface Cross Section A-A'

Appendices

Appendix A: Field Investigation

Figure A-1. Legend of Terms and Symbols Used on Exploration Logs

Figures A-2 & A-3. Logs of Borings BH-1 and BH-2

Appendix B: Laboratory Investigation

Figure B-1. Grain Size Distribution Test Results
Figure B-2. Plasticity Chart

GEOTECHNICAL REPORT
GENERATOR BUILDING AND CHEMICAL INJECTION
KENMORE, WASHINGTON

1.0 INTRODUCTION

1.1 GENERAL

This report presents results of our subsurface exploration program, laboratory testing, and geotechnical engineering analyses for the proposed Generator Building and Chemical Injection Building in Kenmore, Washington. The purpose of this study was to explore and evaluate the subsurface conditions and provide geotechnical recommendations for the proposed improvements based on the conditions encountered.

1.2 PROJECT DESCRIPTION

Our understanding of the project is based on discussions with Black and Veatch engineers Alex Chen, Sahadev Chirayath, and Bruce Ball.

We understand King County is going to construct a new generator building and a chemical injection tank at the Kenmore Pump Station site, located at 6719 NE 175th Street. The project location and general configuration of the site are shown on the Vicinity Map and the Site and Exploration Plan, Figures 1 and 2, respectively. The proposed generator building will be located on the south side of the existing odor control building, and will essentially share the south wall of the existing building. The new building will be approximately 40 feet wide (the width of the existing odor control building) and 65 feet long. The building will be one-story high and will be comprised of masonry walls.

As proposed, a chemical injection tank will be located on the north side of the existing odor control building, as shown on Figure 2. The 7,000-gallon, chemical holding tank will be supported on an at-grade concrete slab that is 20 feet square.

In addition to the new structures, new utilities and an underground fuel tank will be constructed as part of this project.

1.3 SCOPE OF SERVICES AND AUTHORIZATION

Written authorization to proceed with this study was provided by Mr. Bruce Ball on May 2, 1999. Our geotechnical services completed for this project included performing a two

exploratory borings, laboratory testing, and engineering evaluations to develop geotechnical recommendations for the proposed facilities.

2.0 FIELD AND LABORATORY INVESTIGATIONS

2.1 FIELD INVESTIGATION

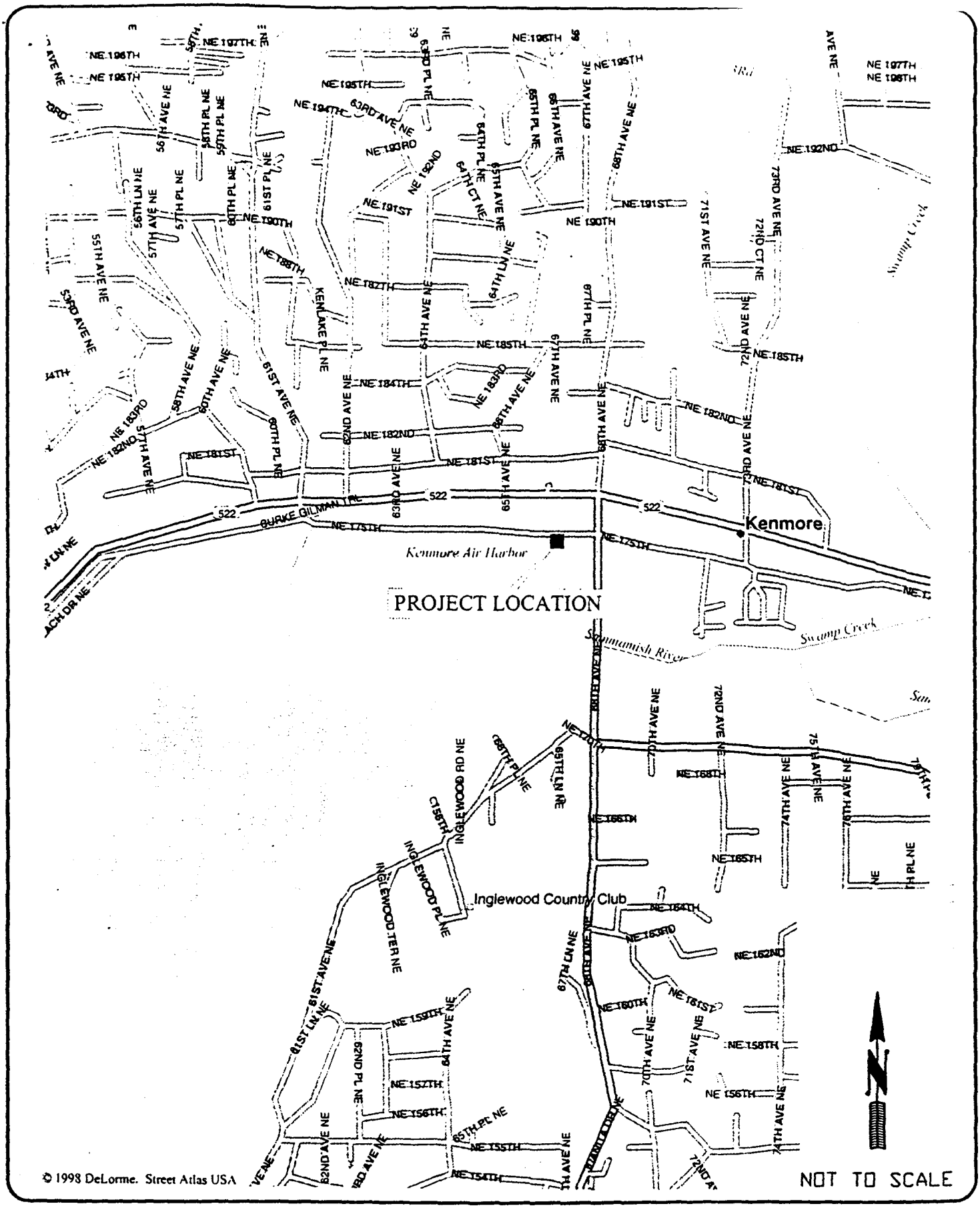
On April 30, 1999, an HWA geotechnical engineer monitored drilling of two 54-feet deep borings. The borings, designated herein as BH-1 and BH-2, were performed using a truck-mounted drill rig by Holocene Drilling of Pacific, Washington. The borings were advanced using 4¼-inch inside diameter continuous flight hollow stem augers. At the completion of boring BH-2, a piezometer was installed to monitor the groundwater level at the site. The explorations were located in the field by taping distances from existing site features and their approximate locations are shown on Figure 2.

At select intervals within each drilled boring, Standard Penetration Test (SPT) sampling was performed using a 2-inch outside diameter split-spoon sampler and a 140-pound hammer. During the test, samples were obtained by driving the sampler 18 inches into the soil with the hammer free-falling 30 inches. The number of blows required for each 6 inches of penetration was recorded. This resistance, or N-value, provides a measure of the relative density of granular soils and the relative consistency of cohesive soils. The soil samples obtained from the SPTs were then placed in airtight containers and taken to our laboratory for further examination and testing.

A legend to the terms and symbols used on the exploration logs is presented on Figure A-1. Logs of borings BH-1 and BH-2 are presented on Figures A-2 and A-3, respectively.

2.2 LABORATORY INVESTIGATION

Laboratory tests were conducted on selected samples obtained from the borings to characterize certain engineering and index properties of the project soils. Laboratory tests included determination of in-situ moisture content, percent fines, grain size distribution, and plasticity characteristics (Atterberg Limits). The tests were conducted in general accordance with appropriate American Society of Testing and Materials (ASTM) standards. Results of moisture content and Atterberg Limits tests are plotted on the boring logs in Appendix A. Grain size distributions and percent fines test results are presented in Appendix B on Figure B-1; additional Atterberg Limits information is presented on Figure B-2.



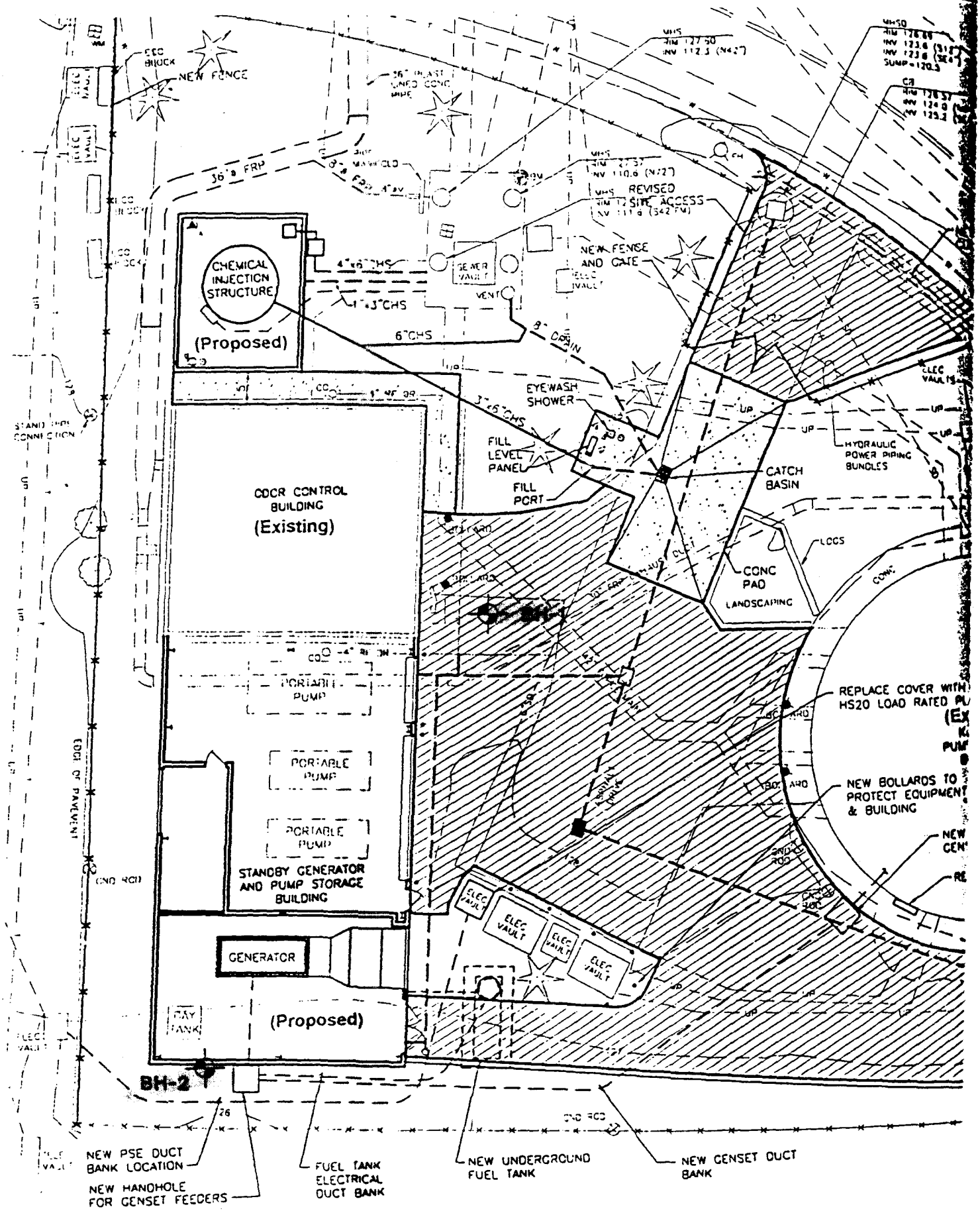
HWA GEOSCIENCES INC.

KENMORE GENERATOR BUILDING AND CHEMICAL INJECTION
KENMORE, WASHINGTON

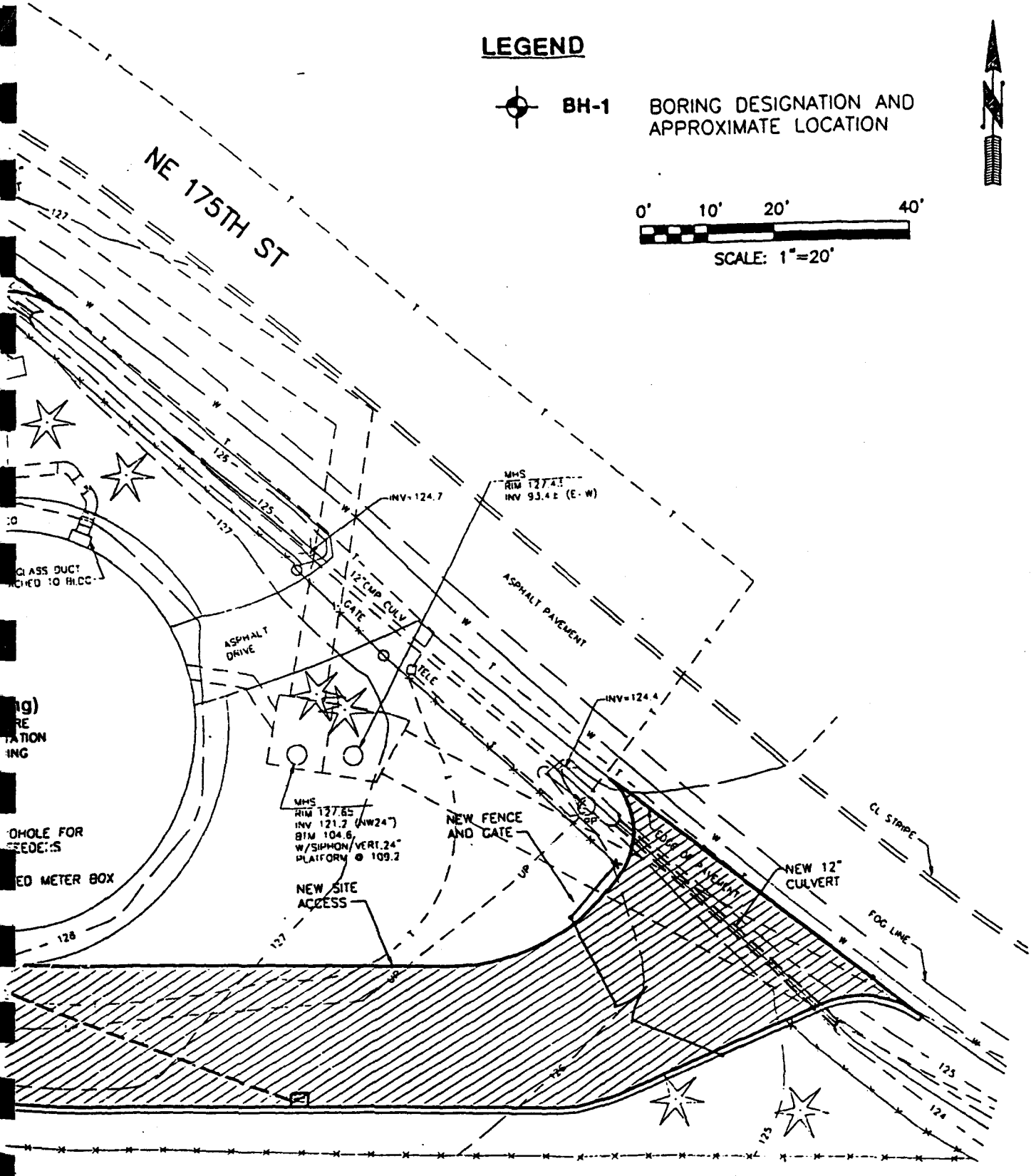
VICINITY MAP

PROJECT NO.: 99072 FIGURE: 1

D:\JOBS\99072\99072001.DWG



REFERENCE: Base map provided by Black & Veatch.



HWA GEOSCIENCES INC.

KENMORE GENERATOR BUILDING AND CHEMICAL INJECTION
KENMORE, WASHINGTON

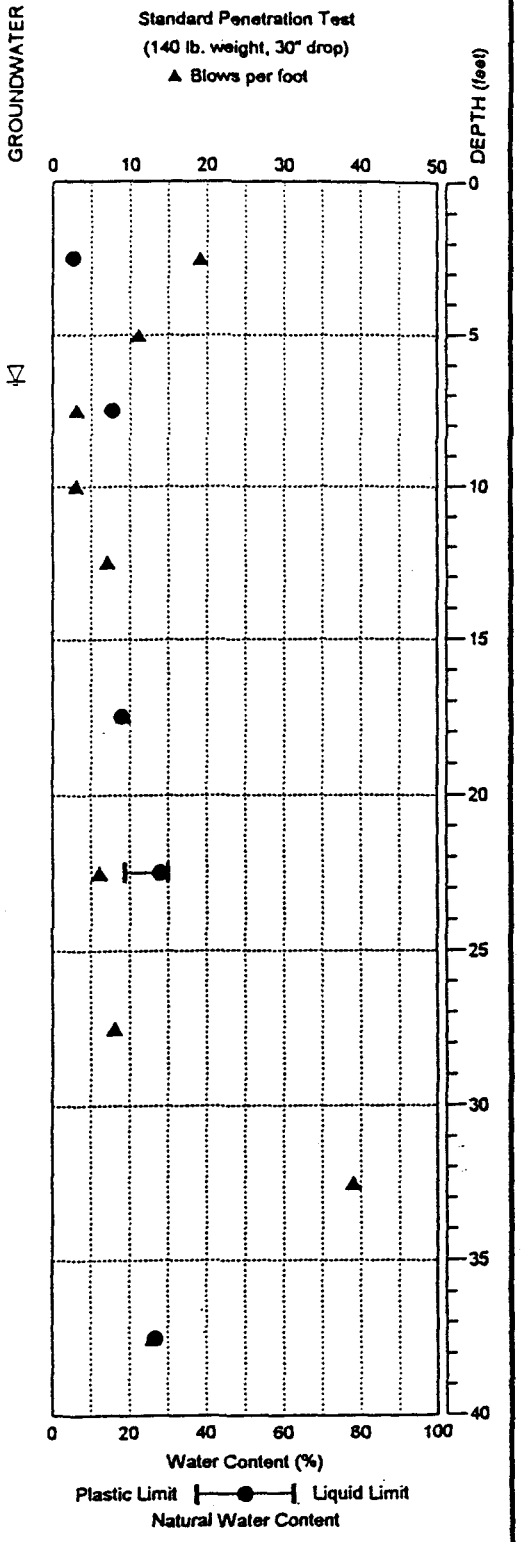
SITE AND EXPLORATION PLAN

PROJECT NO.: 99072 FIGURE: 2

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: SPT
SURFACE ELEVATION: ± feet

LOCATION: See Figure 2
DATE STARTED: 4/30/99
DATE COMPLETED: 4/30/99
LOGGED BY: D. Sowers

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0		SP SM	Medium dense, brown to grayish brown, silty, gravelly SAND, moist. Fine to coarse sand. Subrounded gravel. (FILL)					
					S-1	5-9-10		
5			Grades to brownish gray to olive gray.		S-2	6-6-5		▽
		SP SM	Very loose to medium dense, olive gray, slightly silty, gravelly SAND, wet. Fine to coarse sand. Fine subrounded to rounded gravel. (ALLUVIUM)		S-3	1-1-2	GS	
10					S-4	1-1-2		
			Grades to olive, clean.		S-5	1-3-4		
15			Grades slight to no gravel, fine to medium sand.		S-6	2-4-5		
20		CL	Medium stiff, olive gray, lean CLAY, moist.		S-7	2-3-3	AL	
25					S-8	2-3-5		
30		ML	Stiff to hard, dark gray to grayish brown, sandy SILT, wet. Fine grained sand.		S-9	14-19-20		
35					S-10	3-5-8	%F	
40								



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Kenmore Generator Building & Chemical Injection
Kenmore, Washington

BORING:
BH-1

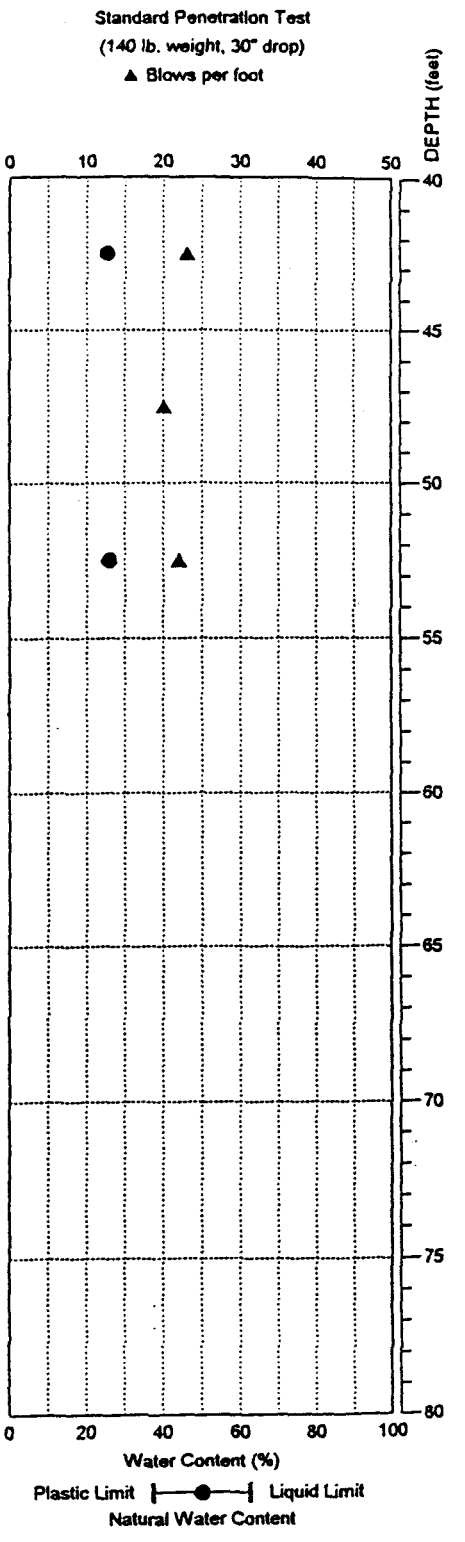
PROJECT NO.: 99072

FIGURE: A-2

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: SPT
SURFACE ELEVATION: ± feet

LOCATION: See Figure 2
DATE STARTED: 4/30/99
DATE COMPLETED: 4/30/99
LOGGED BY: D. Sowers

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
40			Very stiff, dark gray to grayish brown, sandy SILT, wet. Fine grained sand.					
					S-11	3-9-14		
45								
					S-12	5-8-12		
50								
					S-13	5-9-13		
55			Bottom of boring at 54 feet.					
			Groundwater encountered at 6.5 feet during drilling.					
60								
65								
70								
75								
80								



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Kenmore Generator Building & Chemical Injection
Kenmore, Washington

BORING: BH-1

PROJECT NO. 99072 FIGURE: 3-2

BCRING 99072.GPJ 5/18/99

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: SPT
SURFACE ELEVATION: ± feet

LOCATION: See Figure 2
DATE STARTED: 4/30/99
DATE COMPLETED: 4/30/99
LOGGED BY: D. Sowers

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0		ML	Soft, dark brown, TOPSOIL.				
		SM	Dense, dark gray with dark brown/reddish brown mottling, slightly gravelly, silty SAND, moist. Fine to coarse sand. Subrounded gravel. (FILL)		S-1	2-18-20	
5		SM	Very loose, olive gray, silty SAND, moist to wet. Fine grained sand. (OLDER FILL/DREDGE FILL)		S-2	1-1-1	
					S-3	1-2-1	
10					S-4	0-0-1	
					S-5	8-8-8	
		PT	Alternating layers of WOOD DEBRIS and dark brown PEAT.				
15					S-6	1-2-8	
		SM	Medium dense to dense, dark gray, silty SAND, wet. Fine to medium sand. Trace fine, subrounded gravel. (ALLUVIUM)				
20			Grades to dark yellowish brown with reddish brown mottling.		S-7	8-5-7	
25		SP	Dense, olive, fine SAND, wet.		S-8	5-12-22	
30		ML	Very stiff, yellowish brown, sandy SILT, moist to wet. Fine grained sand.		S-9	5-10-12	%F
35		SM	Medium dense, yellowish brown, silty SAND, wet. Fine grained sand.		S-10	5-9-13	
40							

PIEZOMETER SCHEMATIC

Standard Penetration Test
(140 lb. weight, 30" drop)
▲ Blows per foot

0 10 20 30 40 50

DEPTH (feet)

0 20 40 60 80 100

Water Content (%)

Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Kenmore Generator Building & Chemical Injection
Kenmore, Washington

BORING: BH-2

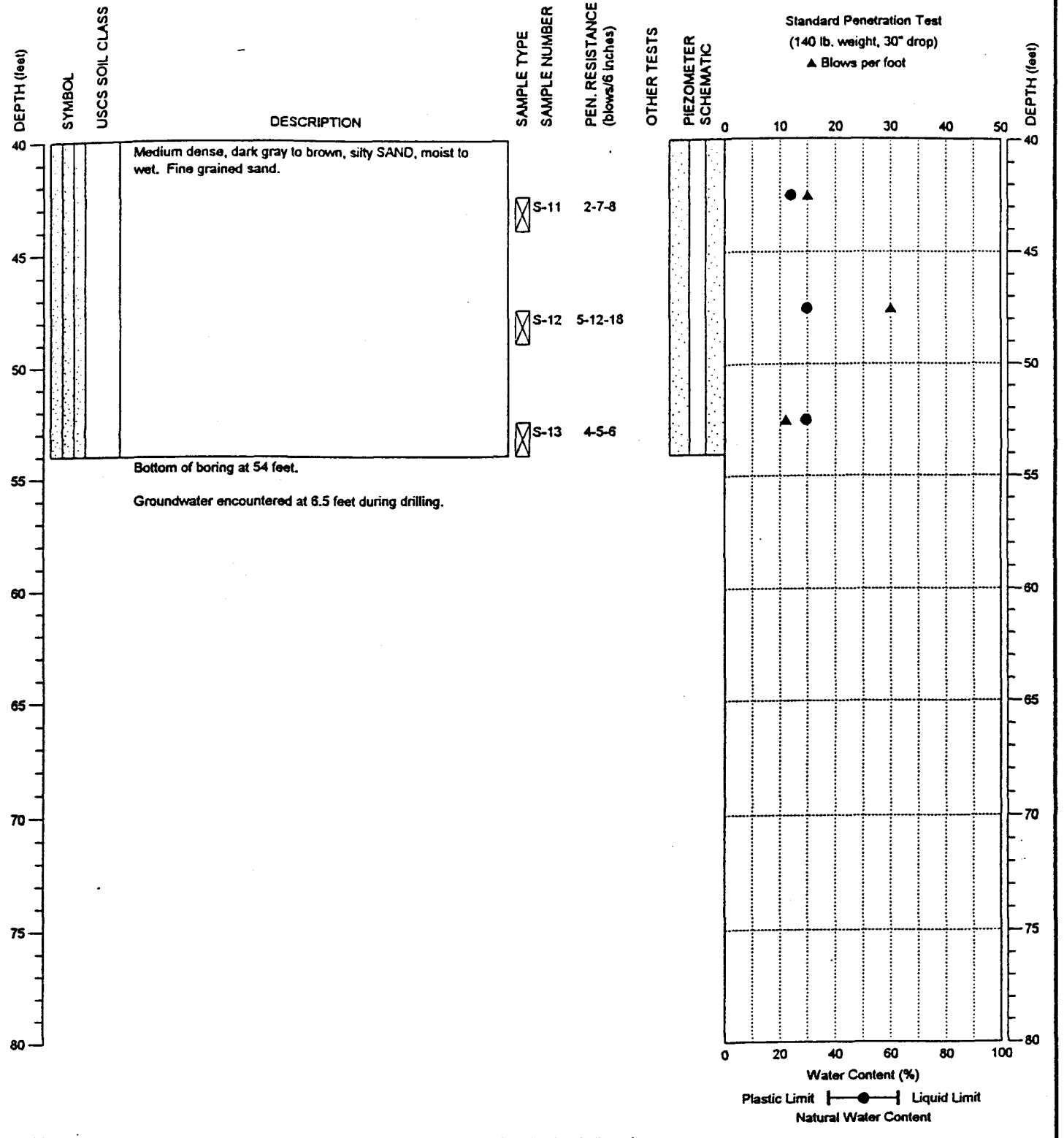
PROJECT NO.: 99072

FIGURE: A-3

PZO 99072.GPJ 5/19/99

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Hollow Stem Auger
SAMPLING METHOD: SPT
SURFACE ELEVATION: ± feet

LOCATION: See Figure 2
DATE STARTED: 4/30/99
DATE COMPLETED: 4/30/99
LOGGED BY: D. Sowers



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Kenmore Generator Building & Chemical Injection
Kenmore, Washington

BORING:
BH-2

PROJECT NO.: 99072

FIGURE: A-3

PZO 99072.GPJ 5/19/99