- ☐ City box number Wetmore-XY-Z
- ☐ Title/cover page w/the following info:
  - ☐ Company (author) name
  - ☐ Report Date
  - ☐ Project name
  - ☐ Company's job number
  - ☐ City DCLU project number (7-digit number)
  - ☐ City Permit number (6-digit number)
  - ☐ Kroll map index number (3-digit number, w?/E,W,N,S)
  - ☐ Green label
  - ☐ Site address (may be on 1st or 2nd page of text)
- ☐ Executive Summary and associated figures
- ☐ Table of Contents
- ☐ Project Location Plan/Map or Vicinity Map
- ☐ Site Plans, Boring Location Plans, or Exploration Plans
- ☐ Survey
- ☐ Geologic Maps
- ☐ Cross Sections/Subsurface Profiles
- ☐ Fill or Peat Thickness Maps and Contour Maps
- ☐ Boring Logs
- ☐ Geology Text (if no logs)
- ☐ Soil Classification Key/Boring Log Key
- ☐ Probe Logs
- ☐ Test Pit Logs
- ☐ Monitoring Well Logs
- ☐ Cone Penetrometer Logs
- ☐ Shear Wave Velocity Measurements
- ☐ Groundwater Maps
- ☐ GW Elevation Tables/Data
- ☐ Soils Lab Testing (Geotechnical) Summary Tables
  - ☐ Grain Size Analyses/Hydrometer Analyses
  - ☐ Atterberg Limits
  - ☐ Strength tests: Triaxial, Unconfined, Direct Shear
  - ☐ Organic Content
  - ☐ ^{14}C or Radiocarbon Testing
  - ☐ Other_____
- ☐ Soil Chemical Analytical Testing Summary Tables
- ☐ Water/Groundwater Chemical Analytical Summary Tables
- ☐ Comments_____
- ☐ Date Copied 5-19-99 By [illegible]

2134

2/9/99

693626

W-7624-01 11

2134

1472 NW WOODBINE W

000273653 PETER & WENDY MULLEN 01472 NW WOODBINE WI
BUILDING ID S 1 PROJECT NR: 9702211
D DEMO EXISTING SFR MO (PS)
EC ESTABLISH USE AS SINGLE FAMILY RESIDENCE CN: 970418 LU:
N CONSTRUCT TWO STORY HOUSE W/BASEMENT & DETACHED REV
O GARAGE. PER PLAN REV SR
REV

Geotechnical Report
Mullen Residence
Seattle, Washington

March 1997

Bumgardner Architects
101 Stewart Street, Suite 200
Seattle, Washington 98101

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
400 N. 34th St. ▪ Suite 100
P.O. Box 300303
Seattle, Washington 98103
206 ▪ 632 ▪ 8020

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
RICHLAND
FAIRBANKS
ANCHORAGE
SAINT LOUIS
BOSTON

March 19, 1997

Bumgardner Architects
101 Stewart Street, Suite 200
Seattle, Washington 98101

Attn: Mr. Bryan Fish

RE: GEOTECHNICAL ENGINEERING REPORT FOR PROPOSED MULLEN RESIDENCE AT 1472 N.W. WOODBINE WAY, SEATTLE, WASHINGTON

We are pleased to provide you with our geotechnical report for the proposed Mullen residence at 1472 N.W. Woodbine Way, Seattle, Washington. This report presents the results of our subsurface explorations and engineering studies, and provides geotechnical recommendations for design and construction of the proposed Mullen residence.

We appreciate the opportunity to be of service to you and look forward to our continued involvement as the project progresses. Please feel free to call me if you have any questions regarding this report or if we may be of further service to you.

Sincerely,

SHANNON & WILSON, INC.

Gerry M. Heslin

Gerry M. Heslin
Engineer

GMH/gmh

Enclosure: Geotechnical Report

cc: Peter and Wendy Mullen

W7624-01.RPT/W7624-lkd/dgw

400 NORTH 34TH STREET · SUITE 100
P.O. BOX 300303
SEATTLE, WASHINGTON 98103
206·632·8020 FAX 206·633·6777
TDD: 1·800·833·6388

W-7624-01

GEOTECHNICAL REPORT
MULLEN RESIDENCE
SEATTLE, WASHINGTON

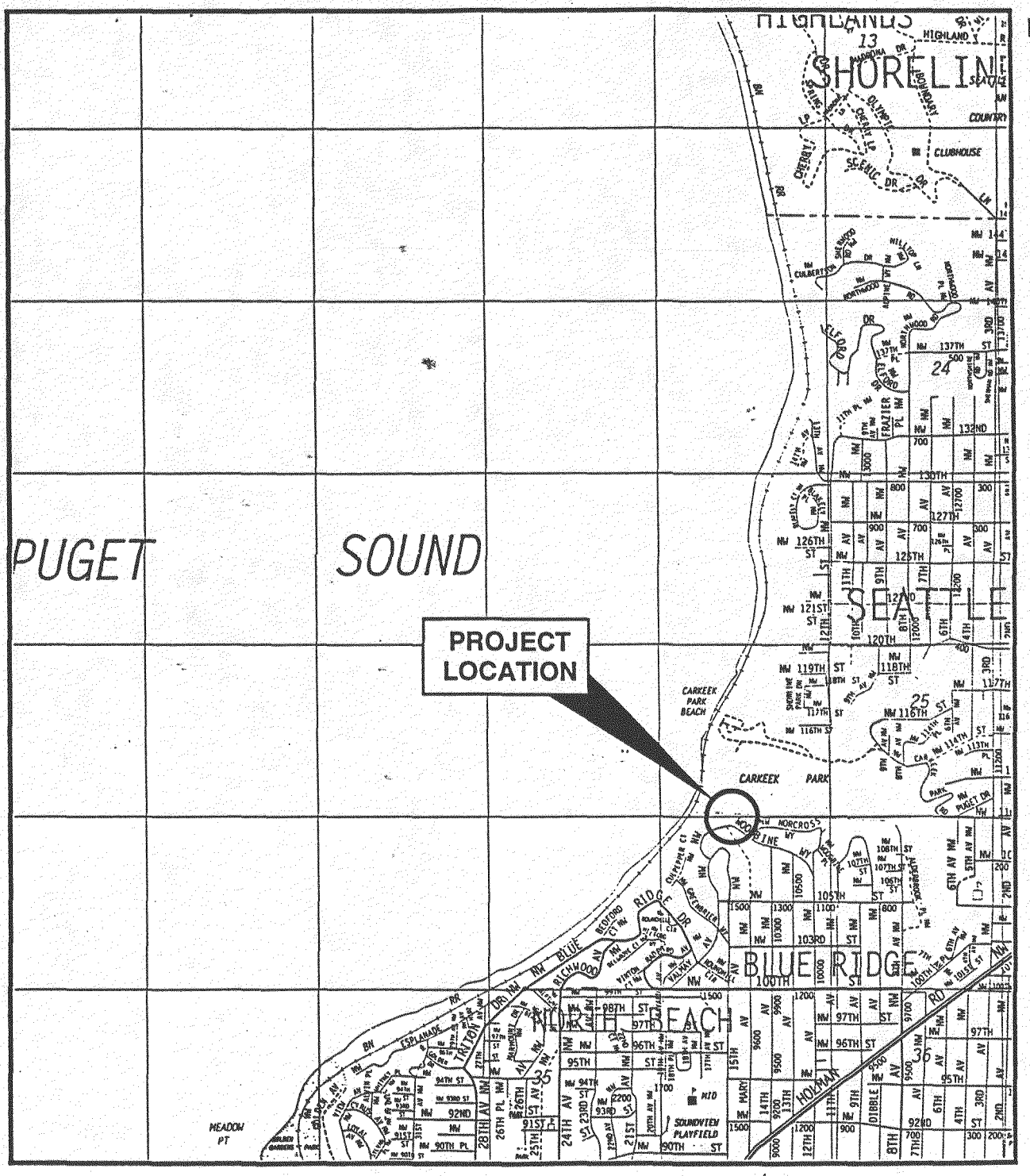
1.0 INTRODUCTION

This report presents the results of our field explorations and geotechnical engineering studies for the proposed Mullen residence at 1472 N.W. Woodbine Way, Seattle, Washington. The property location is shown on the Vicinity Map (Figure 1). The purpose of our study is to formulate engineering recommendations for foundation design, excavation, and site development. As this site is in an area considered to be environmentally sensitive, this report addresses the requirements of the City of Seattle Department of Construction and Land Use (DCLU) Director's Rules 2-93 and 3-93. The attached Appendix B presents the completed Director's Rule Site Evaluation Checklist for the subject property. This report represents a Stage C report, as defined by DCLU guidelines.

Our scope of services included reviewing existing subsurface information for the property, drilling five additional soil borings, performing engineering analyses, and preparing this report. Our services were authorized by Ms. Wendy Mullen on February 12, 1997.

2.0 PROJECT AND SITE DESCRIPTION

The subject property consists of the lot and single family home at 1472 N.W. Woodbine Way, Seattle, Washington. The property is shown on the Site and Exploration Plan (Figure 2). The lot is roughly triangular, with access to N.W. Woodbine Way in the southeast corner of the lot. With the exception of the area near the western property boundary, the site is relatively flat with a gentle downward slope from southeast to northwest. This gentle slope drops approximately 12 feet over approximately 220 feet. The topography along the east side of the lot is up to 7 feet higher than the existing house and driveway grade. It appears the driveway was formed by an excavation into the hillside up to 8 feet high. The excavation is presently supported by an unreinforced masonry retaining wall. The western property line roughly follows a steep slope which extends down to the west and terminates in a ravine beyond the western property line. The slope is approximately 25 feet high and extends down to the southwest at angles between 22.5 to



0 1/4 1/2 1

Scale in Miles

Proposed Mullen Residence
Seattle, Washington

VICINITY MAP

March 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 1

NOTE

Reproduced with permission granted by THOMAS BROS. MAPS ®
This map is copyrighted by THOMAS BROS. MAPS ® It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission. All rights reserved.

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 PROJECT AND SITE DESCRIPTION 1

3.0 SUBSURFACE EXPLORATIONS AND LABORATORY ANALYSES 3

4.0 SUBSURFACE CONDITIONS 3

5.0 SITE STABILITY 4
- 5.1 Landslide History 4
- 5.2 Conclusions Regarding Site Stability 5

6.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS 6
- 6.1 General 6
- 6.2 Footing Design 7
- 6.3 Lateral Earth Pressures 7
- 6.4 Excavation and Shoring 8
- 6.5 Fill Placement 9
- 6.6 Drainage 10
- 6.7 Wet Weather Earthwork 11
- 6.8 Erosion Control 12
- 6.9 Seismic Considerations 12
- 6.10 Additional Geotechnical Services 13

7.0 LIMITATIONS 13

LIST OF FIGURES

Figure No.

1 Vicinity Map
2 Site and Exploration Plan
3 Generalized Subsurface Profile A-A'
4 Generalized Subsurface Profile B-B'
5 Typical Wall Subdrain and Backfill

UNIFIED SOIL CLASSIFICATION SYSTEM
(From ASTM D 2488-93 & 2487-93)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL②		TYPICAL DESCRIPTION
Coarse-Grained Soils *(more than 50% retained on No. 200 sieve)* *[Use Dual Symbols for 5 - 12% Fines (i.e. GP-GM)]*①	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Clean Gravels① *(less than 5% fines)*	GW		Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GP		Poorly Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		Gravels with① Fines *(more than 12% fines)*	GM		Silty Gravels, Gravel-Sand-Silt Mixtures
			GC		Clayey Gravels, Gravel-Sand-Clay Mixtures
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Clean Sands① *(less than 5% fines)*	SW		Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP		Poorly Graded Sand, Gravelly Sands, Little or No Fines
		Sands with① Fines *(more than 12% fines)*	SM		Silty Sands, Sand-Silt Mixtures
			SC		Clayey Sands, Sand-Clay Mixtures
Fine-Grained Soils *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Inorganic Silts of Low to Medium Plasticity, Rock Flour, or Clayey Silts with Slight Plasticity
			CL		Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
		Organic	OL		Organic Silts and Organic Silty Clays of Low Plasticity
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	CH		Inorganic Clays of Medium to High Plasticity, Sandy Fat Clay, Gravelly Fat Clay
			MH		Inorganic Silts, Micaceous or Diatomaceous Fine Sands or Silty Soils, Elastic Silt
		Organic	OH		Organic Clays of Medium to High Plasticity, Organic Silts
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		PT		Peat, Humus, Swamp Soils with High Organic Content (See D 4427-92)

NOTES

1. Dual symbols (symbols separated by a hyphen, i.e., SP-SM, slightly silty fine SAND) are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

2. Borderline symbols (symbols separated by a slash, i.e., CL/ML, silty CLAY/clayey SILT; GW/SW, sandy GRAVEL/gravelly SAND) indicated that the soil may fall into one of two possible basic groups.

Proposed Mullen Residence
Seattle, Washington

SOIL CLASSIFICATION AND LOG KEY

March 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-1
Sheet 2 of 2

Shannon & Wilson, Inc., uses a soil classification system modified from the Unified Soil Classification (USC) System. Elements of the USC and other definitions are provided on this and the following page. Soil descriptions are based on visual-manual procedures (ASTM D 2488-93) unless otherwise noted.

S&W CLASSIFICATION OF SOIL CONSTITUENTS

- MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (SAND).
- Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (slightly silty SAND).
- *Trace constituents compose 0 to 5 percent of* the soil (slightly silty SAND, trace of gravel).

MOISTURE CONTENT DEFINITIONS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

ABBREVIATIONS

ATD	At Time of Drilling
Elev.	Elevation
ft	feet
HSA	Hollow Stem Auger
ID	Inside Diameter
in	inches
lbs	pounds
Mon.	Monument cover
N	Blows for last two 6-inch increments
NA	Not Applicable or Not Available
OD	Outside Diameter
OVA	Organic Vapor Analyzer
PID	Photoionization Detector
ppm	parts per million
PVC	Polyvinyl Chloride
SS	Split Spoon sampler
SPT	Standard Penetration Test
USC	Unified Soil Classification
WLI	Water Level Indicator

GRAIN SIZE DEFINITIONS

DESCRIPTION	SIEVE SIZE
FINES	< #200 (0.08 mm)
SAND*	
• Fine	• #200 - #40 (0.4 mm)
• Medium	• #40 - #10 (2 mm)
• Coarse	• #10 - #4 (5 mm)
GRAVEL*	
• Fine	• #4 - 3/4 inch
• Coarse	• 3/4 - 3 inches
COBBLES	3 - 12 inches
BOULDERS	> 12 inches

* Unless otherwise noted, sand and gravel, when present, range from fine to coarse in grain size.

RELATIVE DENSITY / CONSISTENCY

COARSE-GRAINED SOILS		FINE-GRAINED/COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
0 - 4	Very loose	<2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
Over 50	Very dense	15 - 30	Very stiff
		Over 30	Hard

WELL AND OTHER SYMBOLS

Cement/Concrete	Asphalt or PVC Cap
Bentonite Grout	Cobbles
Bentonite Seal	Fill
Slough	Ash
Silica Sand	Bedrock
2" I.D. PVC Screen (0.010-inch Slot)	

Proposed Mullen Residence
Seattle, Washington

SOIL CLASSIFICATION AND LOG KEY

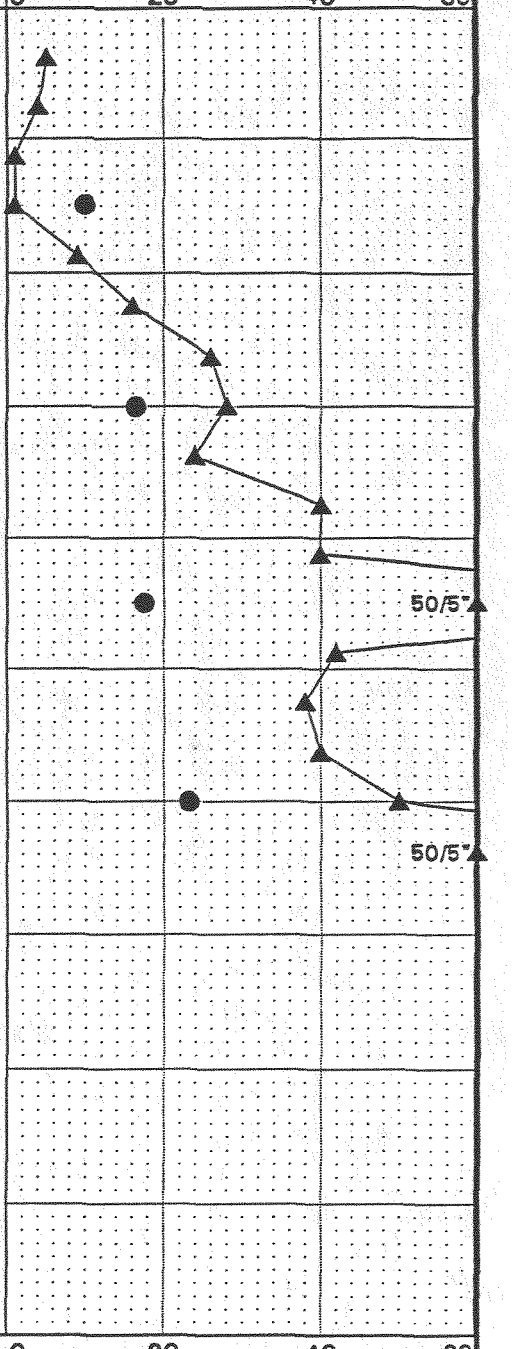
March 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-1
Sheet 1 of 2

MATERIAL DESCRIPTION Surface Elevation: Approx. 209 Feet	Depth, Ft.
Very loose, dark brown, slightly silty, fine to medium SAND; moist; with numerous organics; SP-SM.	3.0
Medium dense to dense, light brown to gray, silty, fine SAND; moist; with iron-oxide stains; SM.	11.5
Medium dense to dense, dark gray to gray, silty, fine SAND; wet; SM.	13.5
BOTTOM OF BORING COMPLETED 2/14/97	

Symbol | Samples | Ground Water | Depth, Ft.



LEGEND

- Sample Not Recovered
- Water Level
- 1.5" O.D. Split Spoon Sample
- G Grab Sample
- Surface Seal
- Annular Sealant
- Piezometer Screen
- Grout

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. The Porter penetration resistance in blows per 6 inches correlates approximately to the Standard Penetration Resistance in blows per foot.
5. Refer to KEY for explanation of 'Soil Log' symbols.
6. USC letter symbol based on visual classification.

Mullen Residence
Seattle, Washington

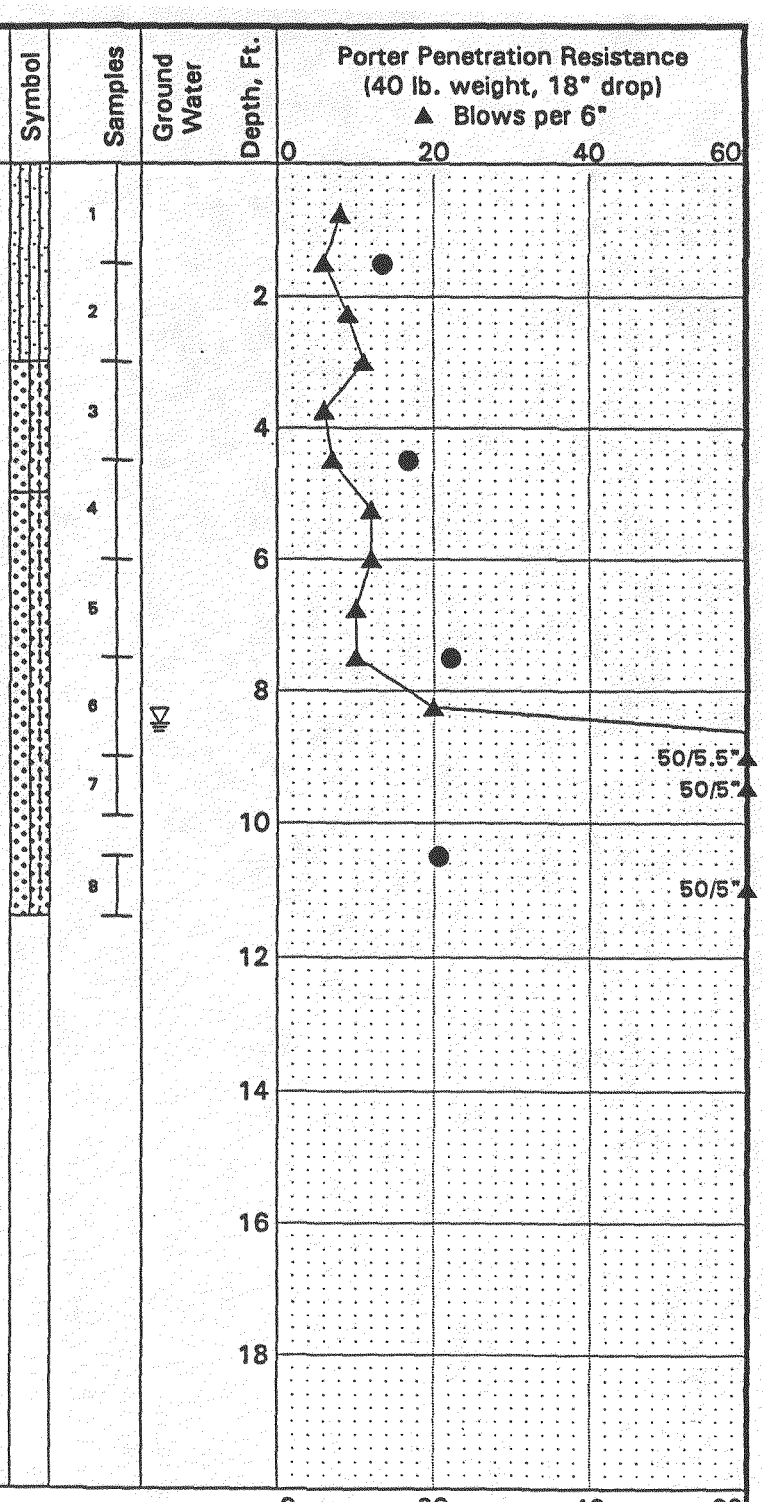
LOG OF HAND BORING HB-1

February 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-2

MATERIAL DESCRIPTION Surface Elevation: Approx. 206 Feet	Depth, Ft.
Very loose to loose, dark brown to brown, silty, fine to medium SAND, with trace of fine gravel; moist; occasional organics; SM.	3.0
Loose, light brown to brown, slightly silty to silty, fine to medium SAND; moist to wet; with occasional iron-oxide stains; SW-SM.	5.0
Medium dense to dense, light brown to brown, slightly silty to silty, fine to medium SAND; moist to wet; SW-SM.	11.4
BOTTOM OF BORING COMPLETED 2/14/97	



LEGEND

- • Sample Not Recovered
- Water Level
- 1.5" O.D. Split Spoon Sample
- G Grab Sample
- Surface Seal
- Annular Sealant
- Piezometer Screen
- Grout

0 20 40 60

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit

Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. The Porter penetration resistance in blows per 6 inches correlates approximately to the Standard Penetration Resistance in blows per foot.
5. Refer to KEY for explanation of 'Soil Log' symbols.
6. USC letter symbol based on visual classification.

Mullen Residence
Seattle, Washington

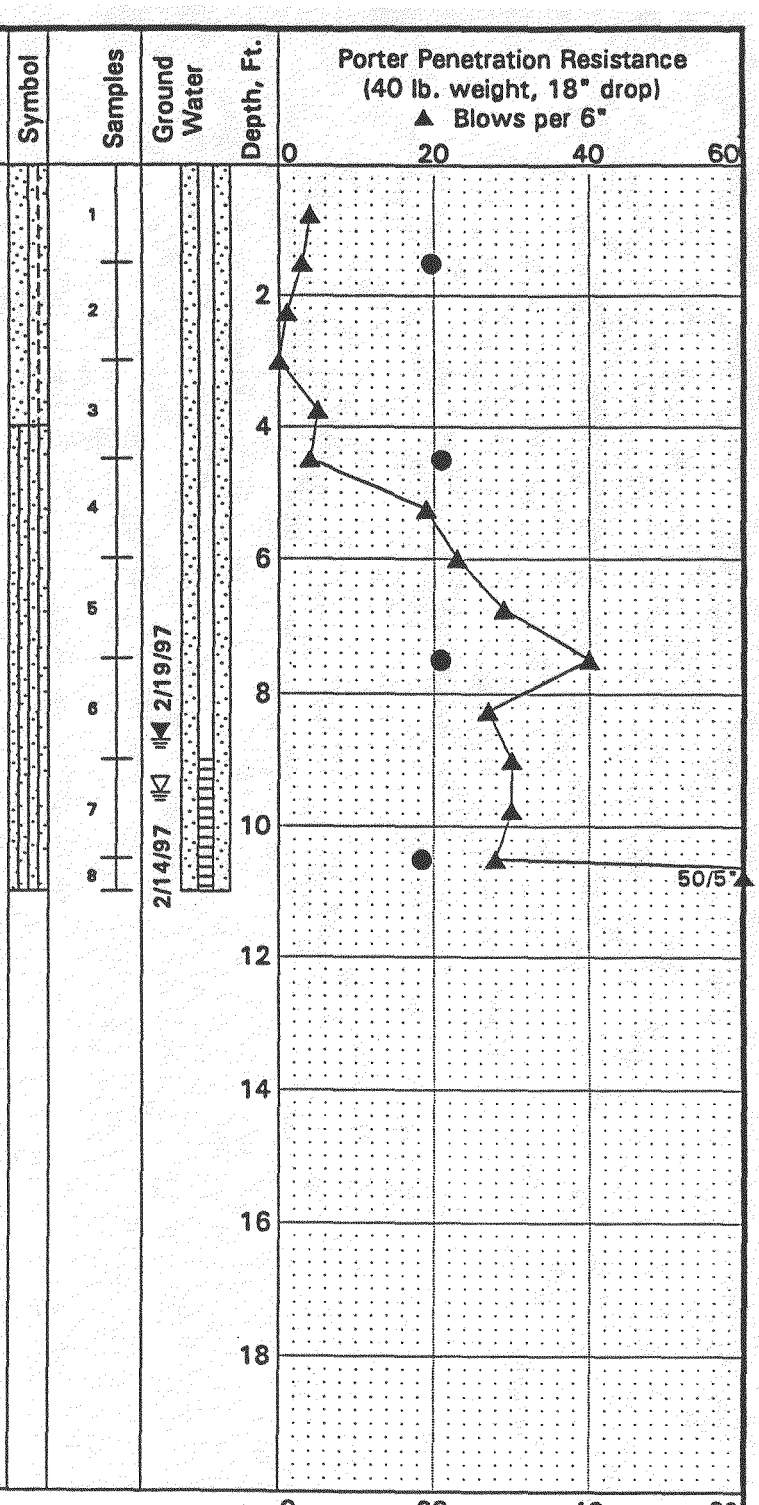
LOG OF HAND BORING HB-2

February 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3

MATERIAL DESCRIPTION Surface Elevation: Approx. 205 Feet	Depth, Ft.
Very loose, dark brown, slightly silty, fine, gravelly, fine to coarse SAND; moist; with numerous organics; SP-SM.	4.0
Medium dense to dense, light brown to brown/gray, silty, fine to medium SAND with traces of coarse sand and fine gravel; moist to wet; occasional iron-oxide stains; SM.	11.0
BOTTOM OF BORING COMPLETED 2/14/97	



LEGEND

- • Sample Not Recovered
- Water Level
- 1.5" O.D. Split Spoon Sample
- G Grab Sample
- Surface Seal
- Annular Sealant
- Piezometer Screen
- Grout

0 20 40 60

● % Water Content

Plastic Limit |—●—| Liquid Limit

Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. The Porter penetration resistance in blows per 6 inches correlates approximately to the Standard Penetration Resistance in blows per foot.
5. Refer to KEY for explanation of 'Soil Log' symbols.
6. USC letter symbol based on visual classification.

Mullen Residence
Seattle, Washington

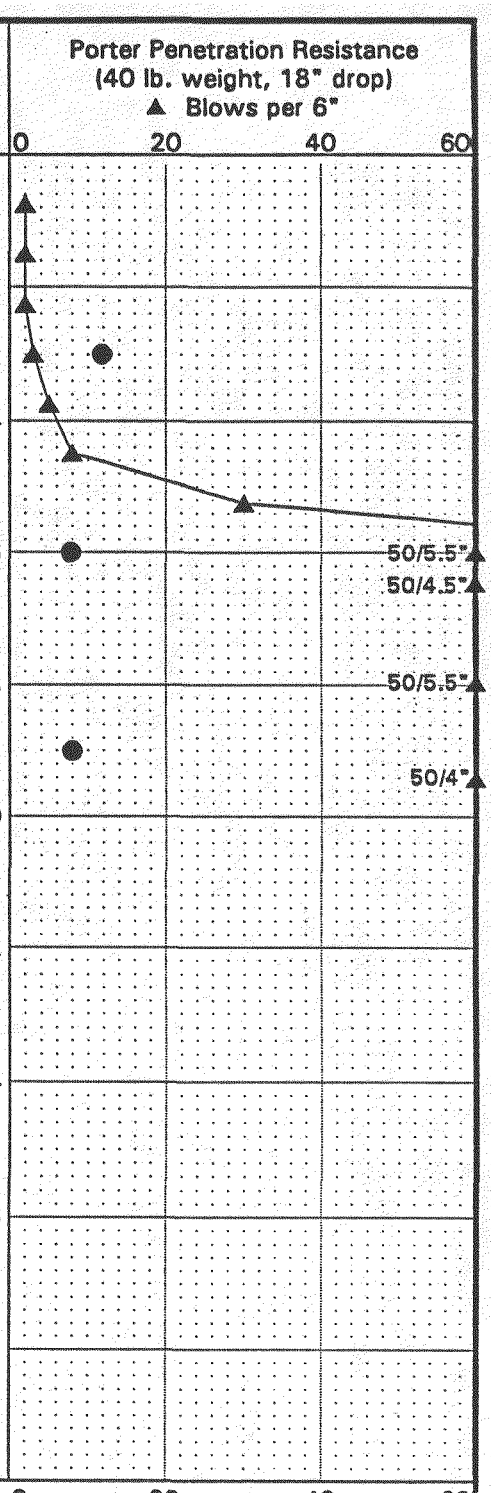
LOG OF HAND BORING HB-3

February 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4

MATERIAL DESCRIPTION Surface Elevation: Approx. 203 Feet	Depth, Ft.	Symbol	Samples	Ground Water
Very loose, dark brown to light brown, slightly silty, fine to coarse SAND with trace of fine gravel; moist; with numerous organics; SP-SM.			1, 2, 3	
Dense, brown to light brown, slightly silty, fine to medium SAND with traces of coarse and fine gravel; moist; SW-SM.	4.0		4, 5, 6, 7	
BOTTOM OF BORING COMPLETED 2/15/97	9.8			



LEGEND

- • Sample Not Recovered
- Water Level
- 1.5" O.D. Split Spoon Sample
- G Grab Sample
- Surface Seal
- Annular Sealant
- Piezometer Screen
- Grout

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. The Porter penetration resistance in blows per 6 inches correlates approximately to the Standard Penetration Resistance in blows per foot.
5. Refer to KEY for explanation of 'Soil Log' symbols.
6. USC letter symbol based on visual classification.

Mullen Residence
Seattle, Washington

LOG OF HAND BORING HB-4

February 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-5

MATERIAL DESCRIPTION Surface Elevation: Approx. 196 Feet	Depth, Ft.	Symbol	Samples	Ground Water	Depth, Ft.	Porter Penetration Resistance (40 lb. weight, 18" drop) ▲ Blows per 6" 0 20 40 60
Loose, dark brown, slightly silty, fine to coarse SAND with trace of fine gravel; moist; numerous organics; SP-SM.			1 G		2	
	3.0				4	
Medium dense, light brown, slightly silty, fine to medium SAND; moist; with iron-oxide stains; SW-SM.			2 G			
	4.5					
BOTTOM OF BORING COMPLETED 2/15/97					6	
					8	
					10	
					12	
					14	
					16	
					18	

LEGEND

- • Sample Not Recovered
- Water Level
- 1.5" O.D. Split Spoon Sample
- G Grab Sample
- Surface Seal
- Annular Sealant
- Piezometer Screen
- Grout

0 20 40 60

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. The Porter penetration resistance in blows per 6 inches correlates approximately to the Standard Penetration Resistance in blows per foot.
5. Refer to KEY for explanation of 'Soil Log' symbols.
6. USC letter symbol based on visual classification.

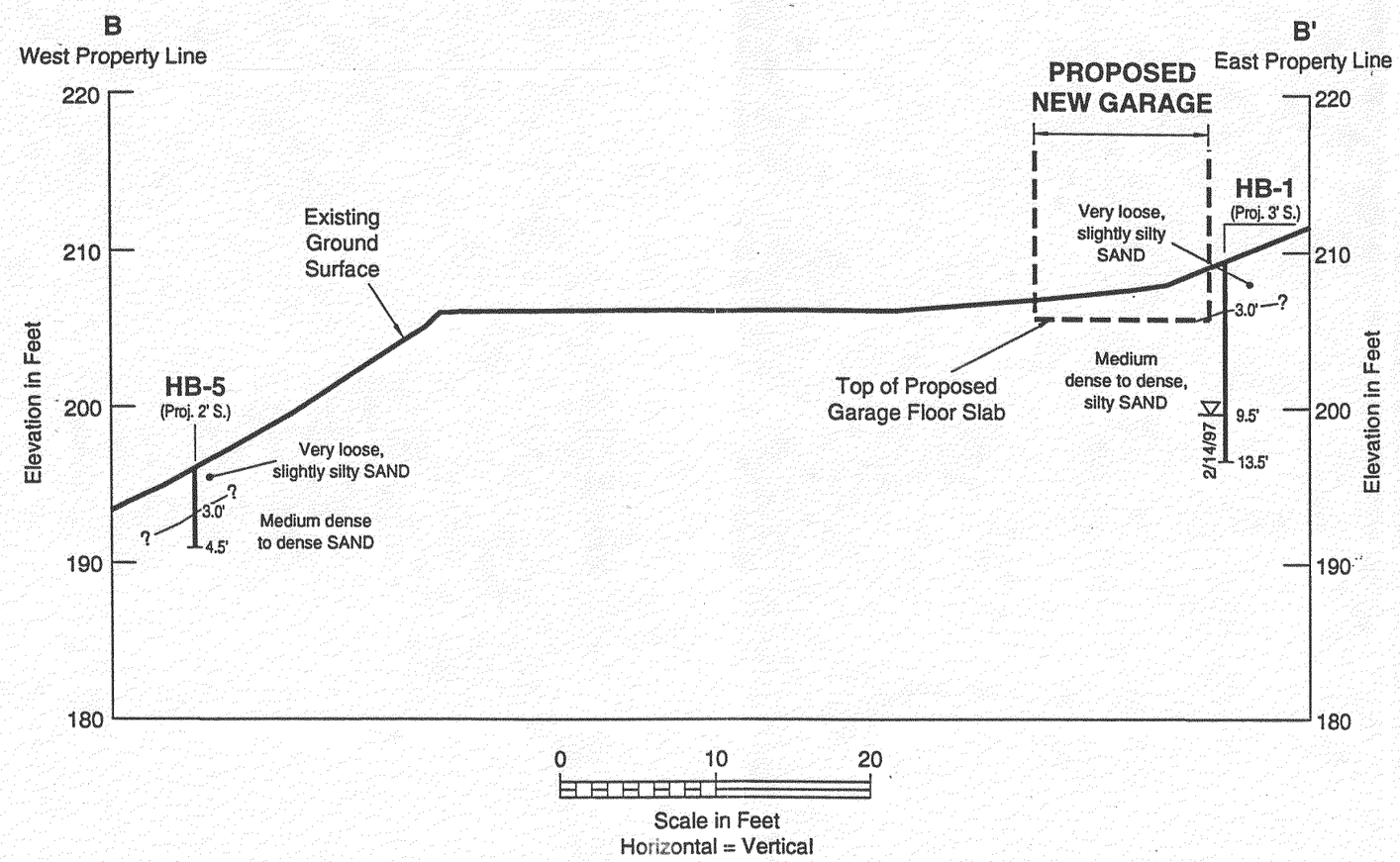
Mullen Residence
Seattle, Washington

LOG OF HAND BORING HB-5

February 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-6



LEGEND

B-1 ← Boring Location and Designation
(Proj. 3'N.) ← Offset Distance
2/14/97 ← Groundwater Level and Date Recorded
? — ? Approximate Geologic Contact
← Bottom of Boring

NOTES

1. Elevations based on site plan from The Bumgardner Architects dated 2-7-97.
2. This subsurface profile is generalized from materials observed in soil borings. Variations between the cross section and actual conditions may exist.

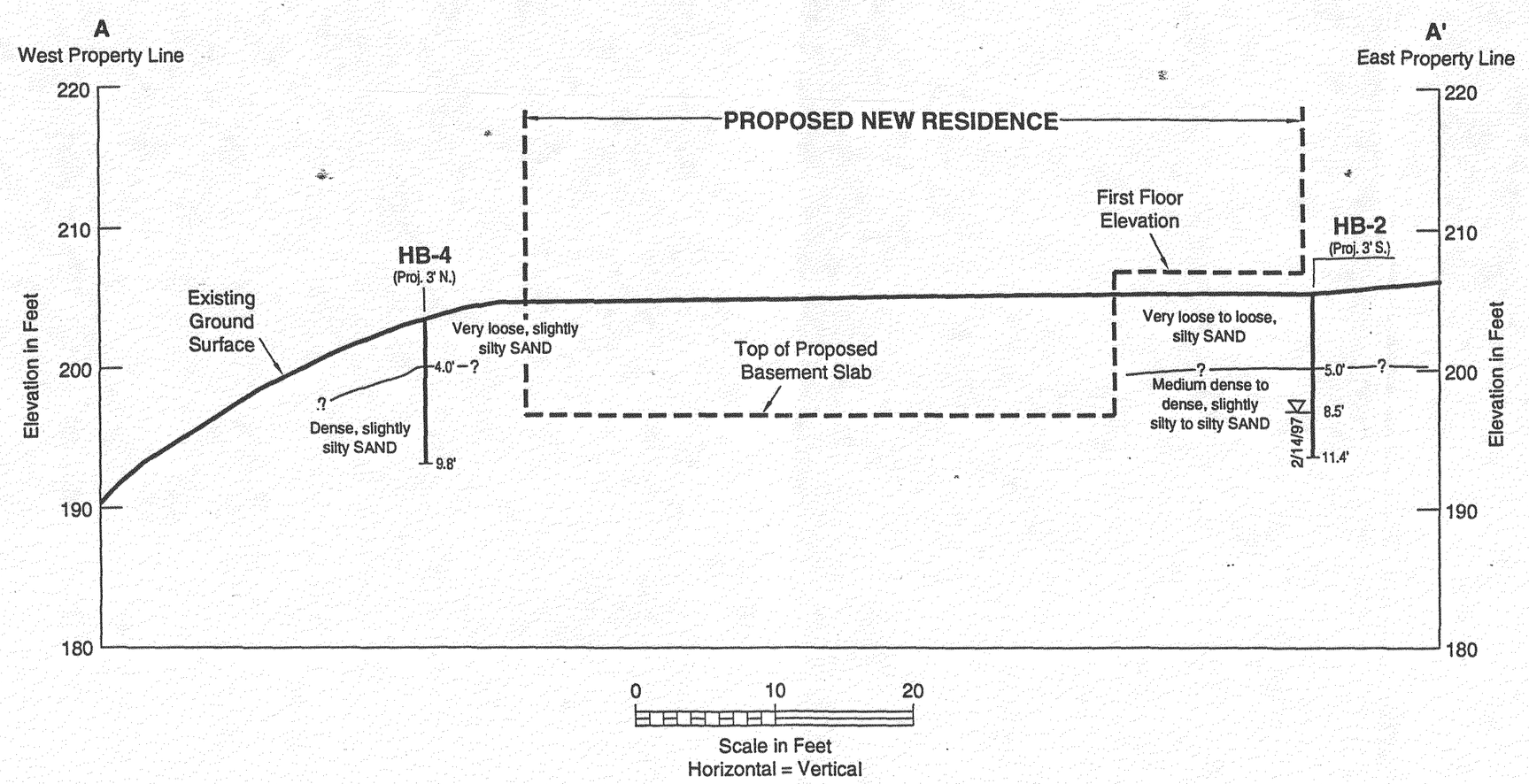
Proposed Mullen Residence
Seattle, Washington

GENERALIZED SUBSURFACE PROFILE B-B'

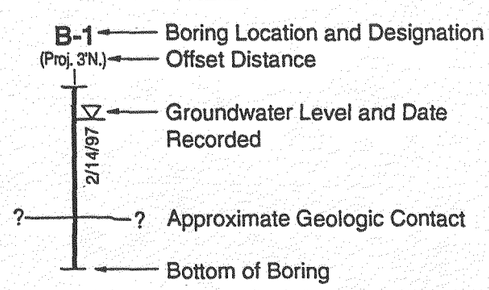
March 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 4



LEGEND



NOTES

1. Elevations based on site plan from The Bumgardner Architects dated 2-7-97.
2. This subsurface profile is generalized from materials observed in soil borings. Variations between the cross section and actual conditions may exist.

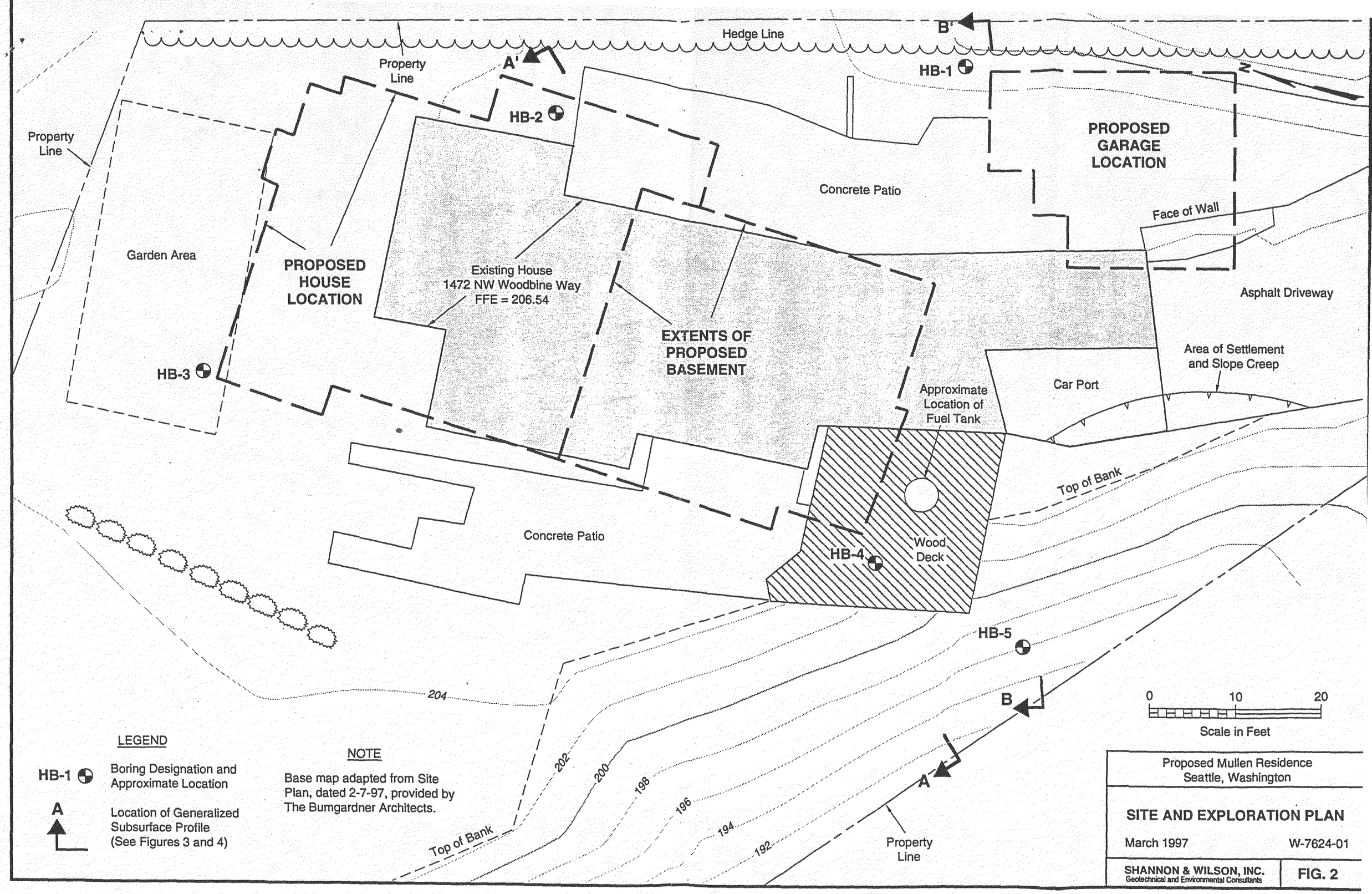
Proposed Mullen Residence
Seattle, Washington

GENERALIZED SUBSURFACE PROFILE A-A'

March 1997 W-7624-01

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 3


Hedge Line
B'
A'
Property Line
HB-1
HB-2
Property Line
PROPOSED GARAGE LOCATION
Concrete Patio
Face of Wall
Garden Area
PROPOSED HOUSE LOCATION
Existing House
1472 NW Woodbine Way
FFE = 206.54
Asphalt Driveway
EXTENTS OF PROPOSED BASEMENT
Area of Settlement and Slope Creep
HB-3
Car Port
Approximate Location of Fuel Tank
Top of Bank
Concrete Patio
HB-4
Wood Deck
HB-5
204
B
0
10
20
Scale in Feet
202
200
198
196
194
192
A
Top of Bank
Property Line
LEGEND
HB-1 Boring Designation and Approximate Location
A Location of Generalized Subsurface Profile (See Figures 3 and 4)
NOTE
Base map adapted from Site Plan, dated 2-7-97, provided by The Bumgardner Architects.
Proposed Mullen Residence
Seattle, Washington
SITE AND EXPLORATION PLAN
March 1997
W-7624-01
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants
FIG. 2