- ☐ City box number recent reports
- ☑ 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_____

3410

- ☐ Date Copied 4/27/00 By CM

2/9/99

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June 7, 1999
AESI Project No. BE99044A

710242

22

David and Susan Ovens
2500 NW 92nd Street
Seattle, Washington 98117

Subject: **Subsurface Exploration and Geotechnical Engineering Report**
Ovens Residence Distress
2500 NW 92nd Street
Seattle, Washington

2500 NW 92nd STREET

Dear Mr. and Mrs. Ovens:

This report presents the results of our subsurface exploration and geotechnical engineering study for the distress to your residence at 2500 NW 92nd Street in Seattle, Washington. The purpose of this study was to provide subsurface data to be utilized in determining the probable cause of foundation distress to your residence, and determining appropriate stabilization or repair measures. On April 14, 1999, we were authorized by Mrs. Susan Ovens to proceed with the investigation.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Analysis of subsurface information collected for this investigation, and review of information collected by others for residential and road-related landslides projects in the neighborhood, suggest that the foundation cracking and settlement at the Ovens residence has occurred due to settlement of the thick fill placed to grade the site. Portions of the footings that were constructed on a cut into native soils, or on thin fill, appear undamaged. Subsurface explorations indicate that the fill is of low density, suggesting that it was poorly compacted at the time of construction.

Additional settlement can be reduced by installing an underpinning system to support the footings. Adequate vertical bearing capacity for micropiles or pinpiles can be obtained from the dense sandy soils encountered at depths of about 18 feet below ground surface.

INTRODUCTION

Our study included a review of available literature including a review of geotechnical reports by other consultants for residential construction and landslide remediation projects in the vicinity of the residence. Our field program consisted of drilling three hollow stem auger borings and one

Coarse Grained Soils – More than 50%[1] Retained on Number 200 Sieve	Gravels– More than 50% of Coarse Fraction	Little to no Fines	GW	Well–graded gravel and gravel with sand, little to no fines
			GP	Poorly–graded gravel and gravel with sand, little to no fines
		With Fines	GM	Silty gravel and silty gravel with sand
			GC	Clayey gravel and clayey gravel with sand
	Sands– 50% or More of Coarse Fraction Passes Number 4 Sieve	Little to no Fines	SW	Well–graded sand and sand with gravel, little to no fines
			SP	Poorly–graded sand and sand with gravel, little to no fines
		With Fines	SM	Silty sand and silty sand with gravel
			SC	Clayey sand and clayey sand with gravel
Fine Grained Soils – 50%[1] or More Passes Number 200 Sieve	Silts and CLays Liquid Limit Less than 50		ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
			CL	Clay of low to medium plasticity, silty clay, sandy or gravelly clay, lean clay with sand or gravel
			OL	Organic clay or silt of low to medium plasticity
	Silts and CLays Liquid Limit 50 or More		MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
			CH	Clay of medium to high plasticity, sandy or gravelly clay, fat clay with sand or gravel
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

Coarse–Grained Soils

Density	SPT[2] blows/foot
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	>50

Fine–Grained Soils

Consistency	SPT[2] blows/foot
Very Soft	0 to 2
Soft	2 to 4
Medium Stiff	4 to 8
Stiff	8 to 15
Very Stiff	15 to 30
Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

[3] Estimated Percentage

Component	Percentage by Weight
Trace	<5
Few	5 to 10
Little	15 to 25
Some	30 to 45

With Non–primary Coarse–grained constuents ≥ 15%

Fine Content between 5% and 15%

Moisture Content

Dry– Absence of moisture, dusty, dry to the touch

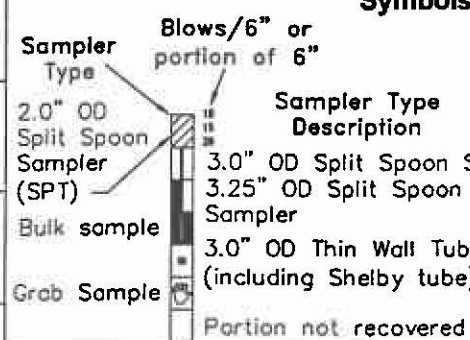
Slightly Moist– Perceptable moisture

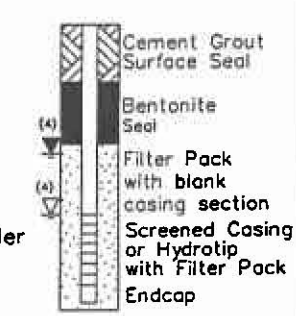
Moist– Damp but no visible water

Very Moist– Water visible but not free draining

Wet– Visible free water, usually from below water table

Symbols





[1] Percentage by Dry Weight
[2] (SPT) Standard Penetration Test (ASTM D–1586)
[3] In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D–2488)

[4] Depth of Groundwater
▼ ATD = At time of drilling
▽ Static water level (date)

Classification of soils in this report is based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual–manual and/or laboratory classification methods of ASTM D–2487 and D2488 were used as an identification guide for the Unified Soil Classification System.

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Exploration Log Key

FIGURE A-1

Exploration Log

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Project Number	Exploration Number	Sheet
BE99044A	EB-1	1 of 1

Project Name	Ovens Residence	Ground Surface Elevation (ft)	N/A
Location	2500 NW 92nd St., Seattle, WA , East Side of House	Datum	N/A
Driller/Equipment	CN Drilling - HSA 3-3/8" ID Portable Acker	Date Start/Finish	5/11/99-5/11/99
Hammer Weight/Drop	140 lbs, 30 in	Hole Diameter (in)	6"

This log is part of the report prepared by Associated Earth Sciences (AESI) for the named project and should be read together only with that report for complete interpretation. This summary applies only to the location of this exploration and at the time of exploration. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

Depth, ft	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Blows/6"	Blows/Foot (10 20 30 40)	Other tests
		1		FILL Very loose, moist, brown SILTY SAND; fine sand, trace fine to medium gravel; slightly mottled with roots and charcoal fragments		2/18"	▲	
		2				3 2 2	▲	
5		3		Interbed of soft, moist, dark brown sandy silt; fine sand, slightly mottled, organic and charcoal fragments		1 1 1	▲	
		4				2 1 2	▲	
10		5		OLD TOPSOIL LAYER		2 1 1	▲	
		6		Loose, wet to saturated, dark brown SILTY SAND; fine sand, trace fine to medium gravel, slightly mottled with roots and charcoal fragments ADVANCE OUTWASH		1 1 1	▲	
15		7		Loose, saturated, brown SILTY SAND; fine sand, trace fine to medium gravel, slightly mottled, trace organics in upper 1 foot Medium dense, wet, brown SAND; fine to medium sand, trace silt; slightly mottled		4 5 10	▲	
		8		- rust colored, grades dense		18 24 20	▲	
20		9		4 inch interbed of dense, wet, brown gravelly sand; fine to medium gravel, fine to coarse sand, some silt Bottom of boring at 21.5 feet depth Piezometer installed		14 22 24	▲	
25								
30								
35								

Sampler Type (ST):
- No Recovery
- 2" OD Split Spoon Sampler
- 3" OD Split Spoon Sampler
- Grab Sample

Lab tests:
- C - Chemical Properties
- P - Permeability
- M - Moisture
- ▽ Water Level (Date)
- ▼ Water Level at time of drilling (ATD)

Logged by: AL
Approved by: DHM
Figure No. A-2

AESIBOR OVENS.GPJ June 2, 1999

Exploration Log

ASSOCIATED EARTH SCIENCES, INC

Project Number	Exploration Number	Sheet
BE99044A	EB-2	1 of 1

Project Name	Ovens Residence	Ground Surface Elevation (ft)	N/A
Location	2500 NW 92nd St., Seattle, WA . Northeast Corner of House	Datum	N/A
Driller/Equipment	CN Drilling - HSA 3-3/8" ID Portable Acker	Date Start/Finish	5/11/99-5/11/99
Hammer Weight/Drop	140 lbs, 30 in	Hole Diameter (in)	6"

This log is part of the report prepared by Associated Earth Sciences (AESI) for the named project and should be read together only with that report for complete interpretation. This summary applies only to the location of this exploration and at the time of exploration. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

Depth, ft	Samples	Blows/6"	Blows/Foot (10 20 30 40)	Other tests	DESCRIPTION
					FILL
	1	2 2 3			Loose to very loose, moist to wet, brown SILTY SAND; fine sand, trace fine to medium gravel, slightly mottled, scattered organics and charcoal fragments
5					
	2	1 1 1			
10					
					ADVANCE OUTWASH
	3	3 2 5			Loose, saturated, brown SILTY SAND; fine sand, trace fine gravel, slightly mottled, scattered organics
15					
	4	10 15 18			- grades dense, wet
20					
	5	50/5.5"		50+	- grades dark brown
25					Bottom of boring at 24 feet depth Groundwater encountered at 11.5 feet depth Immediately backfilled with excavated material
30					
35					

Well Completion: ▼

Sampler Type (ST):
- ☐ No Recovery
- 2" OD Split Spoon Sampler
- 3" OD Split Spoon Sampler
- Grab Sample

Lab tests:
- C - Chemical Properties
- P - Permeability
- M - Moisture
- ▽ Water Level (Date)
- ▼ Water Level at time of drilling (ATD)

Logged by: AL
Approved by: DHM
Figure No. A-3

AESIBOR OVENS.GPJ June 2, 1999

Exploration Log

ASSOCIATED EARTH SCIENCES, INC

Project Number	Exploration Number	Sheet
BE99044A	EB-3	1 of 1

Project Name	Ovens Residence	Ground Surface Elevation (ft)	N/A
Location	2500 NW 92nd St., Seattle, WA , West Side of House	Datum	N/A
Driller/Equipment	CN Drilling - HSA 3-3/8" ID Portable Acker	Date Start/Finish	5/11/99-5/11/99
Hammer Weight/Drop	140 lbs, 30 in	Hole Diameter (in)	6"

This log is part of the report prepared by Associated Earth Sciences (AESI) for the named project and should be read together only with that report for complete interpretation. This summary applies only to the location of this exploration and at the time of exploration. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

Depth, ft	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Blows/6"	Blows/Foot (10 20 30 40)	Other tests
				ADVANCE OUTWASH				
				Medium dense, moist, brown SAND; fine sand, trace silt, mottled stringers				
	▨	1				3 5 9	▲	
5	▨	2				7 11 13	▲	
	▨	3		- grades dense		14 17 20	▲	
10	▨	4				11 21 35	50+ ▲	
				Bottom of boring at 11.5 feet depth No groundwater encountered Immediately backfilled with excavated materials				
15								
20								
25								
30								
35								

Sampler Type (ST):
- ☐ No Recovery
- ▨ 2" OD Split Spoon Sampler
- ▯ 3" OD Split Spoon Sampler
- Grab Sample

Lab tests:
- C - Chemical Properties
- P - Permeability
- M - Moisture
- ▽ Water Level (Date)
- ▼ Water Level at time of drilling (ATD)

Logged by: AL
Approved by: DHM
Figure No. A-4

AESIBOR OVENS.GPJ June 2, 1999

LOG OF HAND AUGER BORING NO. HB-1

Location: **Assumed Datum:**

Depth, ft	Water Level	Graphic Symbol	Description
			This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together only with that report for complete interpretation. This summary applies only to the location of this exploration at the time of exploration. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.
1 2 3	▼		FILL Very soft, wet to saturated, brown SANDY SILT; fine sand, trace fine to medium gravel; scattered roots and concrete fragments
4 5 6			FILL Loose, saturated, dark gray SILTY SAND; fine sand, trace angular fine to medium gravel
7			BOH at 7 feet depth Groundwater encountered at 3.5 feet depth at time of drilling Immediately backfilled with excavated soils

AESPT6 OVENS.GPJ June 2, 1999

▼ Water Level

Ovens Residence

2500 NW 92nd St., Seattle, WA

Project No.

BE99044A

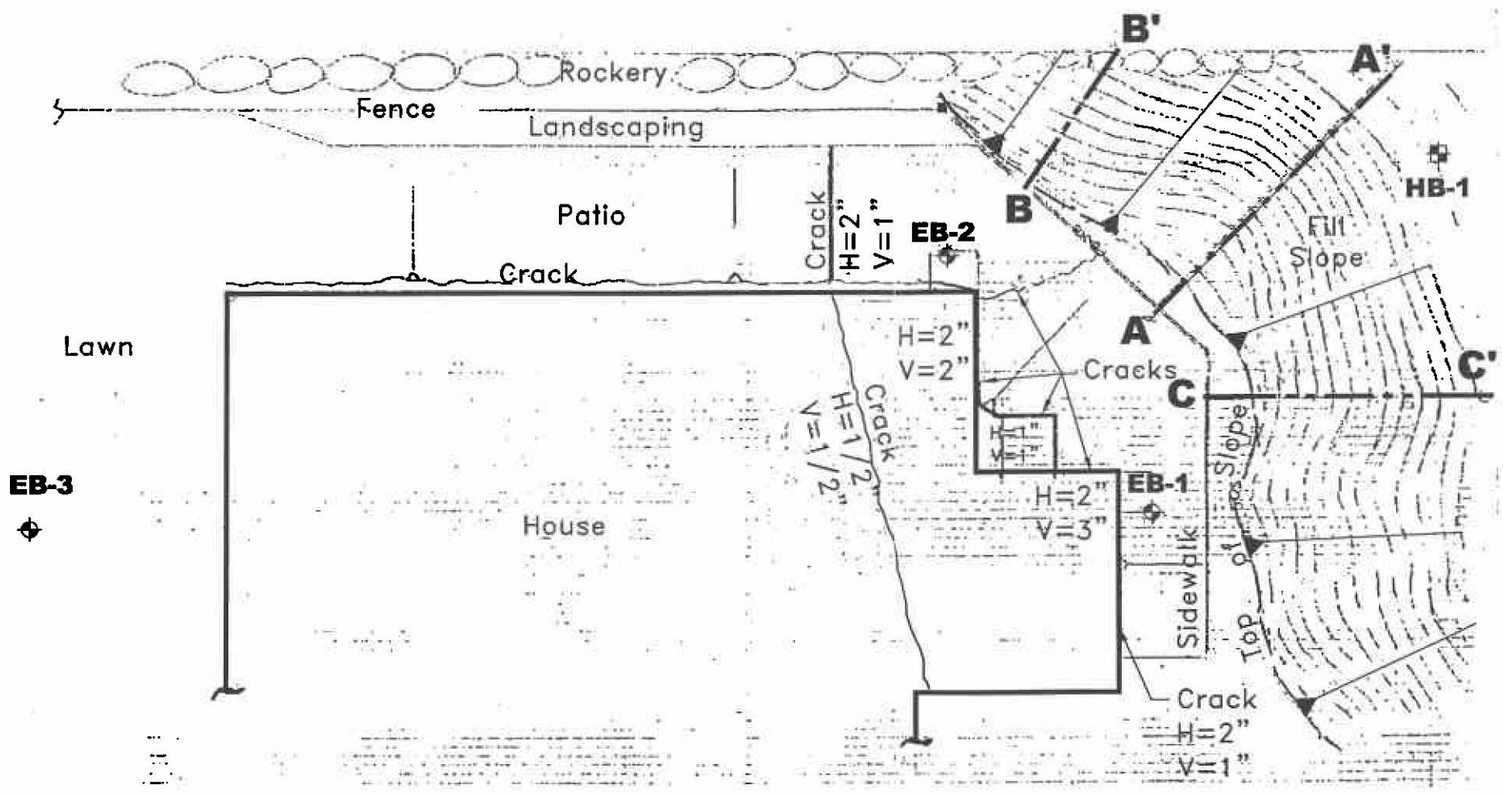
ASSOCIATED EARTH SCIENCES, INC

Date: 5/11/99

Logged By: AL

Figure No.

A-5



Approximate Scale in Feet

0 5 10

LEGEND

HB-1	Hand Boring Number and Location
EB-1	Exploration Boring Number and Location
H=2" V=1"	Amount of Horizontal and Vertical Offset of Slab Cracks
— - - — - - —	Cross Section Location

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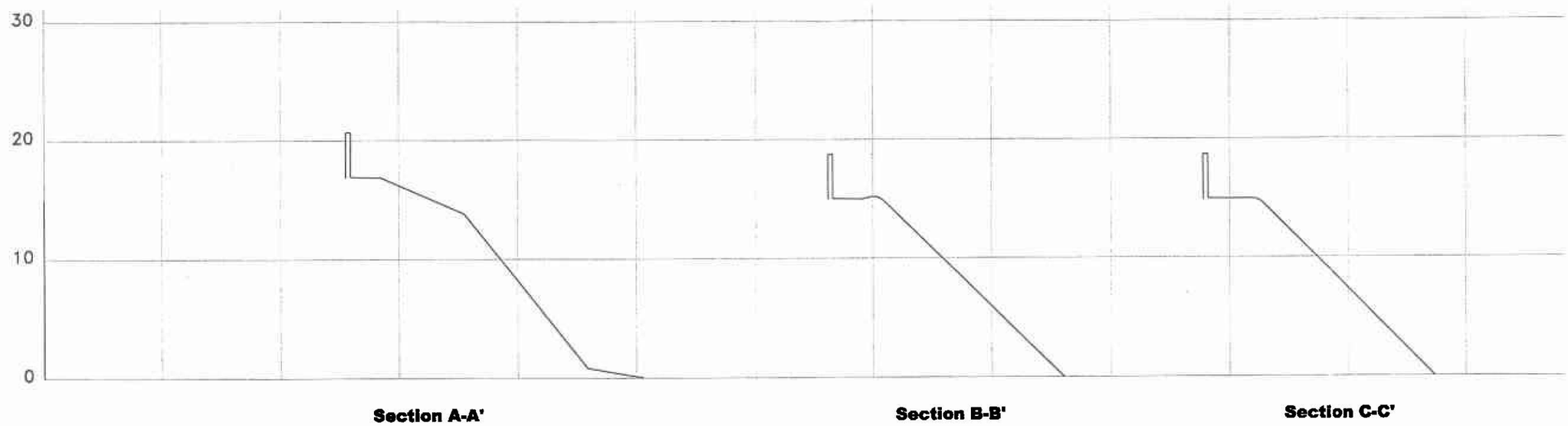
Site and Exploration Plan

Ovens Residence

2500 NW 92nd Street, Seattle, Washington

FIGURE

1



Approximate Scale in Feet

0 5 10

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Cross Sections A-A', B-B', C-C'

Ovens Residence

2500 NW 92nd Street, Seattle, Washington

FIGURE

2