

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 1<sup>st</sup> or 2<sup>nd</sup> page of text)

3409

~~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
  - <sup>14</sup>C or Radiocarbon Testing
  - Other \_\_\_\_\_
- Soil Chemical Analytical Testing Summary Tables
- Water/Groundwater Chemical Analytical Summary Tables
- Comments \_\_\_\_\_

Date Copied 6-22-00 By Suzanne

709518

182

7961 - 4<sup>th</sup> AVENUE SW

*Geotechnical Report for*

---

---

**Emerald Terrace  
Lot 11 Block 1  
Lots 11 - 18 Block 16  
Seattle, Washington**

*GENC0006*

*February 1999*

Outstanding Professionals ...  
Outstanding Quality

DAVID EVANS AND ASSOCIATES, INC.



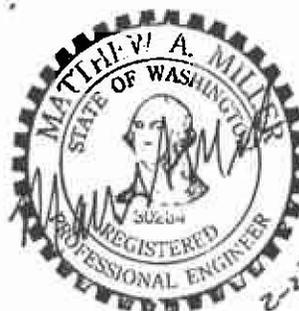


*Prepared for*

---

Mr. Matthew Chan  
Emerald City Partners  
1620 South Mildred Street, Suite #4  
Tacoma, WA 98465

*Prepared by*  
Mr. Matthew A. Miller, P.E.



EXPIRES 2/8/00

David Evans and Associates, Inc.  
3700 Pacific Highway East, Suite 311  
Tacoma, Washington 98424  
(253) 922-9780

GENC 0006

P:\g\genc0006\reports\gen6ggee1.doc

February 1999



DAVID EVANS AND ASSOCIATES, INC.

3700 Pacific Highway East

Suite 311

Tacoma, Washington 98424

Tel: 253.922.9780

Fax: 253.922.9781

February 23, 1999

Mr. Matthew Chan  
Emerald City Partners  
1620 South Mildred Street, Suite #4  
Tacoma, WA 98465

**SUBJECT: GEOTECHNICAL REPORT FOR EMERALD TERRACE  
LOT 11 BLOCK 1, LOTS 11 - 18, BLOCK 16, SEATTLE, WASHINGTON**

Dear Mr. Chan:

Enclosed is our geotechnical report for the development of nine residences on Lot 11, Block 1, and 11 through 18, Block 16 within the Emerald Terrace Subdivision located in Seattle, Washington, as prepared by David Evans and Associates, Inc. (DEA).

This report presents our conclusions from subsurface evaluation and our recommendations for the design of the foundations for the nine residences. The subsurface investigation revealed that the site is underlain by varying amounts of fill underlain by a medium dense silty sand, capable of supporting the anticipated light loads of two-story residential structures. Our recommendations include using shallow foundations on the southern most lots, and deep foundation walls and or piers on the lots where the fill is too extensive to excavate. Following the given recommendations will produce sites suitable for the proposed development.

If you have any questions, please call us at (253) 922-9780. We thank you for the opportunity to prepare this report and look forward to working with you during the construction of the project.

Sincerely,

DAVID EVANS AND ASSOCIATES, INC.

Matthew A. Miller, P.E.  
Geological Engineer



## Contents

<b>Introduction .....</b>	<b>1</b>
Project Description .....	1
<b>Site Description.....</b>	<b>2</b>
<b>Site Investigation .....</b>	<b>2</b>
Groundwater .....	3
Site Stability .....	3
<b>Recommendations .....</b>	<b>3</b>
Site Preparation .....	3
Foundation Support.....	4
Slab on Grade .....	5
Earth Pressures and Retaining Walls.....	5
Drainage.....	6
<b>Conclusion .....</b>	<b>6</b>
<b>Limitations.....</b>	<b>6</b>
<b>Figures</b>	
Figure 1 - Vicinity Map.....	1
<b>Appendix</b>	
Soil Logs	
Table 16-J, 1997 Uniform Building Code	
Site Plan	

## Introduction

This report presents the results of our geotechnical study for nine proposed residences located on Lot 11, Block 1, and Lots 11 through 18, Block 16 within the Emerald Terrace Subdivision located in Seattle, Washington. The lots are located along the east side of the new 4th Avenue SW, south of SW Elmgrove Street (*Figure 1*). The scope included evaluating the subsurface conditions of the site, reviewing previous reports and available literature, and providing recommendations for design and construction of the proposed development in accordance with the Department of Construction and Land Use (DCLU) Director's Rule 3-93. As part of the investigation, we reviewed a previous report prepared by GeoSource Engineering, Inc. dated February 23, 1993. The report was for the entire Emerald Terrace Subdivision and includes preliminary recommendations for the subject lots. The recommendations given in the report were reviewed and verified as part of this report. Our work included the excavation of 11 test pits using a trackhoe and visual reconnaissance of the area.

**Figure 1: Vicinity Map**



Source: *The Thomas Guide, 1998 edition*

During the investigation, unsuitable fill soils were encountered near the surface to depths ranging from 3 to 12 feet below the existing grade. The soils considered unsuitable for support of foundations include silty and sandy fill with traces of organics and construction debris throughout.

The foundations must be placed upon the medium dense silty sands with gravels found below the fill at depths of 3 feet to 12 feet below the existing elevation. Earthwork should take place during a dry time of the year due to the potential for erosion on the site.

## Project Description

The development will include the construction of wood-frame single-family residences on each of the nine lots. The homes will use conventional foundations with daylight basements shallow spread footings and deep pier foundations to conform to the topography of the lot. The roads and utilities are in place along the west side of each lot.

DAVID EVANS AND ASSOCIATES, INC.

EXPLORATION TEST PIT LOGS

Client: Generation Corporation		TP-1		Page: 1 of 6			
Location: Lot 18 NE Corner			Contractor: Highline Excavating				
Project: Emerald Terrace					Elevation: 252'		
Excavation Date: 1/21/1999			Job No: GENC 0006				
Total Depth: 13 ft			Logged By: MAM				
Depth (FT)	M	Sample Type	Ground-water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Grass and weeds at surface	Total Fill depth 12 ft
2						Dark brown medium dense sandy silt with cobbles moist with organic debris	
3	1					FILL Large stumps with branches	
4							
5							
6	2						
7							
8							
9						Blue silty clay at 9 ft very wet	
10	3						
11							
12						Old topsoil layer	
13	4					Medium dense to dense light brown sand with a trace of gravel Some mottling	

Client: Generation Corporation		TP-2		Page: 1 of 6			
Location: Lot 18 SW corner			Contractor: Highline Excavating				
Project: Emerald Terrace					Elevation: 256'		
Excavation Date: 1/21/1999			Job No: GENC 0006				
Total Depth: 9 ft			Logged By: MAM				
Depth (FT)	M	Sample Type	Ground-water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Grass and weeds at surface	Total Fill depth 3 ft
2						Tan stiff silt with cobbles moist with organic debris some concrete	
3	1					FILL	
4						Old topsoil layer	
5						Medium dense light brown sandy silt with a trace of gravel	
6						Some mottling	
7	2						
8							
9							

Note: The log of subsurface conditions shown hereon applies only at the specific excavation location and at the date indicated. Information presented is not warranted to be representative of subsurface conditions at other locations and times.

DAVID EVANS AND ASSOCIATES, INC.

EXPLORATION TEST PIT LOGS

Client: Generation Corporation		TP-3		Page: 2 of 6			
Location: Lot 17 NE Corner		Contractor: Highline Excavating					
Project: Emerald Terrace				Elevation: 256'			
Excavation Date: 1/21/1999		Job No: GENC 0006					
Total Depth: 12 ft		Logged By: MAM					
Depth (FT)	M	Sample Type	Ground-water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Grass and weeds at surface	Total Fill depth 10.5 Ft
2						Dark brown soft sandy silt with cobbles moist with organic debris	
3	1					FILL	
4							
5							
6							
7	2					Gray to blue silty clay very soft	
8							
9							
10	3					Old topsoil layer	
11						Medium dense light brown sandy silt with a trace of gravel	
12							
13	4						

Client: Generation Corporation		TP-4					
Location: Lot 16 Center		Contractor: Highline Excavating					
Project: Emerald Terrace				Elevation: 268'			
Excavation Date: 1/21/1999		Job No: GENC 0006					
Total Depth: 7 ft		Logged By: MAM					
Depth (FT)	M	Sample Type	Ground-water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Grass and weeds at surface	Total Fill depth 4 ft
2						Gray to blue silty clay stump	
3	1					Dark brown medium dense sandy silt with cobbles moist with organic debris	
4						FILL	
5						Old topsoil layer reddish brown	
6						Medium dense tan sandy silt with a trace of gravel	
7	2						

Note: The log of subsurface conditions shown hereon applies only at the specific excavation location and at the date indicated. Information presented is not warranted to be representative of subsurface conditions at other locations and times.

DAVID EVANS AND ASSOCIATES, INC.

**EXPLORATION TEST PIT LOGS**

Client: Generation Corporation		TP-5		Page: 3 of 6			
Location: Lot 15			Contractor: Highline Excavating				
Project: Emerald Terrace			Elevation: 272 ft				
Excavation Date: 1/21/1999			Job No: GENC 0006				
Total Depth: 8 ft			Logged By: MAM				
Depth (FT)	M	Sample Type	Ground-water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Grass and weeds at surface	Total Fill depth 6 ft
2						Dark brown medium dense sandy silt with cobbles moist with organic debris	
3	1					FILL Large stumps with branches	
4							
5							
6	2					Old topsoil layer	
7						Medium dense tan to brown sand with a trace of gravel	
8							
9							

Client: Generation Corporation		TP-6		Page: 3 of 6			
Location: Lot 14			Contractor: Highline Excavating				
Project: Emerald Terrace			Elevation: 274 ft				
Excavation Date: 1/21/1999			Job No: GENC 0006				
Total Depth: 6 ft			Logged By: MAM				
Depth (FT)	M	Sample Type	Ground-water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Grass and weeds at surface	Total Fill depth 5 ft
2						Tan stiff silt with cobbles moist with organic debris some concrete	
3	1					FILL	
4						Old topsoil layer	
5						Medium dense light brown sandy silt with a trace of gravel	
6	2					Some mottling	

Note: The log of subsurface conditions shown herein applies only at the specific excavation location and at the date indicated. Information presented is not warranted to be representative of subsurface conditions at other locations and times.

DAVID EVANS AND ASSOCIATES, INC.

EXPLORATION TEST PIT LOGS

Client: Generation Corporation		TP-7		Page: 4 of 6			
Location: Lot 13 NE Corner			Contractor: Highline Excavating				
Project: Emerald Terrace					Elevation: 278'		
Excavation Date: 1/21/1999			Job No: GENC 0006				
Total Depth: 8 ft			Logged By: MAM				
Depth (FT)	M	Sample Type	Ground- water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Grass and weeds at surface	Total Fill depth 6.5 ft
2						Dark brown medium dense sandy silt with cobbles moist with organic debris	
3	1					FILL	
4							
5							
6	2					Old topsoil layer	
7						Medium dense to dense light brown sand with a trace of gravel	
8							

Client: Generation Corporation		TP-8					
Location: Lot 12 NW Corner			Contractor: Highline Excavating				
Project: Emerald Terrace					Elevation: 282'		
Excavation Date: 1/21/1999			Job No: GENC 0006				
Total Depth: 9 ft			Logged By: MAM				
Depth (FT)	M	Sample Type	Ground- water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Grass and weeds at surface	Total Fill depth 8 ft
2						Brown medium dense sandy gravel moist with organic debris	
3	1					FILL	
4							
5						Gray blue silt with debris	
6	2					Old topsoil layer	
7						Medium dense to dense tan sandy silt with a trace of gravel	
8							

Note: The log of subsurface conditions shown hereon applies only at the specific excavation location and at the date indicated. Information presented is not warranted to be representative of subsurface conditions at other locations and times.

DAVID EVANS AND ASSOCIATES, INC.

EXPLORATION TEST PIT LOGS

Client: Generation Corporation		TP-9		Page: 5 of 6			
Location: Lot 11 NW corner			Contractor: Highline Excavating				
Project: Emerald Terrace			Elevation: 284'				
Excavation Date: 1/21/1999		Job No: GENC 0006					
Total Depth: 6 ft		Logged By: MAM					
Depth (FT)	M	Sample Type	Ground-water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Grass and weeds at surface	Total Fill depth 5 feet
2						Dark brown medium dense sandy silt with cobbles moist with organic debris	
3	1					FILL	
4							
5						Old topsoil layer	
6	2					Medium dense to dense light brown sand with a trace of gravel	

Client: Generation Corporation		TP-10					
Location: Lot 11 Block 1			Contractor: Highline Excavating				
Project: Emerald Terrace			Elevation: 250'				
Excavation Date: 1/21/1999		Job No: GENC 0006					
Total Depth: 7 ft		Logged By: MAM					
Depth (FT)	M	Sample Type	Ground-water	Lithology	USCS SYM	LITHOLOGIC DESCRIPTION	REMARKS
1						Blackberries at surface	Total Fill depth 6.5 ft
2						Dark brown medium dense sandy silt with cobbles moist with organic debris	
3	1					FILL	
4							
5							
6	2					Large Stump	
7						Old topsoil layer	
8						Medium dense to dense light brown sand with a trace of gravel	

Note: The log of subsurface conditions shown hereon applies only at the specific excavation location and at the date indicated. Information presented is not warranted to be representative of subsurface conditions at other locations and times.

DAVID EVANS AND ASSOCIATES, INC.

EXPLORATION TEST PIT LOGS

Client: Generation Corporation		TP-11		Page: 6 of 6		
Location: Lot 11 Block 1			Contractor: Highline Excavating			
Project: Emerald Terrace			Elevation: 246'			
Excavation Date: 1/21/1999		Job No: GENC 0006				
Total Depth: 6 ft		Logged By: MAM				
Depth (ft)	Sample #	Ground-water	Lithology	USCS SVM	LITHOLOGIC DESCRIPTION	REMARKS
1					Blackberries at surface	
2					Dark brown silt with some sand and cobbles moist with organic debris	
3	1				FILL	Total Fill depth 12 ft
4						
5						
6	2					
7						
8						
9	3					
10						
11						
12	4				Old topsoil layer	
					Medium dense to dense light brown sand with a trace of gravel	

Note: The log of subsurface conditions shown hereon applies only at the specific excavation location and at the date indicated. Information presented is not warranted to be representative of subsurface conditions at other locations and times.

TABLE 16-I—SEISMIC ZONE FACTOR Z

ZONE	1	2A	2B	3	4
Z	0.075	0.15	0.20	0.30	0.40

NOTE: The zone shall be determined from the seismic zone map in Figure 16-2.

TABLE 16-J—SOIL PROFILE TYPES

SOIL PROFILE TYPE	SOIL PROFILE NAME/GENERIC DESCRIPTION	AVERAGE SOIL PROPERTIES FOR TOP 100 FEET (30 480 mm) OF SOIL PROFILE		
		Shear Wave Velocity, $V_s$ feet/second (m/s)	Standard Penetration Test, $N$ (or $N_{60}$ for cohesionless soil layers) (blows/foot)	Undrained Shear Strength, $S_u$ psf (kPa)
$S_H$	Hard Rock	> 5,000 (1,500)	—	—
$S_R$	Rock	2,500 to 5,000 (760 to 1,500)		
$S_C$	Very Dense Soil and Soft Rock	1,200 to 2,500 (360 to 760)	> 50	> 2,000 (100)
$S_D$	Stiff Soil Profile	600 to 1,200 (180 to 360)	15 to 50	1,000 to 2,000 (50 to 100)
$S_G^1$	Soft Soil Profile	< 600 (180)	< 15	< 1,000 (50)
$S_F$	Soil Requiring Site-specific Evaluation. See Section 1629.3.1.			

<sup>1</sup>Soil Profile Type  $S_G$  also includes any soil profile with more than 10 feet (3048 mm) of soft clay defined as a soil with a plasticity index,  $PI > 20$ ,  $w_{mc} \geq 40$  percent and  $s_u < 500$  psf (24 kPa). The Plasticity Index,  $PI$ , and the moisture content,  $w_{mc}$ , shall be determined in accordance with approved national standards.

TABLE 16-K—OCCUPANCY CATEGORY

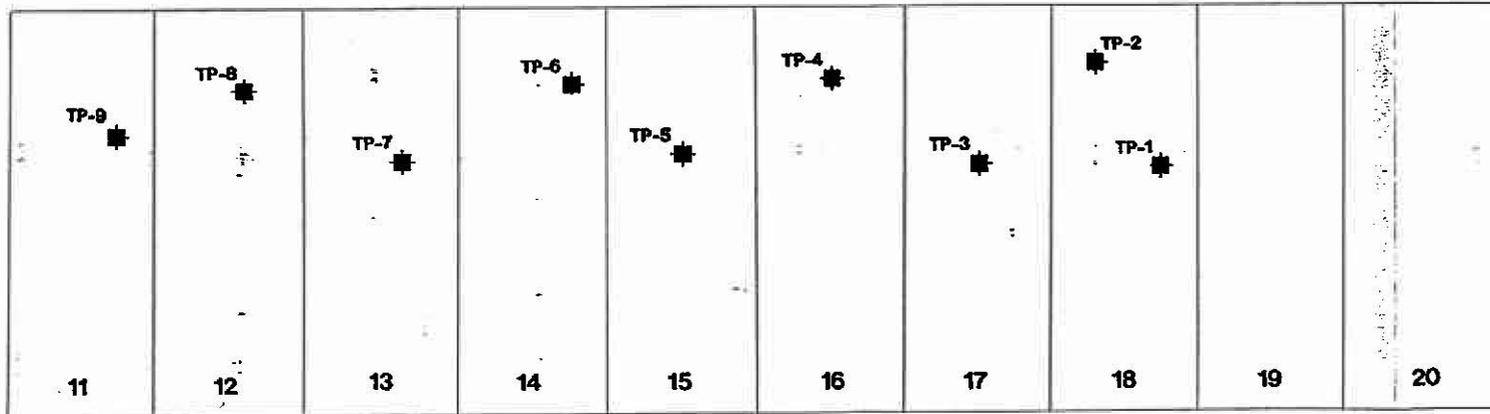
OCCUPANCY CATEGORY	OCCUPANCY OR FUNCTIONS OF STRUCTURE	SEISMIC IMPORTANCE FACTOR, $I$	SEISMIC IMPORTANCE FACTOR, $I_p$	WIND IMPORTANCE FACTOR, $I_w$
1. Essential facilities <sup>2</sup>	Group I, Division 1 Occupancies having surgery and emergency treatment areas Fire and police stations Garages and shelters for emergency vehicles and emergency aircraft Structures and shelters in emergency-preparedness centers Aviation control towers Structures and equipment in government communication centers and other facilities required for emergency response Standby power-generating equipment for Category 1 facilities Tanks or other structures containing housing or supporting water or other fire-suppression material or equipment required for the protection of Category 1, 2 or 3 structures	1.25	1.50	1.15
2. Hazardous facilities	Group H, Divisions 1, 2, 6 and 7 Occupancies and structures therein housing or supporting toxic or explosive chemicals or substances Nonbuilding structures housing, supporting or containing quantities of toxic or explosive substances that, if contained within a building, would cause that building to be classified as a Group H, Division 1, 2 or 7 Occupancy	1.25	1.50	1.15
3. Special occupancy structures <sup>3</sup>	Group A, Divisions 1, 2 and 2.1 Occupancies Buildings housing Group E, Divisions 1 and 3 Occupancies with a capacity greater than 300 students Buildings housing Group B Occupancies used for college or adult education with a capacity greater than 500 students Group I, Divisions 1 and 2 Occupancies with 50 or more resident incapacitated patients, but not included in Category 1 Group I, Division 3 Occupancies All structures with an occupancy greater than 5,000 persons Structures and equipment in power-generating stations, and other public utility facilities not included in Category 1 or Category 2 above, and required for continued operation	1.00	1.00	1.00
4. Standard occupancy structures <sup>3</sup>	All structures housing occupancies or having functions not listed in Category 1, 2 or 3 and Group U Occupancy towers	1.00	1.00	1.00
5. Miscellaneous structures	Group U Occupancies except for towers	1.00	1.00	1.00

<sup>1</sup>The limitation of  $I_p$  for panel connections in Section 1633.2.4 shall be 1.0 for the entire connector.

<sup>2</sup>Structural observation requirements are given in Section 1702.

<sup>3</sup>For anchorage of machinery and equipment required for life-safety systems, the value of  $I_p$  shall be taken as 1.5.

4th Avenue SW



Block 16

# EMERALD TERRACE

Seattle, WA

DEA Test Pit Locations

SW Elingrove St.



Block 1

Emerald City Partners

GENC 0006