Foundation Engineering, Inc.
Professional Geotechnical Services

Neal Christensen, P.E.
David Evans and Associates, Inc.
2100 SW River Parkway
Portland, Oregon 97201

October 17, 2005

Rose Biggi Avenue Extension
Geotechnical Investigation
Beaverton, Oregon

Project 2052033

Dear Mr. Christensen:

We have completed the subsurface investigation for the proposed extension of Rose Biggi Avenue from Crescent Street to Millikan Way in Beaverton, Oregon. A vicinity map is included in Figure 1.

This technical memorandum includes a description of our work, a discussion of site conditions, a summary of laboratory testing and a discussion of engineering analyses. Recommendations for site preparation, grading, earthwork, signal foundation design, retaining wall design and site drainage are enclosed.

BACKGROUND

The proposed project involves the extension of Rose Biggi Avenue from Millikan Way across the Tri-Met light rail to Crescent Street. The extension will require the removal of the existing Westgate Theater. Rose Biggi Avenue will have two 14-foot travel lanes, 10-foot sidewalks on both sides, street trees and some on-street parking. The project, once completed, will provide access to the Beaverton Central Light Rail Station and The Round.

The City of Beaverton is the project owner and David Evans & Associates, Inc. is the civil engineering consultant. Foundation Engineering, Inc. (FEI) was retained by David Evans & Associates to complete a geotechnical investigation for the proposed road and signal construction. We understand the pavement design will be provided by others.

FIELD EXPLORATION

We drilled four exploratory boreholes at the site on August 12, 2005. The boreholes were drilled with a CME-75 truck-mounted drill rig and hollow stem augers to maximum depths ranging from ±11.5 to 16.5 feet. Disturbed samples were obtained in conjunction with Standard Penetration Tests (SPT) at 2.5-foot intervals to a depth of 10 feet and at 5-foot intervals thereafter. Shelby tube samples were also collected at various depths to obtain relatively undisturbed samples for additional laboratory testing and analyses.

Portland • Corvallis
8380 SW Nimbus Avenue • Beaverton, Oregon 97008 • Bus. (503) 643-1541 • Fax (503) 626-2419

The boreholes were continually logged in the field by a geotechnical engineer from our office. The final logs (appended) were prepared based on a review of the field logs and an examination of the soil samples in our laboratory. The approximate locations of the borings are shown on the site plan in Figure 2. The subsurface conditions are discussed below.

SITE CONDITIONS

Site Topography and Geology

The site is located in a relatively flat urban area in northern downtown Beaverton. The site is generally undeveloped south of the light rail track, with the Westgate theater, parking lots and multi-story residential and commercial complexes located north of the light rail track. Grading and fill placement has taken place as the area developed. Geologic mapping indicates that the natural subsurface is composed of fine-grained soil (Willamette Silt) from catastrophic Pleistocene flood deposits. The low to medium plasticity silt encountered in borings are consistent with the geologic mapping.

Subsurface Conditions

Borehole (BH-1) was drilled in an existing parking lot ±200 feet north of the light rail tracks near the proposed intersection of Crescent Street and Rose Biggi Avenue. Asphaltic concrete was encountered for ±3 inches followed by gravel fill to a depth of ±1.5 feet. A low plasticity silt layer extended to a depth of ±9.5 feet, followed by a silt with sand layer to ±14 feet. Low plasticity silt extended to the bottom of the boring at ±16.5 feet.

Borehole (BH-2) was drilled in an existing parking area ±120 feet north of the light rail tracks at a point midway between the light rail tracks and the proposed intersection of Crescent Street and Rose Biggi Avenue. Asphaltic concrete was encountered for ±3 inches followed by gravel fill to a depth of ±1.5 feet. A medium plasticity clayey silt layer extended to a depth of ±9 feet, followed by a silt with sand layer to the bottom of the boring at ±11.5 feet.

Borehole (BH-3) was drilled in a grassy area ±45 feet northwest of the proposed intersection of the light rail tracks and Rose Biggi Avenue. The first ±6-inch layer consisted of nonplastic organic silt, followed by nonplastic silty sand with some organics to a depth of ±3 feet. A low plasticity silt with sand layer was encountered between ±3 and 9.5 feet, followed by medium plasticity silt to the bottom of the boring at a depth of ±16.5 feet.

Borehole (BH-4) was drilled ±70 feet south of the light rail tracks near the existing intersection of Rose Biggi Avenue and Millikan Way. Asphaltic concrete was encountered for ±3 inches followed by gravel fill to a depth of ±2 feet. A medium plasticity clayey silt layer extended to a depth of 4.5 feet, followed by medium plasticity silty clay to the bottom of the boring at a depth of ±16.5 feet.

Ground Water

We observed ground water during drilling at depths of ±11.5 feet, 10.5 feet and 11.5 feet in borings BH-1, BH-3 and BH-4, respectively. Ground water was not encountered in boring BH-2. We expect that the ground water level approaches the ground surface during winter or periods of wet weather.

LABORATORY TESTING

The laboratory work included natural water contents, Atterberg limits, percent fines, pH and dry density tests to help classify the foundation soils. Atterberg limit tests indicate that the soil in boring BH-1 at a depth of ±7 feet is low plasticity silt (ML) and that the soil in boring BH-4 at a depth of ±5 feet is medium plasticity clay (CL). Percent fines testing performed on samples in borings BH-1, BH-2 and BH-3 at depths of ±7, 5 and 10.5 feet indicate percentages of fine-grained soil as 75.3, 96.8 and 66.9, respectively. pH testing performed on samples from BH-1 at a depth of 10.0 feet and BH-2 at a depth of 9.5 feet indicate that the soil is approximately neutral with readings of 7.4 and 7.5, respectively. Dry density tests indicate that the soil in boring BH-1 at a depth of ±7 feet has a dry unit weight of 85.0 pcf and that the soil in boring BH-4 at a depth of ±5 feet has a dry unit weight of 87.2 pcf. Water contents are included in the final boring logs and the results of the Atterberg limits, percent fines, dry density and pH tests are summarized in Table 1 below.

Table 1: Laboratory Test Summary

Boring	Sample	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	-200 %Fines	pH	Dry Density (pcf)
BH-1	SH-1-2	7.0-8.5	36.7	27.2	9.5			85.0
	SS-1-4B	7.0-8.5				75.3		
BH-2	SS-2-3	5.0-6.5				96.8		
	SS-2-4	10.0-11.5					7.5	
BH-3	SS-3-2	10.5-12				66.9		
	SS-3-4	9.5-11.0					7.4	
BH-4	SH-4-2	5.0-7.0	47.8	23.3	24.5			87.2

ENGINEERING ANALYSIS

Retaining Walls

Analysis was conducted for relatively low height (less than 6-foot) retaining walls. The analysis assumes a maximum exposed wall height of 5 feet and a minimum embedment of 1 foot below the adjacent ground. We also assumed the walls will consist of a relatively flexible Mechanically Stabilized Earth (MSE) style or cantilever wall.

__Bearing Capacity.__ Bearing capacity of the anticipated subgrade was calculated for an effective footing width of at least 3 feet. Our analysis assumed the base of the wall would bear on medium stiff silt, at least 1 foot below the adjacent ground surface. The bearing capacity was calculated assuming a friction angle of 32 degrees. These calculations suggest an allowable bearing pressure of 2,000 psf for the native silt soil, assuming a typical factor-of-safety of 3.

__Settlement.__ Proposed retaining wall pressures are not expected to exceed previous preconsolidation of the native soil. Therefore, we assumed elastic settlement and estimate that total settlement will be less than ½ inch. Settlement will likely occur rapidly during construction.

__Global Stability.__ The global stability of retaining walls could not be checked at this time since the final location and configuration of the retaining walls was not available. However, global stability of retaining walls on level ground is not expected to be a concern.

__Lateral Earth Pressures.__ Lateral earth pressures were calculated for the design of the retaining walls. Our calculations assumed the walls will be drained and backfilled with clean, crushed rock. The calculations included effects of surcharge, active earth pressures and seismic considerations. The backfill friction angle was assumed to be 34 degrees and peak ground acceleration was modeled as 0.29 g for a 6-foot tall wall with 1 foot of embedment. Assuming a backfill unit weight of 125 pcf and an allowable displacement of one inch, the equivalent fluid density was calculated to be 32 pcf under static conditions and 54 pcf under seismic loading using the method of Richard and Elms, assuming up to 1-inch of permanent wall deflection during seismic loading.

__External Stability.__ We checked the external stability by analyzing a typical wall section 4 feet wide and 6 feet tall for resistance to sliding and overturning. This analysis should be checked using the final wall dimensions. We used the lateral earth pressures described above and assumed a unit weight of 135 pcf for the retaining wall. Factors-of-safety greater than 3.0 were calculated for static overturning and sliding. Pseudo-static seismic loads were estimated using Mononobe-Okabe method and an acceleration coefficient of 0.29. A factor-of-safety of 1.30 was calculated for overturning with seismic loading and a factor-of-safety of 1.39 was calculated for sliding.

Signal Light Foundations

Our analysis included evaluation of the lateral response parameters for drilled piers supporting the planned signal foundation. Our analysis assumed the signals would be supported by ±3-foot diameter, ±5 to 8-foot long, reinforced concrete drilled pier foundations. We also assumed a free-head pier support condition and an axial load of 2000 lbs applied at the top of the pier. Using the computer program LPILE, we estimated a range of moments applied at the top of the pier for a range of embedment depths resulting in a pier head deflection of ±0.25 inches. The computed moments and embedment depths are shown in Table 2.

Table 2. Signal Pole Moments

Embedment Depth (ft.)	Moment (ft-lbs)	Estimated Deflection at 0-foot depth (in)
5	18,800	0.25
6.5	36,700	0.25
8	62,500	0.25

Site Drainage

We observed water levels at ±10 feet below the ground surface in mid August and expect ground water near the ground surface during wet winter months. The surface soils are also fine-grained; therefore, we expect infiltration to be relatively slow and not practical for storm water disposal.

General Earthwork

The silt soils encountered at the site are sensitive to moisture content and rapidly lose strength if disturbed when wet. The following specifications assume earthwork will be completed during dry weather. We should be contacted in the event that the work occurs in the winter or late spring. Care should be taken to minimize disturbance to the subgrade during excavation and construction. We recommend an on-site conference with the contractor prior to the grading work to review site conditions.

GEOTECHNICAL RECOMMENDATIONS

General Earthwork Specifications

1. Crushed rock, or base rock, as defined in this letter should consist of ¾"-0 or 1½"-0 (as specified), clean, well graded, crushed rock. We should be provided a sample of the intended fill for approval, prior to delivery to the site.

2. Compact all crushed rock in loose lifts not exceeding 12 inches. Thinner lifts may be required if light or hand-operated equipment is used. Compact all fill to a minimum of 95% relative compaction, unless otherwise specified. The maximum dry density of ASTM D 698 should be used as the standard for estimating relative compaction, unless otherwise specified. Granular fill (sand, rock or gravel) will compact more efficiently with a smooth-drum, vibratory roller. Field density tests should be run frequently to confirm adequate compaction.

3. Construct permanent slopes no steeper than 1(V):2(H) for cuts and 1(V):2(H) for embankment fill, except as noted.

4. Place all moisture-density testable materials in lifts not exceeding 8 inches (ODOT specification 00330.43(a-b)). The maximum dry density of ASTM D 698 should be used as the standard for estimating relative compaction. The moisture content of the fine-grained soil should be adjusted to within +2% to -4% of its optimum value prior to compaction. Field density tests should be run frequently to confirm adequate compaction.

Site Preparation

5. Remove all existing footings and portions of the foundation to a depth of at least 18 inches below subgrade. Any foundation material at a depth greater than 18 inches may be left in place if broken and perforated to facilitate drainage. Note that leaving foundation material in place may complicate future utility work.

6. Crush all concrete rubble to be used as fill to a maximum diameter of 3 inches and remove all wire, steel, wood and other unsuitable materials.

7. Moisture condition the concrete rubble fill as necessary prior to placement. The amount of water added to the concrete rubble to facilitate compaction should be determined by the field engineer at the time of construction. Place rubble fill in 12-inch (maximum) lifts and compact using a vibratory sheep's-foot or segmented pad roller making a minimum of 3 passes per lift.

8. Remove the existing fill and strip any organics to expose the subgrade. We estimate a 6-inch average stripping depth in vegetated areas.

9. Care should be taken not to disturb the subgrade during excavation. The subgrade soils are typically moisture sensitive. Excavate using a smooth-edge bucket, and do not scarify or recompact the subgrade. Do not allow equipment to operate on the subgrade. The approved subgrade should be backfilled with crushed rock as soon as practical. Excavation work should be limited to an area that can be backfilled the same day.

10. A field engineer should be present on-site during excavation to evaluate the suitability of the exposed subgrade. Areas of excessively soft or wet material should be identified, excavated and backfilled with compacted crushed rock as the work progresses.

Retaining Wall

11. Design retaining walls for a maximum effective bearing pressure of 2,000 psf.

12. Design retaining walls with an equivalent fluid density of 32 pcf for the lateral earth load on the wall, and 54 pcf for seismic considerations

13. Construct the wall on a leveling pad, consisting of compacted crushed rock backfill. The leveling pad should have a nominal thickness of 4 inches, but may be thicker to accommodate irregular surfaces.

14. Include a foundation drain in the design for all walls. The drain should include a perforated drain-pipe (ODOT specification 02410) bedded in granular drain backfill (ODOT specification 00430) and wrapped in a drainage geotextile (ODOT specification 02320). Unless otherwise specified, a Type 1 drainage geotextile should be used.

15. Construct MSE walls using MSE backfill (ODOT specification 00596.11(c)) or as recommended by the manufacturer of the wall system.

16. Compact the backfill in lifts as described in the following recommendations or as recommended by the wall system supplier (ODOT specification 00510.48(a-b)). Compact the fill within 3 feet of the wall face using lightweight, hand-operated or walk-behind equipment. The adjacent general embankment fill should be placed and compacted in lifts at the same time as the MSE layers.

Light Signal Foundations

17. Use Table 2 for design of the signal foundation depth based on the calculated moments. The applied moments result in ±0.25 inches of displacement for the range of embedment depths.

DESIGN REVIEW/CONSTRUCTION OBSERVATION/TESTING

We should be provided the opportunity to review all drawings and specifications that pertain to site preparation and foundation construction. Site preparation will require field confirmation of suitable subgrade. Mitigation of any subgrade pumping will also require engineering review and judgment. This judgment should be provided by one of our representatives. Frequent field density tests should be run on all engineered fill, subgrade and base rock. We recommend that we be retained to provide the necessary construction observation.

VARIATION OF SUBSURFACE CONDITIONS, USE OF THIS REPORT AND WARRANTY

The analysis, conclusions and recommendations contained herein are based on the assumption that the soil profiles and the ground water levels encountered in the borings are representative of overall site conditions. The above recommendations assume that we will have the opportunity to review final drawings and be present during construction to confirm assumed foundation conditions. No changes in the enclosed recommendations should be made without our approval. We will assume no responsibility or liability for any engineering judgment, inspection or testing performed by others.

This report was prepared for the exclusive use of David Evans and Associates, Inc. and the City of Beaverton for the Rose Biggi Avenue street extension in Beaverton, Oregon. Information contained herein should not be used for other sites or for unanticipated construction without our written consent. This report is intended for planning and design purposes. Contractors using this information to estimate construction quantities or costs do so at their own risk. Our services do not include any survey or assessment of potential surface contamination or contamination of the soil or ground water by hazardous or toxic materials. We assume that those services, if needed, have been completed by others.

Our work was done in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

It has been a pleasure assisting you with this phase of your project. Please do not hesitate to contact us if you have any questions or if you require further assistance.

Sincerely,

FOUNDATION ENGINEERING, INC.

Kirk Ellison
Staff Engineer

Timothy J. Pfeiffer, P.E.
Project Manager

REGISTERED PROFESSIONAL ENGINEER
16,066
OREGON
JULY 21, 1992
TIMOTHY J. PFEIFFER
Exp. 12-31-06

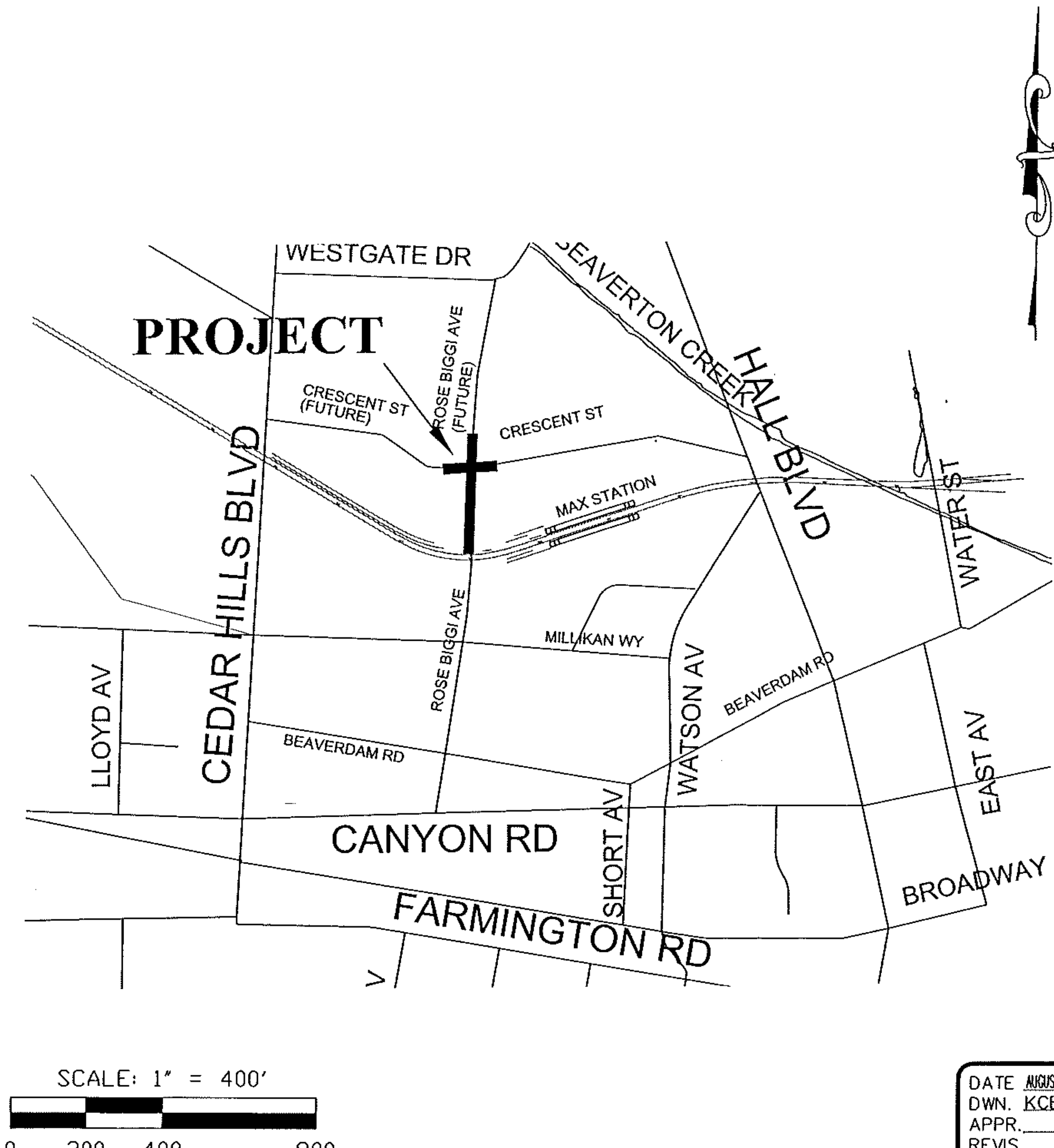
KCE/TJP/plt

Appendix A

Figures

Professional
Geotechnical
Services

Foundation Engineering, Inc.



Original image provided by City of Beaverton

DATE AUGUST 2005
DWN. KCE
APPR.
REVIS.
PROJECT NO. 205-2-033

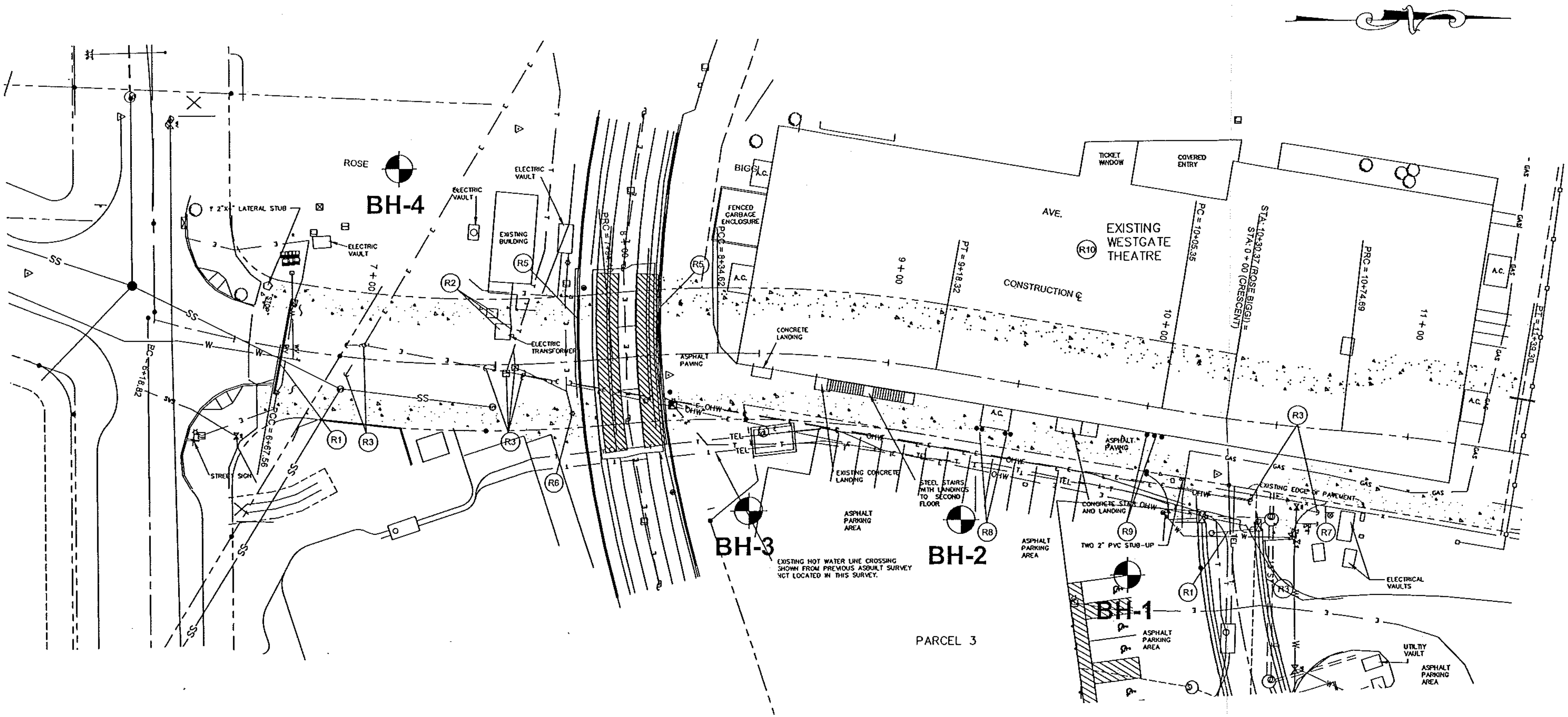
FOUNDATION ENGINEERING INC.
PROFESSIONAL GEOTECHNICAL SERVICES
8380 SW Nimbus Avenue
Beaverton, OR 97008
Bus: (503) 643-1541 Fax: (503) 626-2419

VICINITY MAP

Rose Biggi Avenue Street Extension
BEAVERTON, OREGON

FIGURE NO. 1

FILE NAME: fig1.dwg



SCALE: 1: 40

0 20 40 80

Original image provided by City of Beaverton

FOUNDATION ENGINEERING INC.
PROFESSIONAL GEOTECHNICAL SERVICES
8380 SW Nimbus Avenue
Beaverton, OR 97008
Bus: (503) 643-1541 Fax: (503) 626-2419

DATE August 2005
DWN. KCE
APPR.
REVIS.
PROJECT NO.
205-2-033

Site Plan
Boring Locations
Rose Biggi Avenue Street Extension
Beaverton, Oregon

FIGURE NO.
2

Appendix B

Boring Logs

Professional
Geotechnical
Services

Foundation Engineering, Inc.

DISTINCTION BETWEEN FIELD LOGS AND FINAL LOGS

A field log is prepared for each boring or test pit by our field representative. The log contains information concerning sampling depths and the presence of various materials such as gravel, cobbles, and fill, and observations of ground water. It also contains our interpretation of the soil conditions between samples. The final logs presented in this report represent our interpretation of the contents of the field logs and the results of the laboratory examinations and tests. Our recommendations are based on the contents of the final logs and the information contained therein and not on the field logs.

VARIATION IN SOILS BETWEEN TEST PITS AND BORINGS

The final log and related information depict subsurface conditions only at the specific location and on the date indicated. Those using the information contained herein should be aware that soil conditions at other locations or on other dates may differ. Actual foundation or subgrade conditions should be confirmed by us during construction.

TRANSITION BETWEEN SOIL OR ROCK TYPES

The lines designating the interface between soil, fill or rock on the final logs and on subsurface profiles presented in the report are determined by interpolation and are therefore approximate. The transition between the materials may be abrupt or gradual. Only at boring or test pit locations should profiles be considered as reasonably accurate and then only to the degree implied by the notes thereon.

SAMPLE OR TEST SYMBOLS

SH-3-4
- Sample Number
- Boring or Test Pit Number
- Sample Type

- Top of Sample Attempt
- Recovered Portion
- Unrecovered Portion (large circle indicates no recovery)
- Bottom of Sample Attempt

S – Grab Samples
SS – Standard Penetration Test Sample (split–spoon)
SH – Thin–walled Shelby Tube Sample
C – Core Sample
CS – Continuous Sample

▲ Standard Penetration Test Resistance equals the number of blows a 140 lb. weight falling 30 in. is required to drive a standard split–spoon sampler 1 ft. Practical refusal is equal to 50 or more blows per 6 in. of sampler penetration.

● Water Content (%).

UNIFIED SOIL CLASSIFICATION SYMBOLS

G – Gravel	W – Well Graded
S – Sand	P – Poorly Graded
M – Silt	L – Low Plasticity
C – Clay	H – High Plasticity
Pt – Peat	O – Organic

FIELD SHEAR STRENGTH TEST

Shear strength measurements on test pit side walls, blocks of soil or Shelby tube samples are typically made with Torvane or pocket penetrometer devices.

TYPICAL SOIL/ROCK SYMBOLS

Sand	Silt
Clay	Gravel
Basalt	Siltstone

WATER TABLE

Water Table Location

(1/31/00) Date of Measurement

Piezometer Tip Location (if used)

FOUNDATION ENGINEERING INC.
PROFESSIONAL GEOTECHNICAL SERVICES
7420 SW Hunziker Rd., Suite A
Portland, OR 97223-8252
BUS. (503) 684-9514 FAX (503) 598-9343

SYMBOL KEY

BORING AND TEST PIT LOGS

Explanation of Common Terms Used in Soil Descriptions

Field Identification	Cohesive Soils			Granular Soils	
	SPT	S_u^* (tsf)	Term	SPT	Term
Easily penetrated several inches by fist.	0 – 1	< 0.125	Very Soft	0 – 4	Very Loose
Easily penetrated several inches by thumb.	2 – 4	0.125–0.25	Soft	5 – 10	Loose
Can be penetrated several inches by thumb with moderate effort.	5 – 8	0.25 – 0.50	Medium Stiff (Firm)	11 – 30	Medium Dense
Readily indented by thumb but penetrated only with great effort.	9 – 15	0.50 – 1.0	Stiff	31 – 50	Dense
Readily indented by thumbnail.	16 – 30	1.0 – 2.0	Very Stiff	> 50	Very Dense
Indented with difficulty by thumbnail.	31 – 60	> 2.0	Hard		

* Undrained shear strength

Term	Soil Moisture Field Description
Dry	Absence of moisture. Dusty. Dry to the touch.
Damp	Soil has moisture. Cohesive soils are below plastic limit and usually moldable.
Moist	Grains appear darkened, but no visible water. Silt/clay will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grain surfaces. Sand and cohesionless silt exhibit dilatancy. Cohesive silt/clay can be readily remolded. Soil leaves wetness on the hand when squeezed. "Wet" indicates that the soil is wetter than the optimum moisture content and above the plastic limit.

Term	PI	Plasticity Field Test
Nonplastic	0 – 3	Cannot be rolled into a thread.
Low Plasticity	3 – 15	Can be rolled into a thread with some difficulty.
Medium Plasticity	15 – 30	Easily rolled into thread.
High Plasticity	> 30	Easily rolled and rerolled into thread.

Term	Soil Structure Criteria
Stratified	Alternating layers at least 1 inch thick – describe variation.
Laminated	Alternating layers at less than 1 inch thick – describe variation.
Fissured	Contains shears and partings along planes of weakness.
Slickensides	Partings appear glossy or striated.
Blocky	Breaks into lumps – crumbly.
Lensed	Contains pockets of different soils – describe variation.

Term	Soil Cementation Criteria
Weak	Breaks under light finger pressure.
Moderate	Breaks under hard finger pressure.
Strong	Will not break with finger pressure.

FOUNDATION ENGINEERING INC.
PROFESSIONAL GEOTECHNICAL SERVICES
7420 SW Hunziker Rd., Suite A
Portland, OR 97223-8252
BUS. (503) 684-9514 FAX (503) 598-9343

COMMON TERMS
SOIL DESCRIPTIONS

Depth Feet	Soil and Rock Description and Comments	Elev. Depth	Samples	▲ SPT, N-Value / ● Moisture, % (0 – 50 – 100)	Installations/ Water Table
0	±3 inches of ASPHALTIC CONCRETE.	180 / 179.8 / 0.3			Borehole backfilled with bentonite, ±1 foot of gravel and capped with asphaltic concrete.
	GRAVEL with some sand, dense, (Fill).	178.5 / 1.5			
2	SILT (ML); greyish brown with white and red specks, damp, low plasticity, medium stiff to stiff, blocky, (Alluvium).		SS-1-1	7	
4	Becomes brown mottled light brown and black.		SH-1-2		
7			SS-1-3	9	
9.5	SILT with some sand (ML); brown mottled light brown with black spots, moist to wet, low plasticity, soft, fine sand, (Alluvium).	170.5 / 9.5	SS-1-4	4	
11.5					Ground water at ±11.5 feet.
14	SILT (ML); greyish brown, wet, low plasticity, medium stiff, (Alluvium).	166.0 / 14.0	SS-1-5	5	
16.5	BOTTOM OF BORING	163.5 / 16.5			

Project No.: 2052033

Surface Elevation: 180.0 feet (Approx)

Date of Boring: August 12, 2005

Boring Log: BH-1

Rose Biggi Avenue

Beaverton, Oregon

Foundation Engineering, Inc.

Depth Feet	Soil and Rock Description and Comments	Elev. Depth (180)	Samples	SPT, N-Value	Installations/ Water Table
	±3 inches of ASPHALTIC CONCRETE.	179.8			
	GRAVEL with some sand, dense, (Fill).	0.3			
1					
	Clayey SILT (ML/MH); brown grey with brown mottling, damp, medium plasticity, medium stiff, (Alluvium).	178.5 / 1.5			
2					
3			SS-2-1	7	
4	Becomes brown mottled light brown and black, moist.				
5			SH-2-2		Borehole backfilled with bentonite, ± foot of gravel and capped with asphaltic concrete.
6					
7	No organics.		SS-2-3	8	
8					
9	SILT with some sand (ML); brown, moist, low plasticity, medium stiff, fine sand, (Alluvium).	171.0 / 9.0			
10	Becomes brownish grey, wet.		SS-2-4	6	
11					
	BOTTOM OF BORING	168.5 / 11.5			

Legend: ▲ SPT, N-Value; ● Moisture, %; Recovery; RQD., % (scale 0 – 50 – 100)

Project No.: 2052033

Surface Elevation: 180.0 feet (Approx)

Date of Boring: August 12, 2005

Boring Log: BH-2

Rose Biggi Avenue

Beaverton, Oregon

Foundation Engineering, Inc.

Depth Feet	Soil and Rock Description and Comments	Log	Elev. Depth (182)	Samples	▲ SPT, N-Value / ⊡ Recovery (0–50–100) / ● Moisture, % / RQD., %	Installations/ Water Table
0	±6 inches of Organic SILT (OL) with some sand; light brown, dry, nonplastic, (Topsoil).		0.0			
	Silty SAND with some organics and trace gravel; mottled light brown, dry to damp, nonplastic, medium stiff, fine to coarse sand, fine gravel, (Alluvium).		181.5 / 0.5			
1						
2						
				SS-3-1	8	
3	SILT with some sand and trace organics (ML); brown mottled light brown and orange with clear specks, damp, low plasticity, stiff, fine sand, (Alluvium).		179.0 / 3.0			
4						
5				SS-3-2	12	Backfilled with bentonite. ±5 feet of native cuttings.
6						
7				SH-3-3		
8						
9						
			172.3 / 9.8	SS-3-4	7	
10	SILT (ML/MH); light brown mottled brown and black, moist, medium plasticity, medium stiff, (Alluvium).					Ground water at ±10.5 feet.
11						
12						
13						
14						
15				SS-3-5	8	
16			165.5 / 16.5			
	BOTTOM OF BORING					

Project No.: 2052033

Surface Elevation: 182.0 feet (Approx)

Date of Boring: August 12, 2005

Foundation Engineering, Inc.

Boring Log: BH-3

Rose Biggi Avenue

Beaverton, Oregon

Depth Feet	Soil and Rock Description and Comments	Elev. Depth (184)	Samples	SPT, N-Value	Installations/ Water Table
0	±3 inches of ASPHALTIC CONCRETE.	183.8			
	Sandy GRAVEL, dense, (Fill).	0.3			
2	Clayey SILT with trace organics (MH); brownish grey, damp, medium plasticity, soft, (Alluvium).	182.0 2.0	SS-4-1	4	
4.5	Silty CLAY with some sand and trace organics (CL); brown mottled light brown red brown and black, damp, medium plasticity, medium stiff, fine sand, (Alluvium).	179.5 4.5	SH-4-2		Borehole backfilled with bentonite, ±1 foot of gravel and capped with asphaltic concrete.
7			SS-4-3	7	
10	Becomes moist.		SS-4-4	5	
11.5					Ground water at ±11.5 feet.
15	No sand, becomes wet.		SS-4-5	5	
16.5	BOTTOM OF BORING	167.5 16.5			

Legend: ▲ SPT, N-Value; ● Moisture, %; Recovery; RQD., % (scale 0 – 50 – 100)

Project No.: 2052033

Surface Elevation: 184.0 feet (Approx)

Date of Boring: August 12, 2005

Boring Log: BH-4

Rose Biggi Avenue

Beaverton, Oregon

Foundation Engineering, Inc.