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Northwest GEO Consultants, LLC

June 28, 2010

Zien Phan
14218 NE Brazee Street
Portland Oregon 97230

Dear Mr. Phan;

RE Cantilever Soldier Pile Wall
Phan Residence – 2942 NE Rocky Butte Road
COP Application 08-131183-00-RS
Site Development Checklist Dated January 6, 2010

08-131183

Northwest GEO Consultants (NGC) is pleased to provide engineering design for the retaining wall at your proposed home on Rocky Butte Road. Based on conversation with you and the design and construction team, we understand you expect a soldier pile and lagging wall using driven H piles will be the most practical to construct.

You provided us with a schematic site plan prepared by Todd Sloan Architects that shows the relationship of the proposed wall to Rocky Butte Road. We were also given a geotechnical report prepared by PSI. The soldier pile wall design provided by this letter makes use of the soil boring completed by PSI.

You also provided structural details for the home (Sheets S-1 and S-6) prepared by Sherman Engineering. Wood lagging for the wall was designed by Sherman Engineering. All other aspects of the wall were designed by NGC.

The following paragraphs describe the site conditions, design assumptions, and analysis result

ASSUMPTIONS AND SITE CONDITIONS

The site plan prepared by Todd Sloan shows the wall will be oriented roughly parallel to Rocky Butte Road, offset about 13 feet from the edge of pavement. Granite bollards prevent traffic from approaching within 4 feet of the new wall.

The design intent is that the wall will act as shoring during construction and will support permanent lateral soil loads after construction. Most of the vertical loads from the new home will be supported by a concrete wall built in front of the shoring wall.

PSI drilled one soil boring on the shoulder of Rocky Butte Road near the proposed residence. The location of our soil boring, documentation of the boring methods, and log of boring B-1are provided in their letter of November 6, 2008.

We used the analysis program Shoring Suite to develop a soldier pile design for the project. We usedthe information contained in the PSI report we modeled near surface soil on the site using the properties shown in Table 1. PSI did not encounter groundwater in their boring.

TABLE 1: SUBSURFACE SOIL MODEL

LAYER	LAYER DESCRIPTION	DEPTH[1] (FT)	MOIST UNIT WEIGHT (PCF)	SOIL FRICTION ANGLE[2]
1	CRUSHED ROCK FILL (NEW)	0.0	145	41
2	DENSE SAND	4.0	120	36
3	LOOSE GRAVELLY SAND, SANDY GRAVEL	6.5	104	29
4	V. STIFF GRAVELLY SILT	17.5	120	36
5	LOOSE GRAVELLY SAND, SANDY GRAVEL	22.5	104	29
6	WEATHERED BASALT ROCK (RH3)	39.0	140	50

1. Depth at top of layer.
2. Soil modeled without cohesion.

The proposed wall will be 13 feet in height from top of pile to the mud at footing subgrade elevation for the interior wall footing. Proximity of the wall to Rocky Butte Road requires the wall to be a cantilever design. We did not add surcharge to the wall loads because the upper 4 feet of retained soil (crushed rock) will be placed after the piles driven and the lagging installed.

The site is located at latitude 45.541, longitude -122.56. Site ground motions for pile supported structures will be based on Site Class B conditions. Seismic site characterization and design recommendations based on USGS analysis are provided in Table 1 below. We used a value of PGA/2 in the seismic ground motion input.

TABLE 2: SEISMIC DESIGN FACTORS (5% DAMPING)

Ss	S1	SC	Fa	Fv	PGA
0.953	0.326	B	1.0	1.0	0.254

Notes: IBC Seismic design factors are based on Maximum Considered Earthquakes with a return period of 2,475 years, corresponding to a probability of exceedence of 2% in 50 years.

S_S = 0.2 Sec Spectral Acceleration for site class B.
S_1 = 1.0 Sec Spectral Acceleration for site class B.
SC = Site Classification for Seismic Design
Fa = 0.2 Sec Period Site Response Modifier for Site Class B
Fv = 1.0 Sec Period Site Response Modifier for Site Class B
PGA = Design Peak Ground Acceleration for site class B.

DESIGN PILE SECTION

Our analysis shows the minimum pile required to support anticipated lateral earth pressure loads is an HP12X74 placed on 4 foot centers. The relatively loose soil to be retained and exposed wall height of 13 feet requires a relatively large and closely spaced pile section. The minimum embedment is 22.5 feet, requiring a total pile length of 35.5 feet. The static case determined the embedment length; the seismic case determined the section size. The piles can be loaded to an allowable vertical capacity of 45 kips.

Deflection of the piles at the top of the wall is estimated to be in the range of 1.8 inches when all assumed static loads are applied. The upper four feet of the wall will be backfilled after pile installation. Sherman Engineering should consider the effect of staged loading/deflection with respect to timing of the interior concrete building wall. If needed, we can provide an estimate of pile deflection before the final fill is placed. Deflections are estimated to be 2.2 inches during a design level seismic event.

LAGGING

Lagging installed between adjacent soldier piles reduces the potential for soil failure, loss of ground, and hazardous working conditions. For permanent shoring wall application wooden timber lagging should be pressure-treated. Lateral earth pressure for lagging design is 35 pounds per cubic foot, expressed as equivalent fluid pressure. Due to soil arching effects for piles placed 8 feet or less on center, temporary lagging can be designed using 25 percent of the value, permanent lagging should be designed using 50 percent of the value.

WALL DRAINAGE

The retaining wall has been designed without the added load of water behind its back side. We recommend using a composite drainboard behind the wall, such as such as Miradrain or Delta-Drain, to maintain the design assumption. The drain board should terminate at the base of the wall in a continuous horizontal drain located either in front of or in back of the wall. The drain should be 3- or 4-inch diameter perforated pipe protected from silt intrusion by a non-woven filter fabric such as Mirafi 140N. As a matter of good construction practice the drain invert elevation should be 12 inches below the interior finished floor elevation. Interior walls should be protected from moisture intrusion.

LAGGING BACKFILL

Voids that remain behind the lagging should be filled free draining coarse material that will flow into voids. Suitable materials are dredge-sand and pea-gravel. Concrete, controlled-density fill, or other impermeable materials are not suitable. The fill or wall should be vibrated to improve material flow into the voids.

WALL BACKFILL

The top of the soldier pile wall will be backfilled about 4 feet to finished grade. The backfill should consist of ¾-inch minus crushed quarry rock that is placed and compacted as structural fill. To reduce pressure on the wall, backfill located within a horizontal distance of 3 feet from the retaining walls should be compacted to approximately 90 percent of the modified Proctor maximum dry density (ASTM D 1557. Backfill more than 3 feet from the wall face should be compacted to 95 percent of the maximum density.

Settlement of up to 1 percent of the wall height commonly occurs immediately adjacent to the wall as the wall rotates and develops active lateral earth pressures. Consequently, we recommend that construction of flat work adjacent to the wall be postponed at least four weeks after construction, unless survey data indicates that settlement is complete prior to that time.

CONSTRUCTION OBSERVATION

We recommend that NGC be retained to continuously monitor soldier pile installation in order to verify that suitable depths are reached and soil conditions are encountered. Monitoring will include observation and documentation of installation procedures, construction materials, drilling conditions, soil conditions, and pile plumbness.

LIMITATIONS

This report was prepared for the exclusive use of Zien Phan and the design team for this specific project. It should be made available to prospective contractors for information on the factual data only, and not as a warranty of subsurface conditions such as those interpreted from the explorations logs and presented in the discussions of the subsurface conditions included in this report.

Unanticipated soil conditions are commonly encountered and cannot fully be determined by merely taking soil samples from borings and test pits. Such unexpected conditions frequently require that additional expenditures be made to attain properly constructed projects. Therefore, some contingency fund is recommended to accommodate the potential for extra costs.

Excavations should be made in accordance with applicable Federal and State Occupational Safety and Health Administration regulations. The contractor should be responsible for selecting the excavation technique, monitoring the excavations for safety, and constructing shoring, as required, to protect personnel and adjacent improvements. NGC is not responsible for site safety during construction.

Within the limitations of the scope, schedule and budget, the analyses, conclusions and recommendations presented in this report were prepared in accordance with generally accepted professional geotechnical engineering principles and practice in this area at the time this report was prepared. We make no warranty, either express or implied.

Zien Phan
Phan Residence - 2942 NE Rocky Butte Road
Cantilever Soldier Pile Retaining Wall

June 28, 2010

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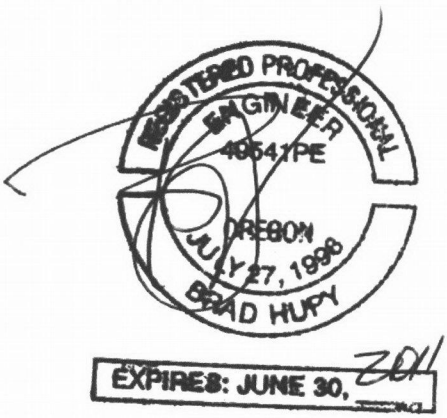
We appreciate the opportunity to be of continued service to you. Please call if you have questions concerning this report or if we can provide additional services.

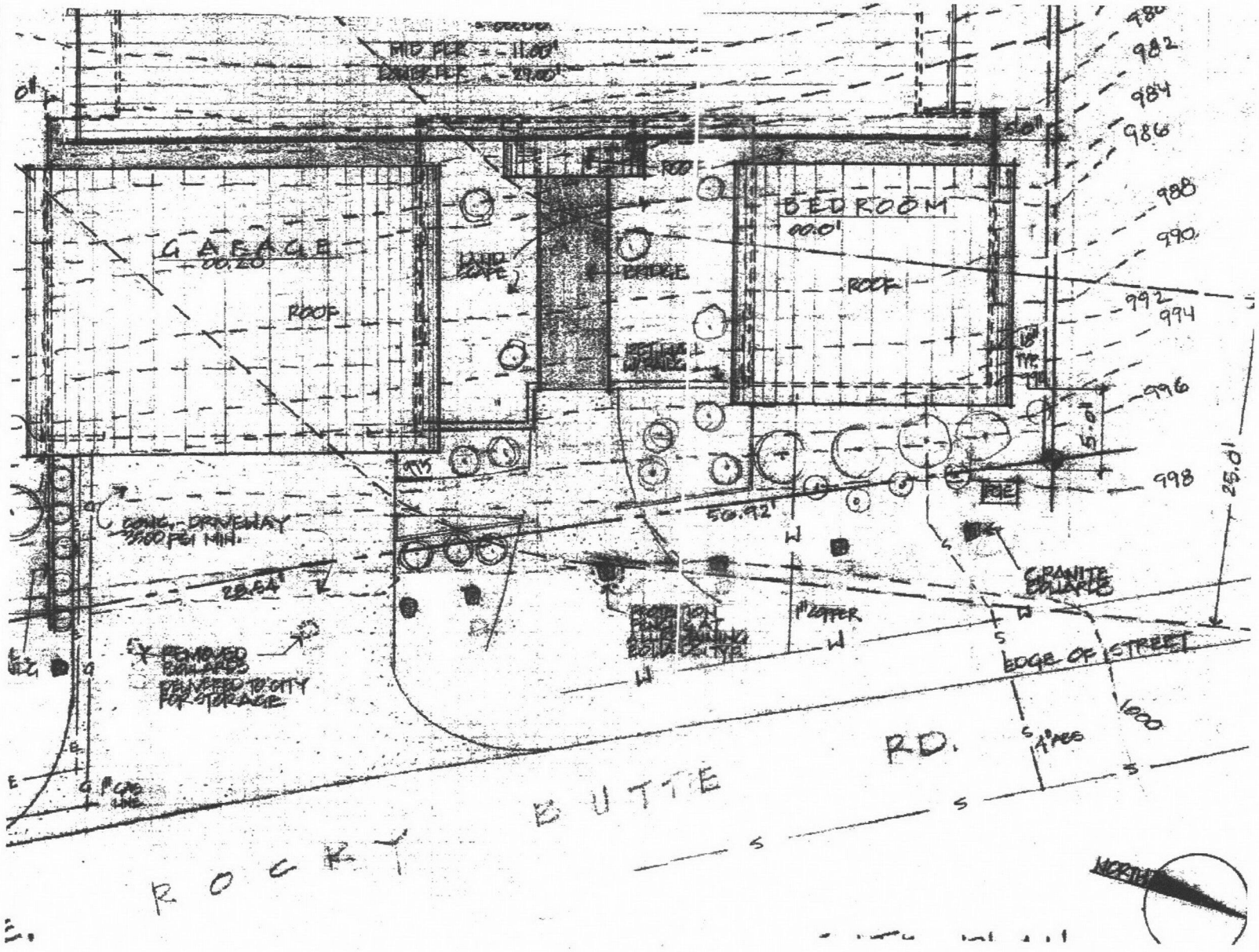
Sincerely,

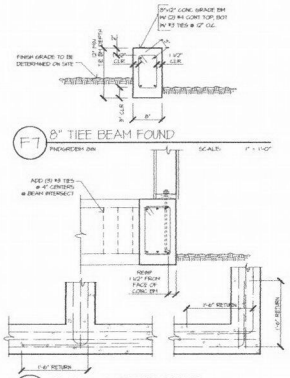


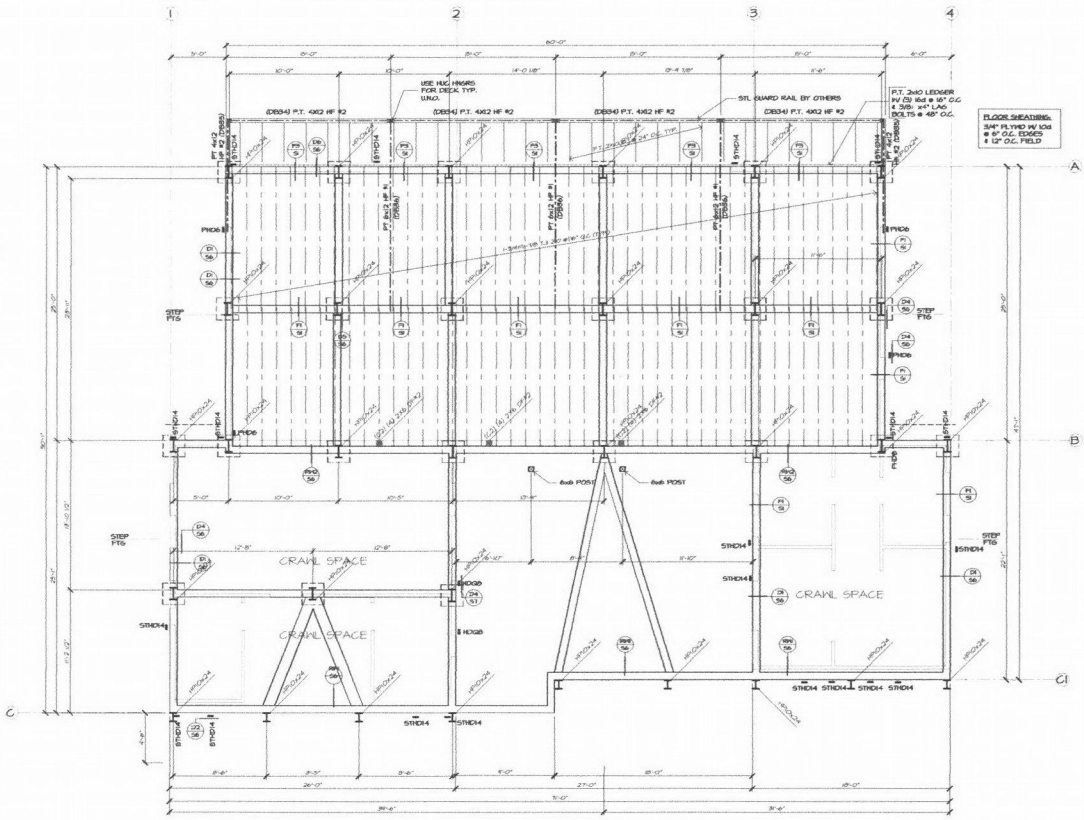
Brad L. Hupy, PE, GE
Principal Engineer

Attachments: Site Plan; Todd Sloan Architect
Foundation and Lower Floor Framing Plan - Sheet S-1; Sherman Engineering
Structural Details - Sheet S-6; Sherman Engineering
PSI Letter Report 704-75236-4 dated November 6, 2008
Analysis Documentation (18 pages)

Cc: Todd Sloan, Todd Sloan Architect
Don P. Sherman, PE, Sherman Engineers


MID PEAK = ~11.00'
RIDGE PEAK = ~29.00'
GARAGE
00.20
ROOF
LAND SLOPE
BEDROOM
00.0'
ROOF
980
982
984
986
988
990
992
994
996
998
50.92'
25.01'
CONC. DRIVEWAY
28.64'
REMOVED BOULDERS
GRANITE BOULDERS
EDGE OF STREET
ROCKY BUTTE RD.
NORTH





PILE DRIVING NOTES:
PILES SHALL BE DRIVEN TO END BEARING REFUSAL IN WEATHERED BASALT ROCK. DEPTH IS APPROXIMATED AND SHOULD BE OBSERVED BY THE SOILS ENGINEER. MAXIMUM CAPACITY IS 34 KIPS. DRIVE PILES USING A 20,000 FOOT-POUND DROP HAMMER.

1/S1 FOUNDATION & LOWER FLOOR FRAMING PLAN
SCALE: 1/4" = 1'-0"

Sherman Engineering, Inc.
1410 NW KEARNEY ST. #317
Portland, OR 97209
(503) 230-8696 (503) 226-4145 fax

Project Title
SE ROCKY BUTTE RESIDENCE
FOR
ZIEN PHAN & DIEU LE
PORTLAND OREGON

Sheet Description
FOUNDATION & LOWER FLOOR FRAMING PLAN

Revisions	
APRIL 30, 2004	---

Job No. ZIEN PHAN
Scale 1/4" = 1'-0"
Date MAR 25, 2004
Drawn DPS

Sheet S1 of S1

11. ALL 5/8" DIAMETER AND LARGER BOLTS CALLED OUT ON DRAWINGS, INCLUDING ANCHOR BOLTS (A.B.), SHALL HAVE MALLEABLE IRON WASHERS AS LISTED BELOW UNDER THE HEAD AND/OR NUT BEARING ON WOOD. ALL BOLTS SHALL HAVE A MINIMUM EMBEDMENT IN CONCRETE OR MASONRY AS LISTED BELOW.

BOLT DIAMETER	1/2"	5/8"	3/4"	7/8"	1"
WASHER-THICKNESS -		5/16	3/8	7/16	1/2
WASHER-DIAMETER -		2 3/4	3"	3 1/2	4"
HORIZONTAL EMBEDMENT	4"	4"	5"	6"	7"

ALL ANCHOR BOLTS SHALL BE 12" LONG, UNLESS NOTED OTHERWISE.

12. ALL HARDWARE SHALL BE MANUFACTURED BY SIMPSON COMPANY. ALTERNATIVE HARDWARE MUST BE APPROVED BY ENGINEER.

13. ALL LUMBER IN CONTACT WITH CONCRETE SHALL BE PRESSURE TREATED.

14. FOR ALL LAG BOLTS, PRE-DRILL HALF THE DIAMETER IN THE THREADED PORTION, PRE-DRILL FULL SHANK DIAMETER IN THE UNTHREADED PORTION.

WOOD

1. ALL STRUCTURAL LUMBER SHALL BE DOUGLAS FIR, VISUALLY GRADED OR MACHINE GRADED UNDER THE 1970 LUMBER GRADING RULES OF WEST COAST LUMBER INSPECTION BUREAU. ALL FRAMING MEMBERS SHALL BE AS FOLLOWS U.N.O.:

THICKNESS	GRADE
4" NOM. AND SMALLER	GRADE NO 2
LARGER THAN 4" NOM	GRADE NO. 1
STUDS (2 X 4 AND 2 X 6)	GRADE NO.2

2. ALL STRUCTURAL PLYWOOD SHEATHING SHALL BE DOUGLAS FIR STANDARD GRADE CD U.N.O. WITH EXTERIOR GLUE CONFORMING TO THE LATEST EDITION OF PS 1. ALL PANELS SHALL BEAR LEGIBLE APA STAMPS.

3. ALL HORIZONTAL SHEATHING SHALL BE LAID FACE GRAIN PERPENDICULAR TO FRAMING. WALL SHEATHING SHALL BE APPLIED VERTICALLY. SHEATHING SHALL BE APPROVED BY THE BUILDING INSPECTOR BEFORE COVERING.

4. ALL NAILINGS SHALL CONFORM TABLE 23-II-B-1.

5. UNLESS OTHERWISE NOTED, ALL WOOD SILL PLATES UNDER BEARING, EXTERIOR, OR SHEAR WALLS IN CONTACT WITH CONCRETE OR MASONRY SHALL BE BOLTED TO CONCRETE OR MASONRY W/ 1/2" ϕ X 12" BOLTS AT 4'-0" O.C. BEGINNING AT 9" MAX. FROM EACH END OF THE PLATES. EMBED BOLTS A MINIMUM OF 5" INTO CONCRETE OR MASONRY. "RAMSET" 1/32 POWER DRIVEN PINS (AT 1/3 OF BOLT SPACING OR 2'-0" MAXIMUM) MAY BE SUBSTITUTED FOR ANCHOR BOLTS AT INTERIOR NON-SHEAR WALLS ONLY.

6. ALL BOLT HEADS AND NUTS WHICH BEAR AGAINST THE FACE OF WOOD MEMBERS SHALL BE PROVIDED WITH METAL WASHERS.

7. ALL WALLS SHALL HAVE BRACING PROVIDED BY ONE OF THE METHODS REQUIRED BY CODE SECTION 2315.

8. ALL NAILS SHALL BE COMMON NAILS. MINIMUM NAILING REQUIREMENTS OUTLINED IN UBC TABLE 23-II-B-1 SHALL BE FOLLOWED UNLESS OTHERWISE NOTED.

9. RETIGHTEN BOLTS BEFORE CLOSING IN.

10. USE OF MACHINE NAILING IS SUBJECT TO A SATISFACTORY JOBSITE DEMONSTRATION FOR EACH PROJECT AND THE APPROVAL BY THE PROJECT ARCHITECT OR STRUCTURAL ENGINEER. THE APPROVAL IS SUBJECT TO CONTINUED SATISFACTORY PERFORMANCE. MACHINE NAILING WILL NOT BE APPROVED IN 5/16 INCH PLYWOOD. IF NAILHEADS PENETRATE THE OUTER PLY MORE THAN WOULD BE NORMAL FOR A HAND HAMMER OR IF MINIMUM ALLOWABLE EDGE DISTANCES ARE NOT MAINTAINED, THE PERFORMANCE WILL BE DEEMED UNSATISFACTORY.

CONCRETE

1. ALL CONCRETE CONSTRUCTION SHALL CONFORM WITH CHAPTER 19 OF THE CODE AND WITH THE PROVISIONS OF ACI 318, LATEST ADDITION.

2. REINFORCED CONCRETE IS DESIGNED BY THE "ULTIMATE STRENGTH DESIGN METHOD".

3. CONCRETE MIXES SHALL BE DESIGNED BY A QUALIFIED TESTING LABORATORY AND APPROVED BY THE STRUCTURAL ENGINEER. MIX DESIGN METHODS (TEST HISTORY OR TRAIL BATCH METHOD) PER CODE SECTION 1905.3 SHALL BE USED TO PROPORTION CONCRETE. SUBMIT MIX DESIGN METHOD DATA.

4. SCHEDULE OF STRUCTURAL CONCRETE 28-DAY STRENGTH AND TYPES.

LOCATION IN STRUCTURE	STRENGTH	DENSITY	SLUMP
ALL CONCRETE FOOTINGS	2500	150 PCF	1-3
ALL CONCRETE SUBSTRUCTURE WALLS	3000	150 PCF	1-3
SLAB-ON-GRADE	3000	150 PCF	1-3

5. PORTLAND CEMENT SHALL CONFORM TO ASTM C-150, TYPE I OR II.

6. AGGREGATE FOR HARDROCK CONCRETE SHALL CONFORM TO ALL REQUIREMENTS AND TESTS OF ASTM C-33 AND PROJECT SPECIFICATIONS.

7. CONCRETE MIXING OPERATION, ETC. SHALL CONFORM TO ASTM C-94.

8. PLACEMENT OF CONCRETE SHALL CONFORM TO CODE SECTION 1905 AND PROJECT SPECIFICATIONS. CLEAN AND ROUGHEN TO 1/4" AMPLITUDE ALL CONCRETE SURFACES AGAINST WHICH NEW CONCRETE IS TO BE PLACED.

9. ALL REINFORCING BARS, ANCHOR BOLTS, AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION PRIOR TO PLACING CONCRETE.

10. PROVIDE SLEEVES FOR PLUMBING AND ELECTRICAL OPENINGS IN CONCRETE BEFORE PLACING. DO NOT CUT ANY REINFORCING WHICH MAY CONFLICT. CORING CONCRETE IS NOT PERMITTED. NOTIFY THE ENGINEER IN ADVANCE OF CONDITIONS NOT SHOWN ON THE DRAWINGS. SEE THESE DRAWINGS FOR ADDITIONAL RESTRICTIONS ON THE PLACEMENT OF OPENINGS IN SLABS AND WALLS.

11. PIPES LARGER THAN 1-1/2" DIAMETER SHALL NOT BE EMBEDDED IN STRUCTURAL CONCRETE EXCEPT WHERE SPECIFICALLY APPROVED BY ENGINEER. PIPES SHALL NOT DISPLACE OR INTERRUPT REINFORCING BARS. SPACE EMBEDDED PIPES AT A MINIMUM OF 3 DIAMETERS.

7. THE CONTRACT STRUCTURAL DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO BRACING, SHORING FOR LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. OBSERVATION VISITS TO THE SITE BY THE STRUCTURAL ENGINEER SHALL SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS.

8. ASTM SPECIFICATIONS ON THE DRAWINGS SHALL BE OF THE LATEST REVISION.

9. CONTRACTOR SHALL INVESTIGATE SITE DURING CLEARING AND EARTHWORK OPERATIONS FOR FILLED EXCAVATIONS OR BURIED STRUCTURES, SUCH AS CESSPOOLS, CISTERNS, FOUNDATIONS, ETC. IF ANY SUCH STRUCTURES ARE FOUND, ENGINEER SHALL BE NOTIFIED IMMEDIATELY.

10. CONSTRUCTION MATERIAL SHALL BE SPREAD OUT IF PLACED ON FRAMED ROOF. LOAD SHALL NOT EXCEED THE DESIGN LIVE LOAD PER SQUARE FOOT. PROVIDE ADEQUATE SHORING AND/OR BRACING WHERE STRUCTURE HAS NOT ATTAINED DESIGN STRENGTH.

11. UNLESS NOTED OTHERWISE, EXPANSION BOLTS IN CONCRETE SHALL BE 1/2" DIAMETER X 3 1/2" EMBEDMENT HILTI KWIK BOLTS II (ICBO 4627) OR APPROVED ALTERNATE WITH ALLOWABLE VALUES EQUAL TO OR EXCEEDING THOSE FOR HILTI, PER CURRENT ICBO RESEARCH REPORT. UNLESS NOTED OTHERWISE, ALL EPOXY ANCHORS SHALL BE 1/2" DIAMETER WITH 4 1/4" EMBEDMENT HILTI HIT SYSTEM (ICBO 4016) OR APPROVED ALTERNATE WITH ALLOWABLE VALUES EQUAL TO OR EXCEEDING THOSE FOR HILTI, PER CURRENT ICBO RESEARCH REPORT. INSTALL EXPANSION AND EPOXY ANCHORS PER MANUFACTURER'S RECOMMENDATIONS.

PREFABRICATED WOOD MEMBERS

1. ALL PREFABRICATED WOOD MEMBERS INDICATED ON THE DRAWINGS SHALL BE AS MANUFACTURED BY THE TRUS JOIST CORP., TJM JOIST, INC., OR APPROVED EQUAL.

2. PRIOR TO FABRICATION AND INSTALLATION, THE MANUFACTURER SHALL SUBMIT COPIES OF CURRENT ICBO REPORTS FOR REVIEW.

3. THE MATERIALS AND FABRICATION PROCEDURES FOR ALL MEMBERS SHALL COMPLY WITH THE REQUIREMENT OF CURRENT ICBO REPORTS.

4. THE SIZE AND LOCATION OF ALL HOLES SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS OR ICBO REPORTS.

5. TOP AND BOTTOM FLANGES ARE NOT TO BE CUT.

6. MEMBERS SHALL BE DELIVERED TO THE JOB SITE IN BUNDLES AND STORED IN AN UPRIGHT POSITION NOT IN CONTACT WITH THE GROUND.

7. ANY DAMAGE OR DISTORTION OF MEMBER SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND THE SUPPLIER. FIELD REPAIR OR MODIFICATIONS SHALL NOT BE MADE WITHOUT WRITTEN APPROVAL FROM THE SUPPLIER AND THE ENGINEER.

8. MEMBER SHALL BE ANCHORED AND BRACED AS IT IS ERECTED. THE ERECTOR SHALL PROVIDE SUPPLEMENTAL LATERAL BRACING AS REQUIRED FOR THE TOP FLANGES UNTIL FLOOR OR ROOF DIAPHRAGMS ARE INSTALLED AND FOR THE BOTTOM FLANGES AT CANTILEVERED MEMBERS UNTIL CEILING IS INSTALLED.

9. PRIOR TO FABRICATION, SHOP DRAWINGS INDICATING MEMBER DESIGNATIONS, LAYOUT, AND DETAILS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.

10. DESIGN CALCULATIONS SHALL BE BASED ON DEAD LOADS SHOWN ON PLANS AND LIVE LOADS SHOWN IN GENERAL NOTES.

DESIGN LOADS

LIVE LOAD (FLOOR):	40 PSF REDUCIBLE
LIVE LOAD (BALCONY):	60 PSF
SNOW LOAD (ROOF):	25 PSF
WIND LOAD:	100 MPH (3 SEC GUST) EXP B
SEISMIC:	DESIGN CAT = D1 I = 1.0 Rw = 6.5
CODES:	2006 IBC, 2007 OSSC

GENERAL

1. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO STARTING CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCIES OR INCONSISTENCIES. IN CASE OF CONFLICT, MORE COSTLY REQUIREMENTS GOVERN FOR BIDDING. SUBMIT CLARIFICATION REQUEST PRIOR TO PROCEEDING WITH WORK.

2. ALL DRAWINGS ARE CONSIDERED TO BE A PART OF THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REVIEW AND COORDINATION OF ALL DRAWINGS AND SPECIFICATIONS PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES THAT OCCUR SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO START OF CONSTRUCTION SO THAT A CLARIFICATION CAN BE ISSUED. ANY WORK PERFORMED IN CONFLICT WITH THE CONTRACT DOCUMENTS OR ANY CODE REQUIREMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT HIS OWN EXPENSE.

3. NOTES AND DETAILS ON DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE GIVEN, CONSTRUCTION SHALL BE AS SHOWN FOR SIMILAR WORK. UNLESS NOTED OTHERWISE, DETAILS IN STRUCTURAL DRAWINGS ARE TYPICAL AS INDICATED BY CUTS, REFERENCES, OR TITLES.

4. ALL WORK SHALL CONFORM TO THE MINIMUM STANDARDS OF THE FOLLOWING CODES:

   1997 UBC AND LATEST REVISIONS REFERRED TO HERE AS "THE CODE", AND ANY OTHER REGULATING AGENCIES WHICH HAVE AUTHORITY OVER ANY PORTION OF THE WORK.

5. SEE ARCHITECTURAL DRAWINGS FOR THE FOLLOWING:

   SIZE AND LOCATION OF ALL DOOR AND WINDOW OPENINGS, EXCEPT AS NOTED.

   SIZE AND LOCATION OF ALL INTERIOR AND EXTERIOR NON-BEARING PARTITIONS.

   SIZE AND LOCATION OF ALL CONCRETE CURBS, EQUIPMENT PADS, PITS, FLOOR DRAINS, SLOPES, DEPRESSED AREAS, CHANGE IN LEVEL, CHAMFERS, GROOVES, INSERTS, ETC.

   SIZE AND LOCATION OF ALL FLOOR AND ROOF OPENINGS EXCEPT AS SHOWN.

   FLOOR AND ROOF FINISHES.

   DIMENSIONS NOT SHOWN ON STRUCTURAL DRAWINGS.

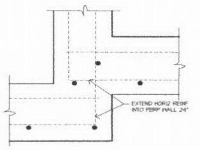
6. SEE MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR THE FOLLOWING:

   PIPE RUNS, SLEEVES, HANGERS, TRENCHES, WALL AND SLAB OPENINGS, ETC., EXCEPT AS SHOWN OR NOTED.

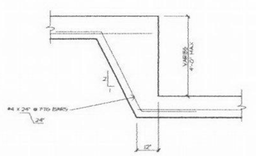
   ELECTRICAL CONDUIT RUNS, BOXES, OUTLETS IN WALLS AND SLABS.

   CONCRETE INSERTS FOR ELECTRICAL, MECHANICAL, OR PLUMBING FIXTURES.

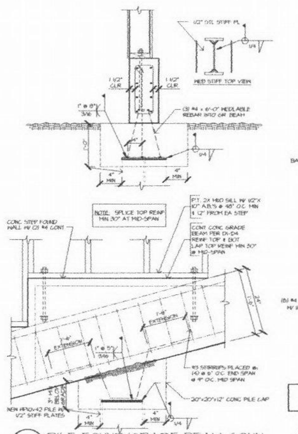
   SIZE AND LOCATION OF MACHINE OR EQUIPMENT BASES, ANCHOR BOLTS FOR MOTOR MOUNTS.



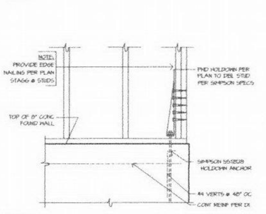
D6 FOUND WALL PLAN @ JOG — SCALE: 1/2" = 1'-0"



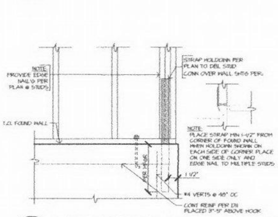
D4 TYP FOOTING STEP — FND STEP — SCALE: N.T.S.



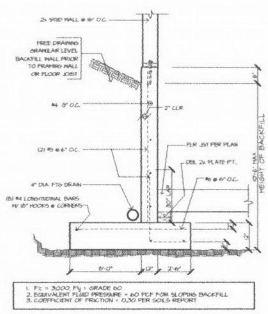
D1 PILE FOUND/GRADE BEAM CONN — FND STG — SCALE: 1" = 1'-0"



D3 HOLDOWN BOLT TO FOUND — HLDPHDX — SCALE: 1" = 1'-0"

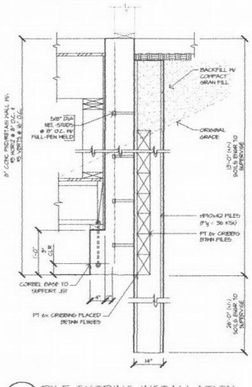


D2 TYP SHEAR WALL STRAP HOLDOWN — HLDSTHDU — SCALE: 1" = 1'-0"



1. F'c = 3000, Fy = GRADE 60
2. EQUIVALENT FLUID PRESSURE = 60 PCF FOR SLOPING BACKFILL
3. COEFFICIENT OF FRICTION = 0.30 PER SOILS REPORT

RW2 10'-6" RETAINING WALL — RW4Ahigh_30pcf — SCALE: NOT TO SCALE



RW1 PILE SHORING INSTALLATION — FND WI2 pile — SCALE: 1" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER 18616 OREGON JUN. 30, 1998 DON P. SHERMAN — EXPIRES 6-30-08

Sherman Engineering, Inc.
1410 NW KEARNEY ST. #517
Portland, OR 97209
(503) 230-8876 (503) 226-4745 fax

Project Title: SE ROCKY BUTTE RESIDENCE FOR ZIEN PHAN — PORTLAND OREGON

Sheet Description: STRUCTURAL DETAILS

		Revisions
Job No	ZIEN PHAN	--
Scale	1/4" = 1'-0"	---
Date	MAR 25, 2008	---
Drawn	DPS	

Sheet S6 of 5

November 6, 2008

Mr. Zien Phan
14218 Northeast Brazee
Portland, Oregon 97230

Subject: **Subsurface Exploration and Foundation Recommendations**
Proposed Single Family Residence
Portland, Oregon
PSI Report No.: 704-75236-4

Dear Mr. Phan:

Psi is pleased to submit this report that provides supplemental geotechnical recommendations for the property at 2942 Northeast Rocky Butte Road in Portland, Oregon. Our report provides the results of our subsurface exploration and recommendations for supporting foundations on self boring micro piles. Our work was performed as outlined in Change Order No. 2 dated September 5, 2008

We understand the proposed structure will be at least two stories situated on the westerly downward slope just west of NE Rocky Butte Road. A preliminary foundation drawing was provided to us by the structural engineer, Don Sherman, PE of Sherman Engineering, Inc. showing a layout of the proposed structure and foundations. The drawing shows that maximum axial and horizontal loads on the foundations will be 24.5 and 98.3 kips respectively.

Purpose and Scope of Services

The purpose of our work was to explore the site and provide recommendations for design and construction of the building foundations. Our scope of our services is summarized below:

- Coordinate and manage the field investigation including utility checks, obtaining permits, access preparation and scheduling PSI field staff;
- Drill one soil boring in the public right-of-way to a depth of 44.5 feet below the ground surface. Our boring included rock coring the final 5 feet of penetration;
- Pre excavate soil boring using vacuum excavation using a subcontractor;
- Obtain samples from the borings at 2-1/2- to 5-foot intervals using a standard penetration test (ASTM D1586);
- Maintain a detailed log of soil, rock and groundwater conditions encountered in each boring and obtain soil samples for laboratory testing;

- Provide recommendations for design and construction of footings including pin pile supported footings with provisions including allowable design bearing pressures, minimum footing depth and width, and estimates of settlement;
- Provide a written report summarizing our explorations, geotechnical analysis, conclusions and recommendations;
- Provide responses to additional requests by the City of Portland for additional information.

Subsurface Exploration

We drilled one soil boring on the shoulder of Rocky Butte Road near the proposed residence. The location of our soil boring is shown in Figure 1, Site Exploration Plan. The boring was drilled to a depth of 44.5 feet below ground surface (bgs) using our CME-75 truck-mounted drill. The upper five feet of our exploration was vacuum drilled using a subcontracted service.

Standard Penetration Tests (SPT) were performed in general accordance with ASTM D1586 at intervals of 2 ½-ft to 5 feet. A 5-ft long rock core was obtained from 39½ to 44½ ft.

Soil samples were obtained for classification, verification, and laboratory testing. Descriptions of the field explorations, laboratory testing program, test results, and the boring logs are provided in Appendix A.

Near surface soil on the site is loose sand fill with gravel and cobbles to a depth of about 2 to 3 feet bgs. The fill is underlain by loose sand to approximately 15 feet bgs. This sand was underlain by soft, red, gravelly silt to about 25 ft bgs. An approximately 14-ft layer of loose sandy gravel underlies the silt to a depth of about 39 feet bgs.

We encountered weathered basalt rock at a depth of 39 feet. A Rock Quality Designation of 30 percent was determined from a 5-ft core sample obtained from 39½ to 44.5 feet.

Groundwater was not encountered at the time of our exploration. Our detailed interpretation of the soils encountered at the site is shown in the exploration log attached to this report.

Foundation Recommendations

We recommend supporting the footings for the residential structure on self-boring hollow steel anchor bars (IBO Bars). This anchoring system derives its support from the basalt rock which underlies the site.

We recommend using Contec® C30/14 IBO Bars to provide the needed structural and geotechnical capacity. The ultimate structural capacity of 30/14 bars is 72 kips. The yield load is 58.5 kips, and the allowable structural load at 60 percent Guaranteed Ultimate Tensile Strength is 35.1 kips per bar. Several 30/14 anchors will be needed to support the design axial and horizontal loads. Based on our site exploration, the bars will be about 40 feet long. Bars installed to resist lateral forces, will be longer. The length will depend on the angle of installation, to be specified by the structural engineer.

To achieve an allowable geotechnical capacity of 35 kips using a Factor of Safety of 2, the bars should be installed using a sacrificial bit at least 3 inches in diameter and drilled a minimum of 5 feet into unweathered basalt rock. The anchors are to be installed using neat cement grout that is pressure injected through the center of the anchor and dispersed the full length of the rod. Grout samples should be taken daily and have a minimum compressive strength of at least 3000 psi at an age of 7 days. Compressive strength testing should be conducted in general accordance with ASTM C109. Anchors near Rocky Butte Road should be installed at an angle no greater than 30 degrees from vertical to limit encroachment into the right-of-way.

Figure No. 2 provides a schematic drawing of an IBO anchor installed in a concrete footing.

Anchor Bar Testing and Acceptance

PSI should be retained to observe installation of the IBO anchor bars in order to verify that soil conditions are as anticipated.

The IBO anchor rods recommended for deep foundation systems should be proof-tested in accordance with the general guidelines specified in general accordance with ASTM D3689, *Standard Test Methods for Deep Foundations Under Static Axial Tensile Load*. We recommend at least 5 percent of the total number of bars installed to be tested. The anchors tested should be sleeved with PVC pipe to create an unbonded zone 10 ft long. Use the loading schedule in Table 1 and the following acceptance criteria.

Table 1: IBO Rod 30/14 Tensile Load Testing Schedule

LOAD INCREMENT	LOAD (KIPS)	MINIMUM HOLD TIME (MIN)
Alignment Load	5	1
1	10	1
2	15	1
3	20	1
4	25	1
5	30	1
6	35	4

Deformation readings shall be obtained after reaching the specified load. The allowable axial deformation at each load increment shall not exceed 0.03 inches, except the alignment load.

If deflection is greater than 0.03 inches at any load increment (neglecting the alignment load) the hold time should extend to 60 minutes. Additional axial deformation readings should be recorded at 8, 15, 30, and 60 minutes. If the axial creep deformation between the 8 and 60 minute readings are less than 0.02 inches, the test increment is acceptable.

After testing the load may be reduced slowly at a rate of 5 kips per second using the bleeder valve.

We appreciate the opportunity to continue our work on your project.

Sincerely,

Professional Service Industries, Inc.

Richard W. Hanford, P.E.
Principal Consultant
Geotechnical Services

REGISTERED PROFESSIONAL ENGINEER
49541PE
OREGON
JULY 27, 1989
BRAD HUPY
EXPIRES: JUNE 30, 2009

Brad L. Hupy, P.E.
Senior Geotechnical Engineer
Geotechnical Services

Attachments: Figure 1, Site Exploration Plan
Figure 2, Drilled and Grouted Titan Micro Piles Schematic
Boring Log (B-1)

JF/BLH:tc

LOG OF TEST BORING NO. B-1

CLIENT: Zien Phan

PROJECT: Phan Residence

LOCATION: Rocky Butte Rd., Portland, OR

PSI PROJECT NUMBER: 704-75236

DATE OF EXPLORATION: 10/3/2008

EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer

LOGGED BY: J. Pogue

BORING LOCATION: 54' N & 4' W of fire hydrant

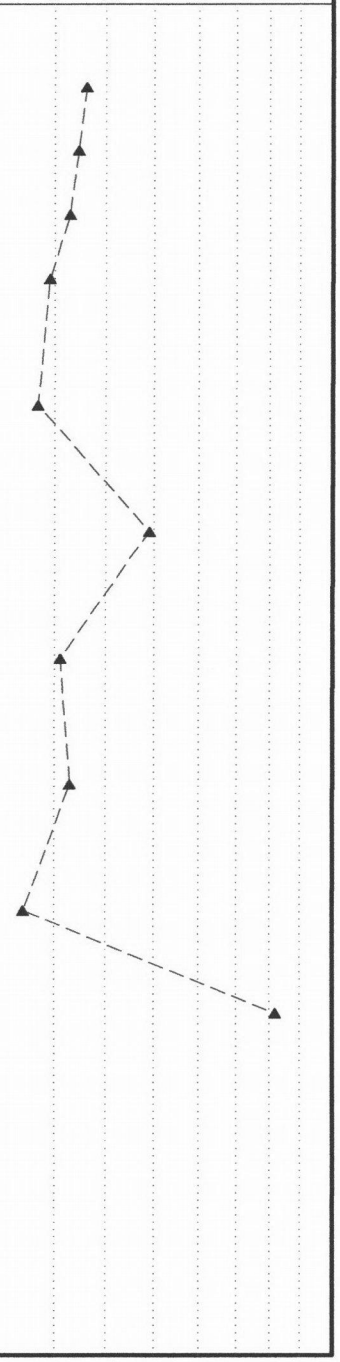
SURF. ELEV.:' **GROUNDWATER:'** **TERMINATION DEPTH: 44'**

The soil boring was backfilled with auger cuttings and granular bentonite at the end of exploration

DEPTH (FT)	SAMPLES	RECOVERY	SYMBOL	U.S.C.S. CLASS	SOIL DESCRIPTION	MOISTURE CONTENT(%)	% PASSING #200 SIEVE	DRY UNIT WEIGHT (PCF)	BLOWS/6"	POCKET PEN (TSF)	TORVANE SHEAR (TSF)	LIQUID LIMIT	PLASTIC LIMIT
				SP	Very dense, **SAND FILL** with gravel and cobbles, moist								
	SPT 1			SPG	Loose, brown, **gravelly SAND**, moist				9-4-4				
5	SPT 2			GPS	Loose, red-brown, **sandy GRAVEL**, moist				3-3-3				
	SPT 3			MLS	Medium stiff, red, **sandy SILT**, moist				4-3-2				
10	SPT 4			SP	Loose, brown, **SAND**, moist				4-2-2				
15	SPT 5			MLG	Soft, red, **gravelly SILT**, moist				2-2-1				
20	SPT 6								3-10-8				
25	SPT 7			GPS	Very loose to loose, red-brown-gray **sandy GRAVEL**, moist				3-2-3				
30	SPT 8								5-2-4				
35	SPT 9								0-1-1				
40	SPT 10			BASALT	Hard (RH3), strong, little weathered, closely fractured, red-brown **BASALT**, RQD 30				30-50/3"				
	CORE 11												
45					Soil boring completed at 45 feet below ground surface.								
					Groundwater not encountered during site exploration.								
50													

PENETRATION RESISTANCE
(blows/foot)
140 pound hammer/30 inch drop

5 10 20 30 40 50 60



BL_PDX_DCP 704-75236.GPJ CURRENT PORTLAND GEOTECH TEMPLATE.GDT 11/6/08

6032 North Cutter Circle, Suite 480
Portland, Oregon 97217-0126
(800) 783-6985

LEGEND:

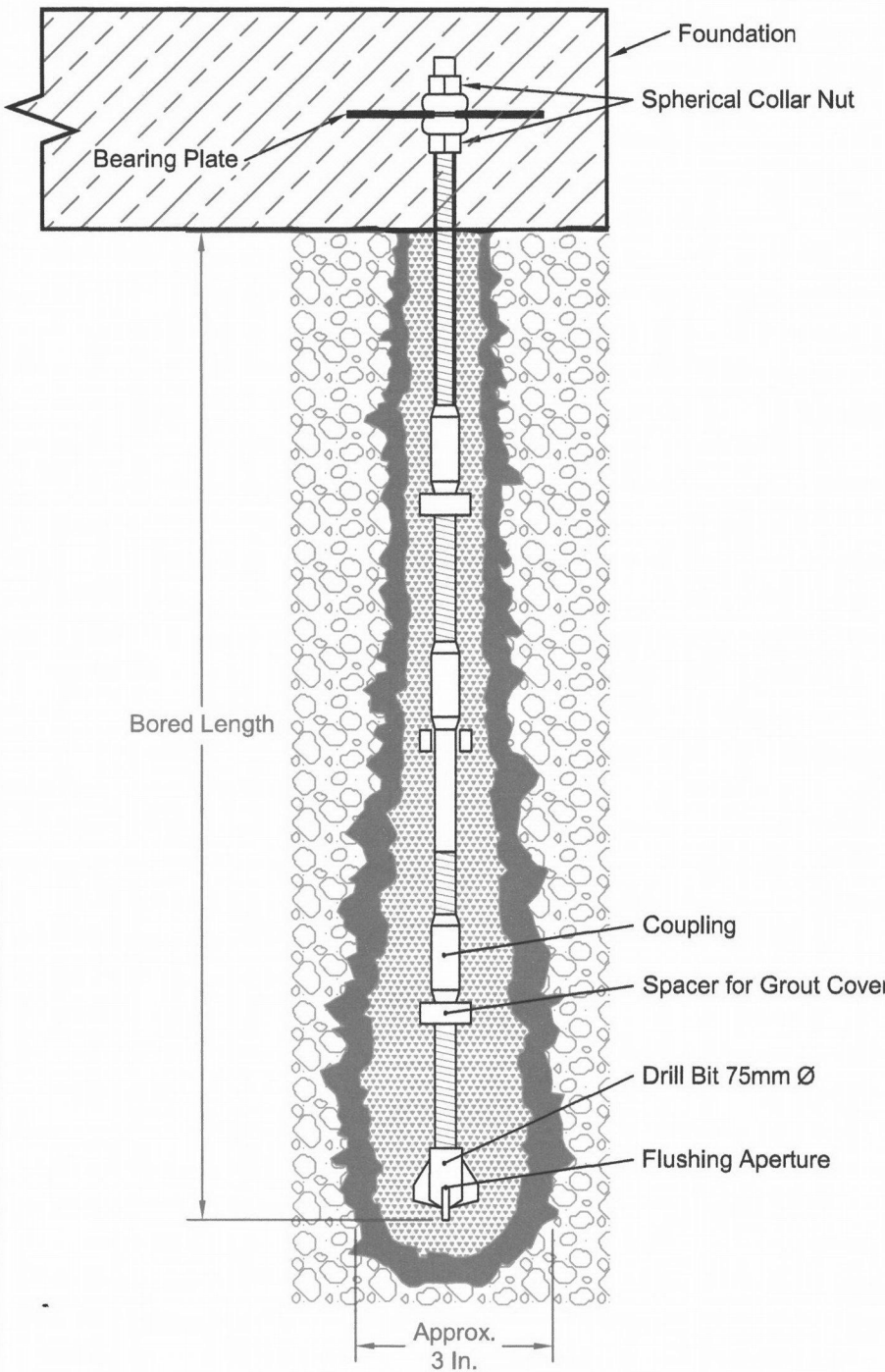
Approximate Location of Soil Boring

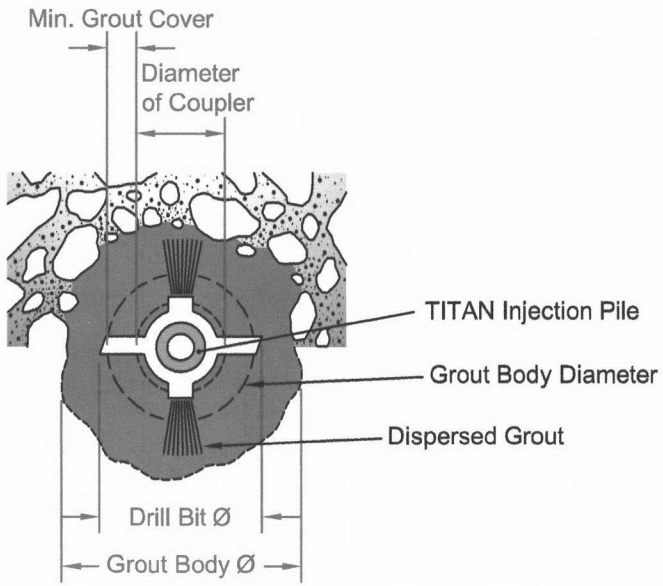
N
W
E
S

Source image reprinted with permission from Google Earth Pro

psi Information To Build On Engineering • Consulting • Testing	**SITE EXPLORATION PLAN**	DATE: 11/4/08	FIGURE NUMBER:1
PSI, Inc. **6032 N. Cutter Circle, Suite 480** **Portland, Oregon 97217** **(503) 289-1778**	Phan Residence 2942 NE Rocky Butte Road, Portland, OR	DRAWN BY: JF	PSI REPORT NUMBER: 704-75236-4

Filename: P:\Groups\704 Geotech\2007 Projects\75236 Phan Residence\Graphics\Fig 2_IBO anchors.dwg Date: 11-06-2008 Login: Carlson, Tima





Proposed Single Family Residence
2942 Northeast Rocky Butte Road
Portland, Oregon

DRILLED AND GROUTED TITAN MICRO PILES

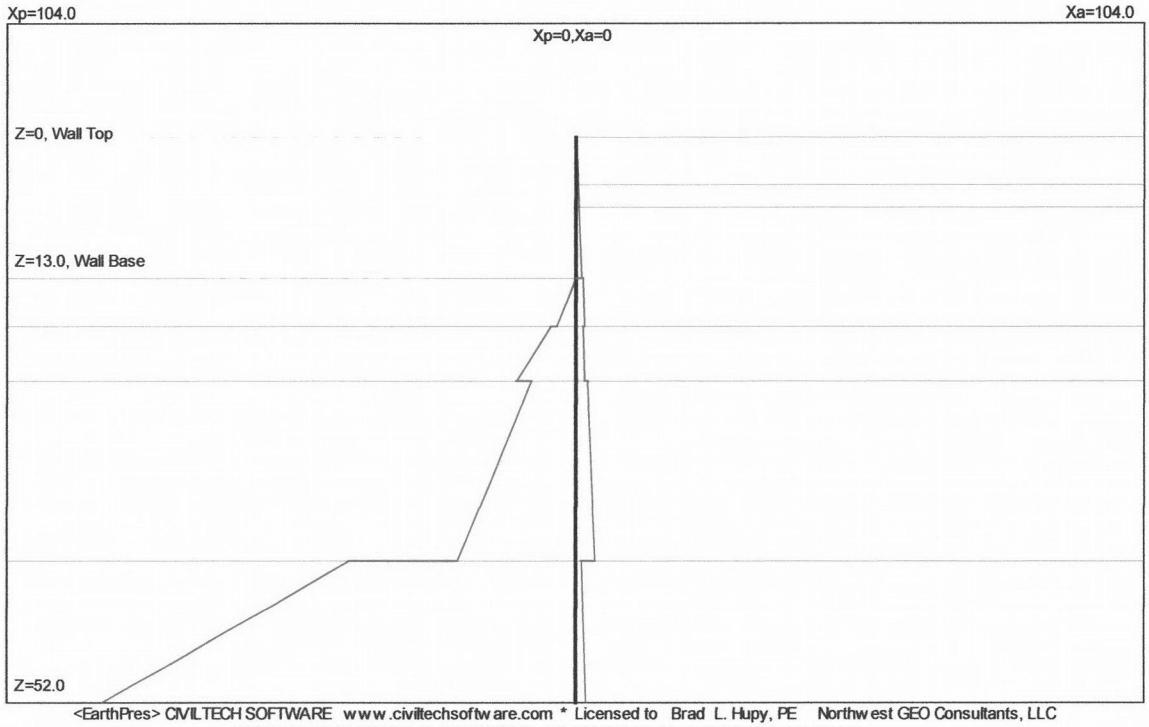
October 2008 704-75236

psi Information To Build On
Engineering · Consulting · Testing

FIG. 2

Zien Phan - 2942 NE Rock Butte Road

Static



UNITS: DEPTH/DISTANCE: ft, UNIT WEIGHT: pcf, FORCE: kip, PRESSURE: ksf, SLOPE: kcf

* INPUT DATA *

Wall Height=13.0 Total Soil Types= 5

Soil No.	Weight	Saturate	Phi	Cohesion	Nspt	Type	Description
1	135.3	148.9	41.4	0.0	58	4	V Dense 3/4
2	121.4	133.6	36.4	0.0	20	4	Dense Sand
3	105.2	115.7	29.0	0.0	4	4	Loose Sandy
4	120.3	132.3	35.7	0.0	17	4	V Stiff Silt
5	136.9	150.6	50.0	0.0	60	4	RH3 Rock

Ground Surface at Active Side:

Line	Z1	Xa1	Z2	Xa2	Soil No.
1	0.0	0.0	0.0	80000.0	1
2	4.5	0.0	4.5	80000.0	2
3	6.5	0.0	6.5	80000.0	3
4	17.5	0.0	17.5	80000.0	4
5	22.5	0.0	22.5	80000.0	3
6	39.0	0.0	39.0	80000.0	5

Ground Surface at Passive Side:

Line	Z1	Xp1	Z2	Xp2	Soil No.
1	13.0	0.0	13.0	80000.0	3
2	17.5	0.0	17.5	80000.0	4
3	22.5	0.0	22.5	80000.0	3
4	39.0	0.0	39.0	80000.0	5

* OUTPUT RESULTS *

Eae (Total Force above Base)= 2.96

Ea (Total Static Force above Base)= 2.96

Ea (Total Earthquake Force above Base)= 0.00

Apparent Pressure above Base - Output to Shoring

No	Z1	Pa1	Z2	Pa2	ka1
0	0.00	0.00	13.00	0.46	0.0351

Driving Pressure below Base - Output to Shoring

No	Z1	Pa1	Z2	Pa2	ka1
0	13.00	0.47	17.50	0.62	0.0321
1	17.50	0.47	22.50	0.62	0.0291
2	22.50	0.80	39.00	1.33	0.0324
3	39.00	0.45	52.00	0.74	0.0223

Passive Pressure below Base - Output to Shoring

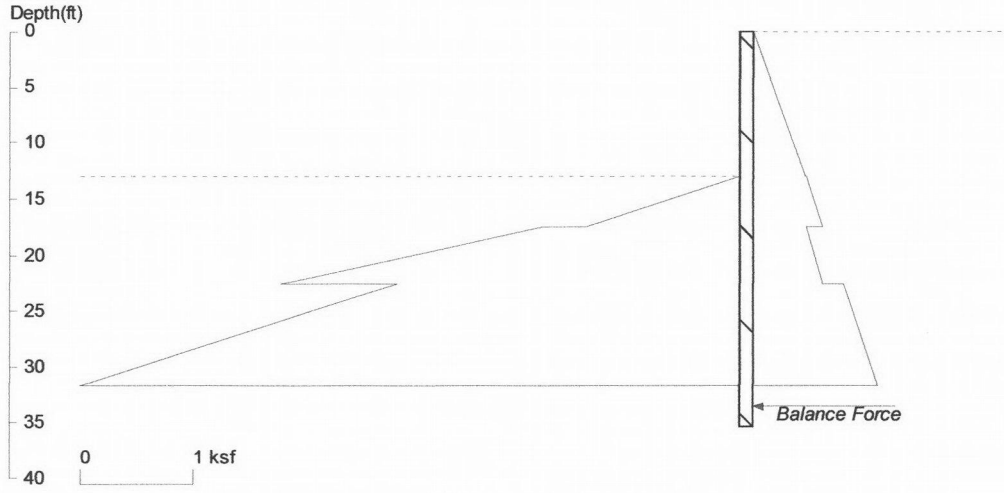
No	Z1	Pp1	Z2	Pp2	kp1
0	13.00	0.0	17.50	1.4	0.303
1	17.50	1.7	22.50	4.1	0.467
2	22.50	3.0	39.00	8.1	0.307
3	39.00	15.6	52.00	32.6	1.305

UNITS: DEPTH/DISTANCE: ft, UNIT WEIGHT: pcf, FORCE: kip, PRESSURE: ksf, SLOPE: kcf

Date: 4/26/2010 File Name: J:\01 NGC PROJECTS\Zien Phan\Zien Phan.ep8

Zien Phan - 2942 NE Rock Butte Road

Static



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Date: 4/26/2010 File Name:

Wall Height=13.0 Pile Diameter=1.0 Pile Spacing=4.0 Wall Type: 3. Soldier Pile, Driving

PILE LENGTH: Min. Embedment=22.45, Min. Pile Length=35.45
MOMENT IN PILE: Max. Moment=136.49 per Pile Spacing=4.0 at Depth=22.31

VERTICAL BEARING CAPACITY: Vertical Loading=0.0, Resistance=91.7, Vertical Factor of Safety=999.00

PILE SELECTION:
Request Min. Section Modulus = 68.9 in3/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=0.66
HP12X74 has Section Modulus = 93.8. It is greater than Min. Requirements!, Top Deflection = 1.78(in)

ACTIVE SPACING:	Z depth	Spacing
1	0.00	4.00
2	13.00	1.00

PASSIVE SPACING:	Z depth	Spacing
1	13.00	1.50

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

No.	Z1	P1	Z2	P2	Slope
1	0.0	0.00	13.0	0.46	0.035
2	13.0	0.47	17.5	0.62	0.032
3	17.5	0.47	22.5	0.62	0.029
4	22.5	0.80	31.7	1.33	0.032
5	1030.7	0.47	1030.7	0.99	0.020

PASSIVE PRESSURES:

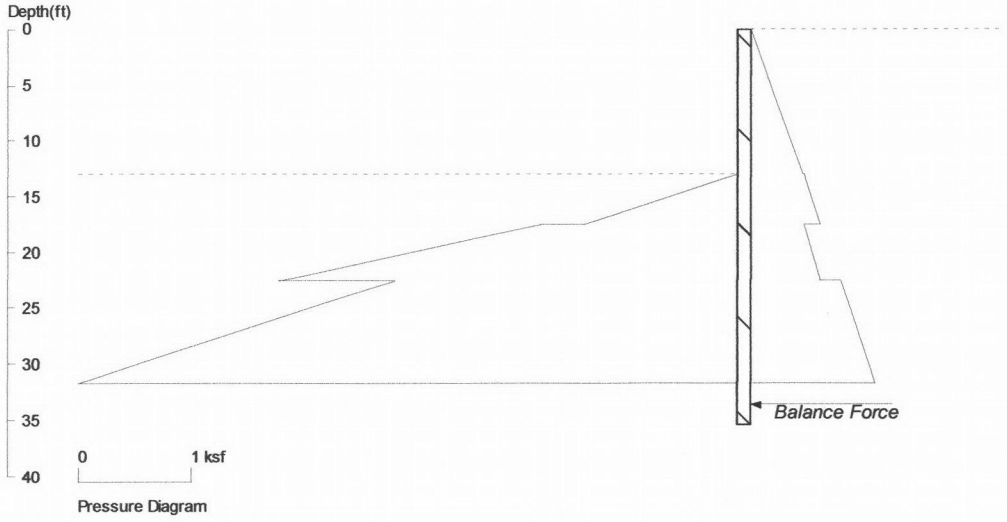
No.	Z1	P1	Z2	P2	Slope
1	13.00	0.00	17.50	1.37	0.3033
2	17.50	1.75	22.50	4.09	0.4675

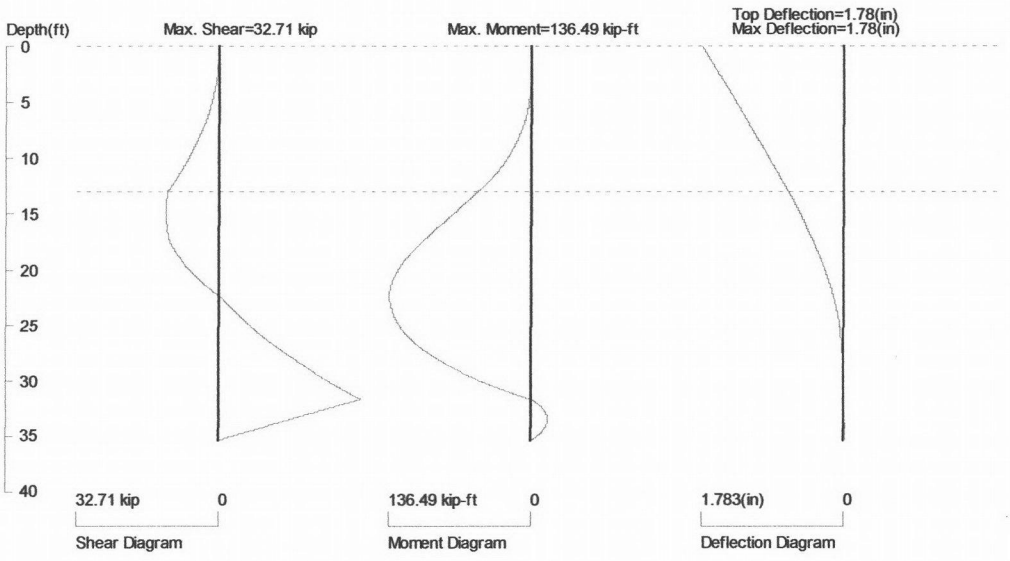
3	22.50	3.04	31.71	8.11	0.3070
4	1030.71	16.24	1030.71	47.72	1.2105

UNITS: Width/Spacing/Diameter/Length/Depth - ft, Force - kip, Moment - kip-ft,
UNITS: Friction/Bearing/Pressure - ksf, Pres. Slope - kip/ft3, Deflection - in

Zien Phan - 2942 NE Rock Butte Road

Static





PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 4.0 feet or meter

Pile: HP12X74 meet Section Requirements. Properties: E (ksi)=29000, I (in4)=569.0

Date: 4/26/2010 File Name: UNTITLED

****

SHORING WALL CALCULATION SUMMARY
The leading shoring design and calculation software
Software Copyright by CivilTech Software
www.civiltechsoftware.com

****

ShoringSuite Software is developed by CivilTech Software, Bellevue, WA, USA.
The calculation method is based on the following references:

1. FHWA 98-011, FHWA-RD-97-130, FHWA SA 96-069, FHWA-IF-99-015
2. STEEL SHEET PILING DESIGN MANUAL by Pile Buck Inc., 1987
3. DESIGN MANUAL DM-7 (NAVFAC), Department of the Navy, May 1982
4. TRENCHING AND SHORING MANUAL Revision 12, California Department of Transportation, January 2000
6. EARTH SUPPORT SYSTEM & RETAINING STRUCTURES, Pile Buck Inc. 2002
5. DESIGN OF SHEET PILE WALLS, EM 1110-2-2504, U.S. Army Corps of Engineers, 31 March 1994
7. EARTH RETENTION SYSTEMS HANDBOOK, Alan Macnab, McGraw-Hill. 2002
8. AASHTO HB-17, American Association of State and Highway Transportation Officials, 2 September 2002

UNITS: Width/Spacing/Diameter/Length/Depth - ft, Force - kip, Moment - kip-ft, Friction/Bearing/Pressure - ksf, Pres. Slope - kip/ft3, Deflection - in

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Date: 4/26/2010 File: UNTITLED

Title: Zien Phan - 2942 NE Rock Butte Road
Subtitle: Static

**********INPUT DATA**********

Wall Type: 3. Soldier Pile, Driving
- Wall Height: 13.00
- Pile Diameter: 1.00
- Pile Spacing: 4.00
- Factor of Safety (F.S.): 1.50

Lateral Support Type (Braces): 1. No
- Top Brace Increase (Multi-Bracing): Add 15%*

Embedment Option: 1. Yes
- Friction at Pile Tip: No*

Check Vertical Bearing Capacity:
- Side Friction for Bearing: 1.00
- Tip Resistance for Bearing: 1.00

Pile Properties:
- Allowable Fb/Fy: 0.66
- Steel Strength, Fy: 36 ksi = 248 MPa
- Elastic Module, E: 29000.00
- Moment of Inertia, I: 100.00
- User Input Pile: HP12X74

* DRIVING PRESSURE (ACTIVE, WATER, & SURCHARGE) *

No.	Z2 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	0.00	0.00	13.00	0.46	0.0351
2	13.00	0.47	17.50	0.62	0.0321
3	17.50	0.47	22.50	0.62	0.0291
4	22.50	0.80	39.00	1.33	0.0324
5	39.00	0.47	65.00	0.99	0.0203

* PASSIVE PRESSURE *

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	13.00	0.00	17.50	1.37	0.3033
2	17.50	1.75	22.50	4.09	0.4675
3	22.50	3.04	39.00	8.11	0.3070
4	39.00	16.24	65.00	47.72	1.2105

The pressure above will be divided by a Factor of Safety =1.5

* ACTIVE SPACE *

No.	Z depth	Spacing
1	0.00	4.00
2	13.00	1.00

* PASSIVE SPACE *

No.	Z depth	Spacing
1	13.00	1.50

*For Tieback: Input1 = Diameter; Input2 = Bond Stength
*For Plate: Input1 = Diameter; Input2 = Allowable Pressure
*For Deaman: Input1 = Horz. Width; Input2 = Allowable Pressure; Angle = 0

**********SPECIFIED PILE **********

HP12X74 has been found in Soldier Pile list!
Area= 21.8 Depth= 12.13 Width= 12.215 Height= 12
Ix= 569 Sx= 93.8 Iy= 186 Sy= 30.4
Flange thickness= 0.61 Web thickness= 0.605

* Note: All the pile dimensions are in English Units.

**********CALCULATION**********

The calculated moment and shear are per pile spacing. Sheet piles are per one feet or meter; Soldier piles are per pile.

Top Pressures start at depth = 0.00

D1 - TOP DEPTH
D2 - EXCAVATION BASE
D3 - PILE TIP

MOMENT BALANCE: M=0.00 AT DEPTH=31.71 WITH EMBEDMENT OF 18.71

Total Passive Pressure = Total Active Pressure, OK!

**********RESULTS**********

* EMBEDMENT *
Based on USS Design Manual, fist calculate embedment for moment equilibrium, then increased by 20 to 40 % to reach force equilibrium.
The embedment for moment equilibrium is 18.71
The 20% increased embedment for force equilibrium is 22.45 (Used by Program)
The 30% increased embedment for force equilibrium is 24.32
The 40% increased embedment for force equilibrium is 26.19

Based on AASHTO Standard Specifications, fist calculate embedment for moment equilibrium, then add safety factor of 30% for temporary shoring; add safety factor of 50% for permanent shoring.
The embedment for moment equilibrium is 18.71
Add 30% embedment for temporary shoring (FS=1.3) is 24.32
Add 50% embedment for permanent shoring (FS=1.5) is 28.06

PROGRAM RECOMMENDED MINIMUM EMBEDMENT = 22.45
TOTAL MINIMUM PILE LENGTH = 35.45

* MOMENT IN PILE (per pile spacing)*
Overall Maximum Moment = 136.49 at 22.31
Maximum Shear = 32.71
Moment and Shear are per pile spacing: 4.0 feet or meter

* VERTICAL LOADING *
Vertical Loading from Braces = 0.00
Vertical Loading from External Load = 0.00
Total Vertical Loading = 0.00

* VERTICAL BEARING CAPACITY CHECK *

Tip Depth	Tip Area	Bearing	Tip Resistance
35.45	0.79	1.00	0.79

Embedment	Side Area*	Friction	Side Resistance
22.45	90.94	1.00	90.94

*Side Area is the surface area of embedment below base and contact area between pile and soil above base.

Total Vertical Resistance = 91.72
Total Vertical Loading = 0.00
Vertical Factor of Safety = 999.00

**********SPECIFIED PILE **********

HP12X74 has been found in Soldier Pile list!
Area= 21.8 Depth= 12.13 Width= 12.215 Height= 12
Ix= 569 Sx= 93.8 Iy= 186 Sy= 30.4
Flange thickness= 0.61 Web thickness= 0.605

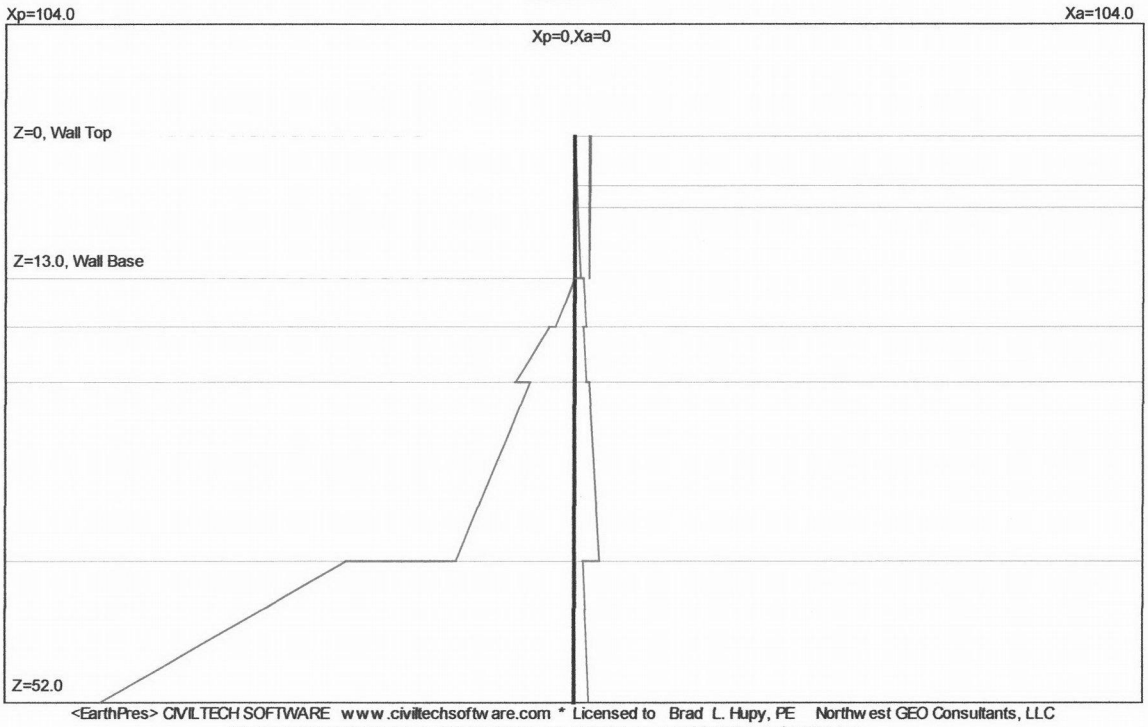
* Note: All the pile dimensions are in English Units.

Request Min. Section Modulus = 68.9 in3/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=0.66
The pile selection is based on the magnitude of the moment only. Axial force is neglected.

HP12X74 is capable to support the shoring!
Top deflection = 1.783(in)
Max. deflection = 1.783(in)

Zien Phan - 2942 NE Rock Butte Road

Seismic



UNITS: DEPTH/DISTANCE: ft, UNIT WEIGHT: pcf, FORCE: kip, PRESSURE: ksf, SLOPE: kcf

* INPUT DATA *

Wall Height=13.0 Total Soil Types= 5

Soil No.	Weight	Saturate	Phi	Cohesion	Nspt	Type	Description
1	135.3	148.9	41.4	0.0	58	4	V Dense 3/4
2	121.4	133.6	36.4	0.0	20	4	Dense Sand
3	105.2	115.7	29.0	0.0	4	4	Loose Sandy
4	120.3	132.3	35.7	0.0	17	4	V Stiff Silt
5	136.9	150.6	50.0	0.0	60	4	RH3 Rock

Ground Surface at Active Side:

Line	Z1	Xa1	Z2	Xa2	Soil No.
1	0.0	0.0	0.0	80000.0	1
2	4.5	0.0	4.5	80000.0	2
3	6.5	0.0	6.5	80000.0	3
4	17.5	0.0	17.5	80000.0	4
5	22.5	0.0	22.5	80000.0	3
6	39.0	0.0	39.0	80000.0	5

Ground Surface at Passive Side:

Line	Z1	Xp1	Z2	Xp2	Soil No.
1	13.0	0.0	13.0	80000.0	3
2	17.5	0.0	17.5	80000.0	4
3	22.5	0.0	22.5	80000.0	3
4	39.0	0.0	39.0	80000.0	5

* OUTPUT RESULTS *

Eae (Total Force above Base)= 3.89
Ea (Total Static Force above Base)= 2.96
Ea (Total Earthquake Force above Base)= 0.93

Apparent Pressure above Base - Output to Shoring

No	Z1	Pa1	Z2	Pa2	ka1
0	0.00	0.00	13.00	0.46	0.0351

Driving Pressure below Base - Output to Shoring

No	Z1	Pa1	Z2	Pa2	ka1
0	13.00	0.62	17.50	0.81	0.0421
1	17.50	0.63	22.50	0.83	0.0391
2	22.50	1.05	39.00	1.75	0.0425
3	39.00	0.62	52.00	1.07	0.0344

Passive Pressure below Base - Output to Shoring

No	Z1	Pp1	Z2	Pp2	kp1
0	13.00	0.0	17.50	1.4	0.314
1	17.50	1.8	22.50	4.2	0.486
2	22.50	3.2	39.00	8.4	0.318
3	39.00	16.3	52.00	33.8	1.345

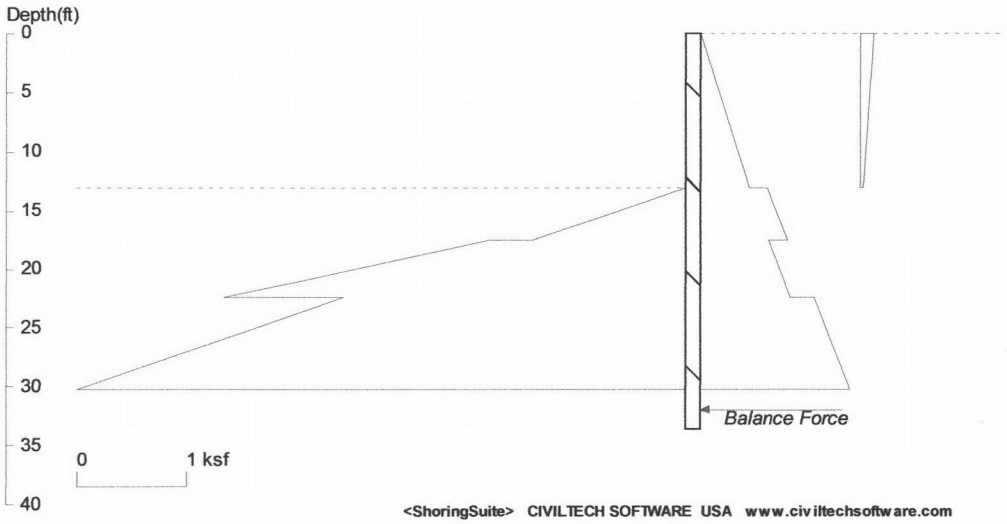
Output Earthquake Pressure above Base - Output to Shoring
Total Earthq. Force, Ee = 0.93

No	Zq1	Pq1	Zq2	Pq2	kq1
0	0.00	0.00	0.00	0.00	0.00

UNITS: DEPTH/DISTANCE: ft, UNIT WEIGHT: pcf, FORCE: kip, PRESSURE: ksf, SLOPE: kcf
Date: 4/26/2010 File Name: J:\01 NGC PROJECTS\Zien Phan\Zien Phan.ep8

Zien Phan - 2942 NE Rock Butte Road

Seismic



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltechsoftware.com

Licensed to Brad L. Hupy, PE Northwest GEO Consultants, LLC
Date: 4/26/2010 File Name:

Wall Height=13.0 Pile Diameter=1.0 Pile Spacing=4.0 Wall Type: 3. Soldier Pile, Driving

PILE LENGTH: Min. Embedment=20.62, Min. Pile Length=33.62
MOMENT IN PILE: Max. Moment=182.55 per Pile Spacing=4.0 at Depth=21.51

VERTICAL BEARING CAPACITY: Vertical Loading=0.0, Resistance=86.0, Vertical Factor of Safety=999.00

PILE SELECTION:
Request Min. Section Modulus = 92.2 in3/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=0.66
HP12X74 has Section Modulus = 93.8. It is greater than Min. Requirements!, Top Deflection = 2.16(in)

ACTIVE SPACING:	Z depth	Spacing
1	0.00	4.00
2	13.00	1.00

PASSIVE SPACING:	Z depth	Spacing
1	13.00	1.50

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

No.	Z1	P1	Z2	P2	Slope
1	0.0	0.00	13.0	0.46	0.035
2	13.0	0.62	17.5	0.81	0.042
3	17.5	0.63	22.5	0.82	0.039
4	22.5	1.05	30.2	1.75	0.042
5	1029.2	0.65	1029.2	1.43	0.030
6	0.0	0.12	13.0	0.03	-0.007

PASSIVE PRESSURES:

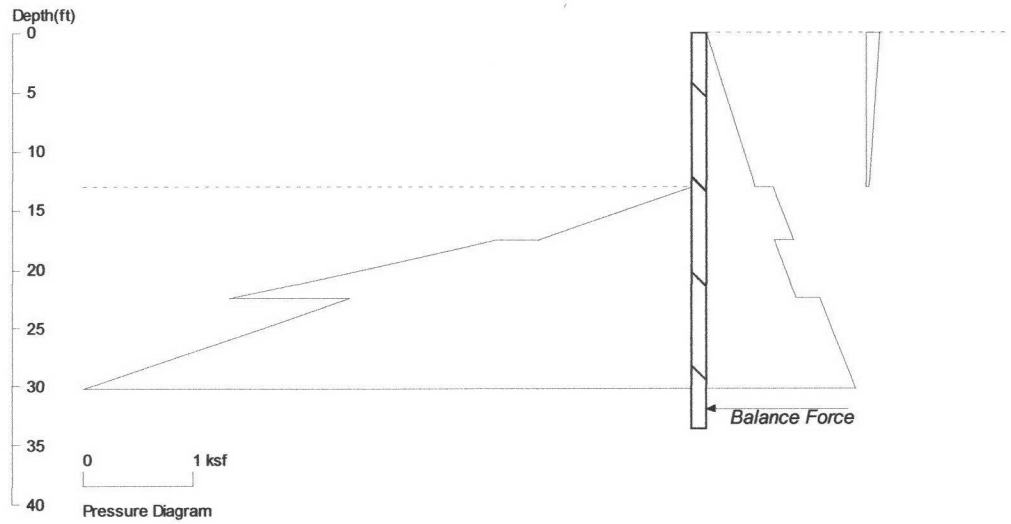
No.	Z1	P1	Z2	P2	Slope
1	13.00	0.00	17.50	1.41	0.3140

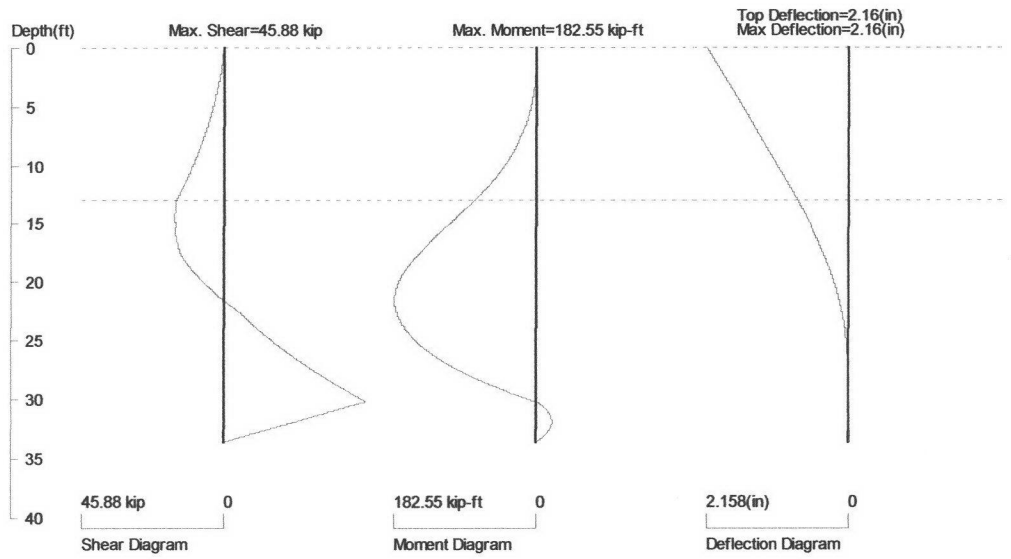
2	17.50	1.81	22.50	4.24	0.4857
3	22.50	3.15	30.18	8.40	0.3178
4	1029.18	16.93	1029.18	49.35	1.2469

UNITS: Width/Spacing/Diameter/Length/Depth - ft, Force - kip, Moment - kip-ft,
UNITS: Friction/Bearing/Pressure - ksf, Pres. Slope - kip/ft3, Deflection - in

Zien Phan - 2942 NE Rock Butte Road

Seismic





PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 4.0 feet or meter

Pile: HP12X74 meet Section Requirements. Properties: E (ksi)=29000, I (in4)=569.0

Date: 4/26/2010 File Name: UNTITLED

****

SHORING WALL CALCULATION SUMMARY
The leading shoring design and calculation software
Software Copyright by CivilTech Software
www.civiltechsoftware.com

****

ShoringSuite Software is developed by CivilTech Software, Bellevue, WA, USA.
The calculation method is based on the following references:

1. FHWA 98-011, FHWA-RD-97-130, FHWA SA 96-069, FHWA-IF-99-015
2. STEEL SHEET PILING DESIGN MANUAL by Pile Buck Inc., 1987
3. DESIGN MANUAL DM-7 (NAVFAC), Department of the Navy, May 1982
4. TRENCHING AND SHORING MANUAL Revision 12, California Department of Transportation, January 2000
6. EARTH SUPPORT SYSTEM & RETAINING STRUCTURES, Pile Buck Inc. 2002
5. DESIGN OF SHEET PILE WALLS, EM 1110-2-2504, U.S. Army Corps of Engineers, 31 March 1994
7. EARTH RETENTION SYSTEMS HANDBOOK, Alan Macnab, McGraw-Hill. 2002
8. AASHTO HB-17, American Association of State and Highway Transportation Officials, 2 September 2002

UNITS: Width/Spacing/Diameter/Length/Depth - ft, Force - kip, Moment - kip-ft, Friction/Bearing/Pressure - ksf, Pres. Slope - kip/ft3, Deflection - in

---

Licensed to Brad L. Hupy, PE Northwest GEO Consultants, LLC
Date: 4/26/2010 File: UNTITLED

Title: Zien Phan - 2942 NE Rock Butte Road
Subtitle: Seismic

**********INPUT DATA**********

Wall Type: 3. Soldier Pile, Driving
- Wall Height: 13.00
- Pile Diameter: 1.00
- Pile Spacing: 4.00
- Factor of Safety (F.S.): 1.00

Lateral Support Type (Braces): 1. No
- Top Brace Increase (Multi-Bracing): Add 15%*

Embedment Option: 1. Yes
- Friction at Pile Tip: No*

Check Vertical Bearing Capacity:
- Side Friction for Bearing: 1.00
- Tip Resistance for Bearing: 1.00

Pile Properties:
- Allowable Fb/Fy: 0.66
- Steel Strength, Fy: 36 ksi = 248 MPa
- Elastic Module, E: 29000.00
- Moment of Inertia, I: 100.00
- User Input Pile: HP12X74

* DRIVING PRESSURE (ACTIVE, WATER, & SURCHARGE) *

No.	Z2 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	0.00	0.00	13.00	0.46	0.0351
2	13.00	0.62	17.50	0.81	0.0421
3	17.50	0.63	22.50	0.82	0.0391
4	22.50	1.05	39.00	1.75	0.0425
5	39.00	0.65	65.00	1.43	0.0300
6	0.00	0.12	13.00	0.03	-0.0066

* PASSIVE PRESSURE *

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	13.00	0.00	17.50	1.41	0.3140
2	17.50	1.81	22.50	4.24	0.4857
3	22.50	3.15	39.00	8.40	0.3178
4	39.00	16.93	65.00	49.35	1.2469

* ACTIVE SPACE *

No.	Z depth	Spacing
1	0.00	4.00
2	13.00	1.00

* PASSIVE SPACE *

No.	Z depth	Spacing
1	13.00	1.50

*For Tieback: Input1 = Diameter; Input2 = Bond Stength
*For Plate: Input1 = Diameter; Input2 = Allowable Pressure
*For Deaman: Input1 = Horz. Width; Input2 = Allowable Pressure; Angle = 0

**********SPECIFIED PILE **********

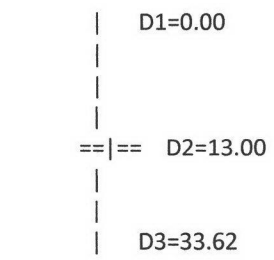
HP12X74 has been found in Soldier Pile list!
Area= 21.8 Depth= 12.13 Width= 12.215 Height= 12
Ix= 569 Sx= 93.8 Iy= 186 Sy= 30.4
Flange thickness= 0.61 Web thickness= 0.605

* Note: All the pile dimensions are in English Units.

**********CALCULATION**********

The calculated moment and shear are per pile spacing. Sheet piles are per one feet or meter; Soldier piles are per pile.

Top Pressures start at depth = 0.00



D1 - TOP DEPTH
D2 - EXCAVATION BASE
D3 - PILE TIP

MOMENT BALANCE: M=0.00 AT DEPTH=30.18 WITH EMBEDMENT OF 17.18

Total Passive Pressure = Total Active Pressure, OK!

**********RESULTS**********

* EMBEDMENT *
Based on USS Design Manual, fist calculate embedment for moment equilibrium, then increased by 20 to 40 % to reach force equilibrium.
The embedment for moment equilibrium is 17.18
The 20% increased embedment for force equilibrium is 20.62 (Used by Program)
The 30% increased embedment for force equilibrium is 22.34
The 40% increased embedment for force equilibrium is 24.06

Based on AASHTO Standard Specifications, fist calculate embedment for moment equilibrium, then add safety factor of 30% for temporary shoring; add safety factor of 50% for permanent shoring.
The embedment for moment equilibrium is 17.18
Add 30% embedment for temporary shoring (FS=1.3) is 22.34
Add 50% embedment for permanent shoring (FS=1.5) is 25.77

PROGRAM RECOMMENDED MINIMUM EMBEDMENT = 20.62
TOTAL MINIMUM PILE LENGTH = 33.62

* MOMENT IN PILE (per pile spacing)*
Overall Maximum Moment = 182.55 at 21.51
Maximum Shear = 45.88
Moment and Shear are per pile spacing: 4.0 feet or meter

* VERTICAL LOADING *
Vertical Loading from Braces = 0.00
Vertical Loading from External Load = 0.00
Total Vertical Loading = 0.00

* VERTICAL BEARING CAPACITY CHECK *

Tip Depth	Tip Area Bearing		Tip Resistance
33.62	0.79	1.00	0.79

Embedment	Side Area*	Friction	Side Resistance
20.62	85.20	1.00	85.20

*Side Area is the surface area of embedment below base and contact area between pile and soil above base.

Total Vertical Resistance = 85.98
Total Vertical Loading = 0.00
Vertical Factor of Safety = 999.00

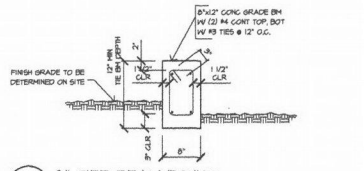
**********SPECIFIED PILE **********

HP12X74 has been found in Soldier Pile list!
Area= 21.8 Depth= 12.13 Width= 12.215 Height= 12
Ix= 569 Sx= 93.8 Iy= 186 Sy= 30.4
Flange thickness= 0.61 Web thickness= 0.605

* Note: All the pile dimensions are in English Units.

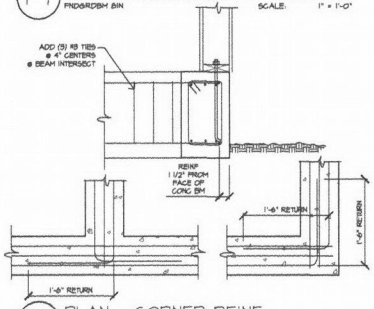
Request Min. Section Modulus = 92.2 in3/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=0.66
The pile selection is based on the magnitude of the moment only. Axial force is neglected.

HP12X74 is capable to support the shoring!
Top deflection = 2.158(in)
Max. deflection = 2.158(in)

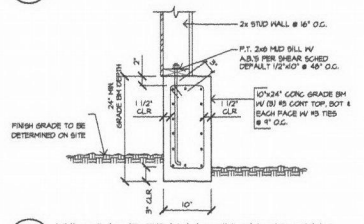


F7 8" TIEE BEAM FOUND

FND@RDBM BIN SCALE: 1" = 1'-0"

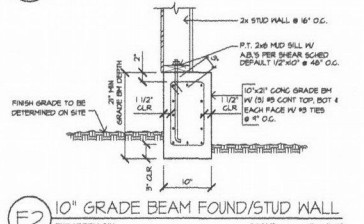


F5 PLAN - CORNER REINF



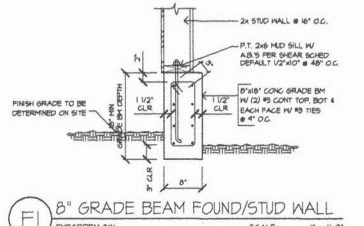
F3 12" GRADE BEAM FOUND/STUD WALL

FND@RDBM BIN SCALE: 1" = 1'-0"



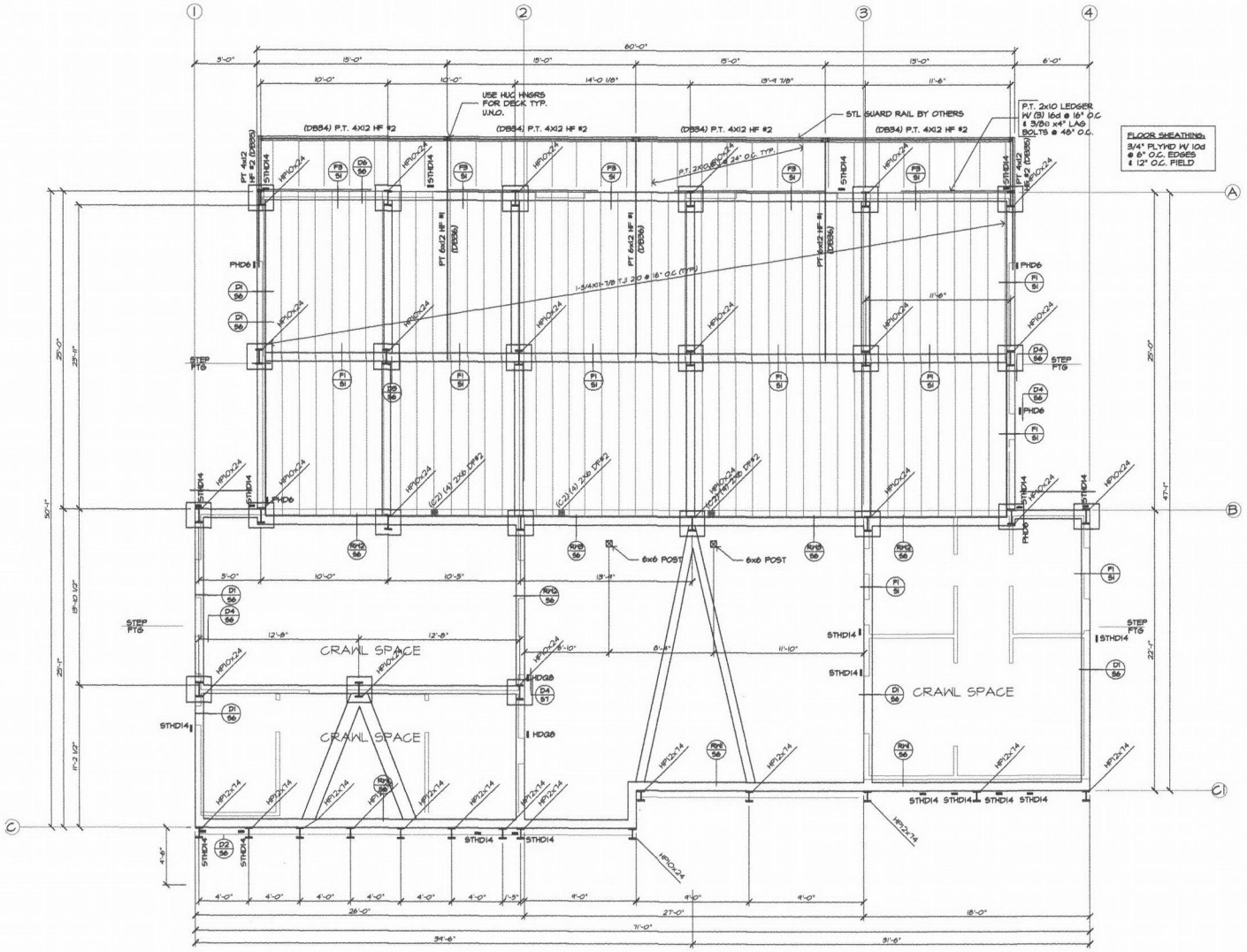
F2 10" GRADE BEAM FOUND/STUD WALL

FND@RDBM BIN SCALE: 1" = 1'-0"



F1 8" GRADE BEAM FOUND/STUD WALL

FND@RDBM BIN SCALE: 1" = 1'-0"



PILE DRIVING NOTES:
PILES SHALL BE DRIVEN TO END BEARING REFUSAL IN WEATHERED BASALT ROCK. DEPTH IS APPROXIMATED AND SHOULD BE OBSERVED BY THE SOILS ENGINEER. MAXIMUM CAPACITY IS 34 KIPS. DRIVE PILES USING A 20,000 FOOT-POUND DROP HAMMER

1/S1 FOUNDATION & LOWER FLOOR FRAMING PLAN

SCALE: 1/4" = 1'-0"

POST SIZE:
USE NAILED BUILT-UP 2X TO MATCH WIDTH OF LARGEST BEAM U.N.O.

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 10, 1981
DON P. SHERMAN
EXPIRES 6-30-14

SHERMAN ENGINEERING, INC.
3151 NE SANDY BLVD. STE. 100
PORTLAND, OR 97232
(503) 230-8016 (503) 226-4745 fax

Project Title
SE ROCKY BUTTE RESIDENCE
FOR
ZIEN PHAN & DIEU LE
PORTLAND OREGON

Sheet Description
FOUNDATION & LOWER FLOOR FRAMING PLAN

Revisions	
MAY 4, 2009	
JAN 11, 2013	

Job No.	ZIEN PHAN
Scale	1/4" = 1'-0"
Date	MAR 25, 2008
Drawn	DPS

Sheet
S1
of 5

PSI Information To Build On
Engineering • Consulting • Testing

TECHNICAL MEMORANDUM

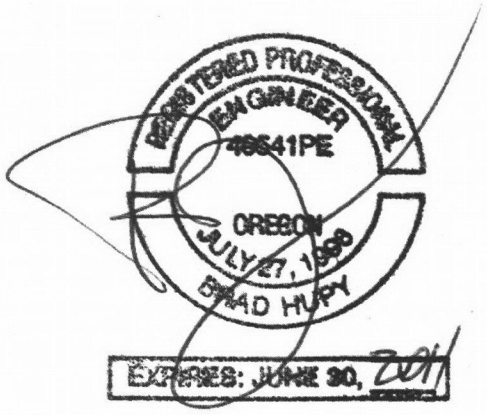
DATE: September 14, 2009

TO: Zien Phan

FROM: Brad L. Hupy, PE

CC: Todd Sloan, Architect
Don Sherman, PE, SE

RE: Phan Residence – H-Pile Recommendations
Portland, Oregon
PSI Project 704-75236



PSI has been involved with geotechnical engineering for the single family residence at 2942 NE Rocky Butte Road in Portland, Oregon since August 2007. Based on our current understanding of the foundation design we offer the following values for design of temporary shoring walls that will support the excavation for the home. The walls will act as yielding walls.

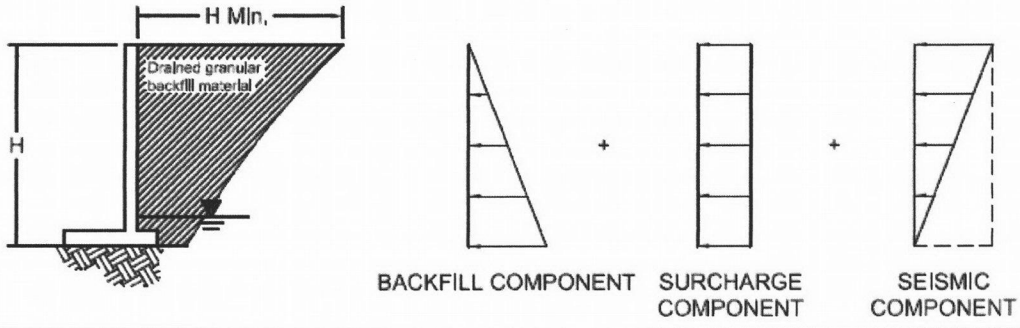
We recommend using the lateral earth pressures shown in Table 1. The loads are provided as equivalent fluid density (G). Diagrams showing use of the lateral earth pressures in design calculations are provided in Figure 1.

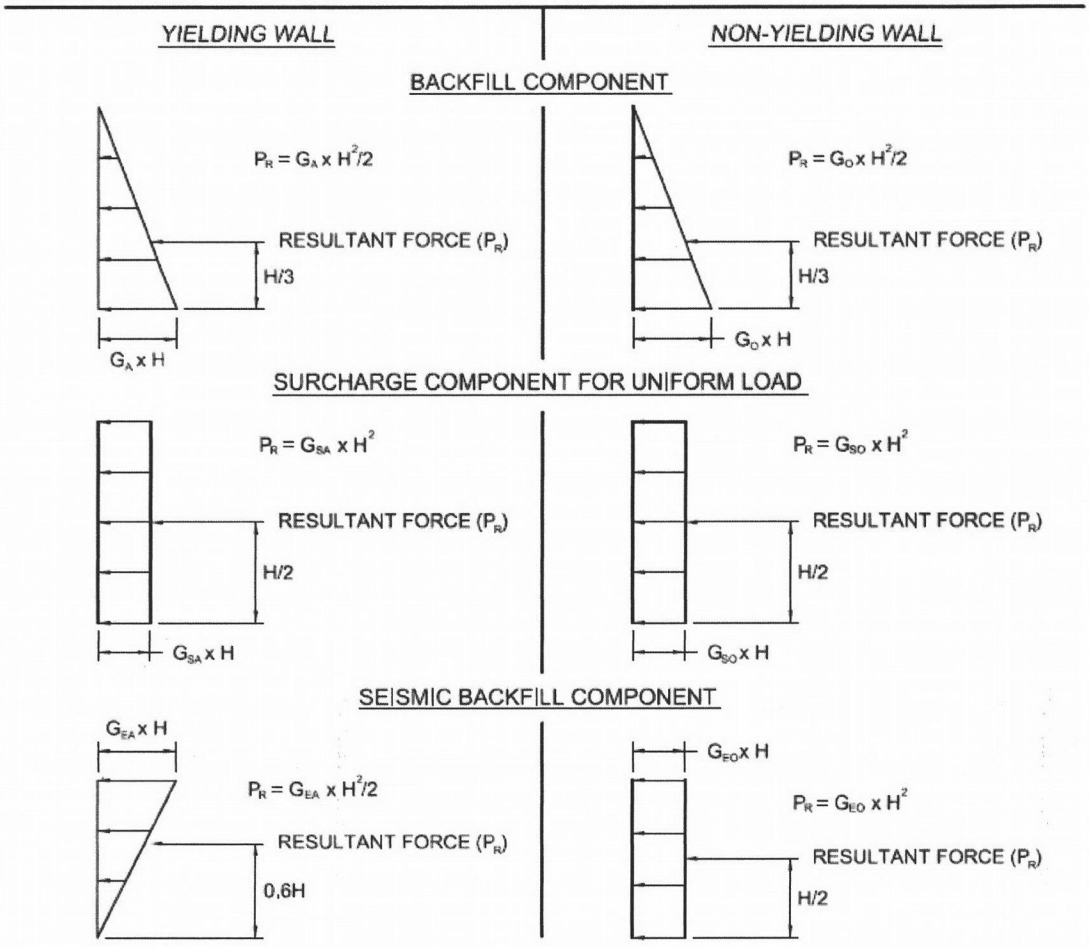
TABLE 1: EQUIVALENT FLUID DENSITY (G) ACTING ON RETAINING WALLS

SOLDIER PILE AND LAGGING SHORING WALL	BACKFILL COMPONENT (PCF)	SURCHARGE COMPONENT (PCF)	SEISMIC COMPONENT (PCF)
NATIVE SOIL	48	SEE TEXT	NA

Surcharge loads imposed on the shoring wall should be applied as a rectangular distribution as shown in Figure 1. The value G_{SA} is equal to the load of construction materials or construction equipment in pounds per square foot that will be placed within a distance H from the wall where H equals the exposed wall height.

Attachment: Figure 1. Lateral Earth Pressure Distribution





Note:

1. See report text for values of G.
   A: Active O: At-Rest S: Surcharge E: Earthquake

psi Information To Build On Engineering • Consulting • Testing	DATE: 09/14/09	PHAN RESIDENCE 2942 NE ROCKY BUTTE ROAD, PORTLAND, OR	PSI PROJECT 704-75236
PSI, INC. **6032 N. CUTTER CIRCLE, SUITE 480** **PORTLAND, OREGON 97217** **(503) 289-1778**	DRAWN BY: TC	**LATERAL EARTH PRESSURE DISTRIBUTION**	**FIGURE 1**

M.1 CRO

City of

PORTLAND, OREGON

Bureau of Development Services
Site Development

1900 SW 4th Avenue, Suite 5000
Portland, Oregon 97201
503-823-6892
FAX: 503-823-5433
TTY 503-823-6868
www.portlandonline.com/bds

Revised Land Use Review Response
Site Development Section, BDS

To:	Kathy Harnden, LUR Division
From:	Mary King, Site Development (823-7539)
Location/Legal:	LOT 2 BLOCK 1, OLYMPUS ESTATES
Land Use Review:	LU 07-124162
Proposal:	Environmental Review for NSFR.
Quarter Sec. Map:	2740, 2840
Date:	November 15, 2007

Site Development has reviewed the Stormwater Infiltration Testing and Stormwater Design report prepared by Professional Services, Inc. as revised November 9, 2007 and finds it acceptable. Site Development requests a condition of approval to require special inspections by the geotechnical engineer during drywell excavation and installation. Consideration of equipment needed to install the stormwater system on the steep slope must be addressed in the erosion control plan and associated inspections by the CPESC or P.E.

Please direct questions regarding stormwater to Mike Ebeling, (503) 823-7247.

MICRO

CITY OF PORTLAND, OREGON – BUREAU OF DEVELOPMENT SERVICES

1900 SW Fourth Avenue, Suite 5000 • Portland, Oregon 97201 • www.portlandonline.com/bds

Completeness Review Response

To: Kathy Harnden, LUR Division
From: Mike Hayakawa, Site Development (823-7539)

Location/Legal: 2942 NE ROCKY BUTTE RD/LOT 2 BLOCK 1, OLYMPUS ESTATES
Land Use Review: LU 07-124162
Proposal: Environmental Review for NSFR.
Quarter Sec. Map: 2740, 2840
Date: May 9, 2007

Please consider the following comments:

- The geotechnical report does not include any actual test pits, only visual reconnaisance and soil drive probes. The report states rip rap, several feet deep, is present, but does not provide any information on the purpose of the rip rap.
- Although a detail of a level spreader for stormwater disposal was attached, it was stamped by a landscape architect, not a registered engineer, and did not appear to be specifically designed for this site, nor did the geotech comment on it, in the report. Site Development does not support the level spreader unless designed by an engineer and accompanied by actual subsurface testing in the vicinity of the spreader location. A drywell should be used instead.
- The steep slopes and amount of excavation will require an erosion control plan prepared by a CPESC and monitoring of the work, also by a CPESC, during construction, as provided for in Title 10 (Special Sites).

Please direct questions to George Helm, PE, at 503-823-7201.

From: LU07-124162EN 11/12/2007 11:05 #087 P.002/005

MICRO

Please Pass To: CCB # 176269
Kathy Harnden
4 pages

psi *Information To Build On*
Engineering • Consulting • Testing

Revised November 9, 2007

Mr. Zien Phan
14218 Northeast Brazee
Portland, Oregon 97230

Subject: **Stormwater Infiltration Testing and Stormwater Design**
Single Family Residential Lot 2-Block 1, Olympus Heights
Home Having, 3100 Square Feet Impervious Surface
Northeast Rocky Butte Road
Portland, Oregon
PSI Report No.: 704-75236-1-R1

Dear Mr. Phan:

We take this opportunity to provide a new stormwater design for your project in response to City of Portland Land Use Review Responses (LU 07-124162) request of a drywell be used for the stormwater system.

We have reviewed the 2004 manual for stormwater destination/disposal hierarchy (pages 18 and 19), that would indicate a required category 2 classification for rooftop runoff and on site infiltration with a private drywell or soakage trench.

We have conducted an infiltration test on your property in the area of the proposed level spreader (near the center of the lot and approximately 60' west down slope of the property line) at a 36" depth. The test was conducted using the EPA Falling Head Percolation test procedure (Design Manual on site Wastewater Treatment and Disposal Systems EPA, 1980). The test was conducted on August 22, 2007.

A six inch hand auger was used to excavate the test hole to a 36 inch depth below existing grade. A six inch diameter PVC stand pipe was installed and seated approximately four to six inches into the underlying undisturbed soils. Approximately 2 to 3 inches of clean rock was placed in the bottom of the stand pipe. Per the cited infiltration method, the test location was presoaked by maintaining a minimum 12 inch head of water for at least four hours. Infiltration tests were conducted inside the stand pipe beginning with a six inch head. The drop of water level over a 30 minute interval was recorded over three test runs. The final percolation rate was determined.

Infiltration Test Data	
Test Location	Infiltration Test
Center of lot	--
Infiltration rate (inches/hr.)	4.0
Depth of test (inches)	36

It should be noted that our test result does not include a factor of safety.

CASE NO. LU07-124162EN
EXHIBIT A.7

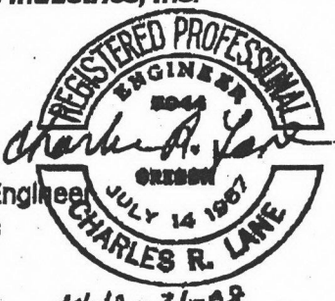
PROFESSIONAL SERVICE INDUSTRIES, INC.
Information to Build On

We recommend you install a drywell using 5' diameter concrete drywell rings in conjection with an overflow soakage trench. Details are shown in the enclosed drawing.

We understand the drywell system is the City of Portland preferred system. Please submit this design to the City for their approval.

If you have any questions, please call Charles R. Lane, P.E. at (503) 978-4703.

Sincerely,
Professional Service Industries, Inc.



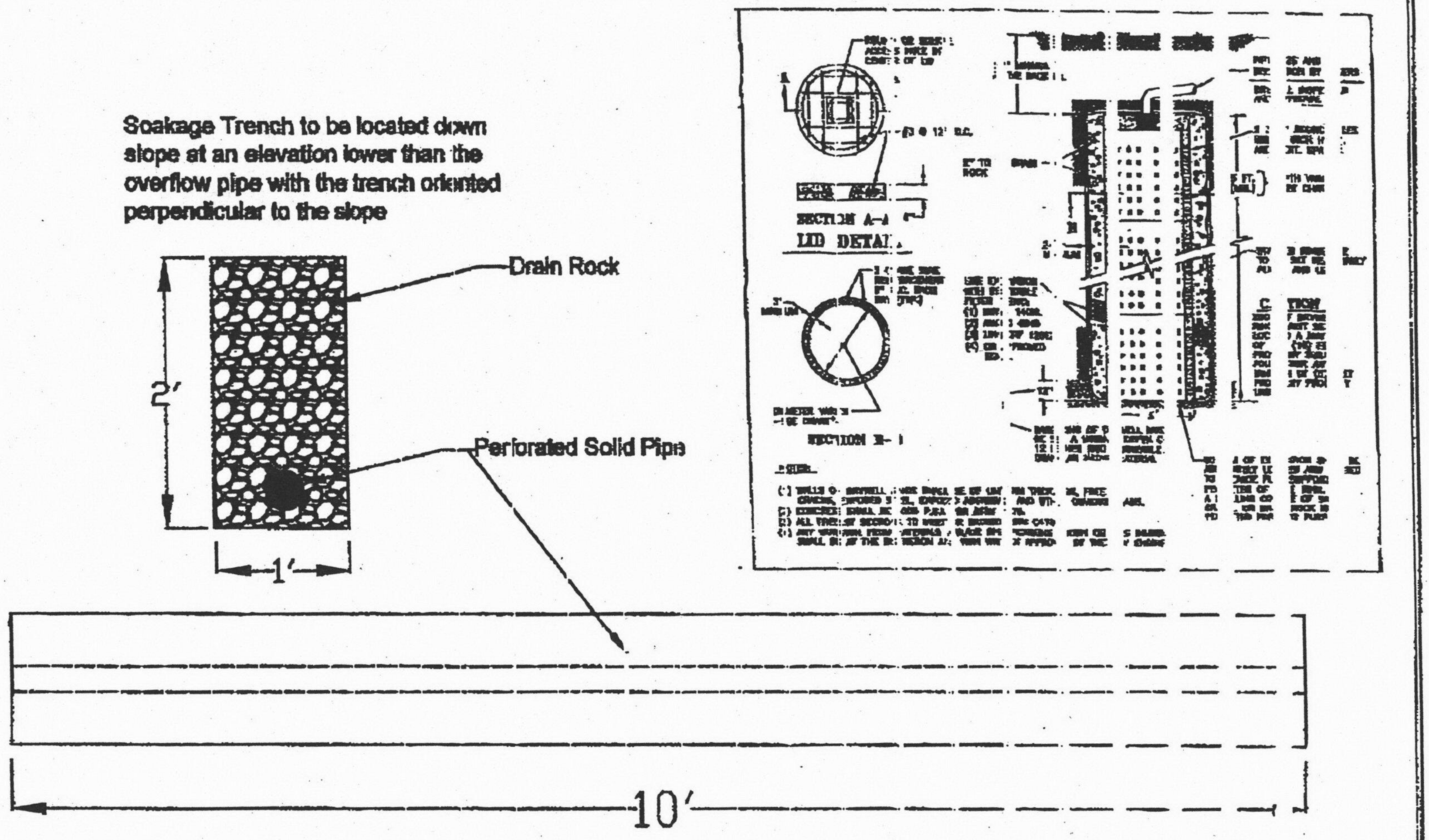
4-12-31-08

Charles R. Lane, P.E.
Senior Geotechnical Engineer
Geotechnical Services

Martin Acaster, R.G.
Department Manager
Geotechnical Services

Cc: Todd Sloan Architect

CRL:ms



OVER FLOW SOAKAGE TRENCH

PSI Information To Build On Engineering · Consulting · Testing PSI, INC. 6032 North Cutter Circle, Suite 480 Portland, Oregon 97217 (503) 289-1778	PROJECT NAME: STORMWATER INFILTRATION TESTING AND DESIGN NORTHEAST ROCKY BUTTE ROAD PORTLAND, OREGON DESCRIPTION: SOAKAGE TRENCH SCHEMATIC	DRAWN BY: MA APPROVED BY:	DATE: 11/0 /07 PSI REPORT NUMBER: 704 5236	FIGURE 2