GEODESIGN INC

July 11, 2012

Oregon Restaurant Supply, Inc.
P.O. Box 4726
Portland, OR 97208

Attention: Mr. Dan Fischer

Report of Geotechnical Engineering Services
Former Zupan's Building
900 North Tomahawk Island Drive
Portland, Oregon
GeoDesign Project: OregonRest-1-01

12-187953-000-00-CO

INTRODUCTION

GeoDesign, Inc. is pleased to submit report of geotechnical engineering services for the former Zupan's Building at 900 North Tomahawk Drive in Portland Oregon. GeoDesign performed geotechnical engineering and testing services for this structure in January and February 2005. The existing former Zupan's building is currently vacant, and the structure is planned to be retrofitted for use as a warehouse facility. We were informed by Mr. Doug Morgan with the City of Portland (COP), Bureau of Development Services (BDS) that COP is requiring engineering services to investigate the cause of the settlement that occurred between 2001 and 2005 and to verify that the foundations will support the retrofitted structure. We were also informed that the foundations will not be required to comply with the 2009 International Building Code (IBC) and the 2010 State of Oregon Structural Specialty Code (SOSSC) as long as additional load will not be applied to the existing foundations and new foundation elements will not be constructed.

PROJECT DETAILS

GeoDesign personnel researched the plans and permits on file at the Resource/Records counter at the COP BDS office. We obtained copies of the original pile driving inspection records that were submitted to COP for the original construction of the building in question. The 1982 construction was referred to as the Hayden Island Office Building. The report is titled Pile Driving Report by Northwest Testing Labs dated May 20, 1982.

The timber piles were installed as the foundation system for the Hayden Island Office Building. The timber piles were installed between May 10 and 14, 1982. The timber piles ranged from 45

to 55 feet in length with butt diameters ranging from 12 to 13 inches and tip diameters ranging from 7.5 to 8.5 inches. The piles were installed with a Linkbelt LB 440 pile driving hammer. The Linkbelt LB 440 single-acting diesel hammer has a ram weight of 4.0 kips and a rated hammer stroke of 4.55 feet, resulting in a maximum rated energy of 18.2 kip-feet. The pile location plan provided on Figure 1 shows the location of each pile and was reproduced from the Northwest Testing Labs original pile driving report.

An additional 15 piles were installed for the structure in 1993 as a retrofit of the existing structure for Payless Drug Stores. The piles were observed by Geotechnical Resources Inc. (GRI) between September 15 and 16, 1993. The 1993 timber piles ranged from 39 to 40 feet in length with butt diameters ranging from 12 to 14 inches and tip diameters ranging from 8 to 13.5 inches. The piles were installed with a Vulcan 01 pile driving hammer. The Vulcan 01 air hammer has a ram weight of 5.0 kips and a hammer stroke of 3 feet, resulting in a maximum rated energy of 15 kip-feet. The pile location plan provided on Figure 2 shows the location of each pile and was reproduced from the GRI original pile driving report and the Payless Drug Store structural plans.

PILE CAPACITY

The foundation system for the original structure was certified by Northwest Testing Labs (1982) and GRI (1993) to have a minimum capacity per pile of 30 tons. We performed wave equation analyses using *GRL WEAP 2010-3* software for pile driving equipment approval. This report summarizes our estimate of pile capacity based on our wave equation analyses. The estimated pile capacity from the results of our wave equation analyses are summarized in Tables 1 and 2. The recommended allowable capacity was arrived at using a factor of safety of 3, which is consistent with current IBC and SOSSC code requirements, as well as industry standards.

Table 1. Summary of GRL WEAP Pile Capacity for Piles Installed in 1982

Pile Number	Tip Diameter (inches)	Butt Diameter (inches)	Pile Length (feet)	Length Below Ground Surface (feet)	Blows Per Last Foot	Wave Equation Ultimate Capacity (kips)	Recommended Allowable Capacity (kips)
1	8.0	12.5	55	37	24	93	31.0
2	8.0	12.0	50	35	24	92	30.7
3	7.5	12.5	55	35	28	102	34.0
4	8.0	12.0	50	32	31	105	35.0
5	8.5	13.0	55	36	31	107	35.7
6	7.5	12.0	50	37	28	100	33.3
7	8.0	13.0	55	34	49	125	41.7
8	8.0	12.5	50	31	38	115	38.3
9	8.0	12.0	55	40	75	134	44.7
10	8.0	12.0	50	31	36	111	37.0

Table 1. Summary of GRL WEAP Pile Capacity (continued)

Pile Number	Tip Diameter (inches)	Butt Diameter (inches)	Pile Length (feet)	Length Below Ground Surface (feet)	Blows Per Last Foot	Wave Equation Ultimate Capacity (kips)	Recommended Allowable Capacity (kips)
11	7.5	12.0	55	38	38	112	37.3
12	8.0	12.5	50	36	36	111	37.0
13	8.0	12.0	55	39	35	110	36.7
14	8.0	12.0	50	38	37	111	37.0
15	8.0	12.0	55	37	40	116	38.7
16	7.5	12.0	50	37	40	114	38.0
17	8.0	12.0	45	26	45	111	37.0
18	8.0	12.5	36	26	52	124	41.3
19	8.0	12.0	45	26	42	118	39.3
20	8.0	12.5	45	29	32	107	35.7
21	8.5	13.0	45	30	35	111	37.0
22	9.0	13.5	45	29	38	115	38.3
23	8.0	12.5	45	30	32	106	35.3
24	8.5	12.0	45	30	38	113	37.7
25	7.5	12.0	45	32	32	105	35.0
26	8.0	13.0	45	29	34	110	36.7
27	8.0	12.5	45	28	33	108	36.0
28	8.0	13.0	45	33	30	103	34.3
29	7.5	12.0	45	31	32	105	35.0
30	7.5	13.0	45	29	29	102	34.0
31	8.0	12.5	45	34	36	111	37.0
32	8.0	13.0	45	29	34	109	36.3
33	8.0	12.5	45	30	32	106	35.3
34	8.0	13.0	45	30	30	104	34.7
35	8.0	13.0	45	28	37	113	37.7
36	8.0	13.0	45	29	32	107	35.7
37	7.5	12.5	45	30	36	111	37.0
38	8.0	13.0	45	28	30	104	34.7
39	7.5	12.0	45	32	29	101	33.7
40	7.5	12.0	45	28	29	102	34.0
41	8.0	12.0	45	30	35	110	36.7
42	7.5	12.0	45	32	34	108	36.0
43	8.0	12.0	45	30	31	105	35.0
44	8.0	12.5	45	32	32	105	35.0
45	7.5	12.0	45	38	24	90	30.0

Table 1. Summary of GRL WEAP Pile Capacity (continued)

Pile Number	Tip Diameter (inches)	Butt Diameter (inches)	Pile Length (feet)	Length Below Ground Surface (feet)	Blows Per Last Foot	Wave Equation Ultimate Capacity (kips)	Recommended Allowable Capacity (kips)
46	8.0	12.0	45	31	35	110	36.7
47	8.0	12.5	45	32	30	103	34.3
48	8.5	13.0	45	31	38	113	37.7
49	8.0	13.0	45	32	32	106	35.3
50	8.0	12.0	45	31	32	106	35.3
51	7.5	12.0	45	32	29	101	33.7
52	8.5	12.5	45	30	39	114	38.0
53	8.0	13.0	45	32	39	114	38.0
54	8.5	13.0	45	32	36	112	37.3
55	8.0	13.0	45	30	35	110	36.7
56	8.0	12.5	45	31	39	114	38.0
57	8.5	12.5	45	31	31	105	35.0
58	8.0	12.0	45	32	42	116	38.7
59	8.0	12.0	45	31	29	102	34.0
60	7.5	12.0	45	34	31	104	34.7
61	7.5	12.0	45	32	32	105	35.0
62	8.0	12.5	45	37	29	105	35.0
63	8.0	12.0	45	32	33	107	35.7
64	8.0	12.0	45	39	24	91	30.3
65	7.5	12.0	45	31	27	98	32.7
66	8.0	13.0	45	31	35	110	36.7
67	8.0	12.5	45	34	29	102	34.0
68	8.0	13.0	45	35	29	101	33.7
69	8.5	12.5	45	32	33	107	35.7
70	8.0	13.0	45	31	37	112	37.3
71	8.5	13.0	45	33	29	102	34.0
72	7.5	12.0	45	33	29	101	33.7
73	8.0	12.5	45	32	31	105	35.0
74	8.0	13.0	45	33	35	109	36.3
75	7.5	12.5	45	34	34	107	35.7
76	8.0	13.0	45	34	39	114	38.0

Table 2. Summary of GRL WEAP Pile Capacity for Piles Installed in 1993

Pile Number	Tip Diameter (inches)	Butt Diameter (inches)	Pile Length (feet)	Length Below Ground Surface (feet)	Blows Per Last Foot	Wave Equation Ultimate Capacity (kips)	Recommended Allowable Capacity (kips)
1	8.5	13.5	40	32	50	175	58.3
2	9.0	13.0	39	33	50	175	58.3
3	9.5	13.0	39	32.5	60	187	62.3
4	8.0	13.0	40	32	28	133	44.3
5	9.5	14.0	40	35	48	174	56.0
6	9.5	13.0	40	35	48	174	58.0
7	9.5	13.0	40	35	42	165	55.0
8	13.5	14.0	40	35	46	194	64.7
9	10.5	13.5	40	35	27	130	43.3
10	8.5	13.0	40	35	45	167	55.7
11	9.0	12.0	40	35	27	131	43.7
12	10.5	13.0	40	35	36	152	50.7
13	9.5	12.5	40	35	56	182	60.7
14	9.0	12.0	40	35	38	157	52.3
15	9.5	12.5	40	35	33	147	49.0

We have also provided the original pile driving logs in the Attachment to this report.

LIQUEFACTION AND LATERAL SPREADING

Liquefaction is caused by a rapid increase in pore water pressure that reduces the effective stress between soil particles to near zero. Granular soils, which rely on interparticle friction for strength, are susceptible to liquefaction until the excess pore pressures can dissipate. In general, loose, saturated sand soils with low silt and clay contents are the most susceptible to liquefaction. Based on our subsurface conditions at the site of the former Zupan's building, which consists of very loose sands, widespread liquefaction is likely under design levels of ground shaking. However, because the structure was designed before the current building codes, the structure does not have to comply with the requirements in the 2009 IBC and the 2010 SOSSC for seismic effects of liquefaction.

Lateral spread is a liquefaction-related seismic hazard. The areas subject to lateral spreading are typically gently sloping or flat sites underlain by liquefiable sediments adjacent to an open face (such as riverbanks or sloughs). Liquefied soils adjacent to open faces may "flow" in that direction, resulting in surface cracking and lateral displacement towards the open face. The magnitude of lateral spread decreases with distance from the open face. The site is located on the bank of the Columbia River, and the open face of the slope is immediately behind the existing structure. Based on this and the fact that liquefaction is expected to be severe at the site, it is

our opinion that the risk of lateral spread should be considered high under design levels of ground shaking. However, because the structure was designed before the current building codes, the structure does not have to comply with the requirements in the 2009 IBC and the 2010 SOSSC for seismic effects of liquefaction and associated lateral spreading.

♦ ♦ ♦

We appreciate the opportunity to continue working with you on this project. If you have questions concerning the information provided, please call.

Sincerely,

GeoDesign, Inc.

Jeffery D. Tucker, P.E., G.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
74942PE
OREGON
July 13, 2004
JEFFERY D. TUCKER
EXPIRES: 6/30/14

cc: Mr. Glen A. Miller, RA CSI, GA Miller Architecture PC (via email only)
Mr. John E. Nordling, P.E., S.E., Nordling Structural Engineers LLC (via email only)

JDT:kt
Attachments
One copy submitted
Document ID: OregonRest-1-01-071112-geolr.doc
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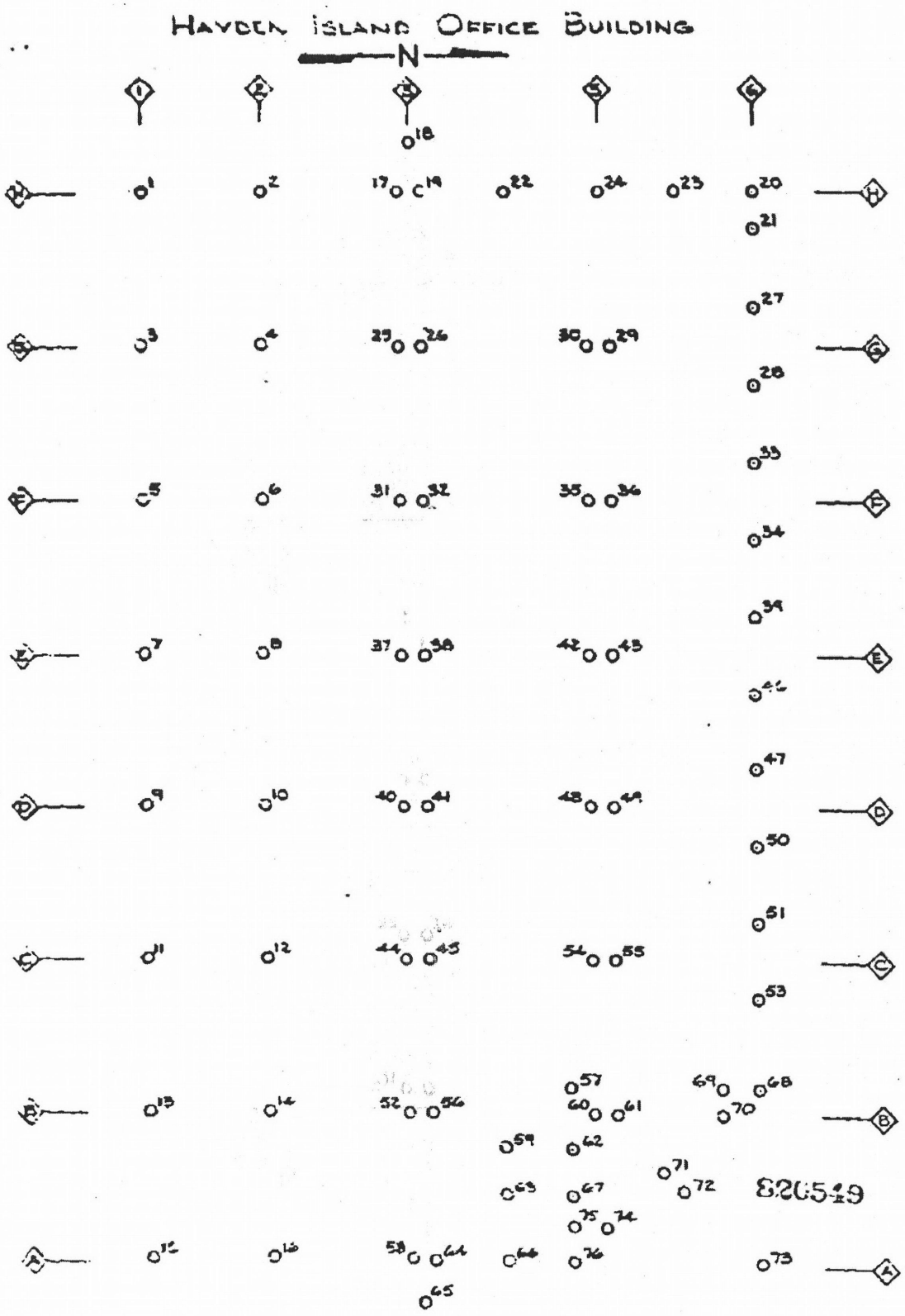

GEODESIGN INC 15575 SW Sequoia Parkway - Suite 100 Portland OR 97224 Off 503.968.8787 Fax 503.968.3068	OREGONREST-1-01	PILE LOCATION PLAN (1982)	
	JULY 2012	FORMER ZUPAN'S BUILDING PORTLAND, OR	FIGURE 1

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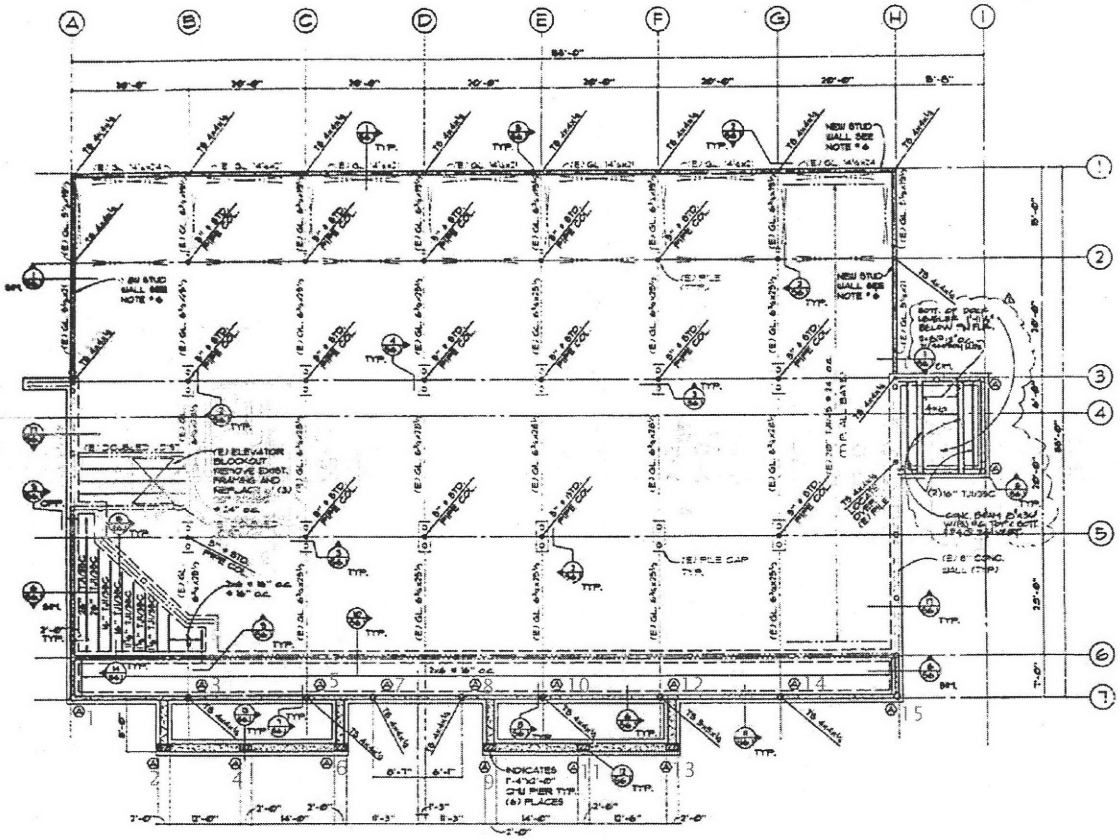
File Name: J:\M-R\OregonRest\OregonRest-1\OregonRest-1-01\Figures\CAD\OregonRest-1-01-SP01.dwg | Layout: FIGURE 1



N

0 20 40

(SCALE IN FEET)

SITE PLAN BASED ON DRAWING S2.1
FOR PAYLESS DRUG STORE PROPOSAL
BY KPFF CONSULTING ENGINEERS

PILE LOCATION PLAN (1993)

FORMER ZUPAN'S BUILDING
PORTLAND, OR

FIGURE 2

OREGONREST-1-01

JULY 2012

GEODESIGN
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
OR 503.968.8787 Fax 503.968.3068

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NORTHWEST TESTING LABORATORIES

PILE DRIVING INSPECTION LOG

Project: Hayden Inland Office Building
Inland Construction

Date: 5-10-82 thru 5-14-82

Type Pile: Treated Timber
Hammer: Mod 440 Diesel Lr
Rated Energy: 18,200 ft.lb

Pile No.	Butt Dia. In.	Tip Dia. In.	Pile Length Ft.	Length Below Ground	Blows Per Last Foot	Remarks
1	8.0	12.5	55.0	37	24	
2	8.0	12.0	50.0	35	24	
3	7.5	12.5	55.0	35	28	
4	8.0	12.0	50.0	32	31	
5	8.5	13.0	55.0	36	31	
6	7.5	12.0	50.0	37	28	
7	8.0	13.0	55.0	34	49	
8	8.0	12.5	50.0	31	38	
9	8.0	12.0	55.0	40	50@8"	
10	8.0	12.0	50.0	31	36	
11	7.5	12.0	55.0	38	38	
12	8.0	12.5	50.0	36	36	
13	8.0	12.0	55.0	39	35	
14	8.0	12.0	50.0	38	37	
15	8.0	12.0	55.0	37	40	
16	7.5	12.0	50.0	37	40	
17	8.0	12.0	45.0	26	30@8"	
18	8.0	12.5	36.0	26	52	
19	8.0	12.0	45.0	26	42	
20	8.0	12.5	45.0	29	32	
21	8.5	13.0	45.0	30	35	
22	9.0	13.5	45.0	29	38	

NORTHWEST TESTING LABORATORIES

PILE DRIVING INSPECTION LOG

Project: Hayden Island Office Building
Inland Construction

Date: 5-10-82 thru 5-14-82

Type Pile: Treated Timber
Hammer: Model 440 Diesel Link
Rated Energy: 18,200 ft# Tol

Pile No.	Butt Dia. In.	Tip Dia. In.	Pile Length Ft.	Length Below Ground	Blows Per Last Foot	Remarks
23	8.0	12.5	45.0	30	32	
24	8 5	12.0	45 0	30	38	
25	7.5	12.0	45.0	32	32	5/11/82
26	8.0	13.0	45.0	29	34	
27	8.0	12.5	45.0	28	33	
28	8 0	13 0	45.0	33	30	
29	7.5	12.0	45.0	31	32	
30	7.5	13.0	45 0	29	29	
31	8.0	12.5	45.0	34	36	
32	8.0	13 0	45.0	29	34	
33	8.0	12.5	45.0	30	32	
34	8.0	13.0	45.0	30	30	
35	8.0	13.0	45.0	28	37	
36	8.0	13.0	45.0	29	32	
37	7 5	12.5	45.0	30	36	
38	8.0	13.0	45.0	28	30	
39	7 5	12 0	45 0	32	29	
40	7.5	12.0	45.0	28	29	
41	8.0	12.0	45.0	30	35	~~S20519~~
42	7 5	12.0	45.0	32	34	
43	8.0	12.0	45.0	30	31	
44	8 0	12.5	45.0	32	32	

NORTHWEST TESTING LABORATORIES

PILE DRIVING INSPECTION LOG

Project: Waylon Island Office Building
Island Construction

Date: 5-10-82 thru 5-14-82

Type Pile: Treated Timber
Hammer: Mod 440 Diesel Link-Belt
Rated Energy: 10,200 Ft.lbs.

Pile No.	Butt Dia. In.	Tip Dia. In.	Pile Length Ft.	Length Below Ground	Blows Per Last Foot	Remarks
45	7.5	12.0	45	38	24	
46	8.0	12.0	45	31	35	
47	8.0	12.5	45	32	30	
48	8.5	13.0	45	31	38	
49	8.0	13.0	45	32	32	
50	8.0	12.0	45	31	32	
51	7.5	12.0	45	32	29	
52	8.5	12.5	45	30	39	
53	8.0	13.0	45	32	39	
54	8.5	13.0	45	32	36	
55	8.0	13.0	45	30	35	
56	8.0	12.5	45	31	39	
57	8.5	12.5	45	31	31	
58	8.0	12.0	45	[illegible]	42	
59	8.0	12.0	45	31	29	5/12/82
60	7.5	12.0	45	34	31	
61	7.5	12.0	45	32	32	
62	8.0	12.5	45	37	29	
63	8.0	12.0	45	32	33	
64	8.0	12.0	45	39	24	82C.5[illegible]
65	7.5	12.0	45	31	27	
66	8.0	13.0	45	31	35	

NORT

Project: Way
Isl

Date: 5-10-8

Pile No.	B D I
23	[illegible]
24	[illegible]
25	[illegible]
26	[illegible]
27	[illegible]
28	8
29	7
30	7
31	8
32	8
33	8
34	8
35	8
36	8
37	7
38	8
39	7
40	7
41	8
42	7
43	8
44	8

NORTHWEST TESTING LABORATORIES

PILE DRIVING INSPECTION LOG

Project: Hayden Island Office Building
Island Construction

Date: 5-10-82 thru 5-14 82

Type Pile: Treated Timber
Hammer: Mod 440 Diesel Link-Belt
Rated Energy: 18,200 ft. lbs.

Pile No.	Butt Dia. In.	Tip Dia. In.	Pile Length Ft.	Length Below Ground	Blows Per Last Foot	Remarks
67	8.0	12.5	45	34	29	
68	8 0	13.0	45	35	29	5/14/82
69	8.5	12.5	45	32	33	
70	8 0	13.0	45	31	37	
71	8.5	13.0	45	33	29	
72	7.5	12.0	45	33	29	
73	8.0	12.5	45	32	31	
74	8.0	13 0	45	33	35	
75	7.5	12.5	45	34	34	
76	8 0	13 0	45	34	39	

820519

Project:

Date: 5-1

Pile No.
45
46
47
48
49
50
51
52
53
54
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66

MULTNOMAH CO. DEPT. OF ENVIRONMENTAL SERVICES, PERMIT SECTION
Transmittal
11/24/81
page 2

11. a) Main floor: wall insulation, R 19 Kraft face @ 2 x 6 [illegible] 2 x 4 stud walls

DA
HIC

To MULT
Dep
Per
211
Por

Sequence 4

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 1 (Grid A-7)

Site Hayden Is Payless Job No. 1422

Pile: Type Treated Timber

Tip Diam. 8.5 in. Butt Diam. 13.5 in.

Length ≤40 ft — in. Weight — lb.

1 3 5 7 8 10 12 14 15

2 4 6 9 11 13

North side building

Penetration:

Elev. of Ground/Pile Cap Bottom —

Elev. of Tip (after driving) —

Penetration 32 ft

RLW

Inspector

Date 9/15/93

Hammer: Make and Model Vulcan No. 1

Stroke: Rated 15000 ft lb Meas. —

Weight of Ram 5000 lb

Mandrel (if used):

Description NA

Length ft in. Weight lb.

Remarks: Not driving square

Vulcan No. rated at 15000 ft lb

Time: *Start Driving* 3:00 AM PM

Finish Driving 3:10 AM PM Driving Time 10 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30	39	45		60		75		90		105	
1		16		31	50	46		61		76		91		106	
2		17		~~32~~		47		62		77		92		107	
3		18	66	33		48		63		78		93		108	
4		19		34		49		64		79		94		109	
5		20		35		50		65		80		95		110	
6		21		36		51		66		81		96		111	
7		22	104	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25	20	40		55		70		85		100		115	
11		26	22	41		56		71		86		101		116	
12	18	27	30	42		57		72		87		102		117	
13		28	32	43		58		73		86		103		118	
14		29	35	44		59		74		89		104		119	
15		30		45		60		75		90		105		120	

Sequence 5

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 2 (Grid A.2 - 8)

Site Hayden Is Payless Job No. 1422

Inspector: RLW

Date 9/15/93

Pile: Type treated timber

Tip Diam. 9 in. Butt Diam. 13 in.

Length ~39 ft – in. Weight – lb.

Hammer: Make and Model Vulcan 01

Stroke: Rated 15000 ft lb Meas. –

Weight of Ram 5000 lb

Mandrel (if used):

Description NA

Length ____ ft ____ in. Weight ____ lb.

Penetration:

Elev. of Ground/Pile Cap Bottom –

Elev. of Tip (after driving) –

Penetration 33 ft

Remarks:

Time: *Start Driving* 3:15 AM PM

Finish Driving 3:20 AM PM Driving Time 5 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0	DROP	15		30	30	45		60		75		90		105	
1		16		31	36	46		61		76		91		106	
2		17	49	32	20	47		62		77		92		107	
3		18		33	30	48		63		78		93		108	
4		19		34		49		64		79		94		109	
5		20		35		50		65		80		95		110	
6		21		36		51		66		81		96		111	
7		22	94	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25	24	40		55		70		85		100		115	
11		26	25	41		56		71		86		101		116	
12	35	27	27	42		57		72		87		102		117	
13		28	30	43		58		73		86		103		118	
14		29	30	44		59		74		89		104		119	
15		30		45		60		75		90		105		120	

Sequence 6

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 3

Site Hayden In Payless Job No. 1422

Pile: Type treated timber

Tip Diam. 9 1/2 in. Butt Diam. 13 in.

Length ≈ 40 ft – in. Weight – lb.

O X O O O O O O O
O O O O O O

RLW
Inspector

Date 9/15/93

Hammer: Make and Model Vulcan 01

Stroke: Rated 15000 ft lb Meas.

Weight of Ram 5000 lb

Mandrel (if used):

Description NA

Length ft in. Weight lb.

Remarks:

Penetration:

Elev. of Ground/Pile Cap Bottom –

Elev. of Tip (after driving) –

Penetration 32 1/2 ft

Time: *Start Driving* AM / 3:18 PM

Finish Driving AM / 3:25 PM Driving Time 7 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30	36	45		60		75		90		105	
1		16		31	45	46		61		76		91		106	
2		17		32	30	47		62		77		92		107	
3		18	50	33		48		63		78		93		108	
4		19		34		49		64		79		94		109	
5		20		35		50		65		80		95		110	
6	Drop	21		36		51		66		81		96		111	
7		22	98	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25		40		55		70		85		100		115	
11		26	19	41		56		71		86		101		116	
12		27	22	42		57		72		87		102		117	
13	35	28	23	43		58		73		86		103		118	
14		29	28	44		59		74		89		104		119	
15		30	34	45		60		75		90		105		120	

Sequence 7

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

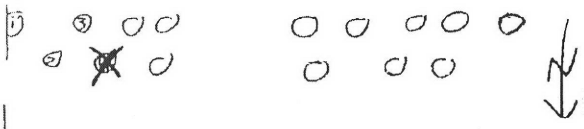
PILE NO. 4

Site treated timber Job No. 1422

Pile: Type treated timber

Tip Diam. 8 in. Butt Diam. 13 in.

Length ≈40 ft ____ in. Weight ____ lb.



Inspector: RLW

Date 9/15/93

Hammer: Make and Model Vulcan 01

Stroke: Rated 15000 ft lb Meas. ____

Weight of Ram 5000 lb

Mandrel (if used):

Description NA

Length ____ ft ____ in. Weight ____ lb.

Remarks: Initial drive to 10 ft with 3000 lb drop hammer. Stopped at 32' on 9/15/93 - hammer guide at ground surface changed to leads at 9/16 AM & finished driving pile "Froze" - 20 blows/in

Penetration:

Elev. of Ground/Pile Cap Bottom —

Elev. of Tip (after driving) —

Penetration 32 ft

Time: *Start Driving* ____ AM 3:28 PM

Finish Driving ____ AM 3:40 PM Driving Time 12 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0	DROP HAMMER	15		30	26	45		60		75		90		105	
1		16		31	28	46		61		76		91		106	
2		17	46	32		47		62		77		92		107	
3		18		33		48		63		78		93		108	
4		19		34		49		64		79		94		109	
5		20		35		50		65		80		95		110	
6		21		36		51		66		81		96		111	
7		22	103	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25	23	40		55		70		85		100		115	
11		26	25	41		56		71		86		101		116	
12	32	27	24	42		57		72		87		102		117	
13		28	25	43		58		73		86		103		118	
14		29	25	44		59		74		89		104		119	
15		30		45		60		75		90		105		120	

Sequence 8

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

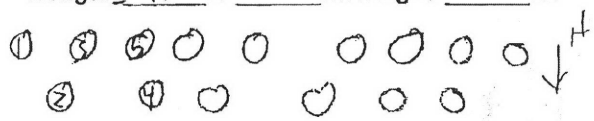
PILE NO. 5 (GRID C-7)

Site Haydin Island Payless Job No. 1422

Pile: Type Treated Timber

Tip Diam. 9.5 in. Butt Diam. 14 in.

Length ≈ 40 ft ____ in. Weight ____ lb.



Inspector: RLW

Date 9/16/93

Hammer: Make and Model Vulcan 01

Stroke: Rated 15000 FT-lb Meas. ____

Weight of Ram 5000 lb

Mandrel (if used):

Description NA

Length ____ ft ____ in. Weight ____ lb.

Remarks: ____

Penetration:

Elev. of Ground/Pile Cap Bottom —

Elev. of Tip (after driving) —

Penetration 35 ft

Time: *Start Driving* 10:24 AM ____ PM

Finish Driving 10:35 AM ____ PM Driving Time 11 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30		45		60		75		90		105	
1		16		31	25	46		61		76		91		106	
2		17		32	27	47		62		77		92		107	
3		18	64	33	40	48		63		78		93		108	
4		19		34	42	49		64		79		94		109	
5		20		~~35~~	43	50		65		80		95		110	
6	Drop	21		36		51		66		81		96		111	
7	hamma	22	87	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25	20	40		55		70		85		100		115	
~~11~~		26		41		56		71		86		101		116	
12		27	19	42		57		72		87		102		117	
13	24	28	24	43		58		73		86		103		118	
14		29	23	44		59		74		89		104		119	
15		30	22	45		60		75		90		105		120	

Sequence 9

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 6 (GRID C.2-8)

Site HAYDIN ISLAND PAYLOES Job No. 1422

Inspector DKF

Date 9-16-93

Pile: Type TREATED TIMBER

Tip Diam. 9.5 in. Butt Diam. 13 in.

Length ≈40 ft ____ in. Weight ____ lb.

Hammer: Make and Model VULCAN 01

Stroke: Rated 1500 ft-lb Meas. ____

Weight of Ram 5000 lb

Mandrel (if used):

Description N/A

Length ____ ft ____ in. Weight ____ lb.

Penetration:

Elev. of Ground/Pile Cap Bottom –

Elev. of Tip (after driving) –

Penetration 35 ft

Remarks:

Time: *Start Driving* 10:37 AM ____ PM *Finish Driving* 10:47 AM ____ PM Driving Time 10 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30	27	45		60		75		90		105	
1		16		31	32	46		61		76		91		106	
2		17	45	32	29	47		62		77		92		107	
3		18		33	41	48		63		78		93		108	
4		19	11	34	48	49		64		79		94		109	
5		20		35		50		65		80		95		110	
6		21		36		51		66		81		96		111	
7	DROP HAMMER	22		37		52		67		82		97		112	
8		23	108	38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25	22	40		55		70		85		100		115	
11		26	26	41		56		71		86		101		116	
12		27	24	42		57		72		87		102		117	
13		28	23	43		58		73		86		103		118	
14		29	26	44		59		74		89		104		119	
15	12	30		45		60		75		90		105		120	

Sequence 10

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 7 (GRID C.6-7)

Site HAYDEN ISLAND PAYLESS Job No. 1422

Pile: Type TREATED TIMBER

Tip Diam. 9.5 in. Butt Diam. 13 in.

Length 40 ft – in. Weight – lb.

1 3 5 7
0 0 0 X 0 0 0 0 0
0 0 0 0 0 0
2 4 6

DKF
Inspector

Date 9-16-93

Hammer: Make and Model VULCAN 01

Stroke: Rated 15000 FT-LB Meas.

Weight of Ram 5000 lb

Mandrel (if used):

Description N/A

Length ft in. Weight lb.

Penetration:

Elev. of Ground/Pile Cap Bottom –

Elev. of Tip (after driving) –

Penetration 75 ft

Remarks:

Time: *Start Driving* 10:49 AM PM

Finish Driving 11:02 AM PM Driving Time 12 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30		45		60		75		90		105	
1		16		31 (10:50)	34	46		61		76		91		106	
2		17	33	32	36	47		62		77		92		107	
3		18		33	37	48		63		78		93		108	
4		19	39	34	35	49		64		79		94		109	
5	DROP HAMMER	20		35	42	50		65		80		95		110	
6		21		36		51		66		81		96		111	
7		22	97	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25		40		55		70		85		100		115	
11		26	20	41		56		71		86		101		116	
12		27	20	42		57		72		87		102		117	
13		28	23	43		58		73		86		103		118	
14	25	29	25	44		59		74		89		104		119	
15		30	28	45		60		75		90		105		120	

Sequence 11

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 9 (GRID D.3-7)

Site HAYDIN JS. PAYLESS Job No. 1422

Inspector DKF

Date 9-16-93

Pile: Type TREATED TIMBER

Tip Diam. 10.5 in. Butt Diam. 13.5 in.

Length ≈ 40 ft - in. Weight - lb.

1 3 5 7 9 11 13 14 15

2 4 6 8 10 12

N

Hammer: Make and Model VULCAN 01

Stroke: Rated 15000 FT-lb Meas.

Weight of Ram 5000 lb

Mandrel (if used):

Description N/A

Length ft in. Weight lb.

Penetration:

Elev. of Ground/Pile Cap Bottom -

Elev. of Tip (after driving) -

Penetration 35 ft

Remarks:

Time: *Start Driving* 11:06 AM PM

Finish Driving 11:14 AM PM Driving Time 8 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30	24	45		60		75		90		105	
1		16		31	24	46		61		76		91		106	
2		17	23	32	26	47		62		77		92		107	
3	DROP HAMMER	18		33	24	48		63		78		93		108	
4		19		34	27	49		64		79		94		109	
5		20		11:09 35		50		65		80		95		110	
6		21		36		51		66		81		96		111	
7		22		37		52		67		82		97		112	
8		23	86	38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25		40		55		70		85		100		115	
11		26	13	41		56		71		86		101		116	
12		27	16	42		57		72		87		102		117	
13		28	18	43		58		73		86		103		118	
14		29	20	44		59		74		89		104		119	
15	21	30	22	45		60		75		90		105		120	

Sequence 12

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 8 (GRID D.6-8)

Site HAYDIN TS PAYLESS Job No. 1422

Pile: Type TREATED TIMBER

Tip Diam. 13.5 in. Butt Diam. 14 in.

Length ≈40 ft ____ in. Weight ____ lb.

1 3 5 7 9 11 13 14 15
0 0 0 0 0 0 0 0 0 N

0 0 0 ~~0~~ 0 0
2 4 6 8 10 12

DFF
Inspector

Date 9-16

Hammer: Make and Model VULCAN 01

Stroke: Rated 15000 Ft-lb Meas. ____

Weight of Ram 5000 lb

Mandrel (if used):

Description N/A

Length ____ ft ____ in. Weight ____ lb.

Remarks:

Penetration:

Elev. of Ground/Pile Cap Bottom ____

Elev. of Tip (after driving) ____

Penetration 35 ft

Time: *Start Driving* 11:15 AM ____ PM *Finish Driving* 11:25 AM ____ PM Driving Time 10 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30	20	45		60		75		90		105	
1		16		31	30	46		61		76		91		106	
2		17		32	30	47		62		77		92		107	
3	DROP HAMMER	18	51	33	41	48		63		78		93		108	
4		19		34	46	49		64		79		94		109	
5		20		35		50		65		80		95		110	
6		21		36		51		66		81		96		111	
7		22	75	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25		40		55		70		85		100		115	
11		26	15	41		56		71		86		101		116	
12		27	27	42		57		72		87		102		117	
13		28	24	43		58		73		86		103		118	
14	24	29	29	44		59		74		89		104		119	
15		30	20	45		60		75		90		105		120	

Sequence 13

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 11 (GRID E-7)

Site HAYDIN Js. PAYLESS Job No. 1422

Pile: Type TREATED TIMBER

Tip Diam. 9 in. Butt Diam. 12 in.

Length ≈40 ft — in. Weight — lb.

N 1 3 5 7 9 11 13 14 15

0 0 0 0 0 ~~0~~ 0 0 0

0 0 0 0 0 0

2 4 6 8 10 12

DKF

Inspector

Date 9-16-93

Hammer: Make and Model VULCAN 01

Stroke: Rated 15000 ft-lb Meas.

Weight of Ram 5000 lb

Mandrel (if used):

Description N/A

Length ft in. Weight lb.

Penetration:

Elev. of Ground/Pile Cap Bottom —

Elev. of Tip (after driving) —

Penetration 35 ft

Remarks:

Time: *Start Driving* 11:28 AM PM

Finish Driving 11:37 AM PM Driving Time 9 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0	DROP HAMMER	15	14	30	11:29 16	45		60		75		90		105	
1		16	47	31	22	46		61		76		91		106	
2		17	74	32	26	47		62		77		92		107	
3		18	14	33	25	48		63		78		93		108	
4		19	13	34	27	49		64		79		94		109	
5		20	15	~~35~~		50		65		80		95		110	
6		21	16	36		51		66		81		96		111	
7		22	16	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25		40		55		70		85		100		115	
11		26		41		56		71		86		101		116	
12		27		42		57		72		87		102		117	
13		28		43		58		73		86		103		118	
14		29		44		59		74		89		104		119	
15		30		45		60		75		90		105		120	

Sequence 14

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 10 (GRID E.3-8)

Site HAYDEN TS. PAYLESS Job No. 1427

Pile: Type TREATED TIMBER

Tip Diam. 8.5 in. Butt Diam. 13 in.

Length ≈40 ft ____ in. Weight ____ lb.

1 3 5 7 9 11 13 14 15

N 2 4 6 8 10 12

Inspector: DKF

Date 9-16-93

Hammer: Make and Model VULCAN 01

Stroke: Rated 15000 Ft-lb Meas. ____

Weight of Ram 5000 lb

Mandrel (if used):

Description N/A

Length ____ ft ____ in. Weight ____ lb.

Penetration:

Elev. of Ground/Pile Cap Bottom –

Elev. of Tip (after driving) –

Penetration 35 ft

Remarks:

Time: *Start Driving* 11:43 AM ____ PM

Finish Driving 11:52 AM ____ PM Driving Time 9 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30		45		60		75		90		105	
1		16		31	35	46		61		76		91		106	
2		17		32	25	47		62		77		92		107	
3		18	52	33	29	48		63		78		93		108	
4	DROP HAMMER	19		34	34	49		64		79		94		109	
5		20		35	45	50		65		80		95		110	
6		21		36		51		66		81		96		111	
7		22	90	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25	1'	40		55		70		85		100		115	
11		26	23	41		56		71		86		101		116	
12		27	21	42		57		72		87		102		117	
13	24	28	29	43		58		73		86		103		118	
14		29	30	44		59		74		89		104		119	
15		30	32	45		60		75		90		105		120	

Sequence 15

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 13 (GRID F-7)

Site HAYDIN IS. PAYLESS Job No. 1422

Inspector DKF

Date 2-16-93

Pile: Type TREATED TIMBER

Tip Diam. 9.5 in. Butt Diam. 12.5 in.

Length 46 ft – in. Weight – lb.

N

0 1 0 3 0 5 0 7 0 9 0 11 0 13 0 14 0 15

0 0 0 0 0 0

2 4 6 8 10 12

Hammer: Make and Model VULCAN 01

Stroke: Rated 15000 FT-lb Meas.

Weight of Ram 5000 lb

Mandrel (if used):

Description N/A

Length ft in. Weight lb.

Penetration:

Elev. of Ground/Pile Cap Bottom –

Elev. of Tip (after driving) –

Penetration 35 ft

Remarks:

Time: *Start Driving* 12:37 AM PM *Finish Driving* 12:50 AM PM Driving Time 13 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30		45		60		75		90		105	
1		16		31	41	46		61		76		91		106	
2		17	46	32	39	47		62		77		92		107	
3		18		33	41	48		63		78		93		108	
4		19	43	34	45	49		64		79		94		109	
5	DROP	20		~~35~~	56	50		65		80		95		110	
6	HAMMER	21		36		51		66		81		96		111	
7		22		37		52		67		82		97		112	
8		23	114	38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25	41	40		55		70		85		100		115	
11		26	28	41		56		71		86		101		116	
12	41	27	36	42		57		72		87		102		117	
13		28	35	43		58		73		86		103		118	
14	35	29	37	44		59		74		89		104		119	
15		30	41	45		60		75		90		105		120	

Sequence 16

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 14 (GRID G-7)

Site HAYDIN FS PAYLESS Job No. 1422

Pile: Type TREATED TIMBER

Tip Diam. 9 in. Butt Diam. 13 in.

Length ≅ 40 ft ____ in. Weight ____ lb.

1 3 5 7 9 11 13 14 15
H 0 0 0 0 0 0 0 ~~0~~ 0
0 0 0 0 0 0
2 4 6 8 10 12

Penetration:

Elev. of Ground/Pile Cap Bottom –

Elev. of Tip (after driving) –

Penetration 35 ft

FKF

Inspector

Date 9-16-93

Hammer: Make and Model VULCAN 01

Stroke: Rated 15000 ~~ft~~ lb Meas. ____

Weight of Ram 5000 lb

Mandrel (if used):

Description H/A

Length ____ ft ____ in. Weight ____ lb.

Remarks:

Time: *Start Driving* ____ AM 12:52 PM

Finish Driving ____ AM 1:02 PM Driving Time 10 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30	29	45		60		75		90		105	
1		16		31	38	46		61		76		91		106	
2		17	64	32	36	47		62		77		92		107	
3		18		33	37	48		63		78		93		108	
4		19		34	38	49		64		79		94		109	
5	DROP HAMMER	20		~~35~~		50		65		80		95		110	
6		21		36		51		66		81		96		111	
7		22		37		52		67		82		97		112	
8		23	95	38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25		40		55		70		85		100		115	
11		26	21	41		56		71		86		101		116	
12		27	25	42		57		72		87		102		117	
13		28	23	43		58		73		86		103		118	
14	26	29	25	44		59		74		89		104		119	
15		30	30	45		60		75		90		105		120	

Sequence 17

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

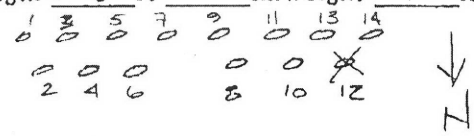
PILE NO. 12 (GRID F.1-B)

Site HAYDIN Js. PAYCLESS Job No. 1422

Pile: Type TREATED TIMBER

Tip Diam. 10.5 in. Butt Diam. 13 in.

Length 40 ft ____ in. Weight ____ lb.



Penetration:

Elev. of Ground/Pile Cap Bottom —

Elev. of Tip (after driving) —

Penetration 35 ft

DKF

Inspector

Date 9-16-93

Hammer: Make and Model VULCAN 01

Stroke: Rated 15000 FT-lb Meas. ____

Weight of Ram 5000 lb

Mandrel (if used):

Description N/A

Length ____ ft ____ in. Weight ____ lb.

Remarks: GRID LINE B REPRESENTS NORTHERN MOST COLUMN LINE NOT MARKED ON PLANS.

Time: *Start Driving* ____ AM 1:08 PM

Finish Driving ____ AM 1:15 PM Driving Time ____ min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30	22	45		60		75		90		105	
1		16		31	26	46		61		76		91		106	
2		17	61	32	18	47		62		77		92		107	
3		18		33	27	48		63		78		93		108	
4		19		34	36	49		64		79		94		109	
5	DROP	20		~~35~~	~~50~~	50		65		80		95		110	
6	HAMMER	21		36		51		66		81		96		111	
7		22	89	37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25		40		55		70		85		100		115	
11		26	17	41		56		71		86		101		116	
12		27	17	42		57		72		87		102		117	
13		28	18	43		58		73		86		103		118	
14	116	29	22	44	66	59		74		89		104		119	
15		30	26	45		60		75		90		105		120	

Sequence 18

GEOTECHNICAL RESOURCES, INC.

Beaverton, Oregon

Pile Driving Record

PILE NO. 15 (GRID H-7)

Site HAYDEN IS. PAYLESS Job No. 1422

Pile: Type TREATED TIMBER

Tip Diam. 9.5 in. Butt Diam. 12.5 in.

Length ~40 ft – in. Weight – lb.

1 3 5 7 9 11 13 14 15

0 0 0 0 0 0 0 0 0

0 0 0 0 0 0

2 4 6 8 10 12

Penetration:

Elev. of Ground/Pile Cap Bottom –

Elev. of Tip (after driving) –

Penetration 35 ft

PKF

Inspector

Date 9-16-93

Hammer: Make and Model VULCAN 01

Stroke: Rated 15000 FT-LB Meas.

Weight of Ram 5000 lb

Mandrel (if used):

Description N/A

Length ft in. Weight lb.

Remarks: PILE LENGTH NOT PRE-MARKED

ONLY LAST 5 FT RECORDED

12-30 FT ⇒ 248 BLOWS

Time: *Start Driving* 1:19 AM PM *Finish Driving* 1:31 AM PM Driving Time 12 min.

Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows	Ft	Blows
0		15		30	31	45		60		75		90		105	
1		16		31	36	46		61		76		91		106	
2		17		32	32	47		62		77		92		107	
3		18		33	32	48		63		78		93		108	
4		19		34	33	49		64		79		94		109	
5	DROP	20		35		50		65		80		95		110	
6	HAMMER	21	248	36		51		66		81		96		111	
7		22		37		52		67		82		97		112	
8		23		38		53		68		83		98		113	
9		24		39		54		69		84		99		114	
10		25		40		55		70		85		100		115	
11		26		41		56		71		86		101		116	
12		27		42		57		72		87		102		117	
13		28		43		58		73		86		103		118	
14		29		44		59		74		89		104		119	
15		30		45		60		75		90		105		120	