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HOFFMAN CONSTRUCTION COMPANY
of Oregon (CCB# 28417)

OHSU RIVER CAMPUS
MEDICAL BUILDING 1,
Portland, OR
HCCO Job No. 231003

MCD 2

Transmittal

City of Portland
APPROVED
MAY 17 2003
03172391-DFS 01 MG
Permit Number

28-Apr-04

To: Daryl Anderson
Company: DeWitt Construction Co.
Address: PMB 201, 13023 NE Hwy 99, Suite 7
Vancouver, WA 98686

Re: OHSU RIVER CAMPUS MEDICAL BUILDING 1, Portland, OR

Transmitted are the following:

Copies	Number	Sect	Description
1	005	SH100	Shoring: Tendon shop drawings
			Shoring: Anchor install procedure
			Shoring: Grout mix & methods
			Shoring: Load zone calc
			Shoring: Qualified personel & equipment

Action Legend
NET = No Exceptions Taken
MCN = Make Corrections Noted
RR = Revise and Resubmit

Delivery Date: 3-May-04

Comments:

cc: Anne Thorne (3 sets) BDS - 5/4/04
File

Signed:
Michael Tryon
Project Engineer

Site Office: Hoffman Construction Company, 3500 SW Bond Ave., Portland, Oregon 97239 503-525-8[illegible]

03172391-DFS 01 MG

OHSU RIVER CAMPUS BUILDING ONE

ARCHITECT

GBD ARCHITECTS
Ron Huld

CONTRACTOR

Attn: Mike Tryon
Hoffman Construction
3500 SW Bond
Portland, OR 97239
(503) 525-8481 phone
(503) 525-8489 fax

PROJECT NO.

20034025T

DATE

4/27/2004

GBD ARCHITECTS
1120 NW Couch Street
Suite 300 Portland
OR 97209
tel (503) 224-9656
Fax (503) 299-6273
www.gbdarchitects.com

SUBMITTAL REPLY

Submittal #: 0005 - 02260

Description: Shoring: Tendon Shop Drawings

Reviewer: KPFF - Nathan Ingraffea

Action: Acceptable as Noted

M.S. TRYON
APR 28 2004

kpff
Consulting Engineers

111 SW FIFTH AVENUE, SUITE 2500
PORTLAND, OR 97204-3628 (503) 227-3251 FAX (503) 227-7980

LETTER OF TRANSMITTAL

Date: 04/27/04 Job No: 203172
Attn: Ron Huld
RE: OHSU RCB1

To: GBD Architects
1120 NW Couch Street
Suite 300
Portland, OR 97209

WE ARE SENDING YOU VIA: ☒ Messenger ☐ U.S. Mail ☐ Overnight Courier ☐ Hand Deliver

☒ Shop Drawings ☐ Prints ☐ Samples ☐ Specifications ☐ Plans

☐ Copy Of Letter ☐ Change Order ☐ Reports

COPIES	DATE	NO.	DESCRIPTION
4	04/27/04		Reviewed Submittal 0005-02260, Shoring: Tendon shop drawings and procedures

THESE ARE TRANSMITTED as checked below:

☐ For your use
☐ For your approval
☐ As requested
☐ For review & comment
☐ For BIDS DUE _____, 19___

☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections

☐ Resubmit _____ copies for approval
☐ Submit _____ copies for distribution
☐ Return _____ corrected prints

PRINTS RETURNED AFTER LOAN TO US

REMARKS

Copy To:

Signed N4I

OHSU RIVER CAMPUS BUILDING ONE

ARCHITECT

GBD ARCHITECTS
Ron Huld

CONTRACTOR

Attn: Mike Ryan
Hoffman Construction
3500 SW Bond
Portland, OR 97239
(503) 525-8481 phone
(503) 525-8489 fax

PROJECT NO.

20034025T

DATE

4/26/2004

GBD
ARCHITECTS

1120 NW Couch Street
Suite 300 Portland
OR 97209
Tel (503) 7249650
Fax (503) 2996273
www.gbdarchitects.com

SUBMITTAL REVIEW

Submittal #: 0005 - 02260

Description: Shoring: Tendon Shop Drawings

Reviewer: KPFF - Nathan Ingraffea

Due Date: 4/30/2004

HOFFMAN CONSTRUCTION COMPANY
of Oregon (CCB#28417)

OHSU RIVER CAMPUS
MEDICAL BUILDING 1,
Portland OR
HCCO Job No 2310003
GBD Job No. 20034025

SUBMITTAL REVIEW AND TRANSMITTAL RECORD

ENTERED 0005

For: OHSU RIVER CAMPUS MEDICAL BUILDING 1, Portland, OR

Submittal Number: SH100 - 005 Original Submittal No: _____

Description: Shoring: Tendon shop drawings

For: [X] Review [ ] Information [ ] Coordination Response Time: 8 Days

Supplier / Subcontractor: DeWitt Construction Co. Submittal Return Due Date: 30-Apr-04

FROM: HCCO / Michael Tryon Date Submitted 22-Apr-04
TO: GBD / Ron Huld Transmittal Comments:
cc:
File
No. of Copies: 5

City of Portland APPROVED MAY 17 2004 Permit Number

Pgs	Item	Action	Contractor Review
	Shoring: Tendon shop drawings Shoring: Anchor install procedure Shoring: Grout mix & methods Shoring: Load zone calc Shoring: Qualified personel & equipment		This submittal has been reviewed for general conformance with the contract documents. Contractor's review does not relieve the Vendor/Subcontractor of responsibility for compliance with all requirements of the contract, including completeness & accuracy of this submittal. ☐ Review Includes HCCO comments

comments & engineer stamp (as required):

PLEASE RETURN (2) COPIES TO CONTRACTOR.

cc:
file

Site Office: Hoffman Construction Company, 3500 SW Bond Ave., Portland, Oregon 97239 503-525-8481

S = Sepia
P = Print
B = Brochure/book

Action Legend
(NET) No Exceptions Taken
(MCN) Make Corrections Noted
(RR) Revise and Resubmit

SUBTERRA
CONSTRUCTION CORP.

5211 NE 88th Street - Vancouver, WA 98665
360-574-5869 - Fax 360-574-5900

OHSU River Campus

Tieback Anchor Submittal

April 20, 2004

1. Tieback System Description, Installation and Grouting Notes (four pages)
2. Tieback Testing Plan (one page)
3. Shoring Wall Sections (one page)
4. Tieback Anchor Schedule (one page)
5. Tieback Anchor Detail (one pages)
6. Tieback Connection Detail (one page)
7. Web Stiffener Detail (one page)
8. Qualifications Submittal (one page)
9. Tieback Test Data Sheets and Calibration Sheets (four pages)
10. Design Calculations (two pages)

City of Portland
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MAY 17 2003
Permit Number

REGISTERED PROFESSIONAL ENGINEER
10,838
OREGON
JULY 29, 1989
DAVID FERWORN
RENEWS DATE: 12/31/05

This structural engineer stamp covers all calculations and items listed in thsi submittal

THIS DOCUMENT HAS BEEN REVIEWED FOR GENERAL COMPATIBILITY WITH DESIGN CONCEPT AND THE FOLLOWING IS NOTED:
- [ ] NO EXCEPTIONS TAKEN
- [ ] REVISE AS NOTED
- [ ] REVISE AND RESUBMIT
- [ ] REJECTED

kpff
By
4/27/04
Date

FT SH100-005
4/22/04
Date

SUBTERRA
CONSTRUCTION CORP.

5211 NE 88th Street - Vancouver, WA 98665
360-574-5869 - Fax 360-574-5900

OHSU River Campus

Tieback System Description:

There are 122 temporary tieback anchors be installed. Refer to the KPFF Shoring Drawings SH101 (ALT.) through SH105 (ALT.) , dated 1/28/04, for the locations of the tieback anchors at each soldier pile wall. The tiebacks are soil anchors that vary from 55 kips to 142 kips design load. Subterra will furnish all labor, materials and equipment necessary for furnishing, installing and testing the tieback anchors. The flange plates and web stiffeners, where the tiebacks attach to the soldier piles, will be installed by others. The tiebacks at the North wall are shown to be installed at an angle of 20 degrees to the horizontal in this submittal, and the tieback design loads have been increased by 3% to compensate. The tiebacks at the West wall will be installed at the angles noted on the KPFF drawings, with each tieback surveyed to verify proper location, as described in a separate submittal. The tieback anchors at the South wall and East wall have been eliminated, and a braced shoring system, designed by KPFF will be substituted. The tieback tendons will be field fabricated, consisting of either grade 150 threadbars furnished by Dywidag Systems or 270 ksi, 0.6" diameter post-tensioning strand.

The soil conditions are described in a report by GeoDesign as 15 to 20 feet of Fill or soft Silt, overlying medium to stiff Silt, overlying very dense fine to coarse Gravel. The depth to gravel varies from approximately 27 feet below the surface at the west side to 45 feet below the surface at the middle and east side of the site. The tiebacks at the North wall, and possibly the top row at the West wall, will anchor into the silt. The bottom row of anchors at the West wall will anchor into the gravel.

The tieback anchors will consist of a 6 inch diameter cased hole, with either a bar or strand tendon centered in the hole, and grouted the full length with neat cement grout. The tiebacks that anchor into silt will have a post-grouted bond length, using post-grout tubes attached to the anchor tendon. The tiebacks that anchor into the gravel will be pressure grouted over the anchor length through the casing. The tieback tendon will have a PVC bond breaker placed over the bar or strand in the unbonded length, to assure that the tendon can stretch freely in the unbonded zone. Every anchor will be tested according to the Tieback Test Procedure.

Materials:

Dywidag Bar:	Grade 150, threaded steel bar conforming to ASTM A722.
Strand:	Seven wire, 0.6" diameter, grade 270, steel conforming to ASTM A416
Grout:	Site mixed neat cement grout with w/c = 0.45 to 0.50
Steel tube:	A500 grade B
Misc. Steel:	A572 (or equivalent 50 ksi grade)
Centralizers:	Fabricated from PVC pipe

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Field Fabrication:

1. The soldier piles will be fabricated with flange plates and web stiffeners, prior to installing the soldier piles, according to the detail 2 on drawing SH105 (ALT), with modifications to the web stiffener placement as shown on the enclosed Web Stiffener Detail.
2. The tieback tendons will be fabricated with the centralizers, bond breaker and any post grouting tubes, as shown on the enclosed Tieback Anchor Detail and Tieback Anchor Schedule.

Tieback Installation Sequence:

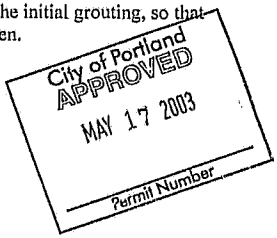
1. The tiebacks will be installed with a track mounted diesel/hydraulic drill, by drilling in threaded sections of 6 inch diameter steel casing to the end of the tieback, using either compressed air, water or both. For the tiebacks at the west wall, the casing will be surveyed after installation to verify its location.
2. The tieback tendon is installed inside the casing and the casing is filled with grout from the bottom upward using a tremie pipe. The placement order of the tendon and grout can be reversed.
3. The casing is then removed. For tiebacks in gravel, additional grout under pressures of 50 psi to 150 psi is pumped into the casing as it is removed from the bond length. After the casing is removed, wash out any grout that is within six inches of the back of the soldier pile.
4. For tiebacks that are in silt, post-grout the anchor the next day.
5. After three days cure for anchors in gravel or five days for anchors in silt, the tieback can be tested and locked-off.

Grouting Plan:

The grout shall consist of clean water and type I/II cement supplied in 94 lb bags. The grout will be mixed in either a colloidal type or paddle type grout mixer, by first placing the mixing water in the hopper, then adding the appropriate number of bags of cement. The grout mix used may vary according to the soil conditions encountered. The typical mix proportions will be in the range of 5.5 to 6 gallons of water per bag of cement. The water to cement ratio is in the range of w/c = 0.45 to 0.5. The batch is mixed for at least two minutes before being discharged.

The grout will be pumped using either a piston type grout pump or a rotor/stator (Moyno) type grout pump. The volume will be measured by the number of bags of cement per batch pumped and recorded by the mixer man. When pressure grouting or post grouting, the grout pressures will be recorded.

Grout used for post grouting will be a more dilute mix than is used for the initial grouting, so that excessive pressure is not built up on the grout pipe before the valves open.



SUBTERRA
ENGINEERING & CONSTRUCTION CORP.
5211 NE 88th Street - Vancouver, WA 98665
360-574-5869 - Fax 360-574-5900

OHSU River Campus

Tieback Testing Plan:

Performance tests shall be conducted on two top row tiebacks, one near each end of the West wall, prior to the installation of any other production tiebacks. All of the other tiebacks will be proof tested. The tests will be run using a 100 ton center hole ram, that is calibrated with a pressure gauge. The load on the ram will be determined by a reading the pressure on the gauge. The elongation of the tieback tendon will be measured with a dial gauge that is supported independently from the shoring wall, and can measure movement to .001". Enclosed are sample Test data Sheets and calibration sheets for the ram and gauge.

Performance Test Procedure:

The tieback will be tested to 150% of design load, using 142 kips as the design load. The test load will be applied in increments of 25% of design load, held for a minimum of 1 minute and the movement recorded to .001" at each increment. After each increasing increment, the load is lowered to the alignment load, the movement recorded, and then increased in 25% increments to the next higher increment. At 150% of design load, the load will be held for 10 minutes and the movement recorded at 1, 2, 3, 4, 5, 6, and 10 minutes. If the movement of the tieback between 1 and 10 minutes is .04" or less, the test is successful. If the movement exceeds .04", the load may be held for another 50 minutes and the movement recorded at 20, 30, 40, 50 and 60 minutes. If the movement between 6 and 60 minutes is .08"or less, the test is successful. A tieback that successfully passes the performance test may be used as a production tieback. Lower the test load back to the alignment load and record the movement. Then lock off the tieback at the specified design load.

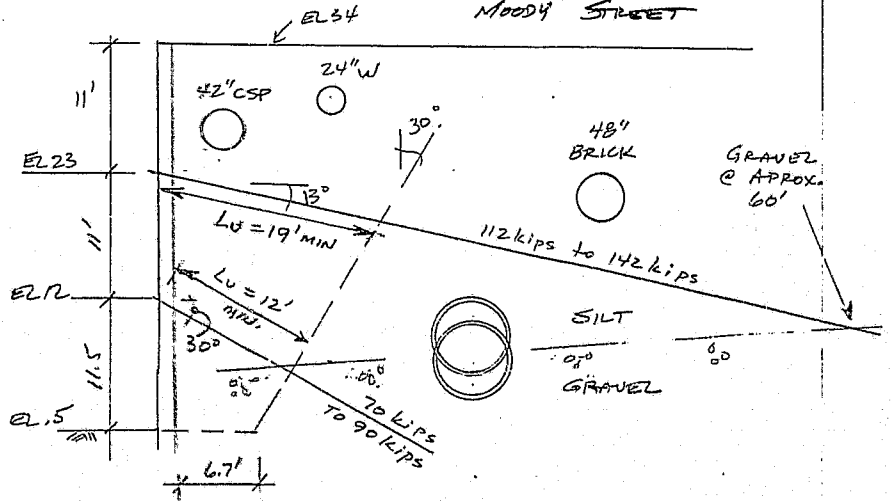
If the tieback does not successfully pass the creep test, reduce the tieback load to one-half of the load that the tieback can hold without excessive creep, and lock off at that load. An additional tieback may need to be added to supplement the difference between the design load and the locked off load. The remaining production anchors should be redesigned, with a longer anchor length, or other means to assure that the production anchors will test to their specified test loads. If the failed tieback is a soil anchor that has been post-grouted, the tieback may be post-grouted again and re-tested

Tieback Proof Test Procedure:

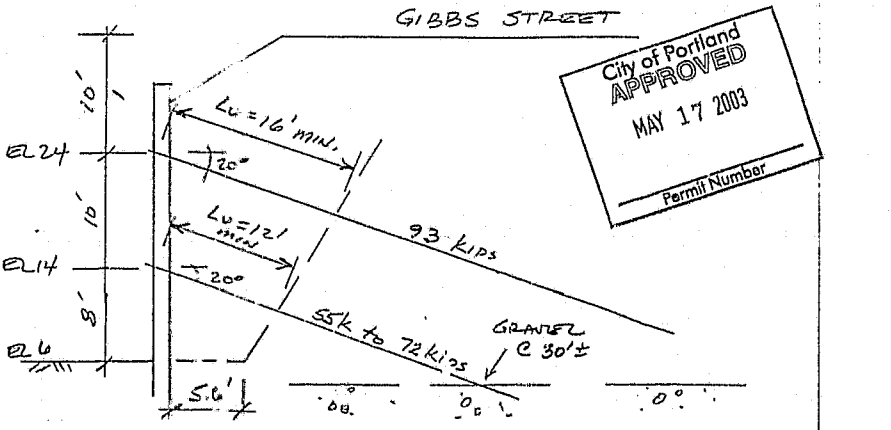
All production tiebacks will be proof tested. The proof test will be run to 133% of the design load. The test load will be applied in 25% increments of DL. At each increment the load will be held for 1 minute and a measurement of the movement recorded to within .001". At 133% DL, the load will be held for 10 minutes and the movement recorded at 1, 2, 3, 4, 5, 6 and 10 minutes. If the movement between 1 and 10 minutes is .04" or less the creep test is successful. If the movement exceeds .04", the load may be held for another 50 minutes and readings taken of the movement at 20, 30, 40, 50 and 60 minutes. If the movement between 6 and 60 minutes is .08" or less, the test is successful. If the creep rate exceeds .08", then the tieback may be post-grouted and retested or the load capacity of the tieback shall be downgraded to a value of one half of the load that the tieback can hold without excessive creep. An additional tieback may need to be installed to provide the full load capacity required.

4-20-04

OHSU River Campus — Wall Sections



West Wall - Looking South



North Wall - Looking West

OHSU RIVER CAMPUS

TIEBACK ANCHOR SCHEDULE

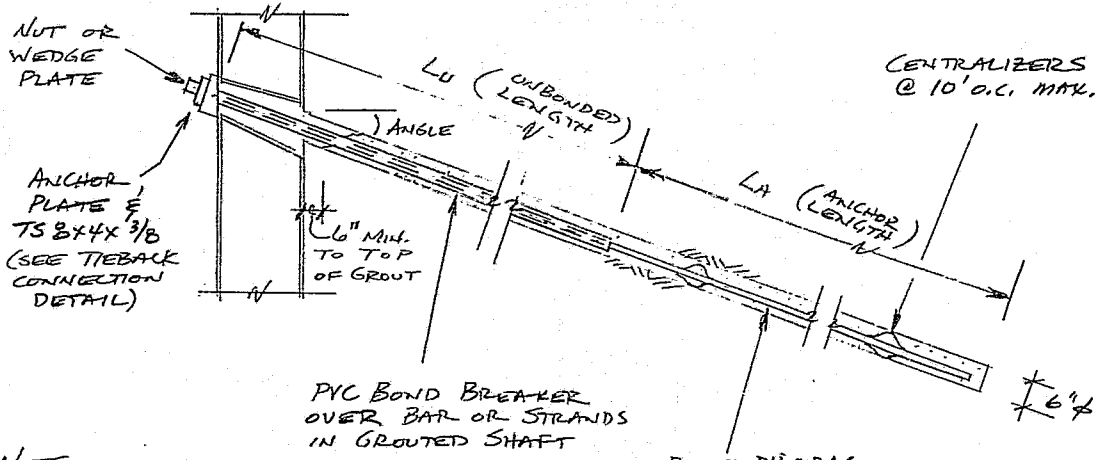
Tieback Number	No. of Tiebacks	Design Load	Angle (degrees)	Unbonded Length	Bonded Length (min)	Grade 150 Bar Size	Number of 0.6" Strands
3 - 4	2	55 kips	20	12'	20'	1"	2
5t - 6t	2	93 kips	20	20'	25'	1-1/4"	3
7t - 24t	18	112 kips	13	20'	30'	1-1/4"	4
25t - 37t	13	142 kips	13	20'	35'	1-3/8"	4
38t to 65t	28	112 kips	13	20'	30'	1-1/4"	4
66t - 98t	deleted						
5b - 6b	2	72 kips	20	12'	20'	1"	3
7b - 24b	18	90 kips	30	12'	15'	1-1/4"	3
25b - 37b	13	70 kips	30	12'	15'	1"	2
38b - 68b	26	90 kips	30	12'	15'	1-1/4"	3
64b - 98b	deleted						3
99-100	deleted						

Note: t = top row tieback, b = bottom row tieback

→ 38-63 included in initial permit.

64-71 & east wall to be added in seperate permit, and are not included in this permit.

OHSU RIVER CAMPUS



NOTE:
SEE TIEBACK SCHEDULE FOR BAR SIZE OR NUMBER OF 0.6"ϕ STRANDS, UNBONDED AND MINIMUM BONDED LENGTHS.

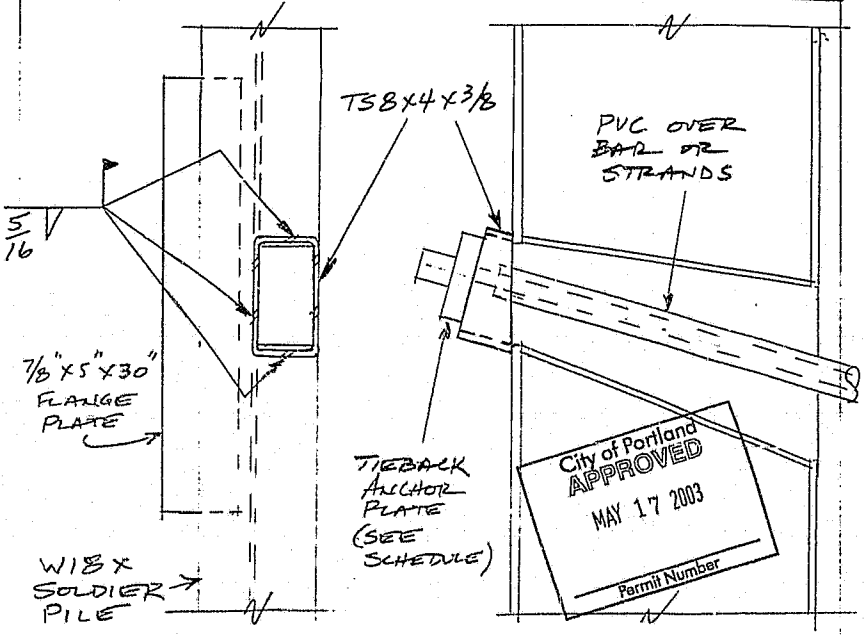
TIEBACK ANCHOR DETAIL

City of Portland
APPROVED
MAY 17 2003
Permit Number

4-20-04

4-20-04

OHSU RIVER CAMPUS — TIEBACK CONNECTION



FRONT VIEW

SIDE VIEW

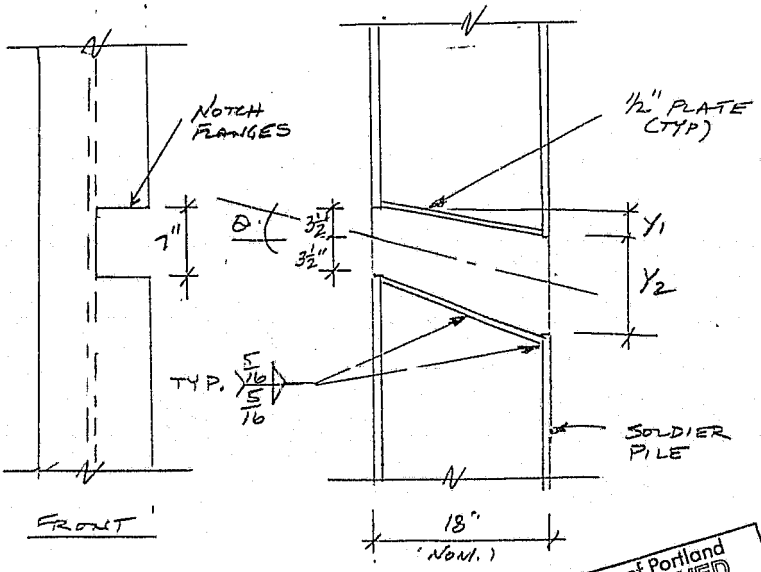
TIEBACK TENDON & ANCHOR PLATE SCHEDULE

DESIGN LOAD	BAR SIZE	PLATE SIZE	No. 0.6" STRANDS	PLATE SIZE
0 TO 72k	1"ϕ	1¼"x5"x6"	3	¾"x6"x6" WITH 3"ϕ HOLE
73k TO 106k	1¼"ϕ	1½"x5"x6"	3	"
107k TO 112k	"	"	4	"
113k TO 142k	1⅜"ϕ	1¾"x5"x6"	"	"

4/9/04

OHSU RIVER CAMPUS –

WEB STIFFENER DETAIL @ TIEBACKS



PILE No.	θ	Y1	Y2
1-6	15°	3"	11"
7-69T	13°	3"	11"
7-69B	30°	8"	12"
70	15°	3"	11"
71T	9°	1"	12"
71B	19°	4"	11"

SUBTERRA
ENGINEERING & CONSTRUCTION CORP.
5211 NE 88th Street - Vancouver, WA 98665
360-574-5869 - Fax 360-574-5900

Qualifications Submittal

Subterra Engineering and Construction Corp was founded in 1994. We specialize in geotechnical construction work that involves drilling, such as for soil and rock anchors, shoring and underpinning, soil nail walls, pin piles, micropiles, and shotcrete work as it applies to retaining walls and slopes.

Supervisory Personnel

Project Manager and Registered Engineer - David Ferworn

Mr. Ferworn has performed bidding, construction management and design work for Subterra since the company was founded. He has had over 20 years experience in design and construction of earth retaining structures, shoring and underpinning, grouted earth anchors, soil nail walls and micro piles. He is a registered civil and structural engineer in Washington, Oregon, California, Idaho, Arizona and Utah. Prior to founding Subterra Corp, he was a construction manager for Schnabel Foundation Company for eleven years, and prior to that he was a structural engineer for KPFF Consulting Engineers for six years.

Superintendent - Albert Bergseng

Mr. Bergseng has had over 25 years experience as a foreman or workman in the field of pile installation, dock building, shoring and anchored retaining walls. He has been either a drill operator, foreman or superintendent on projects for Subterra since 1998. Prior to that he had been a foreman for Brusco Construction and General Construction.

SUBTERRA Construction Corp

TIEBACK PROOF TEST DATA SHEET

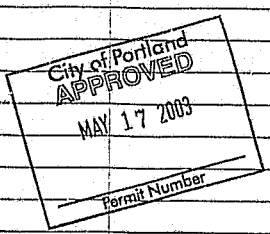
Project: OHSU River Campus

Jack#
Guage#

Tieback No. _____ Date Tested_____ Date Installed_____

Design Load = _____kips Lu = _____ ft. Lt = _____ ft.

Load Basis	Load (kips)	Pressure (psi)	Dial #1	Dial #2	Notes
Alignment Load					
0.25 x Design Load					
0.50 x Design Load					
0.75 x Design Load					
1.0 x Design Load					
1.25 x Design Load					
1.33 x Design Load					
1 minute held	"	"			
2 " "	"	"			
3 " "	"	"			
4 " "	"	"			
5 " "	"	"			
6 " "	"	"			
10 " "					
Alignment Load					



Extended Test: If the creep rate from 1 minute to 10 minutes exceeds .04", then extend the load hold as follows:

	Load	pressure	Dial Movement		
20 minutes held					
30 " "	"	"			
40 " "	"	"			
50 " "	"	"			
60 " "	"	"			

If the creep rate from 6 minutes to 60 minutes is less than .08", the test is successful.

SUBTERRA CONSTRUCTION PERFORMANCE TEST DATA SHEET

Job Name: OHSU River Campus Date Tested:

Design Load: 142 kips Lu = _____ ft. Lt = _____ ft

Load Basis	Load (kips)	Pressure (psi)	Dial Movement	Load Basis	Load (kips)	Pressure (psi)	Dial Movement
Alignment Load				Alignment Load			
0.25 x Design Load				0.25 x Design Load			
Alignment Load				0.5 x Design Load			
0.25 x Design Load				0.75 x Design Load			
0.50 x Design Load				1.0 x Design Load			
Alignment Load				1.25 x Design Load			
0.25 x Design Load				1.5 x Design Load			
0.50 x Design Load				1 minute held			
0.75 x Design Load				2 "			
Alignment Load				3 "			
0.25 x Design Load				4 "			
0.50 x Design Load				5 "			
0.75 x Design Load				6 "			
1.0 x Design Load				10 "			
Alignment Load				Alignment Load			
0.25 x Design Load							
0.50 x Design Load							
0.75 x Design Load							
1.0 x Design Load							
1.25 x Design Load							
1 minute held	"	"					
2 " "	"	"					
3 " "	"	"					
4 " "	"	"					
5 " "	"	"					
6 " "	"	"					
10 " "	"	"					

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Permit Number

Extended Test If the creep rate from 1 to 10 minutes exceeds .04", then extend the load hold as follows:

	Load	pressure	Dial Movement
20 minutes held			
30 " "	"	"	
40 " "	"	"	
50 " "	"	"	
60 " "	"	"	

Notes:

Carlson Testing, Inc.

Main Office
P.O. Box 23814
Tigard, Oregon 97281
Phone (503) 684-3460
FAX (503) 684-0954

Salem Office
4060 Hudson Ave., NE
Salem, OR 97301
Phone (503) 589-1252
FAX (503) 589-1309

Bend Office
P.O. Box 7918
Bend, OR 97708
Phone (541) 330-9155
FAX (541) 330-9163

September 30, 2003
T0302995.CTI

City of Portland
APPROVED
MAY 17 2003
Permit Number

Subterra
5211 N.E. 88th Street
Vancouver, Washington

Gentlemen:

The following is the test data obtained from (1) one hydraulic system submitted to our lab on September 25, 2003. Our metal lab log # M1899B.

100 ton cylinder, marked sub100A, 10,000psi. gauge sub11.

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) average
1000	20340	20400	20000	20246
2000	41220	41200	40500	40973
3000	62600	62380	61720	62333
4000	83560	83200	82620	83133
5000	104900	104180	103600	104226
6000	125680	125320	125400	125467
7000	146860	145640	145500	146000
8000	166760	166500	166260	166507
9000	187760	187200	187980	187646
9500	197600	197420	197400	197473

Tests performed on our Ad-Tek model AD-1M-D, SN96142, compression machine.

Our reports pertain to the material tested / inspected only. Information contained herein is not to be reproduced, except in full, without prior authorization from this office.

If there are any questions regarding this matter, please do not hesitate to contact this office.

Respectfully submitted,

CARLSON TESTING, INC.

Jim Hietpas
Quality Assurance Manager

mc

Carlson Testing, Inc.

Main Office
P.O. Box 23814
Tigard, Oregon 97281
Phone (503) 684-3460
FAX (503) 684-0954

Salem Office
4060 Hudson Ave., NE
Salem, OR 97301
Phone (503) 589-1252
FAX (503) 589-1309

Bend Office
P.O. Box 7918
Bend, OR 97708
Phone (541) 330-9155
FAX (541) 330-9163

September 30, 2003
T0302995.CTI

Subterra
5211 N.E. 88th Street
Vancouver, Washington

Gentlemen:

The following is the test data obtained from (1) one hydraulic system submitted to our lab on September 25, 2003. Our metal lab log # M1899C.

100 ton cylinder, marked sub100A. 10,000psi. gauge sub12.

Gauge reading (psi.)	Actual load (lb.) 1st run	Actual load (lb.) 2nd run	Actual load (lb.) 3rd run	Actual load (lb.) average
1000	18720	18740	18100	18250
2000	38960	38960	38720	38880
3000	60100	59920	59600	59873
4000	81260	80800	80780	80947
5000	101800	101860	102100	101920
6000	122620	123000	123000	122873
7000	143880	143900	144000	143927
8000	163740	163980	164960	164226
9000	184720	185100	184800	184873
9500	195420	194620	195380	195140

Tests performed on our Ad-Tek model AD-1M-D, SN96142, compression machine.

Our reports pertain to the material tested / inspected only. Information contained herein is not to be reproduced, except in full, without prior authorization from this office.

If there are any questions regarding this matter, please do not hesitate to contact this office.

Respectfully submitted,

CARLSON TESTING, INC.

Jim Hietpas
Quality Assurance Manager

mc

OHSU River Campus

Tieback Bearing Plate:

MAX Load = 142k → 1 3/8" ϕ DSI Bar

Span = 4" − (2) 3/8" = 3.25"

$M = 142(3.25)\frac{1}{4} = 115k"$

$t = \sqrt{\frac{(115)(6)}{(37.5ksi)(6")}} = 1.75" \rightarrow$ PL 1 3/4" x 5" x 6" for Bar

For Strand → (4) .6" ϕ Strand

Casing = 4.5" ϕ Diameter in 3" ϕ Hole

Span = (3.25" − 3")$\frac{1}{2}$ = .125" to edge of Hole

$M = 142k(.125")\frac{1}{2} = 8.9k"$

$t = \sqrt{\frac{9k"(6)}{(37.5)(6)}} = .5" \rightarrow$ use Nominal 3/4"

PL 3/4" x 6" x 6" w/ 3" ϕ Hole

For Tieback Load = 112k → 1 1/4" ϕ DSI Bar or (4) Strand

$M = 112(3.25")\frac{1}{4} = 91k"$

$t = \sqrt{91(6)/(37.5)(6")} = 1.5" \rightarrow$ PL 1 1/2" x 5" x 6" for Bar

For Tieback Load = 72k or less

use 1" ϕ DSI Bar or 2 Strand

$M = 72(3.25)\frac{1}{4} = 58k"$

$t = \sqrt{58(6)/(37.5)(6)} = 1.25" \rightarrow$ PL 1 1/4" x 5" x 6"

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Tube Connection to Pile:

Use TS 8 x 4 x 3/8"

$f_B = \frac{142k}{(3/8")(16")} = 23.7 ksi$ ✓

Weld to Pile:

$(142k)(\sin 15°) = 37k$ (vertical)

or $(90k)/(\sin 30°) = 45k$ ← controls

$w = 5/16" (70ksi)(.3)(.707) = 4.6k/"$

$\ell = 45k/4.6 - 9.8 \rightarrow 10"$

→ Weld long side, top & bottom

Tieback unbonded lengths:

Refer to sections

For West Wall, Top Row, use $L_u = 20'$

" " Bottom Row, use $L_u = 12'$

For North Wall, Top Row, use $L_u = 20'$

" " Bottom, use $L_u = 12'$

Use a PVC bond breaker over the bare strand or bar in the unbonded length. Stop grout or clean out grout at least 6" behind the soldier pile.