ARCHER ENGINEERING L.L.C.

GT_002532

Structural Plan Check Response

To:	Mike Olsen *City of Portland*
From:	Michael Archer P.E. *Archer Engineering*
Regarding:	Application # 04-001465-REV-01-RS Foundation Anchor Lipset / More Residence 3127 NE Tillamook St, Portland, OR
Date:	August 5, 2005

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Background Discussion:

As part of an addition/remodel project at the above SFR the existing original oil tank was decommissioned and removed. The excavation was filled with recycled concrete. An addition to the house was constructed with the southeast corner of the foundation placed over the oil tank excavation (see enclosed plan). It was learned after the addition was framed that the compaction of the recycled concrete was sub-standard (81% actual; 90% required).

Archer Engineering proposed using a helical pier foundation anchor to support the addition where it was bearing on the under-compacted fill. The original load to the anchor was conservatively calculated as 13 kips. The value was calculated not knowing the exact location of the tank and using worst case loading values.

The anchor was installed by *LBZ Earth Anchors* on July 7, 2005 and observed by inspectors from Carlson Testing. The actual tip elevation was at 30'. The capacity of the anchor as determined by an installation torque to ultimate axial load ratio (1:10). The final measured torque was 2319 ft. lbs which correlates to 23,190 lbs of axial load capacity.

During the installation of the anchor the installer did not think the anchor was penetrating through the concrete fill as expected. This led to an excavation of the top soil over the area to determine the exact location of the original tank and the new concrete fill. The concrete fill was just inside the east perimeter of the addition's foundation. The anchor penetrated the native soil underlying the east edge of the new foundation.

With the exact location of the tank known, a new calculation determined that the maximum applied load to the anchor is 6.6 kips. (see enclosed calculation)

Archer Engineering proposes that the load test requirement for less than a 4:1 safety factor be waived and the anchor installation be approved since there is a 3.5 :1 safety factor and a true load test would be impractical.

Please call with if you need to discuss this matter further.

2345 NE 37th Ave., Portland, OR 97212
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ARCHER ENGINEERING L.L.C.

Item #	Issue	Response
1.	Anchor part #	Lead Section # C150-0007; Extension # C150-0008. Anchor manufacturer: *Chance*. See enclosed anchor drawings.
2.	Anchor installation specifications	Enclosed.
3.	Minimum tip elevation	Minimum elevation was 15'; actual tip elevation was 30'.
4.	Load calculations	Enclosed. Factor of Safety = 3.5
5.	Testing procedure	Enclosed. Testing the anchor should not be required.
6.	Discussion of differential settlement	The settlement of the anchor and the surrounding native soil that supports the foundation should both be negligible.
7.	Special Inspection	Inspection Report from Carlson Testing enclosed.

Thank you,

REGISTERED PROFESSIONAL ENGINEER
63134PE
OREGON
MAR. 14, 2000
MICHAEL D. ARCHER

Exp. 12/31/05

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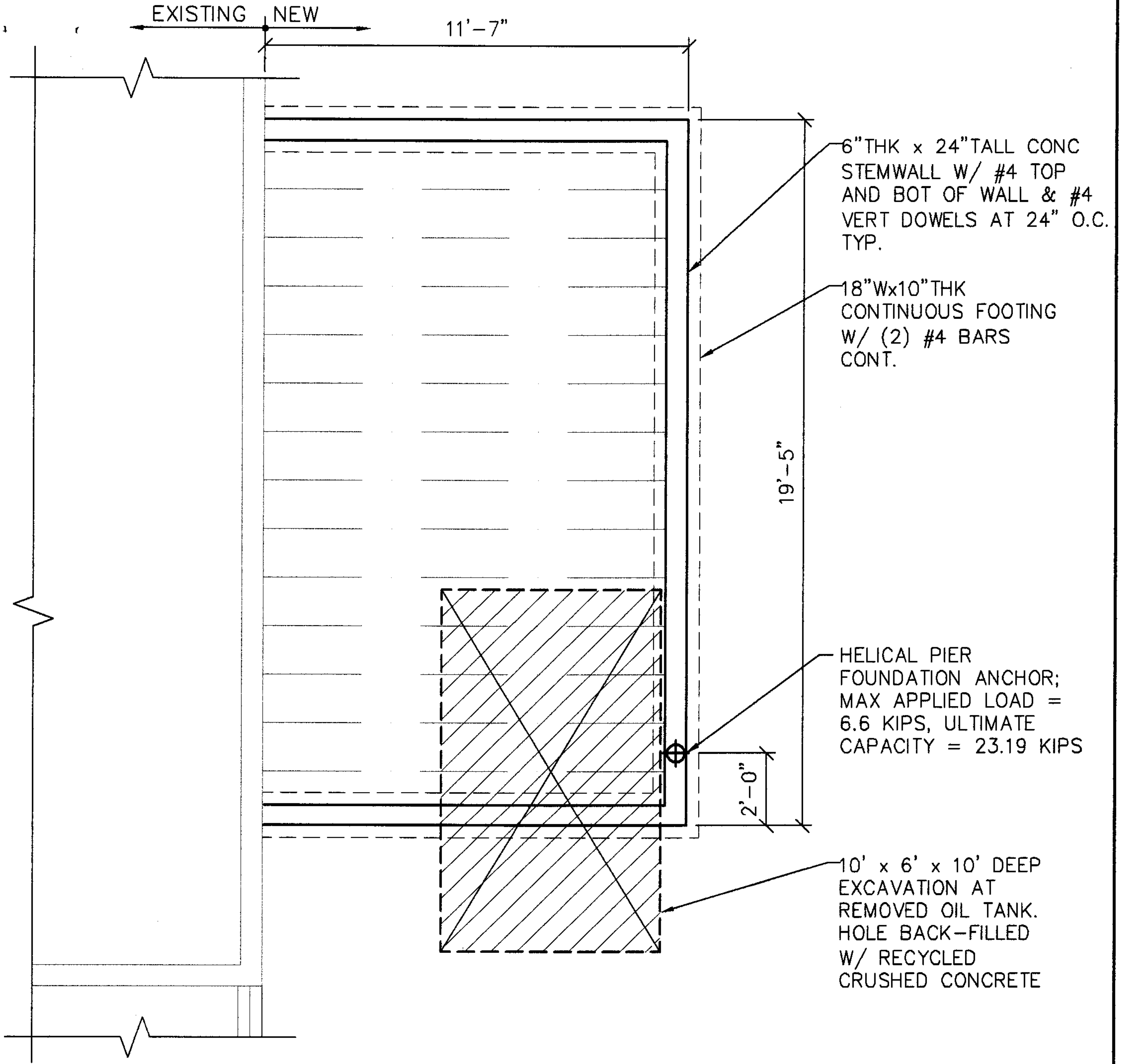


FOUNDATION ANCHOR CONTRACTOR TO SUPPLY DETAIL OF ANCHOR TO FOUNDATION CONNECTION AND VERIFICATION OF ANCHOR CAPACITY

1/S1 PARTIAL FOUNDATION PLAN

1/4" = 1'-0"

NORTH

FOUNDATION SUPPORT

LIPSET / MORE RESIDENCE
3127 NE TILLAMOOK ST., PORTLAND, OR

ARCHER ENGINEERING L.L.C.
2345 NE 37th Ave., Portland, OR 97212 P 503.281.6441 F 503.281.6445 C 503.730.3357 E archereng@mindspring.com

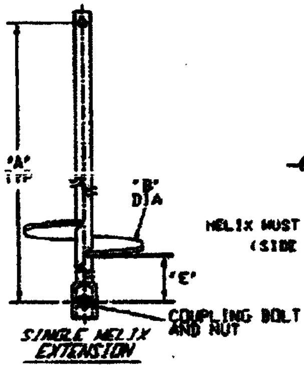
RAY LIPSET/STEPHANIE MORE
3127 NE TILLAMOOK
PORTLAND, OR 97212

BY: MDA

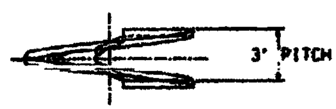
DATE:	08/04/05
PROJECT:	AE402
DETAIL	1/S1

SS5 HELICAL PIERS AND ANCHORS

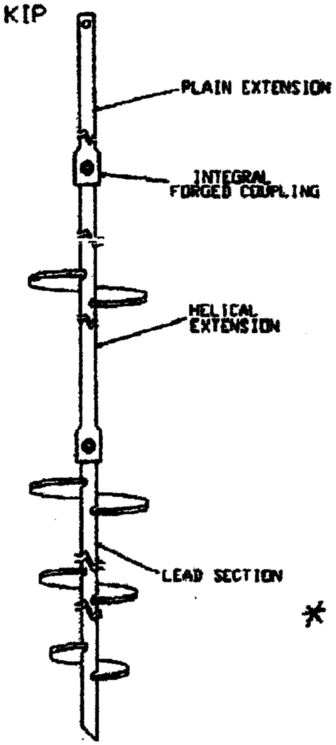
TORQUE STRENGTH RATING-5,500 FT-LB
ULTIMATE CAPACITY* (TENSION/COMPRESSION)-55 KIP
*BASED ON A TORQUE FACTOR (Kt)=10
SINGLE HELIX ULTIMATE STRENGTH-40 KIP
ULTIMATE TENSION STRENGTH (COUPLING BOLT)-70 KIP



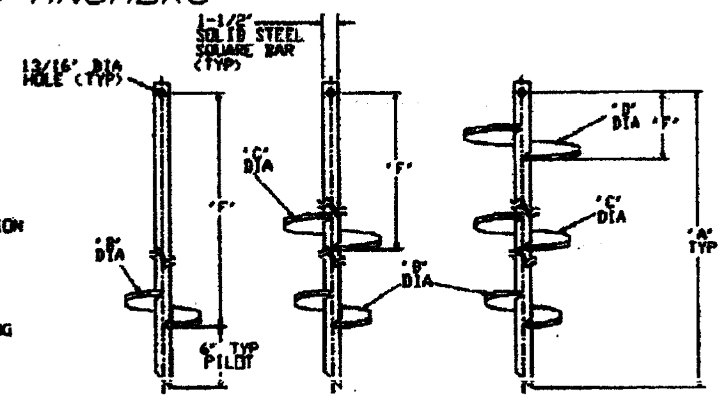
SINGLE HELIX EXTENSION



HELIX MUST BE FORMED BY MATCHING METAL DIE (SIDE VIEW OF TRUE HELICAL FORM)



TYPICAL ANCHOR/PIER ASSEMBLY



SINGLE HELIX LEAD SECTION — TWIN HELIX LEAD SECTION — TRIPLE HELIX LEAD SECTION

EXTENSION

CAT. NO.	'A'	'B'	'E'	ICC-ES' LISTED
C150-0159	57-1/2"	12"	27-1/2"	X
C150-0166	37-3/4"	14"	27-3/4"	X
C150-0167	57-1/2"	14"	27-1/2"	X
C150-0158	58"	10"	8"	
T150-0440	59"	14"	4"	

' ICC-ES LISTINGS FORMERLY ICBO AND SBCCI.

LEAD SECTION

CAT. NO.	'A'	'B'	'C'	'D'	'F'	ICC-ES' LISTED
C150-0001	82-1/4"	8"			76-1/4"	X
C150-0002	59"	8"			53"	X
C150-0003	82-1/4"	10"			76-1/4"	X
C150-0004	82-1/4"	12"			76-1/4"	X
C150-0005	82-1/4"	14"			76-1/4"	X
C150-0030	82-1/4"	6"	8"		58-1/4"	X
C150-0006	82-1/4"	8"	10"		52-1/4"	X
C150-0031	123"	8"	10"		93"	X
* C150-0007	63-1/4"	8"	10"	12"	5-3/4"	X
C150-0058	59"	10"			53"	X
T150-0086	35-3/4"	6"	6"		11-3/4"	X
C150-0051	82-1/4"	10"	12"		46-1/4"	X
C150-0160	35-3/4"	8"	10"		5-3/4"	X
C150-0161	42"	10"	12"		6"	X
C150-0242	59"	12"			53"	X
C150-0243	59"	14"			53"	X
C150-0244	35-3/4"	6"	8"		11-3/4"	X
C150-0397	82-1/4"	8"	10"	12"	22-1/4"	
C150-0398	123"	10"	12"	14"	51"	
C150-0399	123"	12"	14"	16"	39"	
C150-0489	82-1/4"	10"	12"	14"	10-1/4"	
T150-0000	82-1/4"	8"	10"	12"	6-1/2"	
C150-0156	25"	8"			21-1/2"	

' ICC-ES LISTINGS FORMERLY ICBO, SBCCI, AND BOCA.
* HELIX ARE SPACED 3' APART

-NOTES-

1. HOT DIP GALVANIZED PER ASTM A153-(LATEST REV.)
2. LEAD AND EXTENSION SECTION AND PILOT POINT LENGTHS ARE NOMINAL. PILOT FOR T150-0000 AND C150-0156 IS 3.75" AND 2.5" RESPECTIVELY.
3. SHAFT MATERIAL-HOT ROLLED ROUND-CORNERED SQUARE (RCS) SOLID STEEL BARS PER ASTM A29; MINIMUM YIELD STRENGTH=70 KSI.
4. HELIX MATERIAL-HOT ROLLED LOW CARBON STEEL SHEET, STRIP, OR PLATE PER ASTM A572, OR A1018, OR A656; MINIMUM YIELD STRENGTH=50 KSI; 3/8" THICK.
5. COUPLING BOLTS: 3/4" DIAMETER X 3" LONG HEX HEAD PER ASTM A320 GRADE L7.
6. NOMINAL SPACING BETWEEN HELICAL PLATES IS THREE TIMES THE DIAMETER OF THE LOWER HELIX.
7. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
8. ALL WELDING TO BE DONE BY WELDERS CERTIFIED UNDER SECTION 5 OF THE AWS CODE D1.1.
9. SEE ICC EVALUATION SERVICE INC., EVALUATION REPORT NO. ER-5110 FOR ALLOWABLE VALUES AND/OR CONDITIONS OF USE CONCERNING MATERIAL PRESENTED IN THIS DOCUMENT.

ICC-ES LISTED ER-9504

ICC-ES LISTED ER-5110

ICC-ES

CHANCE

HUBBELL POWER SYSTEMS

SS5 LEADS AND HELICAL EXTENSIONS

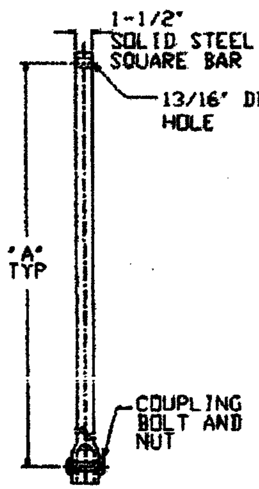
#1

SS5 EXTENSIONS

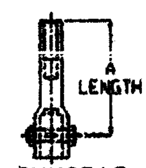
TORQUE STRENGTH RATING - 5,500 FT-LB
ULTIMATE CAPACITY* (TENSION/COMPRESSION)-55 KIP
* BASED ON A TORQUE FACTOR (Kt)=10
ULTIMATE TENSION STRENGTH (COUPLING BOLT)-70 KIP

EXTENSION		
CAT. NO.	"A"	ICC-ES† LISTED
C150-0047	37-3/4"	X
C150-0008	57-1/2"	X
~~C150-0009~~	~~80-1/2"~~	~~X~~
C150-0048	120"	X
C150-0032	20"	
C114-0009	11"	

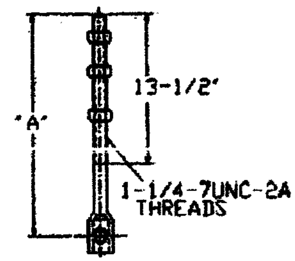
†ICC-ES LISTINGS FORMERLY ICBO, SBCCI, AND BOCA.



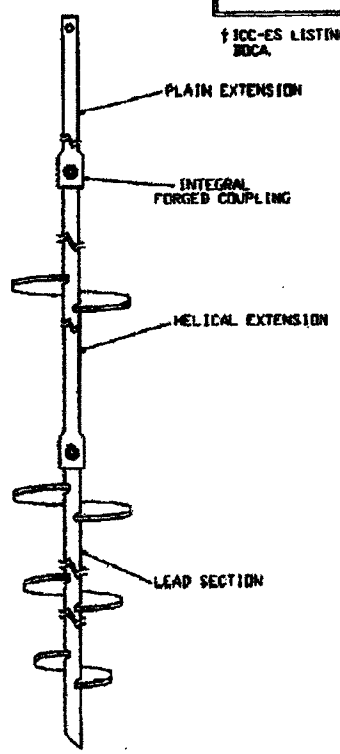
PLAIN EXTENSION



1" DYWIDAG ADAPTER C114-0009 FOR 1-1/2" SHAFT



THREADED ADAPTER C150-0032 FOR 1-1/2" SHAFT



TYPICAL ANCHOR/PIER ASSEMBLY

-NOTES-

1. HOT DIP GALVANIZED PER ASTM A153-(LATEST REV.)
2. LEAD AND EXTENSION SECTION AND PILOT POINT LENGTHS ARE NOMINAL.
3. SHAFT MATERIAL-HOT ROLLED ROUND-CORNERED-SQUARE (RCS) SOLID STEEL BARS PER ASTM A29; MINIMUM YIELD STRENGTH=70 KSI.
4. COUPLING BOLTS: 3/4" DIAMETER X 3" LONG HEX HEAD PER ASTM A320 GRADE L7.
5. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
6. ALL WELDING TO BE DONE BY WELDERS CERTIFIED UNDER SECTION 5 OF THE AWS CODE D1.1.
7. SEE ICC EVALUATION SERVICE INC., EVALUATION REPORT NO. ER-5110 FOR ALLOWABLE VALUES AND/OR CONDITIONS OF USE CONCERNING MATERIAL PRESENTED IN THIS DOCUMENT.
8. REFER TO SA150-0001 DRAWING FOR LEAD SECTIONS AND HELICAL EXTENSIONS.

ICC-ES LISTED	ICC-ES LISTED	ICC-ES LISTED
RR 94-27	ER-5110	ER-9504

CHANCE — HUBBELL POWER SYSTEMS

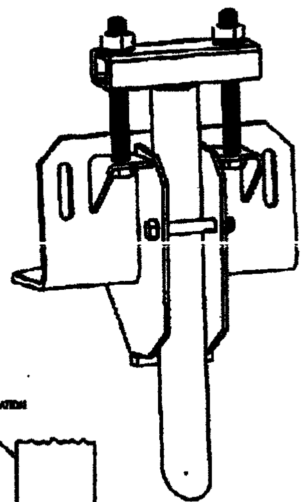
TITLE: SS5 EXTENSIONS

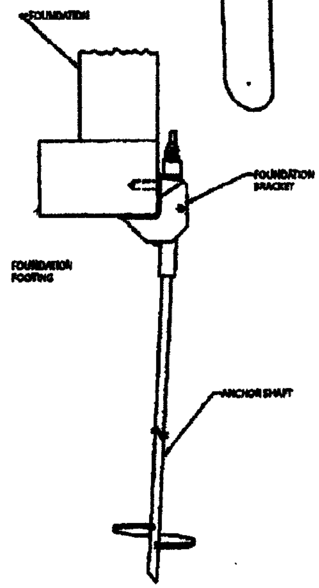
SIZE: SC | DWG NO.: SA150-0047 | CAT / PART / ASSY NO.: SEE CHART | REV: --

DRN BY KSH | DATE 4/25/05 | SHEET 2/2

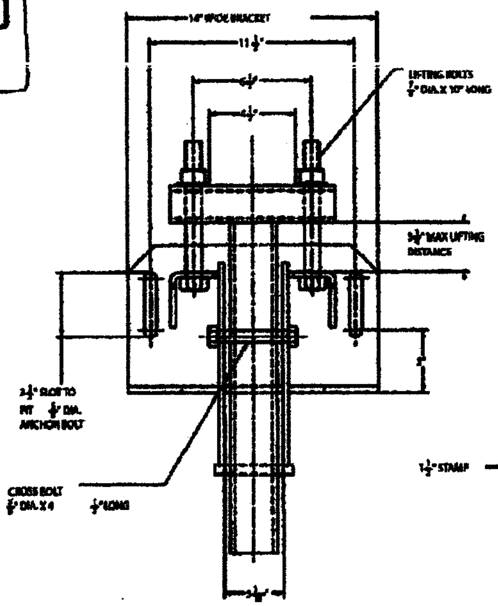
#1

MINIMUM MECHANICAL ULTIMATE STRENGTH OF 40,000 LB.

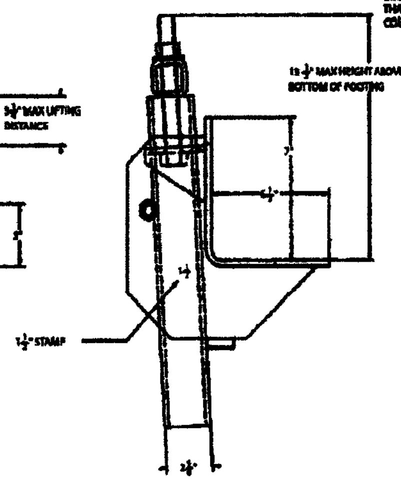




TYPICAL INSTALLATION
FOUNDATION REPAIR BRACKET



REAR VIEW



SIDE VIEW

CC150-0121 ACCEPTS
SS5 & SS150 1 1/2" SHAFTS

[illegible]				
ANCHOR TYPE	BRACKET	MINIMUM ULTIMATE STRENGTH	WORKING LOAD 2:1 SAFETY FACTOR	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

-NOTES-

1. HOT DIP GALVANIZE PER ASTM A123-LATEST REVISION.
2. ASSEMBLE COMPLETE AS SHOWN IN SIDE VIEW.
3. COVERED BY ONE OR MORE OF THE FOLLOWING UNITED STATES PATENTS:
   5,011,336
   5,120,163
   5,213,448
4. DO NOT EXCEED 165 FT-LBS OF TORQUE ON 7/8" DIA LIFTING BOLTS DURING STABILIZING OR LOAD LOCK-OFF.
5. RECOMMENDED ANCHOR SHAFT CUTOFF LEVEL ABOVE THE BOTTOM OF THE FOOTING IS 10" TO 11" FOR MAXIMUM LIFT DISTANCE.
6. FOR DETAILED INSTALLATION INSTRUCTIONS, READ CHANCE BULLETIN 01-9812.
7. MATERIAL SPECIFICATIONS:
   BRACKET BODY : PER ASTM A36 AND ASTM A570 GR. 50.
   T-PIPE TUBE : HOT ROLLED MECHANICAL TUBING PER ASTM A500.
   LIFTING BOLTS: HEX HEAD BOLT PER SAE J429 GRADE 5.
   CROSS BOLT : HEX HEAD BOLT PER SAE J429 GRADE 5.
8. THE C150-0121 BRACKET HAS A MINIMUM ULTIMATE STRENGTH OF 40,000 LBS. A FACTOR OF SAFETY OF 2 YIELDS A SAFE WORKING LOAD OF 20,000 LBS FOR THE BRACKET ONLY.
9. THE CAPACITY OF THE UNDERPINNING SYSTEM IS A FUNCTION OF [illegible] INDIVIDUAL ELEMENTS, INCLUDING THE CAPACITY OF THE FOUNDATION, BRACKET, PIER SHAFT HELICAL PLATE, AND BEARING STRATA, AS WELL AS THE STRENGTH OF THE FOUNDATION TO BRACKET CONNECTION AND THE QUALITY OF PIER INSTALLATION. COLUMN THREE OF THE TABLE SHOWS TYPICAL UNDERPINNING SYSTEM CAPACITIES THAT ARE ACHIEVABLE UNDER NORMAL CONDITIONS. YOUR ACHIEVABLE CAPACITIES COULD BE HIGHER OR LOWER DEPENDING ON THE ABOVE FACTORS.

ICBO LISTED
ER-5110

SBCCI LISTED
ER-9504B

CHANCE
TOLERANCE CHART

HUBBELL POWER SYSTEMS

TITLE: BRACKET, STANDARD UNDERPINNING BRACKET

SIZE	DWG NO.	CAT / PART / ASSY NO.	REV
SB	SA150-0121	C150-0121	K

DO NOT SCALE THIS DRAWING | DRN BY KSH | DATE 4/22/04 | SHEET 1 OF 1

Updated 4/13/2005

#2

3.03 INSTALLATION

A. General:

1. The HSF installation technique shall be consistent with the geotechnical, logistical, environmental and load carrying conditions of the project.

2. Installation equipment shall be rotary type, hydraulic power driven torque motor with clockwise and counterclockwise rotation capabilities.

   a. Utilize a torque motor capable of continuous adjustment to number of revolutions per minute (RPM) during installation and with a torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed. Do not use percussion drilling equipment.

   b. Utilize equipment capable of applying adequate downward pressure and torque simultaneously to suit project soil conditions and load requirements, and capable of continuous position adjustment to maintain proper HSF alignment.

3. Installation tooling shall consist of a Kelly Bar Adapter (KBA) and Type SS or HS drive tool as manufactured by AB Chance Company.

4. A calibrated torque indicator shall be used during HSF installation. The torque indicator may be an integral part of the installation equipment or externally mounted in-line with the installation tooling.

B. Central Steel Shaft Installation Procedure:

1. Engage and advance HSF into soil in a smooth, continuous manner at a rate of rotation of 5 - 20 RPM. Provide extension sections to obtain the required minimum overall length and installation torque as shown on the working drawings. Connect sections together using coupling bolt and nut tightened to torque of 40 ft-lb (54 N x m).

2. Apply sufficient down pressure to uniformly advance the HSF sections approximately 3 inches (76 mm) per revolution. Adjust rate of rotation and magnitude of down pressure for different soil conditions and depths.

C. Termination Criteria:

1. Satisfy the minimum installation torque and minimum overall length criteria as shown on the working drawings prior to terminating the HSF.

2. The torque as measured during the installation shall not exceed the torsional strength rating of the central steel shaft.

3. If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to achieving the minimum overall length required, the installer shall have the following options:

   a. Terminate the installation at the depth obtained subject to the review and acceptance of the Owner, or:

   b. Remove the existing HSF and install a new one with fewer and/or smaller diameter helix plates. The new helix configuration shall be subject to review and

#2

acceptance of the Owner. If reinstalling in the same location, the topmost helix of the new HSF shall be terminated at least 3 feet (1 m) beyond the terminating depth of the original HSF.

4. If the minimum installation torque as shown on the working drawings is not achieved at the minimum overall length, and there is no maximum length constraint, the Contractor shall have the following options:

   a. Install the HSF deeper using additional extension sections.

   b. Remove the existing HSF and install a new one with additional and/or larger diameter helix plates. The new helix configuration shall be subject to review and acceptance of the Owner. If reinstalling in the same location, the topmost helix of the new HSF shall be terminated at least 3 feet (1 m) beyond the terminating depth of the original HSF.

   c. De-rate the load capacity of the HSF and install additional pile(s). The de-rated capacity and additional pile location shall be subject to the review and acceptance by the Owner.

5. If the HSF is refused or deflected by a subsurface obstruction, terminate the installation and remove the pile. Remove the obstruction, if feasible, and reinstall the HSF. If it is not feasible to remove the obstruction, install the HSF at an adjacent location, subject to review and acceptance by the Owner.

6. If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to proper positioning of the last plain extension section relative to the final elevation, the Contractor may remove the last plain extension and replace it with a shorter length extension, If it is not feasible to remove the last plain extension, the Contractor may cut the extension shaft to the correct elevation. Do not reverse (back-out) the helical screw foundation to facilitate extension removal.

7. The average torque for the last 3 feet (1 m) of penetration shall be used as the basis of comparison with the minimum installation torque as shown on the working drawings. The average torque shall be defined as the average of the last 3 readings recorded at 1 foot (0.3 m) intervals.

D. Site Tolerances: Install HSF to the Bridge Fabricator's specifications.

3.04 FIELD QUALITY CONTROL

A. Installation Records: Provide the Project Manager copies of HSF installation records within 24 hours after each installation is completed. Include, at a minimum, the following information.

   1. Name of project and Contractor.

   2. Name of Contractor's supervisor during installation.

   3. Date and time of installation.

   4. Name and model of installation equipment.

   5. Type of torque indicator used.

#2

6. Location of HSF by assigned identification number.

7. Actual HSF type and configuration - including lead section (number and size of helix plates), number and type of extension sections (manufacturer's SKU numbers).

8. HSF installation duration and observations.

9. Total length of installed HSF.

10. Cutoff elevation.

11. Inclination of HSF.

12. Installation torque at 1-foot (0.3 m) intervals for the final 10 feet (3.1 m),

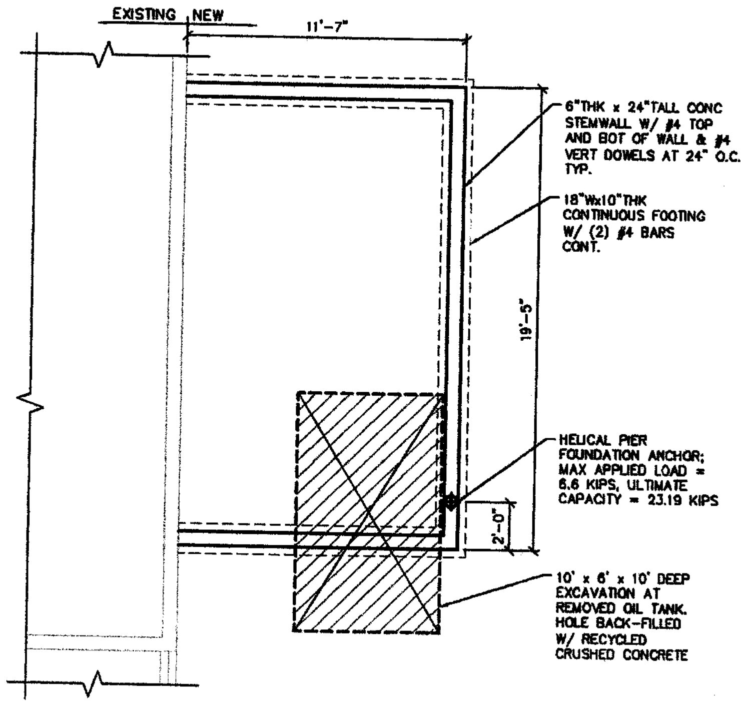
13. Comments pertaining to interruptions, obstructions or other relevant information.

14. Rated load capacities.

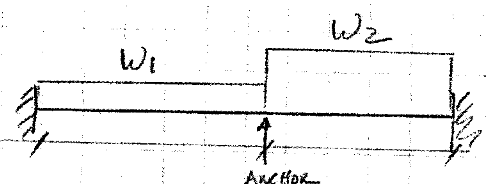
3.05 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION



LOAD @ ANCHOR:



W1 = 16'·10 PSF = 160 PLF WALL D.L.
(WALL + FDN) 1.5·150/2 = 113 PLF STEM WALL DL
1.25·150 = 200 PLF FTG D.L.
473 PLF DL
100 PLF INCIDENTAL L.L.

ANCHOR
4.1 (DL 2.2 + LL 1.9)
2.5 (2.1 + .4)
6.6 K

W2 = W1 + (2) 6'·40 PSF = 480 LL
((2) FLOOR ; ROOF + W1) (3) 6'·15 PSF = 270 DL
6'·25 PSF = 150 SL
} FLOOR + ROOF 630 LL / 740 DL

LOAD @ ANCHOR 6.6 K (4.3 DEAD + 2.3 LIVE)

Title : Lipset/ More addition
Dsgnr: mda
Description :
Date:
Job # AE402

#4 2/2

Scope :

Rev: 510001

Multi-Span Concrete Beam

Description

General Information

Fy	60,000.0 psi	Spans Considered Continuous Over Supports		ACI Dead Load Factor	1.40
f'c	2,500.0 psi	Stirrup Fy	60,000.0 psi	ACI Live Load Factor	1.70

Concrete Member Information

Description		SOUTH	NORTH
Span	ft	7.00	6.00
Beam Width	in	6.00	6.00
Beam Depth	in	24.00	24.00
End Fixity		Fix-Fix	Fix-Fix
Reinf: Center	Area	0.20in2	0.20in2
	Bar Depth	20.00in	20.00in
Left	Area	0.20in2	0.20in2
	Bar Depth	3.00in	3.00in
Right	Area	0.20in2	0.20in2
	Bar Depth	3.00in	3.00in

Loads

Using Live Load This Span ??		Yes	Yes
Dead Load	k/ft	0.600	0.740
Live Load	k/ft	0.100	0.630

Results

		Beam OK	Beam OK
Mmax @ Cntr	k-ft	2.06	3.16
@ X =	ft	3.50	3.00
Mn * Phi	k-ft	17.56	17.56
Max @ Left End	k-ft	-4.12	-6.32
Mn * Phi	k-ft	18.46	18.46
Max @ Right End	k-ft	-4.12	-6.32
Mn * Phi	k-ft	18.46	18.46
		Bending OK	Bending OK
Shear @ Left	k	3.53	6.32
Shear @ Right	k	3.53	6.32

Reactions & Deflections

DL @ Left	k	2.10	2.22	
LL @ Left	k	0.35	1.89	
Total @ Left	k	2.45	4.11	
DL @ Right	k	2.10	2.22	
LL @ Right	k	0.35	1.89	
Total @ Right	k	2.45	4.11	= 6.6 KIPS
Max. Deflection	in	-0.000	-0.000	
@ X =	ft	3.50	3.00	
Inertia : Effective	in4	6,912.00	6,912.00	

Shear Stirrups

Stirrup Rebar Area	in2	0.220	0.220
Spacing @ Left	in	Not Req'd	Not Req'd
Spacing @ .2*L	in	Not Req'd	Not Req'd
Spacing @ .4*L	in	Not Req'd	Not Req'd
Spacing @ .6*L	in	Not Req'd	Not Req'd
Spacing @ .8*L	in	Not Req'd	Not Req'd
Spacing @ Right	in	Not Req'd	Not Req'd

#5

Anchor Proof Testing Procedure

All of the anchors and should be proof tested. The proof testing shall consist of loading the each anchor in 5 equal increments to 100% of the design load. The 100% load should be held for 10 minutes. If the anchor movement between 1 and 10 minutes is less than 0.1 inches the anchor is acceptable. If the anchor moves more than 0.1 inches the anchor should deepened and retested or abandoned and a new, redesigned, replacement anchor installed.

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

July 21, 2005
T0406730.CTI
Permit No. 04-001465-RS

#7

FIELD INSPECTION REPORT

DATES COVERED: July 6, 2005

PROJECT: Stephanie More / Ray Lipsit
ADDRESS: 3127 NE Tillamook Street – Portland, OR
INSPECTOR: M. Powlison – COP#706, WABO#POW966957, OBOA#404, ICBO#1089636-85

07-06-05 – Anchors:

As requested by Jeff, CTI representative was on site for continuous observation of earth anchor installation. The following was noted.

1. Details available were reviewed. They showed location of anchor.

2. ICC ES Legacy Report 94-27 provided and reviewed. Installation was observed. Installer showed proof of certification by Chance. Soil verification to be determined by engineer. Final installation was 900 psi at 30' depth, which correlates to 2,319 ft/lbs. Bracket was installed and tightened into place prior to anchor bolt attachment to foundation. Two 5/8" Ø x 6" anchor bolts were used to provide this attachment. Powers wedge anchors were not torqued at this time.

3. Installation appears to be in general conformance with the ICC report. Final approval of conditions to be made by engineer after testing and review of documents.

*** CHECK ONE BOX ONLY ***	YES	NO
1. This is a preliminary inspection only. – OR –	☒	
2. The work inspected conforms to acceptance criteria listed above. If "No," the portions of the work that are non-conforming items are clearly stated above and will be added to the NCL. Remaining portions of the work, which are not preliminary in nature, are to be considered as conforming.	☐	☐

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 further questions regarding this matter, please do not hesitate to contact this office.

Respectfully submitted,
CARLSON TESTING, INC.

James F. Hietpas
Operations Manager

MP/sab

Attachments

cc: Stephanie More / Ray Lipsit
City of Portland – BDS

Carlson Testing, Inc.

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Phone (541) 330-9155
Fax (541) 330-9163

Special Inspection
DAILY FIELD REPORT

#7

Project: Moore / Lipsit Residence Date: 7/5/05

Job Address: 3127 NE Tillamook, Portland CTI Job No. T2406730

Permit No.: 04-001465-RS Type of Inspection: Anchors

Field ☒ or Fab Shop Partly Cloudy Weather:

Inspection Notes (include location, testing data, substitutions/deviations, materials and methods of construction, non-conforming items, acceptance criteria, corrected non-conforming items, etc.):

CTI Rep on site for continuous observation of earth anchor installation as requested by Jeff with

The following was noted:

1) Details available were reviewed. They showed location of anchors.

2) ~~ICBO Report~~ ICC ES Legacy Report 94-27 provided and reviewed. Installation was observed. Installer showed proof of certification by Chance. Soil verification to be determined by engineer. Final installation was 900 psi at 30' depth which correlates to 2319 ft lbs. Bracket was installed and tightened into place prior to anchor bolt attachment to foundation. Two 5/8"ϕ x 6" anchor bolts were used to provide this attachment. Powers wedge anchors were not torqued at this time.

3) Installation appears to be in general conformance with the ICC Report. Final approval of conditions to be made by engineer after testing and review of documents.

***** CHECK ONE BOX ONLY *****

	YES	NO
1. This is a preliminary inspection only. —OR—	☒	
2. The work inspected conforms to acceptance criteria listed above. If "No," the portions of the work that are non-conforming items are clearly stated above and will be added to the NCL. Remaining portions of the work, which are not preliminary in nature, are to be considered as conforming.	☐	☐

Inspector: [signature] Certification No.: COP 706

EARTH ANCHORS FOUNDATIONS INSTALLATION RECORD

#7

Client Name: Stephanie More-Lipsit
Site Address: 3127 NE Tillamook
Portland, Oregon

Job #: 854
Date: 7/6/2005
Type of Structure: Residencial Underpinning

Foundation Installation					Bracket		Tie Backs		
Pier No.	Helix Desc	Length Lead/Ext (Shaft)	Depth Ft.	Installing Torque(Ft lb) Depth Reading	Lifting Force Applied (lbs.)	Structure Movements (Inches)	Proof Tested lbs	Ultimate Capacity lbs.	Lock Off lbs.
1	8",10",12"	5'	30'	2319				23190	

: 503 709 5658 Jeff Torson

LEGACY REPORT

94-27

Reissued November 1, 2003

ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office # 5360 Workman Mill Road, Whittier, California 90601 # (562) 699-0543
Regional Office # 900 Montclair Road, Suite A, Birmingham, Alabama 35213 # (205) 599-9800
Regional Office # 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 # (708) 799-2305

Legacy report on the BOCA® *National Building Code*/1999

DIVISION: 2—SITEWORK
Section: 02465—Bored Piles

REPORT HOLDER:

A.B. CHANCE COMPANY / HUBBELL POWER SYSTEMS, INC.
210 NORTH ALLEN STREET
CENTRALIA, MISSOURI 65240-1395
www.abchance.com

EVALUATION SUBJECT:

HELICAL PIER FOUNDATION SYSTEM

1.0 EVALUATION SCOPE

Compliance with the following code:

BOCA® *National Building Code*/1999 (BNBC)

Properties evaluated:

Structural

2.0 USES

The Helical Pier Foundation System is intended for use as foundation underpinning in undisturbed soils.

3.0 DESCRIPTION

3.1 General:

The system consists of a lead section with helical plates, shaft extensions, and a foundation support bracket. The lead section is placed in the soil with mechanical rotation. Depending on the application, the depth of the lead section of the helical piers in the soil is extended to the required depth by adding one or more shaft extensions coupled to the lead section. The foundation repair bracket is used to support a building footing and is attached to a helical pier.

3.2 System Components:

3.2.1 Lead Section: The lead section of the helical foundation system, as shown in Figure 1, consists of circular steel plates welded to a central steel shaft.

The shaft of the lead section is round cornered square (RCS) solid steel bars. The RCS bar is $1^1/_2$-inch-square (38 mm) and is formed of ASTM A 29 steel. Material specifications for the steel shaft are as presented in Table 1 of this report.

The minimum diameter of the helical steel plate is 6 inches, and the maximum is 14 inches (356 mm). The center of the plate is punched out to accept the pier shaft. Each helical plate is formed so that all radial sections of the plate are normal to the central longitudinal axis ±3 degrees. The pitch of the helix is 3 inches (76 mm). The helical plates are $^3/_8$-inch-thick (9.5 mm). The material specifications for the helical plates are noted in Tables 1 and 2 of this report.

The size of the helical plates remains the same, or increases as they are placed up the shaft of the lead section, as shown in Figure 1 and Table 1. The size of the plates used depends on the required bearing capacity of the pier and the soils into which the pier is to be installed. The spacing between any two helical plates on the central shaft is nominally three times the diameter of the lower helix.

Each lead section of helical steel pier has a coupler means on the top end and an earth penetrating pilot on the bottom. The connection means consists of a hole drilled perpendicular to the central axis near the end of the shaft, to accommodate a bolted connection to extensions or support brackets.

Once the plates are welded to the central shaft and the coupler and pilot ends formed, the entire assembly is hot dipped galvanized in accordance with ASTM A 153. The maximum design strengths of the helical pier foundation systems, based on the lead section used and Load Resistant Factored Design (LRFD), are given in Table 1.

3.2.2 Extensions: Extensions consist of the same size steel shaft described above for the lead section, with or without 14-inch (356 mm) helical plates. The dimensions and material specifications for the steel shaft and the helical plates are as described above, and each extension assembly is also hot dipped galvanized in accordance with ASTM A 153. The extensions are shown in Figures 2 and 3. Technical data for the extension shaft and the coupling connection is given in Table 2.

Each extension has a coupler means on one end and a connection means on the other. The coupler at the end of the central shaft is an integrally forged socket that slips over the connection means at the end of the preceding lead section or extension. Each socket has a transverse hole in the socket to facilitate connection of lead sections and extensions with a bolt and nut. The connection and coupling means of the coupler connection are shown on the extension in Figures 2 and 3.

3.2.3 Foundation Bracket: The foundation bracket consists of upper and lower steel bracket bodies which are interconnected with two lifting bolts, as shown in Figure 4. Table 3 gives design data for the foundation bracket.

The brackets are formed of $^1/_4$- and $^3/_8$-inch-thick (6 mm and 9.5 mm) ASTM A 36 steel. The stem of the T-shaped upper bracket is an 18-inch-long hot rolled electrical resistance welded round steel tubing which complies with ASTM A 512 or ASTM A 513 Grade 1020, with a minimum yield and tensile strength of 50 and 62 ksi (344738 and 427475 kPa), respectively. Both the upper and lower brackets have an ASTM A 153, Grade B-1 hot dipped galvanized coating.

The lifting bolts are $^7/_8$-inch-diameter (22 mm), comply with SAE J429, Grade 2, and have a minimum yield strength of 36 ksi (248211 kPa) and a minimum tensile strength of 60 ksi (413685 kPa). Cross bolts are also required to support the eccentric load of the foundation on the helical pier extension. These cross bolts are $^5/_8$-inch-diameter (16 mm), comply with SAE J429, Grade 5, and have a minimum yield and tensile strength of 92 and 120 ksi (634318 and 827370 kPa) respectively.

4.0 INSTALLATION

4.1 General:

Installation of Helical Pier Foundation System shall comply with this report and the published manufacturer's installation instructions. The manufacturer's published installation insturctions shall be available at the jobsite at all times during installation.

4.2 Helical Pier:

The helical pier shall be installed in undisturbed soil with rotary motors that are capable of rotating clockwise or counterclockwise. The torque applied during the installation of the final length of the helical pier shall be recorded. Ultimate bearing capacity of the soil for the installed pier is determined by multiplying the final installation torque of the pier by the load factor for the lead section, as given in Table 1.

The piers are rated by the maximum torque permitted to be used to complete their installation. Torque ratings for the lead sections and extensions are given in Tables 1 and 2. The minimum required torque rating for each extension shall be equal to or greater than the torque rating of the lead section it is used with.

4.3 Foundation Bracket:

The T-shaped upper bracket body is slid over the end of the topmost extension of the installed helical steel pier. The lower bracket is attached to the foundation with anchors bolts, as specified in the approved construction documents required in Sections 5.9 and 5.10 of this report. The lower bracket body is attached to the upper bracket body with the lifting bolts. A jacking tool with cross plate is connected to the top of the lifting bolts, and a jack is placed between the cross plate and the top of the T-bracket, as shown in Figure 5. In this manner the jack is used to lift the lower bracket body as it pushes down on the T-shaped section of the upper bracket body, and indirectly loads the extension of the helical pier. Once the lower bracket has been lifted to the desired height the nuts on the lifting bolts are tightened and

900 psi

Lead Section P/N C150.0160
Extensions C150.0008
Underpinning bracket C150.0121

5.0 CONDITIONS OF USE

This report is limited to the applications and products as stated in this report. The ICC-ES Subcommittee on National Codes intends that the report be used by the code official to determine that the report subject complies with the code requirements specifically addressed, provided that this product is installed in accordance with the following conditions:

5.1 The Helical Pier Foundation System shall be limited to applications where the required bearing and uplift capacity of the anchor does not exceed that determined through application of Table 1 of this report, and the recommendations of the construction documents required in Sections 5.9 and 5.10 of this report.

5.2 The Helical Pier Foundation System shall be installed in accordance with this research report and the manufacturer's recommendations, by installers certified by the manufacturer. The installation shall comply to the approved construction documents, and the following:

5.2.1 The anchor shall be positioned and angled as specified in the approved construction documents.

5.2.2 The rotation rate of the helical piers during installation shall be between 5 to 20 revolutions a minute.

5.2.3 If used, extensions shall be connected to the helical pier with the bolts specified in Table 2. The bolts shall be tightened to 40 ft-lbs (401 N•m) of torque.

5.2.4 The piers shall be installed to the minimum depth shown on the approved construction documents, with a minimum depth to the top helix of 5 feet.

5.2.5 Each extension used with the lead sections shall have a minimum torque rating, as shown in Table 2, equal to or greater than the torque rating of the lead section, as given in Table 1.

5.3 Special Inspections of the installation of helical piers shall be provided in accordance with Section 1705.9 of the BOCA® *National Building Code*/1999. Items to be confirmed by the Special Inspector shall include, but not be limited to, evidence of certification of installers by manufacturer, verification of adequacy of soil for installation, the installation torque of the pier, correct jacking of the foundation onto the pier and compliance of the installation with the approved construction documents and this report.

5.4 The factored design load on the helical pier shall not be greater than the lowest value determined from the following:

5.4.1 The design soil bearing capacity of the anchor, determined by multiplying the installation torque, in ft-lbs, used to install the final length of the pier by the load factor given in Table 1 of this report, and a strength reduction factor, $\phi = 0.70$.

5.4.2 The maximum design strength, P_D, given for the lead section in Table 1 of this report.

5.5 The capacity of the anchor in all but soft soils shall be determined in the manner described in Section 5.4. Determination of capacity in soft soils, including loose cohesionless soils, soft organic soils or soft clays, is beyond the scope of this report. Verification that the proposed pier location or locations do not include "soft soils" shall be included in the soils investigation ...

5.6 Factored design loads on the foundation bracket, based on LRFD, shall not exceed 24.1 kips (10, 941 kg). Other brackets, or other means of securing the helical pier to the building or structure supported are beyond the scope of this report. All connections used in conjunction with the helical pier shall be designed by a registered design professional, as required by Section 5.9 of this report.

5.7 The use of the helical piers described in this report is limited to undisturbed soils that have been determined by the registered design professional responsible for the construction documents described in Section 5.10 of this report to be adequate to provide support of the helical pier against lateral buckling, and to meet the requirements of Section 1804.2 of the BOCA® *National Building Code*/1999 as satisfactory foundation material.

5.8 Evaluation of the durability of the galvanized coating in the soil it is to be placed in is outside the scope of this report.

5.9 All permit applications for helical piers shall be accompanied by structural calculations which are performed by a registered architect or engineer who is qualified to perform them in accordance with the registration laws of the state in which construction is to take place. Items addressed in the structural calculations shall include, but not be limited to, the following:

5.9.1 All brackets and connections used to secure the Helical Pier to the building or structure.

5.9.2 Column buckling of the piers due to compression loads, based on the lateral load carrying capacity of the soil, as given in the soil investigation report required in Section 5.10 of this report.

5.9.3 The effects of seismic loads on the helical pier, as required in Sections 1610.0 and 1802.1.1 of the BOCA® *National Building Code*/1999.

5.9.4 The required spacing of the anchors.

5.9.5 A settlement analysis of the helical piers under design load shall be provided, as required by Section 1816.19 of the BOCA® *National Building Code*/1999. The analysis shall demonstrate that the predicted settlement of the piers shall not cause harmful distortion of, or instability in, the structure supported, nor cause any stresses within the structure to exceed allowable values.

5.9.6 The angle at which the pier is to be placed.

5.10 A soils investigation report for the proposed construction site shall be provided by a registered design professional qualified to perform such work, with each permit application. Information provided in the soils investigation reports shall include, but not be limited to, the following:

5.10.1 The type of soil at each strata along the length of the proposed pier installation.

5.10.2 The allowable soil bearing pressure.

5.10.3 Indication of the method used by the registered design professional to determine that the soil

5.10.4 Properties affecting the design of the system, including the lateral load carrying capacity of the soil at each strata.

5.10.5 The location of the ground water table.

5.10.6 The maximum anticipated depth of frost.

5.10.7 The presence or absence of corrosives in the soil and the appropriateness of the use of galvanized steel in the soil.

5.10.8 The presence of stone, rocks or other debris in each soil strata, and their effect on the suitability of the soil for use with the Helical Pier system.

5.10.9 Recommendations to the registered design pro-fessional to preclude settlement due to ground water or overloading of the soil, wall damage due to frost heave or corrosion of the pier materials and the characteristics of the appropriate types of loading for the soil.

5.10.10 Suitability of the system in a seismic area for areas required to have seismic calculations in Section 5.9.2 of this report.

5.11 This report is subject to periodic re-examination. For information on the current status of this report, contact the ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 LBA, Inc., Report on a Load Test of an A.B. Chance Helical Pier, dated November 3, 1992, stamped by Carl Bobish, P.E..

6.2 CTL/Thompson, Inc., Axial Compressive Load Test, dated February 5, 1993, stamped by Robert U. Branson, P.E.

6.3 Chen Northern, Inc., Observation of Helical Anchor Pile Load Test at West High School, 9th Avenue and Galapago Street, Denver, CO., dated May 28, 1992, stamped by Michael Riggins, P.E.

6.4 BBC & M Engineering, Inc, Load Testing Results, Thompson and Avery Road Sites, dated August 31, 1992, signed by Robert Thompson, P.E.

6.5 Report of Full-Scale Load Tests on Helical Anchors, dated June 23, 1995, by Engineering Surveys and Services.

6.6 Pressure Distribution Beneath a Bearing Plate Resulting from a Compressive Load Being Applied to a Helical Pier Foundation in Soil, signed and dated October 11, 1995, by Gary Seider, P.E.

6.7 Compression Load Tests on A.B. Chance - Helical Pier Foundation System Components, Radco Test Report No. RAD-1663, dated January, 1996, by Radco, signed by Ray Tucker, P.E.

6.8 Report on Full-Scale Tensile Load Tests on Helical Anchors, dated July 11, 1996, by Engineering Surveys and Services, signed by Bruce Dawson, P.E.

6.9 S.P. Clemence, P.E., Professor and Chairman, Civil Engineering Department, Syracuse University, *Uplift Capacity of Helical Anchors in Soil*, presented at the International Conference on Soil Mechanics and

6.10 Letter of September 27, 1995, signed by Dr. S.P. Clemence, P.E., discussing the uplift capacity of helical piers in various types of soils based on the finding sited in *Uplift Capacity of Helical Anchors in Soil*, and comparing the test method used for that report to ASTM D3689-90 and ASTM D1143.

6.11 S.P. Clemence, P.E., Professor, Syracuse University, L.K. Crouch, Assistant Professor, Department of Civil Engineering, Tennessee Technological University, and R.W. Stephenson, Professor, Department of Civil Engineering, University of Missouri-Rolla, *Prediction of Uplift Capacity for Helical Anchors in Sand.*

6.12 Coupling Bolt Calculations, prepared and signed by Gary Seider, P.E., dated December 20, 1994 and March 1, 1995. Mr. Seider prepared calculations in accordance with AISC LRFD.

6.13 Stress Analysis - Foundation Repair Brackets, prepared and signed by Gary Seider, P.E. These calculations, done in accordance with AISC LRFD.

6.14 Compression Load Tests on A.B. Chance - Helical Pier Foundation System Components, Radco Test Report No. RAD-1663, dated January, 1996 by Radco, signed by Ray Tucker, P.E.

6.15 Study of Loading Tests Results of the Chance Underpinning System Tested in Centralia, Missouri, by Lymon Reese and Associates, dated December, 1993.

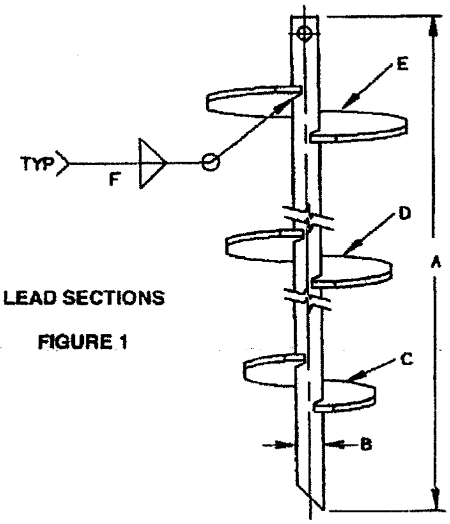
6.16 Quality Control Manual and Inspection Procedures for A.B. Chance Company, by RADCO, dated August 1994.

6.17 Copies of the AWS certification for weld inspectors employed by A.B. Chance.

7.0 PRODUCT IDENTIFICATION

The Helical Pier Foundation System described in this report shall be identified by a stamp bearing the manufacturer's name (A.B. Chance Company / Hubbell Power Systems, Inc.) and/or trademark, the product type, the name of the third-party inspection agency and the evaluation number (ICC-ES Legacy Report No. 94-27).

CHANCE HELICAL PIER FOUNDATION SYSTEM DETAILS



LEAD SECTIONS

FIGURE 1

TABLE 1 — DESCRIPTION AND ULTIMATE BEARING CAPACITY OF LEAD SECTIONS

LEAD SECTION								LOAD FACTOR[1]		MAXIMUM DESIGN STRENGTH P_o[5] (kips)	HELICAL PLATE MATERIAL SPECIFICATION[2]	SHAFT TYPE & SPEC
CAT. NO.	A	B	C	D	E	F	MAX. INSTALLATION TORQUE RATING FT.-LB.	COMPRESSION[4]	UPLIFT[4]			
C150-0001	7'	1-1/2"	8"	NP	NP	5/16"	(SS-5) 5,500	10	10	20	ASTM A 570 ASTM A 572 ASTM A 607 GRADE 50 F_Y = 50KSI MIN. F_T = 65KSI MIN.	RCS SOLID STEEL BAR ASTM A 29 F_Y = 70 ksi MIN. F_T = 100 ksi MIN.
C150-0002	5'	1-1/2"	8"	NP	NP	5/16"	(SS-5) 5,500	10	10	20		
C150-0003	7'	1-1/2"	10"	NP	NP	5/16"	(SS-5) 5,500	10	10	20		
C150-0004	7'	1-1/2"	12"	NP	NP	5/16"	(SS-5) 5,500	10	10	20		
C150-0005	7'	1-1/2"	14"	NP	NP	5/16"	(SS-5) 5,500	6[3]	6[3]	16		
C150-0030	7'	1-1/2"	6"	8"	NP	1/4"	(SS-5) 5,500	10	10	27.5		
C150-0006	7'	1-1/2"	8"	10"	NP	1/4"	(SS-5) 5,500	10	10	27.5		
C150-0031	10'	1-1/2"	8"	10"	NP	1/4"	(SS-5) 5,500	10	10	27.5		
C150-0007	7'	1-1/2"	8"	10"	12"	1/4"	(SS-5) 5,500	10	10	27.5		
C150-0168	2-1/2'	1-1/2"	8"	10"	NP	1/4"	(SS-7) 7,000	10	10	36.0		HSLA ASTM A 29 F_Y = 95 ksi MIN. F_T = 120 ksi MIN.
C150-0169	5'	1-1/2"	8"	10"	12"	1/4"	(SS-7) 7,000	10	10	35.0		
C150-0170	10'	1-1/2"	14"	14"	14"	1/4"	(SS-7) 7,000	6[3]	6[3]	35.0		

S.I. 1 in. = 25.4 mm; 1 ft-lb = 1.36 N•m; 1 kip = 4.45 kN; 1 ksi = 6894.8 kPa; 1 ft = 0.305 m

[1] The ultimate bearing capacity of the soil supporting the anchor is determined by multiplying the maximum torque used to fully install the lead section and extensions by the load factor given in Table 1. The load factor is a function of the lead section only.

[2] Grades and physical properties shown are minimum.

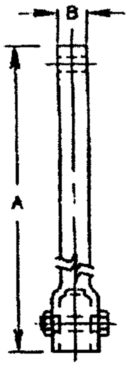
[3] Load factor of 10 applicable in uniform homogenous deposits of clay or silty-clay soils, load factor of 6 applicable in sand or soil combinations which include sand.

[4] Use of these load factors to determine capacity of the anchor shall be limited to those soils which are not considered soft or very soft soils, as determined by the registered design professional responsible for the preparation of the construction documents.

[5] Based on LRFD, with $P_o = \phi P_u$.

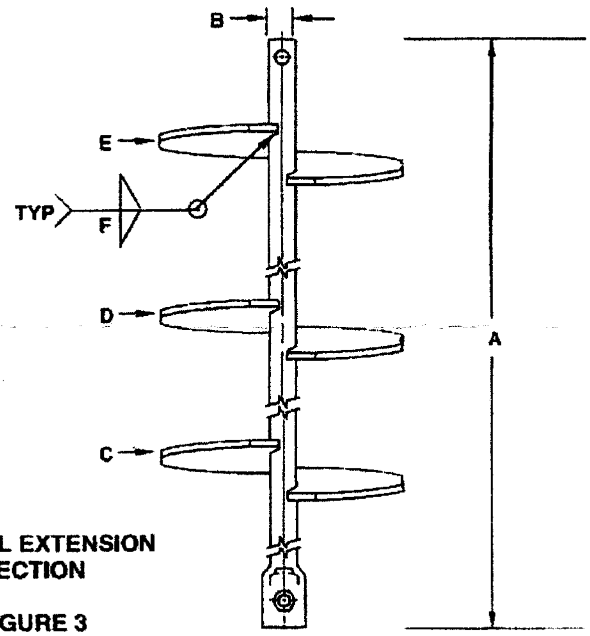
NP = Not Provided

CHANCE HELICAL PIER® FOUNDATION SYSTEM DETAILS



EXTENSION SECTION

FIGURE 2



HELICAL EXTENSION SECTION

FIGURE 3

TABLE 2 — DESCRIPTION OF EXTENSIONS

EXTENSION								BOLTS			HELICAL PLATE MATERIAL SPECIFICATION	SHAFT MATERIAL SPECIFICATION
CAT. NO.	A	B	C	D	E	F	MAX. INSTALLATION TORQUE RATING FT.-LB.	QTY	SIZE	TYPE		
C150-0047	3-1/2'	1-1/2"					(SS-5) 5,500	1	3/4	ASTM A 320 GRADE L7		ASTM A 29 Fy = 70 ksi MIN. Ft = 100 ksi MIN.
C150-0008	5'	1-1/2"					(SS-5) 5,500	1	3/4			
C150-0009	7'	1-1/2"					(SS-5) 5,500	1	3/4			
C150-0048	10'	1-1/2"					(SS-5) 5,500	1	3/4			
C150-0144	3-1/2'	1-1/2"					(SS-7) 7,000	1	3/4			HSLA ASTM A 29 Fy = 95 MIN. Ft = 120 MIN.
C150-0145	5'	1-1/2"					(SS-7) 7,000	1	3/4			
C150-0146	7'	1-1/2"					(SS-7) 7,000	1	3/4			
C150-0175	10'	1-1/2"					(SS-7) 7,000	1	3/4			
C150-0176	4'	1-1/2"	14"			1/4"	(SS-7) 7,000	1	3/4		ASTM A 715, A 656 GRADE 80 Fy = 80KSI min. Ft = 90KSI	
C150-0177	6-1/2'	1-1/2"	14"	14"		1/4"	(SS-7) 7,000	1	3/4			
C150-0178	10'	1-1/2"	14"	14"	14"	1/4"	(SS-7) 7,000	1	3/4			

S.I. 1 in. = 25.4 mm; 1 ft = 0.304 m; 1 ft-lb = 1.36 N•m; 1 ksi = 6894.8 kPa

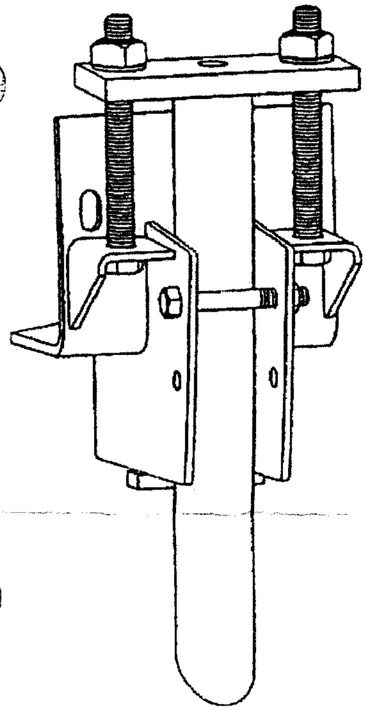


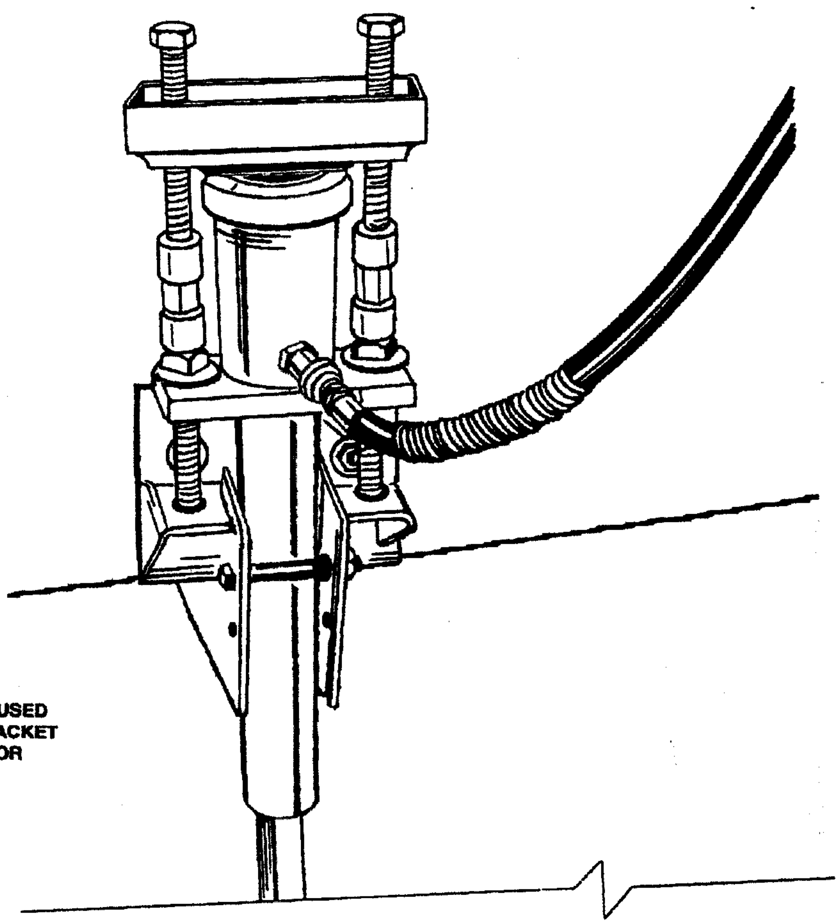
FIGURE 4
FOUNDATION BRACKET

TABLE 3—ACCESSORY COMPONENTS

Component	Design Strength P_D[1] (kips)	Bolts Used
C150-0121 Foundation Bracket	20.0	(2) 7/8″ lifting bolts (1) 5/8″ cross bolt

1. Based on LRFD with $P_D = \phi P_U$

S.I. 1 kip = 4.45 kN; 1 in. = 25.4 mm



JACKING TOOL AND JACK USED TO PLACE FOUNDATION BRACKET ON HELICAL PIER ANCHOR

FIGURE 5