Purchasing Division
Finance Department

Room 120
411 West First Street
Duluth, Minnesota 55802

218-730-5340
purchasing@duluthmn.gov

Addendum #2
Solicitation # 20-10AA
Hot Water Distribution System Balance of Plant (Mechanical) at Duluth Energy Systems

This addendum serves to notify all bidders of the following changes to the solicitation documents:

Item 1: Changes to the Bidder Qualifications

The following general requirement shall apply to the bidding Prime contractor and its sub-contractors:

> ***Contractor Minimum Qualifications and Contract Award***
>
> ***"Bidders shall provide documentation verifying successful completion of a minimum of one (1) project similar in size and scope to this project within the last five (5) years. The documentation shall include references that may be contacted for confirmation. Failure to provide prior experience documentation and/or references will result in your bid being deemed non-responsive. DES will evaluate and validate all bids. The evaluation processes will be used to confirm that the contractor has the qualifications and experience required to successfully complete the project on-time and within budget, while meeting the acceptable level of quality. The City of Duluth reserves the right to waive informalities, to reject any and all bids, and to award in the best interests of the City."***

Item 2: Changes to the Steel Erector and Fabricator Qualifications

In specification section **051200-3 1.6 QUALITY ASSURANCE** the following language:

> "***A. Installer (Erector) Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.***
> ***B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant.*** "

Is replaced and superseded by the following language:

> ***A. Installer (Erector) Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.***

B. Fabricator Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

Item 3: Geotechnical report

The following question has been submitted:
"I am looking for some help locating the geotechnical report for this project which is referenced on sheet S204 under plan notes No. 2. American Engineering Testing (AET) Report No. 01-20551. Specifically, I am looking for the soil log for SB-19-1. Any help here would be greatly appreciated. "
Response: The requested report has been included with this addendum for bidders' use.

Item 4: Question about existing roof structure

The following question has been submitted:
"We would like to inquire about any floor loading restrictions at Elevation 626 and is it possible to utilize the existing roof structure to assist in setting the new structural assembly in place?"

Response: The evaluation of any structures (both existing and new) to accommodate contractor means and methods requires the contractor to hire an engineer and submit relevant calculations. It is not possible for us to provide an answer to this question. Having so stated, we know that previous brief considerations of the roof as a potential lifting point were rejected as unsafe without reinforcement and careful analyses and design.

Please acknowledge receipt of this Addendum by checking the acknowledgment box within the www.bidexpress.com solicitation or by initialing and dating next to Addendum # on the paper bid form.

Posted: 4/22/2020

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AMERICAN ENGINEERING TESTING, INC.

CONSULTANTS
- ENVIRONMENTAL
- GEOTECHNICAL
- MATERIALS
- FORENSICS

December 17, 2019

Ever-Green Energy
76 West Kellogg Boulevard
St. Paul, MN 55102

Attn: Luke Davis

RE: Foundation Installation Observations
Proposed Steam Converter System
Duluth Energy Systems – One Lake Place Drive
Duluth, Minnesota
AET No. 01-20551

Dear Mr. Davis:

This letter report presents the results of our observations and summarizes our professional opinions regarding the foundation constructed for support of the new steam converter equipment.

1.0 Project Information

Equipment for a new Steam Converter System will be installed inside the existing Duluth Energy Systems building at the above referenced address. Loads associated with the new equipment will be supported on a steel reinforced, cast-in-place concrete pile cap, constructed near the slab elevation of the lower level, with dimensions of approximately 12 feet x 14 feet. The thickness of the cap is 2½ feet. Subsurface soil conditions and available information concerning foundation support for the existing building warranted use of a deep foundation system beneath the pile cap. Please reference the AET report of Geotechnical Review dated August 30, 2019 for information that lead to this recommendation.

The Helical Pile foundation approach was selected over the Micro-pile option due to significant cost savings.

A pre-award/pre-installation meeting was held at the project site on November 15, 2019, with the owner, design consultants and specialty contractor.

The Helical Pile design was based on 9 piles; each contributing a design load of 75 kips/pile.

2.0 Helical Piles

The Helical Pile designer/installer was Atlas Foundation Company; located in Osseo, Minnesota.

The piles used are manufactured by A.B. Chance Company. They are designated as “SS200 Anchors” (see attached schematic diagram). Lead sections were 5 feet long, having 3 helices attached with diameters of 8, 10, and 12 inches. The extension sections had a single bolt connection that were either

5 or 7 feet long. After each pile was cut off it received a prefabricated steel top plate. All piles were galvanized. It was reported the SS200 Anchor System has an ultimate axial capacity of 150 kips.

The final few feet of Helical Pile penetration was achieved using a Bobcat T-630 mounted torque head rated at 18,000 foot-pounds (torque head calibration attached).

3.0 Subsurface Characteristics

Because access was so restrictive inside the building where the SCS foundation had been sited, geotechnical information was obtained by performing a Standard Penetration Test Boring in the adjacent parking lot. The boring identified mixed mineral fill soils and organic materials to a depth of about 17 feet below the surface. Below this depth the soils transitioned from loose to dense and cobble/boulder inclusions were more common. A thin layer of compressed peat was noted at a depth of about 31 feet below the surface; implying the overlying soils were of possible man-made fill origin. Dense sands were encountered to the borings termination depth on probable bedrock at 51 feet.

4.0 Helical Pile Installation and Testing

Prior to installation of the piles, the floor slab in the SCS foundation area was saw-cut and removed. Exposed soils consisted of brown, fine to medium-grained sands. Existing utilities that conflicted with the pile layout were removed or rerouted.

The foundation design called for nine helical piles, generally positioned symmetrically in the 12 x 14-foot pile cap excavation. Pile number 6 was selected by the contractor as the pile that would be tested in axial compression. This pile was added as the tenth pile to the group to facilitate the static load test set-up.

Typically, at depths ranging from 20 to 22 feet below grade, the lead section of the helical pile would begin to penetrate materials that offered significant resistance to the pile's advancement. The contractor trimmed the leading edge of the helices to aid the pile's ability to bypass apparent cobble and boulder size obstructions. All of the production piles were installed before the static load test was initiated. Torque was also applied to each of the original anchors after the static load test was complete to confirm resistances were similar to that of the test pile.

The test pile was installed to a penetration of 29 feet below grade. At this penetration a consistent gage pressure of 2400 psi was achieved. Based on the Torque Head Calibration sheet provided (attached) by Atlas, the corresponding ultimate capacity developed at this penetration was 163 kips (81.5 tons). Judging from the behavior of the first few helical piles installed, continuing to try to advance the pile at a gage pressure around 2400 psi was cause for twisting and permanent deformation of the square extension bar section that could be observed above grade.

The static load test was performed on December 4, 2019. It was conducted in general conformance with ASTM:D1143/1143M. Load was applied using a 200 kip (100 ton) hydraulic jack and steel beam reaction frame. The maximum test load was established as 150 kips (75 tons), or twice the design load of 75 kips (37.5 tons).

Axial compression load was applied to the test pile in 7.5-kip increments. At a load of approximately 90 kips (45 tons), pile head deflection was already exceeding 1-inch. Attempts to hold this load with no further deflection were unsuccessful. Maximum pile head deflection reached 1½-inches before the

pile was unloaded in equal decrements. Final pile head deflection was just over ⅝-inch. Numeric and graphic results of the static load test are attached.

5.0 Discussion of Results

The maximum test load of 150 kips was unachievable due to excessive pile head deflection. Discussions with the contractor and our observations suggest the load was properly positioned over the test pile. Therefore, eccentric loading was not considered a contributing factor to the pile head deflection. It is our opinion that bending of the helical pile shaft was the primary cause for the excessive pile head movement recorded rather than vertical movement of the lead pile section embedded more than 25 feet below the surface. The contractor confirmed that pile shaft bending was a concern as the test was being performed. Attempts to restrain the pile shaft from bending using chains proved unsuccessful. We suspect the lateral resistance offered by the upper fill soils is low and that this condition would be the limiting factor in how much load the helical piles could safely support. We discussed performing another load test with the contractor. It was their opinion that similar results would likely be obtained unless the pile shaft's stiffness/restraint could be improved. This improvement would be provided through the use of possible casing and grout. It was judged that testing another helical pile that would be installed differently than those already in-place would not provide representative results. Further conversations with you and the project structural engineers at MBJ lead to the decision to review an option of assigning a reduced design load on the installed piles and adding piles to make up the difference. Based on the static load test results we offered our professional opinion that the installed piles could be considered capable of supporting a working load of 40 kips/pile (20 tons/pile) while providing a safety factor of at least 2.0 against bearing capacity failure.

6.0 Final Pile Arrangement and Lengths

MBJ's analysis indicated the installation of 3 additional helical piles would satisfy design requirements. Locations of those piles (pile no. 11, 12 & 13) are shown on the attached sketch. The piles were installed in the order that they were numbered.
The following table summarizes the installed pile lengths.

Table 6.1 Helical Pile Lengths and Final Resistances

Pile No.	No. of 5' Extensions	No. of 7' Extensions	Total Length (feet)	Gage Pressure (psi)**	Cut-Off Length (feet)	Length Below Cut-Off (feet)
1	0	4	33	2400	5.7	27.3
2	1	3	31	2400	3.7	27.3
3	1	3	31	2400	3.2	27.8
4	1	3	31	2400	4.3	26.7
5	2	3	36	2400	1.6	34.4
6*	0	4	33	2400	3.8	29.2
7	2	3	36	2400	1.8	34.2
8	1	3	31	2400	2.4	28.6
9	2	3	36	2400	2.2	33.8
10	1	3	31	2300	3.6	27.4
11	2	3	36	2300	3.3	32.7
12	2	3	36	2300	3.8	32.2
13	4	3	46	2250	2.8	43.2

* Test Pile ** For final 3 feet of penetration

7.0 Professional Opinions and Recommendations

It is our professional opinion that the helical anchors were installed in a manner consistent with the intent of the specifications. The helical piles could not be installed to the design target depth of 45 feet due to very dense soils with cobble/boulder size inclusions common below a depth of about 20 feet. Pile damage would have resulted if sustained torque values greater than 16,000 foot-pounds had been attempted. The average pile toe elevation is approximately 30 feet below grade. At this penetration the base sections of the piles likely did not fully penetrate the possible fill soils and buried peat layer represented by EPC Boring Number SB-19-1. Assuming the conditions represented by the boring are similar to those where the helical piles were installed, we have a high degree of confidence the helices of the piles were advanced into competent materials capable of providing the required support along with a reasonable safety factor against bearing capacity failure. What limits the safe capacity is the bending of the shaft of the pile. This was not anticipated as a limiting factor during design, and quite fortunately was identified during the load testing.

The contractor's possible inability to advance the helical piles beyond the depths of 20 to 30 feet was discussed during the conceptual design phase. If the piles could not be extended into the native sands below 32± feet the risk of potential settlement of the piles was discussed as well and found to be acceptable in the light of the more costly foundation alternative(s). We recommend establishing settlement monitoring points at the corners of the pile cap and periodically surveying the elevations of the points to aid in evaluating if any vertical movement is occurring.

Steel reinforcement observations and concrete sampling have been performed. Concrete compressive strength testing will be performed. Results of these observations and tests will be relayed under separate cover.

8.0 Limitations

Within the limitations of scope, budget, and schedule, we have endeavored to provide our services according to generally accepted geotechnical engineering practices at this time and location. Other than this, no warranty, express or implied, is intended.

Please contact us if you have any questions.

Sincerely,

American Engineering Testing

Prepared by:

William K. Cody, PE
Principal Engineer

Reviewed by:

Gregory R. Reuter, PE, D.GE
Principal Engineer/Vice President

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under Minnesota Statute Section 326.02 to 326.15

Name: William K. Cody

Date: 12/17/19 **License #: 16136**

Attachments:
Helical Pile Location Diagram
Helical Pile Schematic (SS200 Anchors)
Torque Head Calibration
Static Load Test Data
100 Ton Ram Calibration Certificate
EPC Boring Number SB-19-1

AMERICAN ENGINEERING TESTING, INC.

PROJECT _____ JOB NO. _____

_____ SHEET NO. _____ OF _____

BY _____ DATE _____

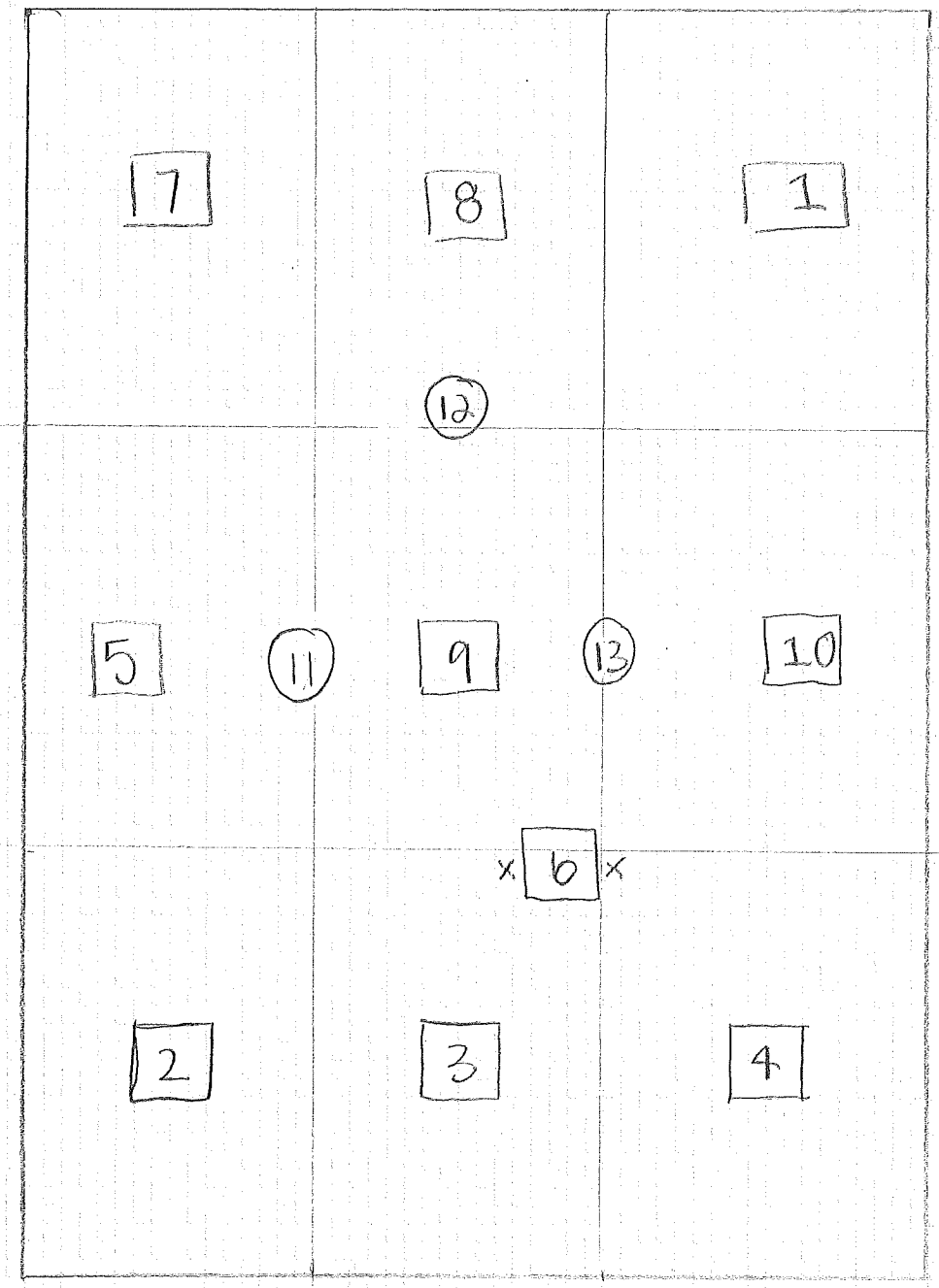
CHECKED BY _____ DATE _____

SCALE _____

□ = original pile

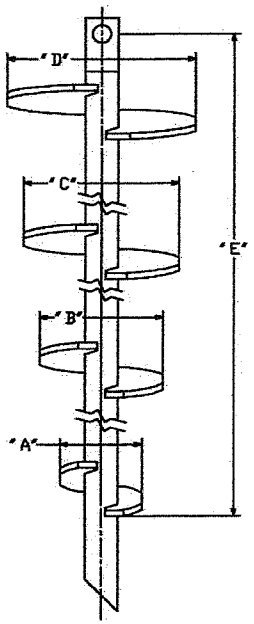
○ = added pile

x □ x = Test Pile

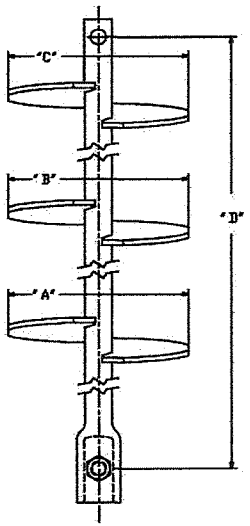


Helical Pile Location Diagram

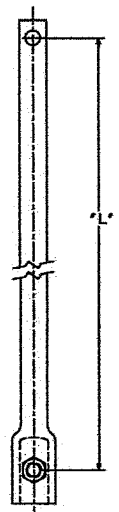
* assumed, according to plans



LEAD SECTION



HELIX EXTENSION

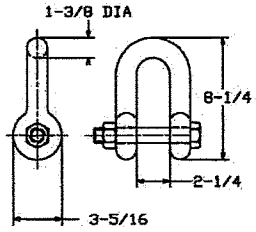


EXTENSION

LEAD SECTION						
CATALOG NUMBER	"A"	"B"	"C"	"D"	"E"	FINISH
C1101256	10	12	--	--	60	GALV
C1100569	6	8	10	--	60	GALV
C1100570	8	10	12	--	60	GALV
C1100571	6	8	10	12	79	GALV
C1100572	14	14	14	--	122	GALV
C1100573	8	10	12	14	122	GALV
C1100791	10	12	14	--	79	GALV
C1100791NG	10	12	14	--	79	BLACK

HELIX EXTENSION					
CATALOG NUMBER	"A" DIM	"B" DIM	"C" DIM	"D" DIM	FINISH
C1100577	14	--	--	42	GALV.
C1140220	14	--	--	42	BLACK
C1101304	12	--	--	42	GALV.
C1100581	14	14	--	79	GALV.
C1100586	14	14	14	122	GALV.

EXTENSION		
CATALOG NUMBER	"L"	FINISH
C1100563	37	GALV
C1100564	58	GALV
C1140219	58	BLACK
C1100565	80	GALV
C1100566	123	GALV



CHAIN SHACKLE
C110-0557 (GALV)

-NOTES-

1. ITEMS MARKED "GALV" ARE HOT DIP GALVANIZED PER ASTM A153-(LATEST REV.)
2. COUPLING BOLTS: 1-1/8" DIAMETER X 4-1/4" LONG HEX HEAD PER ASTM A193 GRADE B7.
3. ALLOWABLE TORQUE CAPACITY - 16,000 FT-LBS.
4. ULTIMATE CAPACITY FOR AXIALLY LOADED FOUNDATION (TENSION/COMPRESSION LOADS) - 150 KIPS.
5. ALL DIMENSIONS IN INCHES.

CHANCE®

HUBBELL® POWER SYSTEMS

TITLE: SS200 ANCHORS

SIZE	DWG NO.	REV
C	SA11010019	M

DO NOT SCALE THIS DRAWING	DRN BY TLB	DATE 4/24/19	SHEET 1/1

Torque Head Calibration

Machine: Bobcat T-630
Torque Head: 18K
Motor #: 1159
Calibrated By: Structural Anchor Supply
Date Calibrated: 8/20/2019

m= 8.973241928
b= -5205.793897
R= 0.994556334

Gage Pressure (psi)	Measured Torque (ft-lbs)	Normalized Torque (ft-lbs)	Working Load (kips)	Ultimate Capacity (kips)
500	900	-700	-3.5	-7.0
700	1300	1100	5.5	11.0
800	1400	2000	10.0	20.0
900	2100	2900	14.5	29.0
1000	3500	3800	19.0	38.0
1100	4000	4700	23.5	47.0
1200	5400	5600	28.0	56.0
1300	6300	6500	32.5	65.0
1400	7200	7400	37.0	74.0
1500	8300	8300	41.5	83.0
1600	9100	9200	46.0	92.0
1700	10200	10000	50.0	100.0
1800	11200	10900	54.5	109.0
1900	12000	11800	59.0	118.0
2000	12800	12700	63.5	127.0
2100	13600	13600	68.0	136.0
2200	14500	14500	72.5	145.0
2300	15800	15400	77.0	154.0
2400		16300	81.5	163.0
2500		17200	86.0	172.0

*10 to 1 ratio for Square Shaft Helical Piers

11730 BROCKTON LANE NORTH · OSSEO, MN 55369 PHONE: 763-428-2261 FAX: 763-428-4754 · www.atlasfoundation.com
PILING, DRILLED PIERS, HELICAL PIERS, MICROPILE, AND EARTH RETENTION SYSTEMS. EQUAL OPPORTUNITY EMPLOYER.
Certified Helical Pier Installation Contractor

Atlas Foundation Company

11730 Brockton Lane North • Osseo, Minnesota 55369
(763) 428-2261 • Fax: (763) 428-4754

Duluth Energy Systems
Duluth, Minnesota

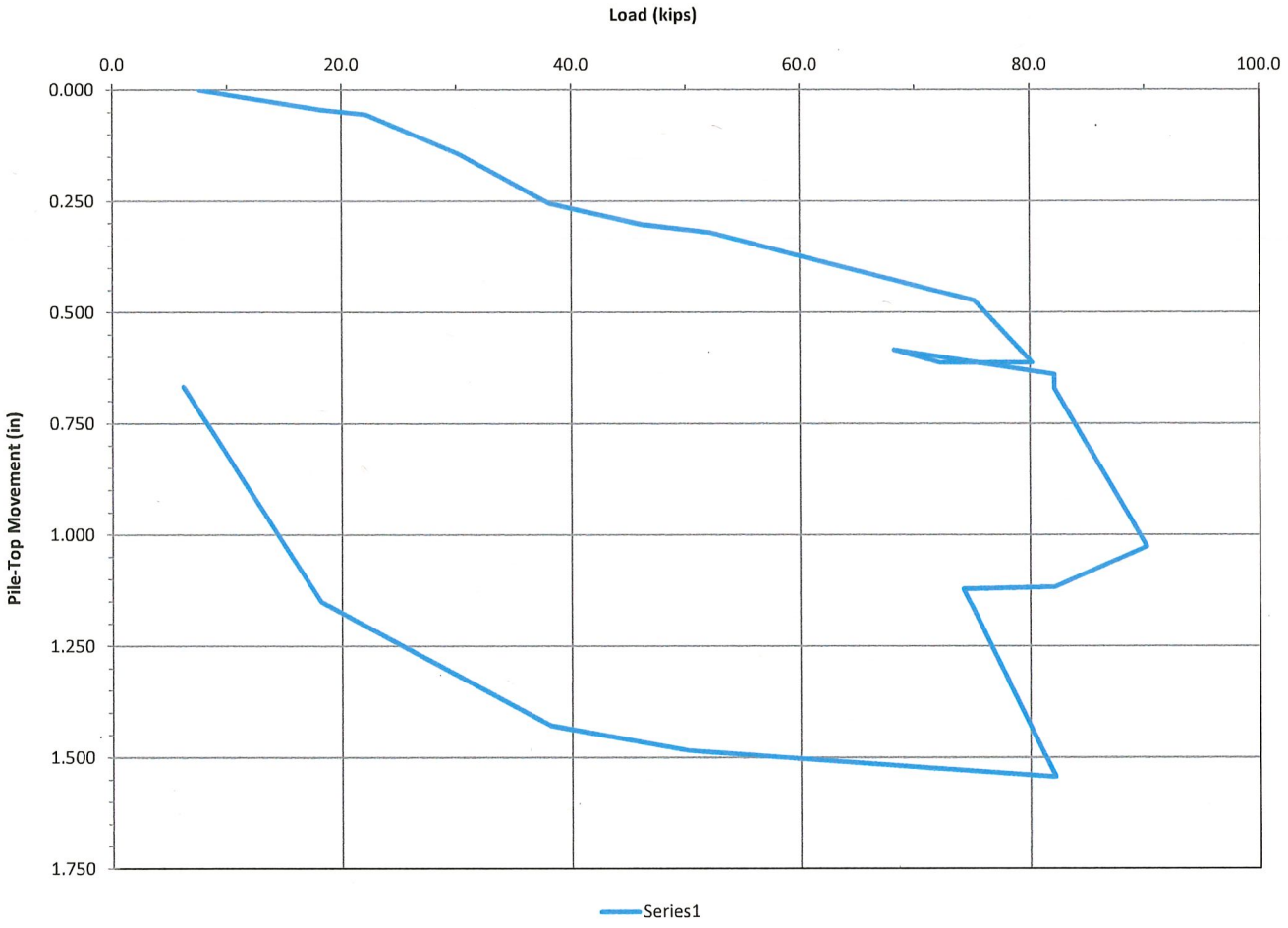
Test Type: **ASTM D1143 - Quick Test**
Helical Pile #: Test Pile
Helical Pile Size: SS200
Helix Configuration: 8"-10"-12"

Design Load (DL), kips: 75.0
Max Test Load (MTL), kips: 150.0

Atlas Project: 19255
Test Date: 12/4/2019
Total Length, ft: 29.2
Lead Section, ft: 5.0
Extensions, ft: 28.0
Cutoff, ft: 3.8
Jack: 100T Simplex

Target % of MTL	Target Load (kips)	Target Pressure	Actual Pressure (psi)	Actual Load (kips)	Pile Dial Gauge 1	Pile Dial Gauge 2	Pile Movement	Hold Time (min)*
5%	7.5	470	470	7.6	**0.000**	**0.000**	**0.000**	4
10%	15.0	840	1000	18.2	**0.070**	**0.018**	**0.044**	4
15%	22.5	1,220	1200	22.2	**0.086**	**0.024**	**0.055**	4
20%	30.0	1,590	1600	30.2	**0.212**	**0.073**	**0.142**	4
25%	37.5	1,970	2000	38.2	**0.374**	**0.137**	**0.255**	4
30%	45.0	2,340	2400	46.2	**0.442**	**0.162**	**0.302**	4
35%	52.5	2,720	2700	52.2	**0.467**	**0.173**	**0.320**	4
40%	60.0	3,090	3100	60.2	**0.544**	**0.204**	**0.374**	4
45%	67.5	3,470	3500	68.2	**0.622**	**0.231**	**0.427**	4
50%	75.0	3,840	3850	75.2	**0.689**	**0.258**	**0.473**	4
55%	82.5	4,220	4100	80.2	**0.887**	**0.338**	**0.612**	4
55%	82.5	4,220	3700	72.2	**0.890**	**0.336**	**0.613**	1
55%	82.5	4,220	3500	68.2	**0.832**	**0.336**	**0.584**	1
55%	82.5	4,220	4200	82.2	**0.913**	**0.366**	**0.639**	4
55%	82.5	4,220	4200	82.2	**0.958**	**0.386**	**0.672**	4
55%	82.5	4,220	4600	90.2	**1.439**	**0.613**	**1.026**	5
60%	90.0	4,590	4200	82.2	**1.561**	**0.673**	**1.117**	4
65%	97.5	4,970	3800	74.2	**1.567**	**0.676**	**1.121**	4
70%	105.0	5,340	4200	82.2	**2.118**	**0.968**	**1.543**	4
75%	112.5	5,720	2600	50.2	**2.033**	**0.935**	**1.484**	4
80%	120.0	6,090	2000	38.2	**1.958**	**0.900**	**1.429**	4
85%	127.5	6,470	1000	18.2	**1.583**	**0.718**	**1.151**	4
90%	135.0	6,840	400	6.2	**0.917**	**0.416**	**0.667**	4
95%	142.5	7,220						4
100%	150.0	7,590						1
100%	150.0	7,590						2
100%	150.0	7,590						3
100%	150.0	7,590						4
100%	150.0	7,590						5
100%	150.0	7,590						6
100%	150.0	7,590						7
100%	150.0	7,590						8
100%	150.0	7,590						9
100%	150.0	7,590						10
80%	120.0	6,090						4
60%	90.0	4,590						4
40%	60.0	3,090						4
20%	30.0	1,590						4
5%	7.5	470						4

Duluth Energy Systems, Duluth, MN
SS200 Helical Pile Load Test
Compression - ASTM-D1143



Atlas Project No. 19255
Test Date: December 4, 2019

Calibration Certificate

Date: 5/31/2019 **Certificate #: 212994**

Calibration Performed By:

BRAUN INTERTEC
The Science You Build On.

11001 Hampshire Ave S
Bloomington, MN 55438
Phone: 952-995-2000

Client:

ATLAS FOUNDATION COMPANY
COREY REESE
11730 BROCKTON LANE NORTH

Equipment Information

Braun I.D.:	36286	Client I.D.:	
Description:	100 TON HYDRAULIC RAM	Serial Number:	
Manufacturer:	SIMPLEX	Model Number:	RCD1006A
Equipment Type:	HYDRAULIC	Sub-type:	RAM
Temperature:	72 F Rel. Humidity: 41 %	Performed by:	EKNUDSON
Calibration Date:	5/31/2019	Calibration Result:	PASS
Last Cal Date:		Due Date:	5/31/2020
Client PO # :		Calibration Interval:	12 months
Assigned to:		Calibration Location:	CLIENT FACILITY

Calibration Notes or Opinions

Y=20.0X-1829
Regression only valid with Enerpac 10,000 psi pressure gauge

Test Data

Seq.	Description	Standard	Tolerance -	Tolerance +	As Found	As Left	Unit	Result	Unc
1	Load at 1000 psi	0	0	0	18300	18300	lb	Pass	643 lb
2	Load at 2000 psi	0	0	0	38150	38150	lb	Pass	643 lb
3	Load at 3000 psi	0	0	0	58170	58170	lb	Pass	1419 lb
4	Load at 4000 psi	0	0	0	78343	78343	lb	Pass	1419 lb
5	Load at 5000 psi	0	0	0	98148	98148	lb	Pass	1419 lb
6	Load at 6000 psi	0	0	0	118215	118215	lb	Pass	1419 lb
7	Load at 7000 psi	0	0	0	138450	138450	lb	Pass	1419 lb
8	Load at 8000 psi	0	0	0	158435	158435	lb	Pass	1419 lb
9	Load at 9000 psi	0	0	0	178303	178303	lb	Pass	1419 lb

Standards Used To Calibrate Equipment

I.D.	Serial #	Manufacturer	Description	Calibration Vendor	Cal Date	Due Date
01573	PASSWORDTINIUS OLSEN		COMPRESSION MACHINE	BRAUN INTERTEC	2/15/2019	2/15/2020

Braun Intertec Procedures Used In This Event:

3.6.IV.17 HYDRAULIC RAMS - MS WORD.docx

Calibration Certificate

Date: 5/31/2019 **Certificate #: 212994**

Work Approved by:

Erik Knudson

CALIBRATION TECHNICIAN

A2LA Certificate # 3940.01

Remarks:

This piece of equipment was calibrated according to the manufacturer specification, or industry recognized standard specification. The calibration was conducted using standards traceable to the SI through the NIST or other NMI.

Reference equipment traceability has been established through other ISO/IEC 17025 accredited calibration laboratories.

Uncertainty shown is total accumulated uncertainty for the corresponding measurements at a confidence level of 95%.

Uncertainty may be greater than the listed CMC when calibrations are performed in the client facilities or on client equipment.

There is no warranty that the equipment will remain within tolerance until the next scheduled calibration date due to influences beyond our control. This certificate shall not be reproduced without the consent of the calibration laboratory.

Uncertainty has not been taken into account in the determination of whether the device meets the stated tolerances.

*** Indicates test result that does not fall under the laboratory accreditation.

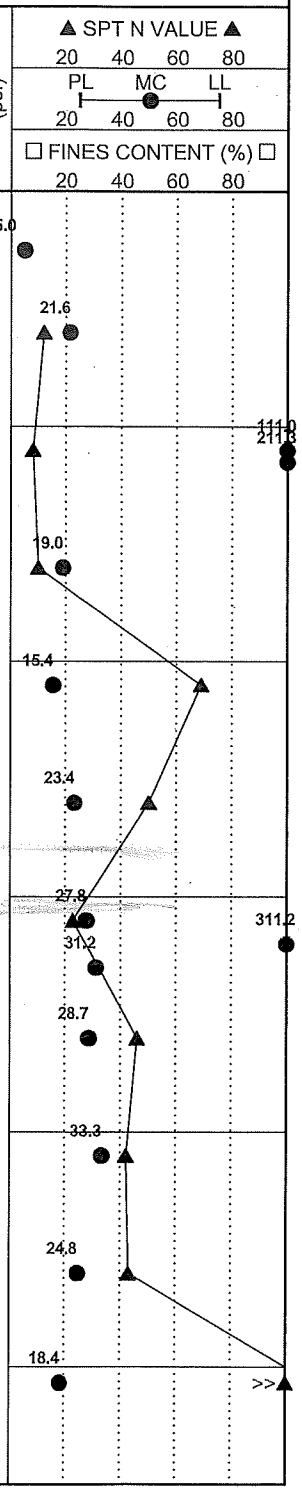
EPC Engineering & Testing
Geotechnical • Environmental • Materials Engineering
539 Garfield Avenue
Duluth, Minnesota 55802

BORING NUMBER SB-19-1

CLIENT Ever-Green Energy, Inc.
PROJECT NAME Duluth Energy Systems Hot Water Conversion
PROJECT NUMBER 19G1376
PROJECT LOCATION 1 Lake Place Drive, Duluth, MN
DATE STARTED 7/11/19 **COMPLETED** 7/12/19
GROUND ELEVATION _____ **HOLE SIZE** 7-inch
DRILLING CONTRACTOR EPC Engineering & Testing
GROUND WATER LEVELS:
DRILLING METHOD CME 750 ATV with HSA & MR and SPT Cal. to N68
▽ **AT TIME OF DRILLING** 10.0 ft
LOGGED BY SR **CHECKED BY** GH
AT END OF DRILLING ---
NOTES Parking lot boring.
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Pocket Penetrometer	DRY UNIT WT. (pcf)
	0		1.5-inches Bituminous Pavement.					
			SILTY SAND (SM) (FILL) Brown, dry to moist, with to trace gravel.	AUGER 1	100			
			CLAY with Organic Fines (CL-CH) (FILL) Dark grayish brown, moist to wet, trace sand and gravel, with to trace wood and organics, stiff consistency. Organic content = 3.8% (slightly organic to organic).	SPT 2	58	5-7-5-6 (12)	1.8	102
	10		WOOD and GRAVEL (FILL) Dark grayish brown, water bearing, trace clay, loose relative density. Organic content = 19.3% (highly organic).	SPT 3	46	4-4-4-4 (8)		22
			PEAT (PT) (ORGANIC) Black and brown, moist to wet, fibric, loose relative density. Organic content = 53.1% (peat organic).					
			SAND and GRAVEL (FILL) Dark grayish brown to brown, water bearing, trace gravel and organics, loose to medium dense relative density.	SPT 4	33	3-5-5-21 (10)		
	20		SILTY SAND (SM) to SAND with Silt (SP-SM) (Could Be Fill) Brown, wet to water bearing, with to trace gravel, very dense to dense to medium dense relative density.					
			Trace black/organic in sample from 20 to 22-feet. Organic content = 0.9% (not organic).	SPT 5	58	18-26-43-44 (69)		
			Began mud rotary drilling at 15-feet. Gravel caved into auger while drilling from 15-feet to 20-feet. Advanced auger to 20-feet and continued mud rotary drilling. Trace clay in sample from 25 to 27-feet.	SPT 6	67	26-25-25-31 (50)		
			Driller's note: With cobble/boulder from about 27 to 29-feet.					
	30		PEAT (PT) (ORGANIC) Black, wet to water bearing, granular-like, trace sand lens, medium dense relative density. Organic content = 56.6% (peat organic).	SPT 7	71	14-11-12-17 (23)		
			SAND with Silt (SP-SM) to SILTY SAND (SM) Brown, wet to water bearing, dense relative density.	SPT 8	71	17-18-28-26 (46)		
	40		Trace black/organic in sample from 40 to 42-feet. Organic content = 1.8% (not to slightly organic).	SPT 9	63	16-22-20-20 (42)		
				SPT 10	67	11-18-25-24 (43)		
	50		Trace rock chips in sample from 50 to 51.3-feet. Dark gray rock chips in sampler tip. Substantial sampler refusal.	SPT 11	50	15-45-50/4"		
			Probable BEDROCK. Took 35-minutes to penetrate 1.5-feet, then substantial refusal.	MR 12	15			
			Substantial mud rotary (button bit) refusal at 53-feet.					

Bottom of hole at 53.0 feet.



GEOTECH BH PLOTS 19G1376 EVER-GREEN DUL ENERGY.GPJ GINT US LAB.GDT 7/29/19