HELD

DR. CLARENCE WELTI, P.E., P.C.

GEOTECHNICAL ENGINEERING

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January 18, 2013

Mr. Steven Held
159 Hillside Avenue
Milford, CT 06460

Re: Geotechnical Study for Residence at 159 Hillside Avenue, Milford, CT
Proposed New Foundation and Raising Living Floor Level above the Base Flood Elevation

Dear Mr. Held:

1.0 Herewith are the boring data pertaining to the above. One boring was drilled to auger refusal at a depth of 31.5 feet below the existing grade. The approximately boring location is shown on the attached plan. *The borings were drilled by Clarence Welti Associates, Inc. and sampling was conducted by this firm solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.*

2.0 The **Subject Project** includes raising of the residence so that the bottom of the lowest supporting horizontal structural member is 1 foot above the (BFE) or (DFE) design flood elevation, whichever is higher. The design flood elevation is defined as the greater of (1) the BFE; or (2) the flood corresponding to the area designated as a flood hazard area on a community's flood hazard map or otherwise legally designated. Based on FEMA mapping dated December 17, 2010, the residence is located partially within FEMA Zone VE14 (BFE at Elev.14) and partially within FEMA Zone AE11 (BFE at Elev.11). We are not aware if there are community maps which designate a higher elevation. The CT building code requires that structures in coastal high hazard zones (V Zones) shall be supported on pilings/piers, the pilings/piers shall have adequate soil penetration to resist the combined wave and wind loads, and the pile/pier embedment shall include consideration of decreased resistance capacity caused by scour of soils around the piles/piers.

3.0 The **Soils Cross Section** from the boring is generally as follows:

Possible FILL or disturbed Soils; fine to coarse SAND, some Gravel, trace Silt to 10 feet below grade, medium compact

SILT and fine SAND, little Organics to 12 feet, loose

Fine to coarse SAND, some Gravel, little Silt to 20.5 feet, dense to very dense

Fine to medium SAND, some Silt, little Gravel to the top of weathered rock at 25 feet, dense to very dense

Weathered/Decomposed Rock to 31.5+ feet, very dense

Bedrock; Schist

3.1 The **Water Table** was at 9 feet below the existing grade at the completion of the boring. The water table is tidal.

3.2 The **Estimated Properties** of the on-site soils are as follows:

Soil to 10 feet below grade	
Unit Weight:	125 pcf
Submerged Unit Weight:	63 pcf
Internal Friction Angle:	30°
Soil from 10 to 12 feet below	
Unit Weight:	110 pcf
Submerged Unit Weight:	48 pcf
Internal Friction Angle:	20°
Soil below 12 feet below existing grade	
Unit Weight:	130 pcf
Submerged Unit Weight:	68 pcf
Internal Friction Angle:	36°

4.0 The **Criteria for Foundation Type and Loading** are as follows:

1. The maximum total settlement shall not exceed 1" and the maximum differential settlement shall not exceed ½ the maximum settlement.

2. The Foundation Type and Loading must address the seismic section of the building code

3. The Foundation must address uplift and lateral loading on the structure during design storms, assuming scour to 3 to 4 feet below existing grades.

The above performance criteria are typical for structure similar to the subject structure. If the owner, engineer or architect have other criteria, the writer should be apprised.

4.1 Regarding item 2 (above), the seismic site soil profile classification is "C". The mapped MCE spectral response acceleration values for Milford, CT are $\mathbf{S_1 = 0.062}$ for one second period and $\mathbf{S_S = 0.253}$ for short periods.

5.0 Based on the presence of fill or disturbed soils to about 10 feet below grade and the requirement to resist lateral and uplift loading with possible scouring of the soils, the foundation type for the structures should be with piers or piles driven/drilled to 12+ feet below the existing grades. Based on the required placement of support beneath the raised house (limited space), the logical type of support for the house would be with helical piles. Considering the potential for scouring and the probable depth of the piles, the lateral capacity of a vertical pile would be less than 1 kip/pile. Additional lateral loading could be resisted by battered piles. The resistance to uplift would be dependent on the final depth of the piles. The allowable uplift resistance, for a pile installed to a depth of 12 feet, would be 4 kips/pile.

5.1 The **Frost Protection Depth** is 3.5 feet below the finished exterior grades in areas which are exposed to weather.

5.2 Summary of Foundation Design Parameters:

Parameter	Value
Recommended Maximum Compression Loading on Helical Piles	20 kips
Recommended uplift loading on the Helical Piles	4 kips
Design Lateral Loading on piles	1 kip
Seismic Site Soil Profile Classification	C
Mapped MCE Spectral Response Acceleration for one second period, S_1	0.062
Mapped MCE Spectral Response Acceleration for short period, S_S	0.253
Frost Protection Depth	3.5 feet

6.0 Regarding **Earthwork,** excavations in the natural soils will fall in OSHA Class C. This will require sloping excavations, which are unshored and exceed 5 feet in height, to be cut back to slopes less than 34° from the horizontal (1.5H:1V).

7.0 This report has been prepared for specific application to the subject project in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. In the event that any changes in the nature, design and location of structures are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

The analyses and recommendations submitted in this report are based in part upon data obtained from referenced explorations. The extent of variations between explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

Dr. Clarence Welti, P.E., P.C., should perform a general review of the final design and specifications in order that geotechnical design recommendations may be properly interpreted and implemented as they were intended.

If you have any questions, please call our office.

Very truly yours,

Clarence Welti Ph.D., P. E.
President, Dr. Clarence Welti P.E.; P.C.

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT
STEVEN HELD

PROJECT NAME
RESIDENCE
LOCATION
159 HILLSIDE AVENUE, MILFORD, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140 lbs	
HAMMER FALL			30"	

OFFSET
LINE & STA.
N. COORDINATE
E. COORDINATE

SURFACE ELEV.
HOLE NO. B-1

GROUND WATER OBSERVATIONS
AT 9.0 FT. AFTER 0 HOURS
AT FT. AFTER HOURS

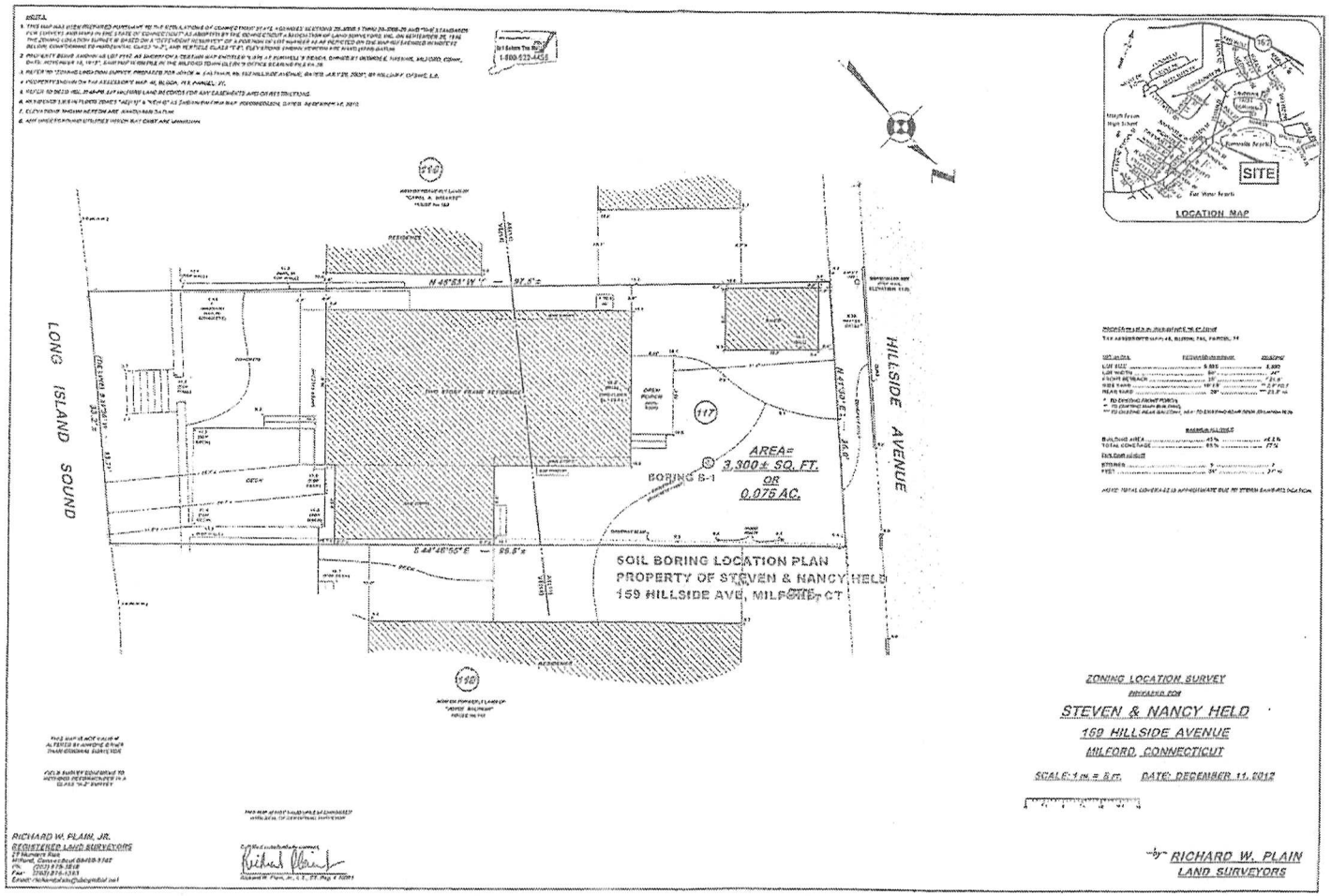
START DATE 1/8/13
FINISH DATE 1/8/13

DEPTH	SAMPLE NO.	BLOWS/6"	DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0					CONCRETE	
	1	60	1.00'-1.50'		BR.FINE-CRS.SAND, SOME GRAVEL, TRACE SILT	0.66
	2	20-19-15-21	2.00'-4.00'			
	3	18-15-13-13	4.00'-6.00'			
5						
10	4	3-3-3	10.00'-11.50'		DARK BR.SILT AND FINE SAND, LITTLE ORGANICS	10.0
	5	6-18-20-35	11.50'-13.50'		GREY/BR.FINE-CRS.SAND, SOME GRAVEL, LITTLE SILT	12.0
15	6	60	15.00'-15.50'			
20	7	15-25-50	20.00'-21.50'		GREY FINE-MED.SAND, SOME SILT, LITTLE GRAVEL	20.5
25	8	60	25.00'-25.50'		WEATHERED/DECOMPOSED ROCK	25.0
30	9	60	30.00'-30.08'			
					BOTTOM OF BORING @ 31.5' (AUGER REFUSAL)	31.5
35						

LEGEND: COL. A:
SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: J. SMITH
INSPECTOR:

SHEET 1 OF 1 | HOLE NO. B-1



ZONING LOCATION SURVEY
PREPARED FOR
STEVEN & NANCY HELD
159 HILLSIDE AVENUE
MILFORD, CONNECTICUT

SCALE: 1 in. = 8 ft. DATE: DECEMBER 11, 2012

by RICHARD W. PLAIN
LAND SURVEYORS

RICHARD W. PLAIN, JR.
REGISTERED LAND SURVEYOR
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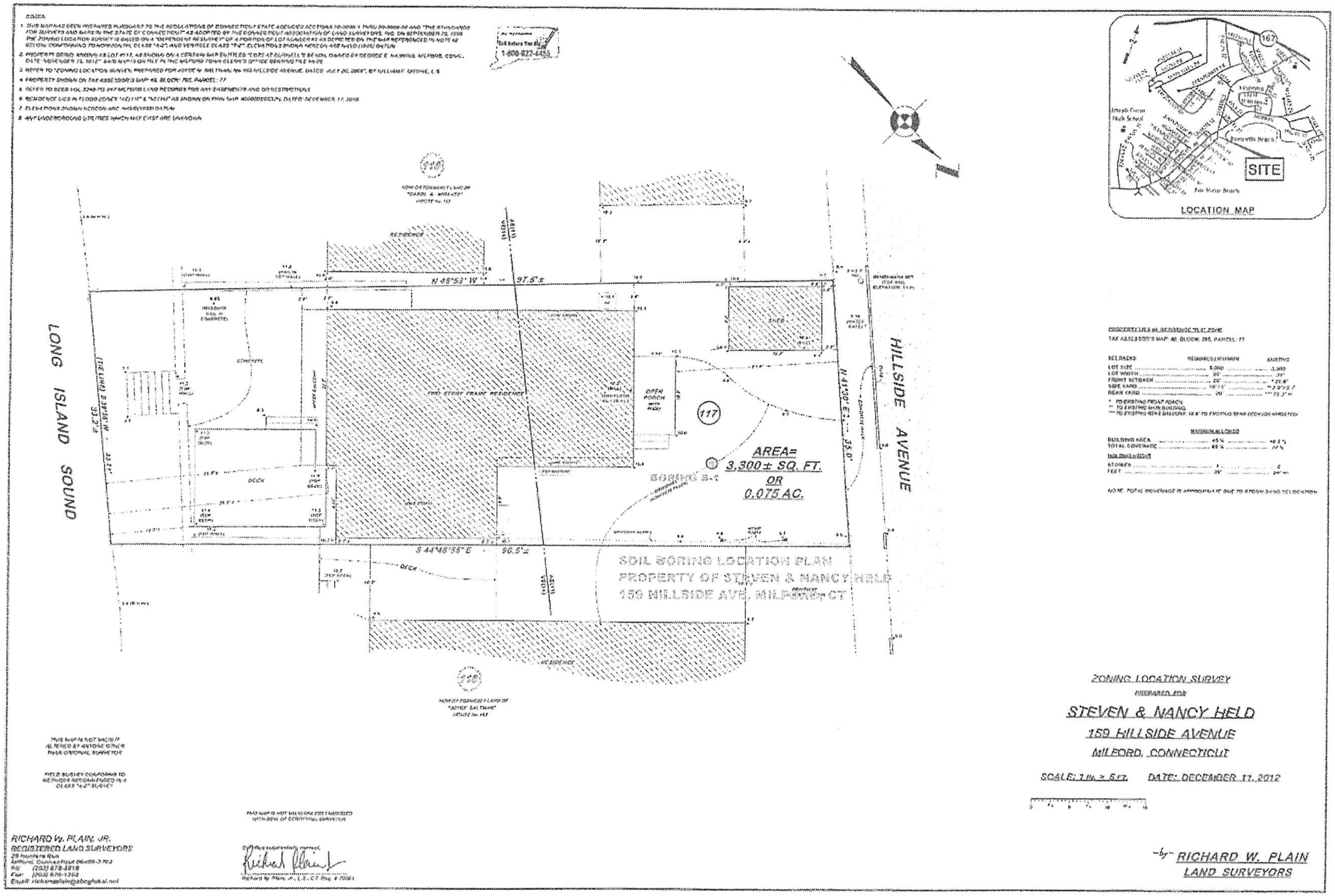
HILLSIDE AVENUE
LONG ISLAND SOUND
N 41°30' E ± 35.0'
N 45°53' W 97.5'±
S 44°46'55" E 96.5'±
(TIE LINE) S 38°36' W 33.2'±
AREA=
3,300± SQ. FT.
OR
0.075 AC.
117
BORING B-1
OPEN PORCH
SHED
DECK
TWO STORY FRAME RESIDENCE
RESIDENCE
SOIL BORING LOCATION PLAN
PROPERTY OF STEVEN & NANCY HELD
159 HILLSIDE AVE, MILFORD, CT
SITE
LOCATION MAP
Call Before You Dig
1-800-922-4455
ZONING LOCATION SURVEY
PREPARED FOR
STEVEN & NANCY HELD
159 HILLSIDE AVENUE
MILFORD, CONNECTICUT
SCALE: 1 IN. = 5 FT.
DATE: DECEMBER 11, 2012
-by- RICHARD W. PLAIN
LAND SURVEYORS
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REGISTERED LAND SURVEYORS