ADDENDUM #2

ESSEX COUNTY, NEW YORK
PUBLIC SAFETY REMOTE COMMUNICATIONS SYSTEM

ELECTRICAL CONTRACTOR SERVICES INVITATION TO BID (ITB)

ESSEX COUNTY PURCHASING
7551 COURT STREET
P.O. BOX 217
ELIZABETHTOWN, NY 12932
(518) 873-3330

June 17, 2013

This Addendum, issued to bid document holders, indicates changes to the bid documents for the *Electrical Contractor Services Invitation to Bid (ITB)*.

This Addendum is hereby made part of the Contract Documents. All other requirements of the Contract Documents remain if full-force and effect.

1. Bidder Requests for Information (RFI's) shall be emailed to Linda Wolf of Essex County at lwolf@co.essex.ny.us

2. Bidders shall be advised that the following dates apply to this Bid:
   a. Last Day of RFI's 06-19-13 @ 5PM
   b. County Responses to RFI's 06-24-13 @ 5PM
   c. Bid Submittals Due 06-28-13 @ 2PM

3. As requested at the pre-bid walk, the following dates apply as the current know on-site delivery dates for equipment shelters at the following sites:
   a. Terry Mountain 07-24-13
   b. Mount Pisgah 07-17-13
   c. Wells Hill 07-10-13

4. As requested at the pre-bid walk, accompanying this Addendum #2 are the project Geotechnical Investigation Reports for Mount Pisgah, Terry Mountain, and Wells Hill.

5. Bid Drawing E-130 for Blue Mountain calls for two (2) #1/0 AWG bare copper buried 18” minimum between the two (2) existing buildings (shelters) if not already in place. For purposes of this bid, bidders shall assume lateral grounding ties are not in place and include the costs for adding the two (2) connections in their proposals.

6. The following clarification is being issued for all bid sites as related to exterior underground utility trenching, conduit installation, exterior grounding and conductor/wire installation:
   a. Bidders are directed to review Drawing E-001 for applicable Project General Notes #4, #5 & #6 which detail the responsibilities of the General Contractor (GC) and the Electrical Contractor (EC) related to these installations.
   b. Bidders are directed to review Project Summary Specification 01 10 00, Section 2.02 for Inclusions and Exclusions related to the scope of this bid.
   c. Bidders are further directed to review Project Summary Specification 01 10 00, Section 2.03 for detailed site-by-site project scope.

7. Clarification – Drawing E-150 for Lewis PSB calls for an electrical tie-in to a “non-UPS Powered Panelboard” in the UPS Room A039 which was not found during the pre-bid walk. Bidders are to tie into nearest non-UPS panel source with availability for this scope assuming this will be within 100-feet of the UPS Room.

8. Clarification – Drawing E-150 for the Lewis PSB calls for providing a 3P, 125A circuit breaker in the existing Liebert UPS. The ENGINEER has confirmed that beneath the right-side blanking panel, the interior bus contains adequate spare space for this new breaker. Bidders to follow current drawing direction for this scope.

This Addendum is hereby made part of the Contract Documents.

Please sign and return with your proposal:

I, ____________________, of ____
(Company)

Have received the Addendum and will include it with the specifications for the above Essex County Proposal.

Linda M. Wolf, CPA, CPPB
Purchasing Agent

– END OF ADDENDUM # 2 –

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Essex County Emergency Services
702 Stowersville Road
P.O. Box 30
Lewis, NY 12950

Attention: Donald Jaquish

October 11, 2011

RE: W.O. 5932.06
GEOTECHNICAL ENGINEERING SERVICES
PROPOSED EQUIPMENT SHELTER
MOUNT PISGAH SITE
SUMMIT OF MOUNT PISGAH SKI AREA
TOWN OF SAINT ARMAND, ESSEX COUNTY, NEW YORK

Dear Mr. Jaquish,

Tectonic Engineering & Surveying Consultants, P.C. has completed a subsurface investigation and a geotechnical engineering analysis for the proposed equipment shelter to be located at the above-referenced project site. The results of our investigation and analysis are summarized in this report, in the form of recommendations for the design and construction of the proposed foundations.

1.0 DESIGN CONSIDERATIONS

The proposed equipment shelter will measure approximately 10 feet by 24 feet in footprint, and will include a 6-foot by 9-foot generator room, as well as communications equipment which is to be used by Essex County for emergency service communications. The foundation for the shelter is anticipated to be subjected to relatively light vertical loading and minimal horizontal loading.

2.0 PROJECT AND SITE DESCRIPTION

The project site is located at the summit of the Mount Pisgah Ski Center in the Village of Saranac Lake, Town of Saint Armand, Essex County, New York. The site consists of a hill with a ski area with several ski and snowboard trails on the north side, and generally undisturbed wooded hillside on the remaining sides. The site is located at the top of the hill, near an existing guyed tower and an existing equipment shelter. An access road extends from the ski area at the base of the north side of the hill to the tower site. A separate cellular communications tower site, consisting of a self-support tower and two equipment shelters, is located approximately 100 feet west of the site. Overhead wires enter the guyed tower site from the north, west, and southeast directions.

The proposed equipment shelter will be located about 6 feet southeast of the base of the guyed tower. The area of the proposed shelter generally consisted of overgrown grass at the time of the subsurface investigation, and slopes downward gently towards the southeast. Some minor re-grading of the site may be required to create a level grade around the equipment shelter.

3.0 SUBSURFACE INVESTIGATION

An investigation was performed to identify the subsurface conditions below the proposed equipment shelter for the purpose of foundation design and construction. The subsurface investigation consisted of one test boring performed within the footprint of the proposed equipment shelter to a depth of 5.8 feet below existing grade. The boring was drilled by TransTech Drilling Services, Inc. on August 17, 2011, with an all-terrain mounted drill rig. The boring was advanced using 3-1/4 inch inside diameter hollow-stem augers. Standard Penetration Testing (SPT), using a 2-inch O.D. split-spoon sampler, was performed continuously throughout the boring. A geotechnical engineer was on-site during the boring operations to locate the boring, collect and identify the soil conditions, and to prepare a log of the subsurface conditions encountered. The boring location is indicated on the Boring Location Plan (Figure 1), which is attached to this report. A typed copy of the boring log is also attached.

4.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered within the boring consist of a thin layer of topsoil overlying gravelly sand soil, weathered bedrock, and bedrock. The soil directly underlying the topsoil consists of brown medium to fine sand with some silt and trace to some coarse to fine gravel. The SPT N-values within these soils were 8 blows per foot in the upper 2 feet, and split-spoon sampler refusal below a depth of 2 feet. Split-spoon sampler refusal is defined as more than 50 blows for less than 6 inches of sampler penetration. Within the upper 4 feet, the split-spoon sampler refusals were likely due to the presence of cobbles and boulders. Below a depth of 4 feet, the recovered samples resembled fractured rock fragments. The N-values indicate very dense conditions below a depth of 2 feet. Auger refusal, due to more competent bedrock, was encountered at a depth of 5.8 feet below grade.

Groundwater was not encountered during the boring. Based on local topography, the depth to groundwater likely exceeds the depths explored. It should be noted that groundwater levels fluctuate and that groundwater may be present at different depths at other times.

5.0 RECOMMENDATIONS

The equipment shelter can be supported on conventional spread footing foundations or circular piers bearing on the native sand and gravel soil or weathered bedrock. The foundations should bear at or below a depth of 5 feet for frost protection. Isolated footings should be a minimum of 2.5 feet wide, or 2.5 feet in diameter if circular piers are used. Continuous strip footings running the full length of the pad should be a minimum of 1.5 feet wide. An allowable net bearing pressure of 3 tons per square foot (tsf) should be used to size the footings.

A single mat (slab) foundation may also be utilized to support the equipment shelter. Unless the mat is designed to resist the bending which would result from heave of the soil during periods of frost, the mat should bear below the frost depth indicated earlier. Local building code requirements for unoccupied buildings should be reviewed to determine the applicability of a shallow-bearing mat. To minimize the potential for frost heave, the mat should bear on a layer of crushed stone at least 12 inches in thickness. The mat should be designed assuming a soil subgrade modulus, k, of 200 pci.

6.0 EARTHWORK CONSTRUCTION CRITERIA

The foundation subgrade should be prepared by removing all soil, cobbles, and boulders loosened by machine excavation to the required bearing depth of the foundation. The subgrade should then be inspected by a geotechnical engineer to verify that the subgrade soils are consistent with those described on the boring logs (dense sand and gravel soil or weathered bedrock). Any unsuitable soil materials (soils other than those recommended for bearing) or areas found to be soft should be removed as directed by the geotechnical engineer. The area of removal should be within the zone of influence of the foundation as defined below. Overexcavated areas of unsuitable soil should be backfilled with structural fill. The native soils contain abundant cobbles and boulders, and these should be anticipated when performing excavations at the site.

Soils that become disturbed due to moisture (wet weather) are unsuitable for providing the recommended bearing capacity. During excavation and prior to backfilling, the ground surface around the mat excavation should be graded to divert surface water away from the excavation. The subgrade should be protected from wet weather until concrete is placed.

If groundwater is encountered, dewatering should be performed to maintain the groundwater level a minimum 2 feet below the deepest excavation in such a manner that the subgrade soils are not disturbed. Dewatering by sump pumps should not be conducted in subgrade areas. If sump pumps are utilized, they should be placed at a distance outside the subgrade area, and the excavation for the sumps should not intersect the zone of influence of the foundation. Subgrade areas disturbed by moisture should be removed from the foundation zone of influence and replaced with compacted structural fill or clean crushed gravel. The zone of influence is defined by imaginary lines sloping downward and outward from the perimeter of the mat at a 1 horizontal to 1 vertical slope.

Backfill around the foundation should be clean natural non-expansive soil free of organic matter, debris and rocks or hard lumps of material in excess of 4 inches in the longest dimension having a moisture content suitable for compaction. Imported structural fill should be clean granular soil free of organic material or debris and conform to the following gradation:

Sieve Size	Percent Finer by Weight
4"	100
¼"	30-70
No. 40	5-40
No. 200	0-10

The native soils encountered below the topsoil may be suitable for re-use as structural fill, provided that all cobbles and boulders are removed, and that additional evaluations of the soil gradation are made during construction.

All fill should be compacted to at least 95 percent of the maximum dry density at near optimum moisture contents as determined by ASTM D1557. The lift thickness for the fill soils will vary depending on the type of compaction equipment used. Fill should generally be placed in uniform lifts not exceeding 8 inches in loose thickness. In confined areas, the loose lift thickness should be 4 inches or less and each lift should be compacted with sufficient passes of hand operated vibratory or impact compaction equipment. A geotechnical engineer with appropriate field and laboratory support should inspect all footing subgrades, approve materials for use as fill, and test fill materials for compliance with the recommended compaction.

The sides of the excavation should be sloped back for safety unless a sheeting or bracing system is used. OSHA and other applicable agency requirements pertaining to worker safety should be met during the excavation activities.

7.0 SOIL RESISTIVITY TESTING

The resistivity testing was performed by setting two potential-measuring electrodes between two current carrying electrodes at various spacing for the purpose of measuring the resistance generated by the soils when passing the current through the soil. The current drop measured by the potential-measuring electrodes provides an indication of the resistance of a soil column equal in thickness to the spacing of the electrodes. The electrode spacing was equal for all spacings between the total of four electrodes during each test.

The test is run by inducing a current through the outer current-carrying electrodes and measuring the voltage drop between the inner potential-measuring electrodes. One test line was performed at the location indicated on the attached Figure 1. Site constraints prohibited performing the tests at greater spacing. The results of the resistivity testing are included on the attached forms and summarized below:

MEASURED RESISTIVITY FOR VARYING ELECTRODE SPACING (Ohm-cm)				
TEST NO.	ELECTRODE SPACING			
	2 FT	4 FT	8 FT	12 FT
RT-1	95,750	367,680	766,000	769,830

NA – TEST COULD NOT BE PERFORMED DUE TO SITE CONSTRAINTS

8.0 LIMITATIONS

Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers and geologists practicing in this or similar situations. The interpretation of the field data is based on good judgment and experience. However, no matter how qualified the geotechnical engineer or detailed the investigation, subsurface conditions cannot always be predicted beyond the points of actual sampling and testing. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The recommendations contained in this report are intended for design purposes only. Contractors and others involved in the construction of this project are advised to make an independent assessment of the rock, subsoil and groundwater conditions for the purpose of establishing quantities, schedules and construction techniques.

This report has been prepared for the exclusive use of Essex County and their agents for the specific application to the proposed equipment shelter to be located at the existing Mount Pisgah tower site in Saranac Lake, New York. We recommend that prior to construction; Tectonic Engineering & Surveying Consultants P.C. review the project plans and specifications. It should be noted that upon review of those documents, some recommendations presented herein might be revised or modified. In the event that any change in the design or location of the proposed structures are planned, Tectonic shall not consider the conclusions and recommendations contained in this report valid unless reviewed and verified in writing. It is further recommended that

Tectonic be retained to provide construction monitoring and inspection services to ensure proper implementation of the recommendations contained herein, which would otherwise limit our professional liability.

We appreciate the opportunity to be of service on this project. Should you require additional information, please do not hesitate to contact the undersigned.

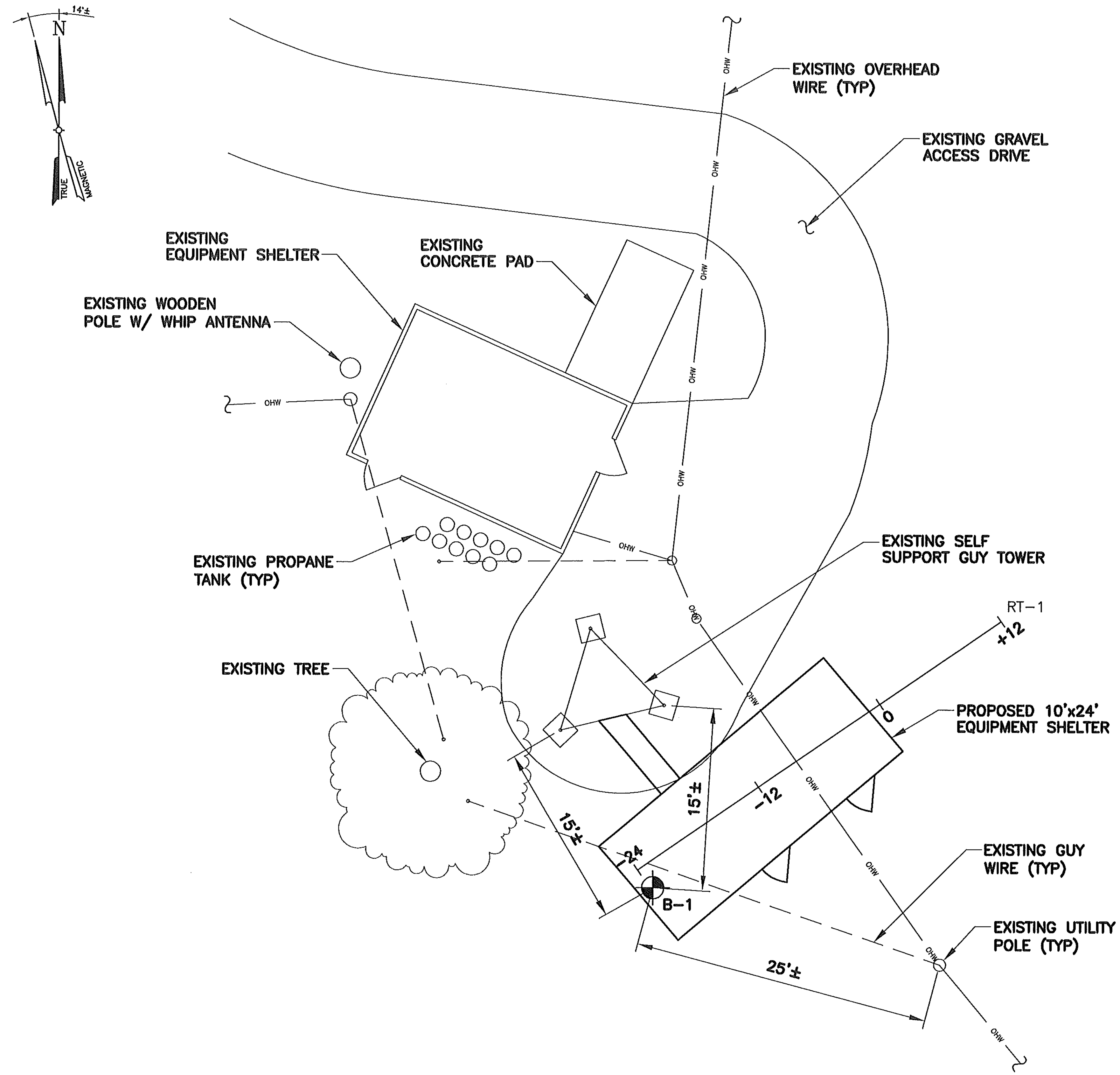
Sincerely,

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

STATE OF NEW YORK
SCOTT MICHAEL DOEHLA
083448
LICENSED PROFESSIONAL ENGINEER

Scott M. Doehla, P.E.
Manager of Engineering

Attachments: Boring Location Plan (Figure 1)
Boring Log
Legend for Soil Description



LEGEND

B-1	APPROXIMATE BORING LOCATION
-24 -12 0 +12 RT-1	APPROXIMATE RESISTIVITY TEST LOCATION

NOTES

1. BORING & RESISTIVITY TEST LOCATIONS DETERMINED ON-SITE BY MEASURING FROM EXISTING SITE FEATURES.
2. BORING LOCATION PLAN BASED ON DRAWING ENTITLED "SITE DETAIL PLAN", DRAWING Z-2 BY TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C., DATED 7/26/11.

ORIGINAL SIZE IN INCHES

0 1 2 3

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- SURVEYING
- CONSTRUCTION MANAGEMENT

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BORING LOCATION PLAN

PROPOSED EQUIPMENT SHELTER
SITE NAME: MOUNT PISGAH
SUMMIT OF MOUNT PISGAH SKI AREA
TOWN OF ST. ARMAND, ESSEX COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
9/13/11	5932.06	FIGURE 1	0
Scale 1" = 10'			

BORING No. B-1

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No.	5932.06
PROJECT:	Mt. Pisgah
LOCATION:	Saranac Lake, NY

SHEET No. 1 of 1

CLIENT: Essex County				INSPECTOR: Cory MacFee
CONTRACTOR: TransTech Drilling Services, Inc.				DRILLER: John Leonhardt
METHOD OF ADVANCING BORING	DIA.	DEPTH		SURFACE ELEVATION: ---
POWER AUGER:	3 1/4"	0 TO 5'	MON. WELL ☐ YES ☒ NO	DATUM: See Remarks
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---	DATE START: 8/17/11
CASING:		TO	WEATHER: Clear TEMP: 60° F	DATE FINISH: 8/17/11
DIAMOND CORE:		TO	DEPTH TO ROCK: Not Encountered'	
			*CHANGES IN STRATA ARE INFERRED	

GROUND WATER	DATE	TIME	DEPTH
	8/17/11		NE

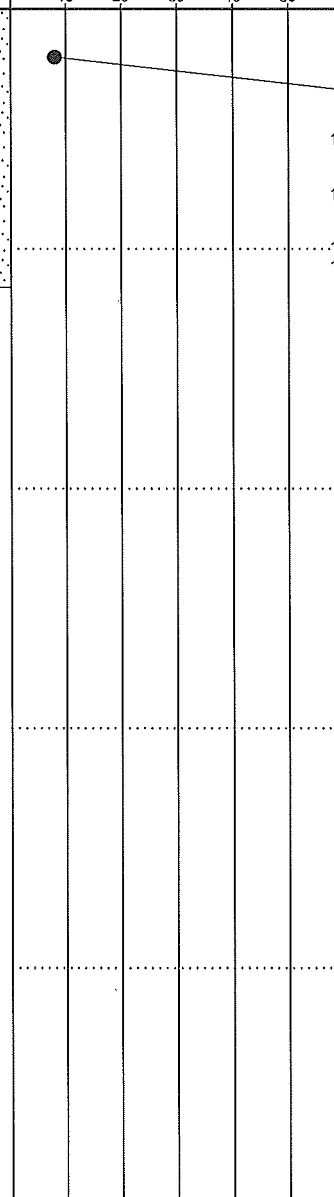
DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL
0–2	8	3, 4, 4, 7	S-1	8		D	SM	Bwn c-f SAND, some Silt, trace c-f Gravel
2–4	160+	12, 60, 100/3	S-2	6		D	SM	Tn c-f SAND, some Silt, some c-f Gravel
4	100+	100/3	S-3	2		D	SM	Tn c-f SAND, some Silt, trace c-f Gravel (rock fragments)
5	100+	75	S-4	4		D	SM	Same
6–7	100+	100/3, 68, 100/2	S-5	2		D	SM	Same

End of Boring at 5.8'

UNCONFINED COMPRESS. STRENGTH (TONS/FT): 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %: 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.): 10 20 30 40 50



DEPTH (FT.): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

REMARKS: Surface elevation data not available.

BORING LOG 5932-06.GPJ TECTONIC ENG.GDT 10/11/11

TECTONIC

SOIL RESISTIVITY DATA SHEET

W.O. NO.: 5932.06 PAGE 1 OF 1

DATE: August 17 2011

CIIENT: Essex County	DEPTH OF SEEPAGE: NE	PROJECT: Mt. Pisgah
CONTRACTOR: Transtech Drilling Services	DEPTH TO GROUNDWATER: NE	LOCATION: Saranac Lake, NY
EQUIPMENT: Nilsson Model 400	DEPTH TO BEDROCK: NE	INSPECTOR: Cory MacFee
	SUFACE ELEVATION: N/A	DATUM: N/A

Location of Test: Near proposed shelter location

Electrode Spacing "a" (ft)		Electrode Depth (a/20)	Measured Average Soil Resistance	Soil Resistivity (ohm-cm)
2 FT	2	0.1	250	95,750
4 FT	4	0.2	480	367,680
8 FT	8	0.4	500	766,000
12 FT	12	0.6	335	769,830
16 FT				

Other

Other

Orientation of Leads: East to West

Topography: mostly level sloping downward to north, east, west and upward to the south

Remarks: Due to restrictive features of site, tests were limited to spacing indicated above.

Method of Resistivity Determination ☐ Nomogram ☐ P=2Π aR (for homogenous soils)

LEGEND FOR SOIL DESCRIPTION

GRANULAR SOIL (Coarser than No. 200 Sieve)

DESCRIPTIVE TERM	GRAIN SIZE: SAND	GRAVEL
Coarse - c	No. 4 Sieve to No. 10 Sieve	3" to ¾"
Medium - m	No. 10 Sieve to No. 40 Sieve	
Fine – f	No. 40 Sieve to No. 200 Sieve	¾" to $^{3}/_{16}$"
COBBLES	3" TO 10"	
BOULDERS	10" +	

GRADATION DESIGNATIONS	PROPORTIONS OF COMPONENT
Fine, f	Less than 10% coarse and medium
Medium to Fine, m-f	Less than 10% coarse
Medium, m	Less than 10% coarse and fine
Coarse to medium, c-m	Less than 10% fine
Coarse, c	Less than 10% medium and fine
Coarse to fine, c-f	All greater than 10%

COHESIVE SOIL (Finer than No. 200 Sieve)

DESCRIPTION	PLASTICITY INDEX	PLASTICITY
Silt	0-1	None
Clayey Silt	2-5	Slight
Silt & Clay	6-10	Low
Clay & Silt	11-20	Medium
Silty Clay	21-40	High
Clay	Greater Than 40	Very High

PROPORTION

DESCRIPTIVE TERM	PERCENT SAMPLE BY WEIGHT
trace	1-10
little	10-20
some	20-35
and	35-50

The Primary component is fully capitalized

COLOR

Blue	- blue	Gy	- gray	Wh	- white	Yl	- yellow
Blk	- black	Or	- orange	Tn	- tan	Lgt	- light
Bwn	- brown	Rd	- red	Gn	- green	Dk	- dark

SAMPLE NOTATION

S	- Split Spoon Soil Sample	WOC	- Weight of Casing
U	- Undisturbed Soil Sample	WOR	- Weight of Rod
C	- Core Sample	WOH	- Weight of Hammer
B	- Bulk Soil Sample	PPR	- Compressive Strength Based on Pocket Pentrometer
NR	- No Recovery of Sample		
		TV	- Shear Strength (tsf) Based on Torvane

LEGEND FOR ENGINEERING ROCK CLASSIFICATION AND CORE DESCRIPTION (1)

DESCRIPTIVE TERMINOLOGY FOR JOINT SPACING

DESCRIPTIVE TERM	SPACING OF JOINT
Very Close	Less Than 2 ½ inches
Close	2 ½ to 8 inches
Medium	8 to 24 inches
Wide	2 to 6 feet
Very Wide	Greater than 6 feet

RELATIONSHIP OF RQD AND ROCK QUALITY

Rock Quality Designation (RQD) (2)	Description of Rock Quality
0-25%	Very Poor
25-50%	Poor
50-75%	Fair
75-90%	Good
90-100%	Excellent

(1) Core description system is based on a suggested system proposed in the Design manual 7.1 – Soil Mechanics, Department of the Navy, Navy Facilities Engineering Command, (May 1982).

(2) "Rock Quality Designation" is defined as a modified core recovery ration which considers only pieces of core that are at least 4 inches long. Obvious fractures introduced by drilling are ignored in this system.

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Essex County Emergency Services
702 Stowersville Road
P.O. Box 30
Lewis, NY 12950

Attention: Donald Jaquish

September 30, 2011

RE: W.O. 5932.07
GEOTECHNICAL INVESTIGATION
PROPOSED EQUIPMENT SHELTER AND TOWER UPGRADES
EXISTING 890-FOOT GUYED TOWER "TERRY MOUNTAIN"
1159 PEASLEEVILLE ROAD
PERU, CLINTON COUNTY, NEW YORK

Dear Mr. Jaquish,

Tectonic Engineering & Surveying Consultants, P.C. has performed a subsurface investigation and geotechnical engineering analyses for the above-referenced project. The purpose of the investigation was to identify the soil, bedrock and groundwater conditions in the vicinity of the existing 890-foot guyed tower and associated guy anchors, and the proposed equipment shelter at the site. This report presents our findings and general descriptions of the site and the investigation.

1.0 SITE DESCRIPTION

The project site is located at 1159 Peasleeville Road in the Town of Peru, Clinton County, New York. The site is an existing tower complex located at the top of Terry Mountain. The property is owned by Rollins Telecasting and contains a fenced compound with three guyed towers, an L-shaped equipment building, and a garage at the crest of the hill. A self-support tower is located within a separate fenced compound approximately 120 feet southwest of, and downhill from, the previously described compound. The ground surface within the compound and the immediately surrounding area is relatively level, but slopes down steeply towards the southwest and southeast, and more gently downward towards the north, at locations away from the compound. The area around the compound comprise the sides of Terry Mountain and are generally vegetated with mature coniferous and deciduous trees, with occasional wetland areas. Bedrock outrcrops are evident at the ground surface within the compound area, outside the compound area, and on the slopes surrounding the tower complex.

The three towers located within the fenced compound are all guyed towers with heights of 60 feet, 100 feet, and 890 feet. The self-support tower within the separate compound has a total height of approximately 160 feet. Each guyed tower is supported by three arrays of guy anchors generally oriented approximately 120 degrees from each other around the tower.

The 890-foot guyed tower is supported at its base by an approximately 4-foot square concrete pad, and has a TV antenna at the top, which extends to a total height of 963 feet above ground level. The guys for this tower extend away from the tower in three different arrays oriented approximately north, southwest, and southeast from the tower. The guys are connected to the tower at heights of 150 feet, 325 feet, 507 feet, 690 feet, and 890 feet above ground level. These guys extend to one of two anchors on each array. The closest set of anchors are located about 385 feet from the tower base, and the outer anchors are located approximately 690 feet from the tower base. Each anchor supports multiple guys and typically consists of a formed concrete block which appears to be embedded below grade. It is our understanding that the dimensions of these blocks increases below grade. Each block appears to have been constructed by excavating into the bedrock.

It is our understanding that the proposed construction includes removing sections of the tower so that the final tower height is 690 feet above grade, and the addition of several dish antennas to support the Essex County emergency communications system. A new equipment shelter is proposed to be located near the existing 890-foot guyed tower, at a location approximately 15 feet to the northwest of the tower base. The new shelter will measure approximately 10 feet by 16 feet in footprint.

3.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of the drilling of four borings, designated as B-1 through B-4. Boring B-1 was performed as near to the existing tower base as possible to a depth of 8.9 feet below grade. Boring B-2 was performed within the proposed shelter location to a depth of 6.3 feet below grade. Borings B-3 and B-4 were performed in-between the southwest and southeast arrays of guy anchors to depths between 5.4 feet and 8.6 feet below grade. The northern guy anchors array could not be accessed due to the steeply sloping terrain. The boring locations are shown on the attached Boring Location Plan (Figure 1).

The borings were drilled by TransTech Drilling Services, Inc. on August 18 and 19, 2011. The borings were advanced using a 2-1/2 inch diameter rotary drill bit through soil materials, and an NQ-size double-tube core barrel through bedrock. Standard Penetration Testing (SPT) was conducted continuously where soil was encountered over the rock. Rock coring was performed in a minimum 5-foot length at each boring location. A geotechnical engineer prepared logs of the subsurface conditions encountered within each boring. Copies of the boring logs are attached to this letter.

4.0 SUBSURFACE CONDITIONS

The subsurface conditions at the site consist of relatively thin layers of topsoil and native soil overlying bedrock. The topsoil was measured to be up to 4 inches thick at the borings. The native soils were encountered to depths between 0.4 and 3.6 feet below grade. The native soil generally consists of silty sand with some gravel.

Bedrock was encountered at depths ranging from 0.4 to 3.6 feet below grade at the boring locations. The bedrock at the site consists of grey to dark grey, slightly weathered, slightly to moderately fractured, medium to coarse grained, hard granite with traces of quartz. Fracture planes within the bedrock are oriented at angles ranging from 0 to 60 degrees from horizontal. The Rock Quality Designations (RQD's) of the cored intervals ranged from 54 to 86 percent, indicating fair to good rock mass quality.

Groundwater was not reported to be present at any of the boring locations during or upon completion of drilling. Groundwater levels will fluctuate with season and weather conditions; therefore, groundwater should be anticipated to be encountered at a shallower depth at other times.

5.0 DISCUSSION AND RECOMMENDATIONS

Based on the results of the test borings and observations made at the site, it appears that the existing tower base is supported by an approximately 4-foot square concrete foundation bearing on the granite bedrock. The guy anchors are anchored by concrete blocks embedded below grade. The increase in axial load on the tower as a result of the proposed antennae installation should be added to the existing axial load on the tower foundation. The resistance which can be provided by each of the existing guy anchors should be checked against the final resistance which will be imposed on each anchor as a result of the new antennae installation. It should be noted that some of the guy anchors may be drilled or anchored into bedrock. If drilled rock anchors were used, their capacity would be difficult to quantify without detailed information on the diameter and depth of the anchor.

The following subsections provide soil properties that can be utilized to evaluate the allowable bearing, uplift and lateral capacity of the foundations.

5.1 Tower Base

The foundation at the base of the tower consists of a 4.0-foot square concrete mat that appears to bear directly on bedrock. Based on these dimensions and the observed rock hardness and degree of weathering and fracturing, the foundation should be assumed to have an allowable bearing capacity of 20 tons per square foot (tsf) when analyzing the tower in accordance with TIA-222-F. Sliding at the base of the tower due to lateral loads should be evaluated using a frictional coefficient of 0.6 between the foundation concrete and bedrock. Passive earth pressure should be ignored.

5.2 Guy Anchorages

Each of the guy anchorages will resist the uplift and lateral forces exerted by the guy wires through a combination of dead weight, resistance to shear, and passive earth pressure. The passive earth pressure will occur, as a result of the lateral loading, along the face of the concrete blocks that are oriented perpendicular to the direction of the guy anchor and are closest to the tower. Frictional resistance will also be developed along the sides and base of the block in the opposite direction of the applied force.

Resistance to uplift forces will be in the form of dead weight of soil and concrete, and rock shear resistance along the anticipated failure planes. It is assumed that the deadmen directly abut bedrock along the side of excavation that faces the tower. When evaluating the dead weight of soil over the concrete foundation, the volume of soil should be determined based on lines extending vertically upward from the edges of the foundation (ignore cone failure methods). The shear resistance of the rock may be determined using a combined friction-cohesion model, assuming formation of a large rock wedge does not occur.

The table below provides recommended parameters for use in evaluating the rock resistance to the imposed lateral and uplift loads:

Bedrock Property	**Units**	
Total Unit Weight	Pounds per cubic foot	140
Friction Angle	Degrees	30
Cohesion	Pounds per square foot	10,000
Ultimate Friction Factor (tan δ where δ is the friction angle of bedrock against concrete)	NA	0.6

The actual dimensions and depths of the deadmen should be verified as part of the evaluation of their stability. This may be possible through non-destructive testing methods, or by performing test pit excavations against the deadmen anchors. If the results of the analysis of the existing guy anchors indicates that additional resistance to the uplift loading is required, additional resistance can be achieved by increasing the size of the blocks or by anchoring the blocks to the rock using rock anchors. Design recommendations for rock anchors can be provided upon request.

5.3 Equipment Shelter Foundation Recommendations

The equipment shelter can be supported on a conventional spread footing bearing on the bedrock. There is no minimum depth requirement when bearing on solid bedrock. An allowable net bearing pressure of 4 tons per square foot (tsf) should be used to size footings bearing on bedrock.

A single mat (slab) foundation may also be utilized to support the equipment shelter. The mat should be constructed directly on a competent bedrock subgrade.

5.4 Equipment Shelter Foundation Construction Considerations

The foundation subgrade should be prepared by excavating to the bearing depth using hydraulic excavation or rock chipping equipment or controlled blasting (if permitted), and using compressed air, brooms and/or hand shovels to remove all soil and broken rock materials loosened by excavation. The subgrade should then be inspected by the geotechnical engineer to observe and document that the materials are consistent with those described in this report (granitic gneiss bedrock). Any unsuitable materials (soil or rock other than those recommended for bearing) should be removed as directed by the geotechnical engineer. The area of removal should be within the zone of influence of the foundation, which is defined by imaginary lines sloping downward and outward from the bottom edge of the foundation at a 1 to 1 (Horizontal to Vertical) slope.

Competent bedrock encountered above the subgrade elevation should be removed to create a level bearing surface. Contractors involved in the excavation for the foundation should anticipate the need for rock removal. Over-excavated or uneven areas within the subgrade should be filled with concrete.

The bedrock surface is anticipated to be variable across the foundation area. The bedrock surface should be leveled to allow foundation construction on a surface sloping no steeper than 5 to 1 (Horizontal to Vertical).

Static groundwater is not anticipated during construction. However, perched water seepage requiring dewatering may be encountered during foundation excavation depending upon the season and rainfall conditions at the time of construction. Surface water runoff around the excavation should be intercepted outside of the subgrade area.

6.0 RESISTIVITY TEST RESULTS

The resistivity testing was performed by setting two potential-measuring electrodes between two current carrying electrodes at various spacing for the purpose of measuring the resistance generated by the soils when passing the current through the soil. The current drop measured by the potential-measuring electrodes provides an indication of the resistance of a soil column equal in thickness to the spacing of the electrodes. The electrode spacing was equal for all spacings between the total of four electrodes during each test.

The test is run by inducing a current through the outer current-carrying electrodes and measuring the voltage drop between the inner potential-measuring electrodes. Three test lines were performed at the locations indicated on the attached Figure 1. The test spacing indicated above was performed for each test line, indicated as RT-1 through RT-3. Site constraints prohibited performing the tests at greater spacing. The results of the resistivity testing are included on the attached forms and summarized below:

MEASURED RESISTIVITY FOR VARYING ELECTRODE SPACING (Ohm-cm)					
TEST NO.	ELECTRODE SPACING				
	2 FT	4 FT	8 FT	12 FT	16 FT
RT-1	478,750	NA	536,200	NA	333,976
RT-2	517,050	666,420	873,240	551,520	520,880
RT-3	384,915	919,200	689,400	NA	551,520

NA – TEST COULD NOT BE PERFORMED DUE TO SITE CONSTRAINTS

7.0 LIMITATIONS

Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers and geologists practicing in this or similar situations. The interpretation of the field data is based on good judgment and experience. However, no matter how qualified the geotechnical engineer or detailed the investigation, subsurface conditions cannot always be predicted beyond the points of actual sampling and testing. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The recommendations provided within this report are for design purposes only. Contractors and others involved in the construction of this project are recommended to make an independent assessment of the soil, bedrock, and groundwater conditions for the purposes of establishing quantities, schedules, costs, and construction techniques.

This report has been prepared for the exclusive use of Essex County Emergency Services for the specific application to the existing guyed tower and proposed equipment shelter installations detailed in this report. In the event that any changes in the design or location of the proposed equipment shelter are planned, the conclusions and recommendations contained in this report shall not be considered valid unless reviewed and verified in writing by Tectonic Engineering & Surveying Consultants P.C. It is recommended that Tectonic be retained to provide construction monitoring and inspection services to ensure proper implementation of the recommendations contained herein, which would otherwise limit our professional liability.

We trust this report will allow you to proceed with design of the proposed foundations.

Sincerely,

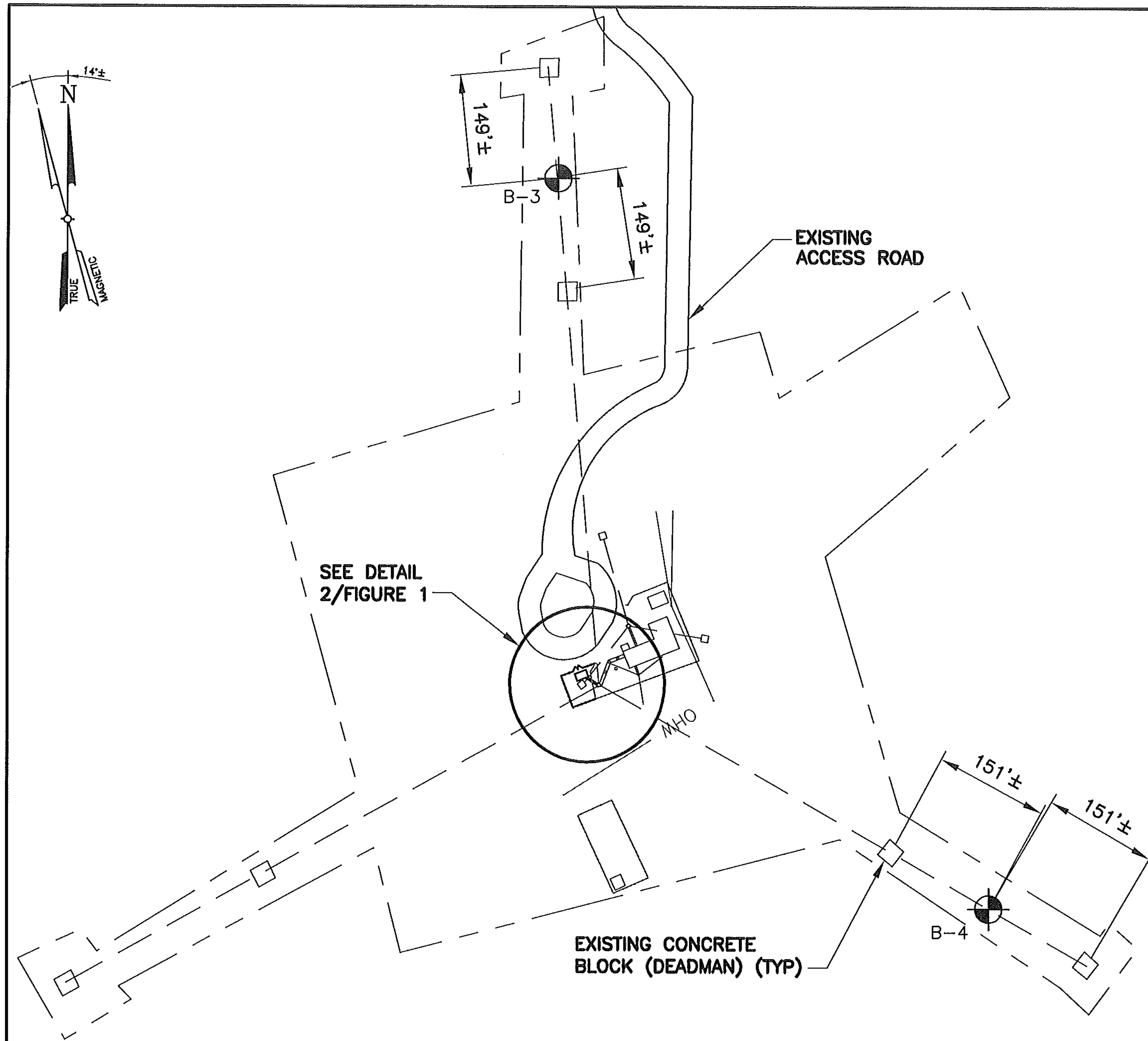
TECTONIC ENGINEERING AND SURVEYING CONSULTANTS P.C.

STATE OF NEW YORK
SCOTT MICHAEL DOEHLA
083448
LICENSED PROFESSIONAL ENGINEER

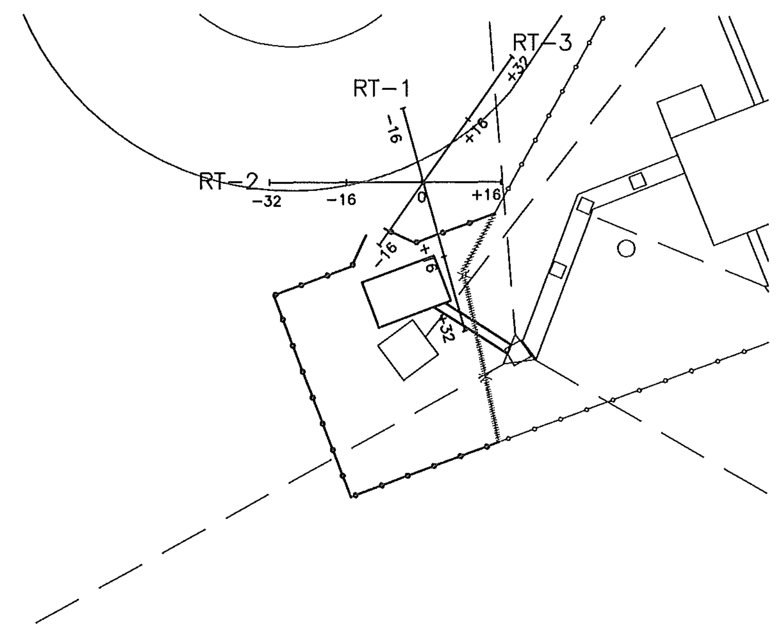
Scott M. Doehla, P.E.
Manager of Engineering

G:\Latham\Geotechnical\5932.Essex\5932.07 Terry Mountain\5932.07 Terry geo rept.doc

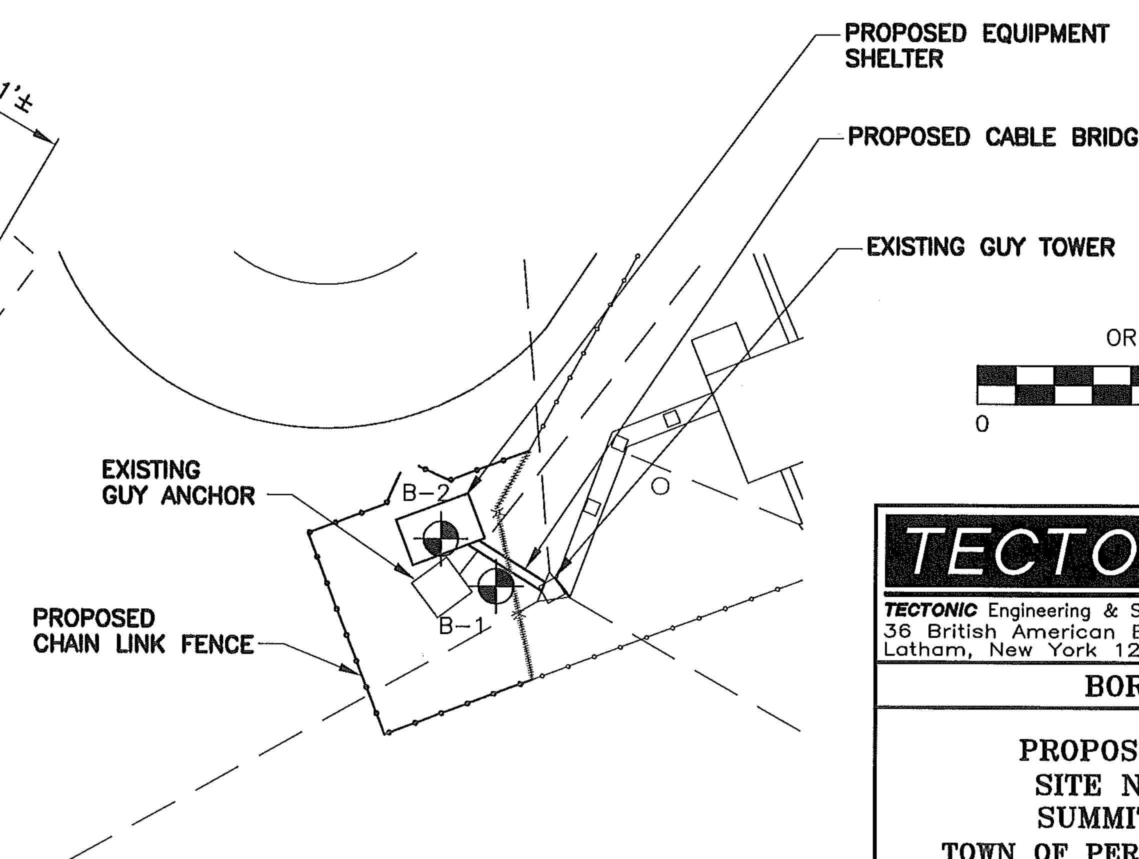
Attachments: Boring Location Plan (Figure 1)
Boring Logs
Legend for Soil Description
Resistivity Test Results



1 figure1 SITE PLAN
SCALE: 1" = 200'



2 figure1 RESISTIVITY TEST LOCATION PLAN
SCALE: 1" = 40'



2 figure1 SITE DETAIL PLAN
SCALE: 1" = 40'

LEGEND

B-1	APPROXIMATE BORING LOCATION
-12 0 +12 +24 RT-1	APPROXIMATE RESISTIVITY TEST LOCATION

NOTES

1. BORING & RESISTIVITY TEST LOCATION DETERMINED ON-SITE BY MEASURING FROM EXISTING SITE FEATURES.
2. BORING LOCATION PLAN BASED ON DRAWING ENTITLED "SITE DETAIL PLAN", DRAWING Z-2 BY TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C., DATED 8/9/11.

ORIGINAL SIZE IN INCHES
0 1 2 3

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• ENGINEERING
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www.tectonicengineering.com

BORING LOCATION PLAN

PROPOSED EQUIPMENT SHELTER
SITE NAME: TERRY MOUNTAIN
SUMMIT OF TERRY MOUNTAIN
TOWN OF PERU, CLINTON COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
9/30/11	5932.07	FIGURE 1	0
Scale: AS NOTED			

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

PROJECT No. 5932.07
PROJECT: Terry Mountain
LOCATION: Peasleeville, NY

BORING No. B-1

SHEET No. 1 of 1

CLIENT: Essex County
CONTRACTOR: TransTech Drilling Services, Inc.

GROUND WATER	DATE	TIME	DEPTH
	8/18/11		NE

INSPECTOR: Cory MacFee
DRILLER: John Leonhardt
SURFACE ELEVATION: ---
DATUM: See Remarks
DATE START: 8/18/11
DATE FINISH: 8/18/11

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:			TO	
ROT. DRILL:	2 1/2"	0	TO	0.9'
CASING:	3"	0	TO	0.9'
DIAMOND CORE:	NQ	0.9	TO	8.9'

CME 750 Track with Auto Hammer

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: Rain TEMP: 65° F
DEPTH TO ROCK: 0.9'
*CHANGES IN STRATA ARE INFERRED

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % 10 20 30 40 50
● STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	DEPTH (FT.)
1	50+	1 50/4	S-1	3		M	SM	2" Topsoil Bwn c-f SAND, some Silt, trace c-f Gravel, roots within sample Refusal @ 0.9'		1
2	14									2
3	14									3
4	14		C-1	60/60	78			Gy, slightly weathered, moderately fractured, medium grained, hard GRANITE with fractures oriented from 0 to 45 degrees with Quartz		4
5	14									5
6	14									6
7	14									7
8	14		C-2	36/36	86			Same		8
9										9
10								End of Boring at 8.9'		10
11										11
12										12
13										13
14										14
15										15
16										16
17										17
18										18
19										19
20										20
21										21
22										22
23										23
24										24
25										25

REMARKS: Surface elevation data not available.

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

PROJECT No. 5932.07
PROJECT: Terry Mountain
LOCATION: Peasleeville, NY

BORING No. B-2

CLIENT: Essex County			GROUND WATER: DATE 8/18/11	TIME	DEPTH NE
CONTRACTOR: TransTech Drilling Services, Inc.					
METHOD OF ADVANCING BORING	DIA.	DEPTH			
POWER AUGER:		TO	MON. WELL ☐ YES ☒ NO		
ROT. DRILL:	2 1/2"	0 TO 1.3'	SCREEN DEPTH: --- TO ---		
CASING:	3"	0 TO 1.3'	WEATHER: Overcast TEMP: 68° F		
DIAMOND CORE:	NQ	1.3 TO 6.3'	DEPTH TO ROCK: 1.3'		
CME 750 Track with Auto Hammer			*CHANGES IN STRATA ARE INFERRED		

INSPECTOR: Cory MacFee
DRILLER: John Leonhardt
SURFACE ELEVATION: ---
DATUM: See Remarks
DATE START: 8/18/11
DATE FINISH: 8/19/11

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5; PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % 10 20 30 40 50; STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	DEPTH (FT.)
1	51+	1 / 1 / 50/3	S-1	1		M	SM	2" Topsoil Bwn c-f SAND, some Silt, trace c-f Gravel Refusal @ 1.3'		1
2	30									2
3	30							Wht to gy, slightly weathered,highly to slightly fractured, coarse to fine grained, hard GRANITE with fractures oriented 0 to 60 degrees from horizontal, weathering and fracturing decreased with depth		3
4	15		C-1	51/60	65					4
5	15									5
6	15									6
7								End of Boring at 6.3'		7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15
16										16
17										17
18										18
19										19
20										20
21										21
22										22
23										23
24										24
25										25

REMARKS: Surface elevation data not available.

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. 5932.07

PROJECT: Terry Mountain

LOCATION: Peasleeville, NY

BORING No. B-3

SHEET No. 1 of 1

CLIENT: Essex County				
CONTRACTOR: TransTech Drilling Services, Inc.				
METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:			TO	
ROT. DRILL:	2 1/2"	0	TO	0.4'
CASING:	3"	0	TO	0.4'
DIAMOND CORE:	NQ	0.4	TO	5.4'
CME 750 Track with Auto Hammer				

GROUND WATER	DATE	TIME	DEPTH
	8/19/11		NE

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: Overcast TEMP: 68° F

DEPTH TO ROCK: 0.4'

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: Cory MacFee

DRILLER: John Leonhardt

SURFACE ELEVATION: ---

DATUM: See Remarks

DATE START: 8/19/11

DATE FINISH: 8/19/11

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	UNCONFINED COMPRESS. STRENGTH (TONS/FT) / PLASTIC LIMIT % – WATER CONTENT % – LIQUID LIMIT % / STANDARD PENETRATION (BLOWS/FT.)	DEPTH (FT.)
	50+	50/4	S-1	0				No Recovery Refusal @ 0.4'		● 50	
1	18										1
2	18							Blk-dk gy, slightly weathered, highly fractured to massive, hard, GRANITE GNEISS with fractures @ 0 to 15 degrees from horizontal			2
3	18		C-1	60/60	54.2						3
4	18										4
5	18										5
6								End of Boring at 5.4'			6
7											7
8											8
9											9
10											10
11											11
12											12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20
21											21
22											22
23											23
24											24
25											25

REMARKS: Surface elevation data not available.

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

PROJECT No. 5932.07
PROJECT: Terry Mountain
LOCATION: Peasleeville, NY

BORING No. B-4

SHEET No. 1 of 1

CLIENT: Essex County	GROUND WATER	DATE	TIME	DEPTH
CONTRACTOR: TransTech Drilling Services, Inc.		8/15/11		NE

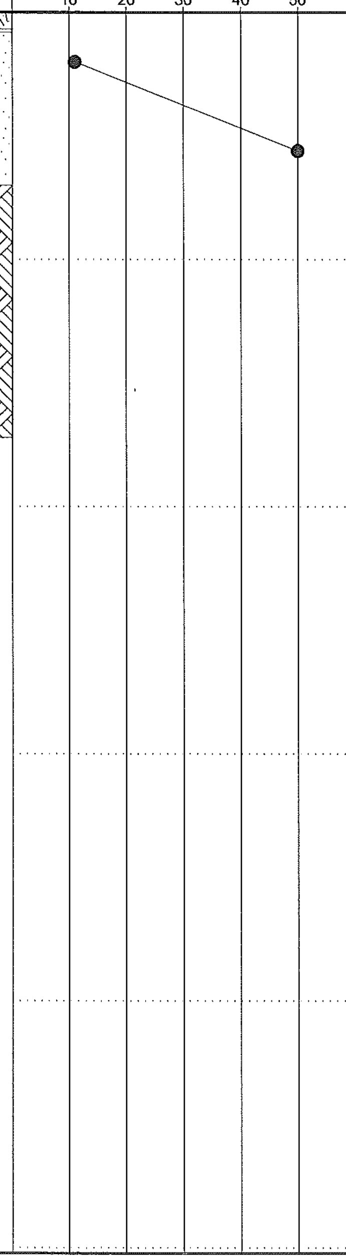
INSPECTOR: Cory MacFee
DRILLER: John Leonhardt
SURFACE ELEVATION: ---
DATUM: See Remarks
DATE START: 8/19/11
DATE FINISH: 8/19/11

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:			TO	
ROT. DRILL:		0	TO	3.6'
CASING:		0	TO	3.6'
DIAMOND CORE:	NQ	3.6	TO	8.6'
CME 750 Track with Auto Hammer				

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: Overcast TEMP: 75° F
DEPTH TO ROCK: 3.6'
*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*
1	11	1 4 7 15	S-1	0				4" Topsoil No Recovery	
2									
3	50+	27 50/1	S-2	4		M	SM	Bwn c-f SAND, some Silt, some c-f Gravel Refusal @ 3.6'	
4	12		C-1	60/60	72			Dk gy, slightly weathered, moderately fractured, medium to coarse grained, hard GRANITE & QUARTZ with fractures oriented @ 0 to 15 degrees from horizontal;	
5	12								
6	12								
7	12								
8	12								
9								End of Boring at 8.6'	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50



REMARKS: Surface elevation data not available.

BORING LOG 5932-07.GPJ TECTONIC ENG.GDT 9/22/11

LEGEND FOR SOIL DESCRIPTION

GRANULAR SOIL (Coarser than No. 200 Sieve)

DESCRIPTIVE TERM	GRAIN SIZE: SAND	GRAVEL
Coarse - c	No. 4 Sieve to No. 10 Sieve	3" to ¾"
Medium - m	No. 10 Sieve to No. 40 Sieve	
Fine – f	No. 40 Sieve to No. 200 Sieve	¾" to $^{3}/_{16}$"
COBBLES	3" TO 10"	
BOULDERS	10" +	

GRADATION DESIGNATIONS	PROPORTIONS OF COMPONENT
Fine, f	Less than 10% coarse and medium
Medium to Fine, m-f	Less than 10% coarse
Medium, m	Less than 10% coarse and fine
Coarse to medium, c-m	Less than 10% fine
Coarse, c	Less than 10% medium and fine
Coarse to fine, c-f	All greater than 10%

COHESIVE SOIL (Finer than No. 200 Sieve)

DESCRIPTION	PLASTICITY INDEX	PLASTICITY
Silt	0-1	None
Clayey Silt	2-5	Slight
Silt & Clay	6-10	Low
Clay & Silt	11-20	Medium
Silty Clay	21-40	High
Clay	Greater Than 40	Very High

PROPORTION

DESCRIPTIVE TERM	PERCENT SAMPLE BY WEIGHT
trace	1-10
little	10-20
some	20-35
and	35-50

The Primary component is fully capitalized

COLOR

Blue	- blue	Gy	- gray	Wh	- white	Yl	- yellow
Blk	- black	Or	- orange	Tn	- tan	Lgt	- light
Bwn	- brown	Rd	- red	Gn	- green	Dk	- dark

SAMPLE NOTATION

S	- Split Spoon Soil Sample	WOC	- Weight of Casing
U	- Undisturbed Soil Sample	WOR	- Weight of Rod
C	- Core Sample	WOH	- Weight of Hammer
B	- Bulk Soil Sample	PPR	- Compressive Strength Based on Pocket Pentrometer
NR	- No Recovery of Sample	TV	- Shear Strength (tsf) Based on Torvane

---

LEGEND FOR ENGINEERING ROCK CLASSIFICATION AND CORE DESCRIPTION (1)

DESCRIPTIVE TERMINOLOGY FOR JOINT SPACING

DESCRIPTIVE TERM	SPACING OF JOINT
Very Close	Less Than 2 ½ inches
Close	2 ½ to 8 inches
Medium	8 to 24 inches
Wide	2 to 6 feet
Very Wide	Greater than 6 feet

RELATIONSHIP OF RQD AND ROCK QUALITY

Rock Quality Designation (RQD) (2)	Description of Rock Quality
0-25%	Very Poor
25-50%	Poor
50-75%	Fair
75-90%	Good
90-100%	Excellent

(1) Core description system is based on a suggested system proposed in the Design manual 7.1 – Soil Mechanics, Department of the Navy, Navy Facilities Engineering Command, (May 1982).

(2) "Rock Quality Designation" is defined as a modified core recovery ration which considers only pieces of core that are at least 4 inches long. Obvious fractures introduced by drilling are ignored in this system.

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SOIL RESISTIVITY DATA SHEET

W.O. NO.: 5932.07	PAGE 1 OF 3	DATE: August 19 2011

CIIENT: Essex County	DEPTH OF SEEPAGE: NE	PROJECT: Terry Mountain
CONTRACTOR: Transtech Drilling Services	DEPTH TO GROUNDWATER: NE	LOCATION: Peasleeville, NY
EQUIPMENT: Nilsson Model 400	DEPTH TO BEDROCK: 0'-1.3' (per borings)	INSPECTOR: Cory MacFee
	SUFACE ELEVATION: N/A	DATUM: N/A

Location of Test: Near proposed tower location

Electrode Spacing "a" (ft)		Electrode Depth (a/20)	Measured Average Soil Resistance	Soil Resistivity (ohm-cm)
2 FT	2	0.1	1,250	478,750
4 FT	8	.4	350	536,200
8 FT	16	.8	109	333,976
12 FT				
16 FT				

Other

Other

Orientation of Leads: northwest to southeast

Topography: rocky outcrops, gradual to steep declines

Remarks: Due to restrictive features of site, tests were limited to spacing mentioned above.

Method of Resistivity Determination ☐ Nomogram ■ P=2Π aR (for homogenous soils)

TECTONIC

SOIL RESISTIVITY DATA SHEET

W.O. NO.: 5932.07	PAGE 2 OF 3	DATE: August 19 2011

CIIENT: Essex County	DEPTH OF SEEPAGE: NE	PROJECT: Terry Mountain
CONTRACTOR: Transtech Drilling Services	DEPTH TO GROUNDWATER: NE	LOCATION: Peasleeville, NY
EQUIPMENT: Nilsson Model 400	DEPTH TO BEDROCK: 0'-1.3' (per borings)	INSPECTOR: Cory MacFee
	SUFACE ELEVATION: N/A	DATUM: N/A

Location of Test: Near proposed tower location

Electrode Spacing "a" (ft)		Electrode Depth (a/20)	Measured Average Soil Resistance	Soil Resistivity (ohm-cm)
2 FT	2	0.1	1,350	517,050
4 FT	4	0.2	870	666,420
8 FT	8	0.4	570	873,240
12 FT	12	0.6	240	551,520
16 FT	16	0.8	170	520,880

Other

Other

Orientation of Leads: northeast to southwest

Topography: rocky outcrops, gradual to steep declines

Remarks: Due to restrictive features of site, tests were limited to spacing mentioned above.

Method of Resistivity Determination ☐ Nomogram ■ P=2Π aR (for homogenous soils)

TECTONIC

SOIL RESISTIVITY DATA SHEET

W.O. NO.: 5932.07		DATE: August 19 2011
CIIENT: Essex County	DEPTH OF SEEPAGE: NE	PROJECT: Terry Mountain
CONTRACTOR: Transtech Drilling Services	DEPTH TO GROUNDWATER: NE	LOCATION: Peasleeville, NY
EQUIPMENT: Nilsson Model 400	DEPTH TO BEDROCK: 0'-1.3' (per borings)	INSPECTOR: Cory MacFee
	SUFACE ELEVATION: N/A	DATUM: N/A

Location of Test: Near proposed tower location

Electrode Spacing "a" (ft)		Electrode Depth (a/20)	Measured Average Soil Resistance	Soil Resistivity (ohm-cm)
2 FT	2	0.1	1,005	384,915
4 FT	4	0.2	1,200	919,200
8 FT	8	0.4	450	689,400
12 FT				
16 FT	16	0.8	180	551,520

Other

Other

Orientation of Leads: northeast to southwest

Topography: rocky outcrops, gradual to steep declines

Remarks: Due to restrictive features of site, tests were limited to spacing mentioned above.

Method of Resistivity Determination ☐ Nomogram ■ $P=2\Pi aR$ (for homogenous soils)

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Essex County Emergency Services
702 Stowersville Road
P.O. Box 30
Lewis, NY 12950

Attention: Donald Jaquish

September 27, 2011

**RE: W.O. 5932.10
GEOTECHNICAL INVESTIGATION
PROPOSED 50-FOOT SELF-SUPPORT TOWER
WELLS HILL SITE
189 SEVENTY LANE
LEWIS, ESSEX COUNTY, NEW YORK**

Dear Mr. Jaquish,

Tectonic Engineering & Surveying Consultants P.C. has performed a subsurface investigation and geotechnical engineering analyses for the proposed self-support tower structure at the above-referenced site. This report presents our findings and recommendations for the design and construction of the foundations for these structures.

1.0 DESIGN CONSIDERATIONS

The proposed self-support tower is a 50-foot tall, three-legged lattice structure that will be used to support communication antennas. The foundation supporting the tower is expected to be subjected to modest compressive and overturning loads and comparatively low horizontal loads. The ground equipment associated with the communication antennas is proposed to be housed within an existing equipment shelter at the site. The actual loads from the tower are to be determined by others.

2.0 SITE DESCRIPTION

The project site is located at 189 Seventy Lane in the Town of Lewis, Esssex County, New York, and is owned by the NYCO Minerals, Inc. The site currently consists of an active mine encompassing approximately one-half of the approximately 200 acre parcel. The property is located on the west side of Seventy Lane, approximately ½ mile north of Wells Hill Road/Carlott Lane. The portion of the property not occupied by the mining operation is generally densely wooded forest on a hillside which slopes downward towards the east. The portions of the site being actively mined have been cut into the bedrock and the land has been altered to allow truck and equipment travel throughout. The project site is located on the eastern boundary of the mining operation, at a location about 1,170 feet west of Seventy Lane. Gravel and dirt-covered access roads, which originate at Seventy Lane near an existing office building on the property, extend into the property, allowing access to the project site.

The project site contains an existing 20-foot tall self-support tower, a one-story equipment shelter, and an above-ground propane tank located within a relatively flat area just east of the access road. The surrounding area currently consists of level, unused land and contains some trees at the top edge of an existing slope to the east. At a location about 18 feet east of the existing shelter, the ground surface slopes downward towards the east at an approximately 1.25 to 1 (Horizontal to Vertical) for a height of about 45 feet. The slope appears to be a fill slope and the area was likely filled with excavation spoils from the mining operations. The proposed tower will be located about 12 feet south of the existing tower and 18 feet west of the existing shelter. A new cable bridge will be constructed to connect with the existing tower. Ground surface elevations around the proposed tower are relatively level at approximately El. +1,548 feet. No regarding of the site is anticipated to result from the proposed construction.

3.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of one test boring, designated as B-1, which was performed at the center of the proposed lattice tower to a depth of 40 feet. The boring was performed by TransTech Drilling Services, Inc. on August 22, 2011 using a rubber-track drill rig. The boring was advanced through overburden soils using 3-¼ inch inside diameter hollow-stem augers. Standard Penetration Testing (SPT) and split-spoon sampling, conducted in accordance with ASTM D 1586, was performed continuously to a depth of 13 feet and at maximum 5-foot intervals thereafter. Groundwater conditions were monitored during and upon completion of drilling. The boring operations were performed under the supervision of a geotechnical engineer. The geotechnical engineer also conducted soil resistivity testing at the site in accordance with the Wenner Four-Point Method as described in ASTM G57.

The boring location and resistivity test locations are shown on the attached Boring Location Plan, Figure 1. Typed copies of the boring log and resistivity test results are attached.

4.0 SUBSURFACE CONDITIONS

The subsurface conditions consist of a relatively thick layer of existing fill overlying dense native sand. The following is a general description of the encountered subsurface conditions. Detailed descriptions can be found on the attached boring log.

Existing fill was encountered to a depth of about 38 feet within boring B-1, and consists primarily of sand and gravel with trace to some silt. The fill contained angular pieces of gravel and appears to be spoils from the results of the mining operation. SPT N-values within the fill ranged from 11 to 48 blows per foot (bpf) in the upper 9 feet, and generally decreased to between 4 and 10 bpf to a depth of 38 feet, with the exception of a sample recovered from 11 to 13 feet, which exhibited an N-value of 33 bpf. An abundance of wood and other organic materials were present at depths of 30 and 35 feet, indicating a possible transition from fill to native soil. Although SPT N-values indicate that the fill could be dense in some layers, the majority of the N-values indicate loose conditions. Considering that the fill was likely placed in an uncontrolled manner, the fill should be considered in a relatively loose condition. Based on observations made during drilling and sampling, the fill likely contains cobbles and boulders.

The soil underlying the fill generally consists of tan coarse to fine sand with little silt and little fine gravel. The SPT N-value of the native soils was 100 bpf, indicating very dense soil conditions.

No evidence of groundwater was encountered within any of the borings. Samples recovered at a depth of 40 feet exhibited an increase in moisture content, but did not appear to be saturated. It should be noted that groundwater conditions vary seasonally and with precipitation changes. Perched water may also be encountered following periods of wet weather or may result from variations in the permeability of the soils.

5.0 TOWER FOUNDATION RECOMMENDATIONS

Due to the relatively thick layer of existing fill at the site, a single large mat which can evenly distribute the bearing pressure of the tower at low levels is recommended. The use of a deep foundation system would require drilling caissons to depths of 40 feet through loose fill containing cobbles and boulders, and would likely be costly and logistically difficult. In order to properly construct a stable subgrade for the mat, some remedial removal of the existing fill and replacement with structural fill is required. Recommendations for a single mat foundation are provided below:

5.1 Ultimate Bearing Pressure

The mat should bear on a minimum 3-foot thick layer of compacted structural fill placed below the proposed foundation after removal of the existing fill. The foundation should also bear at least 5 feet below the ground surface for purposes of frost protection. The dimensions of the mat and the actual depth of embedment of the mat should be determined by the designer so as to provide sufficient resistance to overturning, sliding and vertical loading.

The mat should be designed utilizing a net allowable bearing pressure of 2,000 pounds per square foot (psf). The maximum compressive pressure at the edges of the mat that occur as a result of relatively high overturning moments should not exceed the design value after application of the reduction factor.

5.2 Subgrade

The mat foundation subgrade should be within the existing fill soils and should be prepared approximately level, at a depth at least 3 feet below the proposed bottom of footing level. Proofrolling of the subgrade should then be achieved using a roller having a static weight of at least 5 tons. The soil and subgrade conditions at the site are anticipated to be relatively loose upon excavation. Proofrolling should continue until the subgrade is thoroughly recompacted. The excavation should extend at least 3 feet (laterally) in all directions around the proposed foundation.

Once a thoroughly compacted and dense overexcavated subgrade is achieved, structural fill should be placed in lifts not exceeding 8 inches in thickness and compacted in accordance with the requirements of Section 5.4 of this report. This should continue until the final subgrade bottom of foundation elevation is achieved.

Cobbles, boulders, and miscellaneous debris within the fill soils should be anticipated. The need to remove cobbles and boulders during excavation should be planned for by the contractors performing excavations at the site.

If perched water is present within the excavation, dewatering should be performed to maintain groundwater at least 2 feet below the subgrade level and prevent adverse affects to the strength of concrete. Additional recommendations relative to temporary construction dewatering are provided in Section 5.4.

5.3 Requirements for Sliding and Overturning

The unit weight of backfill should be assumed to be 115 pounds per cubic foot (pcf). Backfill gradation and compaction requirements are presented in Section 5.4 of this report. A sliding coefficient of 0.35 should be used to calculate the ultimate sliding resistance of the foundation/soil interface.

The passive resistance of the backfill soil should be ignored within the upper 4 feet due to frost action of the soil. A passive coefficient of 3.00 should be used for design below this depth.

5.4 Foundation Construction Considerations

Special attention to excavation safety will be required due to the coarse-grained nature of the soils. The excavation sidewalls will likely ravel easily. The appropriate sloping should be provided to maintain excavation stability. All OSHA and State regulations pertaining to excavation safety should be followed during construction.

The foundation subgrade should be prepared by removing all soil loosened by machine excavation to at least 3 feet below the required bearing depth of the mat. The subgrade should then be thoroughly proofrolled with a minimum 5-ton vibratory roller making at least 4 passes in 2 perpendicular directions. Any soil materials found to be soft should be removed as directed by the geotechnical engineer. The area of removal should be within the zone of influence of the foundation as defined below. Overexcavated areas of unsuitable soil should be backfilled with structural fill. The existing fill and native soils contain cobbles and boulders, and these should be anticipated when performing excavations at the site.

Soils that become disturbed due to moisture (wet weather) are unsuitable for providing the recommended bearing capacity. During excavation and prior to backfilling, the ground surface around the mat excavation should be graded to divert surface water away from the excavation. The subgrade should be protected from wet weather until concrete is placed.

If groundwater is encountered, dewatering should be performed to maintain the groundwater level a minimum 2 feet below the deepest excavation in such a manner that the subgrade soils are not disturbed. Dewatering by sump pumps should not be conducted in subgrade areas. If sump pumps are utilized, they should be placed at a distance outside the subgrade area, and the excavation for the sumps should not intersect the zone of influence of the foundation. Subgrade areas disturbed by moisture should be removed from the foundation zone of influence and replaced with compacted structural fill or clean crushed gravel. The zone of influence is defined by imaginary lines sloping downward and outward from the perimeter of the mat at a 1 horizontal to 1 vertical slope.

Backfill around and above the foundation should be clean natural non-expansive soil free of organic matter, debris and rocks or hard lumps of material in excess of 4 inches in the longest dimension having a moisture content suitable for compaction.

Imported structural fill used to re-establish subgrade below the mat should be clean granular soil free of organic material or debris and conform to the following gradation:

Sieve Size	Percent Finer by Weight
4"	100
¼"	30-70
No. 40	5-40
No. 200	0-10

The on-site soils are not suitable for use as structural fill without processing.

All fill should be compacted to at least 95 percent of the maximum dry density at near optimum moisture contents as determined by ASTM D1557. The lift thickness for the fill soils will vary depending on the type of compaction equipment used. Fill should generally be placed in uniform lifts not exceeding 8 inches in loose thickness. In confined areas, the loose lift thickness should be 4 inches or less and each lift should be compacted with sufficient passes of hand operated vibratory or impact compaction equipment. A geotechnical engineer with appropriate field and laboratory support should inspect all footing subgrades, approve materials for use as fill, and test fill materials for compliance with the recommended compaction. 3

The sides of the excavation should be sloped back for safety unless a sheeting or bracing system is used. OSHA and other applicable agency requirements pertaining to worker safety should be met during the excavation activities.

Care should be exercised during excavation so as not to undermine any existing structures to remain. If necessary, existing structure foundations should be underpinned. All underpinning and excavation shoring, if used, should be designed by a New York State licensed Professional Engineer.

6.0 RESISTIVITY TEST RESULTS

The resistivity testing was performed by setting two potential-measuring electrodes between two current carrying electrodes at various spacing for the purpose of measuring the resistance generated by the soils when passing the current through the soil. The current drop measured by the potential-measuring electrodes provides an indication of the resistance of a soil column equal in thickness to the spacing of the electrodes. The electrode spacing was equal for all spacings between the total of four electrodes during each test.

The test is run by inducing a current through the outer current-carrying electrodes and measuring the voltage drop between the inner potential-measuring electrodes. Two test lines were performed at the locations indicated on the attached Figure 1. The test spacing indicated above was performed for each test line, indicated as RT-1 through RT-2. Site constraints prohibited performing the tests at greater spacing. The results of the resistivity testing are included on the attached forms and summarized below:

MEASURED RESISTIVITY FOR VARYING ELECTRODE SPACING (Ohm-cm)						
TEST NO.	ELECTRODE SPACING					
	2 FT	4 FT	8 FT	10 FT	16 FT	20 FT
RT-1	40,215	40,598	22,980	36,768	36,768	NA
RT-2	15,320	26,044	69,706	51,705	NA	17,618

NA – TEST COULD NOT BE PERFORMED DUE TO SITE CONSTRAINTS

7.0 LIMITATIONS

Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers and geologists practicing in this or similar situations. The interpretation of the field data is based on good judgment and experience. However, no matter how qualified the geotechnical engineer or detailed the investigation, subsurface conditions cannot always be predicted beyond the points of actual sampling and testing. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The recommendations contained in this report are for design purposes only. Contractors and others involved in this project are advised to make an independent assessment of the subsurface conditions for the purpose of estimating quantities and scheduling.

This report has been prepared for the exclusive use of Essex County for the specific application to the proposed self-support tower installation detailed in this report. In the event that any changes in the design or location of the proposed tower shelter are planned, the conclusions and recommendations contained in this report shall not be considered valid unless reviewed and verified in writing by Tectonic Engineering & Surveying Consultants P.C. It is recommended that Tectonic be retained to provide construction monitoring and inspection services to ensure proper implementation of the recommendations contained herein, which would otherwise limit our professional liability.

We trust this report will allow you to proceed with design of the proposed foundations.

Sincerely,

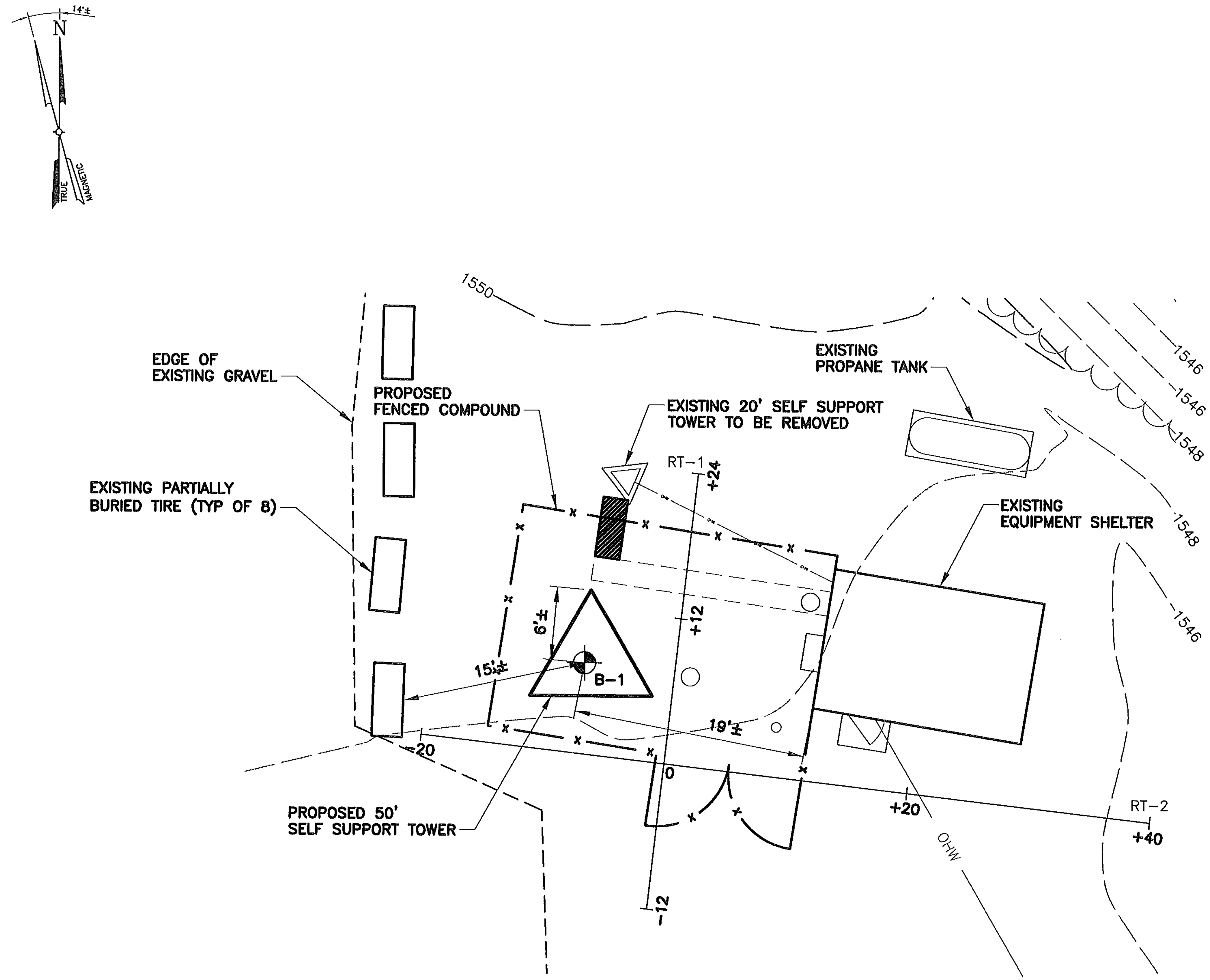
TECTONIC ENGINEERING AND SURVEYING CONSULTANTS P.C.

Scott M. Doehla, P.E.
Manager of Engineering

SMD File G:\Latham\Geotechnical\5932.Essex\5932.10 Wells Hill\Report\5932.10 geo report.doc

Attachments: Figure 1 - Boring Location Plan
Boring Log
Legend for Soil Description
Resistivity Test Results

cc: Geotechnical File



LEGEND

B-1	APPROXIMATE BORING LOCATION
-12 0 +12 +24 RT-1	APPROXIMATE RESISTIVITY TEST LOCATION

NOTES

1. BORING & RESISTIVITY TEST LOCATIONS DETERMINED ON-SITE BY MEASURING FROM EXISTING SITE FEATURES.

2. BORING LOCATION PLAN BASED ON DRAWING ENTITLED "SITE DETAIL PLAN", DRAWING Z-2 BY TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C., DATED 8/11/11.

ORIGINAL SIZE IN INCHES

0 1 2 3

TECTONIC

• PLANNING
• ENGINEERING
• SURVEYING
• CONSTRUCTION MANAGEMENT

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BORING LOCATION PLAN

PROPOSED 50-FOOT SELF SUPPORT TOWER
SITE NAME: WELLS HILL
189 SEVENTY LANE, TOWN OF LEWIS
ESSEX COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
9/13/11	5932.10	FIGURE 1	0
Scale 1" = 10'			

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

BORING No. B-1

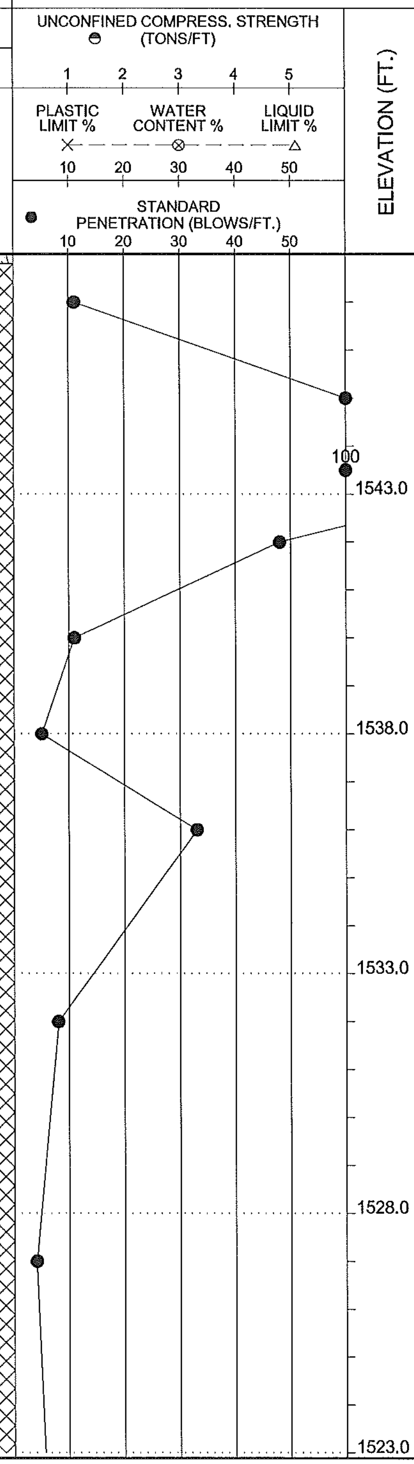
SHEET No. 1 of 2

PROJECT No.	5932.10		
PROJECT:	Wells Hill		
LOCATION:	Lewis, NY		
CLIENT:	Essex County	INSPECTOR:	Cory MacFee
CONTRACTOR:	TransTech Drilling Services, Inc.	DRILLER:	John Leonhardt
		SURFACE ELEVATION:	1548.0
		DATUM:	See Remarks
		DATE START:	8/22/11
		DATE FINISH:	8/22/11

GROUND WATER	DATE	TIME	DEPTH
	8/22/11		35'

METHOD OF ADVANCING BORING	DIA.	DEPTH	
POWER AUGER:	3 1/4"	0 TO 40'	MON. WELL ☐ YES ☒ NO
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---
CASING:		TO	WEATHER: Overcast TEMP: 60° F
DIAMOND CORE:		TO	DEPTH TO ROCK: Not Encountered'
CME 750 Track Rig with Auto Hammer			*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
0–2	11	3, 4, 7, 10	S-1	20		M		2" Topsoil Bwn c-f SAND, some c-f Gravel, trace Silt (FILL)	
2–4	60	19, 26, 34, 50/5	S-2	22		M		Same (FILL)	
4–5	100+	100/4	S-3	3		M		Wh-blk c-f GRAVEL, and c-f Sand (FILL)	1543.0
5–7	48	28, 20, 28, 12	S-4	18		M		Bwn c-f SAND, little c-f Gravel (FILL)	
7–9	11	9, 6, 5, 5		0				No Recovery	
9–11	5	4, 2, 3, 24	S-5					Bwn c-f SAND, some c-f Gravel, some Silt (FILL)	1538.0 (10)
11–13	33	37, 17, 16, 24	S-6	10		M		Bwn-tn c-f SAND, and c-f Gravel, trace Silt (FILL)	
13–15									1533.0 (15)
15–17	8	1, 1, 7, 22	S-7	1		M		Same (FILL)	
17–20									1528.0 (20)
20–22	4	2, 3, 1, 1	S-8	5		M		Bwn c-f SAND, little c-f Gravel, trace Silt (FILL)	
22–25									1523.0 (25)



REMARKS: Surface elevation estimated based on drawing entitled "Site Detail Plan", sheet Z-2 by Tectonic dated 8/11/11. Depth to groundwater estimated based on sample moisture content.

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **5932.10**

PROJECT: **Wells Hill**

LOCATION: **Lewis, NY**

BORING No. B-1

CLIENT: **Essex County**

CONTRACTOR: **TransTech Drilling Services, Inc.**

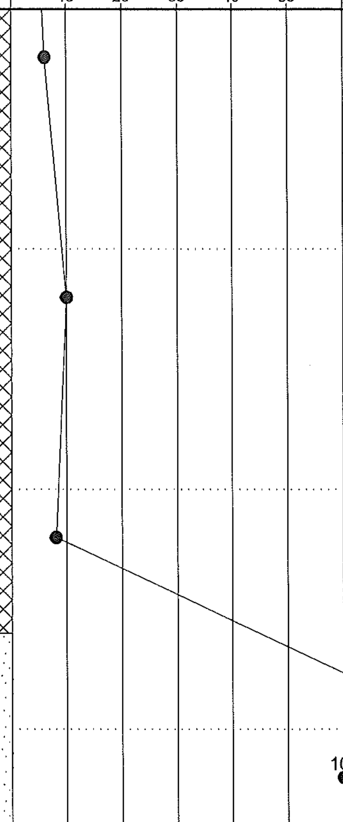
DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
26	6	2, 3, 3, 3	S-9	8		M		Dk bwn SAND, some c-f Gravel, some Silt (FILL)	
30									1518.0
31	10	4, 4, 6, 5	S-10	3		M		Dk bwn c-f SAND, little c-f Gravel, trace Silt (wood, organic matter) (FILL)	
35								▼	1513.0
36	8	3, 4, 4, 5	S-11	6		W		Dk bwn c-f SAND, little c-f Gravel, little Silt (Possible FILL)	
40									1508.0
41	100	5, 54, 46, 35	S-12	22		M	SM	Dk bwn c-f SAND, some c-f Gravel, trace Silt	
42								End of Boring at 42'	
45									1503.0
50									1498.0
55									1493.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

LITHOLOGY*



REMARKS: Surface elevation estimated based on drawing entitled "Site Detail Plan", sheet Z-2 by Tectonic dated 8/11/11. Depth to groundwater estimated based on sample moisture content.

LEGEND FOR SOIL DESCRIPTION

GRANULAR SOIL (Coarser than No. 200 Sieve)

DESCRIPTIVE TERM	GRAIN SIZE: SAND	GRAIN SIZE: GRAVEL
Coarse - c	No. 4 Sieve to No. 10 Sieve	3" to ¾"
Medium - m	No. 10 Sieve to No. 40 Sieve	
Fine – f	No. 40 Sieve to No. 200 Sieve	¾" to $^{3}/_{16}$"
COBBLES	3" TO 10"	
BOULDERS	10" +	

GRADATION DESIGNATIONS	PROPORTIONS OF COMPONENT
Fine, f	Less than 10% coarse and medium
Medium to Fine, m-f	Less than 10% coarse
Medium, m	Less than 10% coarse and fine
Coarse to medium, c-m	Less than 10% fine
Coarse, c	Less than 10% medium and fine
Coarse to fine, c-f	All greater than 10%

COHESIVE SOIL (Finer than No. 200 Sieve)

DESCRIPTION	PLASTICITY INDEX	PLASTICITY
Silt	0-1	None
Clayey Silt	2-5	Slight
Silt & Clay	6-10	Low
Clay & Silt	11-20	Medium
Silty Clay	21-40	High
Clay	Greater Than 40	Very High

PROPORTION

DESCRIPTIVE TERM	PERCENT SAMPLE BY WEIGHT
trace	1-10
little	10-20
some	20-35
and	35-50

The Primary component is fully capitalized

COLOR

Blue	- blue	Gy	- gray	Wh	- white	Yl	- yellow
Blk	- black	Or	- orange	Tn	- tan	Lgt	- light
Bwn	- brown	Rd	- red	Gn	- green	Dk	- dark

SAMPLE NOTATION

S	- Split Spoon Soil Sample	WOC	- Weight of Casing
U	- Undisturbed Soil Sample	WOR	- Weight of Rod
C	- Core Sample	WOH	- Weight of Hammer
B	- Bulk Soil Sample	PPR	- Compressive Strength Based on Pocket Pentrometer
NR	- No Recovery of Sample	TV	- Shear Strength (tsf) Based on Torvane

---

LEGEND FOR ENGINEERING ROCK CLASSIFICATION AND CORE DESCRIPTION (1)

DESCRIPTIVE TERMINOLOGY FOR JOINT SPACING

DESCRIPTIVE TERM	SPACING OF JOINT
Very Close	Less Than 2 ½ inches
Close	2 ½ to 8 inches
Medium	8 to 24 inches
Wide	2 to 6 feet
Very Wide	Greater than 6 feet

RELATIONSHIP OF RQD AND ROCK QUALITY

Rock Quality Designation (RQD) (2)	Description of Rock Quality
0-25%	Very Poor
25-50%	Poor
50-75%	Fair
75-90%	Good
90-100%	Excellent

(1) Core description system is based on a suggested system proposed in the Design manual 7.1 – Soil Mechanics, Department of the Navy, Navy Facilities Engineering Command, (May 1982).

(2) "Rock Quality Designation" is defined as a modified core recovery ration which considers only pieces of core that are at least 4 inches long. Obvious fractures introduced by drilling are ignored in this system.

TECTONIC SOIL RESISTIVITY DATA SHEET

W.O. NO.: 5932.10 PAGE 1 OF 2

DATE: August 17 2011

CIIENT: Essex County	DEPTH OF SEEPAGE: NE	PROJECT: Wells Hill
CONTRACTOR: Transtech Drilling Services	DEPTH TO GROUNDWATER: NE	LOCATION: Lewis, NY
EQUIPMENT: Nilsson Model 400	DEPTH TO BEDROCK: NE	INSPECTOR: Cory MacFee
	SUFACE ELEVATION: 1,548'	DATUM: See Remarks

Location of Test: Near proposed tower location

Electrode Spacing "a" (ft)		Electrode Depth (a/20)	Measured Average Soil Resistance	Soil Resistivity (ohm-cm)
2 FT	2	0.1	105	40,215
4 FT	4	0.2	53	40,598
8 FT	8	0.4	15	22,980
12 FT	10	0.5	16	36,768
16 FT	16	0.8	12	36,768

Other __________

Other __________

Orientation of Leads: North to South

Topography: sloping downward to southeast, upward to northwest

Remarks: Due to restrictive features of site, tests were limited to spacing mentioned above.
Elevation Estimate based on drawing entitled "site detail plan" sheet Z-2 dated 8/11/11 by Tectonic Engineering & Surveying Consultants PC.

Method of Resistivity Determination ☐ Nomogram ☐ P=2Π aR (for homogenous soils)

TECTONIC	SOIL RESISTIVITY DATA SHEET	W.O. NO.: 5932.10	PAGE 2 OF 2
		DATE: August 17 2011	

CIIENT: Essex County	DEPTH OF SEEPAGE: NE	PROJECT: Wells Hill
CONTRACTOR: Transtech Drilling Services	DEPTH TO GROUNDWATER: NE	LOCATION: Lewis, NY
EQUIPMENT: Nilsson Model 400	DEPTH TO BEDROCK: NE	INSPECTOR: Cory MacFee
	SUFACE ELEVATION: 1,548'	DATUM: See Remarks

Location of Test: Near proposed tower location

Electrode Spacing "a" (ft)		Electrode Depth (a/20)	Measured Average Soil Resistance	Soil Resistivity (ohm-cm)
2 FT	2	0.1	40	15,320
4 FT	4	0.2	34	26,044
8 FT	8	0.4	45.5	69,706
12 FT	10	0.5	22.5	51,705
16 FT	20	1.0	4.6	17,618

Other

Other

Orientation of Leads: East to West

Topography: sloping downward to southeast, upward to northwest

Remarks: Due to restrictive features of site, tests were limited to spacing mentioned above.
Elevation Estimate based on drawing entitled "site detail plan" sheet Z-2 dated 8/11/11 by Tectonic Engineering & Surveying Consultants PC.

Method of Resistivity Determination ☐ Nomogram ☐ P=2Π aR (for homogenous soils)