STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square
New Britain, Connecticut 06051
Phone: (860) 827-2935
Fax: (860) 827-2950

July 13, 2001

Sandy M. Carter
Verizon Wireless
20 Alexander Drive
P.O. Box 5029
Wallingford, CT 06492

RE: **TS-VER-027-010615** - Cellco Partnership d/b/a Verizon Wireless request for an order to approve tower sharing at an existing telecommunications facility located at 46 Meadow Road, Clinton, Connecticut.

Dear Ms. Carter:

At a public meeting held July 11, 2001, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Any additional change to this facility may require an explicit request to this agency pursuant to General Statutes § 16-50aa or notice pursuant to Regulations of Connecticut State Agencies Section 16-50j-73, as applicable. Such request or notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction.

The proposed shared use is to be implemented as specified in your letter dated June 14, 2001.

Thank you for your attention and cooperation.

Very truly yours,

Mortimer A. Gelston
Chairman

MAG/RKE/laf

c: Honorable James M. Mccusker, Jr., First Selectman, Town of Clinton
Thomas Lane, Zoning Enforcement Officer, Town of Clinton
Esther McNany, SBA, Inc.
Stephen J. Humes, Esq., LeBoeuf, Lamb, Greene, & MacRae

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square
New Britain, Connecticut 06051
Phone: (860) 827-2935
Fax: (860) 827-2950

June 15, 2001

Honorable James M. Mccusker, Jr.
First Selectman
Town of Clinton
54 East Main Street
Clinton, Ct. 06413

RE: **TS-VER-027-010615** - Cellco Partnership d/b/a Verizon Wireless request for an order to approve tower sharing at an existing telecommunications facility located at 46 Meadow Road, Clinton, Connecticut.

Dear Mr. Mccusker:

The Connecticut Siting Council (Council) received this request for tower sharing, pursuant to Connecticut General Statutes § 16-50aa.

The Council will consider this item at the next meeting scheduled for July 11, 2001, at 1:30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

Please call me or inform the Council if you have any questions or comments regarding this proposal.

Thank you for your cooperation and consideration.

Very truly yours,

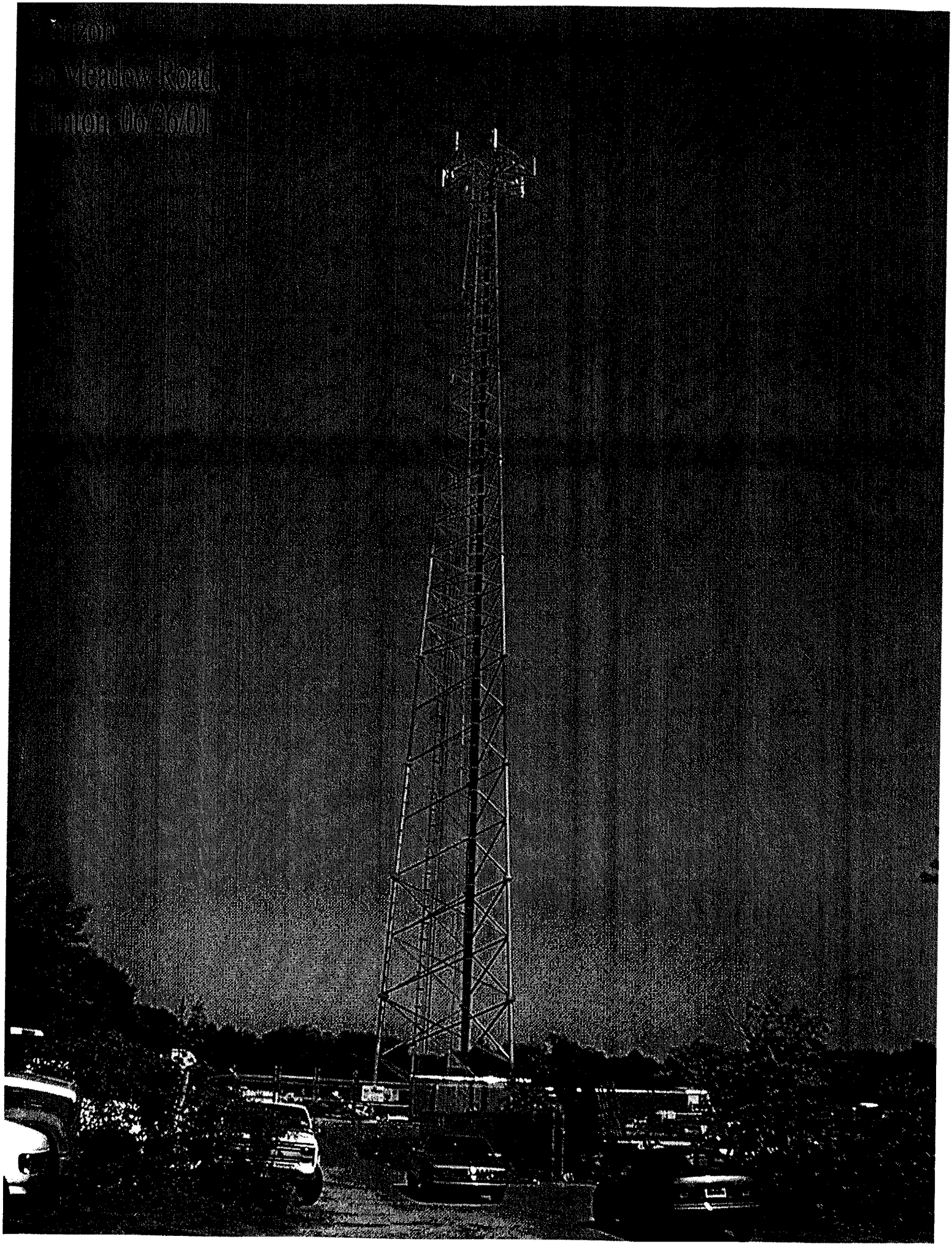
Joel M. Rinebold
Executive Director

JMR/RKE/laf

Enclosure: Notice of Tower Sharing

c: Planning and Zoning Department, Town of Clinton

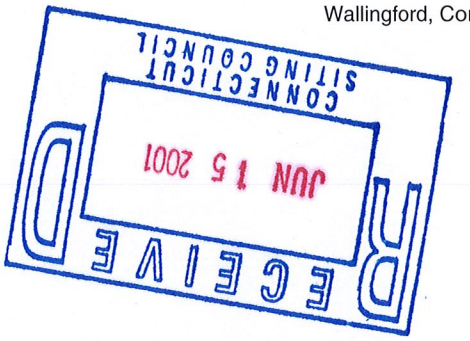
I:\siting\em\bam-ver\clinton\mccusker1.doc


rizon
Meadow Road
ton, 06/26/01

Network Dept.

verizonwireless

Verizon Wireless
20 Alexander Drive
Wallingford, Connecticut 06492



June 14, 2001

Mr. Mortimer A. Gelston, Chairman
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

Re: **Request by Cellco Partnership d/b/a Verizon Wireless for an Order to Approve the Shared Use of a Tower Facility located at 46 Meadow Road, Clinton, Connecticut.**

Dear Chairman Gelston:

Pursuant to Connecticut General Statutes (C.G.S.) Sec. 16-50aa, Cellco Partnership d/b/a Verizon Wireless hereby requests an order from the Connecticut Siting Council ("Council") to approve the proposed shared use by Verizon Wireless of an existing tower located at 46 Meadow Road, Clinton, Connecticut. The property is owned by Michael and Anne Louise Charney and the tower is owned and managed by SBA Properties, Inc. of Boca Raton, Florida. As shown on the attached drawing and as further described below, Verizon Wireless proposes to install antennas on the existing tower and to locate its equipment shelter at the base of the tower. Verizon Wireless requests that the Council finds that the proposed shared use of the tower facility satisfy the criteria stated in C.G.S. Sec. 16-50aa, and to issue an order approving the proposed shared use.

Background

Verizon Wireless is licensed by the Federal Communications Commission to provide cellular telephone service in the Middlesex County New England County Metropolitan Area (NECMA), which includes the area to be served by the proposed Vernon installation.

The facility at 46 Meadow Road in Clinton consists of a 195 foot AGL steel lattice tower built by SBA, Inc. located on a leased parcel at 46 Meadow Road in the Town of Clinton. The lattice tower supports the antennas of Voicestream, a wireless carrier that provides mobile communications service to the public pursuant to its FCC license. The tower can structurally support multiple carriers and a structural report by Sabre Communications Corporation is enclosed with this application. Verizon Wireless and SBA, Inc. have agreed to the proposed shared use of this tower pursuant to mutually acceptable terms and conditions. SBA, Inc. has authorized Verizon Wireless to apply for all necessary permits, approvals and authorizations which may be required for the proposed shared use of this facility.

Verizon Wireless proposes to install twelve (12) cellular, panel type antennas, Model DB844H90, on a platform with their center of radiation at approximately 162 feet above ground level ("AGL"). Each antenna is approximately 48 inches in height. Equipment associated with these antennas would be located in a new approximately 12-foot x 30-foot equipment shelter located at the base of the tower. A proposed emergency use, diesel fuel generator will be located at the base of the tower as shown on the attached site plan. The generator will be owned by SBA, Inc. and Verizon Wireless will connect to this generator for emergency use. SBA, Inc. will install this generator following receipt of the required DEP permit.

C.G.S. Sec. 16-50aa provides that, upon written request for approval of a proposed shared use, "if the Council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the Council shall issue an order approving such shared use" (C.G.S. Sec. 16-50aa©(1).)

Discussion

A. Technical Feasibility. The existing tower is structurally sound and capable of supporting the proposed Verizon Wireless antennas. The tower will not require any structural modification to support the proposed attachments. A copy of the structural design is attached to this application. Verizon Wireless engineers have determined that the proposed antenna installations present minimal potential for interference to or from existing radio transmissions from this location. In addition, the applicant is unaware of any occasion where its operations have caused interference with AM, FM or television reception. The proposed shared use of this tower therefore is technically feasible.

B. Legal Feasibility. Under C.G.S. Sec. 16-50aa, the Council has been authorized to issue an order approving the proposed-shared use of an existing communication tower facility such as the facility at 46 Meadow Road. (C.G.S. Sec. 16-50aa©(1).) This authority complements the Council's prior existing authority under C.G.S. Sec. 16-50p to issue orders approving the construction of new towers that are subject to the Council's jurisdiction. C.G.S. Sec. 16-50x(a) directs the Council to "give consideration to other state laws and municipal regulations as it shall deem appropriate" in ruling on requests for the shared use of existing tower facilities. Under the authority vested in the Council by C.G.S. Sec. 16-50aa, an order by the Council approving the shared use would permit the applicant to obtain a building permit for the proposed installations.

C. Environmental Feasibility. The proposed shared use would have a minimal environmental effect, for the following reasons:

1. The proposed installations would have an insignificant incremental visual impact, and would not cause any significant change or alteration in the physical or environmental characteristics of the existing site. The addition of the proposed antennas would not increase the height of the tower, and would not extend the boundaries of the tower site, including the placement of the equipment building near the base of the existing tower.

2. The proposed installation would not increase the noise levels at the existing facility by six decibels or more. The only additional noise will occur during emergency use or periodic exercising of the generator.

3. Operation of the additional antennas will not increase the total radio frequency electromagnetic radiation power density, measured at the tower base to a level at or above the applicable standard. "Worst-case" exposure calculations for a point at the base of the tower in relation to operation of each of the various carriers' antenna arrays are as follows:

	Applicable ANSI Stnd	Calculated "Worst-Case"	Percentage of Stnd
Verizon Wireless	0.583 mW/cm2	0.0260 mW/cm2	4.46%
Voicestream	1.000 mW/cm2	0.0095 mW/cm2	0.95%
		Total	5.41%

The collective "worst-case" exposure would be only 5.41% of the ANSI standard, as calculated for mixed frequency sites. Power density levels from shared use of the tower facility would thus be well below applicable ANSI standards.

4. The proposed installations would not require any water or sanitary facilities, or generate discharges to water bodies. Operation of the emergency back-up generator will result in limited air emissions; pursuant to R.S.A. Section 22a-174-3, the generator will require the issuance of a permit from the Department of Environmental Protection Bureau of Air Management. After construction is complete, the proposed installation would not generate any traffic other than periodic maintenance visits.

`The proposed use of this facility would therefore have a minimal environmental effect, and is environmentally feasible.

D. Economic Feasibility. As previously mentioned, the tower owner and the applicant have entered into a mutual agreement to share use of the existing tower on terms agreeable to the parties, and the proposed tower sharing is thus economically feasible.

E. Public Safety Concerns. As stated above, the existing tower is structurally capable of supporting the proposed Verizon Wireless antennas. The Applicant is not aware of any other public safety concerns relative to the proposed tower sharing of the existing tower. In fact, the provision of continued and improved cellular phone service in the Clinton area, especially along the heavily traveled Amtrak railway area located in Clinton, through shared use of the tower is expected to enhance the safety and welfare of area residents and railroad passengers. The public safety benefits of wireless service are further illustrated by the decision of local authorities elsewhere in Connecticut to provide cellular phones to residents to improve local public safety and emergency communications. The proposed-shared use of this facility would likewise improve public safety in the Clinton area.

Conclusion

For the reasons discussed above, the proposed shared use of the existing telecommunications tower facility at 46 Meadow Road satisfies the criteria stated in C.G.S. Sec. 16-50aa, and advances the General Assembly's and the Council's goal of preventing the proliferation of towers in Connecticut. The Applicant therefore requests that the Council issue an order approving the proposed-shared use.

Thank you for your consideration of this matter.

Pursuant to Connecticut General Statutes Sec. 16-50v and Section 16-50v-1(a) of the Regulations of Connecticut State Agencies, Verizon Wireless has enclosed a check in the amount of $500.00 for the required filing fee.

Respectfully yours,

Sandy M. Carter

Sandy M. Carter
Manager-Regulator
Verizon Wireless

Attachments
cc: Mr. James McCusker, First Selectman

Network Dept.

Verizon Wireless
20 Alexander Drive
Wallingford, Connecticut 06492

June 14, 2001

Honorable James McCusker,
First Selectman
Town Hall
54 East Main Street
Clinton, Connecticut 06413

Dear Mr. McCusker:

This letter is to inform you that Cellco Partnership d/b/a Verizon Wireless plans to install antennas and associated equipment at the existing tower facility located at 46 Meadow Road, Clinton, Connecticut. I am enclosing a copy of Verizon Wireless's tower sharing application to the Connecticut Siting Council.

The application fully sets forth the Company's proposal. However, if you have any questions or require further information on our plans or the Siting Council's procedures, please contact me at (203) 294-8519 or Mr. Joel Rinebold, Executive Director of the Connecticut Siting Council at (860) 827-2935.

Sincerely,

Sandy M. Carter

Sandy M. Carter
Manager – Regulatory
Verizon Wireless

Enclosure

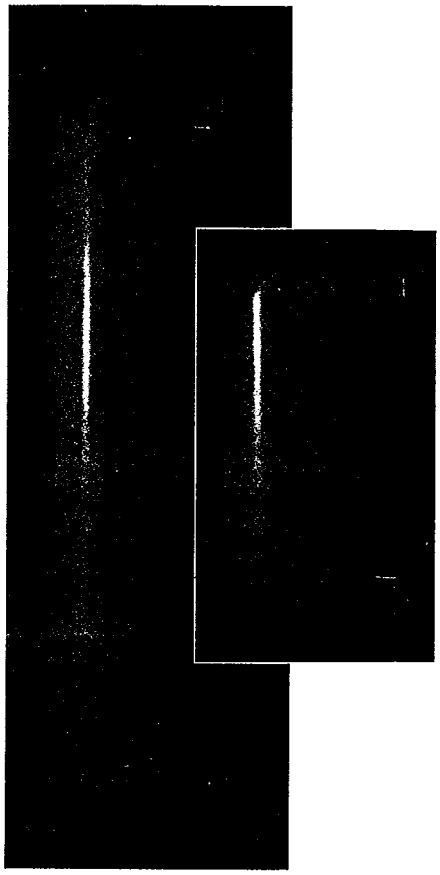
DB842H80N-XY, DB842H90N-XY dB DIRECTOR™ LOG PERIODIC ANTENNAS
DB844H80N-XY, DB844H90N-XY 9-13 dBd GAIN, 40 dB F/B RATIO, 806-960 MHz

Ideal for cellular and trunking/ESMR applications, these high quality log periodics are now available from Decibel in four new models with 80 or 90 degree horizontal apertures. They're compact, lightweight, and provide an **unmatched front-to-back ratio of 40 dB**.

- **Less Wind Loading** - They measure only 24 or 48 inches (610 or 1219 mm) tall, 8.5 inches deep (216 mm), and 6 inches wide (152 mm). They weigh only 5 or 10 pounds.
- **Downtilt** - Electrical downtilt is available on all 4-foot models, 6°, 8°, 11°, 13°, or for mechanical downtilt, order DB5083 bracket.
- **Null-Fill** - Four-foot models provide null-fill and upper lobe suppression.
- **Most Stringent IM Test** - Each antenna is tested for the absence of IM with 16 carriers at 500 watts of composite power.
- **Sturdy Construction** - Made in the U.S. of high-strength aluminum alloy backs, brass elements and UV resistant ABS plastic radomes. No rivets are used!
- **Lightning Resistant** - All metal parts are grounded.
- **Terminations and Mounts** - All models are available with N-Female or 7/16 DIN connectors. DB380 pipe mount is included.

Ordering information - See table for models to fit your requirements.

UPS Shippable



4-Foot and 2-Foot dB DIRECTORS

Models Available

Model*	DB842H80N-XY	DB844H80N-XY	DB842H90N-XY	DB844H90N-XY
Gain – dBd/dBi	10/12.1	13/15.1	9/11.1	12/14.1
F/B Ratio – dB	40	40	40	40
Horizontal beamwidth**	80°	80°	90°	90°
Vertical beamwidth**	30°	15°	30°	15°
Height – in. (mm)	24 (610)	48 (1219)	24 (610)	48 (1219)
Weight – lbs. (kg)	5 (2.3)	10 (4.6)	5 (2.3)	10 (4.6)
Shipping weight – lbs. (kg)	8 (3.6)	15 (6.8)	8 (3.6)	15 (6.8)

* For 7/16 DIN connectors substitute "E" for "N" in the model numbers. Example: DB842H80E-XY.

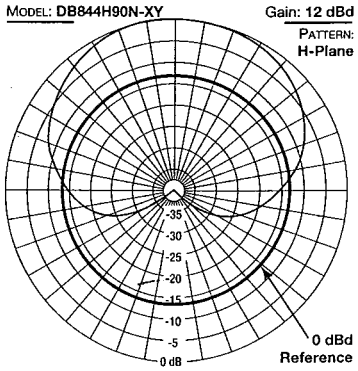
** 3 dB from maximum.

Side offset mounting bracket is included. For electrical downtilt of 6°, 8°, 11° or 13° add T6, T8, T11 or T13 before the "N" or "E" in any 4-foot model number. Example: DB844H80T6N-XY. Note: Electrical downtilt causes a gain loss of .05 dB, or , at the horizon, a reduction of 3, 6, 9 or 12 dB on downtilts of 6°, 8°, 11° or 13° respectively. For mechanical downtilt order DB5083 bracket.

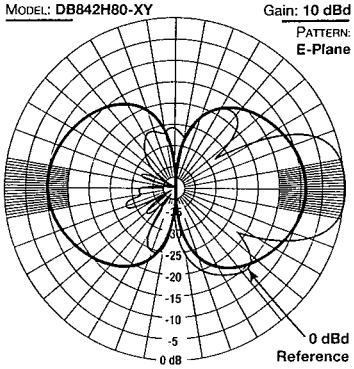
Mechanical Data	
Width – in. (mm)	6 (152)
Depth – in. (mm)	8.5 (216)
Height	See table above
Maximum wind speed – mph (km/h)	125 (200)
Wind area – ft² (m²)	
24" (610 mm) antenna	1 (.093)
48" (1219 mm) antenna	2 (.186)
Wind load (at 100 mph/161 km/h) – lbf (N) kp	
24" (610 mm) antenna	40 (178) 18
48" (1219 mm) antenna	80 (356) 36
Radome	Gray ABS
Backplate	Passivated aluminum
Radiators	Brass
Mounting hardware	Galvanized steel
Weight	See table above

Electrical Data	
Frequency Range - MHz	806-960
Gain - dBd	See table above
Front-to-back ratio - dB	>40
Beamwidths	See table above
VSWR	<1.5:1
Null-fill and secondary lobe suppression	On 48" (1219 mm) models only
Maximum power input - watts	500
Nominal impedance - ohms	50
Lightning protection	All metal parts grounded
Termination	N-Female or 7/16 DIN

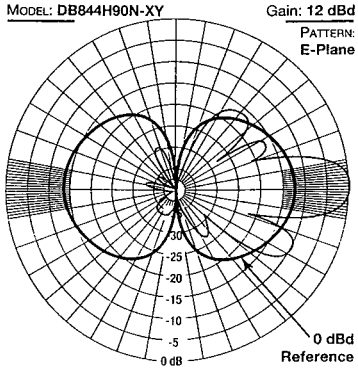
Typical DB842H90N-XY, DB844H90N-XY Horizontal Pattern



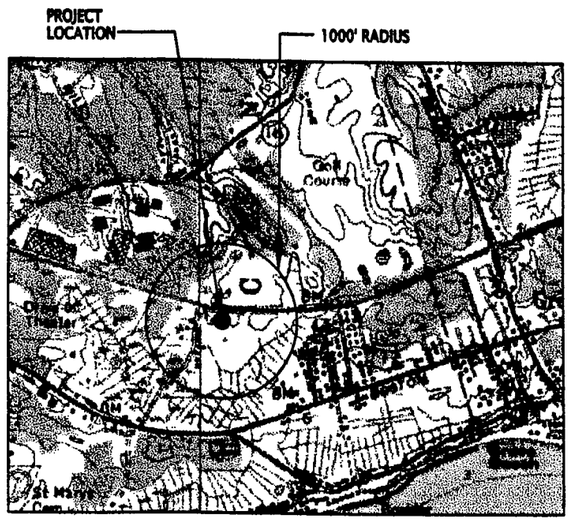
Typical DB842H80-XY Vertical Pattern



Typical DB844H90N-XY Vertical Pattern



dB DIRECTOR™



LOCATION MAP

SCALE

2000 0 2000

1" = 2000 FT

SITING COUNCIL SUBMISSION
CLINTON SOUTH
TELECOMMUNICATION FACILITY

46 MEADOW ROAD
CLINTON, CONNECTICUT 06413

VICINITY MAP

SCALE

800 0 800

1" = 800 FT

PREPARED FOR:

CELLCO PARTNERSHIP DBA
VERIZON WIRELESS
20 ALEXANDER DRIVE
WALLINGFORD, CONNECTICUT 06492

CONTENTS

PREPARED BY:

Cusick & Associates P.C.
SURVEYORS \ MAPPERS
PLANNERS
19 Cedar Island Ave.
Clinton, CT 06413
FAX (860) 669-6888
(860) 669-7798
Surveyors www.CusickSurveyors.com

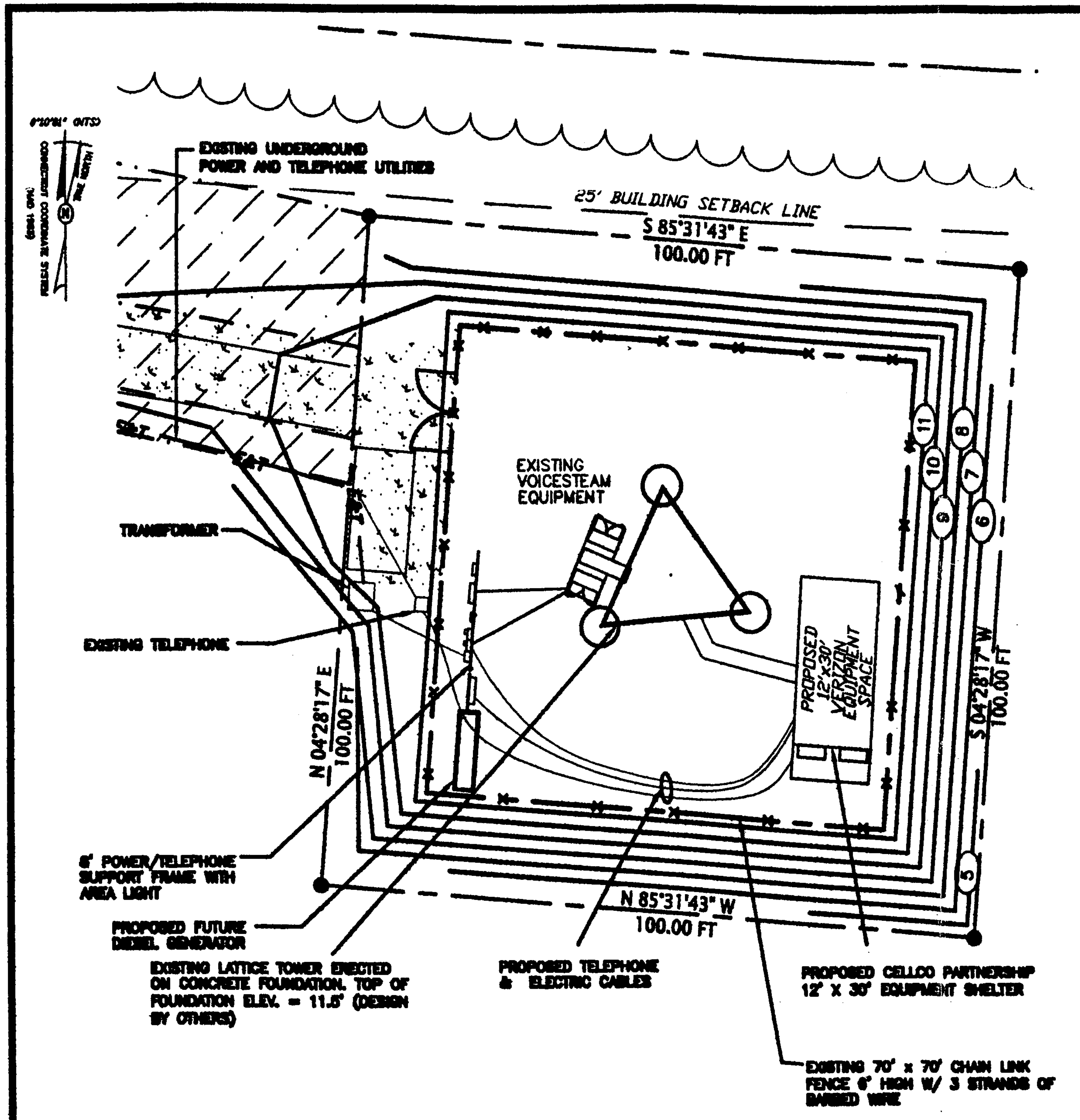
In Cooperation with:

OSPREY
ENVIRONMENTAL ENGINEERING, LLC
146 East Main St PHONE (860) 669-6661
Clinton, CT 06413 FAX (860) 664-8761

NOT FOR CONSTRUCTION

DATES

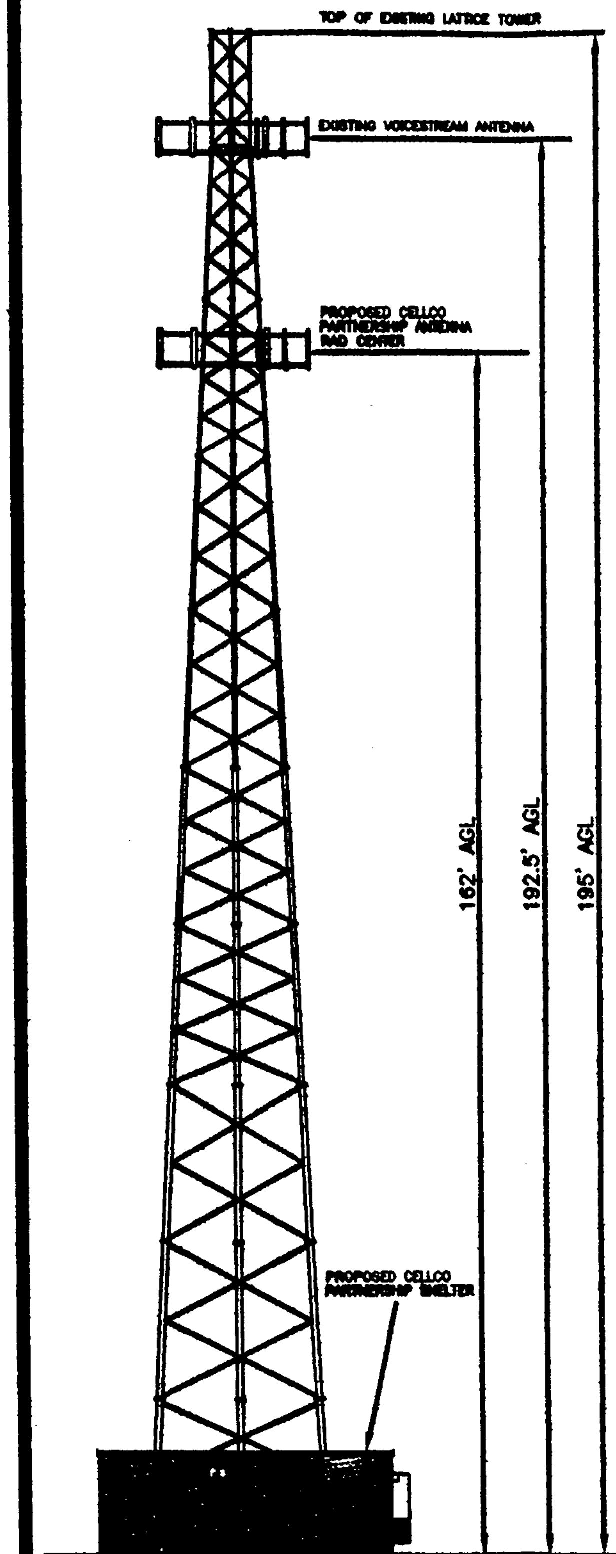
ISSUE DATE: MARCH 21, 2001
REVISIONS:
JUNE 13, 2001 ADDED PROPOSED DIESEL GEN.



SITE PLAN

Scale 1" = 20 ft

SBA LEASE PARCEL INFORMATION	
DEED	VOLUME 282 PG. 683 VOLUME 282 PG. 683 VOLUME 282 PG. 683
AREA	10,000 SQ. FT.
ACRES	.2296



TOWER ELEVATION

NOT TO SCALE

TOWER LOCATION

Gesick & Associates P.C.
SURVEYORS | MAPPERS PLANNERS

In Cooperation with:

OSPREY ENVIRONMENTAL ENGINEERING, LLC

DATE: 3/21/01

SCALE: AS SHOWN

REVISIONS

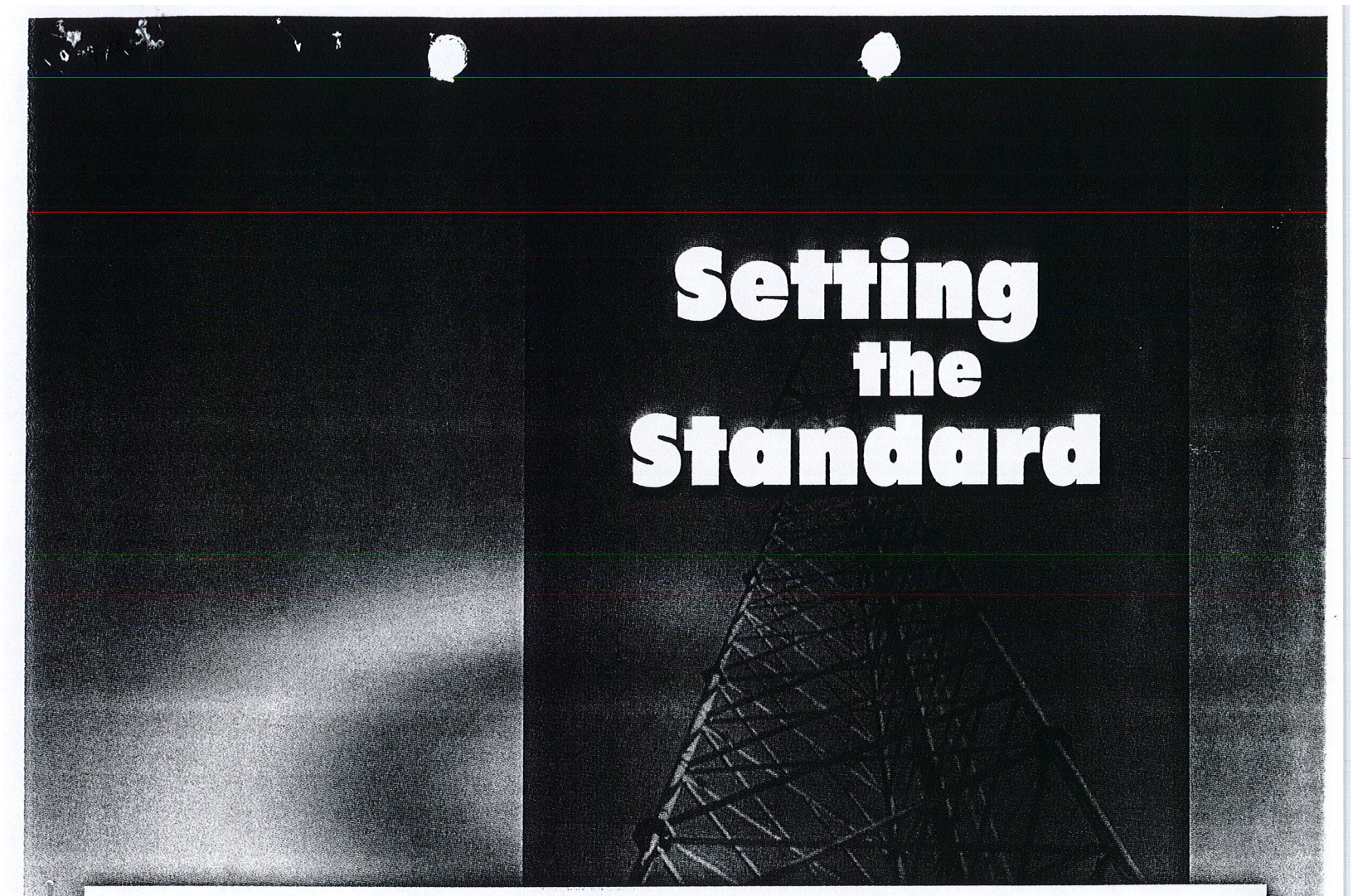
SITE PLAN AND TOWER ELEVATION

CLINTON SOUTH TELECOMMUNICATION FACILITY
46 MEADOW ROAD
CLINTON, CONNECTICUT

Sheet No.

Site Plan and Elevation

SC-1

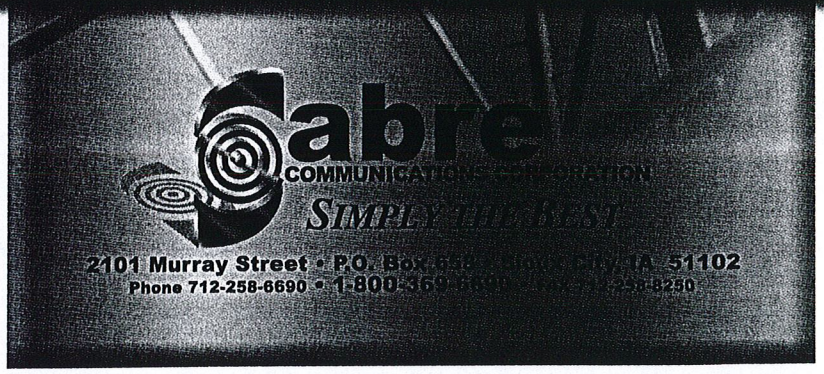


SBA, INC

195' *MODEL S3T-L*

CLINTON 4, CT *00-10101*

PE STAMPED PERMIT DRAWINGS



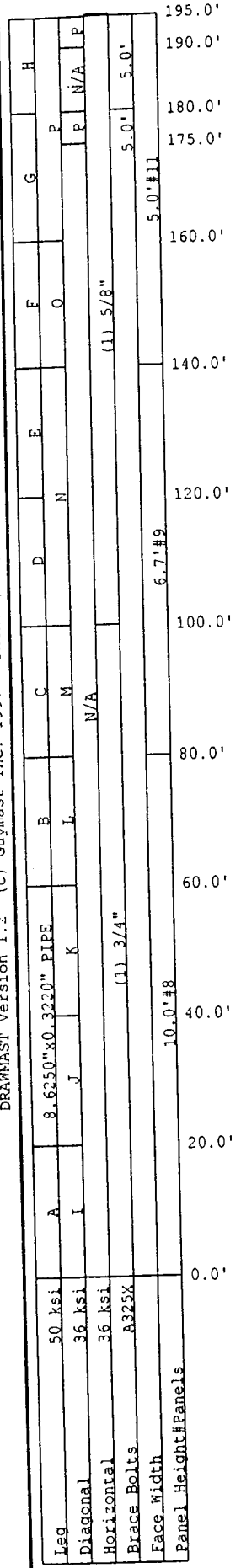
Structural Design Report
195' S3TL Self-Supporting Tower
located at Clinton 4, CT
H275-034

prepared for S.B.A., Inc.
by Sabre Communications Corporation

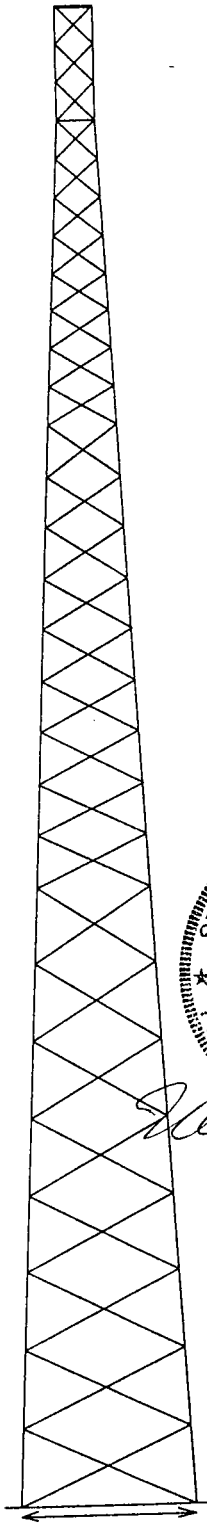
Job # 00-10101
SA # 2479S

November 19, 1999

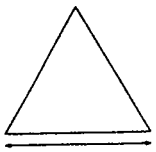
11/23/99



DRAWMAST Version 1.2 (c) Guymast Inc. 1997 Phone:(416) 736-7453



ELEVATION



PLAN AT BASE

PLAN AT TOP

NOTES:

1. The tower model is S3TL.
2. Transmission lines are to be attached to standard 6-over-6 waveguide ladders.
3. Azimuths are relative (not based on true north).
4. Foundation loads shown are maximums.
5. (8) 1-1/2" dia. anchor bolts per leg.
6. Due to the 25% reduction in wind pressure, which is allowed by the 222-F standard when considering ice accumulation (section 2.3.16), the ice case does not control the design of any tower member or the foundations

ANTENNA LIST

NO	ELEV	ANTENNA	TX-LINE
1	195'	(12) DB 896 + mount	(12) 1-5/8"
2	185'	(12) DB 896 + mount	(12) 1-5/8"
3	175'	(12) DB 896 + mount	(12) 1-5/8"
4	165'	(12) DB 896 + mount	(12) 1-5/8"
5	155'	(12) DB 896 + mount	(12) 1-5/8"

STATE OF CONNECTICUT
KEITH J. TINDALL
No. 21551
LICENSED PROFESSIONAL ENGINEER

11/23/99

MATERIAL LIST

NO	TYPE
A	8.6250"x0.5000" PIPE
B	6.6250"x0.4320" PIPE
C	6.6250"x0.2800" PIPE
D	5.5625"x0.3750" PIPE
E	4.5000"x0.3370" PIPE
F	3.5000"x0.3000" PIPE
G	3.5000"x0.2160" PIPE
H	2.3750"x0.1540" PIPE
I	L 3-1/2"x4"x1/4" (SLV)
J	L 3-1/2"x3-1/2"x1/4"
K	L 3"x3-1/2"x1/4" (SLV)
L	L 3"x3"x1/4"
M	L 3"x3"x3/16"
N	L 2-1/2"x2-1/2"x3/16"
O	L 2"x2"x3/16"
P	L 1-3/4"x1-3/4"x3/16"

TOTAL FOUNDATION LOADS
H=48.91k
V=50.77k
M=5764.20k-ft
T=0.00k-ft

INDIVIDUAL FOOTING LOADS
H=29.36k
V=306.31k
U=-258.40k

Sabre Communications Corporation
2101 Murray Street, Sioux City, Iowa 51102
Phone: (712) 258-6690 **Fax: (712) 258-8250**

Client: SBA, Inc.
Location: Clinton, CT #H275-034(SA2479S)
Standard: ANSI/TIA/EIA 222-F 1996

Job No: 00-10101

Date: 19 nov 1999
Tower Height: 195.00'
Design Wind & Ice: 85 mph + 1/2" ice

Project: c:\guymast\s3tl\sa2479s.lod

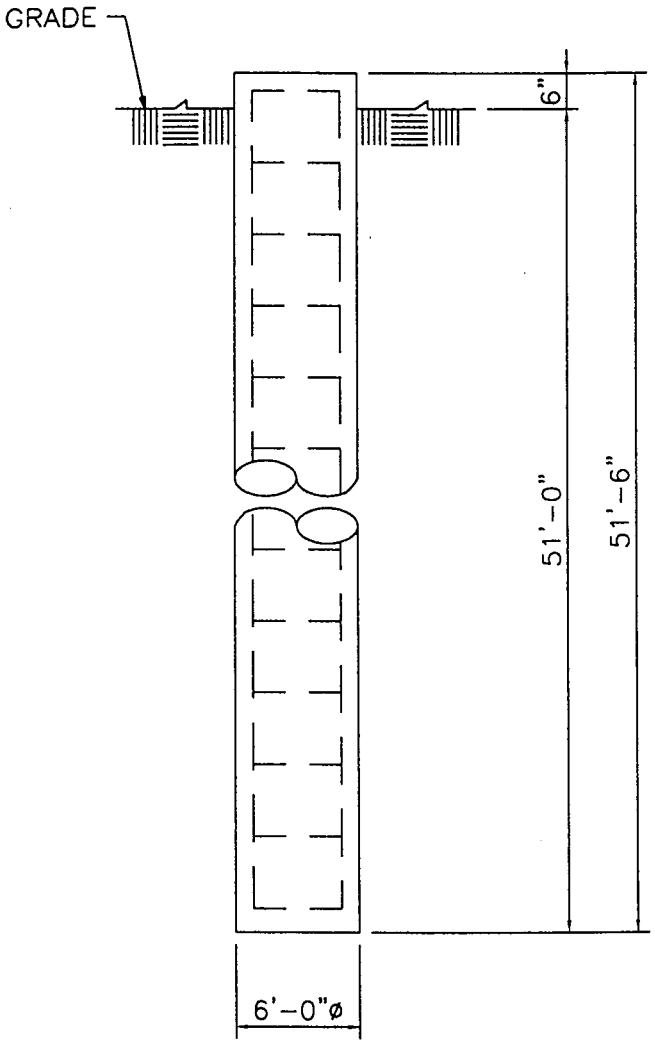
SABRE COMMUNICATIONS CORPORATION
2101 MURRAY STREET P.O. BOX 658 SIOUX CITY, IOWA 51102
PHONE: (712) 258-6690 FAX: (712) 258-8250

NO. SA2479-S
COVER PAGE 2
DATE 11/23/99
BY KJT/CE

CUSTOMER: S.B.A., INC.

SITE: CLINTON 4, CT #4275-034

TITLE: 195 FT. MODEL S3TL SELF-SUPPORTING TOWER AT 85 MPH WIND + 1/2" ICE PER EIA-222-F-1996. ANTENNA LOADING PER PAGE 1 OF THE STRESS ANALYSIS.



DRILLED CAISSON
(53.93 CU. YDS. EACH)
(3) REQUIRED

STATE OF CONNECTICUT
KEITH J. TINDALL
No. 21551
LICENSED PROFESSIONAL ENGINEER

11/23/99

NOTES

1). CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI, IN ACCORDANCE WITH ACI 318-95.

2). REBARS PER ASTM A615 GR. 60.

3). FOUNDATION DESIGN IS BASED UPON SOILS REPORT (PROJECT NO. 99500G) BY JAWORSKI GEOTECH, INC. DATED NOVEMBER 22, 1999.

4). USE (8) 1 1/2 ø (50 KSI OR EQUAL) ANCHOR BOLTS WITH 1/2" THK. TEMPLATE AT TOP AND BOTTOM OF ANCHOR BOLTS PER LEG.

5). 3" MINIMUM CONCRETE COVER.

6). SEE SOILS REPORT FOR CAISSON INSTALLATION REQUIREMENTS.

REBAR SCHEDULE PER CAISSON
(28) #8 V-BARS W/#4 TIES @ 12" O.C.

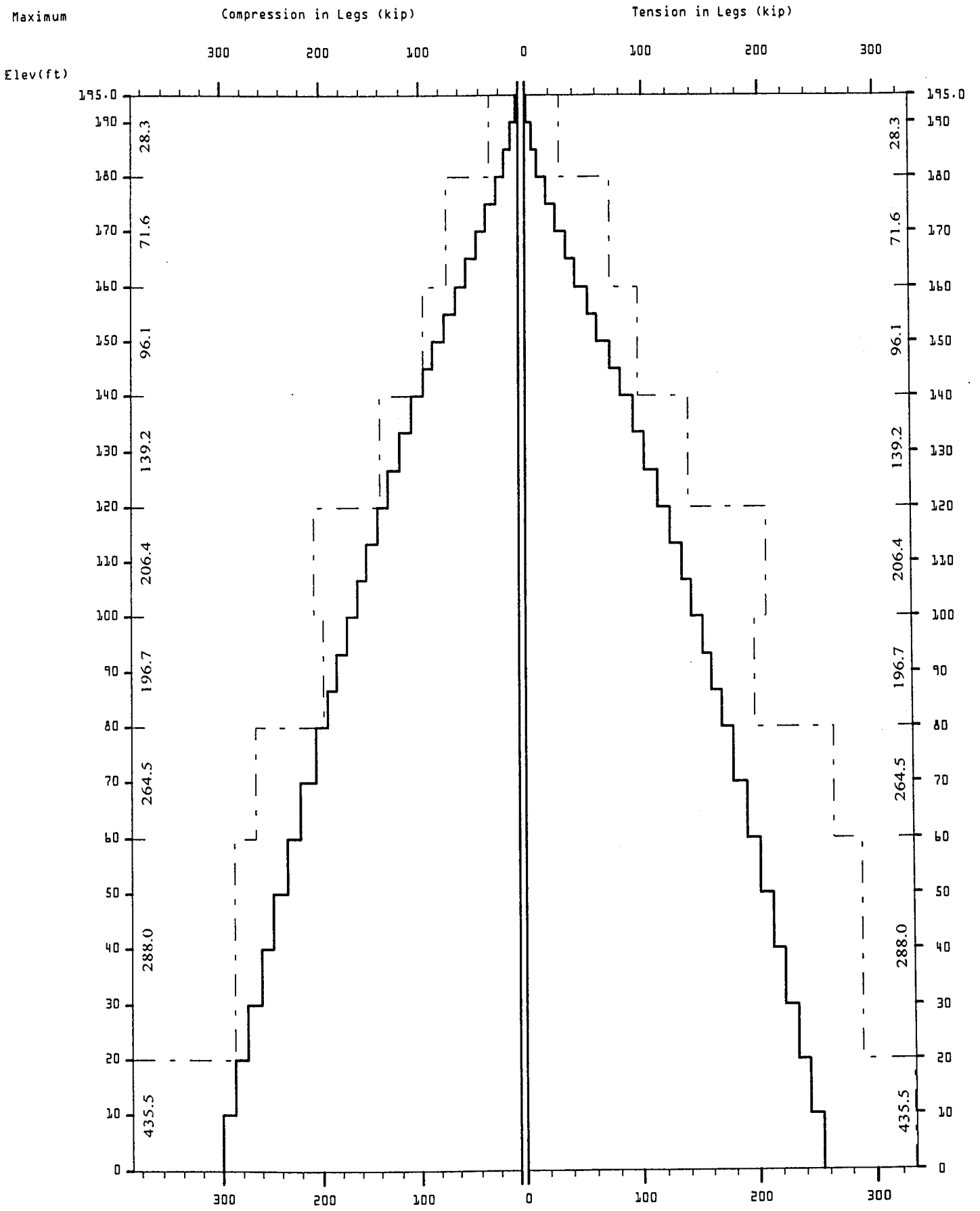
MASTPLOT Ver 1.0 (c) Guymast Inc. 1[illegible] Phone:(416) 736-7453

Licensed to: Sabre Communicatio

[SA2479S]-195 FT S3TL SBA CLINTON 4[illegible] CT #H275-034 (00-10101) 11-19-99 JDI

19 nov 1999

10:57:29



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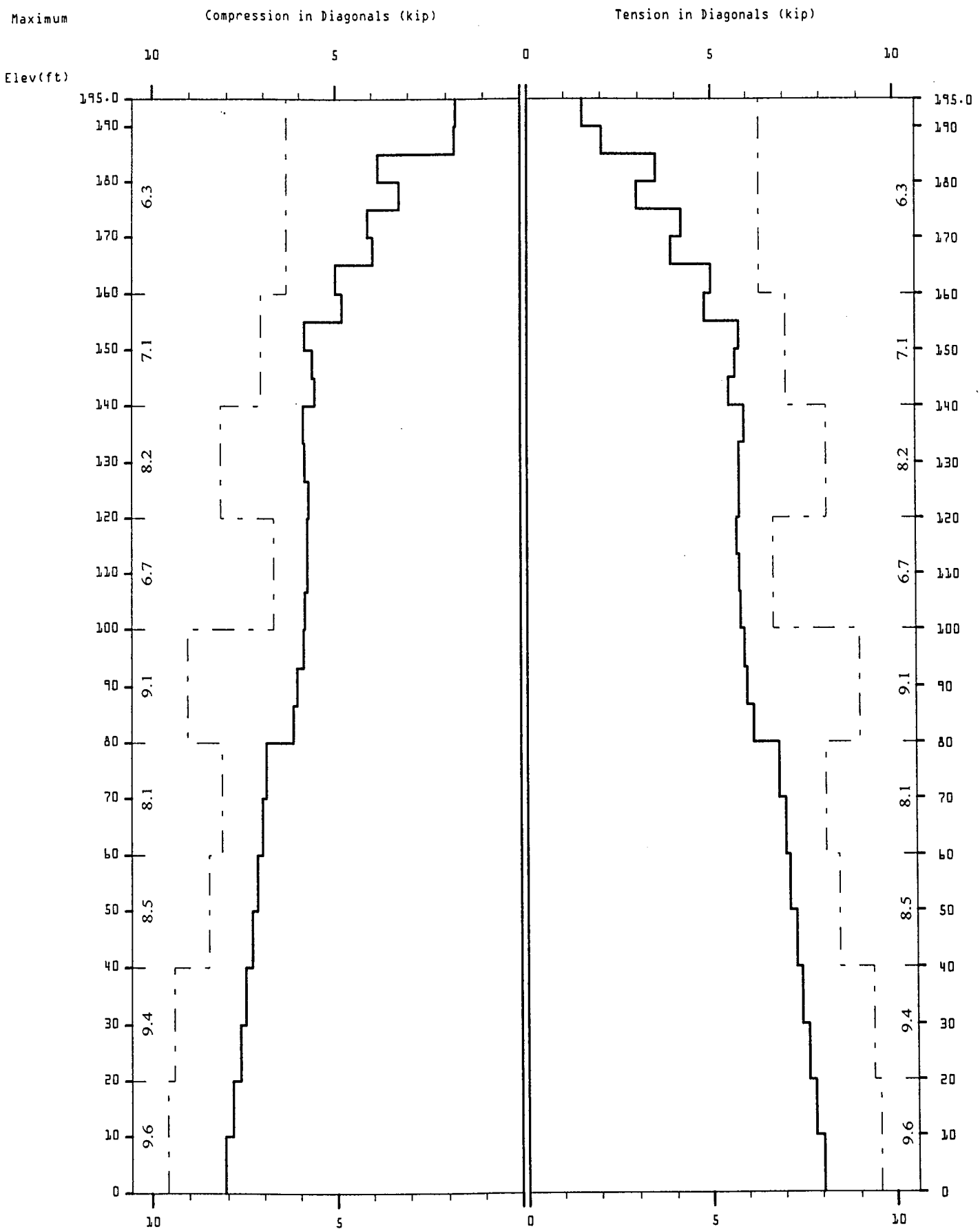
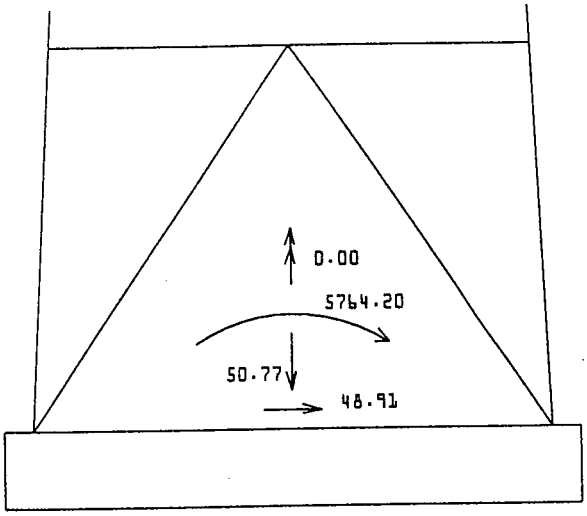
[SA2479S]-195 FT S3TL SBA CLINTON 4, CT #H275-034 (00-10101) 11-19-99 JDI

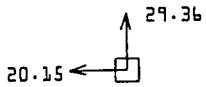


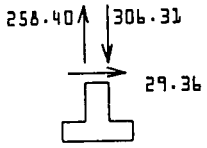
MAXIMUM FOR ALL LOAD CASES

TOTAL FOUNDATION LOADS (kip, ft-kip)



INDIVIDUAL FOOTING LOADS (kip)





MAST - Latticed Tower Analysis (Unguyed)

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Sabre Communication

on: 19 nov 1999 at: 10:57:29

[SA2479S]-195 FT S3TL SBA CLINTON 4, CT #H275-034 (00-10101) 11-19-99 JDI

MAST GEOMETRY (ft)

PANEL TYPE	NO.OF LEGS	ELEV.AT BOTTOM	ELEV.AT TOP	F.W..AT BOTTOM	F.W..AT TOP	TYPICAL PANEL HEIGHT
X	3	180.00	195.00	5.00	5.00	5.00
X	3	140.00	180.00	9.00	5.00	5.00
X	3	80.00	140.00	15.00	9.00	6.67
X	3	0.00	80.00	23.00	15.00	10.00

MEMBER PROPERTIES

MEMBER TYPE	BOTTOM ELEV ft	TOP ELEV ft	X-SECTN AREA in.sq	RADIUS OF GYRAT in	ELASTIC MODULUS ksi	THERMAL EXPANSN /deg
LE	180.00	195.00	1.075	0.000	29000.	0.0000000
LE	160.00	180.00	2.228	0.000	29000.	0.0000000
LE	140.00	160.00	3.016	0.000	29000.	0.0000000
LE	120.00	140.00	4.407	0.000	29000.	0.0000000
LE	100.00	120.00	6.111	0.000	29000.	0.0000000
LE	80.00	100.00	5.581	0.000	29000.	0.0000000
LE	60.00	80.00	8.405	0.000	29000.	0.0000000
LE	20.00	60.00	8.399	0.000	29000.	0.0000000
LE	0.00	20.00	12.763	0.000	29000.	0.0000000
DI	160.00	195.00	0.621	0.000	29000.	0.0000000
DI	140.00	160.00	0.715	0.000	29000.	0.0000000
DI	100.00	140.00	0.902	0.000	29000.	0.0000000
DI	80.00	100.00	1.090	0.000	29000.	0.0000000
DI	60.00	80.00	1.437	0.000	29000.	0.0000000
DI	40.00	60.00	1.562	0.000	29000.	0.0000000
DI	20.00	40.00	1.687	0.000	29000.	0.0000000
DI	0.00	20.00	1.812	0.000	29000.	0.0000000
HO	190.00	195.00	0.621	0.000	29000.	0.0000000
HO	175.00	180.00	0.621	0.000	29000.	0.0000000

✳ LOADING CONDITION A

85 MPH + NO ICE WIND AZ 0 DEGREES

MAST LOADING

LOAD TYPE	ELEV	APPLY..LOAD..AT RADIUS	AZI	LOAD AZI	.....FORCES..... HORIZ	DOWN	.....MOMENTS..... VERTICAL	TORSNAL

✳ FOUR WIND DIRECTIONS WERE ANALYZED. ONLY ONE CONDITION IS SHOWN IN FULL.

PAI

	ft	ft			kip	kip	ft-kip	ft-kip
C	195.0	0.00	0.0	0.0	3.12	2.66	0.00	0.00
C	185.0	0.00	0.0	0.0	3.07	2.66	0.00	0.00
C	175.0	0.00	0.0	0.0	3.02	2.66	0.00	0.00
C	165.0	0.00	0.0	0.0	2.97	2.66	0.00	0.00
C	155.0	0.00	0.0	0.0	2.92	2.66	0.00	0.00
D	195.0	0.00	180.0	0.0	0.12	0.07	0.00	0.00
D	190.0	0.00	180.0	0.0	0.12	0.07	0.00	0.00
D	190.0	0.00	180.0	0.0	0.11	0.06	0.00	0.00
D	180.0	0.00	180.0	0.0	0.11	0.06	0.00	0.00
D	180.0	0.00	180.0	0.0	0.13	0.10	0.00	0.00
D	175.0	0.00	180.0	0.0	0.13	0.10	0.00	0.00
D	175.0	0.00	180.0	0.0	0.12	0.09	0.00	0.00
D	165.0	0.00	180.0	0.0	0.12	0.09	0.00	0.00
D	165.0	0.00	180.0	0.0	0.14	0.12	0.00	0.00
D	160.0	0.00	180.0	0.0	0.14	0.12	0.00	0.00
D	160.0	0.00	180.0	0.0	0.14	0.14	0.00	0.00
D	140.0	0.00	180.0	0.0	0.15	0.14	0.00	0.00
D	140.0	0.00	180.0	0.0	0.16	0.17	0.00	0.00
D	120.0	0.00	180.0	0.0	0.16	0.17	0.00	0.00
D	120.0	0.00	180.0	0.0	0.17	0.19	0.00	0.00
D	100.0	0.00	180.0	0.0	0.17	0.19	0.00	0.00
D	100.0	0.00	180.0	0.0	0.18	0.20	0.00	0.00
D	80.0	0.00	180.0	0.0	0.18	0.20	0.00	0.00
D	80.0	0.00	180.0	0.0	0.17	0.23	0.00	0.00
D	60.0	0.00	180.0	0.0	0.17	0.23	0.00	0.00
D	60.0	0.00	180.0	0.0	0.17	0.24	0.00	0.00
D	40.0	0.00	180.0	0.0	0.17	0.24	0.00	0.00
D	40.0	0.00	180.0	0.0	0.16	0.25	0.00	0.00
D	20.0	0.00	180.0	0.0	0.16	0.25	0.00	0.00
D	20.0	0.00	180.0	0.0	0.17	0.31	0.00	0.00
D	0.0	0.00	180.0	0.0	0.17	0.31	0.00	0.00

MAXIMUM MAST DISPLACEMENTS:
==========

ELEV	------DEFLECTIONS (ft)-----			--TILTS (DEG)---		TWIST
ft	NORTH	EAST	DOWN	NORTH	EAST	DEG
195.0	1.939 C	0.943 D	0.022 C	1.239 C	0.606 D	0.000 B
190.0	1.830 C	0.890 D	0.021 C	1.233 C	0.603 D	0.000 B
185.0	1.722 C	0.837 D	0.020 C	1.213 C	0.593 D	0.000 B
180.0	1.616 C	0.786 D	0.018 C	1.173 C	0.573 D	0.000 B
175.0	1.513 C	0.735 D	0.017 C	1.145 C	0.559 D	0.000 B
170.0	1.413 C	0.686 D	0.016 C	1.108 C	0.541 D	0.000 B
165.0	1.317 C	0.640 D	0.015 C	1.063 C	0.519 D	0.000 B
160.0	1.223 C	0.594 D	0.014 C	1.010 C	0.493 D	0.000 B
155.0	1.137 C	0.551 D	0.013 C	0.967 C	0.472 D	0.000 B
150.0	1.050 C	0.509 D	0.012 C	0.919 C	0.448 D	0.000 B
145.0	0.972 C	0.471 D	0.011 C	0.867 C	0.423 D	0.000 B
140.0	0.895 C	0.434 D	0.010 C	0.811 C	0.395 D	0.000 B
133.3	0.803 C	0.389 D	0.009 C	0.758 C	0.369 D	0.000 A
126.7	0.714 C	0.346 D	0.008 C	0.701 C	0.341 D	0.000 A
120.0	0.634 C	0.307 D	0.008 C	0.643 C	0.313 D	0.000 A
113.3	0.558 C	0.270 D	0.007 C	0.600 C	0.292 D	0.000 A
106.7	0.489 C	0.236 D	0.006 C	0.557 C	0.271 D	0.000 A
100.0	0.423 C	0.204 D	0.006 C	0.513 C	0.249 D	0.000 A
93.3	0.365 C	0.176 D	0.005 C	0.465 C	0.225 D	0.000 A
86.7	0.311 C	0.150 D	0.005 C	0.415 C	0.201 D	0.000 A

80.0	0.263 C	0.127 D	0.004 C	0.366 C	0.177 D	0.000 A
70.0	0.201 C	0.097 D	0.004 C	0.316 C	0.153 D	0.000 A
60.0	0.148 C	0.071 D	0.003 C	0.267 C	0.129 D	0.000 A
50.0	0.103 C	0.049 D	0.003 C	0.217 C	0.105 D	0.000 A
40.0	0.067 C	0.032 D	0.002 C	0.167 C	0.080 D	0.000 A
30.0	0.038 C	0.018 D	0.001 B	0.116 C	0.056 D	0.000 A
20.0	0.020 C	0.010 D	0.001 B	0.066 C	0.032 D	0.000 A
10.0	0.006 C	-0.003 B	0.000 B	0.033 C	0.016 D	0.000 B
0.0	0.000 A	0.000 A	0.000 A	0.000 A	0.000 A	0.000 A

MAXIMUM TENSION IN MAST MEMBERS (kip)

ELEV ft	LEGS	DIAG	HORIZ	BRACE
195.0	----------		0.61 C	0.00 A
	1.07 A	1.49 D		
190.0	----------		0.00 A	0.00 A
	5.05 A	2.02 D		
185.0	----------		0.01 A	0.00 A
	10.38 A	3.50 A		
180.0	----------		1.21 A	0.00 A
	18.17 A	2.97 A		
175.0	----------		0.01 A	0.00 A
	25.88 A	4.19 D		
170.0	----------		0.01 A	0.00 A
	34.67 A	3.90 D		
165.0	----------		0.00 A	0.00 A
	42.62 A	5.00 B		
160.0	----------		0.02 A	0.00 A
	52.93 A	4.82 D		
155.0	----------		0.00 C	0.00 A
	61.10 A	5.79 D		
150.0	----------		0.02 A	0.00 A
	72.44 A	5.69 D		
145.0	----------		0.00 B	0.00 A
	81.06 A	5.51 B		
140.0	----------		0.02 A	0.00 A
	92.30 A	5.92 D		
133.3	----------		0.00 C	0.00 A
	102.43 A	5.78 B		
126.7	----------		0.02 A	0.00 A
	113.65 A	5.77 D		
120.0	----------		0.00 A	0.00 A
	122.77 A	5.72 B		
113.3	----------		0.01 A	0.00 A
	132.78 A	5.79 D		
106.7	----------		0.00 A	0.00 A
	141.26 A	5.80 B		
100.0	----------		0.01 A	0.00 A
	150.50 A	5.92 B		
93.3	----------		0.01 A	0.00 A
	158.57 A	6.01 B		
86.7	----------		0.01 A	0.00 A
	167.32 A	6.17 D		
80.0	----------		0.01 A	0.00 A
	176.96 A	6.87 B		
70.0	----------		0.01 A	0.00 A
	189.25 A	7.01 D		
60.0	----------		0.01 A	0.00 A

	200.29 A	7.13 B		
50.0	----------		0.01 A	0.00 A
	211.84 A	7.31 D		
40.0	----------		0.00 A	0.00 A
	222.41 A	7.45 B		
30.0	----------		0.01 A	0.00 A
	233.38 A	7.63 D		
20.0	----------		0.00 C	0.00 A
	243.49 A	7.80 B		
10.0	----------		0.00 A	0.00 A
	253.86 A	8.03 B		
0.0	----------		0.00 A	0.00 A

MAXIMUM COMPRESSION IN MAST MEMBERS (kip)

ELEV ft	LEGS	DIAG	HORIZ	BRACE
195.0	----------		-0.43 A	0.00 A
	-2.61 C	-1.74 D		
190.0	----------		0.00 C	0.00 A
	-7.61 C	-1.77 D		
185.0	----------		0.00 C	0.00 A
	-14.34 C	-3.82 C		
180.0	----------		-1.02 C	0.00 A
	-22.65 C	-3.26 C		
175.0	----------		-0.01 C	0.00 A
	-33.07 C	-4.10 B		
170.0	----------		-0.01 C	0.00 A
	-42.14 C	-3.99 B		
165.0	----------		0.00 A	0.00 A
	-52.58 C	-5.00 D		
160.0	----------		-0.02 C	0.00 A
	-63.54 C	-4.83 B		
155.0	----------		0.00 A	0.00 A
	-74.17 C	-5.87 B		
150.0	----------		-0.02 C	0.00 A
	-86.39 C	-5.64 B		
145.0	----------		0.00 A	0.00 A
	-95.67 C	-5.57 D		
140.0	----------		-0.02 C	0.00 A
	-107.99 C	-5.89 B		
133.3	----------		0.00 A	0.00 A
	-119.18 C	-5.84 D		
126.7	----------		-0.02 C	0.00 A
	-131.69 C	-5.74 B		
120.0	----------		0.00 C	0.00 A
	-142.00 C	-5.78 D		
113.3	----------		-0.01 C	0.00 A
	-153.41 C	-5.77 B		
106.7	----------		0.00 C	0.00 A
	-163.18 C	-5.85 D		
100.0	----------		-0.01 C	0.00 A
	-173.85 C	-5.91 B		
93.3	----------		-0.01 C	0.00 A
	-183.30 C	-6.06 B		
86.7	----------		-0.01 C	0.00 A
	-193.55 C	-6.16 B		
80.0	----------		-0.01 C	0.00 A
	-205.05 C	-6.93 D		

70.0	----------		-0.01 C	0.00 A
	-219.82 C	-7.02 B		
60.0	----------		-0.01 C	0.00 A
	-233.27 C	-7.18 D		
50.0	----------		-0.01 C	0.00 A
	-247.37 C	-7.32 B		
40.0	----------		0.00 C	0.00 A
	-260.45 C	-7.50 D		
30.0	----------		-0.01 C	0.00 A
	-274.05 C	-7.65 B		
20.0	----------		0.00 A	0.00 A
	-286.92 C	-7.86 B		
10.0	----------		0.00 C	0.00 A
	-300.32 C	-8.05 B		
0.0	----------		0.00 A	0.00 A

MAXIMUM INDIVIDUAL FOUNDATION LOADS: (kip)

LOAD---COMPONENTS				TOTAL
NORTH	EAST	DOWN	UPLIFT	SHEAR
29.36 C	-20.15 B	306.31 C	-258.40 A	29.36 C

MAXIMUM TOTAL LOADS ON FOUNDATION : (kip & kip-ft)

HORIZONTAL			DOWN	OVERTURNING			TORSION
NORTH	EAST	TOTAL @ 0.0		NORTH	EAST	TOTAL @ 0.0	
48.9 C	23.3 D	48.9 C	50.8 B	5764.2 C	2776.8 D	5764.2 C	0.0 A

DRILLED STRAIGHT PIER D IGN BY SABRE COMMUNICATIO , CORP.

195' S3TL SBA INC H275-034 CLINTON 4 CT (00-10101) 11-23-99 KJT

REACTIONS :-

HORIZONTAL FORCE (kips)	=	29.36
VERTICAL FORCE (kips)	=	258.4
OVERTURNING MOMENT (ft-k)	=	0

SOIL AND CAISSON DATA :-

HT. OF PIER ABOVE GRADE (ft)	=	.5
DEPTH OF LOOSE TOP SOIL (ft)	=	2.5
WEIGHT OF SOIL (pcf)	=	120
WATER TABLE BELOW GRADE (ft)	=	5
ANGLE OF SOIL FRICTION (deg)	=	30
ULTIMATE COHESION (psf)	=	0
S.F. OF SOIL OR SKIN FRICTION	=	2
S.F. OF CONCRETE	=	1.25
Fy OF RE-BARS (ksi)	=	60

NOTE: SEE SOILS REPORT FOR CAISSON INSTALLATION REQUIREMENTS

ULTIMATE SKIN FRICTION psf	DEPTH OF EACH STRATUM FROM ft	TO ft
0	0.0	20.0
730	20.0	51.0

*** DRILLED STRAIGHT CAISSON DATA AND CAPACITIES ***

ALLOWABLE VERTICAL REISTANCE (kips)	= 321.42
CALCULATED LATERAL SOIL PRESSURE AT TOP (ksf)	= 0.229
ALLOWABLE LATERAL SOIL PRESSURE AT TOP (ksf)	= 1.385
CALCULATED LATERAL SOIL PRESSURE AT BOTTOM (ksf)	= 0.187
ALLOWABLE LATERAL SOIL PRESSURE AT BOTTOM (ksf)	= 4.074
DIAMETER OF CAISSON (ft)	= 6.00
DEPTH OF CAISSON BELOW GRADE (ft)	= 51.00
TOTAL LENGTH OF CAISSON (ft)	= 51.50
VOLUME OF CONCRETE OF EACH CAISSON (cu. yd.)	= 53.93
MAX. MOMENT AT CAISSON BELOW GRADE (ft-k)	= 401.44
REQUIRED AREA OF RE-BARS (sq. in.)	= 20.36

(28) #8 bars w/ #4 ties @12"

JGI
AWORSKI
EOTECH, INC.

SERVICES
- Geotechnical
- Environmental
- Construction
- Underground Tank & Materials Testing

GEOTECHNICAL EVALUATION

SBA TOWER SITE #4275-034
CLINTON, CONNECTICUT

PROJECT NO. 99500G

NOVEMBER 22, 1999

Prepared for:

Mr. Randy Freschlin
Construction Project Manager
SBA, Inc.
125 Shaw Street, Suite 116
New London, CT 06320

achary Road
ster, NH 03109-5614
7-9700 Fax 647-4432

❑ 44 Wood Avenue, Unit #4
Mansfield, MA 02048-1255
(508) 337-6100 Fax 261-1348

❑ 114 Woodlawn Road
Berlin, CT 06037-1535
(860) 829-1725 Fax 829-1745

: Address: http://www.jgi-geo.com

JAWORSKI
GEOTECH, INC.

SERVICES
- Geotechnical
- Environmental
- Construction
- Underground Tank & Materials Testing

November 22, 1999

Mr. Randy Freschlin
Construction Project Manager
SBA, Inc.
125 Shaw Street, Suite 116
New London, CT 06320

re: SBA Tower Site #4275-034
Clinton, Connecticut

Project No. 99500G

Dear Mr. Freschlin:

The following report was prepared by Jaworski Geotech, Inc. (JGI) regarding a geotechnical evaluation for the above-referenced project. Included is our review of subsurface data from borings drilled by New England Boring Corporation (NEBC) of Glastonbury, Connecticut, field resistivity testing, and our evaluation of subsurface data for foundation design and construction. Our work was completed in accordance with our general agreement dated May 28, 1998 and your subsequent authorization. The contents of this report are subject to the Limitations in Appendix A.

SITE AND PROJECT DESCRIPTION

The proposed tower site is located on a property identified as 46 Meadow Road in Clinton, Connecticut. The property is located on the east side of the street, north of its intersection with Route 1. The site is currently utilized as a commercial vehicle salvage yard. The tower lease area is planned within the northern portion of the property adjacent to a railroad line. According to a site plan provided by Gesick & Associates, P.C., dated August 27, 1999, topography within the proposed tower lease area slopes downward to the east from approximately elevation (El) 7.5 to El 5.5. Elevations are in feet and refer to the National Geodetic Vertical Datum of 1929.

The project involves the construction of a 195-foot-tall-lattice communications tower within a 4,900 square foot lease area. The lease area will be raised by the placement of fill to approximately El 11.5.

Zachary Road
ıester, NH 03109-5614
647-9700 Fax 647-4432

❑ 44 Wood Avenue, Unit #4
Mansfield, MA 02048-1255
(508) 337-6100 Fax 261-1348

❑ 114 Woodlawn Road
Berlin, CT 06037-1535
(860) 829-1725 Fax 829-1745

ıet Address: http://www.jgi-geo.com

Both equipment cabinets and prefabricated equipment shelters will also be constructed within the lease area. The existing gravel access road will be improved to a width of 14 feet, extending from the lease area to Meadow Road. The existing site conditions and the proposed tower lease area are shown on Figure 1.

SUBSURFACE EXPLORATIONS AND CONDITIONS

JGI planned and monitored three test borings, identified as JB-1 through JB-3, drilled by NEBC on November 10 and 17, 1999. The borings were advanced at each of the three tower leg locations utilizing 3-inch-inside diameter flush-joint casing to depths ranging from 22.0 to 52.0 feet below ground surface. Soil samples were generally obtained at the surface and at 5-foot intervals thereafter with a standard 2-inch-outside diameter split-barrel sampler. Standard Penetration Tests were performed at sampling intervals in general accordance with ASTM D-1586. A copy of the boring logs prepared by JGI are included in Appendix B. The approximate tower location had been previously field staked by Gesick & Associates, P.C. of Clinton, Connecticut. The approximate test boring locations are shown on Figure 1.

The soil profile, as identified by the test borings, consists of granular fill underlain by a natural outwash deposit. The granular fill generally consists of dense, brown, medium to fine sand, little to trace silt, trace gravel. The thickness of the fill is approximately 2.5 feet. The fill appears to represent on-site material which was placed to level the site. The characteristics of the outwash deposit underlying the fill range from very loose, tan, medium to fine sand, trace silt to medium dense, coarse to fine sand, trace gravel and silt. The deposit generally becomes more dense with increasing depth.

Groundwater was observed during drilling at a depth of approximately 5.0 feet in each of the borings. This depth corresponds to approximately El 1.0. However, it should be noted that groundwater levels vary depending upon season, precipitation, construction and other conditions which may be different from those at the time of drilling.

In situ soil resistivity testing was conducted by a JGI representative on November 10, 1999 after the completion of drilling. Resistivity testing was performed in accordance with ASTM G-57 using the Wenner electrode configuration. Electrodes were spaced from the tower center at 2, 4, 8, 16, 25 and 40 feet. Two resistivity lines were completed within the lease area. The location and orientation of the resistivity lines are shown on Figure 1. The results of the resistivity tests are summarized on Table 1. The resistivity values are within an anticipated range for both saturated and unsaturated conditions of the soil deposit.

FOUNDATION DESIGN RECOMMENDATIONS

Tower Foundation

Due to the presence of potentially liquefiable sand, supporting the tower using a mat foundation is not recommended. As such, it is recommended the tower be supported on multiple reinforced concrete drilled shafts deriving their capacity from the deeper medium dense sand deposit. Soil parameters associated with the design of drilled shafts are summarized on Table 2. It is anticipated that the length of the shaft will be based on either compression, uplift, or the lateral capacity required to resist live loading such as a combination of wind and ice.

The compression and uplift capacity of the shaft is be based on allowable friction within the outwash sand below approximately El -14.0 (bottom of potentially liquefiable sand) and end bearing at the bottom of the shaft. Drilled shafts designed to resist tension loads should have reinforcing steel installed the entire length of the shaft.

Technical specifications should be prepared that require material and installation detail submittals, proof of experience in drilled shaft installation, concrete placement methods, anchoring and use and removal of temporary steel casing. We can prepare technical specifications at your request.

Equipment Cabinets or Shelters

We recommend supporting the equipment cabinets or shelter on a slab-on-grade. The slab should be supported on a minimum 12-inch-thick layer of compacted structural fill or 3/4-inch-size crushed stone placed above proofrolled existing proofrolled fill. The non-frost susceptible structural fill will reduce the occurrence of heaving due to freeze thaw cycles. A modulus of subgrade reaction (K_s) of 200 kips per cubic foot may be used for design. Air entraining admixtures should be used for concrete slab components exposed to freezing. Slab subgrades should be protected against frost if construction occurs during cold weather.

Seismic Criteria

The subsurface conditions were reviewed in accordance with the *Connecticut State Building Code*, which includes the Building Officials & Code Administrators International, Inc. *The BOCA National Building Code*-13th Edition. For calculation of the lateral seismic forces on the structure, the soil profile is considered to be type S4. Accordingly, the recommended site coefficient (S) for seismic design is 2.0. The outwash sand between approximately El 1.0 and El -14.0 is potentially susceptible to liquefaction in the event of an earthquake.

CONSTRUCTION RECOMMENDATIONS

Drilled Shafts

Premium costs associated with drilling through boulders or socketing the shaft into bedrock are not anticipated. Care should be taken to ensure proper vertical alignment of the shaft. The use of drilling slurry, temporary steel casing, or both may be necessary to maintain an open hole below groundwater. The drilling method or combination of methods selected by the contractor should be submitted for review. Concrete may be placed by tremie to avoid dewatering and maintain stability.

Compacted Structural Fill

Structural fill should conform to the gradation requirements on Table 3. Due to the silt content, excavated fill should not be reused as structural fill directly below the equipment pads. Structural fill should be placed in loose lifts not exceeding 8 inches and compacted to at least 95 percent of the maximum dry density as determined by ASTM D-1557.

Preparation of Foundation Subgrades

The bearing subgrade for the equipment cabinet pads should be prepared and reviewed as outlined herein. In no case should fill or concrete be placed on frozen subgrades, nor should frozen soils be used as fill. The subgrade beneath the equipment pads is anticipated to consist of granular fill. Slab subgrades should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D-1557. Unstable areas observed during the compaction process should be replaced with compacted structural fill.

Temporary Excavations

Excavations greater than 4.0 feet deep should be cut to a stable slope or be temporarily braced. Temporary construction slopes should be designed in strict compliance with the most recent governing regulations. Stockpiles should be placed away from the edge of the excavation and their height should be controlled so they do not surcharge the sides of the excavation. Surface drainage should be controlled to avoid flow of surface water into the excavations.

Construction Dewatering

Significant construction dewatering is not anticipated for the equipment pads or utilities. Dewatering, if needed, may be accomplished using properly filtered sump pumps in the excavation. Efforts should be made to prevent surface water runoff from collecting in excavations.

Access Road

Pavement subgrades should be proofrolled with a minimum of six passes of a vibratory roller. Loose areas should be replaced with compacted fill. Following proofrolling, a minimum 12-inch-thick layer of Gravel Base, as defined by the *Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, and Incidental Construction*, 1995, Section M.02.03 Grading A should be placed on the subgrade. The gradation criteria for this material is included on Table 3. The gravel base should be compacted to at least 92 percent of its maximum dry density as determined by ASTM D-1557.

We trust the report contents satisfy your needs. If you have questions, please contact us. It was a pleasure working with you and we look forward to working with you in the future.

Very truly yours,

JAWORSKI GEOTECH, INC.

Timothy C. Carney, P.E.

Lawrence J. Dwyer, P.E.

/etc

Attachments

cc: Mr. Jim Gibson, Sabre Communications Corporation

LIMITATIONS

Explorations

1. The analyses, recommendations, and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. The nature and extent of variations near the bore hole may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced samples. For specific information, refer to the test boring logs.

3. Water level readings have been made in the test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from those at the time the measurements were made.

Review

4. It is recommended that Jaworski Geotech, Inc. (JGI) be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.

5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by JGI.

Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during drilled shaft installation. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

7. This report has been prepared for the exclusive use of SBA, Inc. in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

8. This report has been prepared by JGI for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to evaluation considerations only.

TABLE 1

SBA Tower Site #4275-034
Clinton, Connecticut
Project No. 99500G

In Situ Soil Resistivity Results[1]

Electrode Spacing (ft)	Resistivity[2] (ohm-m) Line #1	Line #2
2	9,000	6,970
4	8,110	7,960
8	5,200	7,350
16	3,670	4,280
25	3,830	3,350
40	3,060	2,290

Notes:

[1] Test completed using Wenner Four Probe Method with an AEMC Digital Ground Tester Model 4500.

[2] Only two lines could be performed due to the numerous cars and scrap metal and other debris scattered throughout the site.

11/19/99

TABLE 2

SBA Tower Site #4275-034
Clinton, Connecticut
Project No. 99500G

Drilled Shaft Foundation Design Recommendations

Design Parameter	**Design Value**
Net Allowable Bearing Capacity (ksf): Outwash (below El -14.0)	5.0
Ultimate Side Friction (psf)[1]: Elevation (El) 6.0 to El -14.0 Below El -14.0	Neglect 500 psf + 7.2 Z_1
Coefficient of Lateral Subgrade Reaction K_n (kcf)	$\frac{24Z_2}{D}$
Angle of Internal Friction El 6.0 to El -14.0 Below El -14.0 *In Situ* Density (pcf) El 6.0 to El 1.0 (Moist) El 1.0 to El -14.0 (Buoyant) Below El -14.0 (Buoyant)	 30° 35° 120.0 57.0 63.0
Approximate Groundwater Depth on 11/10/99 (feet)	5.0 (El 1.0)

Notes:

ksf - kips per square foot
psf - pounds per square foot
[1] To be applied uniformly to the area of the shaft below El -14.0
Z_1 - depth below El -14.0
kcf - kips per cubic foot
Z_2 - depth below final ground surface (El 11.5)
D - diameter of loaded area.
pcf - pounds per cubic foot

TABLE 3

SBA Tower Site #4275-034
Clinton, Connecticut
Project No. 99500G

Gradation Specifications

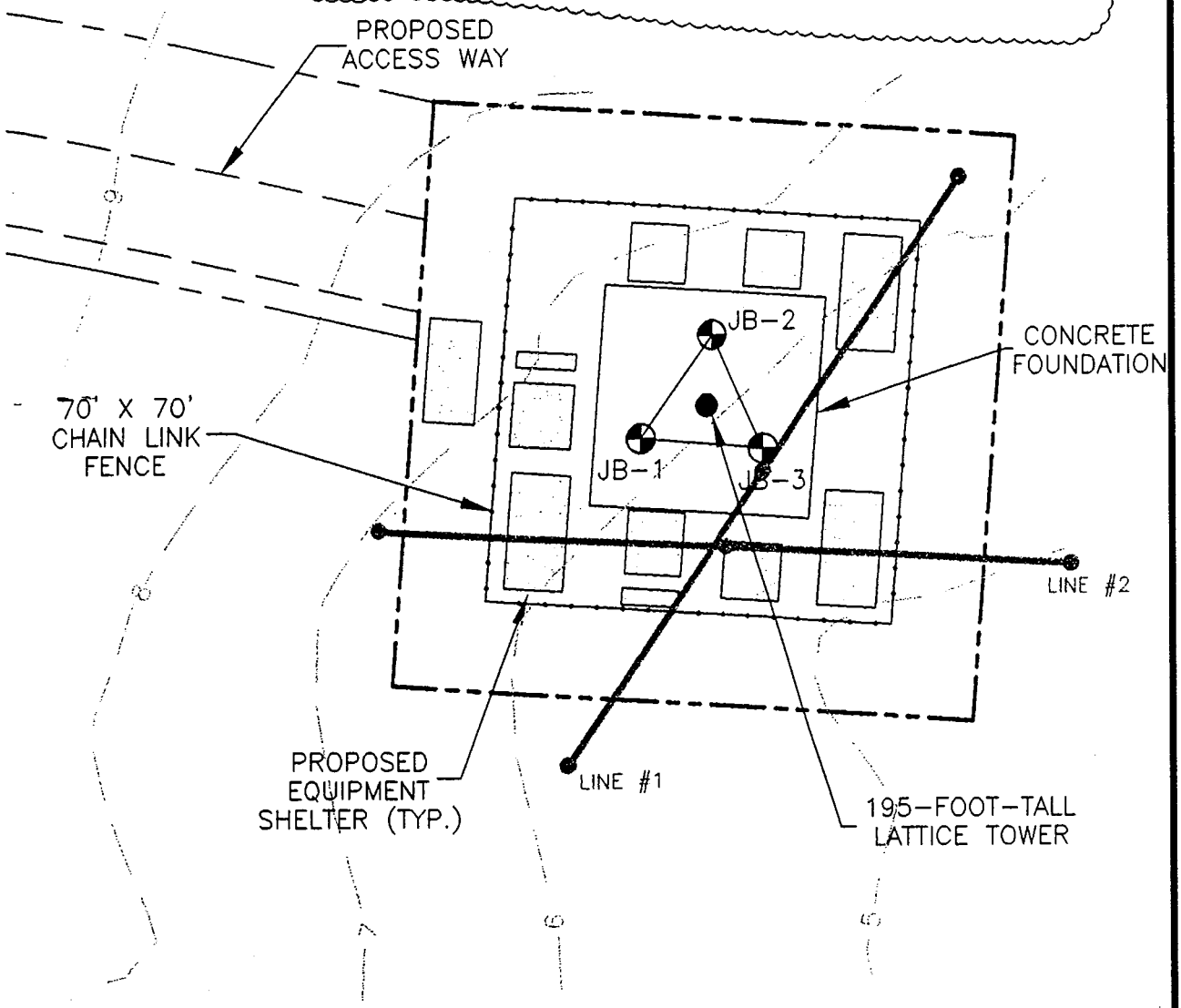
Sieve Size	Percent Passing by Weight: Structural [1] Fill	Percent Passing by Weight: Gravel [2] Base
8"	100	--
3 1/2"	--	100
3"	70-100	--
1 1/2"	--	55-100
3/4"	45-95	--
No. 4	30-90	25-60
No. 10	25-80	15-45
No. 40	10-50	5-25
No. 100	--	0-10
No. 200	0-12	0-5

Notes:

[1] Three inch maximum particle size within 12 inches of slab grade.

[3] From Connecticut Department of Transportation Standard Specifications for Roads, Bridges, and Incidental Construction, 1995, Section M.02.03, Grading A.

11/18/99



S:

HIS PLAN WAS PREPARED FROM A COPY OF AN UNTITLED, UNDATED PLAN ARED BY GESICK & ASSOCIATES, P.C. OF CLINTON, CONNECTICUT.

EST BORINGS SHOWN AS JB-1 THROUGH JB-3 WERE ADVANCED ON MBER 15 AND 17, 1999, UNDER THE DIRECTION OF JGI WITH EQUIPMENT D AND OPERATED BY NEW ENGLAND BORING CONTRACTORS, INC. OF TONBURY, CONNECTICUT.

HE APPROXIMATE LOCATIONS OF THE SUBSURFACE EXPLORATIONS WERE RMINED BY TAPE REFERENCING STAKES PLACED IN THE FIELD BY GESICK SOCIATES, P.C. THESE LOCATIONS SHOULD BE CONSIDERED ACCURATE TO THE DEGREE IMPLIED BY THE METHOD USED.

SE OF THIS PLAN IS LIMITED TO THE APPROXIMATE LOCATION OF THE URFACE EXPLORATIONS. ANY OTHER USE OF THIS PLAN WITHOUT SSION FROM JGI IS PROHIBITED.

LEGEND

JB-3 TEST BORING LOCATION

LINE #1 LINE OF RESISTIVITY

GRAPHIC SCALE

15 0 15 30 60

(IN FEET)

1 inch = 30 ft.

SBA TOWER SITE #4275-034

CLINTON, MASSACHUSETTS

REPARED FOR:

SBA, INC.
125 SHAW STREET; SUITE 116
NEW LONDON, CONNECTICUT 06320

E: NOVEMBER 1999

LE: 1" = 30'

JECT NO. 99500

FIGURE 1

SUBSURFACE EXPLORATION LOCATION PLAN

JAWORSKI GEOTECH, INC.
150 ZACHARY ROAD
MANCHESTER, NH 03109

99500

TEST BORING LOG

OJECT NAME:	SBA Tower Site #4275-034
CATION:	Clinton, Connecticut
OJECT NO.:	99500
TE START:	November 10, 1999
TE END:	November 17, 1999
RING CO.:	New England Boring Contractors, Inc.
LOCATION:	Glastonbury, Connecticut
REMAN:	Orin Hatch/Tim Carpenter
REP:	B. Dillon/S. Haynes

	CASING	SAMPLER
TYPE:	Casing	SS
SIZE:	3" ID	2" OD
	HAMMER	FALL
	140 lbs.	30"

SHEET 1 OF 2
BORING NO: JB-1
LOCATION: See Plan
SURFACE EL: 6.0' +/-

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING AT	STABILIZATION PERIOD
11/10/99	5.0'	5.0'	0 hours

pth .)	SAMPLING No.	Depth (ft.)	Blows/6"	Penetration/ Recovery (in.)	Sample Description	Stratum Change (ft.) (not to scale)	PID/OVM Readings (1)
	SS-1	0-2	3-4	24/18	SS-1: Loose, brown, fine SAND, trace Silt (Fill)	2.5	0
			5-3				
	SS-2	2-4	3-3	24/16	SS-2: Loose, tan, medium to fine SAND, trace Silt.		0
			5-5				
5							
	SS-3	5-7	4-4	24/18	SS-3: Similar to SS-2.		0
			5-3				
10							
	SS-4	10-12	1-1	24/18	SS-4: Similar to SS-2, except very loose, wet.		0
			2-2				
15							
	SS-5	15-17	2-2	24/18	SS-5: Loose, tan, coarse to fine SAND, trace Gravel and Silt, wet.		0
			4-3				
20							
	SS-6	20-22	2-3	24/16	SS-6: Similar to SS-5.		0
			5-11				
25							
	SS-7	25-27	4-6	24/20	SS-7: Medium dense, tan, medium to fine SAND, trace Gravel and Silt. (Outwash)		0
			13-31				
30							

TES:
(1) As referenced to benzene using an HNu Photoionization Detector (PID) Model PI 101 with 10.2 eV lamp, reported in parts per million.

JAWORSKI GEOTECH, INC.

Proportions used: trace (1-10%), little (10-20%), some (20-35%), and (35-50%)

Cohesive Consistency (Blows/ft.)	
very soft	0-2
soft	2-4
medium stiff	4-8
stiff	8-15
very stiff	15-30
hard	30+

Cohesionless Relative Density (Blows/ft.)	
very loose	0-4
loose	4-10
medium dense	10-30
dense	30-50
very dense	50+

Remarks: The stratification lines represent the approximate boundary between materials and the transition may be gradual. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the groundwater may occur due to other factors than those presented at the time measurements were made.

TEST BORING LOG

JECT NAME:	SBA Tower Site #4275-034
CATION:	Clinton, Connecticut
JECT NO.:	99500
TE START:	November 10, 1999
TE END:	November 17, 1999
RING CO.:	New England Boring Contractors, Inc.
LOCATION:	Glastonbury, Connecticut
EMAN:	Orin Hatch/Tim Carpenter
REP:	B. Dillon/S. Haynes

	CASING	SAMPLER
TYPE:	Casing	SS
SIZE:	3" ID	2" OD
	HAMMER	FALL
	140 lbs.	30"

SHEET 2 OF 2
BORING NO: JB-1
LOCATION: See Plan
SURFACE EL: 6.0' +/-

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING AT	STABILIZATION PERIOD
11/10/99	5.0'	5.0'	0 hours

th)	SAMPLING No.	Depth (ft.)	Blows/6"	Penetration/ Recovery (in.)	Sample Description	Stratum Change (ft.) (not to scale)	PID/OVM Readings (1)
	SS-8	30-~~32~~	4-5	24/16	S-8: Similar to SS-7.		
5							
	SS-9	35-37	4-5	24/24	SS-9: Medium dense, medium to fine SAND, trace Gravel		
			17-18		and Silt, wet.		
0							
	SS-10	40-42	5-5	24/24	SS-10: Medium dense, coarse to fine SAND, trace Gravel and		
			14-15		Silt, wet.		
5							
	SS-11	45-47	17-25	24/12	SS-11: Similar to SS-10, except very dense.		
			30-44				
0			7-5	24/24	Medium dense, medium to fine SAND, trace Gravel and Silt,		
			8-16		wet.		
					Exploration terminated - 52.0'.		
5							
0							

TES:
1) As referenced to benzene using an HNu Photoionization Detector (PID) Model PI 101 with 10.2 eV lamp, reported in parts per million.

JAWORSKI GEOTECH, INC.

Proportions used: trace (1-10%), little (10-20%), some (20-35%), and (35-50%)

Cohesive Consistency (Blows/ft.)	
very soft	0-2
soft	2-4
medium stiff	4-8
stiff	8-15
very stiff	15-30
hard	30+

Cohesionless Relative Density (Blows/ft.)	
very loose	0-4
loose	4-10
medium dense	10-30
dense	30-50
very dense	50+

Remarks: The stratification lines represent the approximate boundary between materials and the transition may be gradual. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the groundwater may occur due to other factors than those presented at the time measurements were made.

TEST BORING LOG

ROJECT NAME:	SBA Tower Site #4275-034
OCATION:	Clinton, Connecticut
ROJECT NO.:	99500
ATE START:	November 10, 1999
ATE END:	November 10, 1999
ORING CO.:	New England Boring Contractors, Inc.
. LOCATION:	Glastonbury, Connecticut
OREMAN:	Orin Hatch
I REP:	B. Dillon

	CASING	SAMPLER
TYPE:	Casing	SS
SIZE:	3" ID	2" OD
	HAMMER	FALL
	140 lbs.	30"

SHEET 1 OF 1
BORING NO: JB-2
LOCATION: See Plan
SURFACE EL: 6.0' +/-

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING AT	STABILIZATION PERIOD
11/10/99	5.0'	5.0'	0 hours

pth t.)	SAMPLING No.	Depth (ft.)	Blows/6"	Penetration/ Recovery (in.)	Sample Description	Stratum Change (ft.) (not to scale)	PID/OVM Readings (1)
	SS-1	0-2	18-22	24/20	SS-1: Dense, brown, medium to fine SAND, little Silt,		0
			14-14		trace Gravel. (Fill)	2.5	
5							
	SS-2	5-7	6-8	24/20	SS-2: Medium dense, tan, medium to fine SAND, trace Silt,		0
			9-15		moist.		
10							
	SS-3	10-12	3-6	24/20	SS-3 Similar to SS-2, except wet.		0
			8-5				
15							
	SS-4	15-17	2-2	24/16	SS-4: Similar to SS-2, except loose, wet.		0
			2-4				
20							
	SS-5	20-22	3-5	24/20	SS-5: Medium dense, coarse to fine SAND, trace Gravel and		0
			6-10		Silt.		
25							
	SS-6	25-27	4-7	24/24	SS-6: Medium dense, medium to fine SAND, trace Gravel and		0
			7-8		Silt. (Outwash)		
					Exploration terminated - 27.0'.		
30							

TES:
(1) As referenced to benzene using an HNu Photoionization Detector (PID) Model PI 101 with 10.2 eV lamp, reported in parts per million.

JAWORSKI GEOTECH, INC.

Proportions used: trace (1-10%), little (10-20%), some (20-35%), and (35-50%)

Cohesive Consistency (Blows/ft.)	
very soft	0-2
soft	2-4
medium stiff	4-8
stiff	8-15
very stiff	15-30
hard	30+

Cohesionless Relative Density (Blows/ft.)	
very loose	0-4
loose	4-10
medium dense	10-30
dense	30-50
very dense	50+

Remarks: The stratification lines represent the approximate boundary between materials and the transition may be gradual. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the groundwater may occur due to other factors than those presented at the time measurements were made.

TEST BORING LOG

OJECT NAME:	SB. Tower Site #4275-034
CATION:	Clinton, Connecticut
OJECT NO.:	99500
TE START:	November 10, 1999
TE END:	November 10, 1999
RING CO.:	New England Boring Contractors, Inc.
. LOCATION:	Glastonbury, Connecticut
REMAN:	Orin Hatch
REP:	B. Dillon

	CASING	SAMPLER
TYPE:	Casing	SS
SIZE:	3" ID	2" OD
	HAMMER	FALL
	140 lbs.	30"

SHEET 1 OF 1
BORING NO: JB-3
LOCATION: See Plan
SURFACE EL: 6.0' +/-

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING AT	STABILIZATION PERIOD
11/10/99	5.0'	5.0'	0 hours

)th .)	SAMPLING No.	Depth (ft.)	Blows/6"	Penetration/ Recovery (in.)	Sample Description	Stratum Change (ft.) (not to scale)	PID/OVM Readings (1)
	SS-1	0-2	6-8	24/20	SS-1: Dense, brown, medium to fine SAND, little Silt,		0
			10-8		trace Gravel. (Fill)	2.5'	
5	SS-2	5-7	2-4	24/20	SS-2: Loose, tan, medium to fine SAND, little Silt, wet.		0
			4-5				
10	SS-3	10-12	2-5	24/20	SS-3 Medium dense, tan, medium to fine SAND, trace		0
			10-7		Gravel and Silt.		
15	SS-4	15-17	3-3	24/16	SS-4: Similar to SS-3.		0
			7-7				
20	SS-5	20-22	5-6	24/20	SS-5: Medium dense, tan, coarse to fine SAND, trace		0
			7-13		Gravel and Silt. (Outwash)		
					Exploration terminated - 22.0'.		
25							
30							

TES:
1) As referenced to benzene using an HNu Photoionization Detector (PID) Model PI 101 with 10.2 eV lamp, reported in parts per million.

JAWORSKI GEOTECH, INC.

Proportions used: trace (1-10%), little (10-20%), some (20-35%), and (35-50%)

Cohesive Consistency (Blows/ft.)		Cohesionless Relative Density (Blows/ft.)	
very soft	0-2	very loose	0-4
soft	2-4	loose	4-10
medium stiff	4-8	medium dense	10-30
stiff	8-15	dense	30-50
very stiff	15-30	very dense	50+
hard	30+		

Remarks: The stratification lines represent the approximate boundary between materials and the transition may be gradual. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the groundwater may occur due to other factors than those presented at the time measurements were made.