STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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

FILE COPY

January 23, 1997

David S. Malko, P.E. Manager
Engineering & Regulatory Services
Bell Atlantic NYNEX Mobile
20 Alexander Drive, P.O. Box 5029
Wallingford, CT 06492

Re: Bell Atlantic NYNEX Mobile request for an order of tower sharing at an existing telecommunications tower located at 716 George Washington Turnpike in the Town of Burlington, Connecticut.

Dear Mr. Malko:

At a meeting held January 22, 1997, 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 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 December 19, 1996. Please notify the Council when all work is complete. A copy of the staff report on this request, dated January 22, 1997, is enclosed for your information.

Very truly yours,

Mortimer A. Gelston
Chairman

MAG:TEF:mmb
Enclosure
1. Staff Report dated January 22, 1997.

c: Theodore Schiedel, First Selectman, Burlington
Sandy Carter, Bell Atlantic NYNEX Mobile

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CONNECTICUT SITING COUNCIL

10 Franklin Square
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Bell Atlantic NYNEX Mobile
Request to Order Tower Sharing
Burlington, Connecticut
January 22, 1997

On December 19, 1996, Bell Atlantic NYNEX Mobile (BANM) submitted a request to the Connecticut Siting Council (Council) for an order to approve the shared use of a tower facility. BANM proposes to attach six directional panel antennas on an existing 140-foot lattice tower owned by the Town of Burlington's (Town) fire department at 719 George Washington Turnpike in Burlington, Connecticut. The tower currently supports the Town's emergency service whip antennas. BANM would construct a 12-foot by 40-foot equipment building within a 40-foot by 60-foot leased area located on level ground near the base of the tower and adjacent to a paved parking lot at the rear of the fire department building. Access to the site would come from this parking lot. The proposed construction would involve little or no grading, no clearing of vegetation, and would have no direct impact on any inland wetland. On January 15, 1997, this site was reviewed by Council staff member Thomas E. Fanning, Jr.

BANM would attach its antennas on the side of the tower, 120-foot above ground level. BANM would also install a diesel-fueled emergency generator within the equipment building to supply emergency power to BANM's and the Town's communications equipment. Utility lines would be underground for approximately 125 feet from the nearest utility pole to BANM's equipment building. An engineering structural analysis of the existing tower indicates the tower would support the BANM antennas.

BANM and the Town have reached a leasing agreement regarding BANM's sharing of the Town's tower. The proposed tower sharing was approved by the Town's Board of Selectman on October 29, 1996. The Town's Planning and Zoning Commission approved BANM's site plan to use the site, and the Town's Inland Wetlands and Watercourses Commission issued a permit to construct the equipment building at the tower site.

The addition of the proposed antennas would not increase the total radio frequency electromagnetic radiation power density at the base of the tower to a level at or above the American National Standards Institute Standard for cellular frequencies, based on worst-case assumptions; would not increase the height of the existing tower; would not extend the boundaries of the site; and would not increase the noise level of the existing facility by six decibels or more at the site boundary.

BANM contends that this proposal constitutes the sharing of towers and that it is technically, legally, environmentally, and economically feasible, meets public safety concerns, will avoid the unnecessary proliferation of towers and is in the public interest. The proposed sharing of this tower is subject to the Council's tower sharing law (General Statutes § 16-50aa).

Thomas E. Fanning, Jr.
Siting Analyst

ROBINSON & COLE

Hartford • Stamford • Boston • New York

Law Offices
Founded in 1845

One Commercial Plaza
280 Trumbull Street
Hartford, CT 06103-3597
860-275-8200
Fax 860-275-8299

Kenneth C. Baldwin
860-275-8345
Internet: kbaldwin@rc.com

VIA HAND-DELIVERY

December 19, 1996

RECEIVED
DEC 19 1996
CONNECTICUT
SITING COUNCIL

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

Re: **Request by Cellco Partnership d/b/a Bell Atlantic NYNEX Mobile for an Order to Approve the Shared Use of a Tower Facility at the Burlington Fire Department, 719 George Washington Turnpike, Burlington, Connecticut**

Dear Chairman Gelston and Members of the Council:

Pursuant to Connecticut General Statutes (C.G.S.) §16-50aa, Cellco Partnership d/b/a Bell Atlantic NYNEX Mobile ("BANM" or the "Applicant") hereby requests an order from the Siting Council to approve the proposed shared use by the Applicant of an existing communications tower located at 719 George Washington Turnpike in Burlington, Connecticut. The property and tower are owned and operated by the Town of Burlington (the "Town") and the site is the location of the Burlington Fire Station. BANM proposes to install antennas on the existing tower. The equipment associated with this facility would be located in a new 12-foot by 40-foot equipment building located within a 40-foot by 60-foot leased parcel near the base of the tower and the existing Fire Station building (See Site Plan Map attached as Exhibit A.). BANM will also install an emergency back-up generator in its equipment building for use during power outages. The generator will be available for use by BANM and the Town of Burlington Fire Department.

The Applicant requests that the Council find that the proposed shared use of the tower facility satisfies the criteria stated in C.G.S. §16-50aa, and to issue an order approving the proposed shared use.

Background

Cellco Partnership d/b/a Bell Atlantic NYNEX Mobile is licensed by the Federal Communications Commission (FCC) to provide cellular telephone service in the Hartford New England County Metropolitan Area (NECMA), which includes the area to be served by the Applicant's proposed installation in Burlington.

The facility at 719 George Washington Turnpike consists of an existing approximately 140-foot self-supporting lattice tower located on a 2.11-acre parcel. The lattice tower currently supports the Town's emergency service antennas. The Applicant and the Town have agreed to the proposed shared use of the tower facility pursuant to mutually acceptable terms and conditions. The proposed shared use of the Fire Department tower and property has been approved by the Burlington Board of Selectmen on October 29, 1996 by, the Burlington Planning and Zoning Commission on November 26, 1996, and by the Burlington Inland Wetlands Commission on November 6, 1996. Copies of the local approvals are attached as Exhibit B.

BANM proposes to install six (6) Swedecom ALP-E9011 - Din panel-type antennas on the tower. Exhibit C contains specifications for the proposed antennas and a sketch of the tower showing the location of BANM antennas. The antennas will be mounted with their center of radiation at approximately 120 feet above ground level ("AGL"). Radio transmission equipment associated with these antennas will be located in a 12-foot by 40-foot equipment building located within a 40-foot by 60-foot leased area near the base of the tower and the Fire Department building. BANM will also install an emergency back-up generator inside its equipment building for use during power outages. The generator will supply emergency power to BANM's and to the Town Fire Department's communications equipment .

C.G.S. §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. §16-50aa(c)(1).)

Discussion

The shared use of the tower satisfies the criteria stated in C.G.S. §16-50aa as follows:

A. Technical Feasibility. The existing tower is structurally sound and capable of supporting the proposed BANM antennas. BANM 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. §16-50aa, the Siting Council has been authorized to issue an order approving the proposed shared use of an existing telecommunications tower facility such

as the facility at 719 George Washington Turnpike. (C.G.S. §16-50aa(c)(1).) This authority complements the Council's prior-existing authority under C.G.S. §16-50p to issue orders approving the construction of new towers that are subject to the Council's jurisdiction. C.G.S. §16-50x(a) directs the Council to "give such 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. §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 will have a minimal environmental effect, for the following reasons:

1. The proposed installations will have an insignificant incremental visual impact, and will not cause any significant change or alteration in the physical or environmental characteristics of the existing site. In particular, the proposed installations will not increase the height of the existing tower, and will not extend the boundaries of the tower site, aside from placement of the equipment building near the existing Fire Station.

2. The proposed installations will not increase the noise levels at the existing facility by six decibels or more.

3. Operation of the additional antennas will not increase the total radio frequency electromagnetic radiation power density at the tower site to a level at or above the applicable American National Standards Institute ("ANSI") standard. The ANSI standard recommended safety level for frequencies used by cellular telephone is 0.5833 mW/cm^2 in uncontrolled environments. The "worst-case" exposure calculated for operation of this facility (i.e., calculated from the base of the tower, which represents the closest publicly accessible point within the broadcast field of the antennas, with all of BANM's antennas simultaneously operating on all 19 channels at full power) would be 0.0516 mW/cm^2 or 8.86% of the ANSI standard. The ANSI standard recommended safety level for frequencies used by the Town's radio antennas is 0.20 mW/cm^2. The maximum power density for the Town's existing antennas is 0.00822 mW/cm^2 or 4.11% of the ANSI standard. Therefore, the total maximum power density from the existing tower after the installation of BANM antennas would be 12.97% of the ANSI standard as calculated for a mixed frequency site.

4. The proposed installations will not require any water or sanitary facilities, or generate air emissions or discharges to water bodies. After construction is complete (approximately four weeks), the proposed installations will not generate any traffic other than periodic maintenance visits.

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

E. Economic Feasibility. As previously mentioned, the Town and the Applicant have entered into a lease agreement to share the existing tower according to terms agreeable to the parties. The proposed tower sharing is therefore economically feasible.

F. Public Safety Concerns. As stated above, the existing tower is structurally capable of supporting the proposed BANM antennas. The Applicant is not aware of any other public safety concerns relative to the proposed sharing of the existing tower. In fact, the provision of new or improved cellular phone service in the Burlington area through shared use of the existing tower facility and the proposed shared use of the Applicant's emergency back-up generator is expected to enhance the public safety and welfare of area residents. The public safety benefits of cellular service are illustrated by the recent decision of local authorities elsewhere in Connecticut and across the country to give cellular phones to residents to improve local public safety and emergency communications. The proposed shared use of this facility will likewise improve public safety in the Burlington area.

Conclusion

For the reasons discussed above, the proposed shared use of the existing telecommunications tower facility at 719 George Washington Turnpike satisfies the criteria stated in C.G.S. §16-50aa, and advances the General Assembly's, the Siting Council's, and the Applicant's goal of preventing the proliferation of towers. The Applicant therefore requests that the Siting Council issue an order approving the proposed shared use.

Thank you for your consideration of this matter.

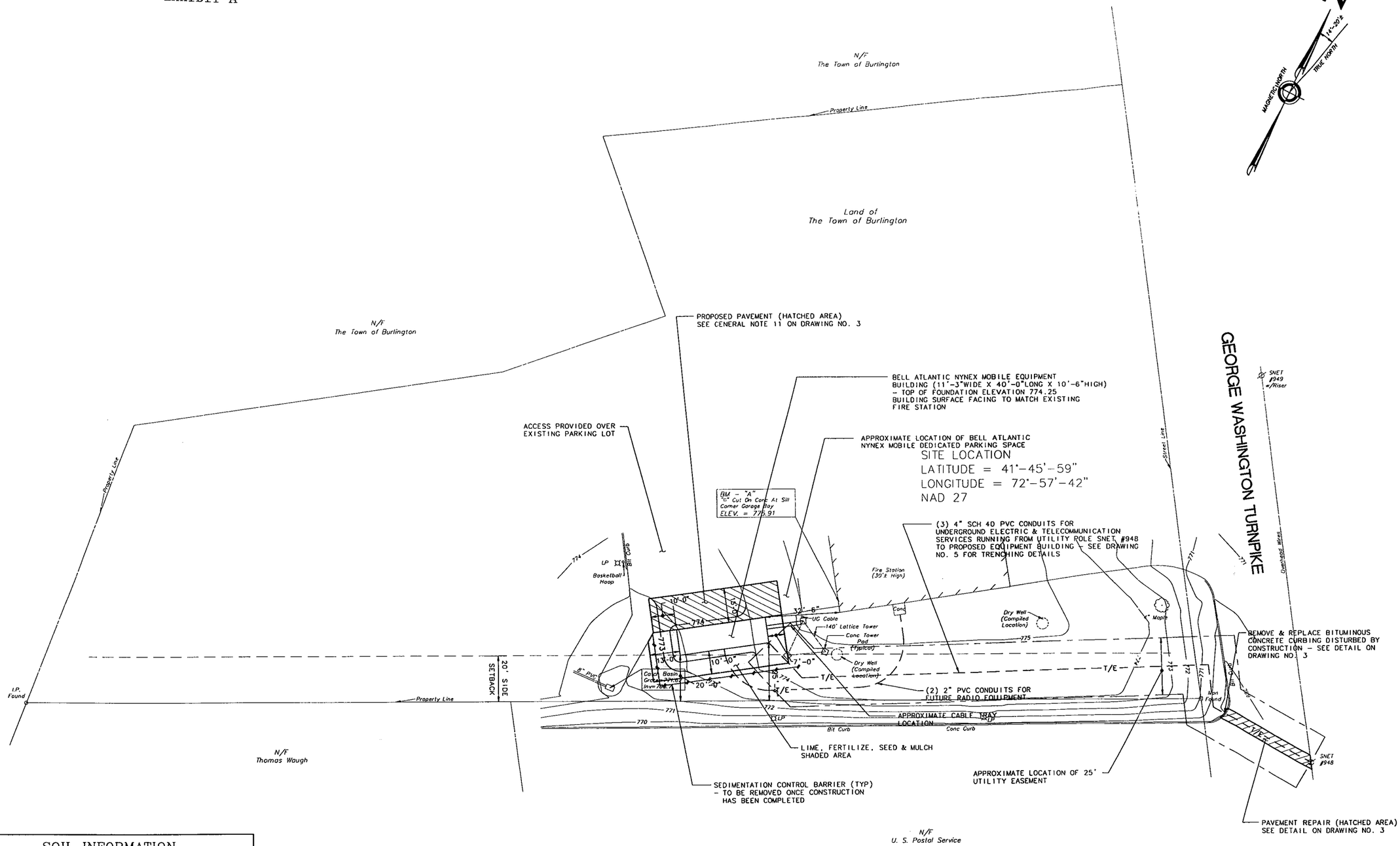
Very truly yours,

Kenneth C. Baldwin

KCB/SYS
Attachments

Copy to: Sandy M. Ranciato

EXHIBIT A



SOIL INFORMATION

SOIL TYPE	DESCRIPTION
HsE	HOLLIS VERY ROCKY LOAM (15 TO 35 PERCENT SLOPES)
HsC	HOLLIS VERY ROCKY LOAM (3 TO 15 PERCENT SLOPES)
PeC	PAXTON VERY STONY LOAM (3 TO 15 PERCENT SLOPES)
PbB	PAXTON LOAM (3 TO 8 PERCENT SLOPES)

NOTE:
INFORMATION OBTAINED FROM "SOIL SURVEY HARTFORD COUNTY, CONNECTICUT" BY THE UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE DATED 1962.

SITE PLAN

SCALE: 1" = 20'

HORIZONTAL GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)

1 inch = 20 ft.

REV.	DATE	DESCRIPTION
		Job No. F301275.82 File No. 127582-2

Bell Atlantic NYNEX Mobile
GEORGE WASHINGTON TURNPIKE, BURLINGTON, CONNECTICUT

SITE MODIFICATION PLAN

Greiner, Inc.
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT

Designed by: R. BURNS
Drawn by: R. BURNS
Checked by: A. JOHNSON
Approved by:

Scale: AS SHOWN

Date: OCTOBER 1996

Dwg. 2 Of 5

Dwg. No. 2

EXHIBIT B

BOARD OF SELECTMEN RESOLUTION
OCTOBER 29, 1996

WHEREAS, the Town of Burlington ("Town") owns certain property located at 719 George Washington Turnpike also known as Lot No. 73-1 on Assessor's Map 4-8 (the "property"); and

WHEREAS, the Property is currently used for municipal purposes and is the site of the Burlington Fire Department headquarters which maintains a communications tower and associated equipment at the Property; and

WHEREAS, Bell Atlantic NYNEX Mobile, a telecommunications company licensed to provide cellular telephone service throughout most of Connecticut, including the Town of Burlington, is desirous of leasing a portion of the Property and space on the existing tower to establish a cellular telecommunications facility; and

WHEREAS, Bell Atlantic NYNEX Mobile has agreed, under a certain lease agreement, to install and maintain a telecommunications facility at the Property, to fulfill the Town's need for additional space for its communications equipment, and to fulfill the Town's need for emergency generator service at the Property, all of which will enhance the public safety through improved emergency service communications and improve telephone service to the residents of the Town; and

WHEREAS, the Town Board of Selectmen find that the above mentioned improvements and the installation of Bell Atlantic NYNEX Mobile telecommunications equipment at the Property constitutes a continuing use of the Property for a municipal purpose which this Board deems to be in the best interest of the community of the Town of Burlington.

NOW, THEREFORE, BE IT RESOLVED: That the Town of Burlington Board of Selectmen hereby approves the proposed lease agreement between the Town and Bell Atlantic NYNEX Mobile and further authorizes the First Selectman to sign said lease agreement on behalf of the Town, as approved by the Town Attorney provided, however, the Board of Selectmen shall receive a favorable recommendation from the Burlington Planning and Zoning Commission pursuant to Section 8-24 of the Connecticut General Statutes.

Dated this 29th day of October, 1996

Theodore C. Scheidel

Mary Ann Schwarzmann

George A. Zurles

Town of Burlington

200 SPIELMAN HIGHWAY
BURLINGTON, CONN. 06013

PLANNING AND ZONING COMMISSION

November 29, 1996

The Bristol Press
Legal Classified Department
99 Main Street
Bristol, Connecticut 06010

Please print this legal notice on time, upon receipt.

NOTICE OF DECISION

The Planning and Zoning Commission of the Town of Burlington made the following decisions at its regular meeting on Tuesday, November 26, 1996:

1. A motion was made by Miller and seconded by Norton to approve the application for site plan, submitted by Cellco Partnership d/b/a Bell Atlantic, property located at 719 George Washington Turnpike, as submitted with conditional approval based on review of antenna. IN FAVOR, unanimous.

2. A motion was made by Penner and seconded by Chard to approve the application for Dutil, Lot #5-3, Wildcat, with conditions bond by engineer during construction and conservation easement be in place. 4 In Favor, 2 Opposed.

3. A motion was made by Chard and seconded by Miller to approve the application for two year permit for Excavation, Removal and Grading of earth products, property located at Rt. 4, "Pavlik Pit", with standard prehaul conditions, staking, bonding, insurance and E & S controls. IN FAVOR, unanimous.

4. A motion was made by Miller and seconded by Chard to approve the application for two year permit for Excavation, Removal and Grading of earth products, property located at Covey Rd. and Foote Rd, with standard prehaul conditions. IN FAVOR, unanimous.

5. A motion was made by Norton and seconded by Miller to approve the application for two year permit for Excavation, Removal, Processing, Screening and Crushing

of earth products, property located at Clearbrook Rd. and Mill Dam Rd., Mill Dam #1, with standard prehaul conditions. IN FAVOR, unanimous.

6. A motion was made by Chard and seconded by Miller to approve the application for two year permit for Excavation, Removal, Processing, Screening and Crushing of earth products, property located at Clearbrook Rd. and Mill Dam Rd., Mill Dam #2, with standard prehaul conditions. IN FAVOR, unanimous.

Dated in Burlington, CT on this 29th day of November, 1996.

Robert Coates, Chairman
Burlington Planning and Zoning Commission

Resolution of the
Burlington Planning and Zoning Commission
Pursuant to §8-24 of the General Statutes

WHEREAS the Planning and Zoning Commission has received a referral from the Board of Selectmen pursuant to §8-24 of the General Statutes to report on the proposed lease agreement between the Town and Bell Atlantic NYNEX Mobile to lease space on the ground and on the existing tower at the Burlington Fire Station; and

WHEREAS the Planning and Zoning Commission believes the proposed lease agreement will benefit the public safety communications system of the Town, will fulfill the Town's need for emergency generator service and additional space for its communications equipment, will improve telephone service to the residents of the Town, and is in the best interest of the community.

NOW, THEREFORE, BE IT RESOLVED: That the Secretary of the Commission is hereby authorized to transmit a favorable report to the Board of Selectmen regarding the proposed lease agreement between the Town and BANM.

11/21/94

Town of Burlington

200 SPIELMAN HIGHWAY
BURLINGTON, CONN. 06013

INLAND WETLANDS AND
WATERCOURSES COMMISSION

November 8, 1996

Bell Atlantic Nynex Mobile
20 Alexander Drive
Wallingford, CT 06492

RE: Inland Wetlands & Watercourses Permit

On Wednesday, November 6, 1996 the Burlington Inland Wetlands and Watercourses Commission voted unanimously to grant a permit to conduct regulated activities in association with construction of a 12' x 40' building to house telecommunication equipment on George Washington Turnpike.

The approved activities are those shown on the map entitled, "Site Modification Plans For The George Washington Turnpike Tower Site, Burlington, Connecticut, Prepared for Bell Atlantic Nynex Mobile, dated October 1996; prepared and stamped by Arthur G. Johnson, Jr.; on file with this Commission and with the Building Official.

The following conditions apply:

1. All sedimentation and erosion controls are to be in place and functional prior to the commencement of all activity.
2. All sedimentation and erosion controls are to be inspected after every storm of 2 year or greater occurrence.
3. Should any sedimentation or erosion control be found to be no longer functioning, work at the site will be suspended until the controls are repaired.
4. The applicant must notify the Building Inspector at Town Hall before commencing work.

This permit is being issued for the activities shown on the above plans only. No other regulated activity has been permitted directly or indirectly. Nothing in this permit shall supersede any other federal, state, municipal or private laws, regulations, ordinances or bylaws which may be binding.

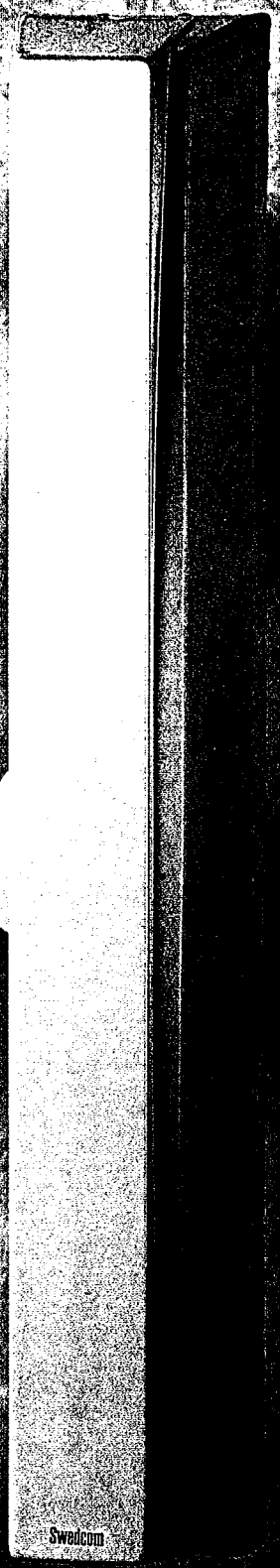
This permit is not transferable without permission of the Commission or its Agent, and shall expire three (3) years from its issuance unless work has commenced, in which case it shall expire one (1) year from commencement of work unless otherwise stated by the Commission.

For the Commission,
David Sherman (CS)
David Sherman, Chairman
Inland Wetlands and Watercourses Commission

cc: Building Official, Town Engineer, PZC, BBHD, File #96082

EXHIBIT C

1996



Antennas

Swedcom

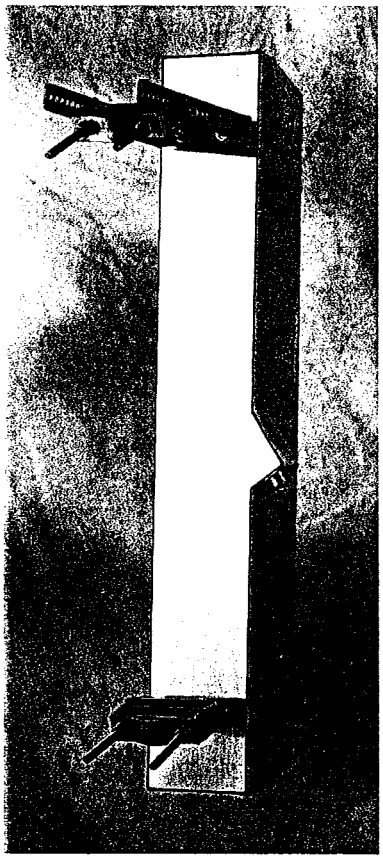
Swedcom

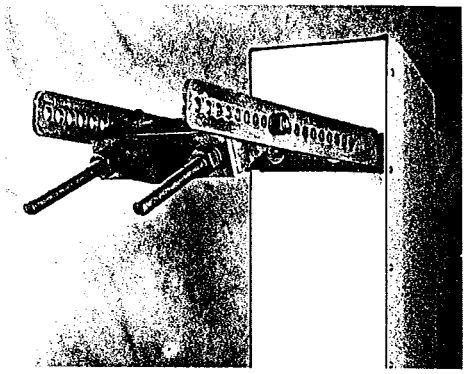
ALP-E 9011-Din

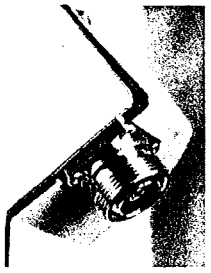
Enhanced Log-Periodic Antenna

Features:

- ❑ Small Size
- ❑ Aesthetically Pleasing
- ❑ Suitable For TDMA/CDMA
- ❑ High Return Loss
- ❑ Low Intermodulation
- ❑ High FTB
- ❑ Broadbanded
- ❑ Side-lobe Suppression
- ❑ Sturdy Design
- ❑ Down-Tilt Brackets Incl.







The distance between the center of the bolts (on the back of the antenna) are shown in the drawing above.

Bolt diameter is: **3/8-16** [comes with lock nut].

[redacted]

Frequency Range:	**800-900 MHz**
Impedance:	**50 ohm**
Connector Type:	**7/16 Din**
Return Loss:	**20 dB**
Polarization:	**Vertical**
Gain:	**> 11 dBd**
Front To Back Ratio:	**> 30 dB**
Side-Lobe Suppression:	**18 dB**
Intermodulation (2x25W):	**IM3 > 146 dB**
	IM5 > 153 dB
	IM7/9 > 163 dB
Power Rating:	**500 W**
H-Plane (-3 dB point):	**85 - 92°**
V-Plane (-3 dB point):	**16 - 18°**
Lightning Protection:	**DC Grounded**

[redacted]

Overall Height:	**43 in**	**[1092 mm]**
Width:	**6.5 in**	**[165 mm]**
Depth:	**8 in**	**[203 mm]**
Weight Including Tilt-Brackets:	**20 lbs**	**[9.1 Kg]**
Rated Wind Velocity:	**113 mph**	**[180 Km/h]**
Wind Area (CxA/Side):	**2.3 sq. ft.**	**[0.22 sq.m]**
Lateral Thrust At Rated Wind Worst Case:	**112 lbs**	**[500 N]**

[redacted]

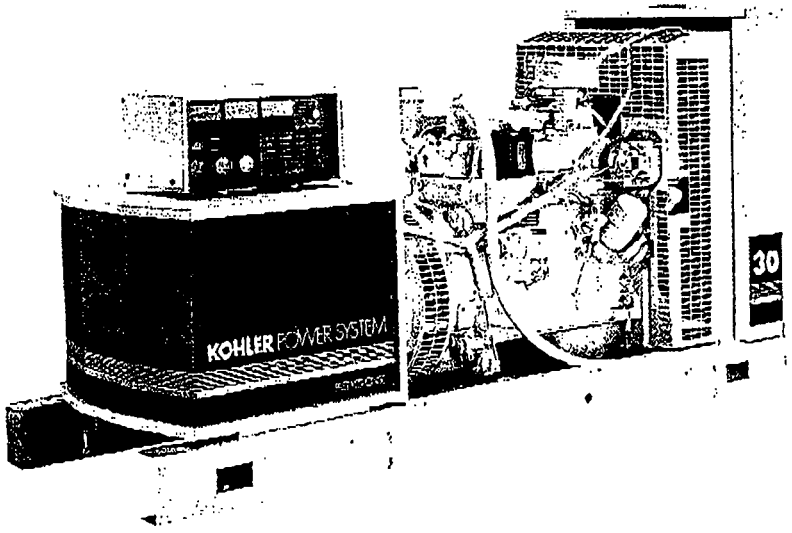
Radiating Elements:	**Aluminum**
Extrusion:	**Aluminum**
Radome:	**Grey PVC**
Tilt-Bracket:	**Hot Dip Galvanized Steel**
Antenna Bolts:	**Stainless Steel**

The ALP-E 9011-Din is made in U.S.A.

Diesel

KOHLER® GENERATORS
30ROZJ

- **Proven Fast Response™ Performance:**
  Kohler Fast Response™ power systems are employed in a variety of applications worldwide. As the leading manufacturer of integrated power systems, performance and reliability are assured through a comprehensive prototype testing program.
- **Instant response to load changes:**
  Response to load transients occurs within five-hundredths of a second.
- **Sustained short circuit capability:**
  Fast response systems maintain output long enough to permit selective breaker tripping.
- **Superior motor starting:**
  Kohler power systems are recognized for their outstanding motor starting performance as well as demanding SCR applications.



KOHLER® POWER SYSTEMS

Ratings and Performance

Model Series	Voltage Code	Voltage	Standby Amps.	Phase	Hz	Generator Model	Standby Ratings, kW/kVA	Prime Ratings, kW/kVA
30ROZJ	01	120/240	99	3	60	4P5	33/41	30/38
30ROZJ	51	139/240	99	3	60	4P5	33/41	30/38
30ROZJ	51	127/220	108	3	60	4P5	33/41	30/38
30ROZJ	61	120/240	138	1	60	4P5	33/33	30/30
30ROZJ	71	277/480	50	3	60	4P5	33/41	30/38
30ROZJ	71	220/380	63	3	60	4P5	33/41	30/38
30ROZJ	81	120/208	115	3	60	4P5	33/41	30/38
30ROZJ	91	347/600	40	3	60	4P5	33/41	30/38
30RFOZJ	01	110/220	85	3	50	4P5	26/33	23/29
30RFOZJ	51	110/190	99	3	50	4P5	26/33	23/29
30RFOZJ	61	110/220	118	1	50	4P5	26/26	23/23
30RFOZJ	71	220/380	49	3	50	4P5	26/33	23/29
30RFOZJ	71	230/400	47	3	50	4P5	26/33	23/29
30RFOZJ	71	240/416	45	3	50	4P5	26/33	23/29
30RFOZJ	81	120/208	90	3	50	4P5	26/33	23/29

RATINGS: Standby ratings are continuous for the duration of any power outage. No overload capacity is specified at this rating. Prime ratings are continuous per BS 5514, DIN 6271, ISO–3046 and IEC 34–1 with 10% overload capacity one hour in 12 hours. All single phase units are rated at 1.0 power factor; 3 phase units are rated at 0.8 power factor. Contact factory for ratings of city water cooled and remote radiator models. Larger generators may be used to meet special application requirements. Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Availability can be determined by contacting your local Kohler Co. Distributor.

Deration Factors

Maximum altitude before gen. set derating – ft (m)	3300(1007)	Maximum intake air temp. before gen. set derating – °F (°C)	104(40)
Altitude deration factor – % per 1000 ft. (305 m)	3	Temp. deration factor – % per 10°F (5.5°C)	1.5

Application Data

Engine Specifications	60 Hz	50 Hz
Manufacturer	John Deere	
Type	4039D 4–Cycle Natural Aspiration	
Cylinder arrangement (number, inline, V, etc.)	4–Inline	
Displacement – cu. in. (cc)	239 (3920)	
Bore and stroke – in. (mm)	4.19(106.5) x 4.33(110)	
Compression ratio	17.8:1	
Piston speed – ft/min. (m/sec.)	1300(6.6)	1082(5.5)
Bearings main: number	5	
type	Replaceable Insert	
Rated rpm	1800	1500
Max. power at rated rpm – hp (kW)	66(49)	56(42)
Cylinder head material	Cast Iron	
Crankshaft material	Forged Steel	
Valves material		
intake	Chromium–Silicon Steel	
exhaust	Stainless Steel	
Governor, type, make/model	Mechanical, Stanadyne/DB2	
Frequency regulation – no–load to full–load, nominal/maximum	3% – 5%	
steady state	+/– 0.33%	
Air cleaner type – all models	Dry	

Lubricating System	
Type	Full Pressure
Oil pan capacity – qts. (L)	8(7.6)
including filter – qts. (L)	9(8.5)
Oil filter – (quantity, type)	One, Full Flow/By–pass
Oil cooler	Water–Cooled

Fuel System	
Fuel supply line, min. I.D. in.(mm)	0.375(9.5)
Fuel return line, min. I.D. in. (mm)	0.375(9.5)
Max. lift of engine driven fuel pump – ft. (m)	4.5(1.4)
Max. fuel flow – gph (Lph)	31(117)

Fuel System – cont'd.	60 Hz	50 Hz
Fuel prime pump	Manual	
Fuel filter	Primary/Secondary	
Recommended fuel	#2 Diesel	

Cooling System		
Engine jacket water capacity – gal. (L)	2(7.6)	
Radiator system capacity (incl. engine) – gal. (L)	5(17.6)	
Engine jacket water flow – gpm (Lpm)	25(94.5)	21(78.9)
Heat rejected to cooling water at rated kW – dry exhaust Btu/min.	1422	1134
Water pump type	Centrifugal	
Fan, blades diameter – in. (mm)	18(457.2)	
Fan hp (kw)	2(1.49)	1.2(0.9)
Maximum air restriction discharge side of radiator – in. H_2O (in. Hg)	0.5(0.037)	

Optional Cooling Systems	
Remote Radiator System	
Exhaust manifold type	Dry
Connection sizes	
water inlet – in. (mm)	1.5(38)
water outlet – in. (mm)	1.88(48)
Remote radiator	
Make/model	Modine/M–4–VR–1
Mounting	Vertical
Discharge	Horizontal
Fan motor – phase, hp (kw)	3,1(0.746)
Radiator capacity – gal. (L)	7(6.6)
Static head allowable above water pump – ft. (m)	21(6.4)
Tank top (inlet) – in.	2.5 NPT
Bottom tank (outlet) – in.	2.5 NPT
Dry Weight–lb.(Kg.)	400(181)

Fast Response Generator

Optional Cooling Systems – Cont'd.	60 Hz	50 Hz
City Water Cooling System		
Exhaust manifold type	Dry	
Heat exchanger capacity – gal. (L))	1.25(4.5)	
Connection sizes		
water inlet – in. (mm)	0.5NPT	
water outlet – in. (mm)	0.5NPT	
City water consumption – gpm (Lpm) at 50°F (10°C)	2.0(7.6)	1.5(5.7)
Connection sizes and capacity based on Young, F502EB4 heat exchanger with pipe threaded water connections, thermostatically controlled water saver valve, electric solenoid valve, and surge tank.		

Exhaust System

Exhaust flow at rated kW – cfm (m^3/min.)	300(8.5)	254(7.2)
Exhaust temp at rated kW, dry exhaust – °F (°C)	1130(610)	1094(590)
Maximum allowable back pressure – in. Hg (kPa)	2.2(7.5)	
Exhaust outlet size at hook–up – in. (mm)	2.5 (63.5)	

Engine Electrical System

Battery charging alternator ground (negative/positive)	Negative
Volts	12
Ampere rating	65
Starter motor rated voltage	12
Minimum recommended battery for 0°F/cold cranking performance (CCA)	630
Quantity	one
Voltage	12
Rolling current @ 32°F	780

Operation Requirements	60 Hz	50 Hz
Radiator–cooled cooling air – cfm (m^3/min.)	4015(114)	3269(93)
City–water, remote radiator cooling air @ 25°F (14°C) rise	1555(43)	
Combustion Air – cfm (m^3/min.)	107(3)	91(2.6)
Heat rejected to ambient air		
Engine BTU/min.	520	
Generator BTU/min.	180	

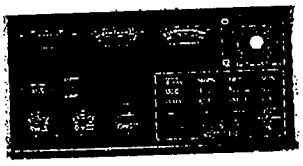
Fuel Consumption – gph (Lph)/Load	100%	75%	50%	25%
60 Hz:	2.7 (10.2)	2.0 (7.6)	1.4 (5.3)	0.9 (3.4)
50 Hz:	2.2 (8.3)	1.7 (6.2)	1.1 (4.2)	0.7 (2.6)

Specifications	Model 4P5/4P7	
Manufacturer	Kohler	
Output reconnectible	Broadrange	
Number of leads	12	
Generator type	Rotating Field	
Voltage regulator	Solid State, Volts/Hz	
Insulation — NEMA		
MG1–1.66	Class H	
Material	Class F	
Temperature rise	1	
Bearing, number, type	Flexible Disc	
Coupling	Full	
Amortisseur windings		
Voltage regulation no load to full load —%	+/– 2% maximum	
One step load acceptance % of rating per NFPA–110	100	
Peak motor starting kVA – 4P5	140 (60 Hz)	100 (50 Hz)
Peak motor starting kVA – 4P7	195 (60 Hz)	130 (50 Hz)

- Generator is designed and built within NEMA, IEEE and ANSI standards for temperature rise.
- Permanent magnet field rotating brushless exciter.
- Skewed rotor for smooth voltage wave form.
- Self–ventilated, drip–proof construction.
- Vacuum impregnated epoxy varnish – Fungus resistant per MIL–I–24092.
- Sustains short circuit current at 300% of rated current up to 10 seconds.

Standard Controller Features

Dec–3 Controller



Type	Microprocessor
Power Source, with circuit protection	12–Volt
Size – H x W x D in. (cm)	9 (22.9) x 17.8 (45.1) x 11.5 (29.2)
Weight – lb. (kg)	19(8.6)

- AC meters, 3.5 in. (89mm) 2% FS accuracy (Volts, Amps., Frequency)
- Meter phase selector switch
- DC meters, 2 in.(51mm), 2% FS accuracy (Volts, Engine Water Temp., Oil Pressure)
- Running time meter
- Alarm horn and silencing switch per NFPA–110
- Lamp test switch
- Front–mounted voltage adjusting rheostat
- Panel lamps (2)
- Cyclic cranking per NFPA–110
- Engine cool–down timer, 5–minute
- System–Ready lamp (green)
- Not–In–Auto lamp (red)
- High–Engine–Temp. safety shut–down and lamp (red)
- Low oil pressure safety shut–down and lamp (red)
- Overspeed safety shut–down and lamp (red)
- Over–Crank safety shut–down and lamp (red)
- Auxiliary safety shut–down lamp (red)
- Emergency stop lamp (red) *
- Auxiliary pre–alarm lamp(yellow) *
- Low–Fuel lamp (red) *
- Battery charger fault lamp (red) *
- Low–Battery Volts lamp (red) *
- Run–Off/Reset–Auto switch (engine start) — Local/Remote two–wire

* requires external sender

KOHLER®
POWER SYSTEMS
KOHLER CO., KOHLER, WISCONSIN 53044
PHONE 414–565–3381, TELEX 26888, FAX 414–565–3648
FOR SALES & SERVICE IN U.S.A. & CANADA PHONE 1–800–544–2444

Standard Features

- Vibration Isolation
- Mounting base, stationary applications
- Low coolant level shutdown
- Radio suppression to commercial standards
- Radiator for 115°F (45°C) ambient
- Fan and belt guards
- Junction box
- Operating instructions

Accessories and Options

Cooling Systems

- ☐ Water cooled manifold
- ☐ Remote radiator cooling
- ☐ City water cooling
- ☐ High ambient radiator

Cooling System Options

- ☐ Block heater with thermostat
- ☐ Radiator duct flange
- ☐ Remote radiator with motor

Fuel System

- ☐ Flexible fuel lines
- ☐ Auxiliary fuel pump
- ☐ Subbase fuel tank
- ☐ Day tank

Exhaust System

- ☐ Industrial exhaust silencer
- ☐ Critical exhaust silencer
- ☐ Flexible exhaust connector, stainless steel
- ☐ Silencer mounting for housing
- ☐ Tail pipe and rain cap kit

Engine Electrical System

- ☐ Battery
- ☐ Battery heater
- ☐ Battery rack and cables
- ☐ Battery charger, trickle–type
- ☐ Battery charger, equalize/ float–type

Engine Mounted

- ☐ Air cleaner, heavy duty
- ☐ Oil drain kit
- ☐ Air cleaner restriction indicator
- ☐ Isochronous governor

Generator Set

- ☐ Safeguard breaker
- ☐ Molded–case line circuit breaker
- ☐ Shunt trip breaker
- ☐ Generator strip heater
- ☐ CSA approval
- ☐ Weather housing
- ☐ Export boxing
- ☐ Reactive droop compensator
- ☐ Construction skid
- ☐ Split packaging
- ☐ Oversized generator
- ☐ 1% voltage regulation
- ☐ Load sharing module
- ☐ Rated power factor testing
- ☐ NFPA–110 literature
- ☐ Spring isolators

Controllers

- ☐ Manual controller
- ☐ Engine gauge box for paralleling
- ☐ 6–light controller (NFPA–110, level 2)
- ☐ Oversized meter box

Controller Accessories

- ☐ Run relay kit
- ☐ Tachometer kit
- ☐ Wattmeter kit
- ☐ Speed potentiometer/electronic governor
- ☐ Common failure relay kit
- ☐ Local emergency stop kit

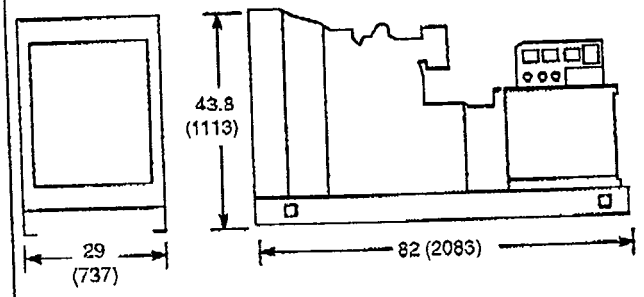
NFPA–110 Controller Accessories

- ☐ Decision Monitor – remote annunciator panel
- ☐ Fast Check – diagnostic fault detector
- ☐ Extension wiring harness for remote mounting of controller
- ☐ Isolated alarm contact kit
- ☐ Overvoltage protection
- ☐ Remote emergency–stop kit
- ☐ Remote audio–visual alarm panel
- ☐ Pre–High Engine Temp. sender and lamp (yellow)
- ☐ Pre–Low Oil Pressure sender and lamp (yellow)
- ☐ Low Water Temp. sender and lamp (red)
- ☐ _____
- ☐ _____

WEIGHTS AND DIMENSIONS

Overall Size: L x W x H – in. (mm) 82 x 29 x 43.8 (2083 x 737 x 1113)

Weight – Radiator Model: wet lb. (kg) 1600 (726)



NOTE: This drawing is provided for reference only and is not to be used in planning installation. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

TOWN OF BURLINGTON

STRUCTURAL ANALYSIS AND REPORT FOR BELL ATLANTIC NYNEX MOBILE OF THE 140 FOOT SELF-SUPPORTING TOWER AT BURLINGTON, CT

BY

YULING CHANG, P.E.

YULING CHANG

Yuling Chang
Nov. 19, 96

CONNECTICUT PROFESSIONAL ENGINEER
NO. 16564

2146-01

November 19, 1996
L & W Engineering
75 Second Street Dumont, NJ 07628

L & W Engineering Structural Analysis and Report
For Bell Atlantic NYNEX Mobile
Of the 140 Foot Self-Supporting Tower at Burlington, Connecticut

PURPOSE:

The purpose of this report is to analyze an existing 140 foot self-supporting tower located at Burlington, Connecticut, to determine if this tower will meet the requirements of ANSI/TIA/EIA-222-F, while supporting four new Allgon ALP 9212-N antennas to be mounted on two sets of 6' side-arms at the 120' elevation of the tower, as well as all existing antennas and transmission lines. The antenna schedule on page 5 of this report lists the proposed antenna, and transmission line configuration.

DESCRIPTION:

The structure is a three-sided UNR-Rohn model SSV tower consisting of seven 20' sections from 12N through 6N. The existing tower information was based upon UNR-Rohn erection and detail drawings. The existing antenna information was based upon a field inspection. This analysis assumes the tower steel is in its original state with no deterioration due to weather or field modification.

REFERENCES:

1. "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures (ANSI/TIA/EIA-222-F-96)," Electronic Industries Association, Washington, DC, 1996.
2. AISC Manual of Steel Construction, Ninth Edition.
3. Swedcom catalog for Allgon System AB antenna information.
4. UNR-Rohn installation drawing C870744 for tower information.
5. Allen Telecom catalog for Antenna Specialists antenna information.
6. Celwave catalog for Celwave antenna information.

PROCEDURE:

This structural analysis was conducted using STAAD III/ISDS. STAAD III is an integrated structural design program, capable of performing structural analysis, and tower and building structure design. The structure is modeled with all of its members, and is detailed on sheets 1 through 10 of the calculation sheets included within this report. A basic wind speed of 80 MPH, with and without 1/2" radial ice, was used for calculating the stresses and reaction forces under ANSI/TIA/EIA-222-F with the following load combinations:

1) $D + W_O$

2) $D + 0.75W_I + I$

D is the dead weight of the structure and appurtenances. W_O is the design wind load on the structure and appurtenances without ice. W_I is the design wind load on the structure and appurtenances with 1/2" radial ice on the tower members. *I* is the weight of the ice. All the tower members were checked by the computer against the AISC code. The results and stress levels for each member are shown on the attached computer output pages.

CONCLUSION:

The analysis results show that, using a basic wind speed of 80 MPH with and without 1/2" radial ice, all of the leg and brace members will be within the allowable stress limits, per ANSI/TIA/EIA-222-F. The tower will be adequate to support the proposed new and existing antennas.

The foundation was also checked (calculation pages 36 and 37). The maximum compression of 63.82 kips is slightly less than the original design load of 67.2 kips. The maximum uplift of 60.56 kips is slightly greater than the original design load of 58.2 kips, however the existing footing will be adequate for this load. The foundation will be adequate to support the existing tower with the proposed new and existing antennas.

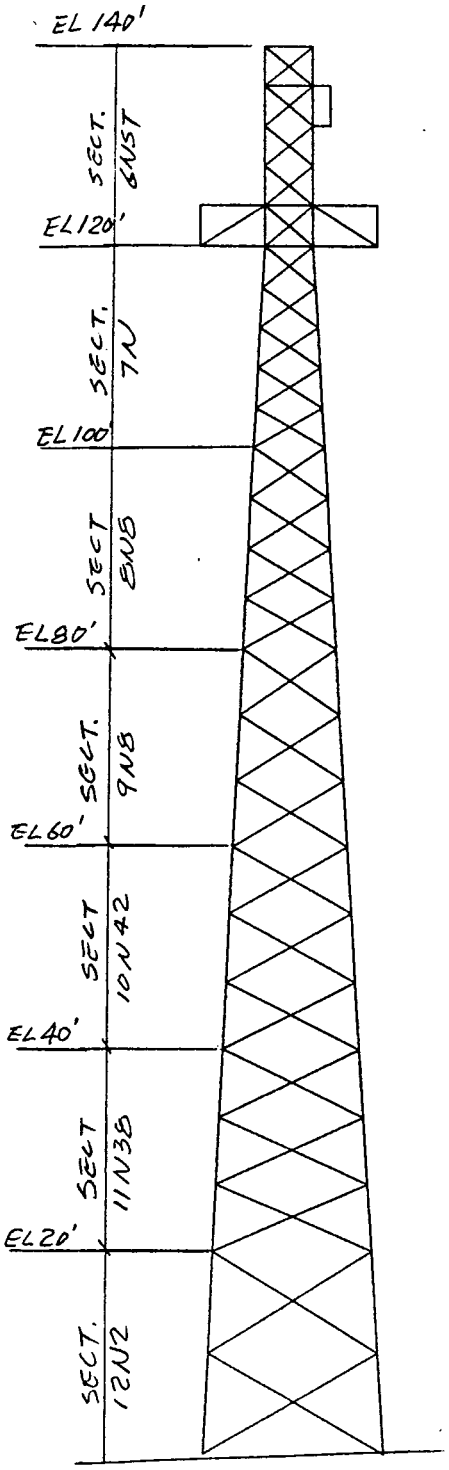
The tower twist and deflection was calculated. The maximum twist will be ± 0.5°, and the maximum deflection will be ± 0.68°, at the top of the tower.

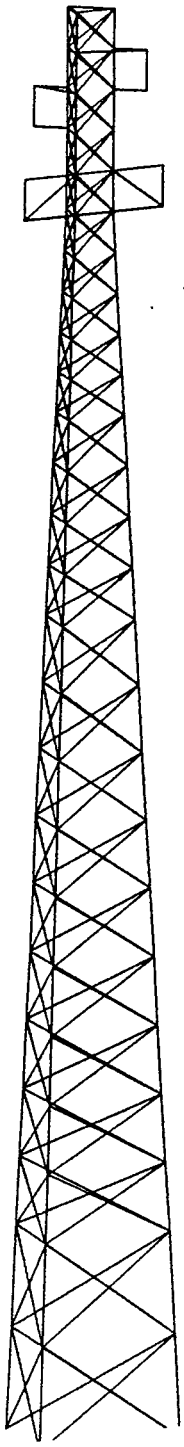
ANTENNA SCHEDULE

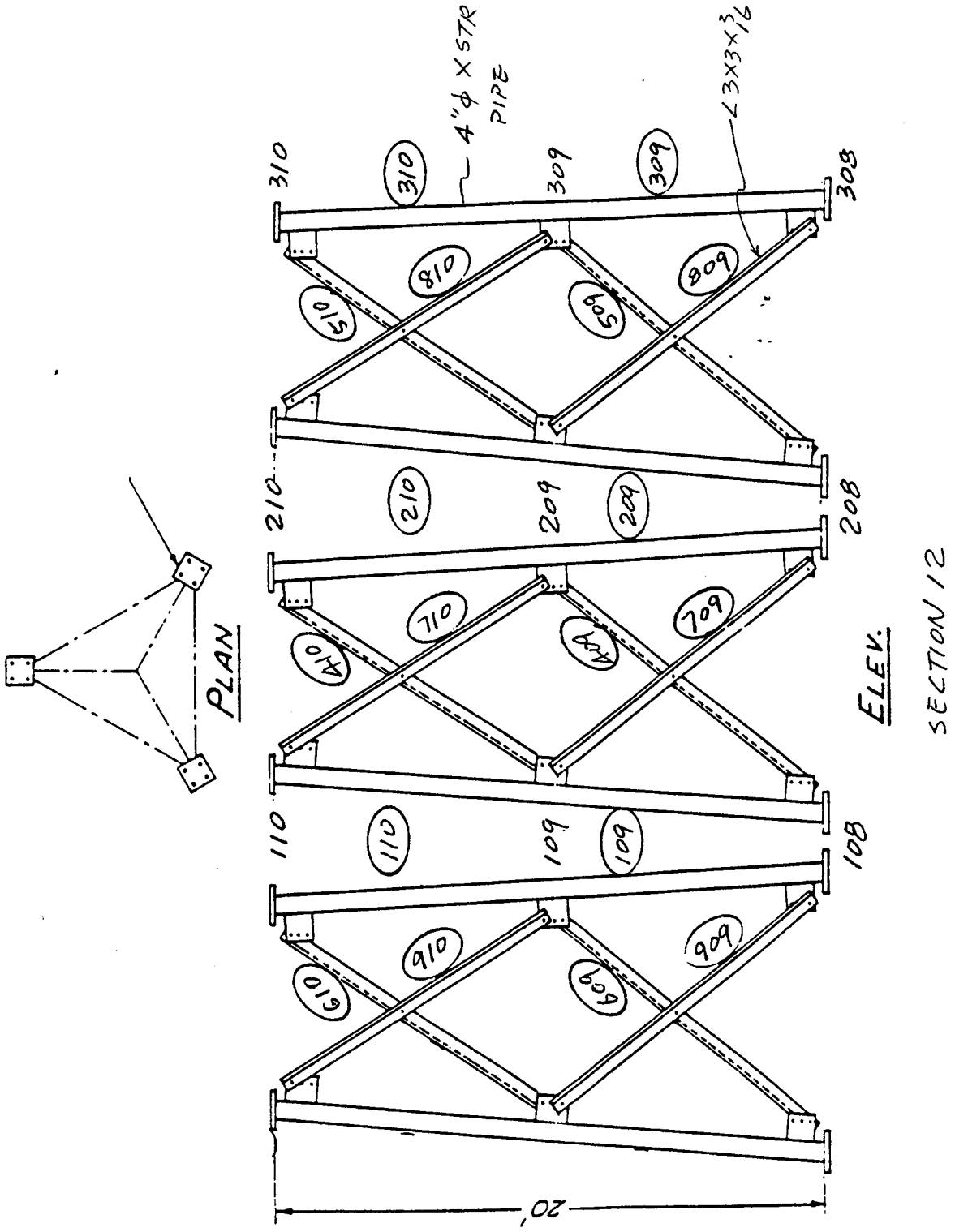
Number	Elevation	Model	Mount	Transmission Line
1.	140'	Antenna Specialists ASPB682	On Leg A	7/8" Heliax
2.	140'	Celwave PD83	On 4' Extension To Leg C	1/2" Heliax
3.	133'	Celwave PD455	4' SAB On Leg B	1/2" Heliax
4.	130'	Antenna Specialists ASPA710	4' SAB On Leg C	1/2" Heliax
5.	126'	Allgon ALP 9212-N	6' SAB Centered At 120' (Lower) On Leg A With Tie Back	7/8" Heliax
6.	126'	Allgon ALP 9212-N	6' SAB Centered At 120' (Lower) On Leg B With Tie Back	7/8" Heliax
7.	125'	(None)	4' SAB On Leg A	(None)
8.	114'	Allgon ALP 9212-N	6' SAB Centered At 120' (Upper) On Leg A With Tie-Back	7/8" Heliax
9.	114'	Allgon ALP 9212-N	6' SAB Centered At 120' (Upper) On Leg B With Tie-Back	7/8" Heliax
10.	102'	Antenna Specialists ASPR766	On 1-1/2" x 18" conduit with 46 clamps to leg B	1/2" Heliax

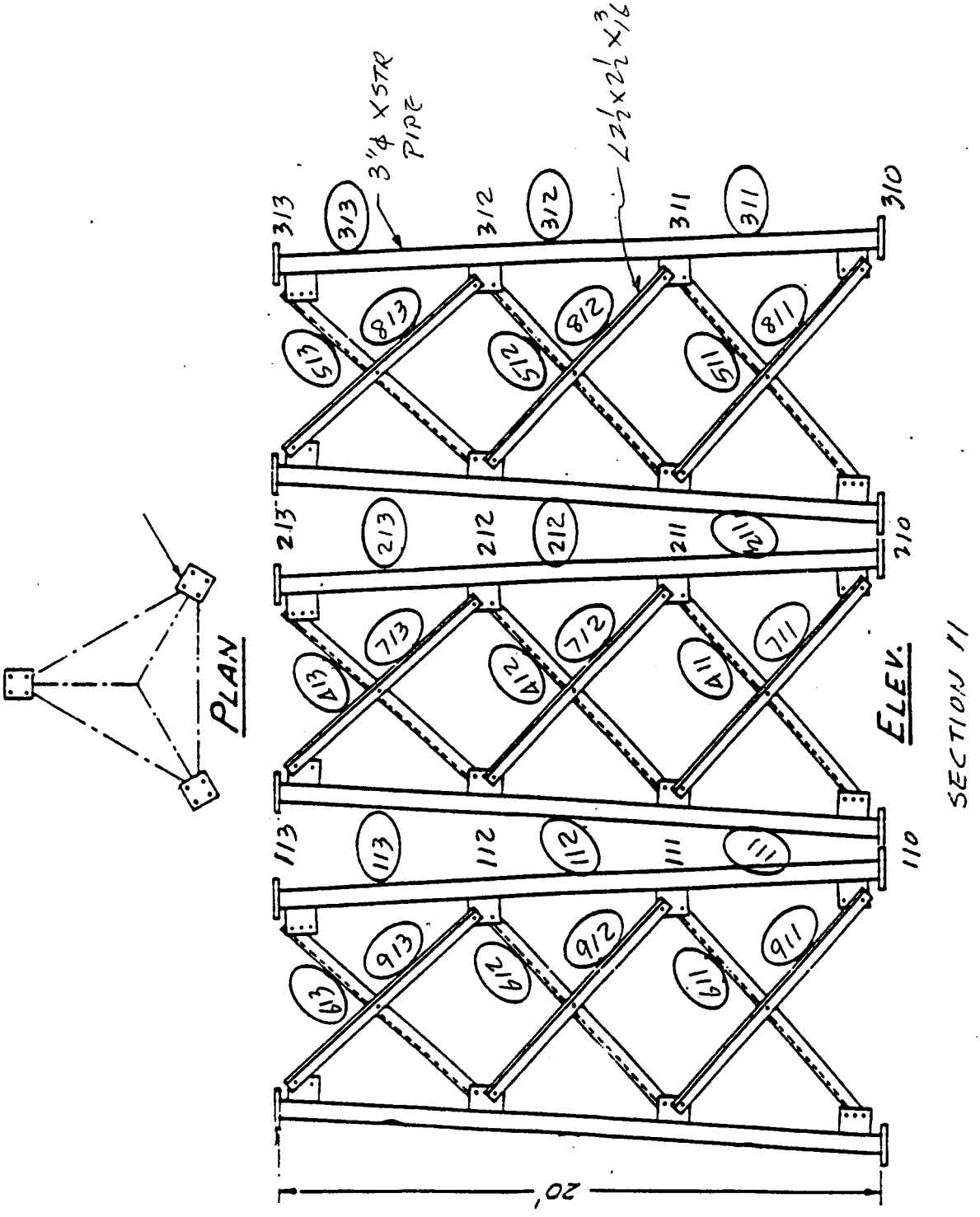
L&W Engineering **Calculation Sheet**

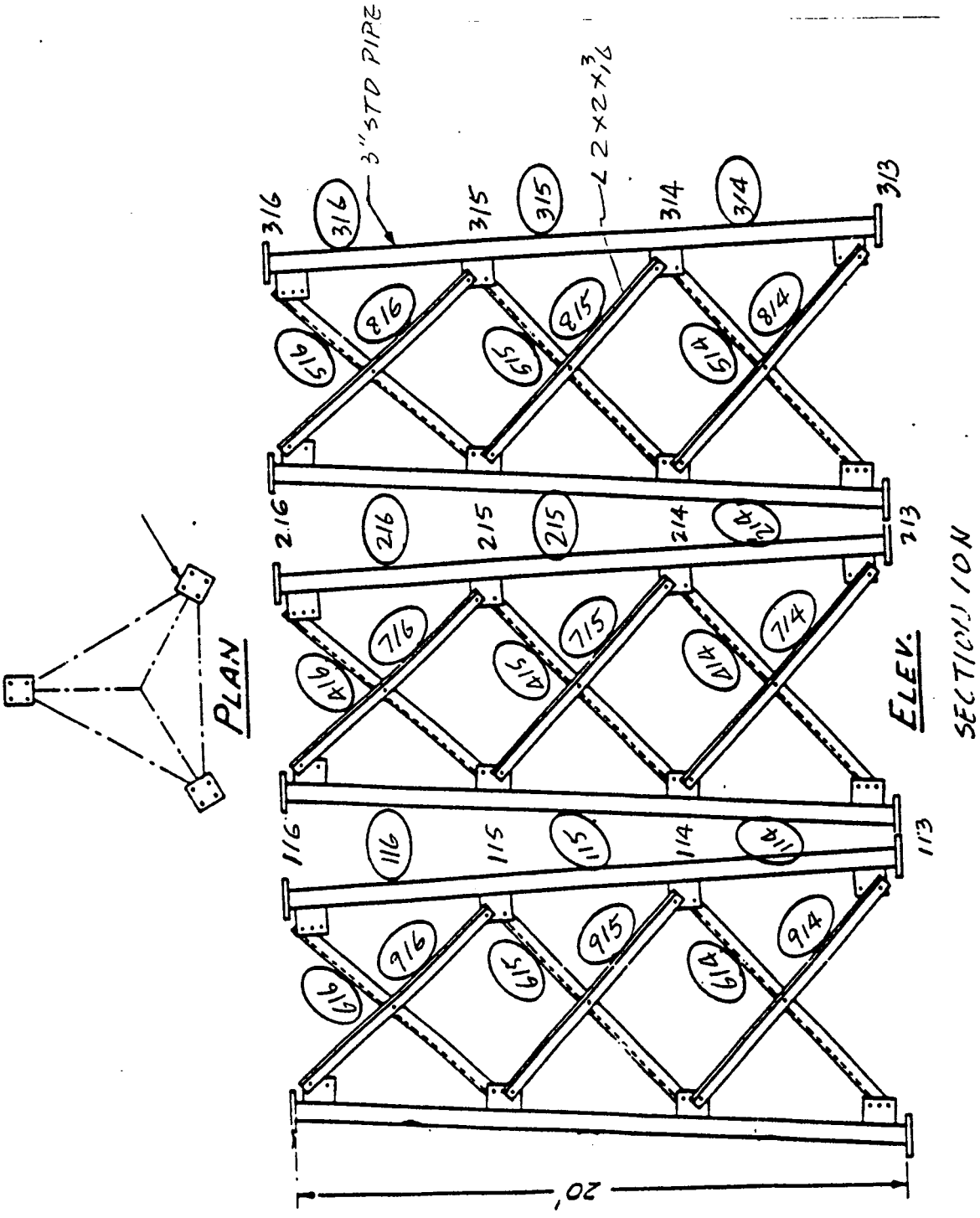
Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	1 of 37
Prepared by	**Rev. No.**	**Date**
Y.CHANG	0	10/12/96

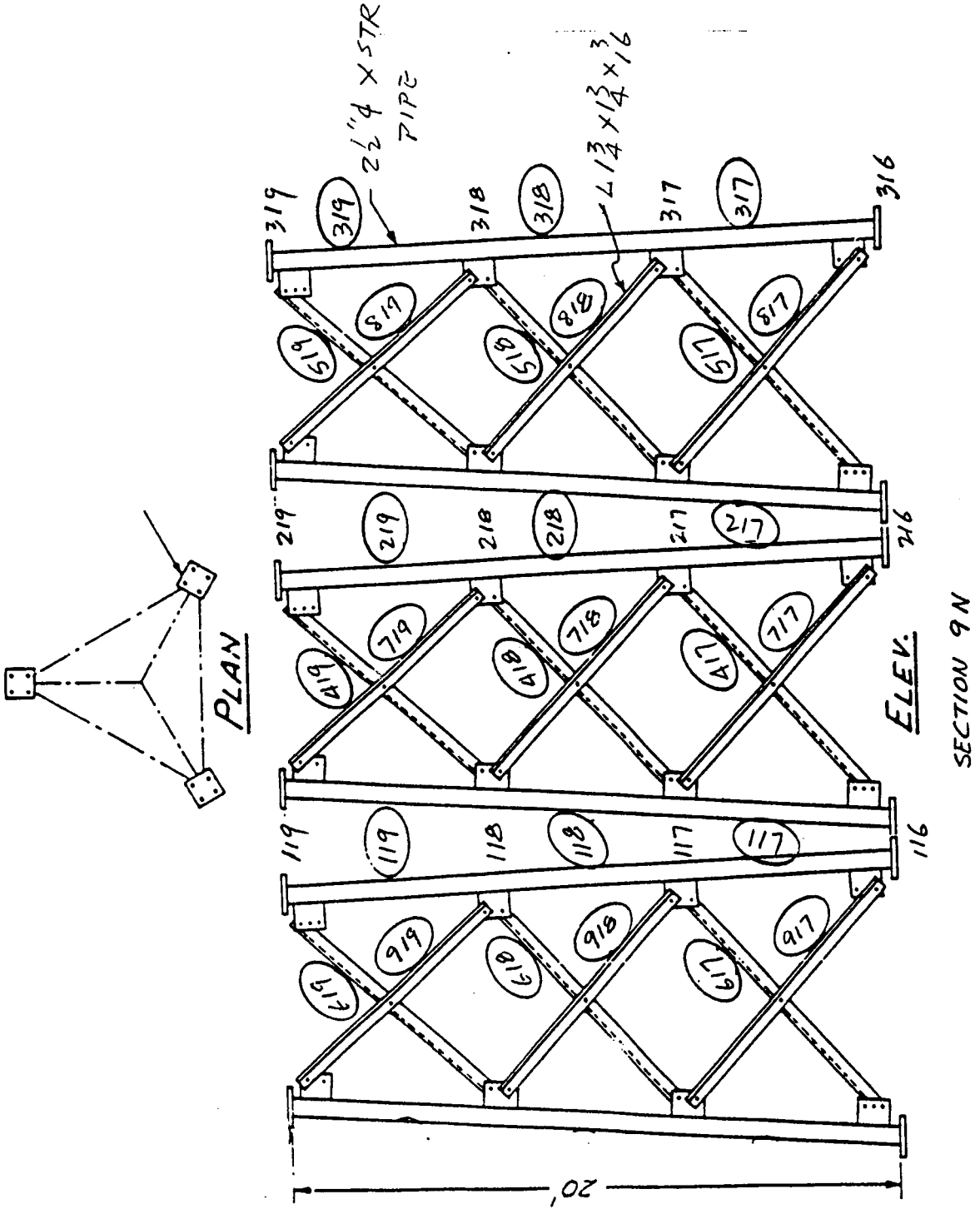


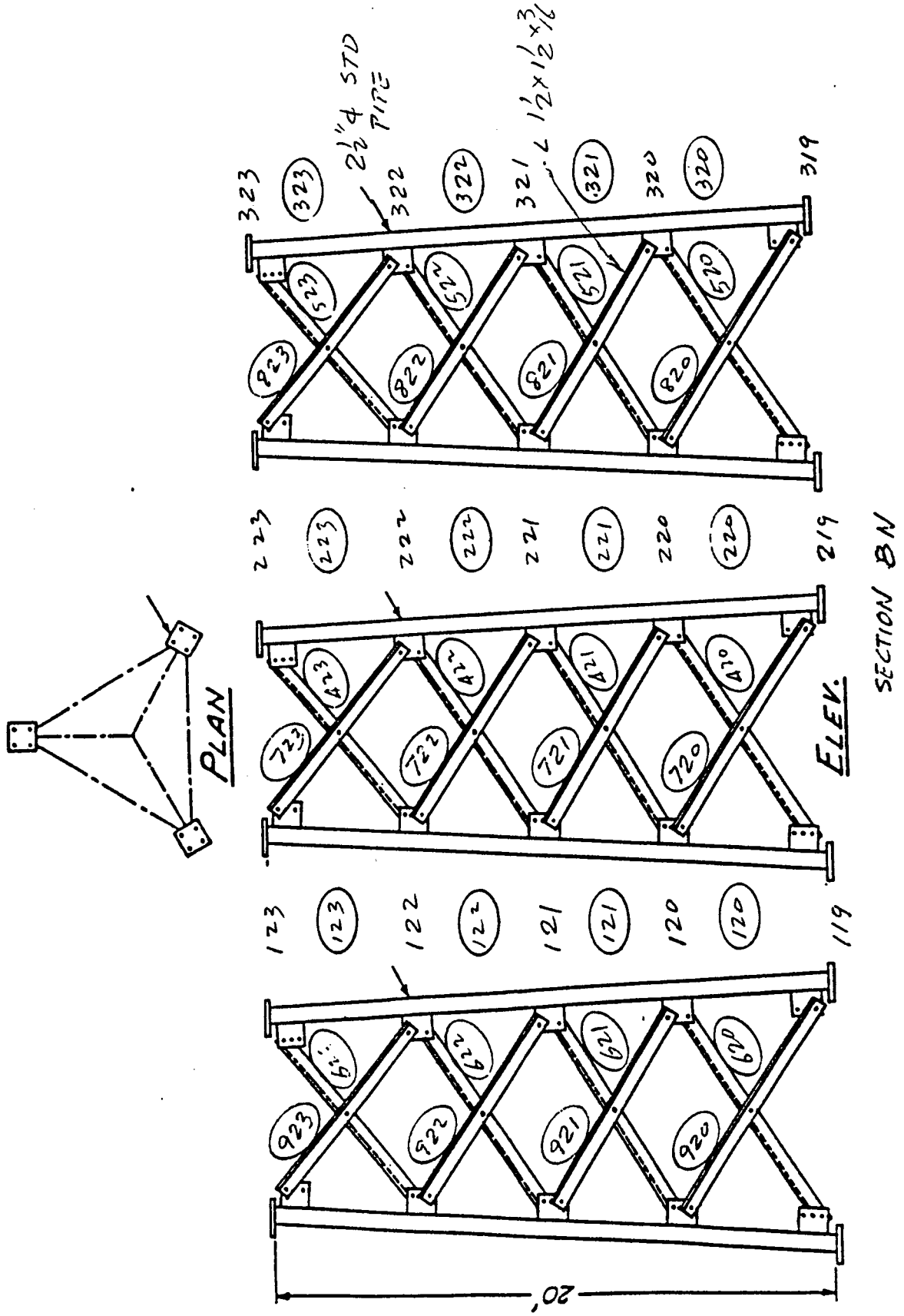


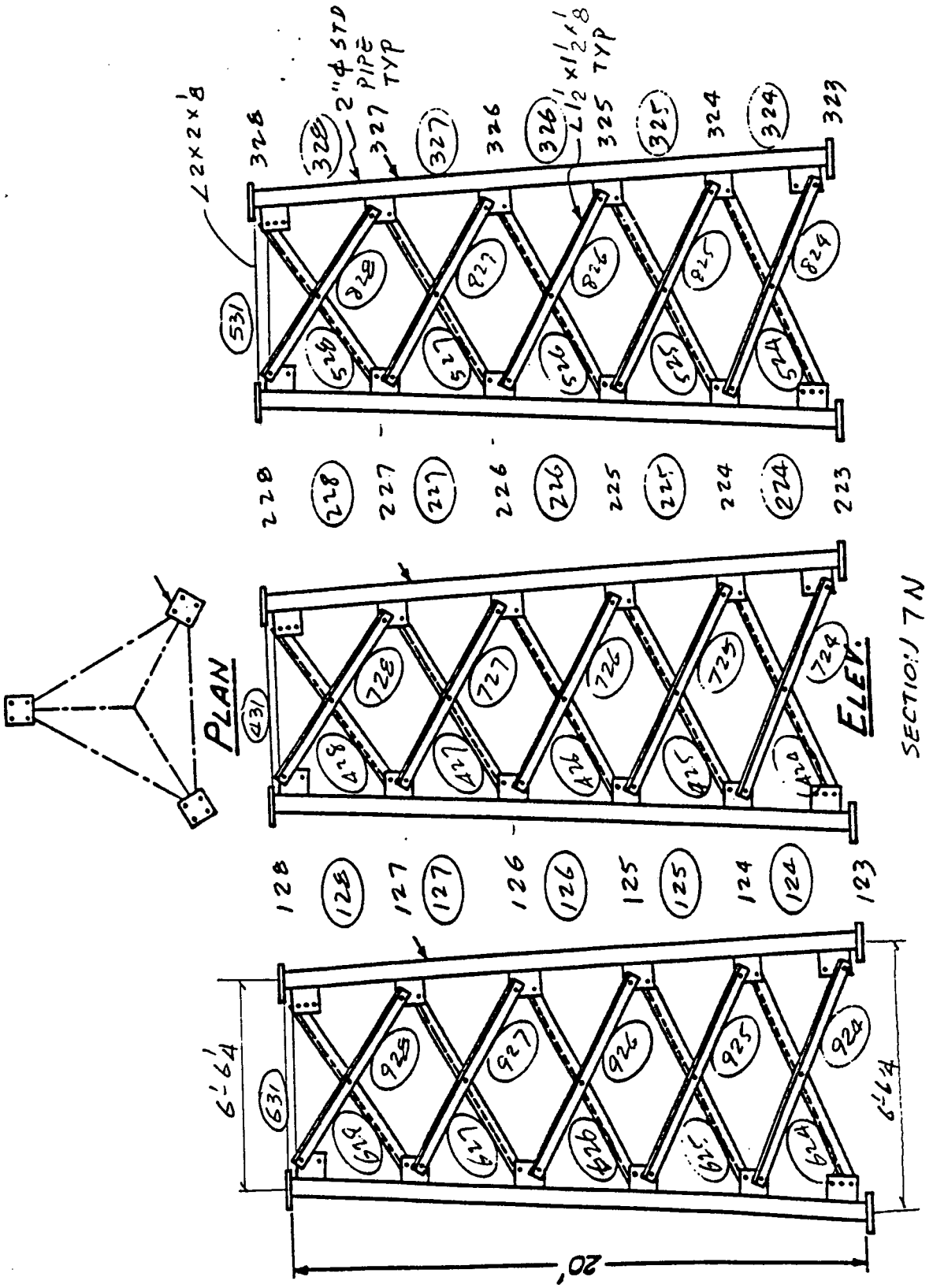

4"ϕ X STR PIPE
L3X3X3/16
310
309
308
210
209
208
110
109
108
810
809
910
909
710
709
610
609
510
509
410
409
20'
PLAN
ELEV.
SECTION 12

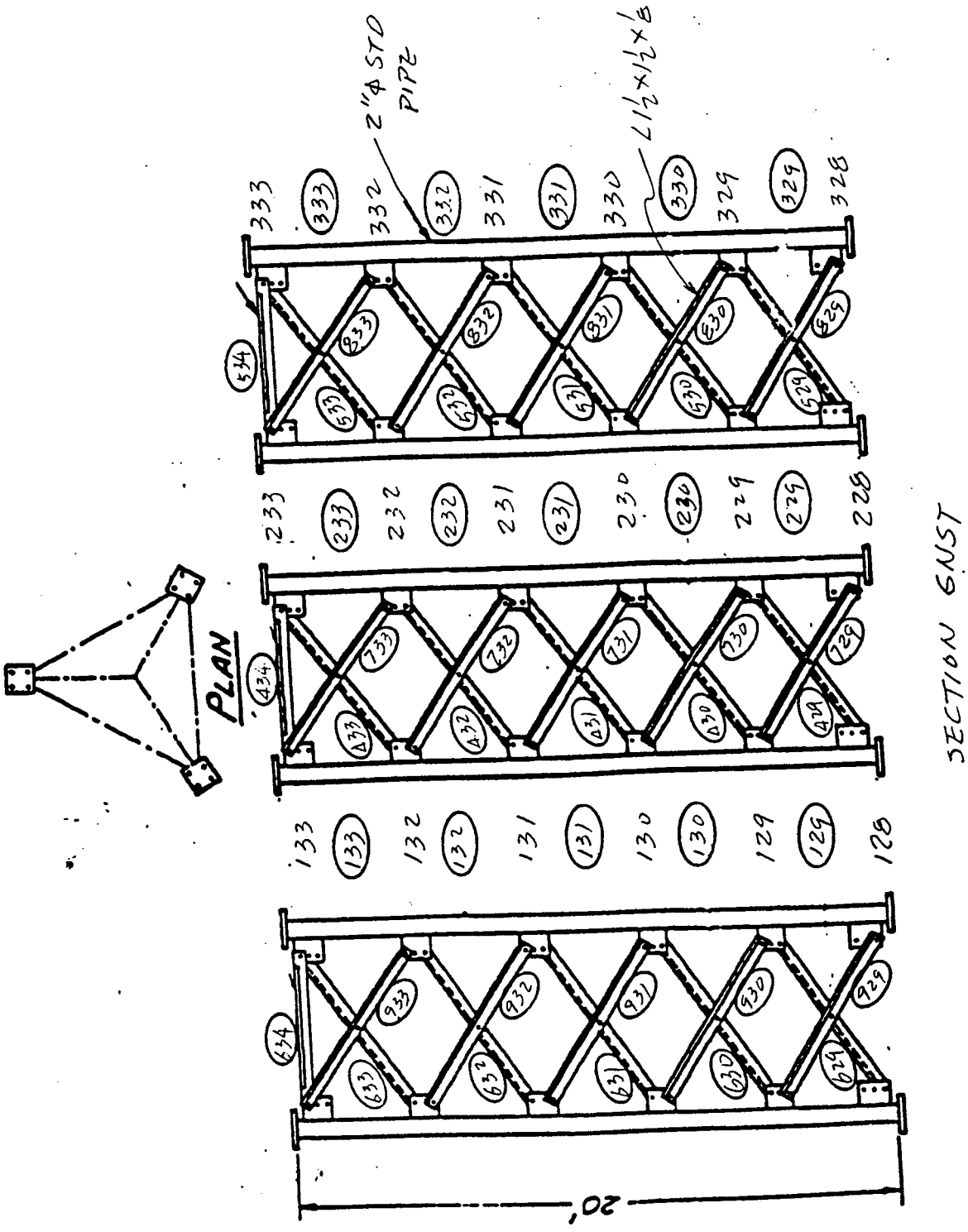

3"ϕ XSTR PIPE
L2½x2½x¼
313
312
311
310
213
212
211
210
113
112
111
110
20'
PLAN
ELEV.
SECTION 11


3"STD PIPE
L 2×2×3/16
316
315
314
313
216
215
214
213
116
115
114
113
PLAN
ELEV.
SECTION
20'


2½"ϕ X STR PIPE
L 1¾ x 1¾ x 3/16
319
318
317
316
219
218
217
216
119
118
117
116
20'
PLAN
ELEV.
SECTION 9 N


2½"ϕ STD PIPE
L 1½x1½x3/16
323
322
321
320
319
223
222
221
220
219
123
122
121
120
119
PLAN
ELEV.
SECTION BN
20'


L2×2×1/8
2"ϕ STD PIPE TYP
L1 1/2×1 1/2×1/8 TYP
PLAN
ELEV.
SECTION 7N
6'-6 1/4"
6'-7 3/4"
20'


2"ϕ STD PIPE
L1½×1½×⅛
PLAN
SECTION 6NST
20'-0"

WIND LOAD CALCULATION FOR ANTENNA SUPPORT STRUCTURES, PER EIA/TIA-222-F

HORIZONTAL WIND FORCE

$$F = q_Z G_H [C_F A_E + \Sigma(C_A A_A)] \text{ (lb)}$$

BUT NOT TO EXCEED $2 q_Z G_H A_G$

WHERE $A_E = D_F A_F + D_R A_R R_R$ (ft^2)

$$F = q_Z G_H [C_F (D_F A_F + D_R A_R R_R) + \Sigma(C_A A_A)] \text{ (lb)}$$

FOR BASIC WIND SPEED = V (MILES-PER-HOUR)

HEIGHT OF TOWER = h (FEET)

z = HEIGHT ABOVE GROUND TO MIDPOINT OF SECTION

$K_Z = [z/33]^{2/7}$

$q_Z = 0.00256 K_Z V^2$ (lb/ft^2)

GUST FACTOR

$$G_H = 0.65 + 0.60/(h/33)^{1/7} \text{ FOR h IN FEET}$$

$$1.00 \le G_H \le 1.25$$

e = SOLIDITY RATIO $= (A_F + A_R)/A_G$

FORCE COEFFICIENTS, C_F

$C_F = 4.0e^2 - 5.9e + 4.0$ (FOR SQUARE CROSS SECTIONS)

$C_F = 3.4e^2 - 4.7e + 3.4$ (FOR TRIANGULAR CROSS SECTIONS)

$R_R = 0.51e^2 + 0.57$ $\quad R_R \le 1.0$

FOR C_F SEE NEXT SHEET

L&W Engineering **Calculation Sheet**

Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	10 of 37
Prepared by	**Rev. No.**	**Date**
Y.CHANG	0	10/13/96

TOWER WIND LOAD CALCULATION FOR SECT. 12N2

TOTAL TOWER HEIGHT	H	=	140	FT.
BASIC WIND SPEED	V	=	80	MPH
HEIGHT OF SECTION CONSIDERED		=	20	ft
SECTION CENTER HEIGHT	z	=	10	FT
BOTTOM OF SECTION WIDTH (C to C)		=	200.38	in = 16.7'
TOP OF SECTION WIDTH (C to C)		=	175.88	in 14.7'
WIDTH OF LEG		=	4.5	in
WIDTH OF BRACE (ROUND)		=		in
LENGTH OF BRACE (ROUND)		=		ft
NO of Equivalent braces (ROUND)		=		
WIDTH OF BRACE (FLAT)		=	3	in
LENGTH OF BRACE (FLAT)		=	18.6	ft
NO of Equivalent braces (FLAT)		=	4	
ICE THICKNESS	t	=	0.5	IN.

GUST FACTOR Gh = 0.65 + 0.6 / (h/33)^1/7 1.00 < Gh < 1.25

= 0.65 + 0.6 /(140 / 33)^1/7 = 1.14

EXPOSURE COEFF. Kz = (z /33)^2/7

=(10 / 33)^2/7 = 0.711 < 1 USE 1

VELOCITY PRESSURI qz = 0.00256 Kz V^2

= 0.00256 x 1 x 80 ^{2}= 16.38 PSI

TOWER WIND LOAD CALCULATION FOR SECT. 12N2 CONTINUED

STRUCTURE FORCE COEFFICIENT - WITHOUT ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(200 + 175.88)/ 2 + 4.5] /12 x 20 = 321.1 ft²

LEG LENGTH ={[(200 - 175.88)/ 24]² + 20 ² }^½ = 20.03 ft

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar = (20 x 9 + x x)/ 12 = 15.02 ft²

Af = (18.6 x 3 + 4)/ 12 = 18.6 ft²

SOLIDITY RATIO e = (Af + Ar)/ Ag

e =(15.02 + 18.6)/ 321.1 = 0.105

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.105 ²- 4.7 x 0.105 + 3.4 = **2.944**

REDUCTION FACTOF Rr = 0.51 e² + 0.57

= 0.51 x 0.105 ²+ 0.57 = **0.576**

STRUCTURE FORCE COEFFICIENT - FOR ICE LOAD

WITH 0.5 in ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(200 + 175.88)/ 2 + 5.5] /12 x 20 = 322.7 ft²

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar =(20 x 11 + x 1 x)/ 12 = 18.36 ft²

Ar = (18.6 x 4 + 4)/ 12 = 24.8 ft²

SOLIDITY RATIO e = Ar / Ag

e =(18.36 + 24.8)/ 322.7 = 0.134

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.134 ²- 4.7 x 0.134 + 3.4 = **2.831**

REDUCTION FACTOF Rr = 0.51 e² + 0.57

= 0.51 x 0.134 ²+ 0.57 = **0.579**

ICE & WIND LOAD CALCULATION

TOWER HEIGHT (FT) H = 140.00 FT
SEC. AT HEIGHT(Ft) z = 10.00 FT
WIND SPEED(MPH) V = 80.00 MPH
ICE THICKNESS It = 0.50 IN
EXPOSURE Coe. Kz = 1.000
GUST FACTOR Gh = 1.138
VELOCITY Pre. qz = 16.38 PSF

MEMBER LOAD ONSECT. 12N2

WIND FORCE qz x Gh (Cf x Af) OR qz x Gh (Cf x Ar x Rr)

MEMBER SIZE	MEMBER WEIGHT lb/FT	Cf	Rr	WIND LOAD Wo lb/FT	ICE LOAD I lb/FT	Cf/I	Rr/I	WIND/ICE .75Wi lb/FT
PIP40		2.944	0.576	11.86	3.054	2.831	0.579	10.51
L3030		2.944	1	13.72	2.722	2.831	0.579	7.64

TOWER WIND LOAD CALCULATION FOR SECT. 11N38

TOTAL TOWER HEIGHT	H	=	140	FT.
BASIC WIND SPEED	V	=	80	MPH
HEIGHT OF SECTION CONSIDERED		=	20	ft
SECTION CENTER HEIGHT	z	=	30	FT
BOTTOM OF SECTION WIDTH (C to C)		=	175.88	in 14.7'
TOP OF SECTION WIDTH (C to C)		=	151.25	in 12.6'
WIDTH OF LEG		=	3.5	in
WIDTH OF BRACE (ROUND)		=		in
LENGTH OF BRACE (ROUND)		=		ft
NO of Equivalent braces (ROUND)		=		
WIDTH OF BRACE (FLAT)		=	2.5	in
LENGTH OF BRACE (FLAT)		=	14.87	ft
NO of Equivalent braces (FLAT)		=	6	
ICE THICKNESS	t	=	0.5	IN.

GUST FACTOR Gh = 0.65 + 0.6 / (h/33)^1/7 1.00 < Gh < 1.25

= 0.65 + 0.6 /(140 / 33)^1/7 = 1.14

EXPOSURE COEFF. Kz = (z /33)^2/7

=(30 / 33)^2/7 = 0.973 < 1 USE 1

VELOCITY PRESSURI qz = 0.00256 Kz V^2

= 0.00256 x 1 x 80 ^{2}= 16.38 PSI

TOWER WIND LOAD CALCULATION FOR SECT. 11N38 CONTINUED

STRUCTURE FORCE COEFFICIENT - WITHOUT ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(176 + 151.25)/ 2 + 3.5] /12 x 20 = 278.4 ft²

LEG LENGTH ={[(176 - 151.25)/ 24]² + 20 ² }^½ = 20.03 ft

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar = (20 x 7 + x x)/ 12 = 11.68 ft²

Af = (14.9 x 2.5 + 6)/ 12 = 18.59 ft²

SOLIDITY RATIO e = (Af + Ar)/ Ag

e =(11.68 + 18.59)/ 278.4 = 0.109

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.109 ²- 4.7 x 0.109 + 3.4 = **2.928**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.109 ²+ 0.57 = **0.576**

STRUCTURE FORCE COEFFICIENT - FOR ICE LOAD

WITH 0.5 in ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(176 + 151.25)/ 2 + 4.5] /12 x 20 = 280.1 ft²

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar =(20 x 9 + x 1 x)/ 12 = 15.02 ft²

Ar = (14.9 x 3.5 + 6)/ 12 = 26.02 ft²

SOLIDITY RATIO e = Ar / Ag

e =(15.02 + 26.02)/ 280.1 = 0.147

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.147 ²- 4.7 x 0.147 + 3.4 = **2.783**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.147 ²+ 0.57 = **0.581**

ICE & WIND LOAD CALCULATION

TOWER HEIGHT (FT) H = 140.00 FT
SEC. AT HEIGHT(Ft) z = 30.00 FT
WIND SPEED(MPH) V = 80.00 MPH
ICE THICKNESS It = 0.50 IN
EXPOSURE Coe. Kz = 1.000
GUST FACTOR Gh = 1.138
VELOCITY Pre. qz = 16.38 PSF

MEMBER LOAD ONSECT. 11N38

WIND FORCE qz x Gh (Cf x Af) OR qz x Gh (Cf x Ar x Rr)

MEMBER SIZE	MEMBER WEIGHT lb/FT	Cf	Rr	WIND LOAD Wc lb/FT	ICE LOAD I lb/FT	Cf/I	Rr/I	WIND/ICE .75Wi lb/FT
PIP30		2.928	0.576	9.17	2.443	2.783	0.581	8.48
L2525		2.928	1	11.37	2.333	2.783	0.581	6.60

L&W Engineering **Calculation Sheet**

Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	16 of 37
Prepared by	**Rev. No.**	**Date**
Y.CHANG	0	10/13/96

TOWER WIND LOAD CALCULATION FOR SECT. 10N42

TOTAL TOWER HEIGHT	H	=	140 FT.
BASIC WIND SPEED	V	=	80 MPH
HEIGHT OF SECTION CONSIDERED		=	20 ft
SECTION CENTER HEIGHT	z	=	50 FT
BOTTOM OF SECTION WIDTH (C to C)		=	151.25 in 12.6
TOP OF SECTION WIDTH (C to C)		=	126.75 in 10.6
WIDTH OF LEG		=	3.5 in
WIDTH OF BRACE (ROUND)		=	in
LENGTH OF BRACE (ROUND)		=	ft
NO of Equivalent braces (ROUND)		=	
WIDTH OF BRACE (FLAT)		=	2 in
LENGTH OF BRACE (FLAT)		=	13.07 ft
NO of Equivalent braces (FLAT)		=	6
ICE THICKNESS	t	=	0.5 IN.

GUST FACTOR Gh = 0.65 + 0.6 / (h/33)^1/7 1.00 < Gh < 1.25

= 0.65 + 0.6 /(140 / 33)^1/7 = 1.14

EXPOSURE COEFF. Kz = (z /33)^2/7

=(50 / 33)^2/7 = 1.126

VELOCITY PRESSURI qz = 0.00256 Kz V^2

= 0.00256 x 1.126 x 80 ²= 18.45 PSI

TOWER WIND LOAD CALCULATION FOR SECT. 10N42 CONTINUED

STRUCTURE FORCE COEFFICIENT - WITHOUT ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(151 + 126.75)/ 2 + 3.5] /12 x 20 = 237.5 ft²

LEG LENGTH ={[(151 - 126.75)/ 24]² + 20 ²}^½ = 20.03 ft

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar = (20 x 7 + x x)/ 12 = 11.68 ft²

Af = (13.1 x 2 + 6)/ 12 = 13.07 ft²

SOLIDITY RATIO e = (Af + Ar)/ Ag

e =(11.68 + 13.07)/ 237.5 = 0.104

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.104 ²- 4.7 x 0.104 + 3.4 = **2.948**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.104 ²+ 0.57 = **0.576**

STRUCTURE FORCE COEFFICIENT - FOR ICE LOAD

WITH 0.5 in ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(151 + 126.75)/ 2 + 4.5] /12 x 20 = 239.2 ft²

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar =(20 x 9 + x 1 x)/ 12 = 15.02 ft²

Ar = (13.1 x 3 + 6)/ 12 = 19.61 ft²

SOLIDITY RATIO e = Ar / Ag

e =(15.02 + 19.61)/ 239.2 = 0.145

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.145 ²- 4.7 x 0.145 + 3.4 = **2.79**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.145 ²+ 0.57 = **0.581**

ICE & WIND LOAD CALCULATION

TOWER HEIGHT (FT)	H =	140.00	FT
SEC. AT HEIGHT(Ft)	z =	50.00	FT
WIND SPEED(MPH)	V =	80.00	MPH
ICE THICKNESS	It =	0.50	IN
EXPOSURE Coe.	Kz =	1.126	
GUST FACTOR	Gh =	1.138	
VELOCITY Pre.	qz =	18.45	PSF

MEMBER LOAD ONSECT. 10N42

WIND FORCE qz x Gh (Cf x Af) OR qz x Gh (Cf x Ar x Rr)

MEMBER SIZE	MEMBER WEIGHT lb/FT	Cf	Rr	WIND LOAD Wo lb/FT	ICE LOAD I lb/FT	Cf/I	Rr/I	WIND/ICE .75Wi lb/FT
PIP30		2.948	0.576	10.40	2.443	2.79	0.581	9.57
L2020		2.948	1	10.32	1.944	2.79	0.581	6.38

L&W Engineering **Calculation Sheet**

Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	19 of 37
Prepared by	**Rev. No.**	**Date**
Y.CHANG	0	10/13/96

TOWER WIND LOAD CALCULATION FOR SECT. 9N8 .

TOTAL TOWER HEIGHT	H	=	140	FT.
BASIC WIND SPEED	V	=	80	MPH
HEIGHT OF SECTION CONSIDERED		=	20	ft
SECTION CENTER HEIGHT	z	=	70	FT
BOTTOM OF SECTION WIDTH (C to C)		=	126.75	in
TOP OF SECTION WIDTH (C to C)		=	102.75	in
WIDTH OF LEG		=	2.875	in
WIDTH OF BRACE (ROUND)		=		in
LENGTH OF BRACE (ROUND)		=		ft
NO of Equivalent braces (ROUND)		=		
WIDTH OF BRACE (FLAT)		=	1.75	in
LENGTH OF BRACE (FLAT)		=	11.67	ft
NO of Equivalent braces (FLAT)		=	6	
ICE THICKNESS	t	=	0.5	IN.

GUST FACTOR Gh = 0.65 + 0.6 / (h/33)^1/7 1.00 < Gh < 1.25

= 0.65 + 0.6 /(140 / 33)^1/7 = 1.14

EXPOSURE COEFF. Kz = (z /33)^2/7

=(70 / 33)^2/7 = 1.24

VELOCITY PRESSURI qz = 0.00256 Kz V^2

= 0.00256 x 1.24 x 80 ^{2}= 20.32 PSI

TOWER WIND LOAD CALCULATION FOR SECT. 9N8 CONTINUED

STRUCTURE FORCE COEFFICIENT - WITHOUT ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(127 + 102.75)/ 2 + 2.875] /12 x 20 = 196 ft²

LEG LENGTH ={[(127 - 102.75)/ 24]² + 20 ² }^½ = 20.02 ft

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar = (20 x 5.75 + x x)/ 12 = 9.59 ft²

Af = (11.7 x 1.75 + 6)/ 12 = 10.21 ft²

SOLIDITY RATIO e = (Af + Ar)/ Ag

e =(9.59 + 10.21)/ 196 = 0.101

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.101 ²- 4.7 x 0.101 + 3.4 = **2.96**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.101 ²+ 0.57 = **0.575**

STRUCTURE FORCE COEFFICIENT - FOR ICE LOAD

WITH 0.5 in ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(127 + 102.75)/ 2 + 3.875] /12 x 20 = 197.7 ft²

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar =(20 x 7.75 + x 1 x)/ 12 = 12.93 ft²

Ar = (11.7 x 2.75 + 6)/ 12 = 16.05 ft²

SOLIDITY RATIO e = Ar / Ag

e =(12.93 + 16.05)/ 197.7 = 0.147

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.147 ²- 4.7 x 0.147 + 3.4 = **2.783**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.147 ²+ 0.57 = **0.581**

ICE & WIND LOAD CALCULATION

TOWER HEIGHT (FT)	H =	140.00	FT
SEC. AT HEIGHT(Ft)	z =	70.00	FT
WIND SPEED(MPH)	V =	80.00	MPH
ICE THICKNESS	It =	0.50	IN
EXPOSURE Coe.	Kz =	1.240	
GUST FACTOR	Gh =	1.138	
VELOCITY Pre.	qz =	20.31	PSF

MEMBER LOAD ONSECT. 9N8

WIND FORCE qz x Gh (Cf x Af) OR qz x Gh (Cf x Ar x Rr)

MEMBER SIZE	MEMBER WEIGHT lb/FT	Cf	Rr	WIND LOAD Wo lb/FT	ICE LOAD I lb/FT	Cf/I	Rr/I	WIND/ICE .75Wi lb/FT
PIP25		2.96	0.575	9.43	2.062	2.783	0.581	9.05
L1717		2.96	1	9.98	1.750	2.783	0.581	6.42

L&W Engineering **Calculation Sheet**

Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	22 of 37
Prepared by	**Rev. No.**	**Date**
Y.CHANG	0	10/13/96

TOWER WIND LOAD CALCULATION FOR SECT. 8N8

TOTAL TOWER HEIGHT	H	=	140	FT.
BASIC WIND SPEED	V	=	80	MPH
HEIGHT OF SECTION CONSIDERED		=	20	ft
SECTION CENTER HEIGHT	z	=	90	FT
BOTTOM OF SECTION WIDTH (C to C)		=	102.75	in
TOP OF SECTION WIDTH (C to C)		=	78.75	in
WIDTH OF LEG		=	2.875	in
WIDTH OF BRACE (ROUND)		=		in
LENGTH OF BRACE (ROUND)		=		ft
NO of Equivalent braces (ROUND)		=		
WIDTH OF BRACE (FLAT)		=	1.5	in
LENGTH OF BRACE (FLAT)		=	9.87	ft
NO of Equivalent braces (FLAT)		=	8	
ICE THICKNESS	t	=	0.5	IN.

GUST FACTOR Gh = 0.65 + 0.6 / (h/33)^1/7 1.00 < Gh < 1.25

= 0.65 + 0.6 /(140 / 33)^1/7 = 1.14

EXPOSURE COEFF. Kz = (z /33)^2/7

=(90 / 33)^2/7 = 1.332

VELOCITY PRESSURI qz = 0.00256 Kz V^2

= 0.00256 x 1.332 x 80 ^{2}= 21.82 PSI

TOWER WIND LOAD CALCULATION FOR SECT. 8N8 CONTINUED

STRUCTURE FORCE COEFFICIENT - WITHOUT ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(103 + 78.75)/ 2 + 2.875] /12 x 20 = 156 ft²

LEG LENGTH ={[(103 - 78.75)/ 24]² + 20 ² }^½ = 20.02 ft

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar = (20 x 5.75 + x x)/ 12 = 9.59 ft²

Af = (9.87 x 1.5 + 8)/ 12 = 9.87 ft²

SOLIDITY RATIO e = (Af + Ar)/ Ag

e =(9.59 + 9.87)/ 156 = 0.125

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.125 ²- 4.7 x 0.125 + 3.4 = **2.866**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.125 ²+ 0.57 = **0.578**

STRUCTURE FORCE COEFFICIENT - FOR ICE LOAD

WITH 0.5 in ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(103 + 78.75)/ 2 + 3.875] /12 x 20 = 157.7 ft²

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar =(20 x 7.75 + x 1 x)/ 12 = 12.93 ft²

Ar = (9.87 x 2.5 + 8)/ 12 = 16.45 ft²

SOLIDITY RATIO e = Ar / Ag

e =(12.93 + 16.45)/ 157.7 = 0.186

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.186 ²- 4.7 x 0.186 + 3.4 = **2.643**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.186 ²+ 0.57 = **0.588**

ICE & WIND LOAD CALCULATION

TOWER HEIGHT (FT) H = 140.00 FT
SEC. AT HEIGHT(Ft) z = 90.00 FT
WIND SPEED(MPH) V = 80.00 MPH
ICE THICKNESS It = 0.50 IN
EXPOSURE Coe. Kz = 1.332
GUST FACTOR Gh = 1.138
VELOCITY Pre. qz = 21.82 PSF

MEMBER LOAD ONSECT. 8N8

WIND FORCE qz x Gh (Cf x Af) OR qz x Gh (Cf x Ar x Rr)

MEMBER SIZE	MEMBER WEIGHT lb/FT	Cf	Rr	WIND LOAD Wo lb/FT	ICE LOAD I lb/FT	Cf/I	Rr/I	WIND/ICE .75Wi lb/FT
PIP25		2.866	0.578	9.86	2.062	2.643	0.588	9.35
L1515	1.8	2.866	1	8.90	1.556	2.643	0.588	6.03

L&W Engineering **Calculation Sheet**

Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	25 of 37
Prepared by	**Rev. No.**	**Date**
Y.CHANG	0	10/13/96

TOWER WIND LOAD CALCULATION FOR SECT. 7N

TOTAL TOWER HEIGHT	H	=	140	FT.
BASIC WIND SPEED	V	=	80	MPH
HEIGHT OF SECTION CONSIDERED		=	20	ft
SECTION CENTER HEIGHT	z	=	110	FT
BOTTOM OF SECTION WIDTH (C to C)		=	78.75	in
TOP OF SECTION WIDTH (C to C)		=	54.25	in
WIDTH OF LEG		=	2.375	in
WIDTH OF BRACE (ROUND)		=		in
LENGTH OF BRACE (ROUND)		=		ft
NO of Equivalent braces (ROUND)		=		
WIDTH OF BRACE (FLAT)		=	1.5	in
LENGTH OF BRACE (FLAT)		=	6.83	ft
NO of Equivalent braces (FLAT)		=	10	
ICE THICKNESS	t	=	0.5	IN.

6.6', 4.5'

GUST FACTOR Gh = 0.65 + 0.6 / (h/33)^1/7 1.00 < Gh < 1.25

= 0.65 + 0.6 / (140 / 33)^1/7 = 1.14

EXPOSURE COEFF. Kz = (z /33)^2/7

=(110 / 33)^2/7 = 1.411

VELOCITY PRESSURE qz = 0.00256 Kz V^2

= 0.00256 x 1.411 x 80 ^{2}= 23.12 PSF

TOWER WIND LOAD CALCULATION FOR SECT. 7N CONTINUED

STRUCTURE FORCE COEFFICIENT - WITHOUT ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(78.8 + 54.25)/ 2 + 2.375] /12 x 20 = 114.8 ft²

LEG LENGTH ={[(78.8 - 54.25)/ 24]² + 20 ² }^½ = 20.03 ft

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar = (20 x 4.75 + x x)/ 12 = 7.93 ft²

Af = (6.83 x 1.5 + 10)/ 12 = 8.54 ft²

SOLIDITY RATIO e = (Af + Ar)/ Ag

e =(7.93 + 8.54)/ 114.8 = 0.143

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.143 ²- 4.7 x 0.143 + 3.4 = **2.797**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.143 ²+ 0.57 = **0.58**

STRUCTURE FORCE COEFFICIENT - FOR ICE LOAD

WITH 0.5 in ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(78.8 + 54.25)/ 2 + 3.375] /12 x 20 = 116.5 ft²

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar =(20 x 6.75 + x 1 x)/ 12 = 11.27 ft²

Ar = (6.83 x 2.5 + 10)/ 12 = 14.23 ft²

SOLIDITY RATIO e = Ar / Ag

e =(11.27 + 14.23)/ 116.5 = 0.219

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.219 ²- 4.7 x 0.219 + 3.4 = **2.534**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.219 ²+ 0.57 = **0.594**

ICE & WIND LOAD CALCULATION

TOWER HEIGHT (FT)	H =	140.00	FT
SEC. AT HEIGHT(Ft)	z =	110.00	FT
WIND SPEED(MPH)	V =	80.00	MPH
ICE THICKNESS	It =	0.50	IN
EXPOSURE Coe.	Kz =	1.411	
GUST FACTOR	Gh =	1.138	
VELOCITY Pre.	qz =	23.11	PSF

MEMBER LOAD ONSECT. 7N

WIND FORCE qz x Gh (Cf x Af) OR qz x Gh (Cf x Ar x Rr)

MEMBER SIZE	MEMBER WEIGHT lb/FT	Cf	Rr	WIND LOAD Wo lb/FI	ICE LOAD I lb/FT	Cf/I	Rr/I	WIND/ICE .75Wi lb/FT
PIP20		2.797	0.58	8.44	1.756	2.534	0.594	8.35
L1515	1.8	2.797	1	9.20	1.556	2.534	0.594	6.19

L&W Engineering **Calculation Sheet**

Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	28 of 37
Prepared by	**Rev. No.**	**Date**
Y.CHANG	0	10/13/96

TOWER WIND LOAD CALCULATION FOR SECT. 6Nst

TOTAL TOWER HEIGHT	H	=	140	FT.
BASIC WIND SPEED	V	=	80	MPH
HEIGHT OF SECTION CONSIDERED		=	20	ft
SECTION CENTER HEIGHT	z	=	130	FT
BOTTOM OF SECTION WIDTH (C to C)		=	54.25	in 4.5'
TOP OF SECTION WIDTH (C to C)		=	54.25	in 4.5
WIDTH OF LEG		=	2.375	in
WIDTH OF BRACE (ROUND)		=		in
LENGTH OF BRACE (ROUND)		=		ft
NO of Equivalent braces (ROUND)		=		
WIDTH OF BRACE (FLAT)		=	1.5	in
LENGTH OF BRACE (FLAT)		=	6.02	ft
NO of Equivalent braces (FLAT)		=	10.7	
ICE THICKNESS	t	=	0.5	IN.

GUST FACTOR Gh = 0.65 + 0.6 / (h/33)^1/7 1.00 < Gh < 1.25

= 0.65 + 0.6 /(140 / 33)^1/7 = 1.14

EXPOSURE COEFF. Kz = (z /33)^2/7

=(130 / 33)^2/7 = 1.48

VELOCITY PRESSURI qz = 0.00256 Kz V^2

= 0.00256 x 1.48 x 80 ^{2}= 24.25 PSI

TOWER WIND LOAD CALCULATION FOR SECT. 6Nst CONTINUED

STRUCTURE FORCE COEFFICIENT - WITHOUT ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(54.3 + 54.25)/ 2 + 2.375] /12 x 20 = 94.4 ft²

LEG LENGTH ={[(54.3 - 54.25)/ 24]² + 20 ²}^½ = 20 ft

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar = (20 x 4.75 + x x)/ 12 = 7.92 ft²

Af = (6.02 x 1.5 + 10.7)/ 12 = 8.05 ft²

SOLIDITY RATIO e = (Af + Ar)/ Ag

e =(7.92 + 8.05)/ 94.4 = 0.169

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.169 ²- 4.7 x 0.169 + 3.4 = **2.703**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.169 ²+ 0.57 = **0.585**

STRUCTURE FORCE COEFFICIENT - FOR ICE LOAD

WITH 0.5 in ICE

CROSS AREA OF ONE TOWER FACE

Ag =[(54.3 + 54.25)/ 2 + 3.375] /12 x 20 = 96 ft²

PROJECTED AREA OF STRUCTURAL COMPONENTS IN ONE FACE

Ar =(20 x 6.75 + x 1 x)/ 12 = 11.25 ft²

Ar = (6.02 x 2.5 + 10.7)/ 12 = 13.42 ft²

SOLIDITY RATIO e = Ar / Ag

e =(11.25 + 13.42)/ 96 = 0.257

FORCE COEFFICIENT Cf = 3.4 e² - 4.7 e +3.4

= 3.4 x 0.257 ²- 4.7 x 0.257 + 3.4 = **2.417**

REDUCTION FACTOR Rr = 0.51 e² + 0.57

= 0.51 x 0.257 ²+ 0.57 = **0.604**

ICE & WIND LOAD CALCULATION

TOWER HEIGHT (FT) H = 140.00 FT
SEC. AT HEIGHT(Ft) z = 130.00 FT
WIND SPEED(MPH) V = 80.00 MPH
ICE THICKNESS It = 0.50 IN
EXPOSURE Coe. Kz = 1.480
GUST FACTOR Gh = 1.138
VELOCITY Pre. qz = 24.24 PSF

MEMBER LOAD ONSECT. 6Nst

WIND FORCE qz x Gh (Cf x Af) OR qz x Gh (Cf x Ar x Rr)

MEMBER SIZE	MEMBER WEIGHT lb/FT	Cf	Rr	WIND LOAD Wo lb/FT	ICE LOAD I lb/FT	Cf/I	Rr/I	WIND/ICE .75Wi lb/FT
PIP15		2.703	0.585	6.91	1.466	2.417	0.604	7.30
PIP20		2.703	0.585	8.63	1.756	2.417	0.604	8.50
PIP25		2.703	0.585	10.45	2.062	2.417	0.604	9.75
L1515		2.703	1	9.32	1.556	2.417	0.604	6.29

L&W Engineering **Calculation Sheet**

Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	31 of 37
Prepared by	**Rev. No.**	**Date**
Y.CHANG		10/11/96

ANTENNA LOAD AT 33 FT AGL. FOR 140 FT TOWE

BASED ON WIND SPEED OF 80 MPH

$F = .00256\ V^2 \cdot Gh \cdot Ca \cdot Aa$ **or for Dish $F = Ca \cdot V^2 \cdot Gh \cdot Aa$**

$.00256\ V^2 = 16.384$

$Gh = 1.138$

ANTENNA TYPE	ANTENNA WEIGHT Lb. WT	PROJ. Area in^2 Aa	COEFF. Ca	MOM ARM ARM	TORQUE ARM HOR-ARM	LATERAL THRUST Lb. Fa	BENDING MOMENT FT-Lb Wm	WIND TORQUE FT-Lb Mt	DISH SHEAR Lb. Fs
CELWAVE									
PD 83	17	1.5	1.2	5.625		34	189		
PD 455	23	2.97	1.2	6.59		66	438		
ASP-682	9.5	1.89	1.2	5.92		42	250		
ASP-710	10	1.68	1.2	6.16		38	232		
ASPR766	1.75	0.1	1.2		1.1	2		2	
ALLGO SYSTEM									
ALP9212N	26.7	4.12	1.4	2.17		108	233		

ANTENNA LOAD AT SUPPORT FOR 140 FT base El.

BASED ON WIND SPEED OF 80 MPH

ANT. No.	ANTENNA TYPE	LOCATION FT	Kz	WT Lb.	LATERAL THRUST Lb.	BENDING MOMENT FT-Lb	WIND TORQUE FT-Lb	DISH SHEAR Lb.
1	ASPB682	140	1.511	9.5	63	378		
2	PD 83	140	1.511	17	51	286		
3	PD 455	133	1.489	23	98	652		
4	ASPA710	130	1.480	10	56	343		
5	ALP 9212N	126	1.466	26.7	158	342		
6	ALP 9212N	126	1.466	26.7	158	342		
7	NONE	125	1.463	0				
8	ALP 9212N	114	1.425	26.7	154	332		
9	ALP 9212N	114	1.425	26.7	154	332		
10	ASPR766	102	1.380	2	3		3	

ICE & WIND LOAD CALCULATION FOR APPURTENANCE

TOWER HEIGHT (FT) H = 140.00 FT
WIND SPEED(MPH) V = 80.00 MPH
ICE THICKNESS It = 0.50 IN
GUST FACTOR Gh = 1.138
VELOCITY Pre. qz = 16.38 x Kz PSF

$$qz = 0.00256\ Kz\ V^2$$

WIND FORCE = qz x Gh (Ca x Aa)

APPURT. SIZE	APPURT. WEIGHT lb/FT	Ca	Aa	WIND LOAD Wo WIND	ICE LOAD I lb/FT	Aa/I	WIND/ICE .75Wi WIND/ICE
COX1/2	0.15	1.2	0.053	1.17	0.690	0.102	2.28
COX7/8	0.33	1.2	0.091	2.03	0.971	0.131	2.92

L&W Engineering **Calculation Sheet**

Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	34 of 37
Prepared by	**Rev. No.**	**Date**
Y. CHANG	0	10/11/96

APPURTENANCES LOADS — ON ONE (1)LEG
TRANSMISSION LINE — UNIT lb/FT

	DESIGN LOAD					FULL CALCUL. LOAD						
WEIGHT	WIND LOAD	ICE LOAD	WIND/I	RED.						APPUR. TYPE &		
WT	Wo	I	Wi	%	Kz	Wo/Kz	I	Wi/Kz	ELEV.	SIZE	NO	TOTAL
0.5	4.21	2.48	8.2	90	1.000	4.7	2.76	9.1	10			4
0.5	4.21	2.48	8.2	90	1.000	4.7	2.76	9.1	20			4
0.5	4.45	2.48	8.7	90	1.057	4.7	2.76	9.1	40			4
0.5	5.00	2.48	9.7	90	1.186	4.7	2.76	9.1	60	COX7/8		4
0.5	5.42	2.48	10.6	90	1.288	4.7	2.76	9.1	80			4
0.5	5.78	2.48	11.3	90	1.373	4.7	2.76	9.1	100			4
0.5	5.81	2.48	11.3	90	1.380	4.7	2.76	9.1	102	COX1/2	1	4
0.4	4.46	1.86	8.7	90	1.411	3.5	2.07	6.8	110			3
0.4	4.50	1.86	8.8	90	1.425	3.5	2.07	6.8	114	COX7/8		3
0.4	4.57	1.86	8.9	90	1.446	3.5	2.07	6.8	120			3
0.4	4.63	1.86	9.0	90	1.466	3.5	2.07	6.8	126	COX7/8		3
0.4	4.67	1.86	9.1	90	1.480	3.5	2.07	6.8	130	COX1/2	1	3
0.3	3.14	1.24	6.1	90	1.489	2.3	1.38	4.6	133	COX1/2	1	2
0.1	1.59	0.62	3.1	90	1.511	1.2	0.69	2.3	140	COX1/2	1	1
										COX7/8		

L&W Engineering **Calculation Sheet**

Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON, CT	2146	35 of 37
Prepared by	**Rev. No.**	**Date**
Y. CHANG	0	10/11/96

APPURTENANCES LOADS ON ONE (1)LEG
TRANSMISSION LINE UNIT lb/FT

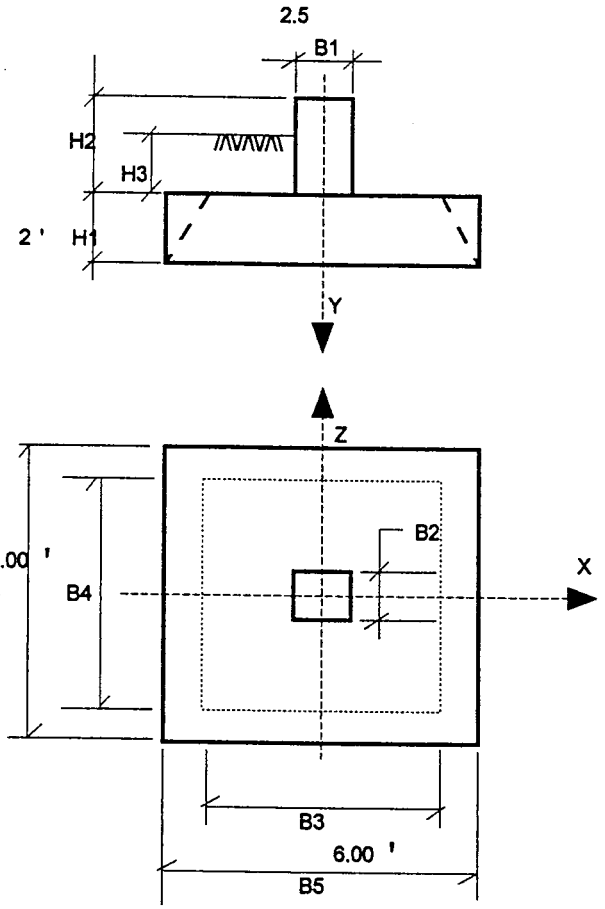
WEIGHT	DESIGN LOAD WIND LOAD	ICE LOAD	WIND/I	RED.	FULL CALCUL. LOAD					APPUR. TYPE &		
WT	Wo	I	Wi	%	Kz	Wo/Kz	I	Wi/Kz	ELEV.	SIZE	NO	TOTAL
1.5	9.14	4.37	13.1	90	1.000	10.2	4.86	14.6	10			5
1.5	9.14	4.37	13.1	90	1.000	10.2	4.86	14.6	20			5
1.5	9.65	4.37	13.9	90	1.057	10.2	4.86	14.6	40			5
1.5	10.84	4.37	15.6	90	1.186	10.2	4.86	14.6	60	COX7/8		5
1.5	11.76	4.37	16.9	90	1.288	10.2	4.86	14.6	80			5
1.5	12.54	4.37	18.0	90	1.373	10.2	4.86	14.6	100			5
1.5	12.61	4.37	18.1	90	1.380	10.2	4.86	14.6	102	COX1/2		5
1.5	12.89	4.37	18.5	90	1.411	10.2	4.86	14.6	110			5
1.5	13.02	4.37	18.7	90	1.425	10.2	4.86	14.6	114	COX7/8	2	5
0.9	7.93	2.62	11.4	90	1.446	6.1	2.91	8.8	120			3
0.9	8.04	2.62	11.6	90	1.466	6.1	2.91	8.8	126	COX7/8	2	3
0.3	3.00	0.97	4.3	100	1.480	2.0	0.97	2.9	130	COX1/2		1
0.3	3.02	0.97	4.3	100	1.489	2.0	0.97	2.9	133	COX1/2		1
0.3	3.07	0.97	4.4	100	1.511	2.0	0.97	2.9	140	COX1/2		1
0.3	3.07	0.97	4.4	100	1.511	2.0	0.97	2.9	140	COX7/8	1	1

FOUNDATION CAPACITY UPLIFT

SOIL INFORMATION:
ALLOW. BEARING Pa = 5500 PSF
SOIL UNIT WEIGHT 100 PCF

FOUNDATION LOAD:

Fx	=	7.07 Kips
Fy	=	-60.56 Kips
Fz	=	Kips
Mx	=	Kip-ft
My	=	Kip-ft
Mz	=	Kip-ft



WIDTH

PIER WIDTH B1	=	2.50	FT.
PIER WIDTH B2	=	2.50	FT.
FTG. WIDTH B3	=	5.50	FT.
FTG. WIDTH B4	=	5.50	FT.
FTG. WIDTH B5	=	6.00	FT.
FTG. WIDTH B6	=	6.00	FT.

DEPTH

FTG. DEPTH H1	=	2.00	FT.
PIER HIGHT H2	=	9.00	FT.
EARTH COVER H3	=	8.50	FT.

CONCRETE WEIGHT Wc = 18.36 Kips

SOIL WEIGHT Wr = 153.7 Kips

ALLOWABLE UPLIFT	Up =	Wr/2 + Wc/1.25 =	91.54	Kips	>	60.56	**OK**
	OR =	(Wr + Wc)/1.5 =	114.71	Kips	>	60.56	OK
ALLOWABLE LATERAL FORCE		Lp =	64.77	Kips	>	7.07	OK
ALLOWABLE VERTICAL LOAD		P =	25.9	Kips	>	0.00	OK
MAXIMUM BEARING	Pb =		1.7	KSF	<	5.50	OK
MINIMUM BEARING	Pb =		-2.6	KSF			

FACTOR OF SAFETY AGAINEST OVERTURNING F.S. = **NA**

VOLUMN OF CONC. Vc = 4.5 Cu.Yd

L&W Engineering **Calculation Sheet**

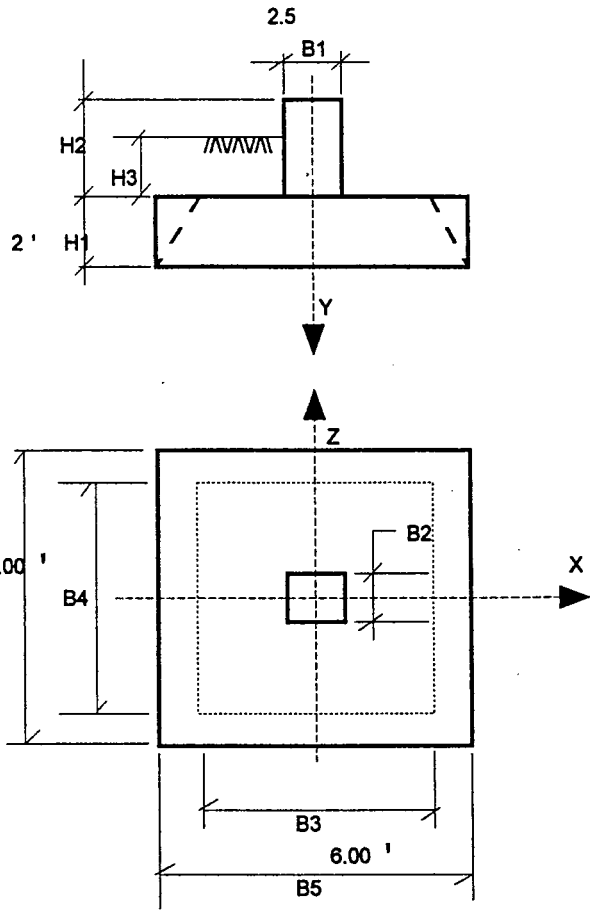
Subject	W.O. No.	Sheet No.
BELL ATLANTIC NYNEX MOBILE140 FT TOWER AT BURLINGTON,CT	2146	37 of 37
Prepared by	**Rev.**	**Date**
Y. CHANG		10/13/96

FOUNDATION CAPACITY COMPRESSION

SOIL INFORMATION:
- ALLOW. BEARING Pa = 5500 PSF
- SOIL UNIT WEIGHT 100 PCF

FOUNDATION LOAD:

Fx	=	7.23 Kips
Fy	=	63.82 Kips
Fz	=	Kips
Mx	=	Kip-ft
My	=	Kip-ft
Mz	=	Kip-ft



WIDTH

PIER WIDTH B1	=	2.50	FT.
PIER WIDTH B2	=	2.50	FT.
FTG. WIDTH B3	=	5.50	FT.
FTG. WIDTH B4	=	5.50	FT.
FTG. WIDTH B5	=	6.00	FT.
FTG. WIDTH B6	=	6.00	FT.

DEPTH

FTG. DEPTH H1	=	2.00	FT.
PIER HIGHT H2	=	9.00	FT.
EARTH COVER H3	=	8.50	FT.

CONCRETE WEIGHT Wc = 18.36 Kips

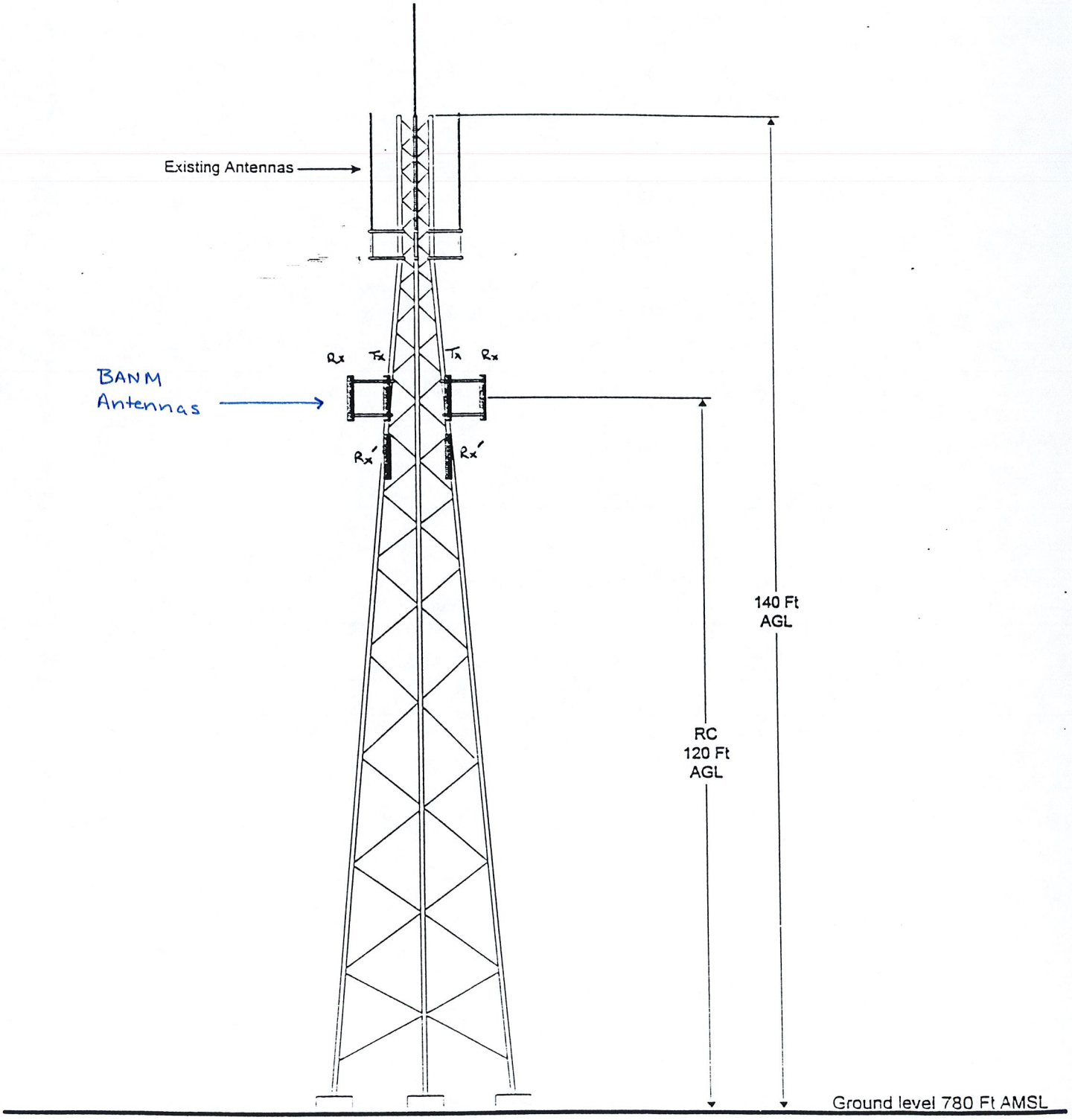
SOIL WEIGHT Wr = 25.3 Kips

ALLOWABLE UPLIFT	Up =	Wr/2 + Wc/1.25 =	91.54	Kips	>	0.00	**NA**
	OR =	(Wr + Wc)/1.5 =	114.71	Kips	>	0.00	NA
ALLOWABLE LATERAL FORCE		Lp =	80.72	Kips	>	7.23	OK
ALLOWABLE VERTICAL LOAD		P =	154.3	Kips	>	63.82	OK
MAXIMUM BEARING	Pb =		5.2	KSF	<	5.50	OK
MINIMUM BEARING	Pb =		0.8	KSF		OK	

FACTOR OF SAFETY AGAINEST OVERTURNING F.S. = 4.05

VOLUMN OF CONC. Vc = 4.5 Cu.Yd

Burlington - New Antenna Configuration Design



Side View

Notes:
1. Drawn not to scale.
2. Buildings are not shown.

RF System Design
Date: 11/20/96