



Daniel F. Caruso
Chairman

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

Internet: ct.gov/csc

March 3, 2009

Carrie L. Larson, Esq.
Pullman & Comley, LLC
90 State House Square
Hartford, CT 06103-3702

RE: **EM-POCKET-111-090122** – Youghioghenny Communications-Northeast, LLC d/b/a Pocket
Communications notice of intent to modify an existing telecommunications facility located at 42 South
Street (a/k/a 126 South Street), Plymouth, Connecticut.

Dear Attorney Larson:

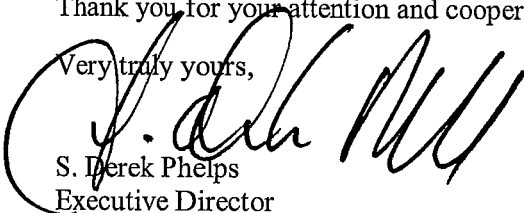
The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing
telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modifications are to be implemented as specified here and in your notice dated January 21,
2009, including the placement of all necessary equipment and shelters within the tower compound. The
modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of
Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend
the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase
the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or
above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes
§ 22a-162. 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. Please be advised that the validity of this
action shall expire one year from the date of this letter. Any additional change to this facility will require
explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such
notice shall include all relevant information regarding the proposed change with cumulative worst-case
modeling of radio frequency exposure at the closest point of 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.

Thank you for your attention and cooperation.

Very truly yours,


S. Derek Phelps
Executive Director

SDP/MP/laf

c: The Honorable Vincent Festa, Jr., Mayor, Town of Plymouth
William Kuehn, Town Planner, Town of Plymouth
Kenneth C. Baldwin, Esq., Robinson & Cole LLP

0.
ORIGINAL

EM-POCKET-111-090122

CARRIE L. LARSON
State House Square
Hartford, CT 06103-3702
(860) 424-4312
(860) 424-4370

w.pullcom.com

January 21, 2009

Via Federal Express

S. Derek Phelps, Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RECEIVED
JAN 22 2009
CONNECTICUT
SITING COUNCIL

Re: Notice of Exempt Modification
Verizon Wireless Telecommunications Facility
42 South Street (a/k/a 126 South Street), Plymouth, Connecticut

Dear Mr. Phelps:

Youghiogheny Communications-Northeast, LLC, doing business as Pocket Communications ("Pocket"), intends to install antennas and appurtenant equipment at the existing 180-foot monopole facility owned by Verizon Wireless and located at 42 South Street (a/k/a 126 South Street), Plymouth, Connecticut ("Facility"). Pocket Communications provides prepaid, flat rate wireless voice and data services to more than a quarter of a million subscribers. Pocket is licensed by the Federal Communications Commission (FCC) to provide PCS wireless telecommunications service in the State of Connecticut, which includes the area to be served by the proposed installation. This installation constitutes an exempt modification pursuant to the Public Utility Environmental Standards Act, Connecticut General Statutes Section 16-50g et. seq. (PUESA), and Section 16-50j-72(b)(2) of the Regulations of the Connecticut State Agencies adopted pursuant to PUESA. In accordance with R.C.S.A. Section 16-50j-73, a copy of this notice has been sent to Vincent Festa, Jr., Mayor, Town of Plymouth.

The existing Facility consists of a 180-foot self-supporting monopole tower capable of supporting multiple carriers within a fenced compound. The coordinates for the Facility are **Lat: 41°-39'-51" and Long: 73°-03'-08"**. The tower is located on the west side of Plymouth, roughly 650 feet west of South Street (Route 262) and roughly 2.5 mile east of Route 8 in Thomaston (see Site Map, attached as Exhibit A). The tower currently supports Verizon antennas at the one hundred seventy nine foot level (179') centerline AGL (above ground level). As noted in the footnote on page 3 of the power density calculations (Exhibit D), Verizon took over the Alltel antenna array at the top of the tower. Verizon plans on removing their existing antennas at the one hundred fifty nine foot level (159') AGL. Pocket proposes to install three APXV18-206517-C flush mount antennas on the tower at the one hundred sixty nine foot level (169') AGL, and a Nortel CDMA Micro BTS 3231 cabinet, mounted on an "H-Frame," contained within a six foot by six foot (6'-0" x 6'-0") lease area. A small GPS antenna will be

Page 2

mounted to an ice bridge which will run from the lease area to the tower. Utilities will be run via a proposed underground conduit from existing utility sources at the Facility (See Design Drawings and Equipment Specifications, attached as Exhibits B and C respectively).

For the following reasons, the proposed modifications to the South Street Facility meet the exempt modification criteria set forth in R.C.S.A. Section 16-50j-72(b)(2):

1. The proposed modification will not increase the height of the tower as Pocket's antennas will be installed at a center line height of approximately 169 feet.
2. The installation of Pocket's equipment and shelter will not require an extension of the site boundaries.
3. The proposed modifications will not increase the noise levels at the existing Facility by six decibels or more.
4. The operation of the additional antennas will not increase the total radio frequency (RF) power density, measured at the site boundary, to a level at or above the standard adopted by the Connecticut Department of Environmental Protection as set forth in Section 22a-162 of the Connecticut General Statutes and MPE limits established by the Federal Communications Commission. The worst-case RF power density calculations for the proposed Pocket antennas would be 10.92% of the FCC standard (see general power density calculations table, attached as Exhibit D).

Also attached, Exhibit E, is a structural analysis confirming that the tower can support the existing and proposed antennas and associated equipment.

For the foregoing reasons, Pocket respectfully submits that the proposed antenna installation and equipment at the Plymouth Facility constitutes an exempt modification under R.C.S.A. Section 16-50j-72(b)(2).

Respectfully Submitted,



Carrie L. Larson

cc: Vincent Festa, Jr., Mayor, Town of Plymouth
Nancy Synkewecz, underlying property owner

Exhibit A

Site Map

Pocket Site NHCT0524A

42 South Street

Plymouth, Connecticut

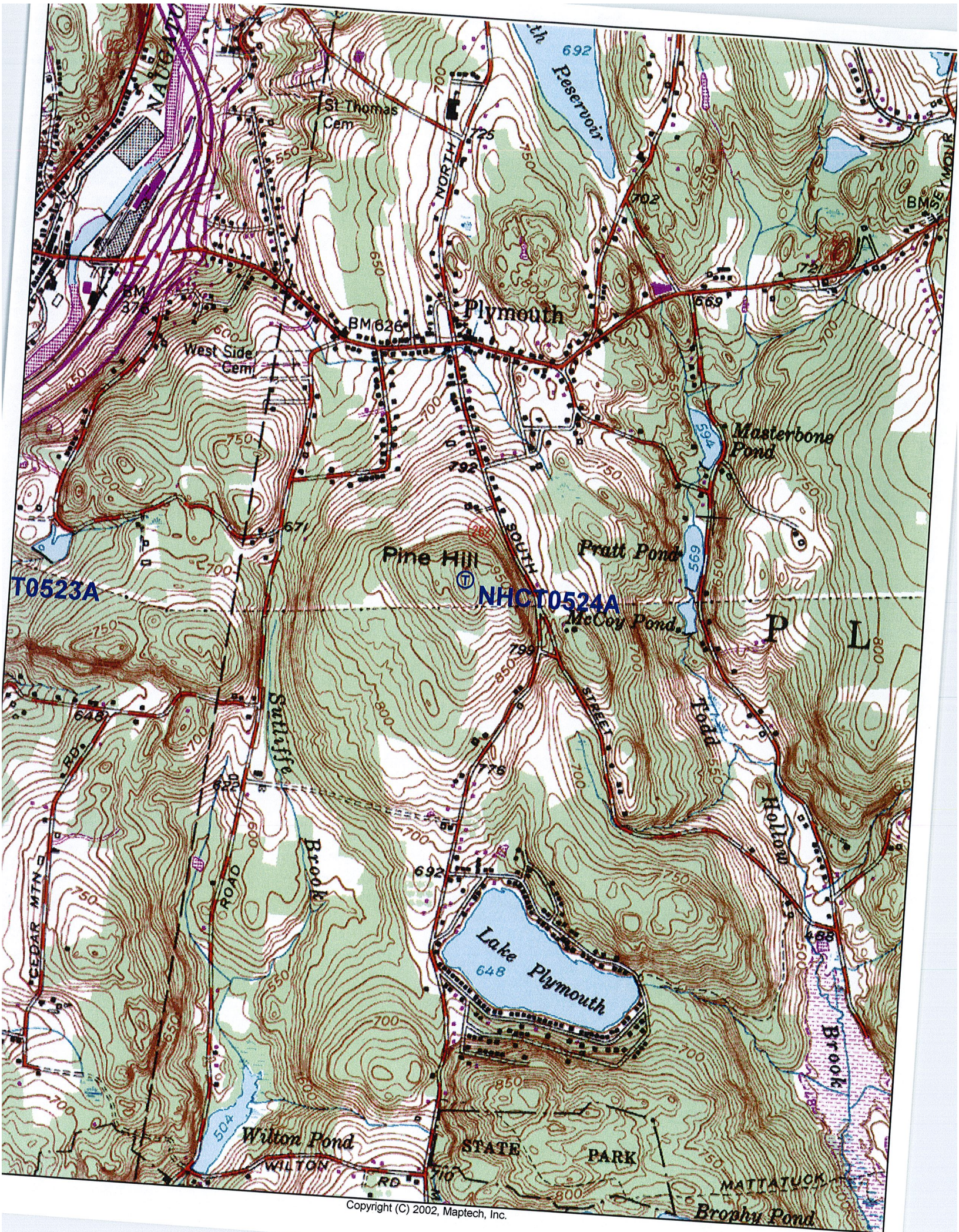


Exhibit B

Design Drawings

Pocket Site NHCT0524A

42 South Street

Plymouth, Connecticut



WIRELESS COMMUNICATIONS FACILITY

NHCT0524A

42 SOUTH STREET
PLYMOUTH, CT 06786

PROJECT SUMMARY

SITE NUMBER: NHCT0524A
SITE NAME: 42 SOUTH STREET, PLYMOUTH
SITE ADDRESS: PLYMOUTH, CT 06786
APPLICANT: YOUNGSCHEIDT
NORTHWEST LLC
1000 WEST 10TH AVE
SAN ANTONIO, TX 78205
CONTACT PERSON: JASON D'AMICO - PROGRAM MANAGER
GRIFFIN SOLUTIONS PRODUCT MANAGEMENT
(860) 238-0104
TOWER COORDINATES: LATITUDE: 41°-39'-51"
LONGITUDE: 72°-03'-59"
COORDINATES BASED ON CONNECTICUT
NAD83 DATUM, LAST UPDATED
OCTOBER 30, 2008.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	1
C-1	COMPOUND PLAN	1
C-2	COMPOUND ELEVATION	1
C-3	ANTENNA AND COAX DETAILS	1
C-4	OPS DETAIL	1
C-5	EQUIPMENT CABINET SUPPORT DETAILS	1
C-6	ICE BRIDGE DETAIL AND NOTES	1
E-1	SUPPRESSOR DETAIL AND ELECTRICAL NOTES	1
E-2	SINGLE LINE DIAGRAM AND NOTES	1
E-3	PANEL AND BURIED CONDUIT DETAIL	1
E-4	ANTENNA CABLE GROUNDING DETAIL	1
E-5	GROUNDING DETAILS	1
E-6	GROUNDING DETAILS	1
E-7	GROUNDING RISER	1

GENERAL NOTES

1. UNLESS ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY POCKET COMMUNICATIONS ARE SHOWN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND HEIGHTS OF THE ANTENNA.
2. ALL POCKET COMMUNICATIONS SAFETY PROCEDURES MUST BE ADHERED TO.
3. DOCUMENT.

PROJECT SCOPE

1. THE PROPOSED SCOPE OF WORK, GENERALLY ENTAILS THE INSTALLATION OF CLUSTER MOUNT TELECOMMUNICATIONS ANTENNA, ICE BRIDGE, AND RADIO CABINET INCLUDING THE NECESSARY UTILITIES.
2. A TOTAL OF THREE (3) DIRECTIONAL PANEL ANTENNAS ARE PROPOSED TO BE INSTALLED ON THE EXISTING 1180 MONOPOLE TOWER AT A RAO CENTER ELEVATION OF 1187' ADJOINING EXISTING TOWER BASE PLATE.
3. ELECTRIC AND TELCO UTILITIES SHALL BE LOCATED AND ADJUSTED TO THE SOUTH OF THE PROPOSED COMPOUND.

PROJECT INFORMATION

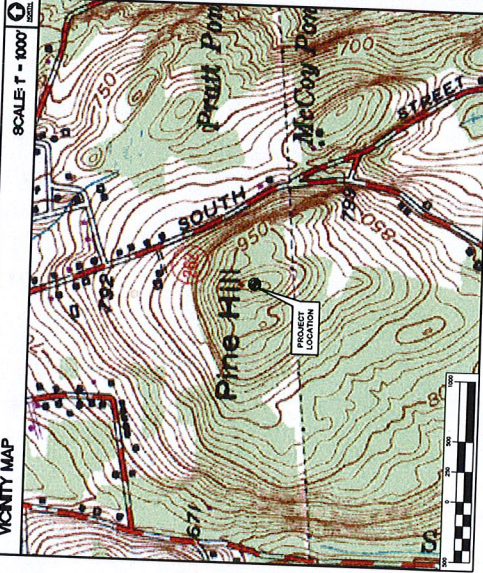
1. THIS SITE IS UNMANNED AND HAS RESTRICTED ACCESS TO OUTDOOR AREAS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRANSMISSION OF RADIO SIGNALS FOR THE PURPOSE OF PROVIDING FOR THE TRANSMISSION OF RADIO SIGNALS.
2. POCKET COMMUNICATIONS CARRIES ANY TELECOMMUNICATIONS SERVICE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRANSMISSION OF RADIO SIGNALS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRANSMISSION OF RADIO SIGNALS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRANSMISSION OF RADIO SIGNALS.
3. NO POTABLE WATER SUPPLY IS TO BE PROVIDED AT THIS LOCATION.
4. NO WASTE WATER WILL BE GENERATED AT THIS LOCATION.
5. NO SOIL WASTE WILL BE GENERATED AT THIS LOCATION.
6. MAINTENANCE CREW (TYPICALLY ONE PERSON) WILL BE ON SITE AT ALL TIMES.

DRAWING DIRECTIONS

ENCLOSURE 10/10/08

TAKE 1/4" WEST TO EXT. 3/4" WEST, RT 6 TO RT 202 (SOUTH ST.), LAST INTERSECTION IS MAPLE ST.

VICINITY MAP



GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2005 INTERNATIONAL BUILDING CODE AS AMENDED BY THE 2005 CONNECTICUT SUPPLEMENTARY CODES AND SUPPORTING STRUCTURES.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND HEIGHTS OF THE ANTENNA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND HEIGHTS OF THE ANTENNA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND HEIGHTS OF THE ANTENNA.
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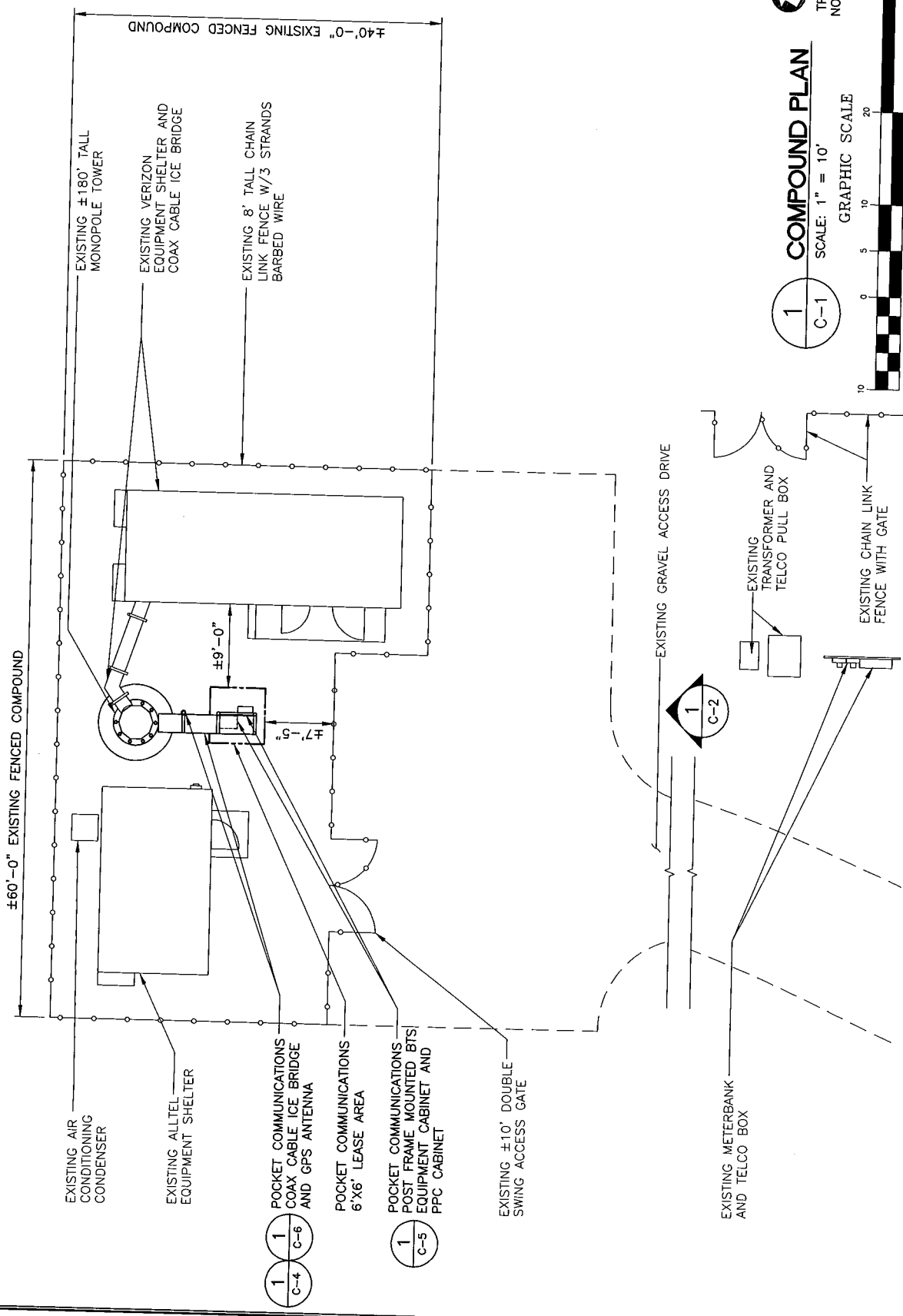
DATE	10/10/08		
SCALE	AS SHOWN		
JOB NO.	08117.0015		
PROJECT NO.	08117.0015		
COMPOUND PLAN			
42 SOUTH STREET			
PLYMOUTH, CT 06786			
NHCT0524A			
POCKET COMMUNICATIONS			
REVISION	DATE	BY	REASON
1	01/19/09	DEB	ISSUED FOR CONSTRUCTION
2	01/19/09	DEB	ISSUED FOR CONSTRUCTION
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98	01/19/09	DEB	ISSUED FOR CONSTRUCTION
99	01/19/09	DEB	ISSUED FOR CONSTRUCTION
100	01/19/09	DEB	ISSUED FOR CONSTRUCTION



POCKET COMMUNICATIONS
42 SOUTH STREET
PLYMOUTH, CT 06786
NHCT0524A

COMPOUND PLAN

C-1



1 C-1

COMPOUND PLAN

SCALE: 1" = 10'

GRAPHIC SCALE

TRUE NORTH



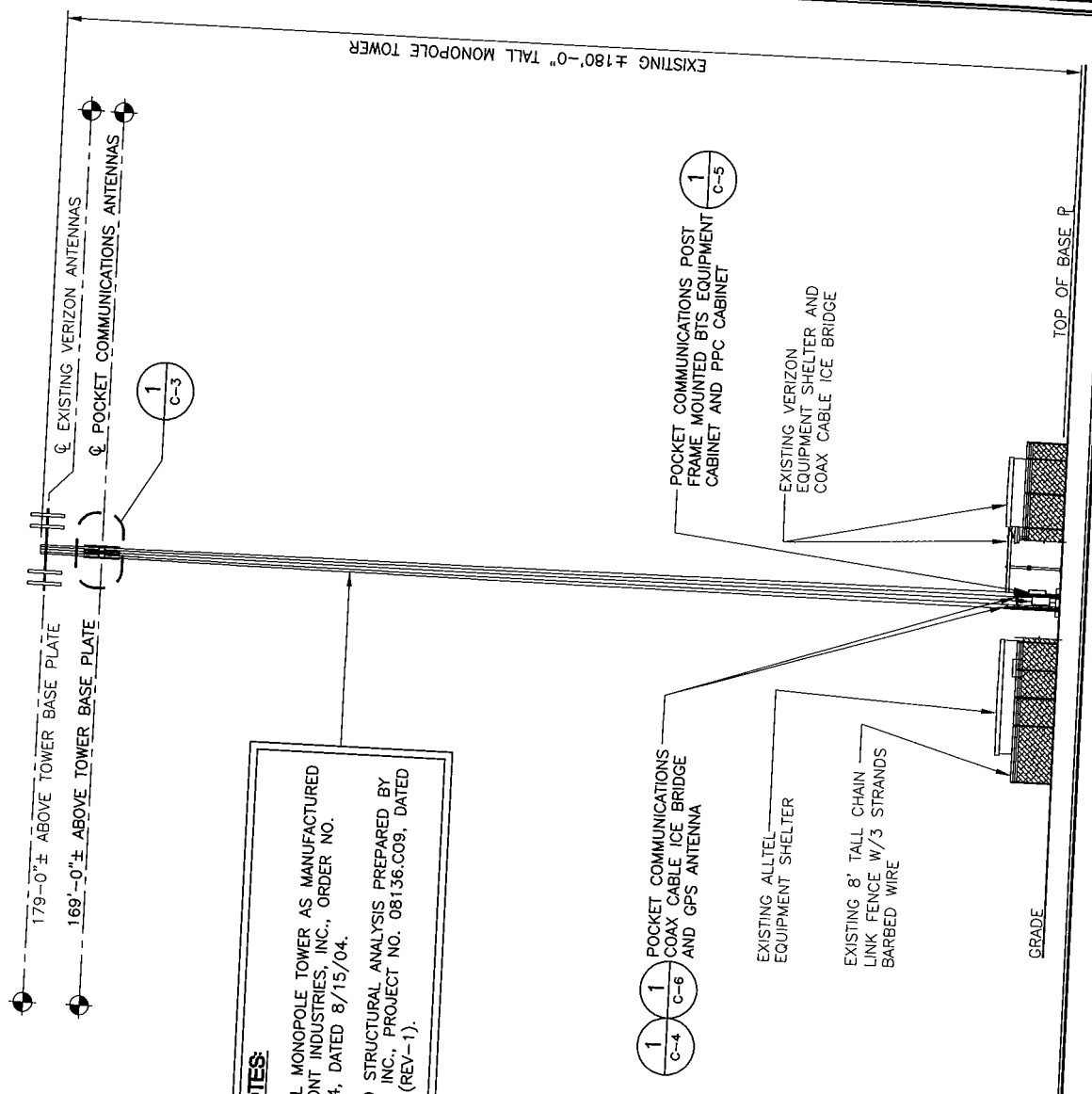
REV	DATE	BY	CHKD	DESCRIPTION
1	1/18/09	AV	OC	ISSUED FOR REVIEW
2	1/17/04	AV	OC	ISSUED FOR REVIEW
3	1/17/04	AV	OC	ISSUED FOR REVIEW
4	1/17/04	AV	OC	ISSUED FOR REVIEW
5	1/17/04	AV	OC	ISSUED FOR REVIEW
6	1/17/04	AV	OC	ISSUED FOR REVIEW
7	1/17/04	AV	OC	ISSUED FOR REVIEW
8	1/17/04	AV	OC	ISSUED FOR REVIEW
9	1/17/04	AV	OC	ISSUED FOR REVIEW
10	1/17/04	AV	OC	ISSUED FOR REVIEW

PROJECT: POCKET COMMUNICATIONS
 DRAWING: POCKET COMMUNICATIONS
 SHEET: POCKET COMMUNICATIONS

POCKET COMMUNICATIONS
 11610-94
 11610-94
 11610-94

POCKET COMMUNICATIONS
 NHCT0524A
 42 SOUTH STREET
 PLYMOUTH, CT 06786

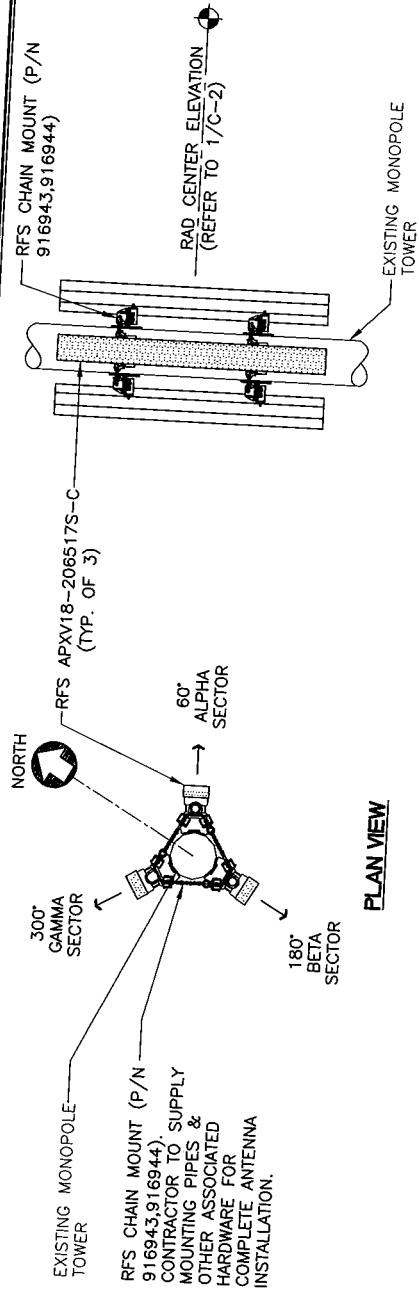
COMPOUND ELEVATION
 SHEET NO. C-2
 SHEET NO. 2 of 2



TOWER NOTES:

1. 180' TALL MONOPOLE TOWER AS MANUFACTURED BY VALMONT INDUSTRIES, INC., ORDER NO. 11610-94, DATED 8/15/04.
2. REFER TO STRUCTURAL ANALYSIS PREPARED BY NATCOMM, INC., PROJECT NO. 08136.C09, DATED 1/14/09 (REV-1).





PLAN VIEW

TYPICAL SECTOR ELEVATION

1
C-3

ANTENNA MOUNTING CONFIGURATION

NOT TO SCALE

ANTENNA KEY

# ANTENNAS PER SECTOR	ANTENNA NUMBER	COAX COLOR CODE	ANTENNA VENDOR	MODEL NUMBER	AZIMUTH	C/L HEIGHT	MECHANICAL DOWNTILT	ELECTRICAL DOWNTILT	COAX SIZE	# COAX PER ANTENNA	COAX MANUFACTURER	COAX LENGTH
1	A-1	(2)-RED BAND	RFS	APXV18-206517S-C	60°	169'-0"	0°	REFER TO RFS ANTENNA SHEET FOR FINAL TILT AND AZIMUTHS	1 5/8"	2	RFS	200'± PER RUN
1	B-1	(2)-BLUE BAND	RFS	APXV18-206517S-C	180°	169'-0"	0°	REFER TO RFS ANTENNA SHEET FOR FINAL TILT AND AZIMUTHS	1 5/8"	2	RFS	200'± PER RUN
1	C-1	(2)-GREEN BAND	RFS	APXV18-206517S-C	300°	169'-0"	0°	REFER TO RFS ANTENNA SHEET FOR FINAL TILT AND AZIMUTHS	1 5/8"	2	RFS	200'± PER RUN
-	-	YELLOW	PC TEL ANT.	GPS-TMG-26NMS	-	12'-6"±	-	-	LMR400	1	RFS	±10'

TOWER NOTES:

- FOR DETAILED TOWER INFORMATION, REFER TO TOWER ERECTION DRAWINGS BY OTHERS. THE TOWER ON SHEET C-2 IS SHOWN GENERAL CONFIGURATION PURPOSES ONLY.
- ANTENNA CONFIGURATION IS SUBJECT TO CHANGE. VERIFY ANTENNA HEIGHT, DOWN-TILT, AND AZIMUTH WITH PROJECT MANAGER PRIOR TO CONSTRUCTION.
- THE TOWER STRUCTURAL SHALL BE REVISED TO REFLECT ANY REVISION IN ANTENNA OR COAX CONFIGURATION.

ANTENNA NOTES:

- ALL COAX SHALL BE COLOR CODED AT (2) PLACES EACH: AT ANTENNA AND AT CABINET.
- (2) COLOR BANDS DENOTES TRANSMIT. TRANSMITS TO BE CONNECTED TO THE +45 PORTS OF THE ANTENNAS.
- PRIOR TO ORDERING ANY ANTENNAS OR COAX, CONTRACTOR SHALL CONTACT POCKET COMMUNICATIONS CONSTRUCTION MANAGER AND OBTAIN APPROVAL FOR MATERIALS LISTED. CONTRACTOR IS SOLELY RESPONSIBLE FOR THIS COORDINATION.

DESIGNED BY:	CHKD BY:
DATE:	DATE:
REV:	REV:
1 1/19/09	1 1/19/09
2 1/17/09	2 1/17/09
3 1/17/09	3 1/17/09
4 1/17/09	4 1/17/09
5 1/17/09	5 1/17/09
6 1/17/09	6 1/17/09
7 1/17/09	7 1/17/09
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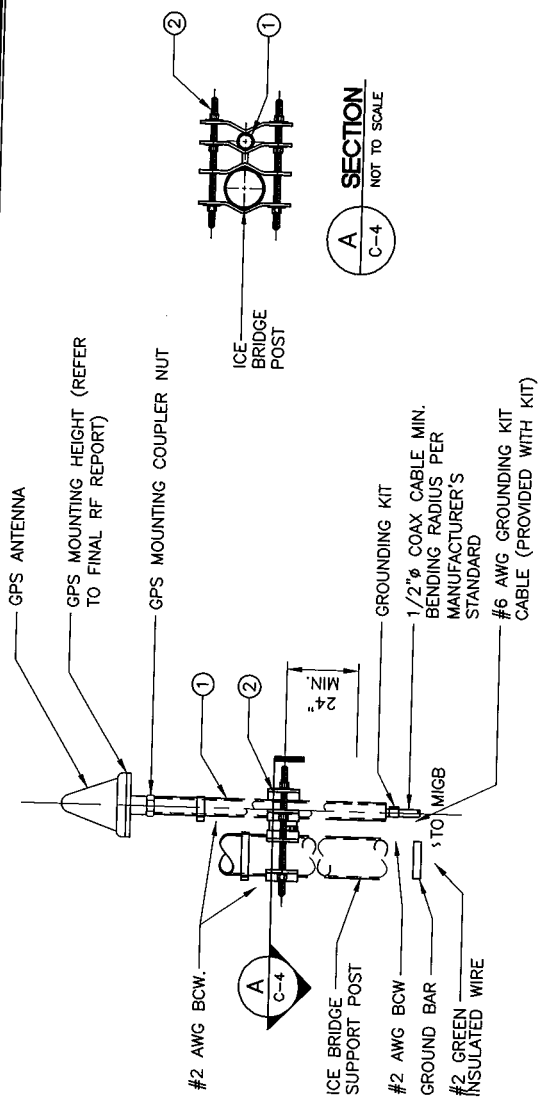
POCKET COMMUNICATIONS

POCKET COMMUNICATIONS

POCKET COMMUNICATIONS
NHCT0524A
42 SOUTH STREET
PLYMOUTH, CT 06786

ANTENNA AND COAX DETAILS

C-3



GPS ANTENNA MOUNTING BRACKET

BILL OF MATERIALS		
ITEM	DESCRIPTION	QUANTITY
①	1" O.D. x 3'-0" LG. ALUMINUM MOUNTING PIPE	1
②	UNIVERSAL CLAMP SET.	1

NOTES:

1. THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT.
2. GPS ANTENNA LOCATION MUST BE ABLE TO RECEIVE CLEAR SIGNALS FROM A MINIMUM OF FOUR (4) SATELLITES. CONFIRM WITH HANDHELD GPS PRIOR TO ESTABLISHING FINAL LOCATION OF GPS ANTENNAS.
3. THE GPS ANTENNA MOUNT IS DESIGNED TO FASTEN TO A 1" OUTSIDE DIAMETER ALUMINUM PIPE. THE PIPE MUST NOT BE THREADED AT THE ANTENNA MOUNT END. THE PIPE SHALL BE CUT TO THE REQUIRED LENGTH (MINIMUM OF 24 INCHES) USING A HAND OR ROTARY PIPE CUTTER TO ASSURE A SMOOTH AND PERPENDICULAR CUT. A HACK SAW SHALL NOT BE USED. THE CUT PIPE END SHALL BE DEBURRED AND SMOOTH IN ORDER TO SEAL AGAINST THE NEOPRENE GASKET ATTACHED TO THE ANTENNA MOUNT.

1
C-4
NOT TO SCALE

GPS GROUNDING/MOUNTING BRACKET DETAIL

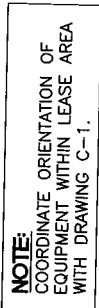
DESIGNED BY: CFC
DRAWN BY: AV
CHECKED BY: CFC

DATE: 11/17/00
REV: 1
11/19/00
CFC
ISSUED FOR CONSTRUCTION

POCKET COMMUNICATIONS
NHCT0524A
42 SOUTH STREET
PLYMOUTH, CT 06786

GPS DETAIL

C-4
Sheet No. 1 of 1



JET NO. **C-5**
 Jet No. 5 of 14

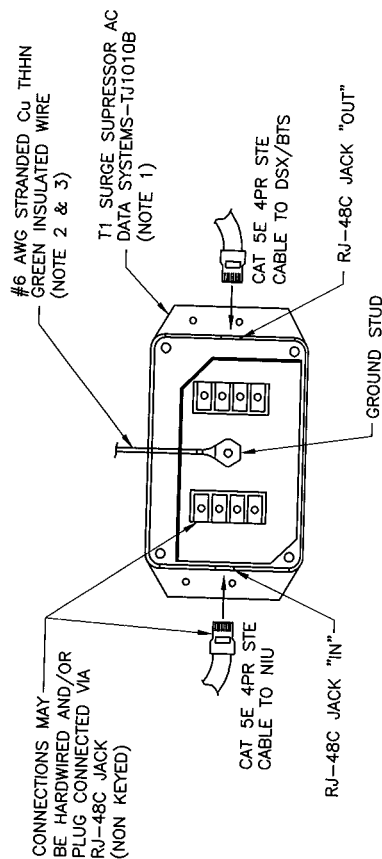


1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. ALL RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED OFF SITE AND BE LEGALLY DISPOSED, AT NO ADDITIONAL COST.
4. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE EQUIPMENT AND TOWER AREAS.
5. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
6. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
7. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
8. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.
9. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST THE PRE MANUFACTURED EQUIPMENT SHOP DRAWINGS.
10. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
11. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318.
12. ALL CONCRETE SHALL BE NORMAL WEIGHT, 6% AIR ENTRAINED WITH A MAXIMUM SLUMP OF 4", AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
13. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60, DEFORMED BARS.
14. PROVIDE 1 1/2 IN. MINIMUM COVER FOR REINFORCING STEEL UNLESS OTHERWISE NOTED ON THE DRAWINGS.
15. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD) AND SHALL CONFORM TO ASTM A36, (FY = 36 KSI).
16. ALL STEEL PIPE SHALL CONFORM TO ASTM A53, (FY = 35 KSI).
17. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
18. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP)" ON IRON AND STEEL HARDWARE."

ICE BRIDGE
DETAIL AND
NOTES
C-6
Sheet No. 7
of 14

[illegible]

1. ALL ELECTRICAL AND GROUNDING WORK TO BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC, AND ALL APPLICABLE LOCAL CODES.
2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL VERIFY ROUTING AND LENGTHS PRIOR TO CONSTRUCTION.
3. WIRING, RACEWAY, AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
4. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
5. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.
6. CONTRACTOR SHALL PROVIDE 100 AMP. SINGLE PHASE, 120/240 VAC, 60 HZ SERVICE FOR SITE.
7. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY BEFORE THE START OF CONSTRUCTION. POWER AND TELCO CONDUIT SHALL BE PROVIDED AND INSTALLED PER UTILITY REQUIREMENTS.
8. FOR COMPLETE INTERNAL WIRING AND ARRANGEMENT REFER TO DRAWINGS PROVIDED BY AC OR TELCO PANEL MANUFACTURER.
9. ALL SERVICE EQUIPMENT AND INSTALLATIONS SHALL COMPLY WITH THE NEC, UTILITY COMPANY AND LOCAL CODE REQUIREMENTS.
10. CONTRACTOR SHALL INSTALL SUFFICIENT LENGTHS OF LFMC INCLUDING ALL CONDUIT FITTINGS (NUTS, REDUCING BUSHINGS, ELBOWS, COUPLINGS, ETC.) NECESSARY FOR CONNECTION FROM IMC CONDUIT TO THE POWER CABINET.
11. CONTRACTOR SHALL PROVIDE ELECTRICAL SERVICE EQUIPMENT WITH FAULT CURRENT RATINGS GREATER THAN THE AVAILABLE FAULT CURRENT FROM THE POWER UTILITY.
12. CONTRACTOR SHALL VERIFY THAT THE MAIN BONDING JUMPER AND GROUNDING ELECTRODE CONDUCTOR IS INSTALLED PROPERLY IN MAIN DISCONNECT SWITCH.



T1 SURGE SUPPRESSOR

NOT TO SCALE

1. MOUNT T1-TVSS UNIT ON EQUIPMENT FRAME. USE APPROPRIATE STAINLESS STEEL BOLTS WITH FLAT WASHERS AND A LOCK WASHER ON THE NUT SIDE. THE TVSS MAY BE LOCATED ON THE TELCO BACKBOARD. REFER TO MANUFACTURERS INSTRUCTIONS.
2. ATTACH RING TERMINAL FROM SUPPLIED GROUND CONDUCTOR TO TVSS GROUND STUD. SECURELY FASTEN WITH SUPPLIED WASHER AND NUT. REFER TO MANUFACTURERS INSTRUCTIONS. FOR PROPER PERFORMANCE, THE GROUND CONDUCTOR LENGTH SHOULD BE LIMITED WITH NO SHARP BENDS ON COILS.
3. WHEN TVSS IS MOUNTED ON EQUIPMENT FRAME, BOND THE GROUND CONDUCTOR TO THE EQUIPMENT FRAME GROUND. ENSURE PROPER GROUNDING SURFACES. WHEN TVSS IS MOUNTED ON THE TELCO BACKBOARD, BOND THE GROUND CONDUCTOR TO THE TELCO BOARD GROUND BAR OR NEAREST GROUND BAR.



- 1 ELECTRICAL DEMARCATION POINT 120/208V OR 240V, 1ø, 3W, ELECTRICAL CONTRACTOR TO COORDINATE WITH LOCAL POWER FOR SERVICE TO METER.
- 2 CONTRACTOR TO SUPPLY AND INSTALL A 100A, 120/208/240V 1ø, 3W METER BASE. METER BASE TO BE NEMA 3R RATED AND ACCEPTABLE TO LOCAL UTILITY. PROVIDE WITH MECHANICALLY ATTACHED ENGRAVED IDENTIFICATION LABEL INDICATING "POCKET COMMUNICATIONS METER".
- 3 MAIN DISCONNECT SWITCH. CONTRACTOR TO SUPPLY AND INSTALL NEMA 3R 100A FUSIBLE DISCONNECT SWITCH WITH LOCKABLE HANDLE. PROVIDE WITH 100A FUSES, AIC RATING TO BE PER LOCAL UTILITY REQUIREMENTS. PROVIDE WITH MECHANICALLY ATTACHED ENGRAVED IDENTIFICATION LABEL INDICATING "POCKET COMMUNICATIONS SERVICE DISCONNECT".
- 4 WEATHER TIGHT JUNCTION BOX (IF REQUIRED). SIZE TO NEC CODE FOR APPLICATION.
- 5 LIQUID TIGHT FLEXIBLE METALLIC CONDUIT W/W WEATHER TIGHT FITTINGS AND SUPPORTS. SIZE AND CONTENTS TO MATCH ASSOCIATED USE (POWER OR TELCO).
- 6 UTILITY POWER ENTRY INTO CABINET. COORDINATE TERMINATION WITH CABINET MANUFACTURER.
- 7 CONTRACTOR TO SUPPLY AND INSTALL 1 1/2" GRC. AFG AND PVC 36" BFG C/W (3) #1 AWG THIN & (1) #6 GRND FOR UTILITY SERVICE. (INSTALL EXPANSION COUPLINGS AT EACH END OF RUN ABOVE GRADE).
- 8 TELCO DEMARCATION POINT. ELECTRICAL CONTRACTOR TO COORDINATE WITH LOCAL TELCO FOR SERVICE TO TELCOBOX OR CABINET.
- 9 CONTRACTOR TO SUPPLY AND INSTALL (1) 2" GRC AFG AND PVC 36" BFG C/W PULL CORDS AND T1 CABLE FOR TELCO SERVICE TO CABINET TERMINATION POINT. VERIFY WITH TELCO REQUIREMENTS (INSTALL EXPANSION COUPLINGS AT EACH END OF RUN ABOVE GRADE).
- 10 TELCO SERVICE ENTRY INTO CABINET. COORDINATE TERMINATION IN WITH CABINET MANUFACTURER.
- 11 CONTRACTOR TO ARRANGE AND PAY FOR UNDERGROUND UTILITY LOCATION SURVEYS FOR ALL TRENCHING. REUSE NATIVE BACKFILL AND RETURN TO ORIGINAL CONDITION. INSTALL 6" WIDE METALLIC LINED RED PLASTIC MARKER TAPE 8" ABOVE ALL BURIED CONDUIT.
- 12 BURIED GROUND RING.
- 13 (1) #2 SOLID BARE TINNED CU GROUNDING ELECTRODE CONDUCTOR BONDED TO 5/8"x10" COPPER CLAD STEEL GROUNDING ELECTRODES. LOCATE GROUNDING ELECTRODE ADJACENT TO "CABINET". BOND GROUNDING ELECTRODE SYSTEM TO CABINET GROUND RING.
- 14 #2 AWG GND.
- 15 #2 AWG SERVICE GROUND.
- 16 TO UTILITY SOURCE PER UTILITY REQUIREMENTS (COORDINATE WITH ELECTRIC UTILITY).
- 17 NEMA 3R TELCO BOX.
- 18 2" PVC (RGS ABOVE GROUND) W/PULL STRING AND T1 CABLE.

PANEL "SSC"									
LOAD DESCRIPTION	LOAD (kVA)	BRKR. SIZE	BRKR. NO.	PHASE	CT. NO.	CT. NO.	CT. NO.	LOAD (kVA)	LOAD DESCRIPTION
BTS CABINET	2.5	30/2	1	A	1	2	30/2	2.2	TVSS
LIGHTING	2.5	10/1	3	B	3	4	2.2	2.2	TVSS
SPACE	9	10/1	5		5	6	2.2	2.2	TVSS
SPACE	9	10/1	7		7	8	2.2	2.2	TVSS
SPACE	9	10/1	9		9	10	2.2	2.2	TVSS
SPACE	9	10/1	11		11	12	2.2	2.2	TVSS
SPACE	9	10/1	13		13	14	2.2	2.2	TVSS
SPACE	9	10/1	15		15	16	2.2	2.2	TVSS
SPACE	9	10/1	17		17	18	2.2	2.2	TVSS
SPACE	9	10/1	19		19	20	2.2	2.2	TVSS
SPACE	9	10/1	21		21	22	2.2	2.2	TVSS
SPACE	9	10/1	23		23	24	2.2	2.2	TVSS
LOAD SUB-TOTAL	5.6						10.3 kVA	4.4	LOAD SUB-TOTAL

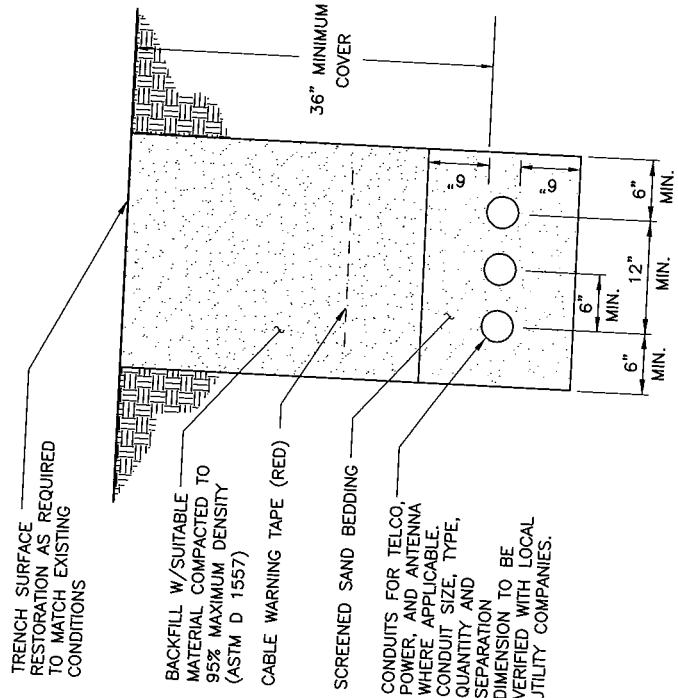
100A MCB, 120/240V, 1 ϕ , 3W (65,000 AIC MIN)	
TOTAL CONNECTED LOAD	10.3 KW
25% OF LARGEST CONT. LOAD	1.250 W
TOTAL LOADS	11.5 KW 48 AMPS
NOTE: ALL NON-OPTIONAL BREAKERS PROVIDED BY SSC MFR	

NOTE:

CIRCUIT BREAKER SIZES SHOWN ARE TYPICAL. REFER TO EQUIPMENT MANUFACTURING SPECIFICATIONS FOR SITE SPECIFIC CIRCUIT BREAKER REQUIREMENTS.

1 PANEL SCHEDULE E-3

NOT TO SCALE



NOTES:

1. THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
2. WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.

2 BURIED CONDUIT DETAIL E-3

NOT TO SCALE

DESIGNED BY	CHECKED BY	DATE	REVISION
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POCKET COMMUNICATIONS

42 SOUTH STREET
PLYMOUTH, CT 06786

POCKET COMMUNICATIONS

NHCT0524A

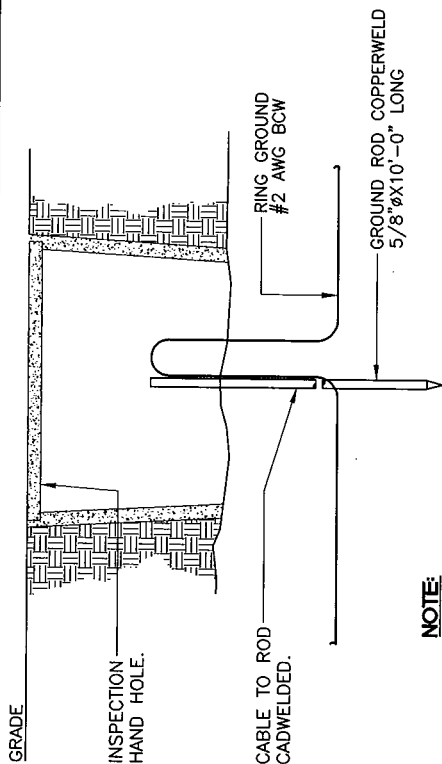
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JOB NO. 081172013

PANEL AND
BURIED CONDUIT
DETAIL

SHEET NO. E-3

SHEET NO. E-3

DATE: 10/10/04
SCALE: AS SHOWN
JOB NO. 081172013



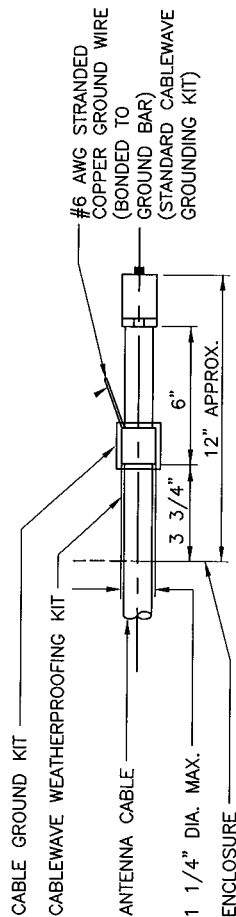
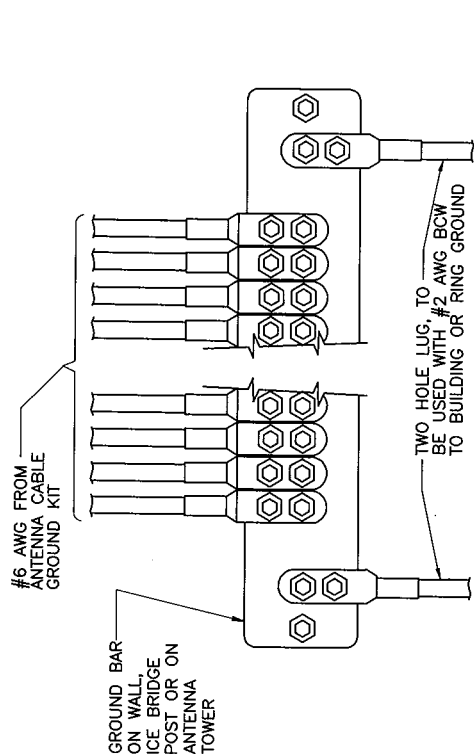
GROUND ROD WITH ACCESS DETAIL

NOT TO SCALE

2
E-5

NOT TO SCALE

INSTALLATION OF GROUND WIRE TO GROUND BAR



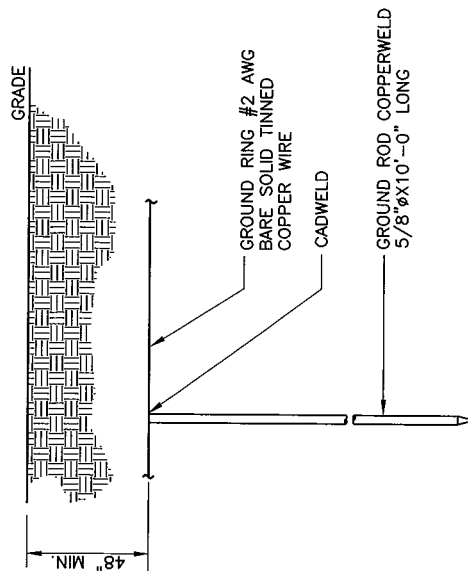
CABLE GROUNDING ANTENNA DETAIL

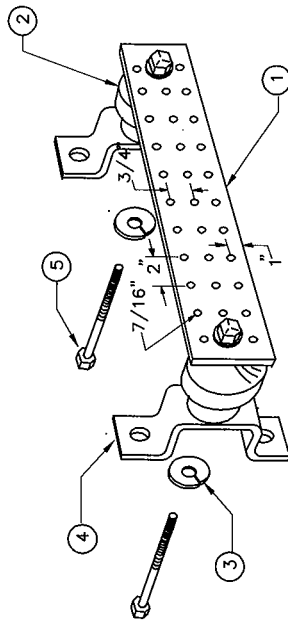
NOT TO SCALE

4

NOT TO SCALE

GROUND ROD DETAIL



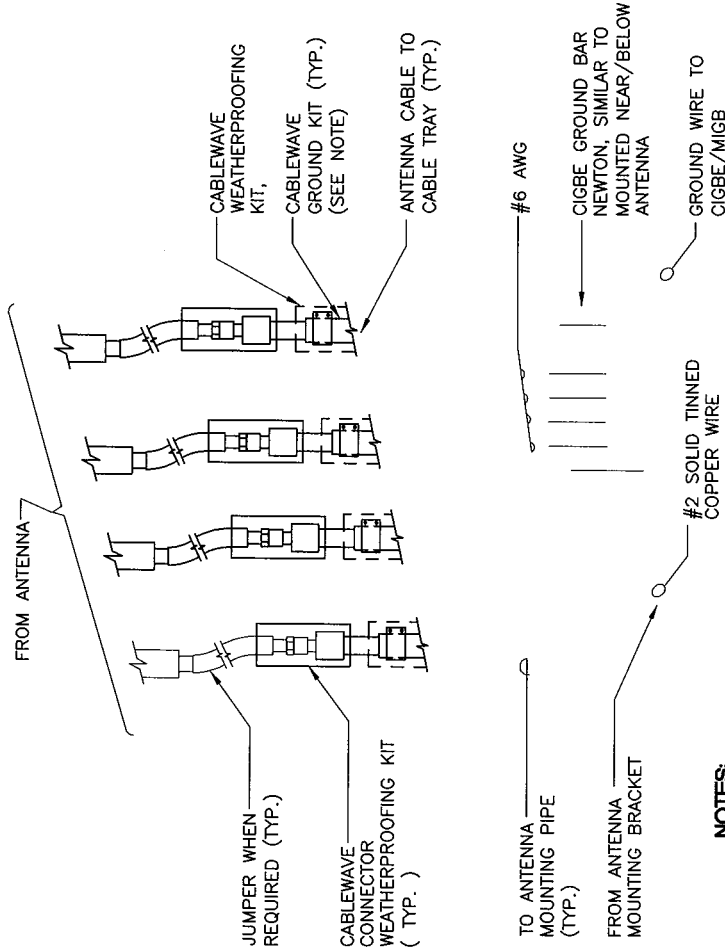


NOTES:

1. TINNED COPPER GROUND BAR, 1/4"X 4"X 20". NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION
2. INSULATORS, NEWTON INSTRUMENT CO. CAT. NO. 3061-4
3. 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-6056
5. 5/8-11 X 1" H.H.C.S.BOLTS, NEWTON INSTRUMENT CO. CAT NO. 3012-1
6. LABEL "DO NOT DISCONNECT".
7. SECTOR CIGBE GROUND BAR TO BE SIZED FOR (4) ANTENNAS AND (4) BRACKETS OR MASTS. ALL OTHER GROUND BARS SHALL BE SIZED TO ACCOMMODATE ALL GROUNDING CONNECTIONS REQUIRED PLUS PROVIDE 50% SPARE CAPACITY.

1 GROUND BAR DETAIL

NOT TO SCALE



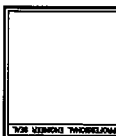
NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.
2. QTY OF CABLES FROM ANTENNA AS REQUIRED BY OWNER.

2 CONNECTION OF GROUND WIRES TO GROUND BAR

NOT TO SCALE

DESIGNED BY:	CYC			
DRAWN BY:	AV			
CHECKED BY:	CYC			
REV.	DATE	REASON	BY	DESCRIPTION
0	11/11/08	AV	CYC	ISSUED FOR REVIEW
1	1/19/09	DEB	CYC	ISSUED FOR CONSTRUCTION
	</			



POCKET COMMUNICATIONS		NHCT0524A		42 SOUTH STREET PLYMOUTH, CT 06786	
DATE:	10/10/08	SCALE:	AS SHOWN		
REV. NO.:	00117/2015				

GROUNDING DETAILS

SHEET NO.	E-6
OF	6

Exhibit C

Equipment Specifications

Pocket Site NHCT0524A

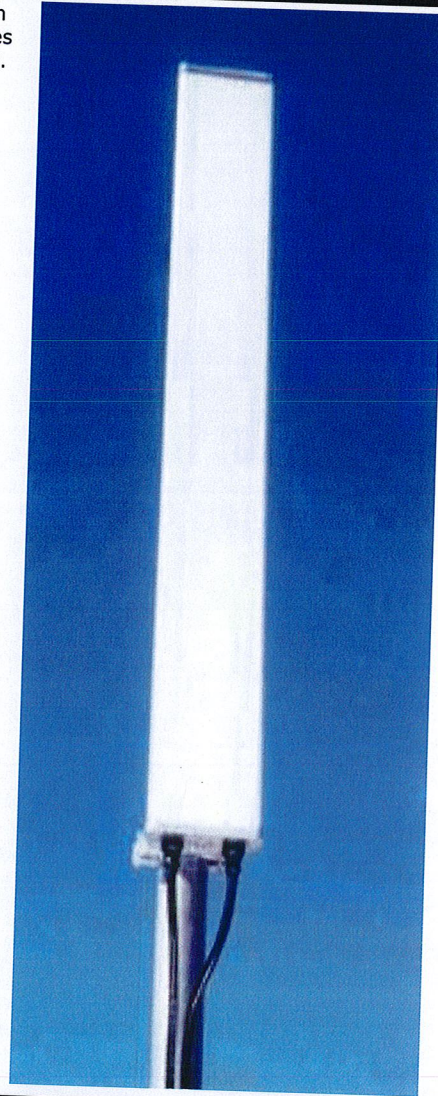
42 South Street

Plymouth, Connecticut



Product Description

This variable tilt antenna provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features null fill and a wide downtilt range with optional remote tilt.



Features/Benefits

- Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.
- High Suppression of all Upper Sidelobes (Typically <-20dB).
- Optional remote tilt - can be retrofitted.
- Broadband design.
- Dual polarization.
- Low profile for low visual impact.

Technical Features

Frequency Band	3G/UMTS (Single, Broad, Dual and Triple-Band)
Horizontal Pattern	Directional
Antenna Type	Panel Dual Polarized
Electrical Down Tilt Option	Variable

RFS The Clear Choice™**APXV18-206517S-C****Print Date: 02.09.2008**

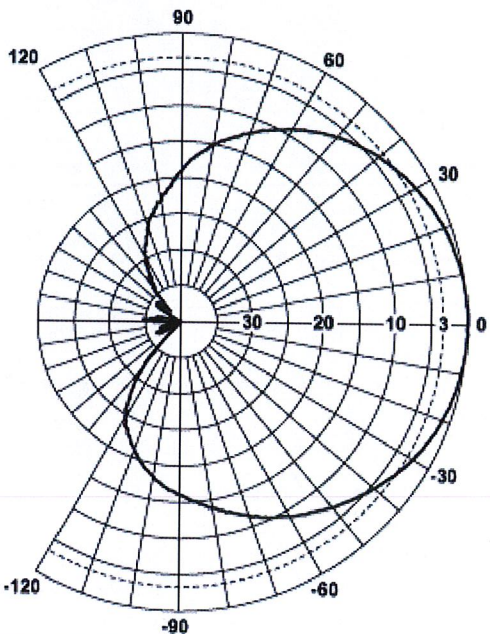
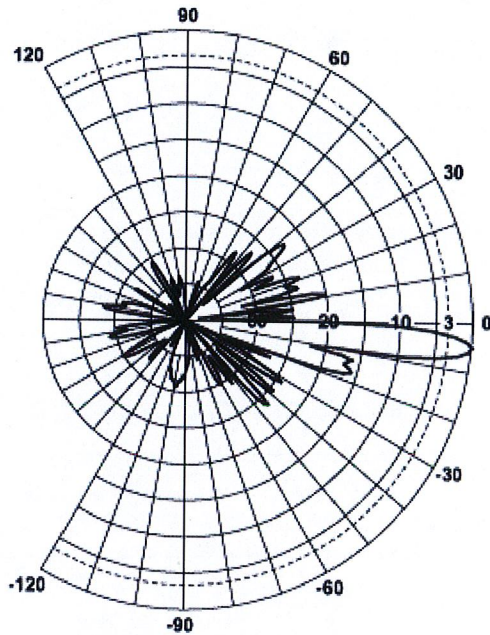
Please visit us on the internet at <http://www.rfsworld.com>

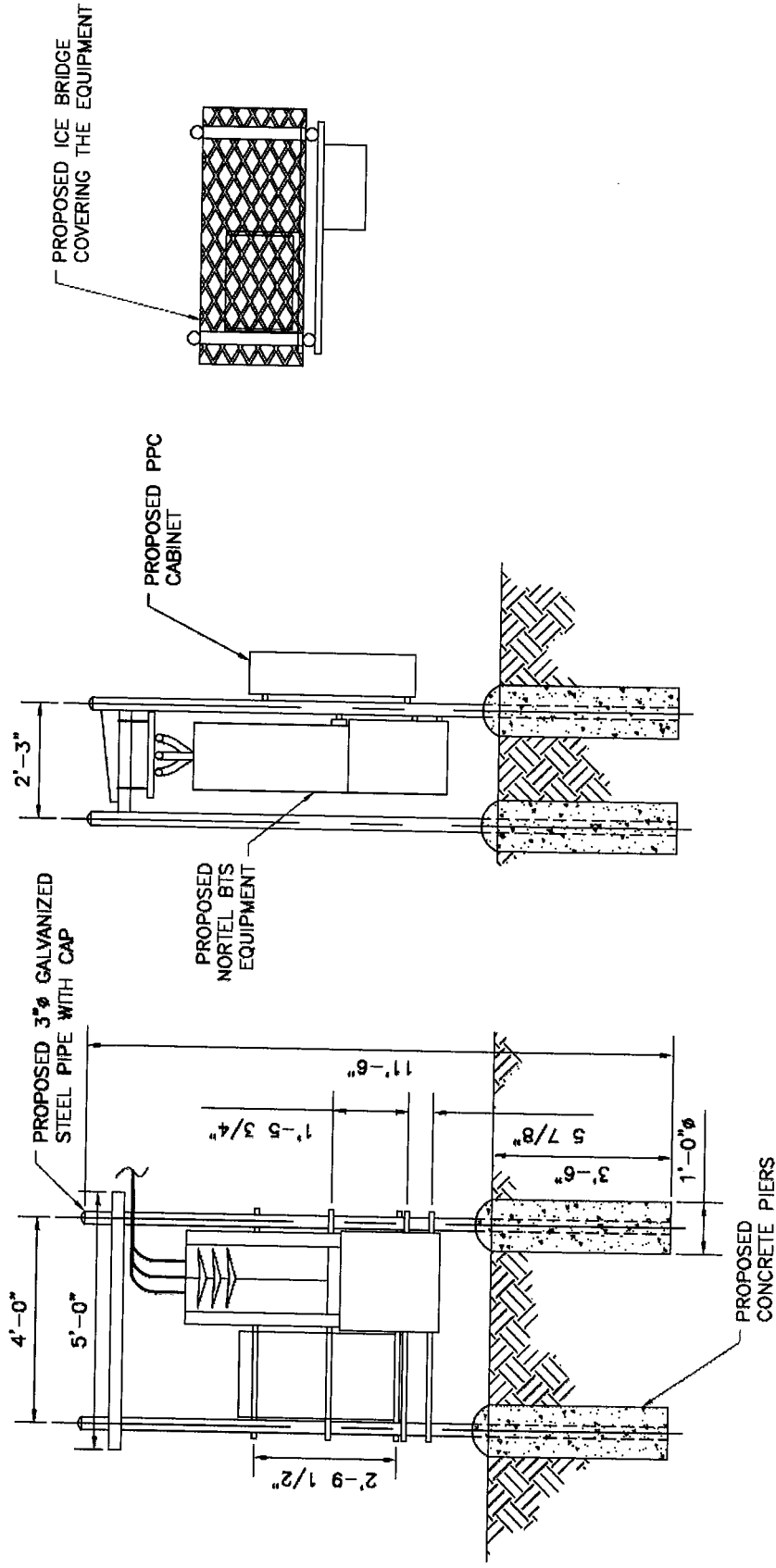
All Information contained in the present datasheet is subject to confirmation at time of ordering.

Radio Frequency Systems



Gain, dBi (dBd)	18.8 (16.7) , 19.0 (16.9)
Frequency Range, MHz	1710-1900, 1900-2170
Connector Type	(2) 7-16 DIN Female
Connector Location	Bottom
Mount Type	Downtilt
Electrical Downtilt, deg	0-10
Horizontal Beamwidth, deg	67 , 63
Mounting Hardware	APM40-2
Rated Wind Speed, km/h (mph)	160 (100)
VSWR	< 1.5:1
Vertical Beamwidth, deg	5.0 , 4.6
Upper Sidelobe Suppression, dB	>17 , >18 all (Typically >20)
Polarization	Dual pol +/-45°
Front-To-Back Ratio, dB	>30
Maximum Power Input, W	300
Isolation between Ports, dB	>30
Lightning Protection	Direct Ground
3rd Order IMP @ 2 x 43 dBm, dBc	>150
7th Order IMP @ 2x46 dBm, dBc	>170
Impedance, Ohms	50
Overall Length, m (ft)	1.85 (6.06)
Mounting Hardware Weight, kg (lb)	3.4 (7.5)
Dimensions - HxWxD, mm (in)	1850 x 175 x 80 (72.0 x 6.8 x 3.15)
Weight w/o Mtg Hardware, kg (lb)	12 (26.4)
Weight w/ Mtg Hardware, kg (lb)	14.8 (32.5)
Radiating Element Material	Brass
Radome Color	Light Grey RAL7035
Radome Material	Fiberglass
Mounting Hardware Material	Diecasted Aluminum
Reflector Material	Aluminum
Max Wind Loading Area, m ² (ft ²)	0.31 (3.3)
Survival Wind Speed, km/h (mph)	200 (125)
Maximum Thrust @ Rated Wind, N (lbf)	558 (125)
Front Thrust @ Rated Wind, N (lbf)	558 (125)
Shipping Weight, kg (lb)	18.3 (39.8)
Packing Dimensions, HxWxD, mm (in)	2021 x 260 x 200 (79.5 x 10.2 x 7.8)
Packing Dimensions - HxWxD, m (ft)	2.0 x 0.26 x 0.2 (6.6 x 0.85 x 0.65)
Notes	
For additional mounting information please click "External Document Link" below.	





Pocket/Youghiogheny Communications – Northeast, LLC
Rack Detail



CDMA BTS 3231 AWS 1.7/2.1 GHz (Outdoor/Indoor)

CDMA BTS 3231

Industry's Highest Capacity AWS Micro BTS

The CDMA BTS 3231 is the latest extension to Nortel Networks BTS (Base Transceiver Station) portfolio providing the ideal solution for urban, sub-urban and rural deployments. The CDMA BTS 3231 is a 3-carrier, 3-sector outdoor/indoor BTS operating at the AWS band of 1.7/2.1 GHz supporting IS-95, 1XRTT and 1xEV-DO simultaneously. BTS 3231 provides flexible deployments solutions including floor, rack, and wall mount options. The power consumption of BTS3231 is industry leading consuming only 630W for 3C3S. The BTS 3231 is also very light at 240lbs making it easy

to transport to hard to reach locations such as the top of a high rise building.



Exhibit D

Power Density Calculations

Pocket Site NHCT0524A

42 South Street

Plymouth, Connecticut



C Squared Systems, LLC
920 Candia Road
Manchester, NH 03109
Phone: (603) 657 9702
E-mail:

support@csquaredsystems.com

Calculated Radio Frequency Emissions



NHCT0524

42 South Street, Plymouth, CT

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Table 1: Proposed Carrier Information3

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Pocket antennas to be installed on the existing tower at 42 South Street, Plymouth, CT.

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are much more conservative (higher) than the actual signal levels will be from the finished installation.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter (mW/cm^2). The number of mW/cm^2 emitted is called the power density. The general population exposure limit for the cellular band is $0.567\text{--}0.593 \text{ mW}/\text{cm}^2$, and the general population exposure limit for the PCS/AWS band is $1.0 \text{ mW}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

The FCC general population / uncontrolled limits set the maximum exposure to which most people may be subjected. General population / uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Higher exposure limits are permitted under the occupational / controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure (through training), and they must be able to exercise control over their exposure. General population / uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals.”

The FCC describes exposure to radio frequency (RF) energy in terms of percentage of maximum permissible exposure (MPE) with 100% being the maximum allowed. Rather than the FCC presenting the user specification in terms of complex power density figures over a specified surface area, this MPE measure is particularly useful, and even more so when considering that power density limits actually vary by frequency because of the different absorptive properties of the human body at different frequencies.

MPE limits are specified as time-averaged exposure limits. This means that exposure can be averaged over 30 minutes for general population / uncontrolled exposure (or 6 minutes for occupational / controlled exposure). However, for the case of exposure of the general public, time averaging is usually not applied because of uncertainties over exact exposure conditions and difficulty in controlling time of exposure. Therefore, the typical conservative approach is to assume that any RF exposure to the general public will be continuous.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population / uncontrolled exposure and for occupational / controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include limits for Maximum Permissible Exposure (MPE) for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP), the exposure limits developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit. As shown in these excerpts, each frequency band has different exposure limits, requiring power density to be reported as a percent of Maximum Permissible Exposure (MPE) when dealing with carriers transmitting in different frequency bands.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{EIRP}{\pi \times R^2} \right) \times \text{Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{H^2 + V^2}$

H = Horizontal Distance from antenna

V = Vertical Distance from bottom of antenna

Off Beam Loss is determined by the selected antenna patterns

4. Calculation Results

Table 1 below outlines the power density information for the site. All information for carriers other than Pocket was obtained from current CSC database, except where otherwise noted. ¹

Carrier	Number of Trans.	Effective Radiated Power (ERP) Per Transmitter (Watts)	Antenna Height (Feet)	Power Density (mw/cm ²)	Operating Frequency (MHz)	Limit	%MPE
Verizon	9	485	179	0.0490	1970	1.0000	4.90%
Verizon	9	200	179	0.0202	875	0.5833	3.46%
Alltel	6	296	159	0.0253	880	0.5867	4.31%
Alltel	3	427	159	0.0182	1930	1.0000	1.82%
Pocket	3	631	169	0.0256	2130-2133.75	1.0000	2.56%
						Total	10.92%

Table 1: Proposed Carrier Information

5. Conclusion

The above analysis verifies that emissions from the proposed site will be well below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at the base of the tower is 10.92% of the FCC limit.

As noted in the introduction, obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished installation.

¹ Based on the structural analysis report submitted by the engineering firm of Natcomm, Inc in December, 2008, Verizon Wireless is taking ownership of the Alltel antenna array at the top of the pole. Verizon plans to remove their existing antennas at the 159' level. AT&T has not installed antennas on the tower. There are currently no other active antennas on the tower other than Verizon Wireless. The %MPE values shown in the above table were calculated based on Verizon's existing and planned relocation. (Gray type denotes recommended updates to CSC database)

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.

A handwritten signature in black ink, appearing to read "Daniel L. Goulet", is written over a horizontal line.

Daniel L. Goulet
C Squared Systems, LLC

January 19, 2009
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits For Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

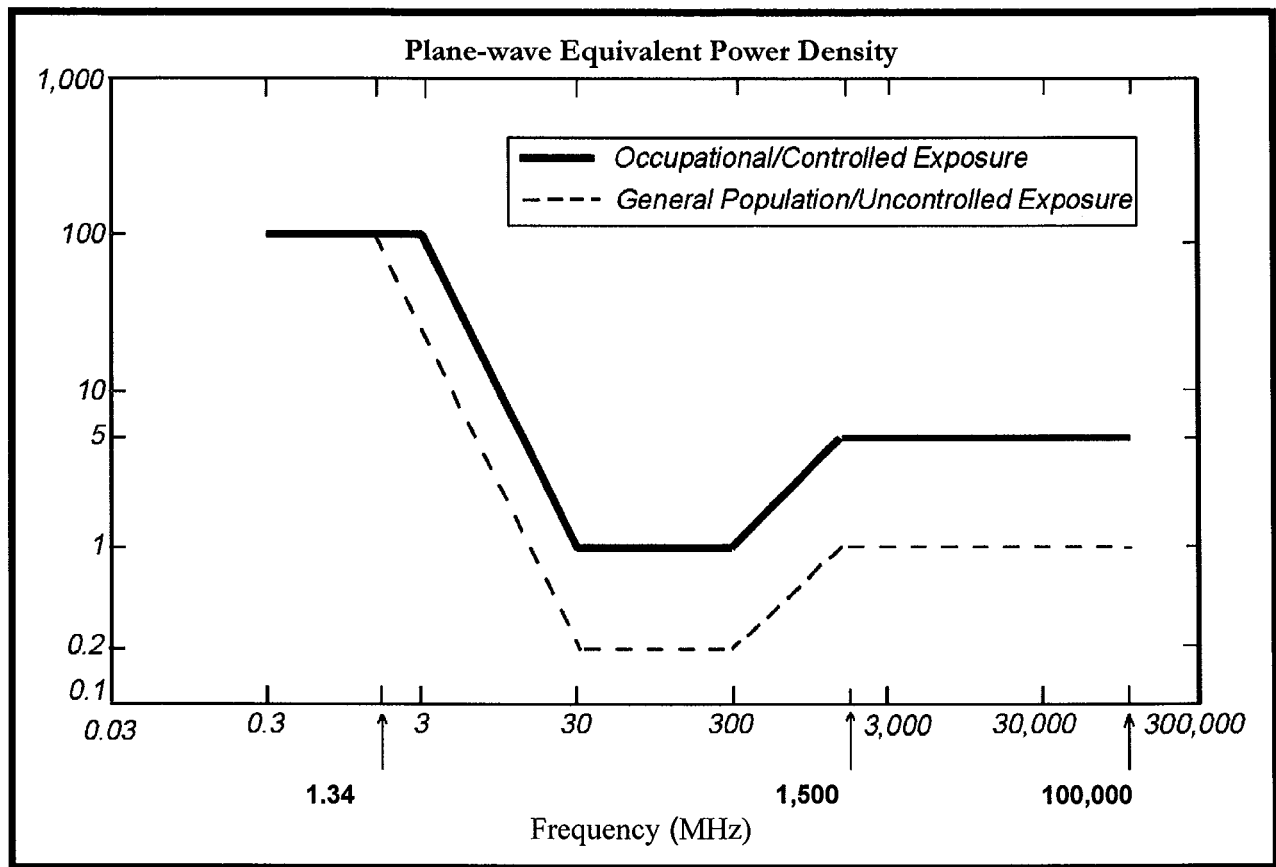
(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

NOTE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.



• FCC Limits for Maximum Permissible Exposure (MPE)

Exhibit E

Structural Analysis

Pocket Site NHCT0524A

42 South Street

Plymouth, Connecticut



Structural Analysis Report

180' Existing Monopole

Pocket Site: NHCT-0524A

42 South Street
Plymouth, CT

Natcomm Project No. 08136-CO-09

~~Date: December 15, 2008~~

Rev. 1: January 14, 2009



Prepared for:

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63-2 N. Branford Rd.
Branford, CT 06405

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- PRIMARY ASSUMPTIONS USED IN THE ANALYSIS.
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- TOWER CAPACITY.
- FOUNDATION AND ANCHORS.
- CONCLUSIONS.

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- RISATower DETAILED OUTPUT.
- ANCHOR BOLT AND BASE PLATE ANALYSIS
- MONOPOLE CAISSON FOUNDATION.
- L-PILE CAISSON ANALYSIS

SECTION 4 – REFERENCE MATERIALS

- URS CORPORATION STRUCTURAL ANALYSIS – Job No: 3693110
dated January 16, 2008.

Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation proposed by Pocket Wireless on behalf of Verizon on the existing monopole (tower) located in Plymouth, Connecticut.

The existing tower is a 180-ft monopole originally designed and manufactured by Valmont Industries, Inc.; order no: 11610-94, dated August 15, 1994. The tower geometry, structure member sizes and the foundation system information were taken from the aforementioned design documents. Antenna and appurtenance inventory information was taken from a structural analysis report prepared by URS Corporation; job no: 3693110 dated January 16, 2008.

The tower is made up of four (4) 12-sided tapered steel sections slip jointed together. The tower sections vary in width from 43.8" $\varnothing$ at the base to 14.89" $\varnothing$ at the top.

The aforementioned structural analysis report prepared by URS Corporation is available for reference in Section 4 of this report.

Pocket Wireless is proposing the installation of three (3) RFS APXV18-206517-C panel antennas flush mounted to the existing tower. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna configuration.

Antenna and Appurtenance Summary

The existing tower was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- **CARRIER VERIZON (Existing):**
Antennas: (6) Antel LPA-80080/4CF panel antennas, (4) Antel LPA-185080/8CF, and (2) Antel LPA-185063/8CF panel antennas mounted to (3) T-Arms with a centerline elevation of 179-ft above the existing tower base.
Coax Cables: (12) 1 5/8" $\varnothing$ coax cables on the inside of the tower.
- **POCKET WIRELESS (Proposed):**
Antennas: (3) RFS APXV18-206517-C antennas flush mounted on a universal tri-bracket assembly at a RAD center elevation of 169-ft above the existing tower base plate.
Coax Cables: Six (6) 1-5/8" $\varnothing$ coax cables running on the inside of the existing tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed within tower through engineered port holes.

A n a l y s i s

The existing tower was analyzed using a comprehensive computer program entitled RISATower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for 80 mph basic wind speed (fastest mile) with no ice and 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

T o w e r L o a d i n g

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice tower structure and its components.

Basic Wind Speed:	Litchfield; v = 80 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	Plymouth; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	<i>TIA/EIA wind speed criteria controls</i>	
Load Cases:	<u>Load Case 1</u> ; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 2</u> ; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1610.1.3 of State Bldg. Code 2005] does not control in the design of this structure type

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software RISATower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

Calculated stresses were found to be within allowable limits. In Load Case 1, per RISATower "Section Capacity Table", this tower was found to be at **91%** of its total capacity.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L4)	0-42.33'	91%	PASS

Foundation and Anchors

The existing foundation consists of a 5.5-ft $\varnothing$ x 14.25' long reinforced concrete caisson. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural analysis report; URS Corporation; job no: 36931110 dated January 16, 2008. The base of the tower is connected to the foundation by means of (12) 2.25" $\varnothing$, ASTM A615-75 anchor bolts embedded into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Base Reactions	Vector	Proposed Load (kips/ft-kips)
Base	Shear	20.0
	Axial	24.0
	Moment	2171.0

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	68.4%	PASS
	Lateral Deflection	0.031in	PASS

Natcomm, Inc.
Structural Monopole Analysis
180' Existing Monopole
Plymouth, CT
December 15, 2008

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Compression	87.0%	PASS
Base Plate	Bending	78.0%	PASS

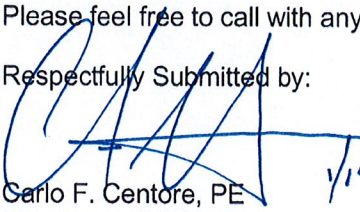
Conclusion

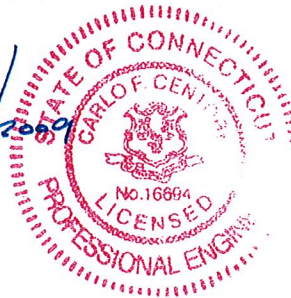
This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by Verizon Wireless. If the existing conditions are different than the information in this report, Natcomm, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:


1/14/2009
Carlo F. Centore, PE
Principal ~ Structural Engineer



Standard Conditions for Furnishing of
Professional Engineering Services on
Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Natcomm, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provide to Natcomm, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Natcomm, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

RISATower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, RISATower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

RISATower Features:

- RISATower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- RISATower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	1	2	3	4
Length (ft)	49.000	48.833	48.667	48.000
Number of Sides	12	12	12	12
Thickness (in)	0.219	0.281	0.344	0.375
Lap Splice (ft)	4.000	4.833	5.667	
Top Dia (in)	14.890	22.102	29.026	35.640
Bot Dia (in)	23.220	30.410	37.290	43.800
Grade	2.2	3.9	6.0	7.8
Weight (K)				19.9

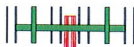
180.0 ft

131.0 ft

86.2 ft

42.3 ft

0.0 ft



DESIGNED APPURTENANCE LOADING

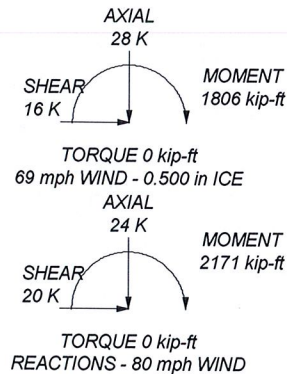
TYPE	ELEVATION	TYPE	ELEVATION
LPA-80080/4CF (Verizon)	179	LPA-185063/8CFx2 (Verizon)	179
LPA-80080/4CF (Verizon)	179	Valmont T-Arm (1) (Verizon)	179
LPA-80080/4CF (Verizon)	179	Valmont T-Arm (1) (Verizon)	179
LPA-80080/4CF (Verizon)	179	Valmont T-Arm (1) (Verizon)	179
LPA-80063/4CF (Verizon)	179	APXV18-206517-C w/mount pipe (Pocket)	169
LPA-80063/4CF (Verizon)	179	APXV18-206517-C w/mount pipe (Pocket)	169
LPA-185080/8CF_2 (Verizon)	179	APXV18-206517-C w/mount pipe (Pocket)	169
LPA-185080/8CF_2 (Verizon)	179		
LPA-185080/8CF_2 (Verizon)	179		
LPA-185080/8CF_2 (Verizon)	179		
LPA-185063/8CFx2 (Verizon)	179		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 91%



NATCOMM

63-2 N. Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: **180' Valmont Monopole Rev ~ 1**

Project: **42 South Street, Plymouth, CT**

Client: Verizon/Pocket	Drawn by: Staff	App'd:
Code: TIA/EIA-222-F	Date: 01/14/09	Scale: NTS
Path: A:\064051800\W000-09-41\064051800\01\064051800 Monopole - Plymouth, CT.dwg	Dwg No. E-1	

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' Valmont Monopole_Rev ~ 1	Page	1 of 20
	Project	42 South Street, Plymouth, CT	Date	12:02:49 01/14/09
	Client	Verizon/Pocket	Designed by	Staff

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.500 in.

Ice density of 56 pcf.

A wind speed of 69 mph is used in combination with ice.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	✓ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
✓ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	✓ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	Use Azimuth Dish Coefficients	Consider Feedline Torque
Use Special Wind Profile	✓ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	✓ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	✓ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	180.000-131.000	49.000	4.000	12	14.890	23.220	0.219	0.876	A572-65 (65 ksi)
L2	131.000-86.167	48.833	4.833	12	22.102	30.410	0.281	1.124	A572-65 (65 ksi)
L3	86.167-42.333	48.667	5.667	12	29.026	37.290	0.344	1.376	A572-65 (65 ksi)
L4	42.333-0.000	48.000		12	35.640	43.800	0.375	1.500	A572-65 (65 ksi)

Tapered Pole Properties

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' Valmont Monopole_Rev ~ 1	Page	2 of 20
	Project	42 South Street, Plymouth, CT	Date	12:02:49 01/14/09
	Client	Verizon/Pocket	Designed by	Staff

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	15.415	10.346	284.227	5.252	7.713	36.850	575.921	5.092	3.404	15.542
	24.039	16.220	1095.282	8.234	12.028	91.061	2219.339	7.983	5.636	25.735
L2	23.586	19.744	1199.975	7.812	11.449	104.812	2431.474	9.717	5.170	18.399
	31.483	27.261	3158.656	10.786	15.752	200.519	6400.293	13.417	7.397	26.323
L3	30.899	31.770	3335.935	10.268	15.035	221.873	6759.509	15.636	6.857	19.933
	38.605	40.924	7130.214	13.227	19.316	369.131	14447.746	20.142	9.072	26.372
L4	37.894	42.582	6759.160	12.625	18.461	366.125	13695.891	20.958	8.546	22.79
	45.345	52.436	12620.965	15.546	22.688	556.274	25573.497	25.807	10.733	28.622

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft ²	in						
L1 180.000- 131.000				1	1	1		
L2 131.000- 86.167				1	1	1		
L3 86.167- 42.333				1	1	1		
L4 42.333- 0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight klf
1 5/8 (Verizon)	C	No	Inside Pole	179.000 - 5.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 5/8 (Pocket)	B	No	Inside Pole	120.000 - 5.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	180.000-131.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.599
L2	131.000-86.167	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.211
		C	0.000	0.000	0.000	0.000	0.560
L3	86.167-42.333	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.274
		C	0.000	0.000	0.000	0.000	0.547
L4	42.333-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.233
		C	0.000	0.000	0.000	0.000	0.466

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Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	180.000-131.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.599
L2	131.000-86.167	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.211
		C		0.000	0.000	0.000	0.000	0.560
L3	86.167-42.333	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.274
		C		0.000	0.000	0.000	0.000	0.547
L4	42.333-0.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.233
		C		0.000	0.000	0.000	0.000	0.466

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
LPA-80080/4CF (Verizon)	A	From Face	4.000	0.000	179.000	No Ice	2.619	6.057	0.012
			6.000			1/2" Ice	2.922	6.453	0.045
			0.000						
LPA-80080/4CF (Verizon)	A	From Face	4.000	0.000	179.000	No Ice	2.619	6.057	0.012
			-6.000			1/2" Ice	2.922	6.453	0.045
			0.000						
LPA-80080/4CF (Verizon)	B	From Face	4.000	0.000	179.000	No Ice	2.619	6.057	0.012
			6.000			1/2" Ice	2.922	6.453	0.045
			0.000						
LPA-80080/4CF (Verizon)	B	From Face	4.000	0.000	179.000	No Ice	2.619	6.057	0.012
			-6.000			1/2" Ice	2.922	6.453	0.045
			0.000						
LPA-80063/4CF (Verizon)	C	From Face	4.000	0.000	179.000	No Ice	7.011	6.084	0.020
			6.000			1/2" Ice	7.421	6.481	0.073
			0.000						
LPA-80063/4CF (Verizon)	C	From Face	4.000	0.000	179.000	No Ice	7.011	6.084	0.020
			-6.000			1/2" Ice	7.421	6.481	0.073
			0.000						
LPA-185080/8CF_2 (Verizon)	A	From Face	4.000	0.000	179.000	No Ice	2.095	2.786	0.007
			4.000			1/2" Ice	2.391	3.092	0.025
			0.000						
LPA-185080/8CF_2 (Verizon)	A	From Face	4.000	0.000	179.000	No Ice	2.095	2.786	0.007
			-4.000			1/2" Ice	2.391	3.092	0.025
			0.000						
LPA-185080/8CF_2 (Verizon)	B	From Face	4.000	0.000	179.000	No Ice	2.095	2.786	0.007
			4.000			1/2" Ice	2.391	3.092	0.025
			0.000						
LPA-185080/8CF_2 (Verizon)	B	From Face	4.000	0.000	179.000	No Ice	2.095	2.786	0.007
			-4.000			1/2" Ice	2.391	3.092	0.025
			0.000						
LPA-185063/8CFx2 (Verizon)	C	From Face	4.000	0.000	179.000	No Ice	3.040	2.734	0.009
			4.000			1/2" Ice	3.382	3.038	0.031

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
LPA-185063/8CFx2 (Verizon)	C	From Face	0.000 4.000 -4.000 0.000	0.000	179.000	No Ice 1/2" Ice	3.040 3.382	2.734 3.038	0.009 0.031
Valmont T-Arm (1) (Verizon)	A	From Face	0.000 2.000 0.000 0.000	0.000	179.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (Verizon)	B	From Face	0.000 2.000 0.000 0.000	0.000	179.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (Verizon)	C	From Face	0.000 2.000 0.000 0.000	0.000	179.000	No Ice 1/2" Ice	10.540 14.450	10.540 14.450	0.336 0.412
APXV18-206517-C w/mount pipe (Pocket)	A	From Face	0.000 1.000 0.000 0.000	0.000	169.000	No Ice 1/2" Ice	5.167 5.618	4.463 5.394	0.048 0.088
APXV18-206517-C w/mount pipe (Pocket)	B	From Face	0.000 1.000 0.000 0.000	0.000	169.000	No Ice 1/2" Ice	5.167 5.618	4.463 5.394	0.048 0.088
APXV18-206517-C w/mount pipe (Pocket)	C	From Face	0.000 1.000 0.000 0.000	0.000	169.000	No Ice 1/2" Ice	5.167 5.618	4.463 5.394	0.048 0.088

Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation ft	z ft	K _Z	q _z ksf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 180.000- 131.000	153.987	1.553	0.025	77.808	A	0.000	77.808	77.808	100.00	0.000	0.000
					B	0.000	77.808		100.00		
					C	0.000	77.808		100.00		
L2 131.000- 86.167	107.842	1.403	0.023	99.366	A	0.000	99.366	99.366	100.00	0.000	0.000
					B	0.000	99.366		100.00		
					C	0.000	99.366		100.00		
L3 86.167- 42.333	63.979	1.208	0.020	122.619	A	0.000	122.619	122.619	100.00	0.000	0.000
					B	0.000	122.619		100.00		
					C	0.000	122.619		100.00		
L4 42.333- 0.000	20.535	1	0.016	141.821	A	0.000	141.821	141.821	100.00	0.000	0.000
					B	0.000	141.821		100.00		
					C	0.000	141.821		100.00		

Tower Pressure - With Ice

$$G_H = 1.690$$

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Section Elevation	z	K _Z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		ksf	in	ft ²		ft ²	ft ²	ft ²			
L1 180.000- 131.000	153.987	1.553	0.019	0.500	81.891	A	0.000	81.891	81.891	100.00	0.000	0.000
						B	0.000	81.891		100.00		
						C	0.000	81.891		100.00		
L2 131.000- 86.167	107.842	1.403	0.017	0.500	103.102	A	0.000	103.102	103.102	100.00	0.000	0.000
						B	0.000	103.102		100.00		
						C	0.000	103.102		100.00		
L3 86.167- 42.333	63.979	1.208	0.015	0.500	126.272	A	0.000	126.272	126.272	100.00	0.000	0.000
						B	0.000	126.272		100.00		
						C	0.000	126.272		100.00		
L4 42.333-0.000	20.535	1	0.012	0.500	145.349	A	0.000	145.349	145.349	100.00	0.000	0.000
						B	0.000	145.349		100.00		
						C	0.000	145.349		100.00		

Tower Pressure - Service

$$G_H = 1.690$$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²			
L1 180.000- 131.000	153.987	1.553	0.010	77.808	A	0.000	77.808	77.808	100.00	0.000	0.000
					B	0.000	77.808		100.00		
					C	0.000	77.808		100.00		
L2 131.000- 86.167	107.842	1.403	0.009	99.366	A	0.000	99.366	99.366	100.00	0.000	0.000
					B	0.000	99.366		100.00		
					C	0.000	99.366		100.00		
L3 86.167- 42.333	63.979	1.208	0.008	122.619	A	0.000	122.619	122.619	100.00	0.000	0.000
					B	0.000	122.619		100.00		
					C	0.000	122.619		100.00		
L4 42.333- 0.000	20.535	1	0.006	141.821	A	0.000	141.821	141.821	100.00	0.000	0.000
					B	0.000	141.821		100.00		
					C	0.000	141.821		100.00		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.599	2.215	A	1	1.03	1	1	1	77.808	3.442	0.070	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.771	3.905	A	1	1.03	1	1	1	99.366	3.967	0.088	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167- 42.333	0.821	6.019	A	1	1.03	1	1	1	122.619	4.202	0.096	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.699	7.760	A	1	1.03	1	1	1	141.821	4.045	0.096	C
			B	1	1.03	1	1	1	141.821			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
Sum Weight:	2.889	19.899	C	1	1.03	1	1	1 OTM	141.821 1309.746 kip-ft	15.656		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000-131.000	0.599	2.215	A	1	1.03	1	1	1	77.808	3.442	0.070	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000-86.167	0.771	3.905	A	1	1.03	1	1	1	99.366	3.967	0.088	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167-42.333	0.821	6.019	A	1	1.03	1	1	1	122.619	4.202	0.096	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333-0.000	0.699	7.760	A	1	1.03	1	1	1	141.821	4.045	0.096	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.889	19.899						1 OTM	1309.746 kip-ft	15.656		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000-131.000	0.599	2.215	A	1	1.03	1	1	1	77.808	3.442	0.070	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000-86.167	0.771	3.905	A	1	1.03	1	1	1	99.366	3.967	0.088	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167-42.333	0.821	6.019	A	1	1.03	1	1	1	122.619	4.202	0.096	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333-0.000	0.699	7.760	A	1	1.03	1	1	1	141.821	4.045	0.096	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.889	19.899						1 OTM	1309.746 kip-ft	15.656		

Tower Forces - No Ice - Wind 90 To Face

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.599	2.215	A	1	1.03	1	1	1	77.808	3.442	0.070	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.771	3.905	A	1	1.03	1	1	1	99.366	3.967	0.088	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167- 42.333	0.821	6.019	A	1	1.03	1	1	1	122.619	4.202	0.096	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.699	7.760	A	1	1.03	1	1	1	141.821	4.045	0.096	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.889	19.899						OTM	1309.746 kip-ft	15.656		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.599	2.815	A	1	1.03	1	1	1	81.891	2.717	0.055	C
			B	1	1.03	1	1	1	81.891			
			C	1	1.03	1	1	1	81.891			
L2 131.000- 86.167	0.771	4.666	A	1	1.03	1	1	1	103.102	3.087	0.069	C
			B	1	1.03	1	1	1	103.102			
			C	1	1.03	1	1	1	103.102			
L3 86.167- 42.333	0.821	6.954	A	1	1.03	1	1	1	126.272	3.246	0.074	C
			B	1	1.03	1	1	1	126.272			
			C	1	1.03	1	1	1	126.272			
L4 42.333- 0.000	0.699	8.839	A	1	1.03	1	1	1	145.349	3.109	0.073	C
			B	1	1.03	1	1	1	145.349			
			C	1	1.03	1	1	1	145.349			
Sum Weight:	2.889	23.273						OTM	1022.790 kip-ft	12.159		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.599	2.815	A	1	1.03	1	1	1	81.891	2.717	0.055	C
			B	1	1.03	1	1	1	81.891			
			C	1	1.03	1	1	1	81.891			
L2 131.000- 86.167	0.771	4.666	A	1	1.03	1	1	1	103.102	3.087	0.069	C
			B	1	1.03	1	1	1	103.102			
			C	1	1.03	1	1	1	103.102			
L3 86.167- 42.333	0.821	6.954	A	1	1.03	1	1	1	126.272	3.246	0.074	C
			B	1	1.03	1	1	1	126.272			
			C	1	1.03	1	1	1	126.272			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L4 42.333-0.000	0.699	8.839	A	1	1.03	1	1	1	145.349	3.109	0.073	C
			B	1	1.03	1	1	1	145.349			
			C	1	1.03	1	1	1	145.349			
Sum Weight:	2.889	23.273						OTM	1022.790 kip-ft	12.159		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000-131.000	0.599	2.815	A	1	1.03	1	1	1	81.891	2.717	0.055	C
			B	1	1.03	1	1	1	81.891			
			C	1	1.03	1	1	1	81.891			
L2 131.000-86.167	0.771	4.666	A	1	1.03	1	1	1	103.102	3.087	0.069	C
			B	1	1.03	1	1	1	103.102			
			C	1	1.03	1	1	1	103.102			
L3 86.167-42.333	0.821	6.954	A	1	1.03	1	1	1	126.272	3.246	0.074	C
			B	1	1.03	1	1	1	126.272			
			C	1	1.03	1	1	1	126.272			
L4 42.333-0.000	0.699	8.839	A	1	1.03	1	1	1	145.349	3.109	0.073	C
			B	1	1.03	1	1	1	145.349			
			C	1	1.03	1	1	1	145.349			
Sum Weight:	2.889	23.273						OTM	1022.790 kip-ft	12.159		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000-131.000	0.599	2.815	A	1	1.03	1	1	1	81.891	2.717	0.055	C
			B	1	1.03	1	1	1	81.891			
			C	1	1.03	1	1	1	81.891			
L2 131.000-86.167	0.771	4.666	A	1	1.03	1	1	1	103.102	3.087	0.069	C
			B	1	1.03	1	1	1	103.102			
			C	1	1.03	1	1	1	103.102			
L3 86.167-42.333	0.821	6.954	A	1	1.03	1	1	1	126.272	3.246	0.074	C
			B	1	1.03	1	1	1	126.272			
			C	1	1.03	1	1	1	126.272			
L4 42.333-0.000	0.699	8.839	A	1	1.03	1	1	1	145.349	3.109	0.073	C
			B	1	1.03	1	1	1	145.349			
			C	1	1.03	1	1	1	145.349			
Sum Weight:	2.889	23.273						OTM	1022.790 kip-ft	12.159		

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Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.599	2.215	A	1	1.03	1	1	1	77.808	1.345	0.027	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.771	3.905	A	1	1.03	1	1	1	99.366	1.550	0.035	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167- 42.333	0.821	6.019	A	1	1.03	1	1	1	122.619	1.642	0.037	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.699	7.760	A	1	1.03	1	1	1	141.821	1.580	0.037	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.889	19.899						OTM	511.619 kip-ft	6.116		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.599	2.215	A	1	1.03	1	1	1	77.808	1.345	0.027	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.771	3.905	A	1	1.03	1	1	1	99.366	1.550	0.035	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167- 42.333	0.821	6.019	A	1	1.03	1	1	1	122.619	1.642	0.037	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.699	7.760	A	1	1.03	1	1	1	141.821	1.580	0.037	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.889	19.899						OTM	511.619 kip-ft	6.116		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.599	2.215	A	1	1.03	1	1	1	77.808	1.345	0.027	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.771	3.905	A	1	1.03	1	1	1	99.366	1.550	0.035	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L3 86.167- 42.333	0.821	6.019	A	1	1.03	1	1	1	122.619	1.642	0.037	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.699	7.760	A	1	1.03	1	1	1	141.821	1.580	0.037	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.889	19.899						OTM	511.619 kip-ft	6.116		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.599	2.215	A	1	1.03	1	1	1	77.808	1.345	0.027	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.771	3.905	A	1	1.03	1	1	1	99.366	1.550	0.035	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167- 42.333	0.821	6.019	A	1	1.03	1	1	1	122.619	1.642	0.037	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.699	7.760	A	1	1.03	1	1	1	141.821	1.580	0.037	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.889	19.899						OTM	511.619 kip-ft	6.116		

Discrete Appurtenance Pressures - No Ice $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _A C _C Front ft ²	C _A C _C Side ft ²
LPA-80080/4CF	300.000	0.012	-1.008	-7.510	179.000	1.621	0.027	2.619	6.057
LPA-80080/4CF	300.000	0.012	-7.008	2.882	179.000	1.621	0.027	2.619	6.057
LPA-80080/4CF	60.000	0.012	7.008	2.882	179.000	1.621	0.027	2.619	6.057
LPA-80080/4CF	60.000	0.012	1.008	-7.510	179.000	1.621	0.027	2.619	6.057
LPA-80063/4CF	180.000	0.020	-6.000	4.627	179.000	1.621	0.027	7.011	6.084
LPA-80063/4CF	180.000	0.020	6.000	4.627	179.000	1.621	0.027	7.011	6.084
LPA-185080/8CF_2	300.000	0.007	-2.008	-5.778	179.000	1.621	0.027	2.095	2.786
LPA-185080/8CF_2	300.000	0.007	-6.008	1.150	179.000	1.621	0.027	2.095	2.786
LPA-185080/8CF_2	60.000	0.007	6.008	1.150	179.000	1.621	0.027	2.095	2.786
LPA-185080/8CF_2	60.000	0.007	2.008	-5.778	179.000	1.621	0.027	2.095	2.786
LPA-185063/8CFx2	180.000	0.009	-4.000	4.627	179.000	1.621	0.027	3.040	2.734
LPA-185063/8CFx2	180.000	0.009	4.000	4.627	179.000	1.621	0.027	3.040	2.734
Valmont T-Arm (1)	300.000	0.336	-2.275	-1.314	179.000	1.621	0.027	10.540	10.540
Valmont T-Arm (1)	60.000	0.336	2.275	-1.314	179.000	1.621	0.027	10.540	10.540
Valmont T-Arm (1)	180.000	0.336	0.000	2.627	179.000	1.621	0.027	10.540	10.540
APXV18-206517-C	300.000	0.048	-1.471	-0.849	169.000	1.595	0.026	5.167	4.463

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Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _{AAc} Front ft ²	C _{AAc} Side ft ²
w/mount pipe									
APXV18-206517-C	60.000	0.048	1.471	-0.849	169.000	1.595	0.026	5.167	4.463
w/mount pipe									
APXV18-206517-C	180.000	0.048	0.000	1.698	169.000	1.595	0.026	5.167	4.463
w/mount pipe									
Sum Weight:		1.286							

Discrete Appurtenance Pressures - With Ice $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _{AAc} Front ft ²	C _{AAc} Side ft ²	t _z in
LPA-80080/4CF	300.000	0.045	-1.008	-7.510	179.000	1.621	0.020	2.922	6.453	0.500
LPA-80080/4CF	300.000	0.045	-7.008	2.882	179.000	1.621	0.020	2.922	6.453	0.500
LPA-80080/4CF	60.000	0.045	7.008	2.882	179.000	1.621	0.020	2.922	6.453	0.500
LPA-80080/4CF	60.000	0.045	1.008	-7.510	179.000	1.621	0.020	2.922	6.453	0.500
LPA-80063/4CF	180.000	0.073	-6.000	4.627	179.000	1.621	0.020	7.421	6.481	0.500
LPA-80063/4CF	180.000	0.073	6.000	4.627	179.000	1.621	0.020	7.421	6.481	0.500
LPA-185080/8CF_2	300.000	0.025	-2.008	-5.778	179.000	1.621	0.020	2.391	3.092	0.500
LPA-185080/8CF_2	300.000	0.025	-6.008	1.150	179.000	1.621	0.020	2.391	3.092	0.500
LPA-185080/8CF_2	60.000	0.025	6.008	1.150	179.000	1.621	0.020	2.391	3.092	0.500
LPA-185080/8CF_2	60.000	0.025	2.008	-5.778	179.000	1.621	0.020	2.391	3.092	0.500
LPA-185063/8CFx2	180.000	0.031	-4.000	4.627	179.000	1.621	0.020	3.382	3.038	0.500
LPA-185063/8CFx2	180.000	0.031	4.000	4.627	179.000	1.621	0.020	3.382	3.038	0.500
Valmont T-Arm (1)	300.000	0.412	-2.275	-1.314	179.000	1.621	0.020	14.450	14.450	0.500
Valmont T-Arm (1)	60.000	0.412	2.275	-1.314	179.000	1.621	0.020	14.450	14.450	0.500
Valmont T-Arm (1)	180.000	0.412	0.000	2.627	179.000	1.621	0.020	14.450	14.450	0.500
APXV18-206517-C	300.000	0.088	-1.471	-0.849	169.000	1.595	0.020	5.618	5.394	0.500
w/mount pipe										
APXV18-206517-C	60.000	0.088	1.471	-0.849	169.000	1.595	0.020	5.618	5.394	0.500
w/mount pipe										
APXV18-206517-C	180.000	0.088	0.000	1.698	169.000	1.595	0.020	5.618	5.394	0.500
w/mount pipe										
Sum Weight:		1.989								

Discrete Appurtenance Pressures - Service $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _{AAc} Front ft ²	C _{AAc} Side ft ²
LPA-80080/4CF	300.000	0.012	-1.008	-7.510	179.000	1.621	0.010	2.619	6.057
LPA-80080/4CF	300.000	0.012	-7.008	2.882	179.000	1.621	0.010	2.619	6.057
LPA-80080/4CF	60.000	0.012	7.008	2.882	179.000	1.621	0.010	2.619	6.057
LPA-80080/4CF	60.000	0.012	1.008	-7.510	179.000	1.621	0.010	2.619	6.057
LPA-80063/4CF	180.000	0.020	-6.000	4.627	179.000	1.621	0.010	7.011	6.084
LPA-80063/4CF	180.000	0.020	6.000	4.627	179.000	1.621	0.010	7.011	6.084
LPA-185080/8CF_2	300.000	0.007	-2.008	-5.778	179.000	1.621	0.010	2.095	2.786
LPA-185080/8CF_2	300.000	0.007	-6.008	1.150	179.000	1.621	0.010	2.095	2.786
LPA-185080/8CF_2	60.000	0.007	6.008	1.150	179.000	1.621	0.010	2.095	2.786
LPA-185080/8CF_2	60.000	0.007	2.008	-5.778	179.000	1.621	0.010	2.095	2.786
LPA-185063/8CFx2	180.000	0.009	-4.000	4.627	179.000	1.621	0.010	3.040	2.734
LPA-185063/8CFx2	180.000	0.009	4.000	4.627	179.000	1.621	0.010	3.040	2.734
Valmont T-Arm (1)	300.000	0.336	-2.275	-1.314	179.000	1.621	0.010	10.540	10.540

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Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _x	q _z ksf	C _A A _c Front ft ²	C _A A _c Side ft ²
Valmont T-Arm (1)	60.000	0.336	2.275	-1.314	179.000	1.621	0.010	10.540	10.540
Valmont T-Arm (1)	180.000	0.336	0.000	2.627	179.000	1.621	0.010	10.540	10.540
APXV18-206517-C w/mount pipe	300.000	0.048	-1.471	-0.849	169.000	1.595	0.010	5.167	4.463
APXV18-206517-C w/mount pipe	60.000	0.048	1.471	-0.849	169.000	1.595	0.010	5.167	4.463
APXV18-206517-C w/mount pipe	180.000	0.048	0.000	1.698	169.000	1.595	0.010	5.167	4.463
Sum Weight:		1.286							

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M _x kip-ft	Sum of Overturning Moments, M _z kip-ft	Sum of Torques kip-ft
Leg Weight	19.899					
Bracing Weight	0.000					
Total Member Self-Weight	19.899			0.093	0.000	
Total Weight	24.074			0.093	0.000	
Wind 0 deg - No Ice		0.000	-20.018	-2084.024	0.000	0.000
Wind 30 deg - No Ice		9.768	-17.336	-1804.806	-998.971	-0.005
Wind 45 deg - No Ice		13.814	-14.155	-1473.601	-1412.759	-0.008
Wind 60 deg - No Ice		16.919	-10.009	-1041.966	-1730.269	-0.009
Wind 90 deg - No Ice		19.536	0.000	0.093	-1997.943	-0.011
Wind 120 deg - No Ice		16.919	10.009	1042.151	-1730.269	-0.009
Wind 135 deg - No Ice		13.814	14.155	1473.786	-1412.759	-0.008
Wind 150 deg - No Ice		9.768	17.336	1804.991	-998.971	-0.005
Wind 180 deg - No Ice		0.000	20.018	2084.209	0.000	0.000
Wind 210 deg - No Ice		-9.768	17.336	1804.991	998.971	0.005
Wind 225 deg - No Ice		-13.814	14.155	1473.786	1412.759	0.008
Wind 240 deg - No Ice		-16.919	10.009	1042.151	1730.269	0.009
Wind 270 deg - No Ice		-19.536	0.000	0.093	1997.943	0.011
Wind 300 deg - No Ice		-16.919	-10.009	-1041.966	1730.269	0.009
Wind 315 deg - No Ice		-13.814	-14.155	-1473.601	1412.759	0.008
Wind 330 deg - No Ice		-9.768	-17.336	-1804.806	998.971	0.005
Member Ice	3.374					
Total Weight Ice	28.152			0.311	0.000	
Wind 0 deg - Ice		0.000	-16.035	-1710.927	0.000	0.000
Wind 30 deg - Ice		7.832	-13.887	-1481.665	-822.381	-0.004
Wind 45 deg - Ice		11.076	-11.339	-1209.717	-1163.022	-0.006
Wind 60 deg - Ice		13.565	-8.018	-855.308	-1424.405	-0.007
Wind 90 deg - Ice		15.664	0.000	0.311	-1644.761	-0.008
Wind 120 deg - Ice		13.565	8.018	855.931	-1424.405	-0.007
Wind 135 deg - Ice		11.076	11.339	1210.340	-1163.022	-0.006
Wind 150 deg - Ice		7.832	13.887	1482.287	-822.381	-0.004
Wind 180 deg - Ice		0.000	16.035	1711.550	0.000	0.000
Wind 210 deg - Ice		-7.832	13.887	1482.287	822.381	0.004
Wind 225 deg - Ice		-11.076	11.339	1210.340	1163.022	0.006
Wind 240 deg - Ice		-13.565	8.018	855.931	1424.405	0.007
Wind 270 deg - Ice		-15.664	0.000	0.311	1644.761	0.008
Wind 300 deg - Ice		-13.565	-8.018	-855.308	1424.405	0.007
Wind 315 deg - Ice		-11.076	-11.339	-1209.717	1163.022	0.006
Wind 330 deg - Ice		-7.832	-13.887	-1481.665	822.381	0.004
Total Weight	24.074			0.093	0.000	
Wind 0 deg - Service		0.000	-7.819	-814.016	0.000	0.000
Wind 30 deg - Service		3.816	-6.772	-704.946	-390.223	-0.002

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Load Case	Vertical Forces <i>K</i>	Sum of Forces <i>X</i> <i>K</i>	Sum of Forces <i>Z</i> <i>K</i>	Sum of Overturning Moments, <i>M_x</i> <i>kip-ft</i>	Sum of Overturning Moments, <i>M_z</i> <i>kip-ft</i>	Sum of Torques <i>kip-ft</i>
Wind 45 deg - Service		5.396	-5.529	-575.569	-551.859	-0.003
Wind 60 deg - Service		6.609	-3.910	-406.962	-675.886	-0.004
Wind 90 deg - Service		7.631	0.000	0.093	-780.446	-0.004
Wind 120 deg - Service		6.609	3.910	407.147	-675.886	-0.004
Wind 135 deg - Service		5.396	5.529	575.754	-551.859	-0.003
Wind 150 deg - Service		3.816	6.772	705.131	-390.223	-0.002
Wind 180 deg - Service		0.000	7.819	814.201	0.000	0.000
Wind 210 deg - Service		-3.816	6.772	705.131	390.223	0.002
Wind 225 deg - Service		-5.396	5.529	575.754	551.859	0.003
Wind 240 deg - Service		-6.609	3.910	407.147	675.886	0.004
Wind 270 deg - Service		-7.631	0.000	0.093	780.446	0.004
Wind 300 deg - Service		-6.609	-3.910	-406.962	675.886	0.004
Wind 315 deg - Service		-5.396	-5.529	-575.569	551.859	0.003
Wind 330 deg - Service		-3.816	-6.772	-704.946	390.223	0.002

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice
19	Dead+Wind 0 deg+Ice
20	Dead+Wind 30 deg+Ice
21	Dead+Wind 45 deg+Ice
22	Dead+Wind 60 deg+Ice
23	Dead+Wind 90 deg+Ice
24	Dead+Wind 120 deg+Ice
25	Dead+Wind 135 deg+Ice
26	Dead+Wind 150 deg+Ice
27	Dead+Wind 180 deg+Ice
28	Dead+Wind 210 deg+Ice
29	Dead+Wind 225 deg+Ice
30	Dead+Wind 240 deg+Ice
31	Dead+Wind 270 deg+Ice
32	Dead+Wind 300 deg+Ice
33	Dead+Wind 315 deg+Ice
34	Dead+Wind 330 deg+Ice
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service

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Comb. No.	Description
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	180 - 131	Pole	Max Tension	6	0.000	0.000	-0.000
			Max. Compression	18	-5.078	0.000	-0.319
			Max. Mx	6	-2.927	-243.503	-0.096
			Max. My	10	-2.805	0.000	-265.216
			Max. Vy	6	7.419	-243.503	-0.096
			Max. Vx	10	7.919	0.000	-265.216
			Max. Torque	23			0.028
L2	131 - 86.167	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-10.222	0.000	-0.319
			Max. Mx	6	-7.367	-657.403	-0.098
			Max. My	10	-7.278	0.000	-701.454
			Max. Vy	6	11.444	-657.403	-0.098
			Max. Vx	10	11.955	0.000	-701.454
			Max. Torque	23			0.028
L3	86.167 - 42.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-17.597	0.000	-0.319
			Max. Mx	6	-14.122	-1238.122	-0.099
			Max. My	10	-14.072	0.000	-1304.182
			Max. Vy	6	15.508	-1238.122	-0.099
			Max. Vx	10	16.016	0.000	-1304.182
			Max. Torque	23			0.027
L4	42.333 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-28.152	0.000	-0.319
			Max. Mx	6	-24.056	-2080.602	-0.100
			Max. My	10	-24.055	0.000	-2170.558
			Max. Vy	6	19.558	-2080.602	-0.100
			Max. Vx	10	20.041	0.000	-2170.558
			Max. Torque	23			0.027

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	19	28.152	0.000	16.035

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Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. H _x	14	24.074	19.536	0.000
	Max. H _z	2	24.074	0.000	20.018
	Max. M _x	2	2170.362	0.000	20.018
	Max. M _z	6	2080.602	-19.536	0.000
	Max. Torsion	23	0.027	-15.664	0.000
	Min. Vert	1	24.074	0.000	0.000
	Min. H _x	6	24.074	-19.536	0.000
	Min. H _z	10	24.074	0.000	-20.018
	Min. M _x	10	-2170.558	0.000	-20.018
	Min. M _z	14	-2080.602	19.536	0.000
	Min. Torsion	31	-0.027	15.664	0.000

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	24.074	0.000	0.000	0.093	0.000	0.000
Dead+Wind 0 deg - No Ice	24.074	0.000	-20.018	-2170.362	0.000	0.000
Dead+Wind 30 deg - No Ice	24.074	9.768	-17.336	-1879.761	-1040.017	-0.012
Dead+Wind 45 deg - No Ice	24.074	13.814	-14.155	-1534.946	-1470.942	-0.015
Dead+Wind 60 deg - No Ice	24.074	16.919	-10.009	-1085.444	-1801.696	-0.018
Dead+Wind 90 deg - No Ice	24.074	19.536	0.000	0.100	-2080.602	-0.017
Dead+Wind 120 deg - No Ice	24.074	16.919	10.009	1085.643	-1801.694	-0.012
Dead+Wind 135 deg - No Ice	24.074	13.814	14.155	1535.144	-1470.940	-0.009
Dead+Wind 150 deg - No Ice	24.074	9.768	17.336	1879.958	-1040.015	-0.005
Dead+Wind 180 deg - No Ice	24.074	0.000	20.018	2170.558	0.000	0.000
Dead+Wind 210 deg - No Ice	24.074	-9.768	17.336	1879.958	1040.015	0.005
Dead+Wind 225 deg - No Ice	24.074	-13.814	14.155	1535.144	1470.940	0.009
Dead+Wind 240 deg - No Ice	24.074	-16.919	10.009	1085.643	1801.694	0.012
Dead+Wind 270 deg - No Ice	24.074	-19.536	0.000	0.100	2080.602	0.017
Dead+Wind 300 deg - No Ice	24.074	-16.919	-10.009	-1085.444	1801.696	0.018
Dead+Wind 315 deg - No Ice	24.074	-13.814	-14.155	-1534.946	1470.942	0.015
Dead+Wind 330 deg - No Ice	24.074	-9.768	-17.336	-1879.761	1040.017	0.012
Dead+Ice	28.152	0.000	0.000	0.319	0.000	0.000
Dead+Wind 0 deg+Ice	28.152	0.000	-16.035	-1805.525	0.000	0.000
Dead+Wind 30 deg+Ice	28.152	7.832	-13.887	-1563.691	-867.458	-0.015
Dead+Wind 45 deg+Ice	28.152	11.076	-11.339	-1276.770	-1226.851	-0.021
Dead+Wind 60 deg+Ice	28.152	13.565	-8.018	-902.771	-1502.678	-0.025
Dead+Wind 90 deg+Ice	28.152	15.664	0.000	0.348	-1735.254	-0.027
Dead+Wind 120 deg+Ice	28.152	13.565	8.018	903.464	-1502.673	-0.023
Dead+Wind 135 deg+Ice	28.152	11.076	11.339	1277.460	-1226.845	-0.018
Dead+Wind 150 deg+Ice	28.152	7.832	13.887	1564.377	-867.453	-0.012
Dead+Wind 180 deg+Ice	28.152	0.000	16.035	1806.208	0.000	0.000
Dead+Wind 210 deg+Ice	28.152	-7.832	13.887	1564.377	867.453	0.012
Dead+Wind 225 deg+Ice	28.152	-11.076	11.339	1277.460	1226.845	0.018
Dead+Wind 240 deg+Ice	28.152	-13.565	8.018	903.464	1502.673	0.023
Dead+Wind 270 deg+Ice	28.152	-15.664	0.000	0.348	1735.254	0.027
Dead+Wind 300 deg+Ice	28.152	-13.565	-8.018	-902.771	1502.678	0.025
Dead+Wind 315 deg+Ice	28.152	-11.076	-11.339	-1276.770	1226.851	0.021
Dead+Wind 330 deg+Ice	28.152	-7.832	-13.887	-1563.691	867.458	0.015
Dead+Wind 0 deg - Service	24.074	0.000	-7.819	-850.167	0.000	0.000
Dead+Wind 30 deg - Service	24.074	3.816	-6.772	-736.268	-407.365	-0.003
Dead+Wind 45 deg - Service	24.074	5.396	-5.529	-601.151	-576.109	-0.005
Dead+Wind 60 deg - Service	24.074	6.609	-3.910	-425.054	-705.597	-0.006
Dead+Wind 90 deg - Service	24.074	7.631	0.000	0.102	-814.759	-0.007
Dead+Wind 120 deg - Service	24.074	6.609	3.910	425.257	-705.596	-0.006

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Load Combination	Vertical K	Shear _x K	Shear _y K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Dead+Wind 135 deg - Service	24.074	5.396	5.529	601.354	-576.109	-0.005
Dead+Wind 150 deg - Service	24.074	3.816	6.772	736.471	-407.364	-0.004
Dead+Wind 180 deg - Service	24.074	0.000	7.819	850.369	0.000	0.000
Dead+Wind 210 deg - Service	24.074	-3.816	6.772	736.471	407.364	0.004
Dead+Wind 225 deg - Service	24.074	-5.396	5.529	601.354	576.109	0.005
Dead+Wind 240 deg - Service	24.074	-6.609	3.910	425.257	705.596	0.006
Dead+Wind 270 deg - Service	24.074	-7.631	0.000	0.102	814.759	0.007
Dead+Wind 300 deg - Service	24.074	-6.609	-3.910	-425.054	705.597	0.006
Dead+Wind 315 deg - Service	24.074	-5.396	-5.529	-601.151	576.109	0.005
Dead+Wind 330 deg - Service	24.074	-3.816	-6.772	-736.268	407.365	0.003

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-24.074	0.000	0.000	24.074	0.000	0.000%
2	0.000	-24.074	-20.018	0.000	24.074	20.018	0.000%
3	9.768	-24.074	-17.336	-9.768	24.074	17.336	0.000%
4	13.814	-24.074	-14.155	-13.814	24.074	14.155	0.000%
5	16.919	-24.074	-10.009	-16.919	24.074	10.009	0.000%
6	19.536	-24.074	0.000	-19.536	24.074	0.000	0.000%
7	16.919	-24.074	10.009	-16.919	24.074	-10.009	0.000%
8	13.814	-24.074	14.155	-13.814	24.074	-14.155	0.000%
9	9.768	-24.074	17.336	-9.768	24.074	-17.336	0.000%
10	0.000	-24.074	20.018	0.000	24.074	-20.018	0.000%
11	-9.768	-24.074	17.336	9.768	24.074	-17.336	0.000%
12	-13.814	-24.074	14.155	13.814	24.074	-14.155	0.000%
13	-16.919	-24.074	10.009	16.919	24.074	-10.009	0.000%
14	-19.536	-24.074	0.000	19.536	24.074	0.000	0.000%
15	-16.919	-24.074	-10.009	16.919	24.074	10.009	0.000%
16	-13.814	-24.074	-14.155	13.814	24.074	14.155	0.000%
17	-9.768	-24.074	-17.336	9.768	24.074	17.336	0.000%
18	0.000	-28.152	0.000	0.000	28.152	0.000	0.000%
19	0.000	-28.152	-16.035	0.000	28.152	16.035	0.000%
20	7.832	-28.152	-13.887	-7.832	28.152	13.887	0.000%
21	11.076	-28.152	-11.339	-11.076	28.152	11.339	0.000%
22	13.565	-28.152	-8.018	-13.565	28.152	8.018	0.000%
23	15.664	-28.152	0.000	-15.664	28.152	0.000	0.000%
24	13.565	-28.152	8.018	-13.565	28.152	-8.018	0.000%
25	11.076	-28.152	11.339	-11.076	28.152	-11.339	0.000%
26	7.832	-28.152	13.887	-7.832	28.152	-13.887	0.000%
27	0.000	-28.152	16.035	0.000	28.152	-16.035	0.000%
28	-7.832	-28.152	13.887	7.832	28.152	-13.887	0.000%
29	-11.076	-28.152	11.339	11.076	28.152	-11.339	0.000%
30	-13.565	-28.152	8.018	13.565	28.152	-8.018	0.000%
31	-15.664	-28.152	0.000	15.664	28.152	0.000	0.000%
32	-13.565	-28.152	-8.018	13.565	28.152	8.018	0.000%
33	-11.076	-28.152	-11.339	11.076	28.152	11.339	0.000%
34	-7.832	-28.152	-13.887	7.832	28.152	13.887	0.000%
35	0.000	-24.074	-7.819	0.000	24.074	7.819	0.000%
36	3.816	-24.074	-6.772	-3.816	24.074	6.772	0.000%
37	5.396	-24.074	-5.529	-5.396	24.074	5.529	0.000%
38	6.609	-24.074	-3.910	-6.609	24.074	3.910	0.000%
39	7.631	-24.074	0.000	-7.631	24.074	0.000	0.000%
40	6.609	-24.074	3.910	-6.609	24.074	-3.910	0.000%
41	5.396	-24.074	5.529	-5.396	24.074	-5.529	0.000%
42	3.816	-24.074	6.772	-3.816	24.074	-6.772	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
43	0.000	-24.074	7.819	0.000	24.074	-7.819	0.000%
44	-3.816	-24.074	6.772	3.816	24.074	-6.772	0.000%
45	-5.396	-24.074	5.529	5.396	24.074	-5.529	0.000%
46	-6.609	-24.074	3.910	6.609	24.074	-3.910	0.000%
47	-7.631	-24.074	0.000	7.631	24.074	0.000	0.000%
48	-6.609	-24.074	-3.910	6.609	24.074	3.910	0.000%
49	-5.396	-24.074	-5.529	5.396	24.074	5.529	0.000%
50	-3.816	-24.074	-6.772	3.816	24.074	6.772	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00092403
3	Yes	6	0.00000001	0.00006594
4	Yes	6	0.00000001	0.00006550
5	Yes	6	0.00000001	0.00006547
6	Yes	4	0.00000001	0.00092034
7	Yes	6	0.00000001	0.00006539
8	Yes	6	0.00000001	0.00006550
9	Yes	6	0.00000001	0.00006596
10	Yes	4	0.00000001	0.00092355
11	Yes	6	0.00000001	0.00006596
12	Yes	6	0.00000001	0.00006550
13	Yes	6	0.00000001	0.00006539
14	Yes	4	0.00000001	0.00092034
15	Yes	6	0.00000001	0.00006547
16	Yes	6	0.00000001	0.00006550
17	Yes	6	0.00000001	0.00006594
18	Yes	4	0.00000001	0.00000001
19	Yes	5	0.00000001	0.00000941
20	Yes	6	0.00000001	0.00016849
21	Yes	6	0.00000001	0.00018049
22	Yes	6	0.00000001	0.00016631
23	Yes	5	0.00000001	0.00000951
24	Yes	6	0.00000001	0.00016614
25	Yes	6	0.00000001	0.00018059
26	Yes	6	0.00000001	0.00016874
27	Yes	5	0.00000001	0.00000939
28	Yes	6	0.00000001	0.00016874
29	Yes	6	0.00000001	0.00018059
30	Yes	6	0.00000001	0.00016614
31	Yes	5	0.00000001	0.00000951
32	Yes	6	0.00000001	0.00016631
33	Yes	6	0.00000001	0.00018049
34	Yes	6	0.00000001	0.00016849
35	Yes	4	0.00000001	0.00032305
36	Yes	5	0.00000001	0.00022478
37	Yes	5	0.00000001	0.00025329
38	Yes	5	0.00000001	0.00021835
39	Yes	4	0.00000001	0.00029306
40	Yes	5	0.00000001	0.00021836
41	Yes	5	0.00000001	0.00025364
42	Yes	5	0.00000001	0.00022526
43	Yes	4	0.00000001	0.00032335

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44	Yes	5	0.00000001	0.00022526
45	Yes	5	0.00000001	0.00025364
46	Yes	5	0.00000001	0.00021836
47	Yes	4	0.00000001	0.00029306
48	Yes	5	0.00000001	0.00021835
49	Yes	5	0.00000001	0.00025329
50	Yes	5	0.00000001	0.00022478

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 131	72.917	43	3.823	0.002
L2	135 - 86.167	39.871	43	2.971	0.001
L3	91 - 42.333	17.407	43	1.850	0.000
L4	48 - 0	4.783	43	0.917	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.000	LPA-80080/4CF	43	72.135	3.806	0.002	16923
169.000	APXV18-206517-C w/mount pipe	43	64.341	3.632	0.001	7691

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 131	185.155	10	9.713	0.009
L2	135 - 86.167	101.447	10	7.558	0.003
L3	91 - 42.333	44.360	10	4.713	0.001
L4	48 - 0	12.200	10	2.340	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.000	LPA-80080/4CF	10	183.174	9.670	0.009	6973
169.000	APXV18-206517-C w/mount pipe	10	163.442	9.236	0.008	3167

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Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
L1	180 - 131 (1)	TP23.22x14.89x0.219	49.000	0.000	0.0	39.000	15.740	-2.805	613.873	0.005
L2	131 - 86.167 (2)	TP30.41x22.102x0.281	48.833	0.000	0.0	39.000	26.517	-7.278	1034.180	0.007
L3	86.167 - 42.333 (3)	TP37.29x29.026x0.344	48.667	0.000	0.0	39.000	39.858	-14.072	1554.480	0.009
L4	42.333 - 0 (4)	TP43.8x35.64x0.375	48.000	0.000	0.0	39.000	52.436	-24.055	2044.990	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}
L1	180 - 131 (1)	TP23.22x14.89x0.219	265.216	37.123	39.000	0.952	0.000	0.000	39.000	0.000
L2	131 - 86.167 (2)	TP30.41x22.102x0.281	701.453	44.378	39.000	1.138	0.000	0.000	39.000	0.000
L3	86.167 - 42.333 (3)	TP37.29x29.026x0.344	1304.183	44.706	39.000	1.146	0.000	0.000	39.000	0.000
L4	42.333 - 0 (4)	TP43.8x35.64x0.375	2170.558	46.824	39.000	1.201	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f _v ksi	Allow. F _v ksi	Ratio f _v F _v	Actual T kip-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio f _{vt} F _{vt}
L1	180 - 131 (1)	TP23.22x14.89x0.219	7.919	0.503	26.000	0.039	0.000	0.000	26.000	0.000
L2	131 - 86.167 (2)	TP30.41x22.102x0.281	11.955	0.451	26.000	0.035	0.000	0.000	26.000	0.000
L3	86.167 - 42.333 (3)	TP37.29x29.026x0.344	16.016	0.402	26.000	0.031	0.000	0.000	26.000	0.000
L4	42.333 - 0 (4)	TP43.8x35.64x0.375	20.041	0.382	26.000	0.030	0.000	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P _a	Ratio f _{bx} F _{bx}	Ratio f _{by} F _{by}	Ratio f _v F _v	Ratio f _{vt} F _{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 131 (1)	0.005	0.952	0.000	0.039	0.000	0.957 ✓	1.333	H1-3+VT ✓
L2	131 - 86.167 (2)	0.007	1.138	0.000	0.035	0.000	1.145 ✓	1.333	H1-3+VT ✓

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' Valmont Monopole_Rev ~ 1	Page	20 of 20
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	Client	Verizon/Pocket	Designed by	Staff

Section No.	Elevation ft	Ratio P_a	Ratio f_{bx}	Ratio f_{by}	Ratio f_v	Ratio f_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	86.167 - 42.333 (3)	0.009	1.146	0.000	0.031	0.000	1.156 ✓	1.333	H1-3+VT ✓
L4	42.333 - 0 (4)	0.012	1.201	0.000	0.030	0.000	1.213 ✓	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF* P_{allow} K	% Capacity	Pass Fail
L1	180 - 131	Pole	TP23.22x14.89x0.219	1	-2.805	818.293	71.8	Pass
L2	131 - 86.167	Pole	TP30.41x22.102x0.281	2	-7.278	1378.562	85.9	Pass
L3	86.167 - 42.333	Pole	TP37.29x29.026x0.344	3	-14.072	2072.122	86.7	Pass
L4	42.333 - 0	Pole	TP43.8x35.64x0.375	4	-24.055	2725.972	91.0	Pass
							Summary	
							Pole (L4)	91.0
							RATING =	91.0
								Pass

Element Map

Section No.	Section Elevation ft	Component Type	Element List
L1	180.000-131.000	Pole	1
L2	131.000-86.167	Pole	2
L3	86.167-42.333	Pole	3
L4	42.333-0.000	Pole	4
			Total number of elements: 4

ANCHOR BOLT AND BASEPLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	OM := 2171·kips·ft	user input
Shear Force:	Shear := 20.0·kips	user input
Axial Force:	Axial := 24.0·kips	user input

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = N	N := 12	user input
Bolt Ultimate Strength:	$F_u := 100\text{·ksi}$	user input
Bolt Allowable Strength:	$F_y := 75\text{·ksi}$	user input
Diameter Of Anchor Bolts	D := 2.25in	user input
Threaded length per inch	n := 4.5	user input
Bolt "Column" Distance:	l := 2.5in	user input
Bolt Modulus:	E := 29000·ksi	user input

Base Plate Data:

Use ASTM A572 Grade 60

Plate Yield Strength:	$F_{ybp} := 60\text{·ksi}$	user input
Base Plate Thickness:	PlateThicknessProvide := 2.625·in	user input

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Description Anchor Bolt and Base Plate Analysis

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Geometric Layout Data:

Distance from the center of gravity of the group to bolt in question = $d(i)$

Distances for loading condition (see detail):

$d_1 := 25.92 \cdot \text{in}$ *user input*

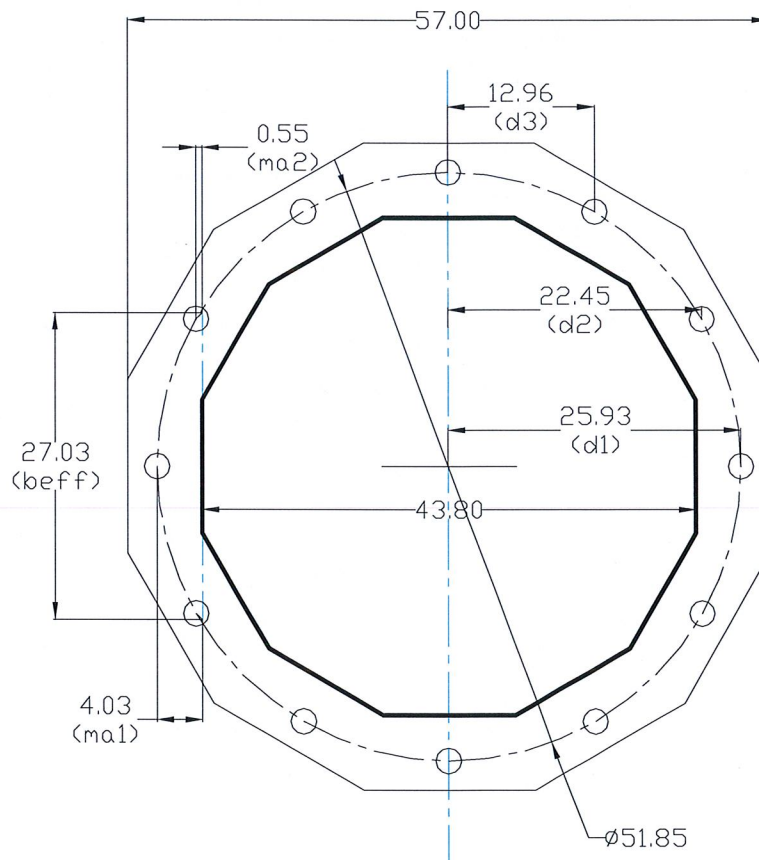
MomentArm₁ := 4.03 · in *user input*

$d_2 := 22.45 \cdot \text{in}$ *user input*

MomentArm₂ := 0.55 · in *user input*

$d_3 := 12.96 \cdot \text{in}$ *user input*

EffectiveWidth := 27.03 · in *user input*



DETAIL - ANCHOR BOLT AND PLATE

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Description Anchor Bolt and Base Plate Analysis

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Anchor Bolt Section Properties:

Polar Moment of Inertia (J) divided by Area (A) = Σd

$$\Sigma d := (d_1)^2 \cdot 2 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 4$$

$$\Sigma d = 4.03 \times 10^3 \cdot \text{in}^2$$

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2$$

$$A_g = 3.98 \cdot \text{in}^2$$

Net Area of Bolt:

$$A_{\text{net}} := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2$$

$$A_{\text{net}} = 3.25 \cdot \text{in}^2$$

Net Diameter:

$$D_n := \frac{2 \cdot \sqrt{A_{\text{net}}}}{\sqrt{\pi}}$$

$$D_n = 2.03 \cdot \text{in}$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4}$$

$$r = 0.51 \cdot \text{in}$$

Section Modulus of Bolt:

$$S_x := \frac{\pi \cdot D_n^3}{32}$$

$$S_x = 0.83 \cdot \text{in}^3$$

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{\text{Shear}}{N} \right) \cdot l$$

$$M_x = 0.35 \cdot \text{kips} \cdot \text{ft}$$

$$f_{bx} := \frac{M_x}{S_x}$$

$$f_{bx} = 5.05 \cdot \text{ksi}$$

Allowable Bending

$$F_{bx} := 1.333 \cdot 0.60 \cdot F_y$$

$$F_{bx} = 59.98 \cdot \text{ksi}$$

Note: 1.333 increase allowed per TIA/EIA

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Anchor Bolt Tensile Stress Check:

Maximum Tensile Force (Gross Area):

$$\text{AllowableTension} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u)$$

$$\text{AllowableTension} = 174.9 \text{ kips}$$

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{\text{net.area}} := 1.333 \cdot (0.60 \cdot A_{\text{net}} \cdot F_y)$$

$$F_{\text{net.area}} = 194.81 \text{ kips}$$

Note: 1.333 increase allowed per TIA/EIA

Maximum Applied Tension:

$$\text{MaxTension} := \frac{\text{OM} \cdot d_1}{\Sigma d} - \frac{\text{Axial}}{N}$$

$$\text{MaxTension} = 165.5 \text{ kips}$$

Check Stresses:

Note: Bolts supplied are "upset bolts." Use net area for checking per AISC.

$$\text{AnchorBoltStress} := \text{if}(F_{\text{net.area}} > \text{MaxTension}, \text{"Not Overstressed"}, \text{"Overstressed"})$$

$$\text{AnchorBoltStress} = \text{"Not Overstressed"}$$

$$\text{PercentStressed} := 100 \cdot \frac{\text{MaxTension}}{F_{\text{net.area}}}$$

$$\text{PercentStressed} = 85$$

Note: Shear Stress is negligible

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Check Compression & Combined Stresses (if required):

Check to see if a complete combined stress analysis is required:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required."

Set the clear space between the plate and bolt to zero if a combined stress analysis is not required and set the bending stress to zero:

$$l := \begin{cases} 1 & \text{if } l > 2 \cdot D_n \\ 0.0 \text{ in} & \text{otherwise} \end{cases} \quad l = 0 \quad f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0 \text{ ksi} & \text{otherwise} \end{cases} \quad f_{bx} = 0 \cdot \text{ksi}$$

Allowable Compressive Force:

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} \quad C_c = 87.36$$

$$F_a := \begin{cases} \frac{\left[1 - \frac{\left(\frac{K \cdot l}{r} \right)^2}{2 \cdot C_c^2} \right] \cdot F_y}{\frac{5}{3} + \frac{3 \cdot \left(\frac{K \cdot l}{r} \right)}{8 \cdot C_c} - \frac{\left(\frac{K \cdot l}{r} \right)^3}{8 \cdot C_c^3}} & \text{if } \frac{K \cdot l}{r} \leq C_c \\ \frac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r} \right)^2} & \text{if } \frac{K \cdot l}{r} > C_c \end{cases} \quad F_a = 45 \cdot \text{ksi}$$

$$F_a := 1.333 \cdot F_a \quad \text{Note: 1.333 increase allowed per TIA/EIA} \quad F_a = 59.98 \cdot \text{ksi}$$

Applied Compressive Force:

$$\text{MaxCompression} := \frac{\text{OM} \cdot d_1}{\Sigma d} + \frac{\text{Axial}}{N} \quad \text{MaxCompression} = 169.5 \cdot \text{kips}$$

$$f_a := \frac{\text{MaxCompression}}{A_{\text{net}}} \quad f_a = 52.19 \cdot \text{ksi}$$

Check Combined Stresses:

$$\text{StressRatio} := \frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \quad \text{StressRatio} = 0.87$$

Condition := if (StressRatio ≤ 1.0, "Not Overstressed", "Overstressed")

Condition = "Not Overstressed"

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Base Plate Analysis:

Force From Bolt(s):

$$C_1 := \frac{OM \cdot d_1}{\Sigma d} + \frac{Axial}{N} \quad C_1 = 169.5 \cdot \text{kips}$$

$$C_2 := \frac{OM \cdot d_2}{\Sigma d} + \frac{Axial}{N} \quad C_2 = 147.07 \cdot \text{kips}$$

Bending Stress In Plate:

$$f_{bp} := \frac{6 \cdot (C_1 \cdot \text{MomentArm}_1 + 2C_2 \cdot \text{MomentArm}_2)}{\text{EffectiveWidth} \cdot \text{PlateThicknessProvide}^2} \quad f_{bp} = 46.72 \cdot \text{ksi}$$

Check Stresses:

$$\text{BasePlateRatio} := \frac{f_{bp}}{1.333 \cdot 0.75 F_{y_{bp}}} \quad \text{BasePlateRatio} = 0.78$$

BasePlateStress := if(BasePlateRatio < 1, "Not Over Stress", "Is Over Stress")

BasePlateStress = "Not Over Stress"

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Job 180' Monopole - Plymouth, CT - Rev 1

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Description Caisson Foundation Evaluation

Computed by Staff

Date 01/14/09

Checked by _____

Date _____

Check Foundation Depth

TIA/EIA-222-F 7.2.5

Shear Force:

$$S_x := 20.0k$$

USER INPUT

Overturning Moment:

$$M := 2171ft \cdot k$$

USER INPUT

Foundation Diameter:

$$d := 5.5ft$$

USER INPUT

Overall Length of
Caisson:

$$L_c := 14.25ft$$

USER INPUT

Depth From Top of
Caisson to Grade:

$$L_{pag} := 1.0ft$$

USER INPUT

Depth of Caisson Below
Ground Level:

$$LD := L_c - L_{pag} \quad LD = 13.2ft$$

USER INPUT

Depth Required:

$$LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d} \right) + 2ft^{.5} \left(\frac{M \cdot ft}{3 \cdot k \cdot d} + \frac{S \cdot ft}{2k} + \frac{S^2 \cdot ft^3}{18k^2 \cdot d^2} \right)^{.5} \quad LD1 = 27.1ft$$

DepthCheck := if(LD1 ≤ LD, "OK", "NO GOOD") DepthCheck = "NO GOOD"

Note: Result not applicable.
Actual soil is better than
normal soil as defined in
TIA/EIA 222 F.
Refer to L-Pile analysis.

Moment Capacity:

Bending Moment:

$$M_u := 2193.8ft \cdot k$$

USER INPUT--FROM LPILE

Moment Capacity:

$$M_n := 4110.6ft \cdot k$$

USER INPUT--FROM LPILE

Factor of Safety:

$$FS := \frac{M_n}{M_u} \quad FS = 1.9$$

Factor of Safety
Required

$$FS_{reqd} := 1.3 \quad FOSCheck := \text{if}(FS \geq FS_{reqd}, "OK", "NO GOOD") \quad FOSCheck = "OK"$$

Axial Capacity:

Applied Axial Load:

$$A1 := 24.0k$$

USER INPUT

Concrete Weight:

$$A2 := .150 \frac{k}{ft^3} \cdot LD \cdot \pi \frac{d^2}{4} \quad A2 = 47.2 \cdot k$$

Total Axial Load:

$$AT := A1 + A2 \quad AT = 71.2 \cdot k$$

Number of Rebar:

$$n := 20$$

USER INPUT

Area of Rebar:

$$A_r := 1.560in^2$$

USER INPUT

#11

Rebar Yield Strength:

$$f_y := 60ksi$$

USER INPUT

Area of Concrete:

$$A_g := \pi \cdot \frac{d^2}{4}$$

Concrete Comp Strength:

$$f_c := 3ksi$$

USER INPUT

Axial Capacity:

$$P_o := n \cdot A_r \cdot f_y + (A_g - n \cdot A_r) \cdot 0.85 \cdot f_c \quad P_o = 10516.5 \cdot k$$

AxialCheck := if(AT ≤ Po, "OK", "NO GOOD")

AxialCheck = "OK"

Plymouth Drilled Foundation.lpo

LPILE Plus for windows, version 5.0 (5.0.39)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

User
NATCOMM Inc

Path to file locations: J:\Jobs\0813600.WI\CO-09 - 42 South Street, Plymouth,
CT\Rev (1)\LPile\
Name of input data file: Plymouth Drilled Foundation.lpd
Name of output file: Plymouth Drilled Foundation.lpo
Name of plot output file: Plymouth Drilled Foundation.lpp
Name of runtime file: Plymouth Drilled Foundation.lpr

Time and Date of Analysis

Date: January 14, 2009 Time: 13:20:33

Problem Title

180' Monopole - Plymouth, CT Rev 1

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:

- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:

- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:

Plymouth Drilled Foundation.lpo

- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:

- values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 171.00 in
 Depth of ground surface below top of pile = 12.00 in
 Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	66.00000000	931420.1800	3421.1900	3120000.
2	171.0000	66.00000000	931420.1800	3421.1900	3120000.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is strong rock (vuggy limestone)
 Distance from top of pile to top of layer = 12.000 in
 Distance from top of pile to bottom of layer = 300.000 in

(Depth of lowest layer extends 129.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 2 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	12.00	.07800
2	300.00	.07800

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Shear Strength of Soils

Shear strength parameters with depth defined using 2 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k _{rm}	RQD %
1	12.000	3280.00000	.00	-----	-----
2	300.000	3280.00000	.00	-----	-----

Notes:

- (1) Cohesion = uniaxial compressive strength for rock materials.
- (2) Values of E50 are reported for clay strata.
- (3) Default values will be generated for E50 when input values are 0.
- (4) RQD and k_{rm} are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)

Shear force at pile head = 20000.000 lbs

Bending moment at pile head = 26052000.000 in-lbs

Axial load at pile head = 24000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Plymouth Drilled Foundation.lpo
 Outside Diameter = 66.0000 in

Material Properties:

Compressive Strength of Concrete = 3.000 kip/in**2
 Yield Stress of Reinforcement = 60. kip/in**2
 Modulus of Elasticity of Reinforcement = 29000. kip/in**2
 Number of Reinforcing Bars = 20
 Area of Single Bar = 1.56000 in**2
 Number of Rows of Reinforcing Bars = 11
 Area of Steel = 31.200 in**2
 Area of Shaft = 3421.194 in**2
 Percentage of Steel Reinforcement = .912 percent
 Cover Thickness (edge to bar center) = 4.000 in

Unfactored Axial Squash Load Capacity = 10516.49 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.560	29.000
2	3.120	27.581
3	3.120	23.461
4	3.120	17.046
5	3.120	8.961
6	3.120	0.000
7	3.120	-8.961
8	3.120	-17.046
9	3.120	-23.461
10	3.120	-27.581
11	1.560	-29.000

Axial Thrust Force = 24000.00 lbs

Bending Max. Steel Moment Stress in-lbs psi	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi
2753519.	3.304222E+12	8.333333E-07	.00002967	35.60239524	91.16543236
763.72455					
5478911.	3.287347E+12	.00000167	.00005727	34.36289996	174.39588
1467.54016					
8176412.	3.270565E+12	.00000250	.00008491	33.96461552	256.30443
2172.43463					
10845266.	3.253580E+12	.00000333	.00011251	33.75423807	336.66616
2876.24301					
13485822.	3.236597E+12	.00000417	.00014012	33.62794787	415.59413
3580.04370					
13485822.	2.697164E+12	.00000500	.00009271	18.54171914	275.44662
6301.45072					
13485822.	2.311855E+12	.00000583	.00010697	18.33697504	316.30516
7386.32839					
13485822.	2.022873E+12	.00000667	.00012124	18.18640083	356.85149
8470.62917					
13485822.	1.798110E+12	.00000750	.00013554	18.07196349	397.08452

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9554.34794					
13485822.	1.618299E+12	.00000833	.00014986	17.98283297	437.00289
10637.48203					
13485822.	1.471181E+12	.00000917	.00016419	17.91212887	476.60553
11720.02574					
13485822.	1.348582E+12	.00001000	.00017855	17.85526425	515.89134
12801.97337					
13485822.	1.244845E+12	.00001083	.00019293	17.80904871	554.85876
13883.32386					
13485822.	1.155928E+12	.00001167	.00020733	17.77122420	593.50689
14964.06915					
13485822.	1.078866E+12	.00001250	.00022175	17.74012274	631.83437
16044.20551					
13485822.	1.011437E+12	.00001333	.00023619	17.71449333	669.83984
17123.72924					
13485822.	9.519404E+11	.00001417	.00025066	17.69338006	707.52195
18202.63636					
13485822.	8.990548E+11	.00001500	.00026514	17.67605120	744.87978
19280.91773					
13485822.	8.517361E+11	.00001583	.00027965	17.66190881	781.91157
20358.57354					
13485822.	8.091493E+11	.00001667	.00029417	17.65049261	818.61631
21435.59524					
13761772.	7.863870E+11	.00001750	.00030872	17.64142102	854.99255
22511.97883					
14388776.	7.848423E+11	.00001833	.00032330	17.63438326	891.03891
23587.71957					
15014878.	7.833849E+11	.00001917	.00033789	17.62912756	926.75420
24662.80993					
15640066.	7.820033E+11	.00002000	.00035251	17.62543362	962.13670
25737.24850					
16264338.	7.806882E+11	.00002083	.00036715	17.62312835	997.18529
26811.02662					
16887683.	7.794315E+11	.00002167	.00038181	17.62205440	1031.89823
27884.14249					
17510101.	7.782267E+11	.00002250	.00039650	17.62208980	1066.27444
28956.58640					
18131586.	7.770680E+11	.00002333	.00041121	17.62312442	1100.31248
30028.35248					
18752124.	7.759500E+11	.00002417	.00042594	17.62505597	1134.01045
31099.43994					
19371716.	7.748686E+11	.00002500	.00044070	17.62780970	1167.36729
32169.83797					
19990351.	7.738201E+11	.00002583	.00045548	17.63131088	1200.38128
33239.54293					
20608028.	7.728010E+11	.00002667	.00047028	17.63550049	1233.05111
34308.54629					
21224728.	7.718083E+11	.00002750	.00048511	17.64031559	1265.37473
35376.84832					
21840457.	7.708397E+11	.00002833	.00049996	17.64571685	1297.35109
36444.43599					
22455206.	7.698928E+11	.00002917	.00051484	17.65166098	1328.97858
37511.30342					
23068960.	7.689653E+11	.00003000	.00052974	17.65810472	1360.25523
38577.44890					
23681716.	7.680556E+11	.00003083	.00054467	17.66501659	1391.17953
39642.86433					
24293468.	7.671621E+11	.00003167	.00055963	17.67236906	1421.74999
40707.54108					
24904214.	7.662835E+11	.00003250	.00057460	17.68013853	1451.96514
41771.46944					
26122628.	7.645647E+11	.00003417	.00060464	17.69681436	1511.32130
43897.07311					

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27336904.	7.628903E+11	.00003583	.00063478	17.71488672	1569.23461
46019.61354					
28546971.	7.612525E+11	.00003750	.00066503	17.73421794	1625.69049
48139.03799					
29752772.	7.596452E+11	.00003917	.00069539	17.75470573	1680.67476
50255.28008					
30954237.	7.580629E+11	.00004083	.00072586	17.77625960	1734.17230
52368.27926					
32151287.	7.565009E+11	.00004250	.00075645	17.79880089	1786.16724
54477.97791					
33343857.	7.549553E+11	.00004417	.00078715	17.82227451	1836.64406
56584.30340					
34531879.	7.534228E+11	.00004583	.00081797	17.84663326	1885.58656
58687.18330					
35660787.	7.507534E+11	.00004750	.00084845	17.86204237	1932.25693
60000.00000					
36568727.	7.437707E+11	.00004917	.00087714	17.84019738	1974.56756
60000.00000					
37313501.	7.340361E+11	.00005083	.00090451	17.79361206	2013.45706
60000.00000					
38055459.	7.248659E+11	.00005250	.00093196	17.75160974	2051.10491
60000.00000					
38681969.	7.141287E+11	.00005417	.00095837	17.69302207	2085.98949
60000.00000					
39168036.	7.015171E+11	.00005583	.00098348	17.61448163	2117.91408
60000.00000					
39665254.	6.898305E+11	.00005750	.00101121	17.58631879	2151.98620
60000.00000					
40145618.	6.785175E+11	.00005917	.00103618	17.51282555	2181.34258
60000.00000					
40624026.	6.677922E+11	.00006083	.00106121	17.44452506	2209.65606
60000.00000					
41100475.	6.576076E+11	.00006250	.00108631	17.38102788	2236.91847
60000.00000					
41472672.	6.463274E+11	.00006417	.00111013	17.30076832	2261.68136
60000.00000					
41752449.	6.342144E+11	.00006583	.00113280	17.20708233	2284.25482
60000.00000					
42030909.	6.226801E+11	.00006750	.00115552	17.11883301	2305.96150
60000.00000					
42308033.	6.116824E+11	.00006917	.00117830	17.03563482	2326.79494
60000.00000					
42583811.	6.011832E+11	.00007083	.00120113	16.95714158	2346.74873
60000.00000					
42858229.	5.911480E+11	.00007250	.00122402	16.88303858	2365.81633
60000.00000					
43131260.	5.815451E+11	.00007417	.00124697	16.81303471	2383.99076
60000.00000					
43402904.	5.723460E+11	.00007583	.00126997	16.74687427	2401.26554
60000.00000					
43673142.	5.635244E+11	.00007750	.00129303	16.68431729	2417.63363
60000.00000					
43941952.	5.550562E+11	.00007917	.00131616	16.62514347	2433.08781
60000.00000					
44209327.	5.469195E+11	.00008083	.00133934	16.56915611	2447.62105
60000.00000					
44399515.	5.381759E+11	.00008250	.00136125	16.50000197	2460.44036
60000.00000					
44564167.	5.294753E+11	.00008417	.00138675	16.47619790	2474.36038
60000.00000					
44699212.	5.207675E+11	.00008583	.00140721	16.39472276	2484.59316
60000.00000					
44833367.	5.123813E+11	.00008750	.00142773	16.31689042	2494.10457

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60000.00000					
44966615.	5.042985E+11	.00008917	.00144829	16.24250025	2502.88937
60000.00000					
45098956.	4.965023E+11	.00009083	.00146890	16.17137128	2510.94241
60000.00000					
45230375.	4.889770E+11	.00009250	.00148956	16.10333043	2518.25825
60000.00000					
45360863.	4.817083E+11	.00009417	.00151027	16.03822035	2524.83149
60000.00000					
45490404.	4.746825E+11	.00009583	.00153102	15.97589153	2530.65654
60000.00000					
45618998.	4.678872E+11	.00009750	.00155183	15.91621023	2535.72788
60000.00000					
45746642.	4.613107E+11	.00009917	.00157269	15.85905057	2540.03981
60000.00000					
45998997.	4.487707E+11	.00010250	.00161456	15.75181621	2546.36177
60000.00000					
46247398.	4.369833E+11	.00010583	.00165664	15.65333086	2549.57458
60000.00000					
46490443.	4.258667E+11	.00010917	.00169894	15.56283921	2546.57131
60000.00000					
46728946.	4.153684E+11	.00011250	.00174146	15.47967643	2546.07714
60000.00000					
46964605.	4.054498E+11	.00011583	.00178421	15.40326422	2549.32913
60000.00000					
47163913.	3.957811E+11	.00011917	.00183322	15.38366157	2546.97596
60000.00000					
47257417.	3.857748E+11	.00012250	.00187078	15.27163965	2542.89923
60000.00000					
47349793.	3.762897E+11	.00012583	.00190848	15.16674203	2546.85022
60000.00000					
47441010.	3.672852E+11	.00012917	.00194634	15.06843764	2549.22554
60000.00000					
47531023.	3.587247E+11	.00013250	.00198436	14.97627407	2549.89006
60000.00000					
47618766.	3.505676E+11	.00013583	.00202263	14.89053065	2544.78442
60000.00000					
47705678.	3.427953E+11	.00013917	.00206103	14.80978328	2541.38627
60000.00000					
47791746.	3.353807E+11	.00014250	.00209955	14.73369759	2545.44695
60000.00000					
47876958.	3.282991E+11	.00014583	.00213820	14.66197067	2548.23469
60000.00000					
47961286.	3.215282E+11	.00014917	.00217699	14.59432322	2549.73021
60000.00000					
48044282.	3.150445E+11	.00015250	.00221595	14.53080243	2548.33928
60000.00000					
48125850.	3.088290E+11	.00015583	.00225510	14.47122735	2543.72277
60000.00000					
48206822.	3.028701E+11	.00015917	.00229435	14.41477185	2539.08883
60000.00000					
48287207.	2.971520E+11	.00016250	.00233370	14.36125892	2542.11920
60000.00000					
48366990.	2.916602E+11	.00016583	.00237316	14.31051940	2545.62604
60000.00000					
48597712.	2.872771E+11	.00016917	.00241908	14.30000013	2548.62198
60000.00000					
48863232.	2.832651E+11	.00017250	.00246675	14.30000013	2549.95926
60000.00000					
48863232.	2.778952E+11	.00017583	.00250665	14.25584990	2547.03140
60000.00000					
48863232.	2.727250E+11	.00017917	.00254562	14.20813948	2543.08977
60000.00000					

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48863232.	2.677437E+11	.00018250	.00258467	14.16258878	2539.13480
60000.00000					
48863232.	2.629412E+11	.00018583	.00262380	14.11909157	2536.03270
60000.00000					
48923261.	2.586252E+11	.00018917	.00266300	14.07754165	2540.11756
60000.00000					
48995881.	2.545241E+11	.00019250	.00270229	14.03784853	2543.51037
60000.00000					
49068158.	2.505608E+11	.00019583	.00274165	13.99992174	2546.20226
60000.00000					
49140096.	2.467285E+11	.00019917	.00278110	13.96368259	2548.18429
60000.00000					
49211682.	2.430207E+11	.00020250	.00282063	13.92905241	2549.44714
60000.00000					
49260165.	2.393206E+11	.00020583	.00285812	13.88559455	2549.95864
60000.00000					
49281733.	2.356099E+11	.00020917	.00289326	13.83230978	2548.51864
60000.00000					
49299970.	2.319999E+11	.00021250	.00292908	13.78388733	2545.77331
60000.00000					
49314172.	2.284826E+11	.00021583	.00296569	13.74064583	2542.88845
60000.00000					
49328304.	2.250721E+11	.00021917	.00300234	13.69890314	2539.99654
60000.00000					
49342348.	2.217634E+11	.00022250	.00303904	13.65858847	2537.09771
60000.00000					
49356313.	2.185519E+11	.00022583	.00307577	13.61964279	2534.19180
60000.00000					
49370196.	2.154336E+11	.00022917	.00311254	13.58200711	2531.27877
60000.00000					
49383994.	2.124043E+11	.00023250	.00314936	13.54562634	2532.96125
60000.00000					
49411347.	2.065980E+11	.00023917	.00322311	13.47642893	2539.01551
60000.00000					
49438345.	2.011051E+11	.00024583	.00329703	13.41166502	2543.77223
60000.00000					
49464997.	1.959010E+11	.00025250	.00337113	13.35100025	2547.20621
60000.00000					
49491285.	1.909632E+11	.00025917	.00344539	13.29412776	2549.29114
60000.00000					
49510913.	1.862479E+11	.00026583	.00352136	13.24649602	2549.77244
60000.00000					
49511728.	1.816944E+11	.00027250	.00360207	13.21860462	2543.97649
60000.00000					
49537288.	1.774470E+11	.00027917	.00368500	13.20000118	2537.79097
60000.00000					
49621121.	1.736016E+11	.00028583	.00377300	13.20000118	2530.71623
60000.00000					
49699811.	1.699139E+11	.00029250	.00386100	13.20000118	2523.64149
60000.00000					

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 49327.40048
in-kip

Computed values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)

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 Specified shear force at pile head = 20000.000 lbs
 Specified moment at pile head = 26052000.000 in-lbs
 Specified axial load at pile head = 24000.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Depth Es* X F/L in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res. p lbs/in
0.000	.031169	2.61E+07	20000.	-.001459	930.031	7.65E+11	0.000
0.000							
1.710	.028723	2.61E+07	20000.	-.001401	931.245	7.65E+11	0.000
0.000							
3.420	.026378	2.61E+07	20000.	-.001343	932.459	7.65E+11	0.000
0.000							
5.130	.024132	2.62E+07	20000.	-.001284	933.672	7.65E+11	0.000
0.000							
6.840	.021986	2.62E+07	20000.	-.001226	934.886	7.64E+11	0.000
0.000							
8.550	.019941	2.62E+07	20000.	-.001167	936.099	7.64E+11	0.000
0.000							
10.260	.017996	2.63E+07	20000.	-.001108	937.313	7.64E+11	0.000
0.000							
11.970	.016151	2.63E+07	20000.	-.001049	938.526	7.64E+11	0.000
0.000							
13.680	.014407	2.63E+07	-20402.	-.000991	939.739	7.64E+11	-47254.
5.61E+06							
15.390	.012763	2.62E+07	-96598.	-.000932	936.057	7.64E+11	-41864.
5.61E+06							
17.100	.011220	2.60E+07	-1.64E+05	-.000873	928.037	7.65E+11	-36802.
5.61E+06							
18.810	.009776	2.57E+07	-2.23E+05	-.000816	916.205	7.65E+11	-32067.
5.61E+06							
20.520	.008431	2.52E+07	-2.74E+05	-.000759	901.050	7.66E+11	-27653.
5.61E+06							
22.230	.007181	2.47E+07	-3.18E+05	-.000703	883.031	7.67E+11	-23555.
5.61E+06							
23.940	.006026	2.41E+07	-3.55E+05	-.000649	862.571	7.67E+11	-19767.
5.61E+06							
25.650	.004963	2.35E+07	-3.85E+05	-.000595	840.063	7.68E+11	-16280.
5.61E+06							
27.360	.003990	2.28E+07	-4.11E+05	-.000544	815.868	7.69E+11	-13087.
5.61E+06							
29.070	.003103	2.21E+07	-4.30E+05	-.000494	790.318	7.70E+11	-10178.
5.61E+06							
30.780	.002300	2.14E+07	-4.46E+05	-.000446	763.713	7.72E+11	-7545.033
5.61E+06							
32.490	.001578	2.06E+07	-4.56E+05	-.000399	736.327	7.73E+11	-5177.250
5.61E+06							
34.200	.000934	1.98E+07	-4.64E+05	-.000355	708.404	7.74E+11	-3064.927
5.61E+06							
35.910	.000365	1.90E+07	-4.67E+05	-.000312	680.163	7.76E+11	-1197.868
5.61E+06							
37.620	-.000132	1.82E+07	-4.68E+05	-.000271	651.798	7.77E+11	434.216
5.61E+06							
39.330	-.000561	1.74E+07	-4.66E+05	-.000232	623.478	7.78E+11	1841.642
5.61E+06							
41.040	-.000925	1.66E+07	-4.62E+05	-.000195	595.349	7.80E+11	3034.689

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5.61E+06							
42.750	-.001227	1.58E+07	-4.56E+05	-.000159	567.534	7.82E+11	4023.548
5.61E+06							
44.460	-.001469	1.50E+07	-4.48E+05	-.000125	540.136	7.83E+11	4818.275
5.61E+06							
46.170	-.001655	1.43E+07	-4.39E+05	-9.37E-05	513.237	8.08E+11	5428.761
5.61E+06							
47.880	-.001790	1.35E+07	-4.30E+05	-6.86E-05	486.901	1.16E+12	5869.563
5.61E+06							
49.590	-.001890	1.28E+07	-4.19E+05	-5.22E-05	461.173	1.70E+12	6198.705
5.61E+06							
51.300	-.001968	1.21E+07	-4.09E+05	-4.17E-05	436.086	2.52E+12	6455.519
5.61E+06							
53.010	-.002032	1.14E+07	-3.97E+05	-3.45E-05	411.669	3.25E+12	6666.166
5.61E+06							
54.720	-.002086	1.08E+07	-3.86E+05	-2.87E-05	387.942	3.25E+12	6843.086
5.61E+06							
56.430	-.002131	1.01E+07	-3.74E+05	-2.32E-05	364.924	3.26E+12	6988.315
5.61E+06							
58.140	-.002166	9.47E+06	-3.62E+05	-1.81E-05	342.630	3.26E+12	7103.801
5.61E+06							
59.850	-.002193	8.86E+06	-3.50E+05	-1.33E-05	321.072	3.27E+12	7191.428
5.61E+06							
61.560	-.002211	8.28E+06	-3.37E+05	-8.82E-06	300.259	3.27E+12	7253.017
5.61E+06							
63.270	-.002223	7.71E+06	-3.25E+05	-4.64E-06	280.197	3.27E+12	7290.329
5.61E+06							
64.980	-.002227	7.17E+06	-3.12E+05	-7.53E-07	260.891	3.28E+12	7305.043
5.61E+06							
66.690	-.002225	6.64E+06	-3.00E+05	2.85E-06	242.342	3.28E+12	7298.775
5.61E+06							
68.400	-.002217	6.14E+06	-2.87E+05	6.18E-06	224.548	3.28E+12	7273.076
5.61E+06							
70.110	-.002204	5.66E+06	-2.75E+05	9.25E-06	207.508	3.29E+12	7229.433
5.61E+06							
71.820	-.002186	5.20E+06	-2.63E+05	1.21E-05	191.217	3.29E+12	7169.272
5.61E+06							
73.530	-.002163	4.76E+06	-2.51E+05	1.47E-05	175.669	3.29E+12	7093.947
5.61E+06							
75.240	-.002136	4.34E+06	-2.39E+05	1.70E-05	160.856	3.29E+12	7004.745
5.61E+06							
76.950	-.002105	3.94E+06	-2.27E+05	1.92E-05	146.768	3.29E+12	6902.891
5.61E+06							
78.660	-.002070	3.57E+06	-2.15E+05	2.11E-05	133.396	3.30E+12	6789.552
5.61E+06							
80.370	-.002032	3.21E+06	-2.03E+05	2.29E-05	120.727	3.30E+12	6665.835
5.61E+06							
82.080	-.001992	2.87E+06	-1.92E+05	2.45E-05	108.749	3.30E+12	6532.788
5.61E+06							
83.790	-.001949	2.55E+06	-1.81E+05	2.59E-05	97.447	3.30E+12	6391.403
5.61E+06							
85.500	-.001903	2.25E+06	-1.70E+05	2.71E-05	86.807	3.30E+12	6242.609
5.61E+06							
87.210	-.001856	1.97E+06	-1.60E+05	2.82E-05	76.815	3.30E+12	6087.278
5.61E+06							
88.920	-.001807	1.71E+06	-1.49E+05	2.92E-05	67.453	3.30E+12	5926.228
5.61E+06							
90.630	-.001756	1.46E+06	-1.39E+05	3.00E-05	58.704	3.30E+12	5760.227
5.61E+06							
92.340	-.001704	1.23E+06	-1.30E+05	3.07E-05	50.553	3.30E+12	5589.991
5.61E+06							
94.050	-.001651	1.02E+06	-1.20E+05	3.13E-05	42.981	3.30E+12	5416.189
5.61E+06							

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95.760	-.001597	8.17E+05	-1.11E+05	3.17E-05	35.969	3.30E+12	5239.439
5.61E+06							
97.470	-.001543	6.35E+05	-1.02E+05	3.21E-05	29.501	3.30E+12	5060.318
5.61E+06							
99.180	-.001488	4.67E+05	-93939.	3.24E-05	23.557	3.30E+12	4879.354
5.61E+06							
100.890	-.001432	3.13E+05	-85752.	3.26E-05	18.118	3.30E+12	4697.036
5.61E+06							
102.600	-.001376	1.74E+05	-77876.	3.27E-05	13.166	3.30E+12	4513.807
5.61E+06							
104.310	-.001320	47050.	-70315.	3.28E-05	8.682	3.30E+12	4330.074
5.61E+06							
106.020	-.001264	-66859.	-63068.	3.28E-05	9.384	3.30E+12	4146.205
5.61E+06							
107.730	-.001208	-1.69E+05	-56135.	3.27E-05	12.990	3.30E+12	3962.530
5.61E+06							
109.440	-.001152	-2.59E+05	-49515.	3.26E-05	16.186	3.30E+12	3779.345
5.61E+06							
111.150	-.001097	-3.38E+05	-43209.	3.24E-05	18.990	3.30E+12	3596.911
5.61E+06							
112.860	-.001041	-4.07E+05	-37213.	3.22E-05	21.421	3.30E+12	3415.458
5.61E+06							
114.570	-.000986	-4.65E+05	-31527.	3.20E-05	23.499	3.30E+12	3235.185
5.61E+06							
116.280	-.000932	-5.14E+05	-26148.	3.18E-05	25.242	3.30E+12	3056.262
5.61E+06							
117.990	-.000878	-5.55E+05	-21073.	3.15E-05	26.668	3.30E+12	2878.833
5.61E+06							
119.700	-.000824	-5.87E+05	-16301.	3.12E-05	27.795	3.30E+12	2703.014
5.61E+06							
121.410	-.000771	-6.10E+05	-11827.	3.09E-05	28.643	3.30E+12	2528.898
5.61E+06							
123.120	-.000718	-6.27E+05	-7650.235	3.06E-05	29.228	3.30E+12	2356.553
5.61E+06							
124.830	-.000666	-6.37E+05	-3766.328	3.02E-05	29.570	3.30E+12	2186.028
5.61E+06							
126.540	-.000615	-6.40E+05	-172.439	2.99E-05	29.685	3.30E+12	2017.351
5.61E+06							
128.250	-.000564	-6.37E+05	3134.602	2.96E-05	29.591	3.30E+12	1850.532
5.61E+06							
129.960	-.000514	-6.29E+05	6157.961	2.92E-05	29.305	3.30E+12	1685.562
5.61E+06							
131.670	-.000464	-6.16E+05	8900.784	2.89E-05	28.845	3.30E+12	1522.418
5.61E+06							
133.380	-.000415	-5.99E+05	11366.	2.86E-05	28.227	3.30E+12	1361.062
5.61E+06							
135.090	-.000366	-5.77E+05	13557.	2.83E-05	27.468	3.30E+12	1201.445
5.61E+06							
136.800	-.000318	-5.52E+05	15477.	2.80E-05	26.584	3.30E+12	1043.503
5.61E+06							
138.510	-.000270	-5.24E+05	17127.	2.77E-05	25.592	3.30E+12	887.164
5.61E+06							
140.220	-.000223	-4.94E+05	18512.	2.75E-05	24.509	3.30E+12	732.347
5.61E+06							
141.930	-.000177	-4.61E+05	19633.	2.72E-05	23.349	3.30E+12	578.963
5.61E+06							
143.640	-.000130	-4.27E+05	20493.	2.70E-05	22.130	3.30E+12	426.918
5.61E+06							
145.350	-8.42E-05	-3.91E+05	21094.	2.68E-05	20.866	3.30E+12	276.111
5.61E+06							
147.060	-3.85E-05	-3.54E+05	21438.	2.66E-05	19.574	3.30E+12	126.438
5.61E+06							
148.770	6.77E-06	-3.18E+05	21528.	2.64E-05	18.269	3.30E+12	-22.205

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5.61E+06							
150.480	5.18E-05	-2.81E+05	21363.	2.63E-05	16.966	3.30E+12	-169.926
5.61E+06							
152.190	9.66E-05	-2.45E+05	20947.	2.61E-05	15.680	3.30E+12	-316.832
5.61E+06							
153.900	.000141	-2.09E+05	20280.	2.60E-05	14.428	3.30E+12	-463.029
5.61E+06							
155.610	.000186	-1.75E+05	19364.	2.59E-05	13.223	3.30E+12	-608.618
5.61E+06							
157.320	.000230	-1.43E+05	18199.	2.58E-05	12.081	3.30E+12	-753.698
5.61E+06							
159.030	.000274	-1.13E+05	16787.	2.58E-05	11.018	3.30E+12	-898.363
5.61E+06							
160.740	.000318	-85585.	15127.	2.57E-05	10.047	3.30E+12	-1042.701
5.61E+06							
162.450	.000362	-61243.	13221.	2.57E-05	9.185	3.30E+12	-1186.790
5.61E+06							
164.160	.000406	-40371.	11068.	2.56E-05	8.445	3.30E+12	-1330.701
5.61E+06							
165.870	.000450	-23391.	8670.018	2.56E-05	7.844	3.30E+12	-1474.495
5.61E+06							
167.580	.000493	-10722.	6025.746	2.56E-05	7.395	3.30E+12	-1618.221
5.61E+06							
169.290	.000537	-2785.035	3135.729	2.56E-05	7.114	3.30E+12	-1761.916
5.61E+06							
171.000	.000581	0.000	0.000	2.56E-05	7.015	3.30E+12	-1905.603
2.80E+06							

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.03116887 in
Computed slope at pile head	=	-.00145918
Maximum bending moment	=	26326002. lbs-in
Maximum shear force	=	-467818.38904 lbs
Depth of maximum bending moment	=	13.68000000 in
Depth of maximum shear force	=	37.62000000 in
Number of iterations	=	9
Number of zero deflection points	=	2

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

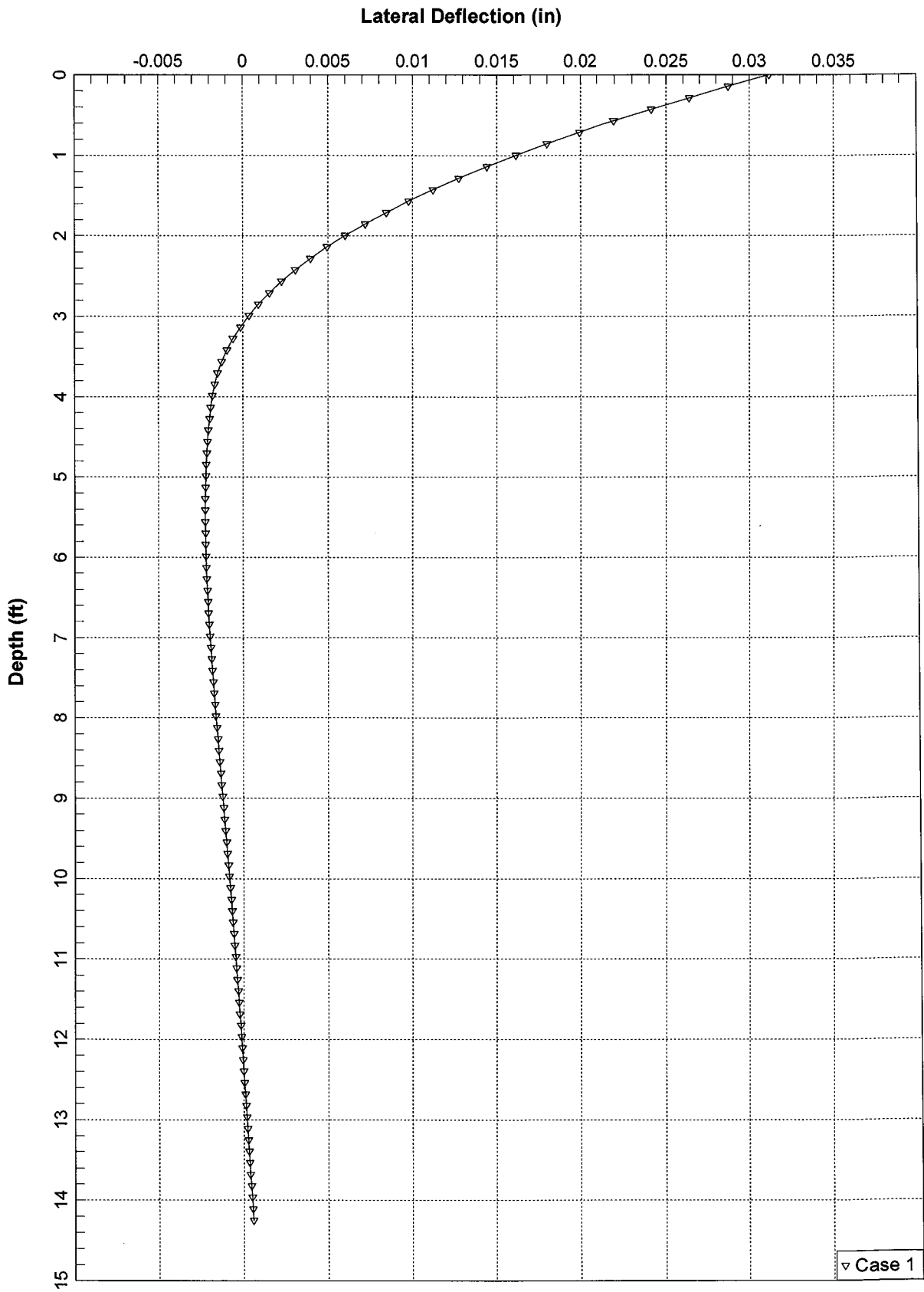
Type 1 = Shear and Moment,	y = pile-head displacement in
Type 2 = Shear and Slope,	M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness,	V = Pile-head Shear Force lbs

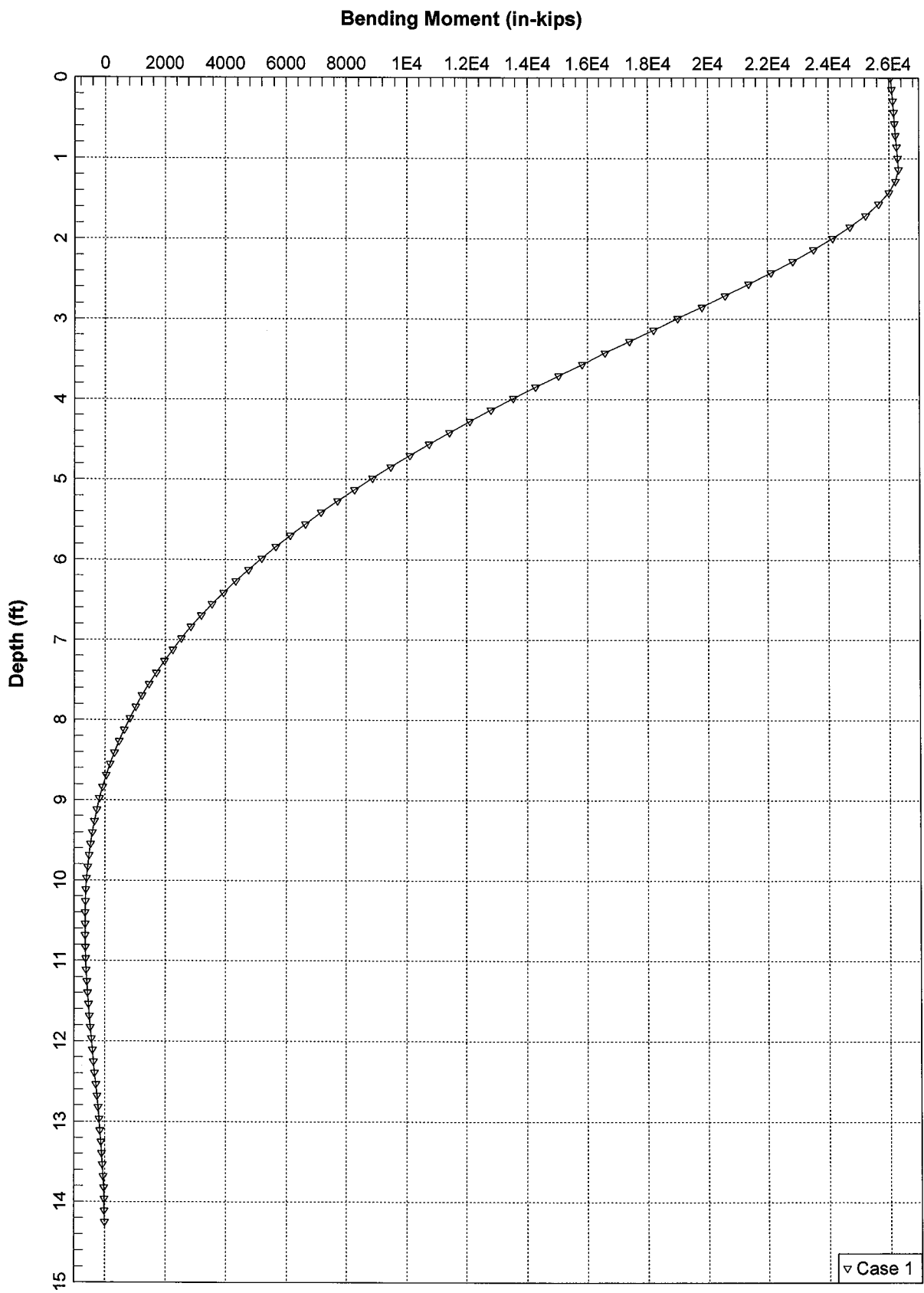
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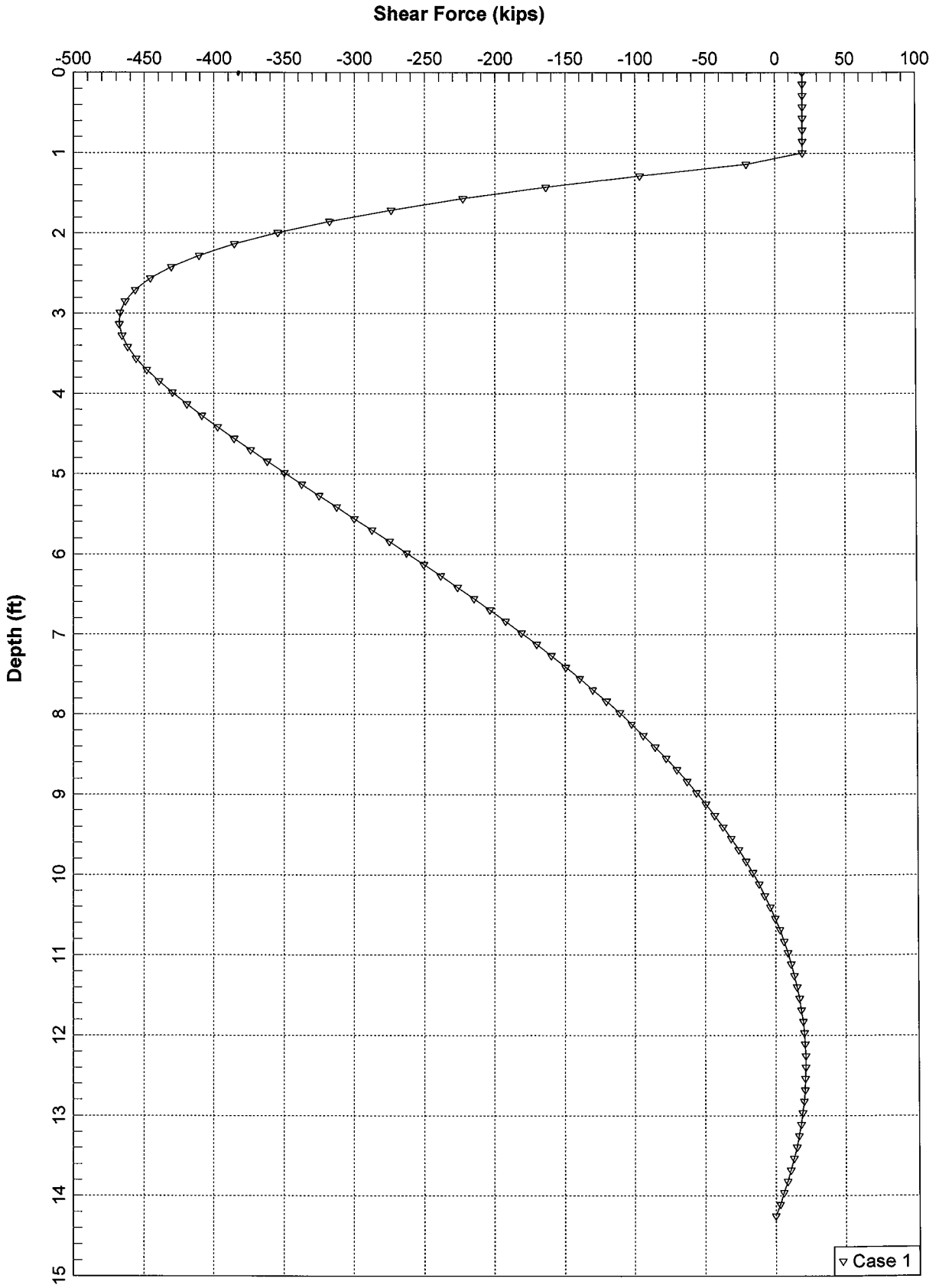
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 20000.	M= 2.61E+07	24000.0000	.0311689	2.6326E+07	-467818.

The analysis ended normally.







DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 180' MONOPOLE FOR NEW ANTENNA ARRANGEMENT

Site I.D: Plymouth West
Address: 42 South Street
Plymouth, CT 06782

prepared for



Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by



URS CORPORATION
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CT 06067
TEL. 860-529-8882

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VZ4-034

January 16, 2008

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1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 180' steel tapered monopole structure, located at 42 South Street, Plymouth, CT. The analysis was conducted in accordance with the 2005 Connecticut State Building Code and the TIA/EIA-222-F standard for a wind velocity of 80 mph (fastest mile) and 69 mph (fastest mile) concurrent with 1/2" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report. The proposed Verizon Wireless installation is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
<u>Remove:</u> <u>Alltel:</u> All existing antennas and TMA's, (14) 7/8" + (1) 1/2" coaxial cable (within monopole) (3) T-Arms <u>Verizon :</u> (6) existing panel antennas (6) 1 5/8" coaxial cables (3) T- Frames <u>Install:</u> <u>Alpha Sector</u> (2) Antel LPA 80080/4CF antennas (2) Antel LPA 185080/8CF antennas <u>Beta Sector</u> (2) Antel LPA 80080/4CF antennas (2) Antel LPA 185080/8CF antennas <u>Gamma Sector</u> (2) Antel LPA 80063/4CF antennas (2) Antel LPA 185063/8CF antennas (12) 1 5/8" coaxial cables (all new Verizon coax feed lines shall be located within existing monopole) (3) Verizon T-Arms (re-located from 169' to 179')	Alltel (existing to be removed) Verizon (existing to be removed) Verizon (Proposed)	@ 179' @ 169' @ 179'

The results of the analysis indicate that the tower structure does have the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

1. EXECUTIVE SUMMARY - *continued*

This analysis is based on:

- 1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
- 2) Tower geometry and structural member sizes utilized in the preparation of this report obtained from manufacturers original design documents prepared by Valmont Industries, Inc., order no. 11610-94, dated August 15, 1994.
- 3) Geotechnical report prepared by Heller and Johnson, Geotechnical Engineering Consultants, File No. 5701, dated April 11, 1994.
- 4) Site documentation and visual verification of existing appurtenances conducted from the existing grade by URS during December 2007.
- 5) Antenna and mount configuration as specified within Section 2 and 6 of this report.

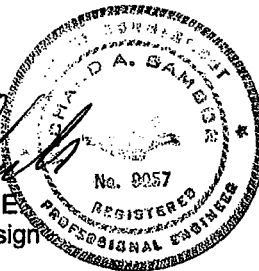
This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration as well as the physical condition of the tower. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,

URS Corporation


Richard A. Sambor, P.E.
Manager Facilities Design



RAS/jrm
cc: AA, DR, ICA - URS, CF/Book

2. INTRODUCTION

The subject tower is located at 42 South Street, Plymouth, CT. The structure is an existing 180' steel tapered monopole structure, designed and manufactured by Valmont Industries, Inc.

The inventory is summarized in the table below:

<i>Antenna Type</i>	<i>Carrier</i>	<i>Mount</i>	<i>Antenna Centerline Elevation</i>	<i>Cable</i>
(4) Antel LPA 80080/4CF, (2) Antel LPA 80063/4CF, (4) Antel LPA 185080/8CF and (2) Antel LPA 185063/8CF panel antennas	Verizon (proposed)	(3) T-Arms (relocated – see note below)	179'	(12) 1-5/8" coax cables (within monopole)

Note: Existing Verizon T-Arms to be removed and relocated to the 179' elevation.

This structural analysis of the communications tower was performed by URS Corporation (URS) for Verizon Wireless. The purpose of this analysis was to investigate the structural integrity of the existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was conducted in accordance with the 2005 Connecticut State Building Code, TIA/EIA-222-F - Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, and the American Institute of Steel Construction (AISC) Manual of Steel Construction - Allowable Stress Design (ASD).

The analysis was conducted using RISA Tower 5.0.2. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Load Condition 1 = 80 mph (fastest mile) Wind Load (without ice) + Tower Dead Load

Load Condition 2 = 69 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

Combined axial and bending stresses on the monopole structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were below the allowable stresses (see table below). Detailed analysis and calculations for the proposed load condition are provided in section 6 of this report. Additionally, the anchor bolts, base plate and foundation were all found to be within the allowable limits.

Tower Component Stress vs. Capacity Summary

Component (Section No.)	Controlling Component / Elevation	Stress Ratio (% capacity)	Pass/Fail	Notes
Pole Shaft (L4)	0'-42.3'	86.1%	Pass	
Anchor Bolts	Compression	82%	Pass	
Base Plate	Bending	74%	Pass	

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments
Reinf. Concrete Caisson	Moment Capacity	66%/2.0	Pass	

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicate that the tower structure has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Foundations were properly constructed to support original design loads as specified in the original design documents.
10. All coaxial cable is installed within the monopole unless specified otherwise.

URS is not responsible for any modifications completed prior to or hereafter in which URS is not or was not directly involved. Modifications include but are not limited to:

- A. Adding antennas
- B. Removing/replacing antennas
- C. Adding coaxial cables

URS hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact URS. URS disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

Ongoing and Periodic Inspection and Maintenance:

After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

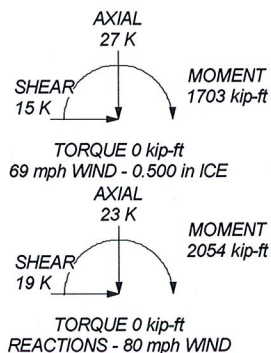
The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

RISA TOWER INPUT/OUTPUT SUMMARY

Section	1	2	3	4
Length (ft)	49.000	48.833	48.667	48.000
Number of Slides	12	12	12	12
Thickness (in)	0.219	0.281	0.344	0.375
Lap Splice (ft)				5.667
Top Dia (in)	14.890	22.102	29.026	35.640
Bot Dia (in)	23.220	30.410	37.290	43.800
Grade		A572-65		
Weight (K)	2.2	3.9	6.0	7.8
		131.0 ft	86.2 ft	42.3 ft
				0.0 ft

180.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
LPA-80080/4CF (Verizon - proposed)	179	LPA-185080/8CF_2 (Verizon - proposed)	179
LPA-80080/4CF (Verizon - proposed)	179	LPA-185080/8CF_2 (Verizon - proposed)	179
LPA-80080/4CF (Verizon - proposed)	179	LPA-185063/8CFx2 (Verizon - proposed)	179
LPA-80080/4CF (Verizon - proposed)	179	LPA-185063/8CFx2 (Verizon - proposed)	179
LPA-80063/4CF (Verizon - proposed)	179	Valmont T-Arm (1) (Verizon - proposed)	179
LPA-80063/4CF (Verizon - proposed)	179	Valmont T-Arm (1) (Verizon - proposed)	179
LPA-185080/8CF_2 (Verizon - proposed)	179	Valmont T-Arm (1) (Verizon - proposed)	179
LPA-185080/8CF_2 (Verizon - proposed)	179		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 86.1%

URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-3991

Job: **180' Valmont Monopole**
Project: **42 South Street, Plymouth, CT**
Client: Verizon Wireless Drawn by: Staff App'd:
Code: TIA/EIA-222-F Date: 01/16/08 Scale: NTS
Path: P:\08\ERI Files\180' Monopole Plymouth CT.eri Dwg No. E-1

RISA TOWER DETAILED OUTPUT

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	180' Valmont Monopole	Page	1 of 20
	Project	42 South Street, Plymouth, CT	Date	13:05:44 01/16/08
	Client	Verizon Wireless	Designed by	Staff

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.500 in.

Ice density of 56 pcf.

A wind speed of 69 mph is used in combination with ice.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
Use Code Safety Factors - Guys	Retention Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	Use Azimuth Dish Coefficients	Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	180.000-131.000	49.000	4.000	12	14.890	23.220	0.219	0.876	A572-65 (65 ksi)
L2	131.000-86.167	48.833	4.833	12	22.102	30.410	0.281	1.124	A572-65 (65 ksi)
L3	86.167-42.333	48.667	5.667	12	29.026	37.290	0.344	1.376	A572-65 (65 ksi)
L4	42.333-0.000	48.000		12	35.640	43.800	0.375	1.500	A572-65 (65 ksi)

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	180' Valmont Monopole	Page	2 of 20
	Project	42 South Street, Plymouth, CT	Date	13:05:44 01/16/08
	Client	Verizon Wireless	Designed by	Staff

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	15.415	10.346	284.227	5.252	7.713	36.850	575.921	5.092	3.404	15.542
	24.039	16.220	1095.282	8.234	12.028	91.061	2219.339	7.983	5.636	25.735
L2	23.586	19.744	1199.975	7.812	11.449	104.812	2431.474	9.717	5.170	18.399
	31.483	27.261	3158.656	10.786	15.752	200.519	6400.293	13.417	7.397	26.323
L3	30.899	31.770	3335.935	10.268	15.035	221.873	6759.509	15.636	6.857	19.933
	38.605	40.924	7130.214	13.227	19.316	369.131	14447.746	20.142	9.072	26.372
L4	37.894	42.582	6759.160	12.625	18.461	366.125	13695.891	20.958	8.546	22.79
	45.345	52.436	12620.965	15.546	22.688	556.274	25573.497	25.807	10.733	28.622

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in
ft	ft ²	in						
L1 180.000- 131.000				1	1	1		
L2 131.000- 86.167				1	1	1		
L3 86.167- 42.333				1	1	1		
L4 42.333- 0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight klf
1 5/8 (Verizon)	C	No	Inside Pole	177.000 - 5.000	12	No Ice 1/2" Ice	0.000 0.000	0.001 0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	180.000-131.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.574
L2	131.000-86.167	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.560
L3	86.167-42.333	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.547
L4	42.333-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.466

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Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	180.000-131.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.574
L2	131.000-86.167	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.560
L3	86.167-42.333	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.547
L4	42.333-0.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.466

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
LPA-80080/4CF (Verizon - proposed)	A	From Face	4.000	0.000	179.000	No Ice	2.619	0.012
			6.000			1/2" Ice	2.922	0.045
			0.000					
LPA-80080/4CF (Verizon - proposed)	A	From Face	4.000	0.000	179.000	No Ice	2.619	0.012
			-6.000			1/2" Ice	2.922	0.045
			0.000					
LPA-80080/4CF (Verizon - proposed)	B	From Face	4.000	0.000	179.000	No Ice	2.619	0.012
			6.000			1/2" Ice	2.922	0.045
			0.000					
LPA-80080/4CF (Verizon - proposed)	B	From Face	4.000	0.000	179.000	No Ice	2.619	0.012
			-6.000			1/2" Ice	2.922	0.045
			0.000					
LPA-80063/4CF (Verizon - proposed)	C	From Face	4.000	0.000	179.000	No Ice	7.011	0.020
			6.000			1/2" Ice	7.421	0.073
			0.000					
LPA-80063/4CF (Verizon - proposed)	C	From Face	4.000	0.000	179.000	No Ice	7.011	0.020
			-6.000			1/2" Ice	7.421	0.073
			0.000					
LPA-185080/8CF_2 (Verizon - proposed)	A	From Face	4.000	0.000	179.000	No Ice	2.095	0.007
			4.000			1/2" Ice	2.391	0.025
			0.000					
LPA-185080/8CF_2 (Verizon - proposed)	A	From Face	4.000	0.000	179.000	No Ice	2.095	0.007
			-4.000			1/2" Ice	2.391	0.025
			0.000					
LPA-185080/8CF_2 (Verizon - proposed)	B	From Face	4.000	0.000	179.000	No Ice	2.095	0.007
			4.000			1/2" Ice	2.391	0.025
			0.000					
LPA-185080/8CF_2 (Verizon - proposed)	B	From Face	4.000	0.000	179.000	No Ice	2.095	0.007
			-4.000			1/2" Ice	2.391	0.025
			0.000					
LPA-185063/8CFx2 (Verizon - proposed)	C	From Face	4.000	0.000	179.000	No Ice	3.040	0.009
			4.000			1/2" Ice	3.382	0.031

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
LPA-185063/8CFx2 (Verizon - proposed)	C	From Face	0.000 4.000 -4.000 0.000	0.000	179.000	No Ice 3.040 1/2" Ice 3.382	2.734 3.038	0.009 0.031
Valmont T-Arm (1) (Verizon - proposed)	A	From Face	0.000 2.000 0.000 0.000	0.000	179.000	No Ice 10.540 1/2" Ice 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (Verizon - proposed)	B	From Face	0.000 2.000 0.000 0.000	0.000	179.000	No Ice 10.540 1/2" Ice 14.450	10.540 14.450	0.336 0.412
Valmont T-Arm (1) (Verizon - proposed)	C	From Face	0.000 2.000 0.000 0.000	0.000	179.000	No Ice 10.540 1/2" Ice 14.450	10.540 14.450	0.336 0.412

Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation ft	z ft	K _Z	q _z ksf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 180.000- 131.000	153.987	1.553	0.025	77.808	A	0.000	77.808	77.808	100.00	0.000	0.000
					B	0.000	77.808		100.00		
					C	0.000	77.808		100.00		
L2 131.000- 86.167	107.842	1.403	0.023	99.366	A	0.000	99.366	99.366	100.00	0.000	0.000
					B	0.000	99.366		100.00		
					C	0.000	99.366		100.00		
L3 86.167- 42.333	63.979	1.208	0.020	122.619	A	0.000	122.619	122.619	100.00	0.000	0.000
					B	0.000	122.619		100.00		
					C	0.000	122.619		100.00		
L4 42.333- 0.000	20.535	1	0.016	141.821	A	0.000	141.821	141.821	100.00	0.000	0.000
					B	0.000	141.821		100.00		
					C	0.000	141.821		100.00		

Tower Pressure - With Ice

$$G_H = 1.690$$

Section Elevation ft	z ft	K _Z	q _z ksf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 180.000- 131.000	153.987	1.553	0.019	0.500	81.891	A	0.000	81.891	81.891	100.00	0.000	0.000
						B	0.000	81.891		100.00		
						C	0.000	81.891		100.00		
L2 131.000-	107.842	1.403	0.017	0.500	103.102	A	0.000	103.102	103.102	100.00	0.000	0.000

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Section Elevation	z	K _z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
ft	ft		ksf	in	ft ²		ft ²	ft ²	ft ²			
86.167						B	0.000	103.102		100.00		
L3 86.167- 42.333	63.979	1.208	0.015	0.500	126.272	C	0.000	103.102		100.00		
						A	0.000	126.272	126.272	100.00	0.000	0.000
						B	0.000	126.272		100.00		
L4 42.333-0.000	20.535	1	0.012	0.500	145.349	C	0.000	126.272		100.00		
						A	0.000	145.349	145.349	100.00	0.000	0.000
						B	0.000	145.349		100.00		
						C	0.000	145.349		100.00		

Tower Pressure - Service

$$G_H = 1.690$$

Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²			
L1 180.000- 131.000	153.987	1.553	0.010	77.808	A	0.000	77.808	77.808	100.00	0.000	0.000
					B	0.000	77.808		100.00		
					C	0.000	77.808		100.00		
L2 131.000- 86.167	107.842	1.403	0.009	99.366	A	0.000	99.366	99.366	100.00	0.000	0.000
					B	0.000	99.366		100.00		
					C	0.000	99.366		100.00		
L3 86.167- 42.333	63.979	1.208	0.008	122.619	A	0.000	122.619	122.619	100.00	0.000	0.000
					B	0.000	122.619		100.00		
					C	0.000	122.619		100.00		
L4 42.333- 0.000	20.535	1	0.006	141.821	A	0.000	141.821	141.821	100.00	0.000	0.000
					B	0.000	141.821		100.00		
					C	0.000	141.821		100.00		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.574	2.215	A	1	1.03	1	1	1	77.808	3.442	0.070	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.560	3.905	A	1	1.03	1	1	1	99.366	3.967	0.088	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167- 42.333	0.547	6.019	A	1	1.03	1	1	1	122.619	4.202	0.096	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.466	7.760	A	1	1.03	1	1	1	141.821	4.045	0.096	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.147	19.899						OTM	1309.746 kip-ft	15.656		

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Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.574	2.215	A	1	1.03	1	1	1	77.808	3.442	0.070	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.560	3.905	A	1	1.03	1	1	1	99.366	3.967	0.088	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167- 42.333	0.547	6.019	A	1	1.03	1	1	1	122.619	4.202	0.096	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.466	7.760	A	1	1.03	1	1	1	141.821	4.045	0.096	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.147	19.899						OTM	1309.746 kip-ft	15.656		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.574	2.215	A	1	1.03	1	1	1	77.808	3.442	0.070	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.560	3.905	A	1	1.03	1	1	1	99.366	3.967	0.088	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167- 42.333	0.547	6.019	A	1	1.03	1	1	1	122.619	4.202	0.096	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.466	7.760	A	1	1.03	1	1	1	141.821	4.045	0.096	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.147	19.899						OTM	1309.746 kip-ft	15.656		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.574	2.215	A	1	1.03	1	1	1	77.808	3.442	0.070	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.560	3.905	A	1	1.03	1	1	1	99.366	3.967	0.088	C
			B	1	1.03	1	1	1	99.366			

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Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.574	2.815	A	1	1.03	1	1	1	81.891	2.717	0.055	C
			B	1	1.03	1	1	1	81.891			
			C	1	1.03	1	1	1	81.891			
L2 131.000- 86.167	0.560	4.666	A	1	1.03	1	1	1	103.102	3.087	0.069	C
			B	1	1.03	1	1	1	103.102			
			C	1	1.03	1	1	1	103.102			
L3 86.167- 42.333	0.547	6.954	A	1	1.03	1	1	1	126.272	3.246	0.074	C
			B	1	1.03	1	1	1	126.272			
			C	1	1.03	1	1	1	126.272			
L4 42.333- 0.000	0.466	8.839	A	1	1.03	1	1	1	145.349	3.109	0.073	C
			B	1	1.03	1	1	1	145.349			
			C	1	1.03	1	1	1	145.349			
Sum Weight:	2.147	23.273						OTM	1022.790 kip-ft	12.159		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.574	2.815	A	1	1.03	1	1	1	81.891	2.717	0.055	C
			B	1	1.03	1	1	1	81.891			
			C	1	1.03	1	1	1	81.891			
L2 131.000- 86.167	0.560	4.666	A	1	1.03	1	1	1	103.102	3.087	0.069	C
			B	1	1.03	1	1	1	103.102			
			C	1	1.03	1	1	1	103.102			
L3 86.167- 42.333	0.547	6.954	A	1	1.03	1	1	1	126.272	3.246	0.074	C
			B	1	1.03	1	1	1	126.272			
			C	1	1.03	1	1	1	126.272			
L4 42.333- 0.000	0.466	8.839	A	1	1.03	1	1	1	145.349	3.109	0.073	C
			B	1	1.03	1	1	1	145.349			
			C	1	1.03	1	1	1	145.349			
Sum Weight:	2.147	23.273						OTM	1022.790 kip-ft	12.159		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.574	2.215	A	1	1.03	1	1	1	77.808	1.345	0.027	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L2 131.000-86.167	0.560	3.905	A	1	1.03	1	1	1	99.366	1.550	0.035	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167-42.333	0.547	6.019	A	1	1.03	1	1	1	122.619	1.642	0.037	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333-0.000	0.466	7.760	A	1	1.03	1	1	1	141.821	1.580	0.037	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.147	19.899						OTM	511.619 kip-ft	6.116		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000-131.000	0.574	2.215	A	1	1.03	1	1	1	77.808	1.345	0.027	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000-86.167	0.560	3.905	A	1	1.03	1	1	1	99.366	1.550	0.035	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167-42.333	0.547	6.019	A	1	1.03	1	1	1	122.619	1.642	0.037	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333-0.000	0.466	7.760	A	1	1.03	1	1	1	141.821	1.580	0.037	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.147	19.899						OTM	511.619 kip-ft	6.116		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000-131.000	0.574	2.215	A	1	1.03	1	1	1	77.808	1.345	0.027	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000-86.167	0.560	3.905	A	1	1.03	1	1	1	99.366	1.550	0.035	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167-42.333	0.547	6.019	A	1	1.03	1	1	1	122.619	1.642	0.037	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333-0.000	0.466	7.760	A	1	1.03	1	1	1	141.821	1.580	0.037	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
Sum Weight:	2.147	19.899						OTM	511.619 kip-ft	6.116		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 180.000- 131.000	0.574	2.215	A	1	1.03	1	1	1	77.808	1.345	0.027	C
			B	1	1.03	1	1	1	77.808			
			C	1	1.03	1	1	1	77.808			
L2 131.000- 86.167	0.560	3.905	A	1	1.03	1	1	1	99.366	1.550	0.035	C
			B	1	1.03	1	1	1	99.366			
			C	1	1.03	1	1	1	99.366			
L3 86.167- 42.333	0.547	6.019	A	1	1.03	1	1	1	122.619	1.642	0.037	C
			B	1	1.03	1	1	1	122.619			
			C	1	1.03	1	1	1	122.619			
L4 42.333- 0.000	0.466	7.760	A	1	1.03	1	1	1	141.821	1.580	0.037	C
			B	1	1.03	1	1	1	141.821			
			C	1	1.03	1	1	1	141.821			
Sum Weight:	2.147	19.899						OTM	511.619 kip-ft	6.116		

Discrete Appurtenance Pressures - No Ice $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _A A _c Front ft ²	C _A A _c Side ft ²
LPA-80080/4CF	300.000	0.012	-1.008	-7.510	179.000	1.621	0.027	2.619	6.057
LPA-80080/4CF	300.000	0.012	-7.008	2.882	179.000	1.621	0.027	2.619	6.057
LPA-80080/4CF	60.000	0.012	7.008	2.882	179.000	1.621	0.027	2.619	6.057
LPA-80080/4CF	60.000	0.012	1.008	-7.510	179.000	1.621	0.027	2.619	6.057
LPA-80063/4CF	180.000	0.020	-6.000	4.627	179.000	1.621	0.027	7.011	6.084
LPA-80063/4CF	180.000	0.020	6.000	4.627	179.000	1.621	0.027	7.011	6.084
LPA-185080/8CF_2	300.000	0.007	-2.008	-5.778	179.000	1.621	0.027	2.095	2.786
LPA-185080/8CF_2	300.000	0.007	-6.008	1.150	179.000	1.621	0.027	2.095	2.786
LPA-185080/8CF_2	60.000	0.007	6.008	1.150	179.000	1.621	0.027	2.095	2.786
LPA-185080/8CF_2	60.000	0.007	2.008	-5.778	179.000	1.621	0.027	2.095	2.786
LPA-185063/8CFx2	180.000	0.009	-4.000	4.627	179.000	1.621	0.027	3.040	2.734
LPA-185063/8CFx2	180.000	0.009	4.000	4.627	179.000	1.621	0.027	3.040	2.734
Valmont T-Arm (1)	300.000	0.336	-2.275	-1.314	179.000	1.621	0.027	10.540	10.540
Valmont T-Arm (1)	60.000	0.336	2.275	-1.314	179.000	1.621	0.027	10.540	10.540
Valmont T-Arm (1)	180.000	0.336	0.000	2.627	179.000	1.621	0.027	10.540	10.540
Sum Weight:		1.142							

Discrete Appurtenance Pressures - With Ice $G_H = 1.690$

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	180' Valmont Monopole	Page	11 of 20
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	Client	Verizon Wireless	Designed by	Staff

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _A Ac Front ft ²	C _A Ac Side ft ²	t _z in
LPA-80080/4CF	300.000	0.045	-1.008	-7.510	179.000	1.621	0.020	2.922	6.453	0.500
LPA-80080/4CF	300.000	0.045	-7.008	2.882	179.000	1.621	0.020	2.922	6.453	0.500
LPA-80080/4CF	60.000	0.045	7.008	2.882	179.000	1.621	0.020	2.922	6.453	0.500
LPA-80080/4CF	60.000	0.045	1.008	-7.510	179.000	1.621	0.020	2.922	6.453	0.500
LPA-80063/4CF	180.000	0.073	-6.000	4.627	179.000	1.621	0.020	7.421	6.481	0.500
LPA-80063/4CF	180.000	0.073	6.000	4.627	179.000	1.621	0.020	7.421	6.481	0.500
LPA-185080/8CF_2	300.000	0.025	-2.008	-5.778	179.000	1.621	0.020	2.391	3.092	0.500
LPA-185080/8CF_2	300.000	0.025	-6.008	1.150	179.000	1.621	0.020	2.391	3.092	0.500
LPA-185080/8CF_2	60.000	0.025	6.008	1.150	179.000	1.621	0.020	2.391	3.092	0.500
LPA-185080/8CF_2	60.000	0.025	2.008	-5.778	179.000	1.621	0.020	2.391	3.092	0.500
LPA-185063/8CFx2	180.000	0.031	-4.000	4.627	179.000	1.621	0.020	3.382	3.038	0.500
LPA-185063/8CFx2	180.000	0.031	4.000	4.627	179.000	1.621	0.020	3.382	3.038	0.500
Valmont T-Arm (1)	300.000	0.412	-2.275	-1.314	179.000	1.621	0.020	14.450	14.450	0.500
Valmont T-Arm (1)	60.000	0.412	2.275	-1.314	179.000	1.621	0.020	14.450	14.450	0.500
Valmont T-Arm (1)	180.000	0.412	0.000	2.627	179.000	1.621	0.020	14.450	14.450	0.500
Sum		1.724								
Weight:										

Discrete Appurtenance Pressures - Service $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _A Ac Front ft ²	C _A Ac Side ft ²
LPA-80080/4CF	300.000	0.012	-1.008	-7.510	179.000	1.621	0.010	2.619	6.057
LPA-80080/4CF	300.000	0.012	-7.008	2.882	179.000	1.621	0.010	2.619	6.057
LPA-80080/4CF	60.000	0.012	7.008	2.882	179.000	1.621	0.010	2.619	6.057
LPA-80080/4CF	60.000	0.012	1.008	-7.510	179.000	1.621	0.010	2.619	6.057
LPA-80063/4CF	180.000	0.020	-6.000	4.627	179.000	1.621	0.010	7.011	6.084
LPA-80063/4CF	180.000	0.020	6.000	4.627	179.000	1.621	0.010	7.011	6.084
LPA-185080/8CF_2	300.000	0.007	-2.008	-5.778	179.000	1.621	0.010	2.095	2.786
LPA-185080/8CF_2	300.000	0.007	-6.008	1.150	179.000	1.621	0.010	2.095	2.786
LPA-185080/8CF_2	60.000	0.007	6.008	1.150	179.000	1.621	0.010	2.095	2.786
LPA-185080/8CF_2	60.000	0.007	2.008	-5.778	179.000	1.621	0.010	2.095	2.786
LPA-185063/8CFx2	180.000	0.009	-4.000	4.627	179.000	1.621	0.010	3.040	2.734
LPA-185063/8CFx2	180.000	0.009	4.000	4.627	179.000	1.621	0.010	3.040	2.734
Valmont T-Arm (1)	300.000	0.336	-2.275	-1.314	179.000	1.621	0.010	10.540	10.540
Valmont T-Arm (1)	60.000	0.336	2.275	-1.314	179.000	1.621	0.010	10.540	10.540
Valmont T-Arm (1)	180.000	0.336	0.000	2.627	179.000	1.621	0.010	10.540	10.540
Sum		1.142							
Weight:									

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M _x kip-ft	Sum of Overturning Moments, M _z kip-ft	Sum of Torques kip-ft
Leg Weight	19.899					
Bracing Weight	0.000					
Total Member Self-Weight	19.899			0.093	0.000	
Total Weight	23.188			0.093	0.000	
Wind 0 deg - No Ice		0.000	-19.380	-1976.241	0.000	0.000
Wind 30 deg - No Ice		9.449	-16.783	-1711.463	-945.080	-0.005
Wind 45 deg - No Ice		13.363	-13.704	-1397.386	-1336.544	-0.008
Wind 60 deg - No Ice		16.367	-9.690	-988.074	-1636.926	-0.009

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Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 90 deg - No Ice		18.898	0.000	0.093	-1890.159	-0.011
Wind 120 deg - No Ice		16.367	9.690	988.259	-1636.926	-0.009
Wind 135 deg - No Ice		13.363	13.704	1397.571	-1336.544	-0.008
Wind 150 deg - No Ice		9.449	16.783	1711.648	-945.080	-0.005
Wind 180 deg - No Ice		0.000	19.380	1976.426	0.000	0.000
Wind 210 deg - No Ice		-9.449	16.783	1711.648	945.080	0.005
Wind 225 deg - No Ice		-13.363	13.704	1397.571	1336.544	0.008
Wind 240 deg - No Ice		-16.367	9.690	988.259	1636.926	0.009
Wind 270 deg - No Ice		-18.898	0.000	0.093	1890.159	0.011
Wind 300 deg - No Ice		-16.367	-9.690	-988.074	1636.926	0.009
Wind 315 deg - No Ice		-13.363	-13.704	-1397.386	1336.544	0.008
Wind 330 deg - No Ice		-9.449	-16.783	-1711.463	945.080	0.005
Member Ice	3.374					
Total Weight Ice	27.144			0.311	0.000	
Wind 0 deg - Ice		0.000	-15.488	-1618.476	0.000	0.000
Wind 30 deg - Ice		7.558	-13.413	-1401.600	-776.155	-0.004
Wind 45 deg - Ice		10.689	-10.952	-1144.344	-1097.649	-0.006
Wind 60 deg - Ice		13.092	-7.744	-809.082	-1344.340	-0.007
Wind 90 deg - Ice		15.117	0.000	0.311	-1552.311	-0.008
Wind 120 deg - Ice		13.092	7.744	809.705	-1344.340	-0.007
Wind 135 deg - Ice		10.689	10.952	1144.967	-1097.649	-0.006
Wind 150 deg - Ice		7.558	13.413	1402.223	-776.155	-0.004
Wind 180 deg - Ice		0.000	15.488	1619.099	0.000	0.000
Wind 210 deg - Ice		-7.558	13.413	1402.223	776.155	0.004
Wind 225 deg - Ice		-10.689	10.952	1144.967	1097.649	0.006
Wind 240 deg - Ice		-13.092	7.744	809.705	1344.340	0.007
Wind 270 deg - Ice		-15.117	0.000	0.311	1552.311	0.008
Wind 300 deg - Ice		-13.092	-7.744	-809.082	1344.340	0.007
Wind 315 deg - Ice		-10.689	-10.952	-1144.344	1097.649	0.006
Wind 330 deg - Ice		-7.558	-13.413	-1401.600	776.155	0.004
Total Weight	23.188			0.093	0.000	
Wind 0 deg - Service		0.000	-7.570	-771.913	0.000	0.000
Wind 30 deg - Service		3.691	-6.556	-668.484	-369.172	-0.002
Wind 45 deg - Service		5.220	-5.353	-545.798	-522.088	-0.003
Wind 60 deg - Service		6.393	-3.785	-385.910	-639.424	-0.004
Wind 90 deg - Service		7.382	0.000	0.093	-738.343	-0.004
Wind 120 deg - Service		6.393	3.785	386.095	-639.424	-0.004
Wind 135 deg - Service		5.220	5.353	545.983	-522.088	-0.003
Wind 150 deg - Service		3.691	6.556	668.669	-369.172	-0.002
Wind 180 deg - Service		0.000	7.570	772.098	0.000	0.000
Wind 210 deg - Service		-3.691	6.556	668.669	369.172	0.002
Wind 225 deg - Service		-5.220	5.353	545.983	522.088	0.003
Wind 240 deg - Service		-6.393	3.785	386.095	639.424	0.004
Wind 270 deg - Service		-7.382	0.000	0.093	738.343	0.004
Wind 300 deg - Service		-6.393	-3.785	-385.910	639.424	0.004
Wind 315 deg - Service		-5.220	-5.353	-545.798	522.088	0.003
Wind 330 deg - Service		-3.691	-6.556	-668.484	369.172	0.002

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice

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Comb. No.	Description
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice
19	Dead+Wind 0 deg+Ice
20	Dead+Wind 30 deg+Ice
21	Dead+Wind 45 deg+Ice
22	Dead+Wind 60 deg+Ice
23	Dead+Wind 90 deg+Ice
24	Dead+Wind 120 deg+Ice
25	Dead+Wind 135 deg+Ice
26	Dead+Wind 150 deg+Ice
27	Dead+Wind 180 deg+Ice
28	Dead+Wind 210 deg+Ice
29	Dead+Wind 225 deg+Ice
30	Dead+Wind 240 deg+Ice
31	Dead+Wind 270 deg+Ice
32	Dead+Wind 300 deg+Ice
33	Dead+Wind 315 deg+Ice
34	Dead+Wind 330 deg+Ice
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	180 - 131	Pole	Max Tension	35	0.000	0.000	-0.000
			Max. Compression	18	-4.790	0.000	-0.319
			Max. Mx	6	-2.905	-220.463	-0.096
			Max. My	10	-2.793	0.000	-242.215
			Max. Vy	6	6.738	-220.463	-0.096
			Max. Vx	10	7.238	0.000	-242.215
			Max. Torque	23			0.026

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L2	131 - 86.167	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-9.744	0.000	-0.319
			Max. M _x	6	-7.119	-603.790	-0.098
			Max. M _y	10	-7.036	0.000	-647.868
			Max. V _y	6	10.741	-603.790	-0.098
			Max. V _x	10	11.252	0.000	-647.868
			Max. Torque	23			0.026
L3	86.167 - 42.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-16.858	0.000	-0.319
			Max. M _x	6	-13.566	-1154.282	-0.099
			Max. M _y	10	-13.519	0.000	-1220.325
			Max. V _y	6	14.812	-1154.282	-0.099
			Max. V _x	10	15.319	0.000	-1220.325
			Max. Torque	23			0.026
L4	42.333 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-27.144	0.000	-0.319
			Max. M _x	6	-23.171	-1964.486	-0.100
			Max. M _y	10	-23.170	0.000	-2054.395
			Max. V _y	6	18.919	-1964.486	-0.100
			Max. V _x	10	19.401	0.000	-2054.395
			Max. Torque	23			0.026

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	19	27.144	0.000	15.488
	Max. H _x	14	23.188	18.898	0.000
	Max. H _z	2	23.188	0.000	19.380
	Max. M _x	2	2054.199	0.000	19.380
	Max. M _z	6	1964.486	-18.898	0.000
	Max. Torsion	23	0.026	-15.117	0.000
	Min. Vert	1	23.188	0.000	0.000
	Min. H _x	6	23.188	-18.898	0.000
	Min. H _z	10	23.188	0.000	-19.380
	Min. M _x	10	-2054.395	0.000	-19.380
	Min. M _z	14	-1964.486	18.898	0.000
	Min. Torsion	31	-0.026	15.117	0.000

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	23.188	0.000	0.000	0.093	0.000	0.000
Dead+Wind 0 deg - No Ice	23.188	0.000	-19.380	-2054.199	0.000	0.000
Dead+Wind 30 deg - No Ice	23.188	9.449	-16.783	-1779.134	-982.000	-0.011
Dead+Wind 45 deg - No Ice	23.188	13.363	-13.704	-1452.764	-1388.874	-0.015
Dead+Wind 60 deg - No Ice	23.188	16.367	-9.690	-1027.318	-1701.159	-0.017
Dead+Wind 90 deg - No Ice	23.188	18.898	0.000	0.100	-1964.486	-0.017
Dead+Wind 120 deg - No Ice	23.188	16.367	9.690	1027.517	-1701.157	-0.012

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Load Combination	Vertical K	Shear _x K	Shear _y K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Dead+Wind 135 deg - No Ice	23.188	13.363	13.704	1452.962	-1388.872	-0.008
Dead+Wind 150 deg - No Ice	23.188	9.449	16.783	1779.331	-981.999	-0.005
Dead+Wind 180 deg - No Ice	23.188	0.000	19.380	2054.395	0.000	0.000
Dead+Wind 210 deg - No Ice	23.188	-9.449	16.783	1779.331	981.999	0.005
Dead+Wind 225 deg - No Ice	23.188	-13.363	13.704	1452.962	1388.872	0.008
Dead+Wind 240 deg - No Ice	23.188	-16.367	9.690	1027.517	1701.157	0.012
Dead+Wind 270 deg - No Ice	23.188	-18.898	0.000	0.100	1964.486	0.017
Dead+Wind 300 deg - No Ice	23.188	-16.367	-9.690	-1027.318	1701.159	0.017
Dead+Wind 315 deg - No Ice	23.188	-13.363	-13.704	-1452.764	1388.874	0.015
Dead+Wind 330 deg - No Ice	23.188	-9.449	-16.783	-1779.134	982.000	0.011
Dead+Ice	27.144	0.000	0.000	0.319	0.000	0.000
Dead+Wind 0 deg+Ice	27.144	0.000	-15.488	-1702.764	0.000	0.000
Dead+Wind 30 deg+Ice	27.144	7.558	-13.413	-1474.681	-816.177	-0.014
Dead+Wind 45 deg+Ice	27.144	10.689	-10.952	-1204.081	-1154.317	-0.020
Dead+Wind 60 deg+Ice	27.144	13.092	-7.744	-851.364	-1413.827	-0.023
Dead+Wind 90 deg+Ice	27.144	15.117	0.000	0.347	-1632.641	-0.026
Dead+Wind 120 deg+Ice	27.144	13.092	7.744	852.054	-1413.823	-0.021
Dead+Wind 135 deg+Ice	27.144	10.689	10.952	1204.769	-1154.312	-0.017
Dead+Wind 150 deg+Ice	27.144	7.558	13.413	1475.366	-816.173	-0.012
Dead+Wind 180 deg+Ice	27.144	0.000	15.488	1703.446	0.000	0.000
Dead+Wind 210 deg+Ice	27.144	-7.558	13.413	1475.366	816.173	0.012
Dead+Wind 225 deg+Ice	27.144	-10.689	10.952	1204.769	1154.312	0.017
Dead+Wind 240 deg+Ice	27.144	-13.092	7.744	852.054	1413.823	0.021
Dead+Wind 270 deg+Ice	27.144	-15.117	0.000	0.347	1632.641	0.026
Dead+Wind 300 deg+Ice	27.144	-13.092	-7.744	-851.364	1413.827	0.023
Dead+Wind 315 deg+Ice	27.144	-10.689	-10.952	-1204.081	1154.317	0.020
Dead+Wind 330 deg+Ice	27.144	-7.558	-13.413	-1474.681	816.177	0.014
Dead+Wind 0 deg - Service	23.188	0.000	-7.570	-804.311	0.000	0.000
Dead+Wind 30 deg - Service	23.188	3.691	-6.556	-696.553	-384.477	-0.003
Dead+Wind 45 deg - Service	23.188	5.220	-5.353	-568.722	-543.739	-0.005
Dead+Wind 60 deg - Service	23.188	6.393	-3.785	-402.123	-665.950	-0.006
Dead+Wind 90 deg - Service	23.188	7.382	0.000	0.101	-768.979	-0.007
Dead+Wind 120 deg - Service	23.188	6.393	3.785	402.325	-665.950	-0.006
Dead+Wind 135 deg - Service	23.188	5.220	5.353	568.924	-543.739	-0.005
Dead+Wind 150 deg - Service	23.188	3.691	6.556	696.755	-384.476	-0.003
Dead+Wind 180 deg - Service	23.188	0.000	7.570	804.512	0.000	0.000
Dead+Wind 210 deg - Service	23.188	-3.691	6.556	696.755	384.476	0.003
Dead+Wind 225 deg - Service	23.188	-5.220	5.353	568.924	543.739	0.005
Dead+Wind 240 deg - Service	23.188	-6.393	3.785	402.325	665.950	0.006
Dead+Wind 270 deg - Service	23.188	-7.382	0.000	0.101	768.979	0.007
Dead+Wind 300 deg - Service	23.188	-6.393	-3.785	-402.123	665.950	0.006
Dead+Wind 315 deg - Service	23.188	-5.220	-5.353	-568.722	543.739	0.005
Dead+Wind 330 deg - Service	23.188	-3.691	-6.556	-696.553	384.477	0.003

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-23.188	0.000	0.000	23.188	0.000	0.000%
2	0.000	-23.188	-19.380	0.000	23.188	19.380	0.000%
3	9.449	-23.188	-16.783	-9.449	23.188	16.783	0.000%
4	13.363	-23.188	-13.704	-13.363	23.188	13.704	0.000%
5	16.367	-23.188	-9.690	-16.367	23.188	9.690	0.000%
6	18.898	-23.188	0.000	-18.898	23.188	0.000	0.000%
7	16.367	-23.188	9.690	-16.367	23.188	-9.690	0.000%
8	13.363	-23.188	13.704	-13.363	23.188	-13.704	0.000%
9	9.449	-23.188	16.783	-9.449	23.188	-16.783	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
10	0.000	-23.188	19.380	0.000	23.188	-19.380	0.000%
11	-9.449	-23.188	16.783	9.449	23.188	-16.783	0.000%
12	-13.363	-23.188	13.704	13.363	23.188	-13.704	0.000%
13	-16.367	-23.188	9.690	16.367	23.188	-9.690	0.000%
14	-18.898	-23.188	0.000	18.898	23.188	0.000	0.000%
15	-16.367	-23.188	-9.690	16.367	23.188	9.690	0.000%
16	-13.363	-23.188	-13.704	13.363	23.188	13.704	0.000%
17	-9.449	-23.188	-16.783	9.449	23.188	16.783	0.000%
18	0.000	-27.144	0.000	0.000	27.144	0.000	0.000%
19	0.000	-27.144	-15.488	0.000	27.144	15.488	0.000%
20	7.558	-27.144	-13.413	-7.558	27.144	13.413	0.000%
21	10.689	-27.144	-10.952	-10.689	27.144	10.952	0.000%
22	13.092	-27.144	-7.744	-13.092	27.144	7.744	0.000%
23	15.117	-27.144	0.000	-15.117	27.144	0.000	0.000%
24	13.092	-27.144	7.744	-13.092	27.144	-7.744	0.000%
25	10.689	-27.144	10.952	-10.689	27.144	-10.952	0.000%
26	7.558	-27.144	13.413	-7.558	27.144	-13.413	0.000%
27	0.000	-27.144	15.488	0.000	27.144	-15.488	0.000%
28	-7.558	-27.144	13.413	7.558	27.144	-13.413	0.000%
29	-10.689	-27.144	10.952	10.689	27.144	-10.952	0.000%
30	-13.092	-27.144	7.744	13.092	27.144	-7.744	0.000%
31	-15.117	-27.144	0.000	15.117	27.144	0.000	0.000%
32	-13.092	-27.144	-7.744	13.092	27.144	7.744	0.000%
33	-10.689	-27.144	-10.952	10.689	27.144	10.952	0.000%
34	-7.558	-27.144	-13.413	7.558	27.144	13.413	0.000%
35	0.000	-23.188	-7.570	0.000	23.188	7.570	0.000%
36	3.691	-23.188	-6.556	-3.691	23.188	6.556	0.000%
37	5.220	-23.188	-5.353	-5.220	23.188	5.353	0.000%
38	6.393	-23.188	-3.785	-6.393	23.188	3.785	0.000%
39	7.382	-23.188	0.000	-7.382	23.188	0.000	0.000%
40	6.393	-23.188	3.785	-6.393	23.188	-3.785	0.000%
41	5.220	-23.188	5.353	-5.220	23.188	-5.353	0.000%
42	3.691	-23.188	6.556	-3.691	23.188	-6.556	0.000%
43	0.000	-23.188	7.570	0.000	23.188	-7.570	0.000%
44	-3.691	-23.188	6.556	3.691	23.188	-6.556	0.000%
45	-5.220	-23.188	5.353	5.220	23.188	-5.353	0.000%
46	-6.393	-23.188	3.785	6.393	23.188	-3.785	0.000%
47	-7.382	-23.188	0.000	7.382	23.188	0.000	0.000%
48	-6.393	-23.188	-3.785	6.393	23.188	3.785	0.000%
49	-5.220	-23.188	-5.353	5.220	23.188	5.353	0.000%
50	-3.691	-23.188	-6.556	3.691	23.188	6.556	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00074952
3	Yes	6	0.00000001	0.00005172
4	Yes	6	0.00000001	0.00005248
5	Yes	6	0.00000001	0.00005125
6	Yes	4	0.00000001	0.00073690
7	Yes	6	0.00000001	0.00005119
8	Yes	6	0.00000001	0.00005248
9	Yes	6	0.00000001	0.00005175
10	Yes	4	0.00000001	0.00074920

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11	Yes	6	0.00000001	0.00005175
12	Yes	6	0.00000001	0.00005248
13	Yes	6	0.00000001	0.00005119
14	Yes	4	0.00000001	0.00073690
15	Yes	6	0.00000001	0.00005125
16	Yes	6	0.00000001	0.00005248
17	Yes	6	0.00000001	0.00005172
18	Yes	4	0.00000001	0.00000001
19	Yes	5	0.00000001	0.00000758
20	Yes	6	0.00000001	0.00012039
21	Yes	6	0.00000001	0.00012992
22	Yes	6	0.00000001	0.00011851
23	Yes	5	0.00000001	0.00000760
24	Yes	6	0.00000001	0.00011841
25	Yes	6	0.00000001	0.00013003
26	Yes	6	0.00000001	0.00012060
27	Yes	5	0.00000001	0.00000757
28	Yes	6	0.00000001	0.00012060
29	Yes	6	0.00000001	0.00013003
30	Yes	6	0.00000001	0.00011841
31	Yes	5	0.00000001	0.00000760
32	Yes	6	0.00000001	0.00011851
33	Yes	6	0.00000001	0.00012992
34	Yes	6	0.00000001	0.00012039
35	Yes	4	0.00000001	0.00024629
36	Yes	5	0.00000001	0.00016679
37	Yes	5	0.00000001	0.00018790
38	Yes	5	0.00000001	0.00016158
39	Yes	4	0.00000001	0.00022165
40	Yes	5	0.00000001	0.00016158
41	Yes	5	0.00000001	0.00018819
42	Yes	5	0.00000001	0.00016719
43	Yes	4	0.00000001	0.00024654
44	Yes	5	0.00000001	0.00016719
45	Yes	5	0.00000001	0.00018819
46	Yes	5	0.00000001	0.00016158
47	Yes	4	0.00000001	0.00022165
48	Yes	5	0.00000001	0.00016158
49	Yes	5	0.00000001	0.00018790
50	Yes	5	0.00000001	0.00016679

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 131	67.901	43	3.550	0.002
L2	135 - 86.167	37.263	43	2.757	0.001
L3	91 - 42.333	16.345	43	1.730	0.000
L4	48 - 0	4.508	43	0.863	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
179.000	LPA-80080/4CF	43	67.176	3.533	0.002	18426

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	180 - 131	172.609	10	9.026	0.009
L2	135 - 86.167	94.891	10	7.021	0.003
L3	91 - 42.333	41.681	10	4.410	0.001
L4	48 - 0	11.506	10	2.203	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
179.000	LPA-80080/4CF	10	170.771	8.986	0.009	7539

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P	Allow. P _a	Ratio P
	ft		ft	ft		ksi	in ²	K	K	P _a
L1	180 - 131 (1)	TP23.22x14.89x0.219	49.000	0.000	0.0	39.000	15.740	-2.793	613.873	0.005
L2	131 - 86.167 (2)	TP30.41x22.102x0.281	48.833	0.000	0.0	39.000	26.517	-7.036	1034.180	0.007
L3	86.167 - 42.333 (3)	TP37.29x29.026x0.344	48.667	0.000	0.0	39.000	39.858	-13.519	1554.480	0.009
L4	42.333 - 0 (4)	TP43.8x35.64x0.375	48.000	0.000	0.0	39.000	52.436	-23.170	2044.990	0.011

Pole Bending Design Data

Section No.	Elevation	Size	Actual M _x	Actual f _{bx}	Allow. F _{bx}	Ratio f _{bx}	Actual M _y	Actual f _{by}	Allow. F _{by}	Ratio f _{by}
	ft		kip-ft	ksi	ksi	F _{bx}	kip-ft	ksi	ksi	F _{by}
L1	180 - 131 (1)	TP23.22x14.89x0.219	242.216	33.903	39.000	0.869	0.000	0.000	39.000	0.000
L2	131 - 86.167 (2)	TP30.41x22.102x0.281	647.867	40.988	39.000	1.051	0.000	0.000	39.000	0.000
L3	86.167 - 42.333 (3)	TP37.29x29.026x0.344	1220.32	41.832	39.000	1.073	0.000	0.000	39.000	0.000

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Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L4	42.333 - 0 (4)	TP43.8x35.64x0.375	2054.39 2	44.318	39.000	1.136	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	180 - 131 (1)	TP23.22x14.89x0.219	7.238	0.460	26.000	0.036	0.000	0.000	26.000	0.000
L2	131 - 86.167 (2)	TP30.41x22.102x0.281	11.252	0.424	26.000	0.033	0.000	0.000	26.000	0.000
L3	86.167 - 42.333 (3)	TP37.29x29.026x0.344	15.319	0.384	26.000	0.030	0.000	0.000	26.000	0.000
L4	42.333 - 0 (4)	TP43.8x35.64x0.375	19.401	0.370	26.000	0.029	0.000	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P_a	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 131 (1)	0.005	0.869	0.000	0.036	0.000	0.874 ✓	1.333	H1-3+VT ✓
L2	131 - 86.167 (2)	0.007	1.051	0.000	0.033	0.000	1.058 ✓	1.333	H1-3+VT ✓
L3	86.167 - 42.333 (3)	0.009	1.073	0.000	0.030	0.000	1.082 ✓	1.333	H1-3+VT ✓
L4	42.333 - 0 (4)	0.011	1.136	0.000	0.029	0.000	1.148 ✓	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF * P_{allow}$ K	% Capacity	Pass Fail
L1	180 - 131	Pole	TP23.22x14.89x0.219	1	-2.793	818.293	65.6	Pass
L2	131 - 86.167	Pole	TP30.41x22.102x0.281	2	-7.036	1378.562	79.4	Pass
L3	86.167 - 42.333	Pole	TP37.29x29.026x0.344	3	-13.519	2072.122	81.1	Pass
L4	42.333 - 0	Pole	TP43.8x35.64x0.375	4	-23.170	2725.972	86.1	Pass
							Summary	
							Pole (L4)	86.1 Pass
							RATING =	86.1 Pass

Element Map

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<i>Section No.</i>	<i>Section Elevation ft</i>	<i>Component Type</i>	<i>Element List</i>
L1	180.000-131.000	Pole	1
L2	131.000-86.167	Pole	2
L3	86.167-42.333	Pole	3
L4	42.333-0.000	Pole	4
			Total number of elements: 4

ANCHOR BOLT AND BASE PLATE ANALYSIS

ANCHOR BOLT AND BASEPLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	OM := 2054·kips·ft	user input
Shear Force:	Shear := 19.0·kips	user input
Axial Force:	Axial := 23.0·kips	user input

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = N	N := 12	user input
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Bolt Ultimate Strength:	F _u := 100·ksi	user input
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Bolt Allowable Strength:	F _y := 75·ksi	user input
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Diameter Of Anchor Bolts	D := 2.25in	user input
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Threaded length per inch	n := 4.5	user input
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Bolt "Column" Distance:	l _w := 2.5in	user input
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Bolt Modulus:	E := 29000·ksi	user input
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Base Plate Data:

Use ASTM A572 Grade 60

Plate Yield Strength:	F _{ybp} := 60·ksi	user input
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Base Plate Thickness:	PlateThicknessProvide := 2.625·in	user input
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Geometric Layout Data:

Distance from the center of gravity of the group to bolt in question = $d(i)$

Distances for loading condition (see detail):

$d_1 := 25.92 \cdot \text{in}$ *user input*

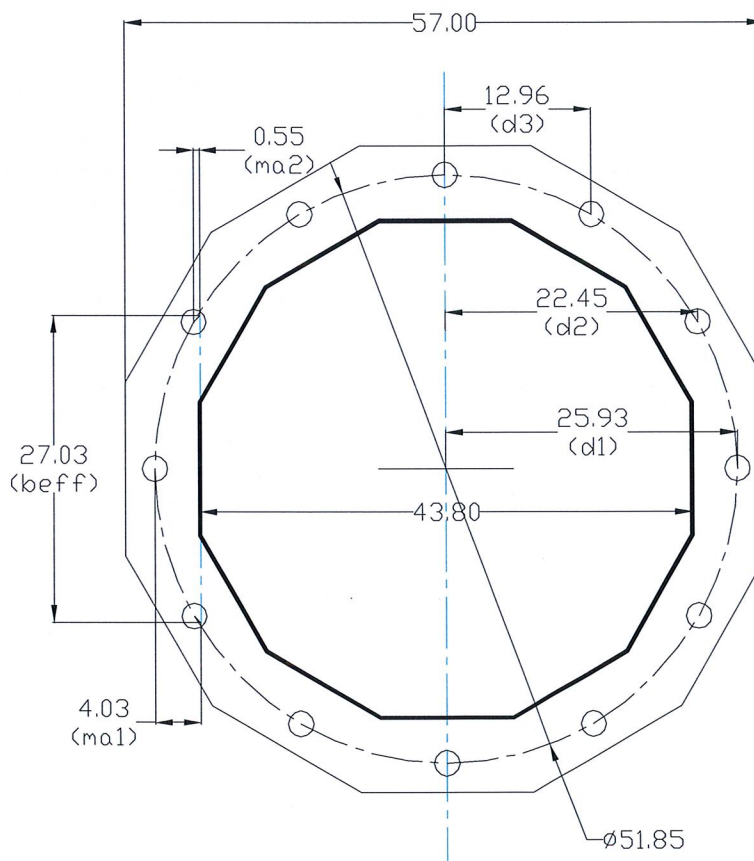
MomentArm₁ := $4.03 \cdot \text{in}$ *user input*

$d_2 := 22.45 \cdot \text{in}$ *user input*

MomentArm₂ := $0.55 \cdot \text{in}$ *user input*

$d_3 := 12.96 \cdot \text{in}$ *user input*

EffectiveWidth := $27.03 \cdot \text{in}$ *user input*



DETAIL - ANCHOR BOLT AND PLATE

Anchor Bolt Section Properties:

Polar Moment of Inertia (J) divided by Area (A) = Σd

$$\Sigma d := (d_1)^2 \cdot 2 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 4 \quad \Sigma d = 4.03 \times 10^3 \cdot \text{in}^2$$

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \quad A_g = 3.98 \cdot \text{in}^2$$

Net Area of Bolt:

$$A_{\text{net}} := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 \quad A_{\text{net}} = 3.25 \cdot \text{in}^2$$

Net Diameter:

$$D_n := \frac{2 \cdot \sqrt{A_{\text{net}}}}{\sqrt{\pi}} \quad D_n = 2.03 \cdot \text{in}$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \quad r = 0.51 \cdot \text{in}$$

Section Modulus of Bolt:

$$S_x := \frac{\pi \cdot D_n^3}{32} \quad S_x = 0.83 \cdot \text{in}^3$$

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{\text{Shear}}{N} \right) \cdot l \quad M_x = 0.33 \cdot \text{kips} \cdot \text{ft}$$

$$f_{bx} := \frac{M_x}{S_x} \quad f_{bx} = 4.79 \cdot \text{ksi}$$

Allowable Bending

$$F_{bx} := 1.333 \cdot 0.60 \cdot F_y \quad F_{bx} = 59.98 \cdot \text{ksi}$$

Note: 1.333 increase allowed per TIA/EIA

Anchor Bolt Tensile Stress Check:

Maximum Tensile Force (Gross Area):

$$\text{AllowableTension} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u)$$

$$\text{AllowableTension} = 174.9 \cdot \text{kips}$$

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{\text{net.area}} := 1.333 \cdot (0.60 \cdot A_{\text{net}} \cdot F_y)$$

$$F_{\text{net.area}} = 194.81 \cdot \text{kips}$$

Note: 1.333 increase allowed per TIA/EIA

Maximum Applied Tension:

$$\text{MaxTension} := \frac{\text{OM} \cdot d_1}{\Sigma d} - \frac{\text{Axial}}{N}$$

$$\text{MaxTension} = 156.55 \cdot \text{kips}$$

Check Stresses:

Note: Bolts supplied are "upset bolts." Use net area for checking per AISC.

AnchorBoltStress := if($F_{\text{net.area}} > \text{MaxTension}$, "Not Overstressed", "Overstressed")

AnchorBoltStress = "Not Overstressed"

$$\text{PercentStressed} := 100 \cdot \frac{\text{MaxTension}}{F_{\text{net.area}}}$$

$$\text{PercentStressed} = 80.4$$

Note: Shear Stress is negligible

Check Compression & Combined Stresses (if required):

Check to see if a complete combined stress analysis is required:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required."

Set the clear space between the plate and bolt to zero if a combined stress analysis is not required and set the bending stress to zero:

$$l_w := \begin{cases} 1 & \text{if } l > 2 \cdot D_n \\ 0.0 \text{ in} & \text{otherwise} \end{cases} \quad l = 0 \quad f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0 \text{ ksi} & \text{otherwise} \end{cases} \quad f_{bx} = 0 \cdot \text{ksi}$$

Allowable Compressive Force:

$$K_w := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} \quad C_c = 87.36$$

$$F_a := \begin{cases} \frac{\left[1 - \frac{\left(\frac{K \cdot l}{r} \right)^2}{2 \cdot C_c^2} \right] \cdot F_y}{\frac{5}{3} + \frac{3 \cdot \left(\frac{K \cdot l}{r} \right)}{8 \cdot C_c} - \frac{\left(\frac{K \cdot l}{r} \right)^3}{8 \cdot C_c^3}} & \text{if } \frac{K \cdot l}{r} \leq C_c \\ \frac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r} \right)^2} & \text{if } \frac{K \cdot l}{r} > C_c \end{cases} \quad F_a = 45 \cdot \text{ksi}$$

$$F_{aw} := 1.333 \cdot F_a \quad \text{Note: 1.333 increase allowed per TIA/EIA} \quad F_a = 59.98 \cdot \text{ksi}$$

Applied Compressive Force:

$$\text{MaxCompression} := \frac{\text{OM} \cdot d_1}{\Sigma d} + \frac{\text{Axial}}{N} \quad \text{MaxCompression} = 160.39 \cdot \text{kips}$$

$$f_a := \frac{\text{MaxCompression}}{A_{\text{net}}} \quad f_a = 49.38 \cdot \text{ksi}$$

Check Combined Stresses:

$$\text{StressRatio} := \frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \quad \text{StressRatio} = 0.82$$

Condition := if(StressRatio ≤ 1.0, "Not Overstressed", "Overstressed")

Condition = "Not Overstressed"

Base Plate Analysis:

Force From Bolt(s):

$$C_1 := \frac{OM \cdot d_1}{\Sigma d} + \frac{Axial}{N} \quad C_1 = 160.39 \cdot \text{kips}$$

$$C_2 := \frac{OM \cdot d_2}{\Sigma d} + \frac{Axial}{N} \quad C_2 = 139.17 \cdot \text{kips}$$

Bending Stress In Plate:

$$f_{bp} := \frac{6 \cdot (C_1 \cdot \text{MomentArm}_1 + 2C_2 \cdot \text{MomentArm}_2)}{\text{EffectiveWidth} \cdot \text{PlateThicknessProvide}^2} \quad f_{bp} = 44.21 \cdot \text{ksi}$$

Check Stresses:

$$\text{BasePlateRatio} := \frac{f_{bp}}{1.333 \cdot 0.75 F_{y_{bp}}} \quad \text{BasePlateRatio} = 0.74$$

$$\text{BasePlateStress} := \text{if}(\text{BasePlateRatio} < 1, \text{"Not Over Stress"}, \text{"Is Over Stress"})$$

$$\text{BasePlateStress} = \text{"Not Over Stress"}$$

FOUNDATION ANALYSIS

Check Foundation Depth

TIA/EIA-222-F 7.2.5

Shear Force:

$$S := 19.0k$$

USER INPUT

Overturning Moment:

$$M := 2054ft \cdot k$$

USER INPUT

Foundation Diameter:

$$d := 5.5ft$$

USER INPUT

Overall Length of Caisson:

$$L_c := 14.25ft$$

USER INPUT

Depth From Top of Caisson to Grade:

$$L_{pag} := 1.0ft$$

USER INPUT

Depth of Caisson Below Ground Level:

$$LD := L_c - L_{pag} \quad LD = 13.2ft$$

USER INPUT

Depth Required:

$$LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d} \right) + 2ft^{.5} \left(\frac{M \cdot ft}{3 \cdot k \cdot d} + \frac{S \cdot ft}{2k} + \frac{S^2 \cdot ft^3}{18k^2 \cdot d^2} \right)^{.5} \quad LD1 = 26.4ft$$

DepthCheck := if(LD1 ≤ LD, "OK", "NO GOOD") DepthCheck = "NO GOOD"

Note: Result not applicable. Actual soil is better than normal soil as defined in TIA/EIA 222 F. Refer to L-Pile analysis.

Moment Capacity:

Bending Moment:

$$Mu := 2075.7ft \cdot k \quad \text{USER INPUT-FROM LPILE}$$

Moment Capacity:

$$Mn := 4107.5ft \cdot k \quad \text{USER INPUT-FROM LPILE}$$

Factor of Safety:

$$FS := \frac{Mn}{Mu} \quad FS = 2.0$$

Factor of Safety Required

$$FS_{reqd} := 1.3 \quad FOSCheck := \text{if}(FS \geq FS_{reqd}, "OK", "NO GOOD") \quad FOSCheck = "OK"$$

Factor of Safety Ratio:

$$FS_{ratio} := \left(\frac{FS_{reqd}}{FS} \right) = 0.66$$

Axial Capacity:

Applied Axial Load: $A1 := 23.0k$ *USER INPUT*

Concrete Weight: $A2 := .150 \frac{k}{ft^3} \cdot LD \cdot \pi \frac{d^2}{4}$ $A2 = 47.2 \cdot k$

Total Axial Load: $AT := A1 + A2$ $AT = 70.2 \cdot k$

Number of Rebar: $n := 20$ *USER INPUT*

Area of Rebar: $Ar := 1.560in^2$ *USER INPUT* #11

Rebar Yield Strength: $fy := 60ksi$ *USER INPUT*

Area of Concrete: $Ag := \pi \cdot \frac{d^2}{4}$

Concrete Comp Strength: $fc := 3ksi$ *USER INPUT*

Axial Capacity: $Po := n \cdot Ar \cdot fy + (Ag - n \cdot Ar) \cdot 0.85 \cdot fc$ $Po = 10516.5 \cdot k$

AxialCheck := if(AT ≤ Po, "OK", "NO GOOD") $AxialCheck = "OK"$

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LPILE Plus for Windows, Version 4

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

J Mead

URS

Name of input data file: P:\08\MathCAD\Drilled Foundation.lpd
Name of output file: P:\08\MathCAD\Drilled Foundation.Ipo
Name of plot output file: P:\08\MathCAD\Drilled Foundation.lpp
Name of runtime file: P:\08\MathCAD\Drilled Foundation.lpr

Time and Date of Analysis

Date: January 16, 2008 Time: 15:35:54

Problem Title

180' Monopole - Plymouth, CT

Program Options

Units Used in Computations - US Customary Units, inches, pounds

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Basic Program Options:

Analysis Type 3:

- Computations of Ultimate Bending Moment Capacity and Pile Response Using Nonlinear EI

Computation Options:

- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:

- Number of pile increments = 100
- Deflection tolerance for closure = 1.0000E-05 in
- Maximum number of iterations allowed = 100
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:

- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 171.00 in
Depth of ground surface below top of pile = 12.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	.000	66.000	9.3142E+05	3.4212E+03	3.1200E+06
2	171.000	66.000	9.3142E+05	3.4212E+03	3.1200E+06

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Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is soft rock (vuggy limestone)

Distance from top of pile to top of layer = 12.000 in

Distance from top of pile to bottom of layer = 300.000 in

(Depth of lowest layer extends 129.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 2 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	.00	.07800
2	300.00	.07800

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 2 points

Point	Depth X	Cohesion c	Angle of Friction	E50/k_rm	RQD
-------	---------	------------	-------------------	----------	-----

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No.	in	lbs/in**2	Deg.	%	
1	.000	3280.00000	.00	-----	-----
2	300.000	3280.00000	.00	-----	-----

Notes:

- (1) Cohesion = uniaxial compressive strength for rock materials.
- (2) E50 is reported for clay strata.
- (3) k_{rm} is reported for rock strata.
- (4) RQD is input and reported only for rock materials.
- (5) Internal default values for E50 will be generated when input value is 0.

Static loading criteria was used for computation of p-y curves

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)

Shear force at pile head = 19000.000 lbs

Bending moment at pile head = 24648000.000 in-lbs

Axial load at pile head = 23000.000 lbs

(Non-zero moment for this load indicates pile-head is free to rotate under the applied pile-head load)

Computations of Ultimate Moment Capacity and Nonlinear Bending Stiffness

Pile Description:

The pile shape is a circular solid pile.

Outside Diameter = 66.000 In

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Material Properties:

Compressive Strength of Concrete = 3. Kip/in**2
 Yield stress for rebar = 60. Kip/in**2
 Modulus of elasticity of steel = 29000. Kip/in**2
 Number of reinforcing bars = 20
 Area of single rebar = 1.56000 in**2
 Number of rows of reinforcing bars = 11
 Cover Thickness = 4.000 in

Ultimate squash load capacity = 10516.49 Kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.560000	29.0000
2	3.120000	27.5806
3	3.120000	23.4615
4	3.120000	17.0458
5	3.120000	8.9615
6	3.120000	.0000
7	3.120000	-8.9615
8	3.120000	-17.0458
9	3.120000	-23.4615
10	3.120000	-27.5806
11	1.560000	-29.0000

Axial Thrust Force = 23.000 Kip

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches
3.301E+06	3.301E+12	.00000100	.00003512	35.116
4.236E+06	8.471E+11	.00000500	.00009239	18.478
7.300E+06	8.111E+11	.00000900	.00016100	17.889
1.034E+07	7.957E+11	.00001300	.00023008	17.699
1.337E+07	7.864E+11	.00001700	.00029966	17.627
1.637E+07	7.797E+11	.00002100	.00036974	17.607
1.936E+07	7.742E+11	.00002500	.00044036	17.614
2.232E+07	7.695E+11	.00002900	.00051151	17.638

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2.525E+07	7.653E+11	.00003300	.00058325	17.674
2.817E+07	7.613E+11	.00003700	.00065559	17.719
3.106E+07	7.575E+11	.00004100	.00072855	17.770
3.392E+07	7.539E+11	.00004500	.00080218	17.826
3.648E+07	7.444E+11	.00004900	.00087401	17.837
3.826E+07	7.219E+11	.00005300	.00093981	17.732
4.452E+07	5.363E+11	.00008300	.00136951	16.500
4.674E+07	4.137E+11	.00011300	.00174721	15.462
4.778E+07	3.341E+11	.00014300	.00210451	14.717
4.854E+07	2.806E+11	.00017300	.00247253	14.292
4.920E+07	2.424E+11	.00020300	.00282545	13.918
4.936E+07	2.119E+11	.00023300	.00315349	13.534
4.948E+07	1.882E+11	.00026300	.00348674	13.258
4.953E+07	1.689E+11	.00029300	.00386758	13.200

Ultimate moment capacity at concrete strain of 0.003 = 4.929E+07 In-lb

 Computed Values of Load Distribution and Deflection
 for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)

Specified shear force at pile head = 19000.000 lbs

Specified bending moment at pile head = 24648000.000 in-lbs

Specified axial load at pile head = 23000.000 lbs

(Non-zero moment for this load does not indicate free-head conditions)

Depth	Deflect.	Moment	Shear	Slope	Total	Flx. Rig.	Soil Res
X	y	M	V	S	Stress	El	p
in	in	lbs-in	lbs	Rad.	lbs/in**2	lbs-in**2	lbs/in
0.000	.031412	2.46E+07	19000.0	-.001425	880.0	7.66E+11	0.000
1.710	.029023	2.47E+07	19000.0	-.001369	881.1	7.66E+11	0.000
3.420	.026728	2.47E+07	19000.0	-.001314	882.3	7.66E+11	0.000
5.130	.024528	2.47E+07	19000.0	-.001259	883.5	7.66E+11	0.000
6.840	.022422	2.48E+07	19000.0	-.001204	884.6	7.66E+11	0.000
8.550	.020411	2.48E+07	19000.0	-.001149	885.8	7.66E+11	0.000
10.260	.018494	2.48E+07	19000.0	-.001093	886.9	7.66E+11	0.000
11.970	.016672	2.49E+07	19000.0	-.001038	888.1	7.66E+11	0.000
13.680	.014946	2.49E+07	-22913.7	-9.82E-04	889.2	7.66E+11	-49021.813

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15.390	.013314	2.48E+07	-102165.1	-9.27E-04	885.3	7.66E+11	-43669.936
17.100	.011777	2.46E+07	-172530.3	-8.71E-04	876.8	7.66E+11	-38628.563
18.810	.010334	2.42E+07	-234537.6	-8.17E-04	864.4	7.67E+11	-33894.568
20.520	.008983	2.38E+07	-288708.6	-7.64E-04	848.4	7.67E+11	-29463.353
22.230	.007722	2.32E+07	-335556.1	-7.11E-04	829.4	7.68E+11	-25329.029
23.940	.006550	2.26E+07	-375581.7	-6.60E-04	807.8	7.69E+11	-21484.598
25.650	.005464	2.19E+07	-409274.5	-6.11E-04	783.9	7.70E+11	-17922.108
27.360	.004461	2.12E+07	-437108.9	-5.63E-04	758.2	7.71E+11	-14632.796
29.070	.003539	2.04E+07	-459544.1	-5.17E-04	730.9	7.73E+11	-11607.225
30.780	.002694	1.96E+07	-477022.6	-4.72E-04	702.5	7.74E+11	-8835.432
32.490	.001923	1.88E+07	-489969.4	-4.30E-04	673.1	7.75E+11	-6307.049
34.200	.001223	1.80E+07	-498791.7	-3.90E-04	643.1	7.77E+11	-4011.372
35.910	5.91E-04	1.71E+07	-503878.0	-3.51E-04	612.7	7.78E+11	-1937.481
37.620	2.27E-05	1.62E+07	-505598.1	-3.14E-04	582.1	7.80E+11	-74.347
39.330	-4.84E-04	1.54E+07	-504303.0	-2.80E-04	551.4	7.82E+11	1589.098
41.040	-9.34E-04	1.45E+07	-500324.6	-2.47E-04	521.0	7.84E+11	3063.958
42.750	-.001330	1.37E+07	-493976.1	-2.16E-04	490.8	7.86E+11	4361.219
44.460	-.001674	1.28E+07	-485551.8	-1.88E-04	461.1	7.88E+11	5491.703
46.170	-.001971	1.20E+07	-475327.9	-1.61E-04	432.0	7.91E+11	6466.104
47.880	-.002224	1.12E+07	-463562.2	-1.36E-04	403.5	7.93E+11	7294.897
49.590	-.002435	1.04E+07	-450495.1	-1.12E-04	375.8	7.95E+11	7988.250
51.300	-.002609	9.66E+06	-436349.8	-9.09E-05	348.9	7.99E+11	8556.001
53.010	-.002746	8.93E+06	-421332.7	-7.11E-05	322.9	8.03E+11	9007.832
54.720	-.002852	8.22E+06	-405634.2	-5.28E-05	297.9	8.06E+11	9353.040
56.430	-.002927	7.54E+06	-389428.9	-3.62E-05	273.8	8.10E+11	9600.511
58.140	-.002975	6.89E+06	-372876.8	-2.10E-05	250.7	8.16E+11	9758.709
59.850	-.002999	6.26E+06	-356123.3	-7.27E-06	228.6	8.23E+11	9835.958
61.560	-.003000	5.67E+06	-339300.2	5.07E-06	207.5	8.30E+11	9840.239
63.270	-.002981	5.10E+06	-322525.7	1.61E-05	187.5	8.37E+11	9779.038
64.980	-.002945	4.57E+06	-305905.9	2.60E-05	168.5	8.43E+11	9659.358
66.690	-.002893	4.06E+06	-289535.1	3.33E-05	150.4	1.30E+12	9487.751
68.400	-.002831	3.57E+06	-273483.4	3.71E-05	133.4	2.56E+12	9286.125
70.110	-.002766	3.12E+06	-257788.0	3.91E-05	117.3	3.30E+12	9071.102
71.820	-.002697	2.69E+06	-242468.0	4.07E-05	102.1	3.30E+12	8847.013
73.530	-.002627	2.29E+06	-227537.9	4.19E-05	87.9107	3.30E+12	8615.098
75.240	-.002554	1.92E+06	-213010.1	4.30E-05	74.5715	3.30E+12	8376.526
76.950	-.002479	1.56E+06	-198894.9	4.39E-05	62.1002	3.30E+12	8132.390
78.660	-.002404	1.23E+06	-185201.2	4.47E-05	50.4713	3.30E+12	7883.713
80.370	-.002327	929626.5	-171935.7	4.52E-05	39.6593	3.30E+12	7631.448
82.080	-.002249	646772.2	-159103.9	4.56E-05	29.6378	3.30E+12	7376.483
83.790	-.002171	385487.5	-146709.8	4.59E-05	20.3805	3.30E+12	7119.638
85.500	-.002092	145021.3	-134755.7	4.60E-05	11.8609	3.30E+12	6861.673
87.210	-.002013	-75380.7	-123243.2	4.60E-05	9.3935	3.30E+12	6603.287
88.920	-.001934	-276474.1	-112172.3	4.60E-05	16.5182	3.30E+12	6345.120
90.630	-.001856	-459013.6	-101542.2	4.58E-05	22.9856	3.30E+12	6087.757

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92.340	-.001778	-623752.0	-91351.0	4.55E-05	28.8222	3.30E+12	5831.727
94.050	-.001700	-771437.7	-81596.1	4.51E-05	34.0547	3.30E+12	5577.509
95.760	-.001624	-902814.3	-72274.0	4.47E-05	38.7093	3.30E+12	5325.532
97.470	-.001548	-1.02E+06	-63380.6	4.42E-05	42.8122	3.30E+12	5076.179
99.180	-.001472	-1.12E+06	-54911.0	4.36E-05	46.3892	3.30E+12	4829.784
100.890	-.001398	-1.21E+06	-46859.9	4.30E-05	49.4659	3.30E+12	4586.643
102.600	-.001325	-1.28E+06	-39221.7	4.24E-05	52.0674	3.30E+12	4347.007
104.310	-.001253	-1.34E+06	-31990.0	4.17E-05	54.2185	3.30E+12	4111.089
106.020	-.001183	-1.39E+06	-25158.4	4.10E-05	55.9437	3.30E+12	3879.066
107.730	-.001113	-1.43E+06	-18720.1	4.03E-05	57.2670	3.30E+12	3651.079
109.440	-.001045	-1.45E+06	-12668.2	3.95E-05	58.2121	3.30E+12	3427.237
111.150	-9.78E-04	-1.47E+06	-6995.4	3.88E-05	58.8022	3.30E+12	3207.618
112.860	-9.12E-04	-1.48E+06	-1694.5	3.80E-05	59.0599	3.30E+12	2992.269
114.570	-8.48E-04	-1.48E+06	3241.9	3.72E-05	59.0076	3.30E+12	2781.212
116.280	-7.85E-04	-1.47E+06	7820.9	3.65E-05	58.6672	3.30E+12	2574.442
117.990	-7.23E-04	-1.45E+06	12050.1	3.57E-05	58.0600	3.30E+12	2371.932
119.700	-6.63E-04	-1.42E+06	15936.6	3.50E-05	57.2072	3.30E+12	2173.632
121.410	-6.03E-04	-1.39E+06	19487.5	3.43E-05	56.1291	3.30E+12	1979.472
123.120	-5.46E-04	-1.36E+06	22709.8	3.35E-05	54.8460	3.30E+12	1789.363
124.830	-4.89E-04	-1.32E+06	25610.5	3.29E-05	53.3774	3.30E+12	1603.201
126.540	-4.33E-04	-1.27E+06	28196.0	3.22E-05	51.7428	3.30E+12	1420.864
128.250	-3.79E-04	-1.22E+06	30473.0	3.15E-05	49.9610	3.30E+12	1242.220
129.960	-3.25E-04	-1.17E+06	32447.5	3.09E-05	48.0505	3.30E+12	1067.120
131.670	-2.73E-04	-1.11E+06	34125.4	3.03E-05	46.0295	3.30E+12	895.410
133.380	-2.22E-04	-1.05E+06	35512.5	2.98E-05	43.9156	3.30E+12	726.924
135.090	-1.71E-04	-987974.0	36614.1	2.92E-05	41.7265	3.30E+12	561.487
136.800	-1.22E-04	-924544.1	37435.3	2.87E-05	39.4792	3.30E+12	398.920
138.510	-7.29E-05	-859947.7	37980.7	2.83E-05	37.1906	3.30E+12	239.040
140.220	-2.49E-05	-794652.3	38254.9	2.79E-05	34.8772	3.30E+12	81.658
141.930	2.24E-05	-729118.1	38262.0	2.75E-05	32.5553	3.30E+12	-73.415
143.640	6.90E-05	-663798.6	38005.6	2.71E-05	30.2410	3.30E+12	-226.370
145.350	1.15E-04	-599141.0	37489.4	2.68E-05	27.9502	3.30E+12	-377.396
147.060	1.61E-04	-535586.9	36716.4	2.65E-05	25.6985	3.30E+12	-526.681
148.770	2.06E-04	-473572.9	35689.5	2.62E-05	23.5014	3.30E+12	-674.411
150.480	2.50E-04	-413530.9	34411.1	2.60E-05	21.3741	3.30E+12	-820.764
152.190	2.94E-04	-355888.9	32883.5	2.58E-05	19.3319	3.30E+12	-965.916
153.900	3.38E-04	-301071.3	31108.6	2.56E-05	17.3897	3.30E+12	-1110.034
155.610	3.82E-04	-249499.6	29087.9	2.55E-05	15.5625	3.30E+12	-1253.277
157.320	4.26E-04	-201592.6	26823.0	2.54E-05	13.8652	3.30E+12	-1395.796
159.030	4.69E-04	-157767.0	24314.8	2.53E-05	12.3125	3.30E+12	-1537.728
160.740	5.12E-04	-118437.9	21564.3	2.52E-05	10.9190	3.30E+12	-1679.203
162.450	5.55E-04	-84018.9	18572.2	2.51E-05	9.6996	3.30E+12	-1820.333
164.160	5.98E-04	-54922.8	15339.0	2.51E-05	8.6687	3.30E+12	-1961.219
165.870	6.41E-04	-31561.4	11865.0	2.51E-05	7.8410	3.30E+12	-2101.945
167.580	6.84E-04	-14346.4	8150.4	2.51E-05	7.2311	3.30E+12	-2242.580

Drilled Foundation.lpo

169.290 7.27E-04 -3688.9 4195.4 2.51E-05 6.8535 3.30E+12 -2383.173
 171.000 7.69E-04 0.0 0.0 2.51E-05 6.7228 3.30E+12 -2523.756

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = .0314 in
 Computed slope at pile head = -1.4245E-03
 Maximum bending moment = 24908298.726 lbs-in
 Maximum shear force = -505598.070 lbs
 Depth of maximum bending moment = 13.680 in
 Depth of maximum shear force = 37.620 in
 Number of iterations = 7
 Number of zero deflection points = 2

Summary of Pile-head Response

Definition of symbols for pile-head boundary conditions:

y = pile-head displacement, in
 M = pile-head moment, lbs-in
 V = pile-head shear force, lbs
 S = pile-head slope, radians
 R = rotational stiffness of pile-head, in-lbs/rad

BC Type	Boundary Condition 1	Boundary Condition 2	Boundary Condition lbs	Axial Load in	Pile Head Deflection in-lbs	Maximum Moment lbs	Maximum Shear
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1 V= 19000.000 M= 2.46E+07 23000.0000 .031412 2.491E+07 -5.056E+05

The analysis ended normally.

