



STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

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

December 22, 2000

Kenneth C. Baldwin
Robinson & Cole
280 Trumbull Street
Hartford, CT 06103-3597

RE: **TS-VER-119-001117** - Cellco Partnership d/b/a Verizon Wireless request for an order to approve tower sharing at an existing telecommunications facility located at 1218 Cromwell Avenue, Rocky Hill, Connecticut.

Dear Attorney Baldwin:


At a public meeting held December 19, 2000, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

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

The proposed shared use is to be implemented as specified in your letters dated November 16, 2000, and December 14, 2000.

Thank you for your attention and cooperation.

Very truly yours,

Mortimer A. Gelston
Chairman

MAG/laf

c: Honorable Antonio Guerrero, Mayor, Town of Rocky Hill
Nick LaRosa, Town Manager, Town of Rocky Hill
Sandy M. Carter, Verizon Wireless
Robert Stanford, Crown Atlantic Company
Julian Pedini, WFI

ROBINSON & COLE LLP

HARTFORD • STAMFORD • GREENWICH • NEW YORK • BOSTON

RECEIVED
DEC 18 2000

CONNECTICUT
SITING COUNCIL

LAW OFFICES
www.rc.com

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

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

December 14, 2000

Joel M. Rinebold
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: TS-VER-119-001117 – 1218 Cromwell Avenue, Rocky Hill, Connecticut


Dear Mr. Rinebold:

I am writing to follow up on our conversation of last night regarding the above-referenced tower share request. Crown's Rocky Hill tower, approved by the Rocky Hill Planning and Zoning Commission on May 24, 2000, was originally built for wireless carriers other than Verizon Wireless. In fact, Crown currently has a lease agreement with XM Radio for use of the site.

Also, the "1996 approved plan" referred to in the Town's approval letter, relates to a site plan approval issued for the landowner's on-going construction yard/earth products operation use of the property at 1218 Cromwell Avenue. This "1996 approved plan" had nothing to do with the construction of a tower at the site.

Please contact me if you have any questions.

Sincerely,


Kenneth C. Baldwin

KCB/kmd

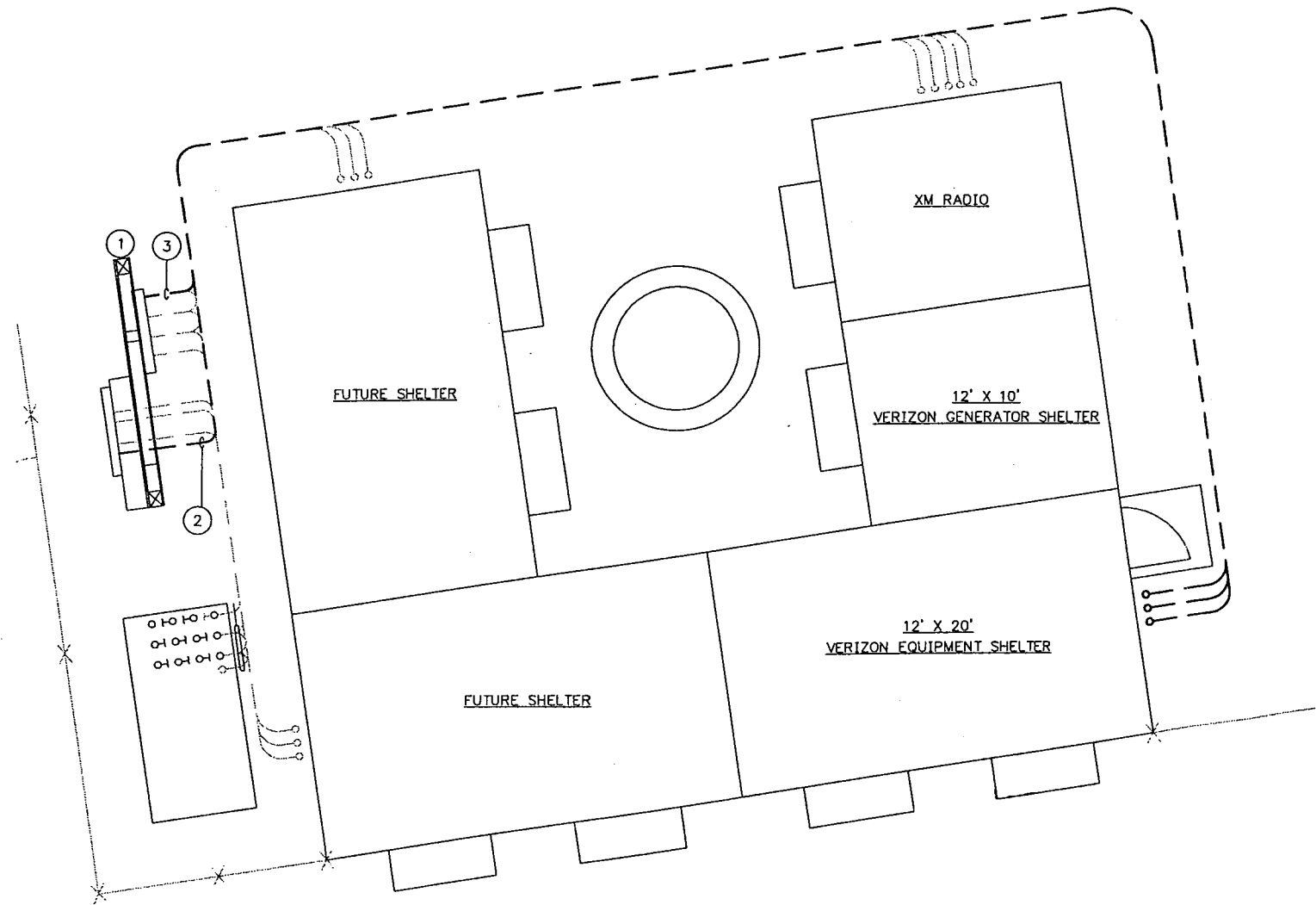
Enclosure

Copy to:

Robert Stanford
Sandy M. Carter

CODED DRAWING NOTES:

- ① EXISTING METER BANK/TELCO BACKBOARD (8'-0" WIDE) w/(1) 200A COMBINATION SERVICE ENCLOSURE FOR LCC AND (4) 200A COMBINATION SERVICE ENCLOSURES FOR FUTURE CARRIERS. METER BY UTILITY, GROUND PER NEC AND UTILITY REQUIREMENTS.
- ② 2" C w/ (3) #3/0 + #6G TO FUTURE 200A AUTOMATIC TRANSFER SWITCH.
- ③ TELCO WIRING IN EXISTING SPARE 2" CONDUIT.
- ④ PER NEC AND UTILITY COMPANY REQUIREMENTS.



① PARTIAL SITE ELECTRICAL PLAN
E1



(IN FEET)
1/8 inch = 1 ft.

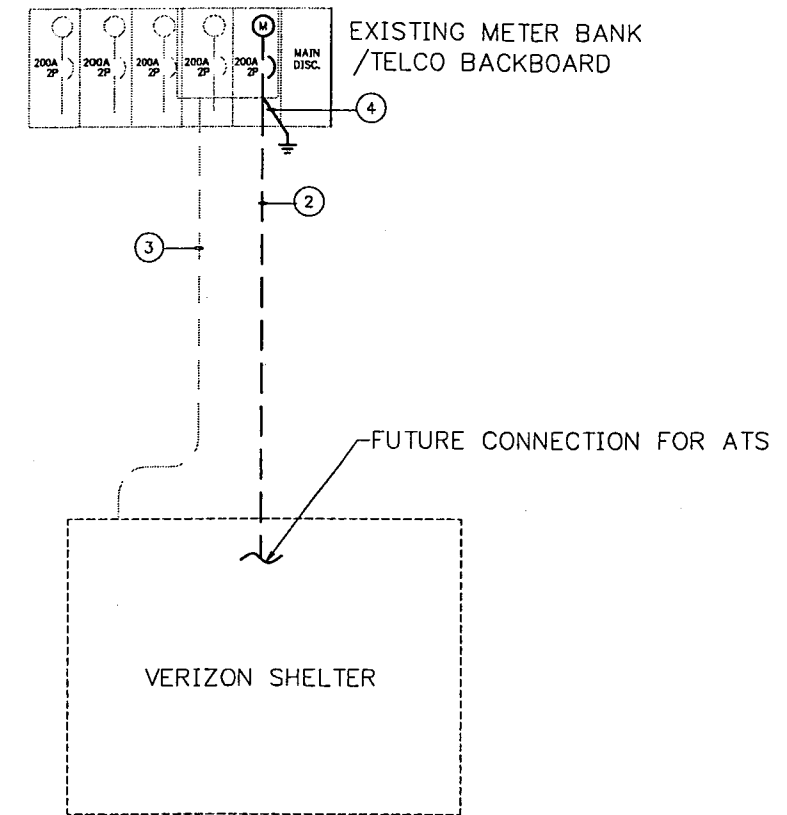
ABBREVIATIONS

- AWG AMERICAN WIRE GAUGE
- ATS AUTOMATIC TRANSFER SWITCH
- BAM BELL ATLANTIC MOBILE
- BCW BARE COPPER WIRE
- BTS BASE TRANSMISSION SYSTEM
- CGBE COAX GROUND BAR EXTERNAL
- CROWN CROWN CASTLE ATLANTIC LLC
- DWG DRAWING
- GEN GENERATOR
- GPS GEOSTATIONARY POSITIONING SYSTEM
- GR GROWTH
- MIGB MASTER ISOLATION GROUND BAR
- MTS MANUAL TRANSFER SWITCH
- PCS PERSONAL COMMUNICATION SERVICE
- RGS RIGID GALVANIZED STEEL
- RWY RACEWAY
- TYP. TYPICAL

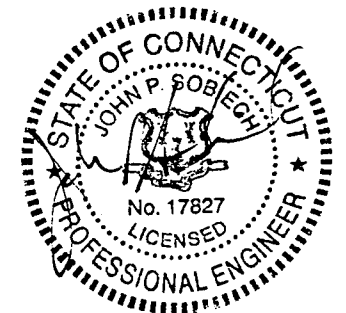
UTILITY CONTACTS

NORTHEAST UTILITIES
WALT FOSTER
(860) 280-2431

SNET
CHUCK DOLL
(860) 725-4177



② ONE LINE DIAGRAM
- NO SCALE



Revisions:	Drawn By:	App'd. By:	Date:
1. ISSUED FOR PERMIT	PAL	SLN	11/10/00

Designed By:	Date:
BM	11/10/00
Drawn By:	Date:
PAL	11/10/00
Checked By:	Date:
SLN	10/13/00

UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF SECTION 7208 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

Designed By:	Date:
BM	11/10/00
Drawn By:	Date:
PAL	11/10/00
Checked By:	Date:
SLN	10/13/00

CHA CLOUGH, HARBOUR & ASSOCIATES LLP
ENGINEERS, SURVEYORS, PLANNERS & LANDSCAPE ARCHITECTS
2139 SILAS DEANE HIGHWAY - ROCKY HILL, CT - 06087
SUITE 212 860-257-4557
CHA Project No. 8961.01

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

ROCKY HILL COMMUNICATIONS FACILITY
CITY OF ROCKY HILL HARTFORD COUNTY
CONNECTICUT
ELECTRICAL SITE PLAN FOR VERIZON
SCALE: AS NOTED DATE: NOVEMBER 13, 2000

Drawing No. **E-1**
SHEET 1 OF 2

GROUNDING NOTES:

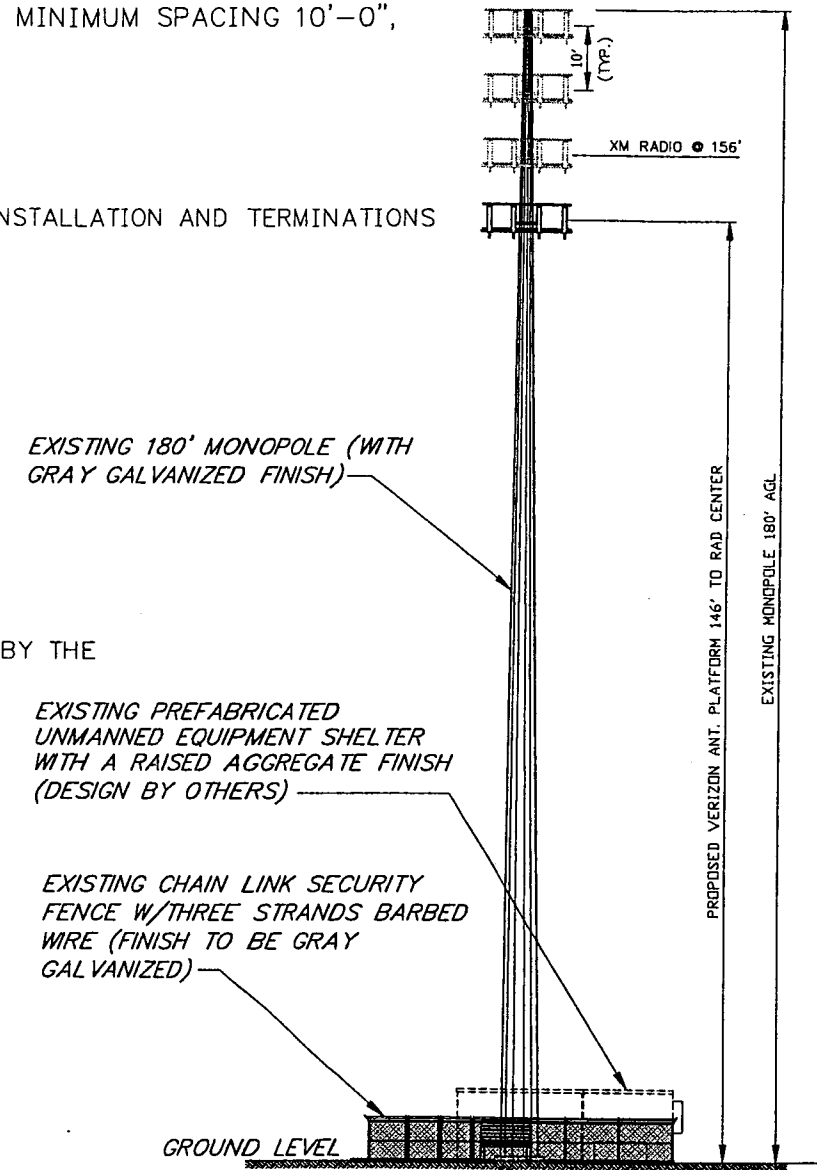
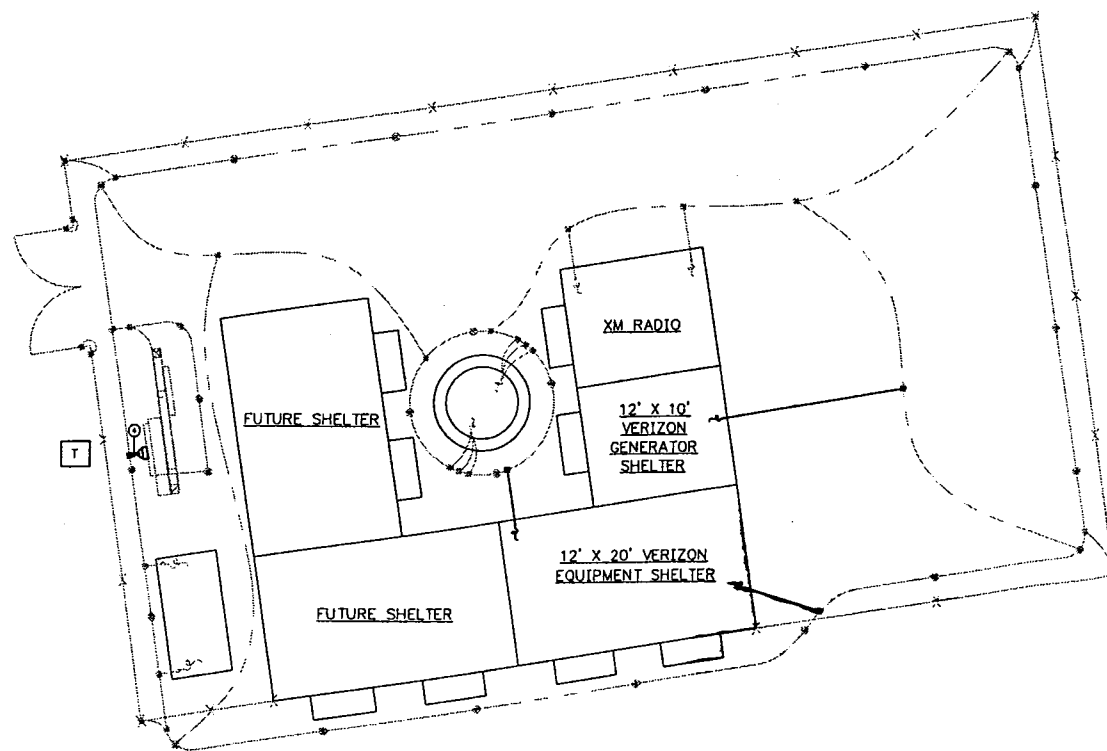
- A. GROUNDING AND BONDING CONTACT POINTS ARE TO BE CLEANED AND MADE FREE OF FOREIGN MATERIALS, SUCH AS PAINT AND CORROSION, TO ENSURE AN ADEQUATE BOND.
- B. MAKE ALL GROUNDING CONNECTIONS TO THE GROUND BAR WITH DOUBLE HOLE HYDRAULICALLY INDENTED LUGS.
- C. CONTRACTOR SHALL PROVIDE AND INSTALL COPPER-CLAD GROUND RODS AS SPECIFIED ON THE SITE GROUNDING PLAN. CONTRACTOR TO COORDINATE WITH SITE OWNER EXACT LOCATION OF BURIED GROUND RING.
- D. GROUNDING LAYOUT COMPLETED BEFORE SITE SPECIFIC TESTS AND DESIGN WERE RETURNED. LAYOUT AND MATERIALS MAY CHANGE.
- E. IF TOWER MAT FOUNDATION IS AT GRADE, THEN GROUNDING TO BE IN 1" CONDUIT WITHIN FOUNDATION, OTHERWISE PLACE GROUNDING 30" BELOW GRADE.

LEGEND

- UNDERGROUND ELECTRIC/TELEPHONE.
- #2 AWG (TINNED) SOLID COPPER GROUND WIRE UNLESS OTHERWISE NOTED.
- 5/8" x 10'-0" COPPER CLAD GROUND ROD. MINIMUM SPACING 10'-0", MAXIMUM SPACING 15'-0" O.C.
- ⊗ INSPECTION PORT
- EXOTHERMIC WELD (CADWELD) CONNECTION
- COMPRESSION TYPE GROUND CONNECTION
- ⊥ MIGB / CGBE GROUND BAR. HARDWARE, LUGS, INSTALLATION AND TERMINATIONS BY THIS CONTRACT.
- T TRANSFORMER
- # INDICATES CODED NOTE NUMBER
- 1 REFERENCE PLAN NUMBER
- E1 REFERENCE DRAWING NUMBER

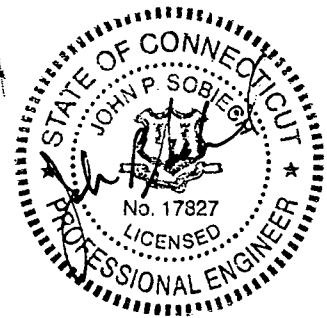
GENERAL NOTES

1. INSTALL PULL BOXES AS REQUIRED PER NEC.
2. ROUTING OF ALL UNDERGROUND UTILITIES SHALL BE APPROVED BY THE OWNER PRIOR TO START OF WORK.



EXISTING MONOPOLE SCHEMATIC
SCALE: 1"=30'

NOTE:
TOWER STRUCTURAL AND FOUNDATION DIMENSIONS SHOULD BE VERIFIED WITH THE TOWER MANUFACTURER OR CROWN BEFORE CONSTRUCTION BEGINS. BOTH THE TOWER STRUCTURE AND FOUNDATION HAVE BEEN DESIGNED BY OTHERS. THIS INFORMATION IS SHOWN FOR GENERAL INFORMATION PURPOSES ONLY.



Revision	Drawn By	App'd. By	Date
1. ISSUED FOR PERMIT	PAL	SLN	11/10/00

Designed By	Date
BM	11/10/00
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CHA Project No. 8561.01

CELLCO PARTNERSHIP
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ROCKY HILL COMMUNICATIONS FACILITY
CITY OF ROCKY HILL HARTFORD COUNTY
CONNECTICUT
ELECTRICAL SITE PLAN FOR VERIZON

Drawing No. **E-2**
SCALE: AS NOTED
DATE: NOVEMBER 13, 2000
SHEET 2 OF 2

Network Dept.



verizon wireless

November 16, 2000

Verizon Wireless
20 Alexander Drive
Wallingford, Connecticut 06492

RECEIVED

NOV 17 2000

CONNECTICUT
SITING COUNCIL

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

Re: **Request of Cellco Partnership d/b/a Verizon Wireless for an Order to Approve the Shared Use of a Tower Facility at 1218 Cromwell Avenue, Rocky Hill, Connecticut**

Dear Chairman Gelston:

Pursuant to Connecticut General Statutes §16-50aa, as amended, Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby requests an order from the Connecticut Siting Council ("Council") to approve the proposed shared use by Cellco of an existing tower located at 1218 Cromwell Avenue in Rocky Hill, Connecticut. Cellco requests that the Council find that the proposed shared use of the tower satisfies the criteria stated in Connecticut General Statutes § 16-50aa and issue an order approving the proposed use.

Background

On May 24, 2000, Crown Atlantic Company LLC ("Crown") received the approval of the Rocky Hill Planning and Zoning Commission to construct a 180-foot tower at 1218 Cromwell Avenue. The tower has been approved for use by Metricom, Inc. A copy of Rocky Hill's approval is attached.

Cellco is licensed by the Federal Communications Commission (FCC) to provide cellular wireless telephone service in the State of Connecticut, which includes the area to be served by Cellco's proposed Rocky Hill installation. Cellco and Crown have agreed to the proposed shared use of this tower pursuant to mutually acceptable terms and conditions, and Crown has authorized Cellco to act on its behalf to apply for all necessary local, state and federal permits, approvals, and authorizations which may be required for the proposed shared use of this facility.

Cellco proposes to install twelve (12) Swedcom Model ALP 9011 panel-type antennas at the 146-foot level on the tower. The radio transmission equipment associated with these antennas would be located in a new 12-foot by 30-foot equipment building which would be located near the base of the tower. (See attached Project Plans).

C.G.S. § 16-50aa(c)(1) provides that, upon written request for approval of a proposed shared use, “if the Council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the council shall issue an order approving such shared use.” The shared use of the tower satisfies those criteria as follows:

A. Technical Feasibility. The existing tower is structurally capable of supporting the proposed Cellco antennas. The proposed-shared use of this tower therefore is technically feasible. (See Structural Analysis attached hereto).

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue orders approving the proposed shared use of an existing tower facility such as the facility at 1218 Cromwell Avenue in Rocky Hill. This authority complements the Council’s prior-existing authority under C.G.S. § 16-50p to issue orders approving the construction of new towers that are subject to the Council’s jurisdiction. In addition, § 16-50aa directs the Council to “give such consideration to other state laws and municipal regulations as it shall deem appropriate” in ruling on requests for the shared use of existing towers facilities. Under the statutory authority vested in the Council, an order by the Council approving the requested-shared use would permit the Applicant to obtain a building permit for the proposed installations.

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

1. The proposed installations would have an insignificant incremental visual impact, and would not cause any significant change or alteration in the physical or environmental characteristics of the existing site. In particular, the proposed installations would not increase the height of the existing tower, and would not extend the boundaries of the tower site outside the limits of the existing site compound.
2. The proposed installations would not increase the noise levels at the existing facility by six decibels or more.

3. Operation of antennas at this site would not exceed the total radio frequency (RF) electromagnetic radiation power density level adopted by the Federal Communications Commission. The “worst-case” exposure calculated for operation of this facility (i.e., calculated at the facility boundary, which represents the closest publicly accessible point within the broadcast field of the antennas), for Verizon Wireless’s antennas, would be 0.0320 mW/cm² (5.49% of the standard). Metricom, Inc. has also mounted their antennas at the 156-foot level of the tower. The “worst-case” exposure calculated for operation of Metricom’s antennas, would be 0.0144 mW/cm² (1.44% of the standard). The collective “worst-case” exposure would be only 6.93% of the ANSI standard, as calculated for mixed frequency sites. Power density levels from shared use of the tower facility would thus be well below the applicable ANSI standards.
4. The proposed installations, would not require any water or sanitary facilities, or generate air emissions or discharges to water or sanitary facilities, or generate air emissions or discharges to water bodies. After construction is complete the proposed installations would not generate any traffic other than periodic maintenance visits.

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

E. Economic Feasibility. As previously mentioned, Crown and Cellco have entered into a mutual agreement to share the use of the replacement tower on terms agreeable to the parties. The proposed tower sharing is therefore economically feasible.

F. Public Safety Concerns. As stated above, the proposed replacement tower will be structurally capable of supporting the Cellco antennas. The existing tower is sited on a parcel in the Rocky Hill Industrial Zone district. Cellco is not aware of any public safety concerns relative to the proposed sharing of the existing tower. In fact, the provision of new or improved phone service through shared use of the existing tower is expected to enhance the safety and welfare of area residents.

Joel M. Rinebold
November 10, 2000
Page 4

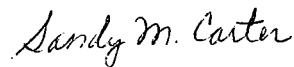
Conclusion

For the reasons discussed above, the proposed shared use of the existing tower off Cromwell Avenue in Rocky Hill, Connecticut satisfies the criteria stated in C.G.S. § 16-50aa and advances the General Assembly's and the Siting Council's goal of preventing the proliferation of towers in Connecticut. The Applicant therefore requests that the Siting Council issue an order approving the proposed-shared use.

Thank you for your consideration of this matter.

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

Very truly yours,



Sandy M. Carter
Regulatory Manager

Attachments

cc: Honorable Antonio Guerrero, Mayor

Network Dept.



Verizon Wireless
20 Alexander Drive
Wallingford, Connecticut 06492

November 16, 2000

Honorable Antonia Guerrero, Mayor
Town Hall
699 Old main Street
Rocky Hill, Connecticut 06067

Dear Mr. Guerrero:

This letter is to inform you that Cellco Partnership d/b/a Verizon Wireless plans to install antennas and associated equipment at the existing tower facility located at 1218 Cromwell Avenue, Rocky Hill, Connecticut. I am enclosing a copy of Verizon Wireless's tower sharing application to the Connecticut Siting Council.

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

Sincerely,

A handwritten signature in cursive script that reads "Sandy M. Carter".

Sandy M. Carter
Manager - Regulatory
Verizon Wireless

Enclosure



Ms. Sandy Carter
Regulatory Manager
Celco Partnership
DBA Verizon Wireless
20 Alexander Drive
Wallingford, Ct. 06492

November 15, 2000

Re: 1218 Cromwell Ave, Rocky Hill, Ct.

Dear Ms. Carter:

Crown Castle Atlantic Co. LLC has received and accepted the application of Celco Partnership, DBA Verizon Wireless for lease of space at the Crown tower site on 1218 Cromwell Ave., Rocky Hill, Ct.

This letter is to serve as authorization to proceed with application for all required State and local approvals and permits for the installation of the Verizon Wireless equipment at this site.

Sincerely,

A handwritten signature in black ink, appearing to read "Hal Giglio", with a long horizontal flourish extending to the right.

Hal Giglio
Project Manager
New England

Town of Rocky Hill



699 OLD MAIN STREET • ROCKY HILL, CONNECTICUT 06067 • (860) 258-2700 • FAX (860) 258-7638

CERTIFIED MAIL

May 25, 2000

Attorney Ken Baldwin
Robinson & Cole
280 Trumbull St.
Hartford, CT 06103-3597

RE: Site Plan application, **Crown Atlantic Company Inc.**, proposing a telecommunications tower (180') and facility at 1218 Cromwell Avenue in a M-Manufacturing Zoning District;

Dear Attorney Baldwin,

The Rocky Hill Planning and Zoning Commission at their regular meeting of May 24, 2000 voted to approved the aforementioned tower as a modification to the 1996 approved plan for 1218 Cromwell Ave. The maps for the Commission's signature are to reflect this approval. Please submit two sets of plans to this office for the Commission's signature. One set is to adhere to the enclosed map requirements. The other set is for filing with the Planning and Engineering Departments. In addition, there is a \$10.00 per sheet (one set only) recording fee. Upon receipt of the signed plans and the fee, staff will gladly record the plans with the Town Clerk.

Should you have any questions, please do not hesitate to contact this office at 860-258-2761 or 860-258-2766.

Sincerely,

Kimberley A. Ricci
Town Planner/Assistant ZEO

KAR/mn

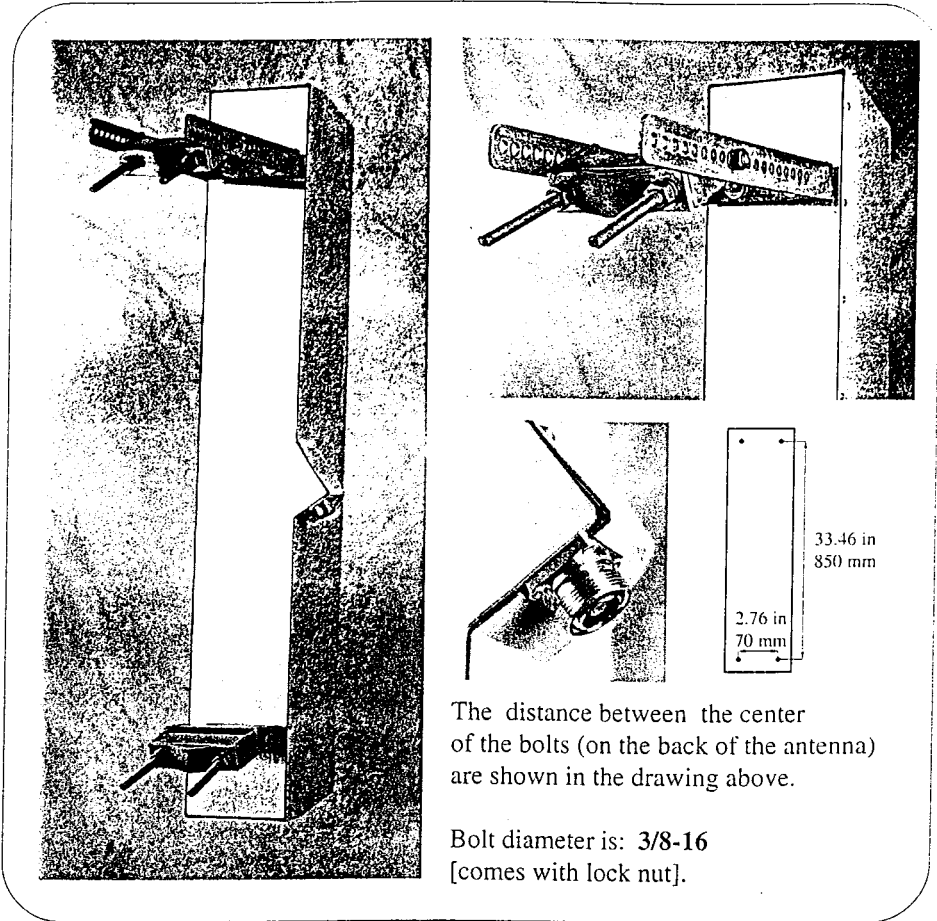
Cc: Roger Tabshey

ALP-E 9011-Din

Enhanced Log-Periodic Antenna

Features:

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



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

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

Electrical Specifications

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

Mechanical Specifications

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

Materials

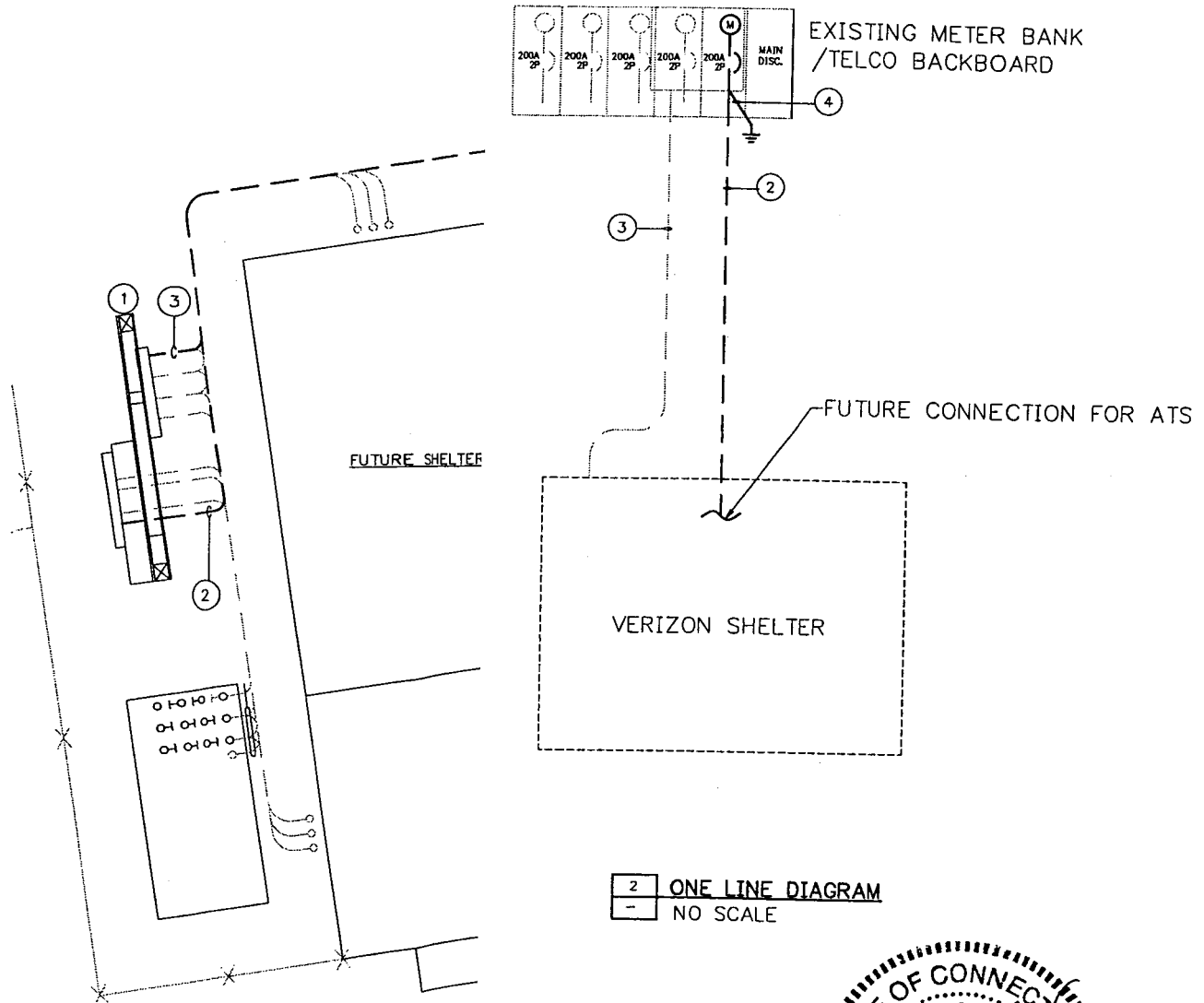
Radiating Elements:	Aluminum
Extrusion:	Aluminum
Radome:	Grey PVC
Tilt-Bracket:	Hot Dip Galvanized Steel
Antenna Bolts:	Stainless Steel

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

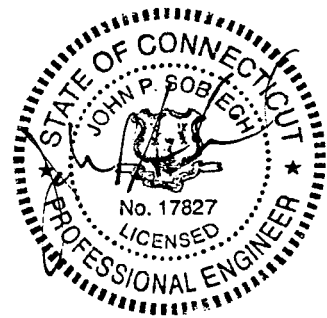
CODED DRAWING NOT



- ① EXISTING METER BANK, ENCLOSURE FOR LCC A METER BY UTILITY, GR
- ② 2" C w/ (3) #3/0 + 1
- ③ TELCO WIRING IN EXIS
- ④ PER NEC AND UTILITY



② ONE LINE DIAGRAM
- NO SCALE



Revisions:	Drawn By:	App'd. By:
1. ISSUED FOR PERMIT	PAL	SN

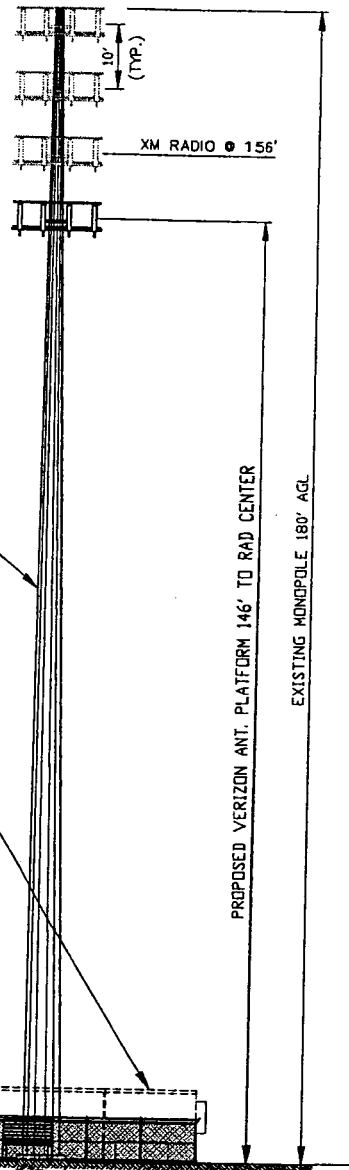
ROCKY HILL COMMUNICATIONS FACILITY CITY OF ROCKY HILL HARTFORD COUNTY CONNECTICUT		Drawing No.
ELECTRICAL SITE PLAN FOR VERIZON		E-1
SCALE: AS NOTED	DATE: NOVEMBER 13, 2000	SHEET 1 OF 2

WISE NOTED.

SPACING 10'-0",

GROUNDING NOTES:

- A. GROUNDING AND BONDING CONTACTS TO BE CLEANED AND MADE FREE OF FOREIGN CORROSION, TO ENSURE AN ADEQUATE CONNECTION.
- B. MAKE ALL GROUNDING CONNECTIONS AND TERMINATIONS DOUBLE HOLE HYDRAULICALLY INSTALLED.
- C. CONTRACTOR SHALL PROVIDE AN ELECTRICAL MAT SPECIFIED ON THE SITE GROUNDING PLAN WITH SITE OWNER EXACT LOCATION.
- D. GROUNDING LAYOUT COMPLETED AND RECORDS WERE RETURNED. LAYOUT AND MATERIALS TO BE USED TO BE APPROVED BY THE ENGINEER.
- E. IF TOWER MAT FOUNDATION IS NOT PROVIDED, A 1" CONDUIT WITHIN FOUNDATION, TO BE INSTALLED BELOW GRADE.



PREFABRICATED EQUIPMENT SHELTER (USED AGGREGATE FINISH BY OTHERS)

CHAIN LINK SECURITY (THREE STRANDS BARBED W/SH TO BE GRAY COLORED)

GROUND LEVEL

EXISTING MONOPOLE SCHEMATIC

SCALE: 1"=30'

FOUNDATION DIMENSIONS SHOULD BE VERIFIED WITH A TOTAL STATION OR CROWN BEFORE CONSTRUCTION BEGINS. BOTH FOUNDATION DIMENSIONS HAVE BEEN DESIGNED BY OTHERS. THIS IS FOR GENERAL INFORMATION PURPOSES ONLY.

Revisions:	Drawn By:	App'd. By:
1. ISSUED FOR PERMIT	PAL	SLN

ROCKY HILL COMMUNICATIONS FACILITY
 CITY OF ROCKY HILL HARTFORD COUNTY
 CONNECTICUT

**ELECTRICAL SITE PLAN
 FOR VERIZON**

SCALE: AS NOTED DATE: NOVEMBER 13, 2000

Drawing No. **E-2**

SHEET 2 OF 2

SUMMIT MANUFACTURING, LLC

225 KIWANIS BOULEVARD, WEST HAZLETON, PA 18201
 PHONE: (888) 847-6537 FAX: (888) 460-6885
 VISIT US AT WWW.SUMMITMFG.COM



PAUL J. FORD AND COMPANY
 STRUCTURAL ENGINEERS
 250 East Broad Street, Suite 500, Columbus, Ohio 43215
 (614) 221-6679 Fax: (614) 221-0166 www.PJFweb.com

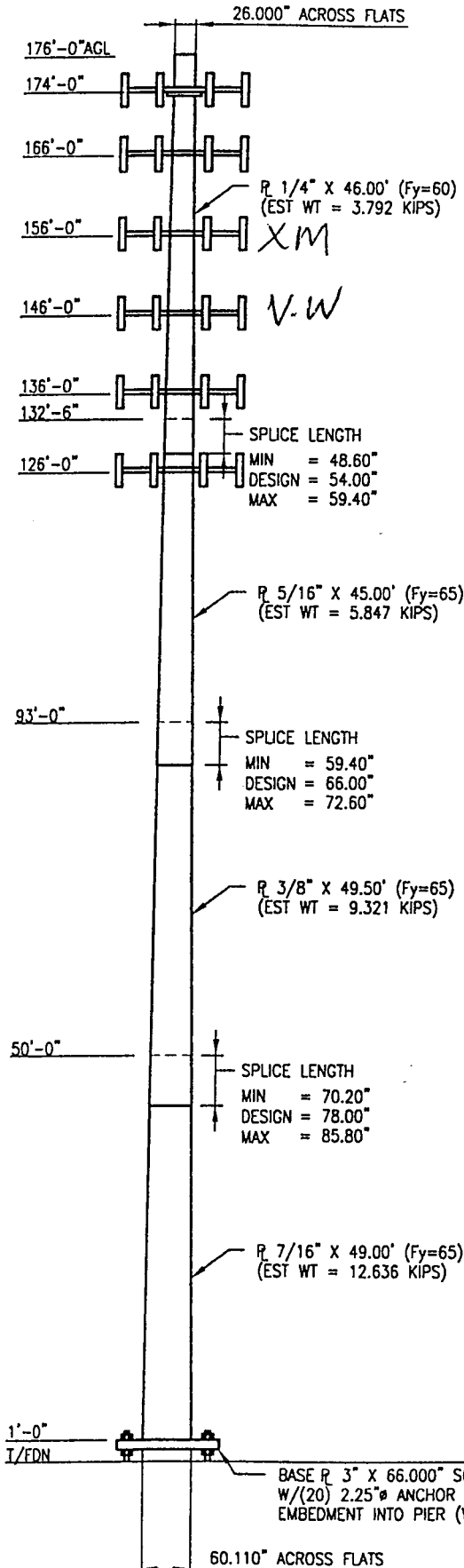
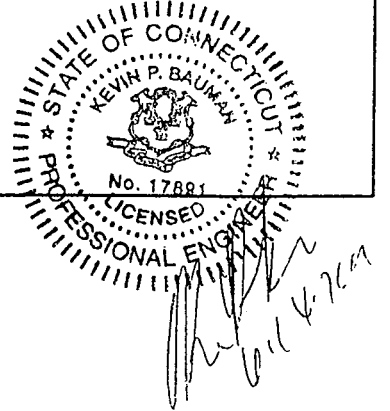
JOB DATA			
Page 1 of 3	Job No.	29200-812	
By SWL	Design No.	SUMMIT # 10073	
Chk'd By DWH	Date	06-09-2000	
Pole	Rev. No.	Rev. Date	
173' MONOPOLE			
Site ROCKY HILL: HARTFORD CO., CT			
Owner CROWN CASTLE USA			
Ref. No.			
Design 80 MPH/ 69 MPH + 1/2" RADIAL ICE			
ACCORDING TO TIA/EIA-222-F 1996			

LOAD CASES			
CASE 1	80 MPH WITH NO ICE	DESIGN WIND	
CASE 2	69 MPH WITH 1/2" RADIAL ICE	REDUCED WIND WITH ICE	
CASE 3	50 MPH WITH NO ICE	OPERATIONAL WIND	

POLE SPECIFICATIONS	
Pole Shape Type:	18-SIDED POLYGON
Taper:	0.208006 IN/FT
Shaft Steel:	ASTM A607 GRADE 60 & 65
Base PL Steel:	ASTM A572 GRADE 55 (55 KSI)
Anchor Bolts:	2 1/4"Ø x 8'-0" LONG #18J ASTM A615 GRADE 75

ANTENNA LIST		
No.	Elev.	Description
-	TOP	5/8" LIGHTNING ROD
1-12	TOP	(12) SWEDCOM ALP-9212-N
-	TOP	14' LOW PROFILE PLATFORM
13-24	166.00	(12) SWEDCOM ALP-9212-N
-	166.00	14' LOW PROFILE PLATFORM
25-36	156.00	(12) SWEDCOM ALP-9212-N
-	156.00	14' LOW PROFILE PLATFORM
37-48	146.00	(12) SWEDCOM ALP-9212-N
-	146.00	14' LOW PROFILE PLATFORM
49-60	136.00	(12) SWEDCOM ALP-9212-N
-	136.00	14' LOW PROFILE PLATFORM
61-72	126.00	(12) SWEDCOM ALP-9212-N
-	126.00	14' LOW PROFILE PLATFORM
73-74	101.00	(2) GPS ANTENNA W/ MOUNT

STEP BOLTS FULL HEIGHT.
 ANTENNA FEED LINES RUN INSIDE OF POLE.



Elevation	80 MPH WIND		50 MPH WIND	
	Lateral Deflection (Inches)	Rotation (sway) (degrees)	Lateral Deflection (Inches)	Rotation (sway) (degrees)
TOP	127.1	6.231	49.5	2.434

SHAFT SECTION DATA					
Shaft Section	Section Length (feet)	Plate Thickness (in.)	Lap Splice (in.)	Diameter Across Flats (inches)	
				@ Top	@ Bottom
1	46.00	0.2500	54.00	26.000	35.568
2	45.00	0.3125	66.00	34.132	43.493
3	49.50	0.3750	78.00	41.723	52.020
4	49.00	0.4375		49.918	60.110

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

BASE REACTIONS FOR FOUNDATION DESIGN

MOMENT = 5000 ft-kips
 SHEAR = 38.9 kips
 AXIAL = 42.0 kips

SUMMIT MANUFACTURING INC.

225 KIWANIS BOULEVARD, WEST HAZLETON, PA 18201
 PHONE: (888) 847-6537 E MAIL: SUMMITCA@EPIX.NET
 FAX: (888) 460-6885 WWW.SUMMITMFGLLC.COM



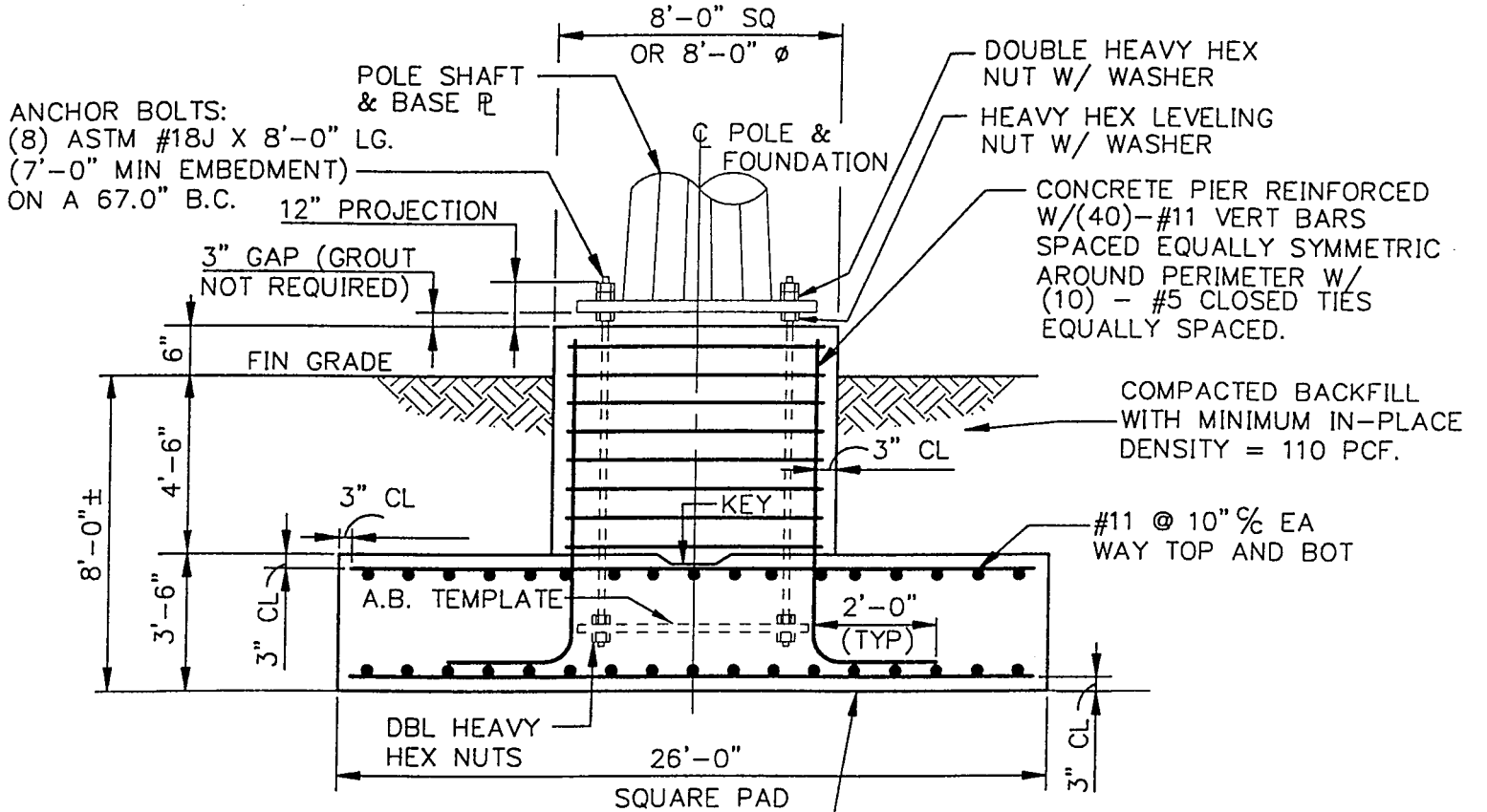
PAUL J. FORD AND COMPANY STRUCTURAL ENGINEERS

250 East Broad Street, Suite 500, Columbus, Ohio 43215
 (614)-221-6679 FAX (614)-221-0166

Pole 173 FT MONOPOLE
 Location HARTFORD COUNTY, CT
 Site ROCKY HILL
 Owner CROWN CASTLE
 Design 80 MPH / 69 MPH + 1/2" RADIAL ICE

Page 2 Of 3
 By SWL Date 6-13-2000
 Summit No. 10073 Job No. 29200-812
 Revision No. _____ Date _____

According to TIA/EIA-222-E 1991 & TIA/EIA-222-F 1996

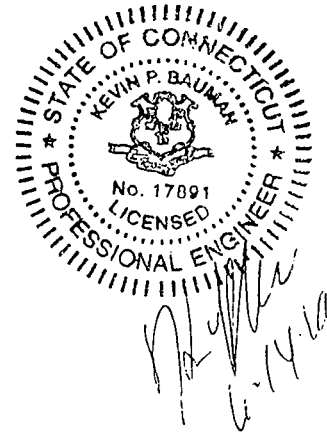


PAD & PIER FOUNDATION

FOUNDATION SHALL BEAR ON UNDISTURBED NATIVE SOIL WITH A MINIMUM ALLOWABLE BEARING CAPACITY OF 3000 PSF. (REFER TO GEOTECHNICAL REPORT)

NOTES:

1. ALL STRUCTURAL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF AT LEAST 3000 PSI AT 28 DAYS.
2. REINFORCING STEEL SHALL CONFORM TO ASTM A615 (GRADE 60) EXCEPT PIER TIES MAY BE ASTM A615 GRADE 40).
3. TOTAL CONCRETE = 99.5 CUBIC YARDS.
4. FOUNDATION DESIGN BASED UPON GEOTECHNICAL EXPLORATION REPORT NO. 8961.07.01, PREPARED BY CLOUGH, HARBOUR & ASSOCIATES, DATED 4-17-2000.
5. CONTRACTOR SHALL READ THE GEOTECHNICAL REPORT AND CONSULT THE GEOTECHNICAL ENGINEER AS NECESSARY PRIOR TO CONSTRUCTION.
6. FOUNDATION DESIGN BASED ON THE FOLOWING SERVICE LOADS:
 OVERTURNING MOMENT= 5000 FT*KIPS SHEAR = 38.9 KIPS AXIAL = 42.0 KIPS

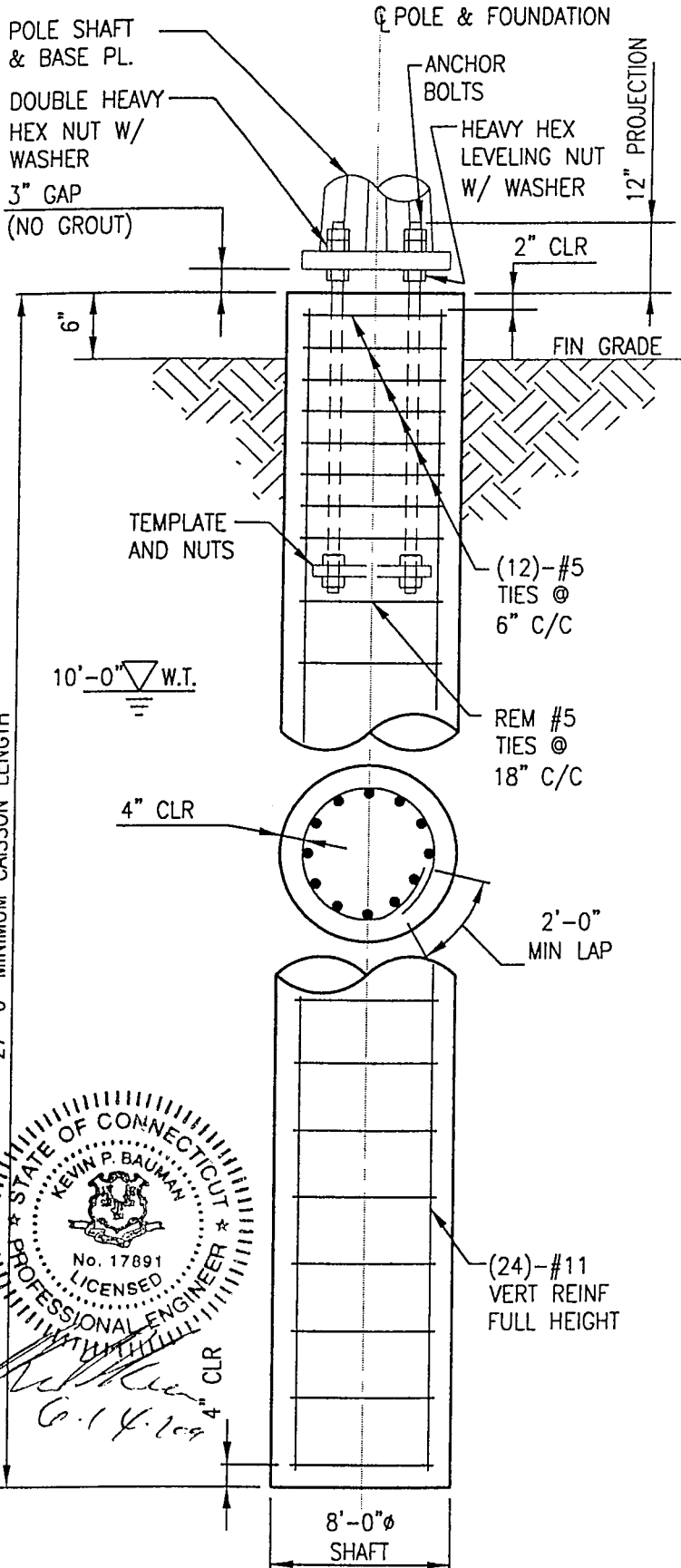


SUMMIT MANUFACTURING, LLC

225 KIWANIS BOULEVARD, WEST HAZLETON, PA 18201
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PAUL J. FORD AND COMPANY
 STRUCTURAL ENGINEERS
 250 East Broad Street, Suite 500, Columbus, Ohio 43215
 (614) 221-6679 Fax: (614) 221-0166 www.PJFweb.com



JOB DATA			
Page 3 of 3	Job No.	29200-812	
By SWL	Design No.	SUMMIT # 10073	
Chk'd By DWH <i>Su</i>	Date	06-09-2000	
	Rev. No.	Rev. Date	
Pole	173' MONOPOLE		
Site	ROCKY HILL: HARTFORD CO., CT		
Owner	CROWN CASTLE USA		
Ref. No.			
Design	80 MPH/ 69 MPH + 1/2" RADIAL ICE ACCORDING TO TIA/EIA-222-F 1996		

THERE ARE TWO NOTCHES ON THE ANCHOR BOLT TEMPLATES LOCATED 180° APART. THE CONTRACTOR SHALL POSITION THE ANCHOR BOLTS AND TEMPLATES IN THE FOUNDATION PER THE SUMMIT MANUFACTURING ANCHOR BOLT TEMPLATE DRAWING.

NOTES:

- ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS. CONCRETE SHALL BE AIR ENTRAINED (6±1.5%). CONCRETE SHALL HAVE A MAXIMUM WATER/CEMENT RATIO OF 0.4. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH "THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", ACI 318, LATEST EDITION. FOUNDATION INSTALLATION SHALL BE IN ACCORDANCE WITH ACI 336, "STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF DRILLED PIERS", LATEST EDITION.
- REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A-615 (GRADE 60) EXCEPT THAT CAISSON TIES MAY BE ASTM A-615 (GRADE 40). ALL REINFORCING DETAILS SHALL CONFORM TO "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", ACI 315, LATEST EDITION, UNLESS DETAILED OTHERWISE ON THIS DRAWING.
- SEE PAGE 1 FOR ANCHOR BOLT QUANTITY, SIZE, LENGTH, AND BOLT CIRCLE.
- TOTAL CONCRETE = 51.5 CUBIC YARDS.
- FOUNDATION DESIGN IS BASED UPON GEOTECHNICAL EXPLORATION REPORT
 PREPARED BY: CLOUGH, HARBOUR & ASSOCIATES, LLP
 REPORT NO.: 8961.07.01
 DATED: 04-17-2000
- CONTRACTOR SHALL READ THE GEOTECHNICAL REPORT AND CONSULT THE GEOTECHNICAL ENGINEER AS NECESSARY PRIOR TO CONSTRUCTION.
- GEOTECHNICAL REPORT INDICATES GROUNDWATER WAS ENCOUNTERED AT 10'-0" BELOW GRADE.
- THE FOUNDATION WAS DESIGNED USING THE FOLLOWING SERVICE LOADS:
 MOMENT: 5000 FT-KIPS
 SHEAR: 38.9 KIPS
 AXIAL: 42.0 KIPS
- CONTRACTOR SHALL DETERMINE THE MEANS AND METHODS TO SUPPORT THE DRILLED PIER EXCAVATION, REFER TO GEOTECHNICAL REPORT FOR RECOMMENDATIONS.

CAISSON (DRILLED PIER) FOUNDATION

29200812M003

Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

S U M M A R Y O F A N A L Y S I S R E S U L T S

Pole Height.....: 173.00 ft
 Top Diameter.....: 26.000 in
 Bottom Diameter.....: 60.110 in
 Pole Shape.....: 18-Sided Polygon
 Splice Joint Type...: Taper shaft - Slip Joint Splice
 Shaft Taper.....: 0.208006 (in/ft)
 Shaft Steel Weight...: 31.597 kips

POLE SHAFT PROPERTIES:

Shaft Section Number	Section Length (ft)	Wall Thickness [t] (in)	Steel Yield [Fy] (ksi)	Top Diameter [Dt] (in)	Bottom Diameter [Db] (in)	Slip Joint Overlap (in)
1.	46.000	0.25000	60	26.000	35.568	54.00
2.	45.000	0.31250	65	34.132	43.493	66.00
3.	49.500	0.37500	65	41.723	52.020	78.00
4.	49.000	0.43750	65	49.918	60.110	

POLE SHAFT SECTION MAXIMUM FORCES AND MOMENTS:

Shaft Section Number	Wind Load No.	Wind Speed (mph)	Radial Ice (in)	Sect. Elev. (ft)	At Base of Section			Max. Ratio Actual/ Allowable [Ftot/Fb]
					Axial Load (kips)	Horiz. Shear (kips)	Bending Moment (ft-kips)	
1.	1	80.0	0.00	132.50	12.058	21.997	529.534	0.5866
2.	1	80.0	0.00	93.00	20.035	29.296	1634.748	0.8831
3.	1	80.0	0.00	50.00	29.391	32.998	3022.266	0.9488
4.	1	80.0	0.00	1.00	41.793	37.047	4763.351	0.9106
>> MAXIMUM BASE REACTIONS :					41.793	37.047	4763.351	<<

POLE DEFLECTION AND ROTATION AT TOP AND AT HIGHEST MICROWAVE DISH ELEVATION:

Wind Load No.	Wind Speed (mph)	Radial Ice (in)	Location	Elev (ft)	Deflection (in)	Rotation (deg)	Max. Allowable Rotation Limit (deg)
1.	80.0	0.00	Top	174.00	127.063	6.231	
2.	69.3	0.50	Top	174.00	105.671	5.206	
3.	50.0	0.00	Top	174.00	49.527	2.434	

PJF_Pole (tm) - Monopole Design Program

Windows Version 1.28.0100

Tue Jun 13, 2000 - 11:08:17 am

(c) 1993 to 1998 PAUL J. FORD AND COMPANY, Columbus, Ohio

Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
Description : 173' Monopole - Rocky Hill: Hartford Co., CT
Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
Status..... : Final Design Revision: Rev. Date :

Pole Height : 173 ft
Pole Shape : 18-Sided Polygon
Pole Type : Taper shaft - Slip Joint Splice
Pole Taper : 0.208006 (in/ft)

INPUT TUBE PROPERTIES:

Tube Sect No.	Top / Splice Elev (ft)	Bot Tube Elev (ft)	Tube Length (ft)	Wall Thick [t] (in)	Steel [Fy] (ksi)	Top Diam [Dt] (in)	Bot Diam [Db] (in)	Slip Joint Overlap (in)
1.	174.00	128.00	46.000	0.25000	60	26.000	35.568	54.00
2.	132.50	87.50	45.000	0.31250	65	34.132	43.493	66.00
3.	93.00	43.50	49.500	0.37500	65	41.723	52.020	78.00
4.	50.00	1.00	49.000	0.43750	65	49.918	60.110	

TUBE SECTION PROPERTIES:

Tube Sect No.	Section Weight (kips)	Elev Location	Diam. Across Flats (in)	Wall Thick [t] (in)	[W/t] Ratio	Diam/ Thick [D/t] Ratio	Area (in ²)	Ix (in ⁴)
1	3.792	@Top	174.0	26.000	0.2500	16.57	104.00	1711.2
		@Splice	132.5	34.632		22.66	138.53	4073.3
		@Bot	128.0	35.568		23.32	142.27	4415.1
2	5.847	@Top	132.5	34.132	0.3125	17.50	109.22	4845.9
		@Splice	93.0	42.348		22.13	135.51	9305.0
		@Bot	87.5	43.493		22.78	139.18	10085.6
3	9.321	@Top	93.0	41.723	0.3750	17.86	111.26	10627.3
		@Splice	50.0	50.668		22.06	135.11	19122.6
		@Bot	43.5	52.020		22.70	138.72	20706.7
4	12.636	@Top	50.0	49.918	0.4375	18.36	114.10	21246.3
		@Bot	1.0	60.110		22.46	137.39	37265.2

Total Shaft Steel Weight = 31.597 kips

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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (Rev. Date :
 Status..... : Final Design Revision: Rev. Date :

Segment Properties: (@ Max Segment = 10 ft)

Tube Segmt No.	Segment Feature Location	Segment Elev. (ft)	Diam. Across Flats (in)	Wall Thick [t] (in)	[W/t] Ratio	Diam/ Thick [D/t] Ratio	Area (in ²)	Ix (in ⁴)
1.	top	174.000	26.000	0.25000	16.57	104.00	20.43	1711.2
2.	<arm [1]>	173.000	26.208	0.25000	16.72	104.83	20.60	1753.0
3.	<arm [2]>	173.000	26.208	0.25000	16.72	104.83	20.60	1753.0
4.	<arm [3]>	173.000	26.208	0.25000	16.72	104.83	20.60	1753.0
5.		170.000	26.832	0.25000	17.16	107.33	21.09	1882.4
6.	<arm [4]>	166.000	27.664	0.25000	17.75	110.66	21.75	2064.8
7.	<arm [5]>	166.000	27.664	0.25000	17.75	110.66	21.75	2064.8
8.		160.000	28.912	0.25000	18.63	115.65	22.74	2359.8
9.	<arm [6]>	156.000	29.744	0.25000	19.22	118.98	23.40	2571.3
10.	<arm [7]>	156.000	29.744	0.25000	19.22	118.98	23.40	2571.3
11.		150.000	30.992	0.25000	20.10	123.97	24.39	2911.7
12.	<arm [8]>	146.000	31.824	0.25000	20.68	127.30	25.05	3154.6
13.	<arm [9]>	146.000	31.824	0.25000	20.68	127.30	25.05	3154.6
14.		140.000	33.072	0.25000	21.56	132.29	26.04	3543.6
15.	<arm [10]>	136.000	33.904	0.25000	22.15	135.62	26.70	3820.0
16.	<arm [11]>	136.000	33.904	0.25000	22.15	135.62	26.70	3820.0
17.	top sec(2)	132.500	34.632	0.25000	22.66	138.53	27.28	4073.3
18.		130.000	34.652	0.31250	17.79	110.89	34.06	5072.9
19.	bot sec(1)	128.000	35.568	0.31250	18.31	113.82	34.97	5489.8
20.	<arm [12]>	126.000	35.484	0.31250	18.26	113.55	34.88	5450.6
21.	<arm [13]>	126.000	35.484	0.31250	18.26	113.55	34.88	5450.6
22.		120.000	36.732	0.31250	18.96	117.54	36.12	6051.6
23.		110.000	38.812	0.31250	20.14	124.20	38.19	7148.8
24.	<arm [14]>	101.000	40.684	0.31250	21.19	130.19	40.04	8243.1
25.		100.000	40.892	0.31250	21.31	130.86	40.25	8371.2
26.	top sec(3)	93.000	42.348	0.31250	22.13	135.51	41.69	9305.0
27.		90.000	42.347	0.37500	18.15	112.93	49.96	11115.7
28.	bot sec(2)	87.500	42.867	0.37500	18.39	114.31	50.57	11534.0
29.		80.000	44.427	0.37500	19.13	118.47	52.43	12851.5
30.		70.000	46.508	0.37500	20.10	124.02	54.91	14759.1
31.		60.000	48.588	0.37500	21.08	129.57	57.38	16846.8
32.	top sec(4)	50.000	50.668	0.37500	22.06	135.11	59.86	19122.6
33.	bot sec(3)	43.500	51.270	0.43750	18.90	117.19	70.58	23035.9
34.		40.000	51.998	0.43750	19.19	118.85	71.60	24039.8
35.		30.000	54.078	0.43750	20.03	123.61	74.48	27068.1
36.		20.000	56.158	0.43750	20.87	128.36	77.37	30340.6
37.		10.000	58.238	0.43750	21.71	133.12	80.26	33866.7
38.	base	1.000	60.110	0.43750	22.46	137.39	82.86	37265.2

 Total Number of Antennas / Arms = 14

PJF_Pole (tm) - Monopole Design Program

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Job No.....: 29200-812          Design No: Summit # 10073      Engineer : BAJ
Description : 173' Monopole - Rocky Hill: Hartford Co., CT
Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
Owner.....  : Crown Castle USA          Client: Summit Manufacturing, LLC (
Status..... : Final Design              Revision:      Rev. Date :
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ANTENNA AND ARM PROPERTIES AND LOAD DATA:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph

Ant Arm No.	Arm Mount. Elev. (ft)	Load Applic. Elev. (ft)	Arm Length (ft)	Ice Load Case	Antenna Area [CaAa] (sf)	Antenna Force [qzGhCaAa] (lbs)	Antenna Weight (lbs)
[1]	173.000	178.000	2.0000	No Ice:	1.00	44.81	100.00
	Description: 5/8" Lightning Rod						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.619	No Ice:	(psf) 26.518	(psf) 44.815	
[2]	173.000	173.000	0.0000	No Ice:	66.66	2963.01	324.00
	Description: (12) Swedcom ALP-9212-N						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.605	No Ice:	(psf) 26.303	(psf) 44.452	
[3]	173.000	173.000	2.0000	No Ice:	21.52	956.60	1300.00
	Description: 14' Low Profile Platform						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.605	No Ice:	(psf) 26.303	(psf) 44.452	
[4]	166.000	166.000	0.0000	No Ice:	66.66	2928.25	324.00
	Description: (12) Swedcom ALP-9212-N						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.587	No Ice:	(psf) 25.994	(psf) 43.930	
[5]	166.000	166.000	2.0000	No Ice:	21.52	945.38	1300.00
	Description: 14' Low Profile Platform						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.587	No Ice:	(psf) 25.994	(psf) 43.930	
[6]	156.000	156.000	0.0000	No Ice:	66.66	2876.72	324.00
	Description: (12) Swedcom ALP-9212-N						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.559	No Ice:	(psf) 25.537	(psf) 43.157	
[7]	156.000	156.000	2.0000	No Ice:	21.52	928.74	1300.00
	Description: 14' Low Profile Platform						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.559	No Ice:	(psf) 25.537	(psf) 43.157	
[8]	146.000	146.000	0.0000	No Ice:	66.66	2822.79	324.00
	Description: (12) Swedcom ALP-9212-N						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.529	No Ice:	(psf) 25.058	(psf) 42.348	
[9]	146.000	146.000	2.0000	No Ice:	21.52	911.33	1300.00
	Description: 14' Low Profile Platform						
					[qz]	[qz] [Gh]	

		1.69	1.529	No Ice:	25.058	42.348	
[10]	136.000	136.000	0.0000	No Ice:	66.66	2766.14	324.00
	Description: (12) Swedcom ALP-9212-N						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		(psf)	(psf)		(psf)	(psf)	
		1.69	1.499	No Ice:	24.555	41.498	
[11]	136.000	136.000	2.0000	No Ice:	21.52	893.04	1300.00
	Description: 14' Low Profile Platform						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		(psf)	(psf)		(psf)	(psf)	
		1.69	1.499	No Ice:	24.555	41.498	
[12]	126.000	126.000	0.0000	No Ice:	66.66	2706.43	324.00
	Description: (12) Swedcom ALP-9212-N						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		(psf)	(psf)		(psf)	(psf)	
		1.69	1.466	No Ice:	24.025	40.602	
[13]	126.000	126.000	2.0000	No Ice:	21.52	873.76	1300.00
	Description: 14' Low Profile Platform						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		(psf)	(psf)		(psf)	(psf)	
		1.69	1.466	No Ice:	24.025	40.602	
[14]	101.000	101.000	2.0000	No Ice:	12.00	457.39	420.00
	Description: GPS Antenna w/ Mount						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		(psf)	(psf)		(psf)	(psf)	
		1.69	1.377	No Ice:	22.554	38.116	

PJF_Pole (tm) - Monopole Design Program
 Windows Version 1.28.0100 Tue Jun 13, 2000 - 11:08:17 am
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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT LOADS:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph

Design Loads per TIA/EIA-222-F Standard; Gust Factor Gh = 1.69
 Pole DL Overload Factor = 1

Per TIA/EIA Table 1: Note 3: For all cross sectional shapes,
 Force Coefficient [Cf] need not exceed 1.2
 for any value of C. (Where C=sqrt(Kz)*V*D.)

Top of Segment Elev. (ft)	Expos Coeff [Kz]	Veloc Press [qz] (psf)	Pole Veloc Coeff [C]	Force Coeff [Cf]	Projected Area Shaft [Ae] (sf)	Segment [Cf Ae] (sf)	Segment Wind Force (lbs)	Shaft Segment Weight (lbs)
174.000	1.608	26.35	219.80	0.650	2.175	1.414	62.96	69.81
173.000	1.605	26.30	221.38	0.650	0.000	0.000	0.00	0.00
173.000	1.605	26.30	221.38	0.650	0.000	0.000	0.00	0.00
173.000	1.605	26.30	221.38	0.650	2.193	1.425	63.35	70.37
170.000	1.597	26.17	226.08	0.650	6.682	4.343	192.42	214.47
166.000	1.587	25.99	232.30	0.650	6.838	4.445	195.92	219.53
166.000	1.587	25.99	232.30	0.650	2.314	1.504	66.08	74.30
160.000	1.570	25.72	241.51	0.650	14.248	9.261	404.36	457.59
156.000	1.559	25.54	247.56	0.650	7.358	4.783	207.16	236.38
156.000	1.559	25.54	247.56	0.650	2.487	1.617	69.78	79.92
150.000	1.541	25.25	256.51	0.650	15.288	9.937	426.07	491.28
146.000	1.529	25.06	262.38	0.650	7.878	5.121	217.69	253.22
146.000	1.529	25.06	262.38	0.650	2.661	1.729	73.24	85.53
140.000	1.511	24.76	271.04	0.650	16.328	10.613	446.32	524.98
136.000	1.499	24.56	276.71	0.650	8.398	5.459	227.47	270.07
136.000	1.499	24.56	276.71	0.650	2.834	1.842	76.44	91.15
132.500	1.488	24.37	281.60	0.650	8.596	5.587	230.83	699.91
130.000	1.480	24.24	281.00	0.650	8.637	5.614	230.49	346.64
128.000	1.473	24.13	287.79	0.650	5.886	3.826	156.22	236.29
126.000	1.466	24.03	286.46	0.650	2.948	1.916	77.99	118.35
126.000	1.466	24.03	286.46	0.650	2.966	1.928	78.27	119.06
120.000	1.446	23.69	294.48	0.650	18.158	11.803	475.35	729.08
110.000	1.411	23.11	307.31	0.650	31.650	20.573	812.62	1271.29
101.000	1.377	22.55	318.23	0.650	29.967	19.479	750.62	1204.19
100.000	1.373	22.49	319.40	0.650	3.416	2.221	84.40	137.31
93.000	1.345	22.03	327.36	0.650	24.374	15.843	595.12	1770.67
90.000	1.332	21.82	325.82	0.650	10.561	6.865	253.97	508.70
87.500	1.321	21.65	328.50	0.650	7.127	4.633	169.97	343.35
80.000	1.288	21.10	336.12	0.650	29.202	18.981	685.11	1407.09
70.000	1.240	20.31	345.21	0.650	38.063	24.741	864.24	1834.68
60.000	1.186	19.44	352.80	0.650	39.796	25.868	867.08	1918.92
50.000	1.126	18.45	358.44	0.650	41.498	26.974	861.61	3343.39
43.500	1.082	17.73	355.56	0.650	25.375	16.494	503.46	1426.35
40.000	1.057	17.31	356.31	0.650	17.263	11.221	331.69	970.56
30.000	1.000	16.38	360.52	0.650	44.371	28.841	812.33	2495.19
20.000	1.000	16.38	374.39	0.650	46.105	29.968	829.79	2593.48
10.000	1.000	16.38	388.25	0.650	47.838	31.095	860.98	2691.76
2.000	1.000	16.38	399.35	0.650	39.519	25.687	711.25	2224.17

Summation TOTAL = 13972.66 31529.00

----- (END LOAD CASE 1 -- POLE SHAFT LOADS) -----

PJF_Pole (tm) - Monopole Design Program

Windows Version 1.28.0100

Tue Jun 13, 2000 - 11:08:17 am

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Job No.....: 29200-812          Design No: Summit # 10073      Engineer : BAJ
Description : 173' Monopole - Rocky Hill: Hartford Co., CT
Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
Owner.....  : Crown Castle USA          Client: Summit Manufacturing, LLC (
Status..... : Final Design              Revision:      Rev. Date :
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POLE SHAFT SEGMENTS -- AXIAL AND SHEAR FORCES:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph

Tube Segment No.	Segment Elevation (ft)	Axial Load (kips)	Cumulative Axial Load (kips)	Horiz. Shear (kips)	Cumulative Horiz. Shear (kips)
1.	174.000	0.070	0.070	0.063	0.063
2.	173.000	0.100	0.170	0.045	0.108
3.	173.000	0.324	0.494	2.963	3.071
4.	173.000	1.370	1.864	1.020	4.091
5.	170.000	0.214	2.079	0.192	4.283
6.	166.000	0.544	2.622	3.124	7.407
7.	166.000	1.374	3.996	1.011	8.419
8.	160.000	0.458	4.454	0.404	8.823
9.	156.000	0.560	5.014	3.084	11.907
10.	156.000	1.380	6.394	0.999	12.906
11.	150.000	0.491	6.886	0.426	13.332
12.	146.000	0.577	7.463	3.040	16.372
13.	146.000	1.386	8.848	0.985	17.357
14.	140.000	0.525	9.373	0.446	17.803
15.	136.000	0.594	9.967	2.994	20.797
16.	136.000	1.391	11.359	0.969	21.766
17.	132.500	0.700	12.058	0.231	21.997
18.	130.000	0.347	12.405	0.230	22.227
19.	128.000	0.236	12.641	0.156	22.384
20.	126.000	0.442	13.084	2.784	25.168
21.	126.000	1.419	14.503	0.952	26.120
22.	120.000	0.729	15.232	0.475	26.595
23.	110.000	1.271	16.503	0.813	27.408
24.	101.000	1.624	18.127	1.208	28.616
25.	100.000	0.137	18.265	0.084	28.700
26.	93.000	1.771	20.035	0.595	29.296
27.	90.000	0.509	20.544	0.254	29.550
28.	87.500	0.343	20.887	0.170	29.720
29.	80.000	1.407	22.295	0.685	30.405
30.	70.000	1.835	24.129	0.864	31.269
31.	60.000	1.919	26.048	0.867	32.136
32.	50.000	3.343	29.391	0.862	32.998
33.	43.500	1.426	30.818	0.503	33.501
34.	40.000	0.971	31.788	0.332	33.833
35.	30.000	2.495	34.284	0.812	34.645
36.	20.000	2.593	36.877	0.830	35.475
37.	10.000	2.692	39.569	0.861	36.336
38.	2.000	2.224	41.793	0.711	37.047
Base	1.000		41.793		37.047

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----- ( END LOAD CASE 1 -- AXIAL AND SHEAR FORCE ) -----

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PJF_Pole (tm) - Monopole Design Program
 Windows Version 1.28.0100 Tue Jun 13, 2000 - 11:08:17 am
 (c) 1993 to 1998 PAUL J. FORD AND COMPANY, Columbus, Ohio

 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- MOMENTS and DEFLECTIONS:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph

Segmnt Elev (ft)	[----- MOMENTS (ft-kips) -----]				[--DEFLECTIONS (inch)-----]		
	From Ant/ Arm	From Shaft Wind	From P-Delta Effects	Total Moment	No P-Delta Effects	Total W/ P-Delta Effects	Total Rotation (deg)
174.00	0.179	0.000	0.000	0.179	121.598	127.063	6.231
173.00	0.224	0.063	0.000	0.287	121.598	127.063	6.231
173.00	0.224	0.063	0.000	0.287	121.598	127.063	6.231
173.00	0.224	0.063	0.054	0.341	120.348	125.753	6.231
170.00	12.117	0.634	0.688	13.439	116.596	121.823	6.228
166.00	27.975	2.300	1.392	31.666	112.848	117.897	6.215
166.00	27.975	2.300	1.677	31.952	111.600	116.590	6.215
160.00	75.003	6.788	4.403	86.195	104.139	108.774	6.170
156.00	106.355	11.142	5.869	123.367	100.433	104.892	6.121
156.00	106.355	11.142	6.407	123.905	99.204	103.605	6.121
150.00	176.217	19.773	10.619	206.609	91.889	95.944	6.019
146.00	222.791	26.961	12.813	262.564	88.282	92.166	5.931
146.00	222.791	26.961	13.588	263.339	87.091	90.919	5.931
140.00	315.056	39.945	19.163	374.164	80.042	83.539	5.769
136.00	376.567	50.101	22.011	448.678	76.593	79.928	5.642
136.00	376.567	50.101	22.995	449.663	75.460	78.742	5.642
132.50	443.196	59.980	26.358	529.534	72.095	75.220	5.518
130.00	490.788	67.610	29.863	588.260	68.794	71.766	5.437
128.00	528.861	74.069	32.220	635.151	66.625	69.496	5.370
126.00	566.935	80.841	33.409	681.184	65.547	68.368	5.301
126.00	566.935	80.841	34.623	682.398	64.483	67.254	5.301
120.00	702.637	103.043	42.688	848.368	58.232	60.715	5.074
110.00	928.807	146.464	56.126	1131.397	48.465	50.502	4.647
101.00	1132.360	192.573	68.022	1392.955	40.440	42.117	4.227
100.00	1155.434	198.115	69.354	1422.903	39.596	41.235	4.179
93.00	1316.955	239.280	78.513	1634.748	33.960	35.350	3.835
90.00	1386.178	258.197	82.503	1726.879	31.689	32.980	3.700
87.50	1443.864	274.534	85.140	1803.537	30.221	31.448	3.589
80.00	1616.922	326.765	95.443	2039.130	24.705	25.694	3.252
70.00	1847.666	403.951	107.649	2359.266	18.619	19.351	2.799
60.00	2078.410	489.799	118.858	2687.067	13.443	13.961	2.344
50.00	2309.154	584.302	128.810	3022.266	9.176	9.523	1.892
43.50	2459.137	650.295	134.364	3243.796	7.037	7.300	1.629
40.00	2539.897	687.287	137.770	3364.955	5.775	5.988	1.489
30.00	2770.641	798.539	145.170	3714.350	3.170	3.284	1.094
20.00	3001.385	917.954	150.727	4070.066	1.350	1.398	0.708
10.00	3232.129	1045.807	154.162	4432.098	0.301	0.311	0.331
1.00	3439.799	1168.346	155.205	4763.351	0.000	0.000	0.000

----- (END LOAD CASE 1 -- MOMENTS AND DEFLECTIONS) -----

PJF_Pole (tm) - Monopole Design Program
 Windows Version 1.28.0100 Tue Jun 13, 2000 - 11:08:17 am
 (c) 1993 to 1998 PAUL J. FORD AND COMPANY, Columbus, Ohio

 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- ACTUAL VS. ALLOWABLE STRESSES:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph
 Note: Per TIA/EIA Sec. 3.1.1.1: Allow a 1/3 stress increase for poles under
 700 feet in height. The allowable stresses
 shown include the factor of 1.333

Segmnt Elev (ft)	[----- ACTUAL STRESSES -----]					Allow. Stress [Fb] (ksi)	Actual/ Allowable [Ftot/Fb] Ratio
	Bending [fb] (ksi)	Axial [fa] (ksi)	Torsion [ft] (ksi)	Shear [fv] (ksi)	Combined [Ftot] (ksi)		
174.00	0.017	0.003	0.000	0.006	0.023	48.00	0.0005
173.00	0.026	0.008	0.004	0.010	0.042	48.00	0.0009
173.00	0.026	0.024	0.147	0.297	0.772	48.00	0.0161
173.00	0.031	0.091	0.232	0.396	1.095	48.00	0.0228
170.00	1.167	0.099	0.221	0.405	1.667	48.00	0.0347
166.00	2.585	0.121	0.342	0.679	3.233	48.00	0.0673
166.00	2.608	0.184	0.417	0.772	3.470	48.00	0.0723
160.00	6.434	0.196	0.382	0.774	6.926	48.00	0.1443
156.00	8.694	0.214	0.483	1.015	9.279	48.00	0.1933
156.00	8.732	0.273	0.547	1.100	9.447	48.00	0.1968
150.00	13.398	0.282	0.503	1.091	13.956	48.00	0.2908
146.00	16.138	0.298	0.589	1.304	16.760	48.00	0.3492
146.00	16.186	0.353	0.644	1.382	16.907	48.00	0.3522
140.00	21.275	0.360	0.596	1.364	21.900	48.00	0.4562
136.00	24.262	0.373	0.670	1.554	24.934	48.00	0.5195
136.00	24.315	0.425	0.717	1.626	25.071	48.00	0.5223
132.50	27.430	0.442	0.687	1.609	28.154	48.00	0.5866
130.00	24.482	0.364	0.551	1.302	25.053	52.00	0.4818
128.00	25.072	0.362	0.522	1.277	25.624	48.00	0.5338
126.00	27.018	0.375	0.602	1.440	27.621	52.00	0.5312
126.00	27.066	0.416	0.636	1.494	27.729	52.00	0.5332
120.00	31.373	0.422	0.593	1.469	31.995	52.00	0.6153
110.00	37.424	0.432	0.531	1.432	38.009	52.00	0.7309
101.00	41.886	0.453	0.496	1.426	42.470	52.00	0.8167
100.00	42.348	0.454	0.491	1.423	42.930	52.00	0.8256
93.00	45.329	0.481	0.458	1.402	45.922	52.00	0.8831
90.00	40.082	0.411	0.382	1.180	40.584	52.00	0.7805
87.50	40.839	0.413	0.373	1.173	41.339	52.00	0.7950
80.00	42.948	0.425	0.347	1.157	43.451	52.00	0.8356
70.00	45.294	0.439	0.317	1.136	45.802	52.00	0.8808
60.00	47.216	0.454	0.290	1.117	47.732	52.00	0.9179
50.00	48.788	0.491	0.266	1.100	49.336	52.00	0.9488
43.50	43.985	0.437	0.224	0.947	44.468	52.00	0.8552
40.00	44.344	0.444	0.217	0.943	44.833	52.00	0.8622
30.00	45.211	0.460	0.201	0.928	45.713	52.00	0.8791
20.00	45.897	0.477	0.186	0.915	46.413	52.00	0.8926
10.00	46.435	0.493	0.173	0.903	46.965	52.00	0.9032
1.00	46.812	0.504	0.162	0.892	47.351	52.00	0.9106

----- (END LOAD CASE 1 -- ACTUAL VS. ALLOWABLE STRESSES) -----

PJF_Pole (tm) - Monopole Design Program

Windows Version 1.28.0100

Tue Jun 13, 2000 - 11:08:17 am

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Job No.....: 29200-812          Design No: Summit # 10073      Engineer : BAJ
Description : 173' Monopole - Rocky Hill: Hartford Co., CT
Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
Owner.....  : Crown Castle USA          Client: Summit Manufacturing, LLC (
Status..... : Final Design              Revision:      Rev. Date :
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ANTENNA AND ARM PROPERTIES AND LOAD DATA:

LOAD CASE 2: WIND VELOCITY = 69.28 mph + 0.50 inches Radial Ice.

Ant Arm No.	Arm Mount. Elev. (ft)	Load Applic. Elev. (ft)	Arm Length (ft)	Ice Load Case	Antenna Area [CaAa] (sf)	Antenna Force [qzGhCaAa] (lbs)	Antenna Weight (lbs)
[1]	173.000	178.000	2.0000	W/ Ice:	2.50	84.03	150.00
	Description: 5/8" Lightning Rod				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.619		W/ Ice:	19.888	33.611	
[2]	173.000	173.000	0.0000	W/ Ice:	72.99	2433.46	864.00
	Description: (12) Swedcom ALP-9212-N				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.605		W/ Ice:	19.727	33.339	
[3]	173.000	173.000	2.0000	W/ Ice:	22.90	763.46	2100.00
	Description: 14' Low Profile Platform				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.605		W/ Ice:	19.727	33.339	
[4]	166.000	166.000	0.0000	W/ Ice:	72.99	2404.91	864.00
	Description: (12) Swedcom ALP-9212-N				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.587		W/ Ice:	19.496	32.948	
[5]	166.000	166.000	2.0000	W/ Ice:	22.90	754.50	2100.00
	Description: 14' Low Profile Platform				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.587		W/ Ice:	19.496	32.948	
[6]	156.000	156.000	0.0000	W/ Ice:	72.99	2362.59	864.00
	Description: (12) Swedcom ALP-9212-N				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.559		W/ Ice:	19.153	32.368	
[7]	156.000	156.000	2.0000	W/ Ice:	22.90	741.22	2100.00
	Description: 14' Low Profile Platform				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.559		W/ Ice:	19.153	32.368	
[8]	146.000	146.000	0.0000	W/ Ice:	72.99	2318.30	864.00
	Description: (12) Swedcom ALP-9212-N				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.529		W/ Ice:	18.793	31.761	
[9]	146.000	146.000	2.0000	W/ Ice:	22.90	727.33	2100.00
	Description: 14' Low Profile Platform				[qz]	[qz] [Gh]	

	1.69	1.529		W/ Ice:	18.793	31.761	
[10]	136.000	136.000	0.0000	W/ Ice:	72.99	2271.77	864.00
	Description: (12) Swedcom ALP-9212-N						
	[Gh]	[Kz]			[qz]	[qz] [Gh]	
	1.69	1.499		W/ Ice:	(psf) 18.416	(psf) 31.124	
[11]	136.000	136.000	2.0000	W/ Ice:	22.90	712.73	2100.00
	Description: 14' Low Profile Platform						
	[Gh]	[Kz]			[qz]	[qz] [Gh]	
	1.69	1.499		W/ Ice:	(psf) 18.416	(psf) 31.124	
[12]	126.000	126.000	0.0000	W/ Ice:	72.99	2222.74	864.00
	Description: (12) Swedcom ALP-9212-N						
	[Gh]	[Kz]			[qz]	[qz] [Gh]	
	1.69	1.466		W/ Ice:	(psf) 18.019	(psf) 30.452	
[13]	126.000	126.000	2.0000	W/ Ice:	22.90	697.35	2100.00
	Description: 14' Low Profile Platform						
	[Gh]	[Kz]			[qz]	[qz] [Gh]	
	1.69	1.466		W/ Ice:	(psf) 18.019	(psf) 30.452	
[14]	101.000	101.000	2.0000	W/ Ice:	16.00	457.39	640.00
	Description: GPS Antenna w/ Mount						
	[Gh]	[Kz]			[qz]	[qz] [Gh]	
	1.69	1.377		W/ Ice:	(psf) 16.915	(psf) 28.587	

PJF_Pole (tm) - Monopole Design Program

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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC ()
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT LOADS:

LOAD CASE 2: WIND VELOCITY = 69.28 mph with 0.50 inches Radial Ice.

Design Loads per TIA/EIA-222-F Standard; Gust Factor Gh = 1.69
 Pole DL Overload Factor = 1

Per TIA/EIA Table 1: Note 3: For all cross sectional shapes,
 Force Coefficient [Cf] need not exceed 1.2
 for any value of C. (Where C=sqrt(Kz)*V*D.)

Top of Segment Elev. (ft)	Expos Coeff [Kz]	Veloc Press [qz] (psf)	Pole Veloc Coeff [C]	Force Coeff [Cf]	Projected Area Shaft [Ae] (sf)	Segment [Cf Ae] (sf)	Segment Wind Force (lbs)	Shaft Segment Weight (lbs)
174.000	1.608	19.76	190.35	0.650	2.259	1.468	49.03	86.22
173.000	1.605	19.73	191.72	0.650	0.000	0.000	0.00	0.00
173.000	1.605	19.73	191.72	0.650	0.000	0.000	0.00	0.00
173.000	1.605	19.73	191.72	0.650	2.276	1.479	49.32	86.91
170.000	1.597	19.63	195.79	0.650	6.932	4.506	149.72	264.88
166.000	1.587	19.50	201.18	0.650	7.088	4.607	152.31	271.09
166.000	1.587	19.50	201.18	0.650	2.397	1.558	51.34	91.74
160.000	1.570	19.29	209.15	0.650	14.748	9.586	313.91	564.96
156.000	1.559	19.15	214.39	0.650	7.608	4.945	160.65	291.79
156.000	1.559	19.15	214.39	0.650	2.571	1.671	54.08	98.64
150.000	1.541	18.94	222.14	0.650	15.788	10.262	330.00	606.36
146.000	1.529	18.79	227.23	0.650	8.128	5.283	168.45	312.49
146.000	1.529	18.79	227.23	0.650	2.744	1.784	56.65	105.54
140.000	1.511	18.57	234.73	0.650	16.828	10.938	344.99	647.75
136.000	1.499	18.42	239.64	0.650	8.648	5.621	175.68	333.19
136.000	1.499	18.42	239.64	0.650	2.917	1.896	59.02	112.44
132.500	1.488	18.28	243.87	0.650	8.846	5.750	178.16	863.36
130.000	1.480	18.18	243.35	0.650	8.887	5.777	177.87	411.53
128.000	1.473	18.10	249.23	0.650	6.053	3.934	120.49	280.50
126.000	1.466	18.02	248.08	0.650	3.032	1.971	60.14	140.50
126.000	1.466	18.02	248.08	0.650	3.049	1.982	60.35	141.33
120.000	1.446	17.77	255.02	0.650	18.658	12.128	366.33	865.40
110.000	1.411	17.33	266.14	0.650	32.484	21.114	625.52	1508.77
101.000	1.377	16.92	275.59	0.650	30.717	19.966	577.06	1428.89
100.000	1.373	16.87	276.61	0.650	3.500	2.275	64.85	162.92
93.000	1.345	16.52	283.50	0.650	24.957	16.222	457.02	2100.72
90.000	1.332	16.37	282.17	0.650	10.811	7.027	194.98	587.84
87.500	1.321	16.24	284.49	0.650	7.294	4.741	130.46	396.75
80.000	1.288	15.83	291.09	0.650	29.869	19.415	525.56	1625.82
70.000	1.240	15.23	298.96	0.650	38.896	25.283	662.37	2119.65
60.000	1.186	14.58	305.53	0.650	40.630	26.409	663.93	2216.72
50.000	1.126	13.84	310.42	0.650	42.332	27.516	659.19	3861.77
43.500	1.082	13.30	307.92	0.650	25.875	16.819	385.04	1616.12
40.000	1.057	12.98	308.57	0.650	17.597	11.438	253.57	1099.64
30.000	1.000	12.29	312.22	0.650	45.205	29.383	620.69	2826.88
20.000	1.000	12.29	324.23	0.650	46.938	30.510	633.59	2938.00
10.000	1.000	12.29	336.24	0.650	48.672	31.636	656.99	3049.12
2.000	1.000	12.29	345.84	0.650	40.185	26.120	542.44	2519.30

Summation TOTAL = 10731.76 36635.57

----- (END LOAD CASE 2 -- POLE SHAFT LOADS) -----

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Windows Version 1.28.0100

Tue Jun 13, 2000 - 11:08:17 am

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Job No.....: 29200-812           Design No: Summit # 10073       Engineer : BAJ
Description : 173' Monopole - Rocky Hill: Hartford Co., CT
Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
Owner.....  : Crown Castle USA           Client: Summit Manufacturing, LLC (
Status..... : Final Design              Revision:           Rev. Date :
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POLE SHAFT SEGMENTS -- AXIAL AND SHEAR FORCES:

LOAD CASE 2: WIND VELOCITY = 69.28 mph with 0.50 inches Radial Ice.

Tube Segment No.	Segment Elevation (ft)	Axial Load (kips)	Cumulative Axial Load (kips)	Horiz. Shear (kips)	Cumulative Horiz. Shear (kips)
1.	174.000	0.086	0.086	0.049	0.049
2.	173.000	0.150	0.236	0.084	0.133
3.	173.000	0.864	1.100	2.433	2.567
4.	173.000	2.187	3.287	0.813	3.379
5.	170.000	0.265	3.552	0.150	3.529
6.	166.000	1.135	4.687	2.557	6.086
7.	166.000	2.192	6.879	0.806	6.892
8.	160.000	0.565	7.444	0.314	7.206
9.	156.000	1.156	8.600	2.523	9.729
10.	156.000	2.199	10.798	0.795	10.525
11.	150.000	0.606	11.405	0.330	10.855
12.	146.000	1.176	12.581	2.487	13.341
13.	146.000	2.206	14.787	0.784	14.125
14.	140.000	0.648	15.434	0.345	14.470
15.	136.000	1.197	16.632	2.447	16.918
16.	136.000	2.212	18.844	0.772	17.689
17.	132.500	0.863	19.707	0.178	17.868
18.	130.000	0.412	20.119	0.178	18.045
19.	128.000	0.280	20.399	0.120	18.166
20.	126.000	1.004	21.404	2.283	20.449
21.	126.000	2.241	23.645	0.758	21.207
22.	120.000	0.865	24.511	0.366	21.573
23.	110.000	1.509	26.019	0.626	22.198
24.	101.000	2.069	28.088	1.034	23.233
25.	100.000	0.163	28.251	0.065	23.298
26.	93.000	2.101	30.352	0.457	23.755
27.	90.000	0.588	30.940	0.195	23.950
28.	87.500	0.397	31.337	0.130	24.080
29.	80.000	1.626	32.962	0.526	24.606
30.	70.000	2.120	35.082	0.662	25.268
31.	60.000	2.217	37.299	0.664	25.932
32.	50.000	3.862	41.160	0.659	26.591
33.	43.500	1.616	42.777	0.385	26.976
34.	40.000	1.100	43.876	0.254	27.230
35.	30.000	2.827	46.703	0.621	27.851
36.	20.000	2.938	49.641	0.634	28.484
37.	10.000	3.049	52.690	0.657	29.141
38.	2.000	2.519	55.210	0.542	29.684
Base	1.000		55.210		29.684

----- (END LOAD CASE 2 -- AXIAL AND SHEAR FORCE) -----

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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design.....: 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- MOMENTS and DEFLECTIONS:

LOAD CASE 2: WIND VELOCITY = 69.28 mph with 0.50 inches Radial Ice.

Segmnt Elev (ft)	[----- MOMENTS (ft-kips) -----]				[--DEFLECTIONS (inch)-----]		
	From Ant/ Arm	From Shaft Wind	From P-Delta Effects	Total Moment	No P-Delta Effects	Total W/ P-Delta Effects	Total Rotation (deg)
174.00	0.336	0.000	0.000	0.336	98.516	105.671	5.206
173.00	0.420	0.049	0.000	0.469	98.516	105.671	5.206
173.00	0.420	0.049	0.000	0.469	98.516	105.671	5.206
173.00	0.420	0.049	0.100	0.569	97.502	104.578	5.206
170.00	10.263	0.493	1.023	11.779	94.460	101.299	5.203
166.00	23.387	1.790	2.017	27.193	91.420	98.022	5.192
166.00	23.387	1.790	2.443	27.619	90.408	96.932	5.192
160.00	62.029	5.280	6.308	73.616	84.358	90.411	5.153
156.00	87.790	8.663	8.343	104.796	81.352	87.172	5.112
156.00	87.790	8.663	9.112	105.565	80.356	86.099	5.112
150.00	145.055	15.366	14.994	175.415	74.426	79.709	5.025
146.00	183.232	20.944	18.016	222.191	71.501	76.559	4.950
146.00	183.232	20.944	19.105	223.281	70.536	75.520	4.950
140.00	258.771	31.015	26.823	316.609	64.822	69.367	4.813
136.00	309.130	38.887	30.721	378.739	62.027	66.358	4.705
136.00	309.130	38.887	32.090	380.108	61.109	65.370	4.705
132.50	363.640	46.543	36.728	446.911	58.382	62.436	4.601
130.00	402.576	52.453	41.486	496.516	55.707	59.558	4.532
128.00	433.724	57.456	44.667	535.847	53.949	57.668	4.476
126.00	464.873	62.700	46.264	573.836	53.075	56.728	4.417
126.00	464.873	62.700	47.918	575.490	52.213	55.801	4.417
120.00	575.839	79.885	58.805	714.529	47.148	50.358	4.226
110.00	760.783	113.470	76.628	950.881	39.234	41.861	3.867
101.00	927.232	149.106	92.102	1168.440	32.734	34.890	3.515
100.00	946.184	153.387	93.818	1193.388	32.050	34.157	3.474
93.00	1078.846	185.177	105.525	1369.549	27.485	29.269	3.186
90.00	1135.702	199.781	110.534	1446.016	25.646	27.301	3.073
87.50	1183.081	212.390	113.826	1509.296	24.457	26.029	2.980
80.00	1325.219	252.689	126.569	1704.477	19.990	21.255	2.698
70.00	1514.737	312.206	141.417	1968.359	15.062	15.996	2.320
60.00	1704.255	378.358	154.822	2237.434	10.873	11.533	1.941
50.00	1893.772	451.135	166.538	2511.445	7.421	7.861	1.565
43.50	2016.959	501.933	172.943	2691.835	5.690	6.023	1.346
40.00	2083.290	530.400	176.841	2790.531	4.669	4.940	1.230
30.00	2272.808	615.984	185.225	3074.017	2.562	2.707	0.903
20.00	2462.325	707.803	191.437	3361.565	1.091	1.152	0.584
10.00	2651.843	806.064	195.230	3653.137	0.243	0.256	0.273
1.00	2822.409	900.199	196.371	3918.979	0.000	0.000	0.000

----- (END LOAD CASE 2 -- MOMENTS AND DEFLECTIONS) -----

PJF_Pole (tm) - Monopole Design Program

Windows Version 1.28.0100

Tue Jun 13, 2000 - 11:08:17 am

(c) 1993 to 1998 PAUL J. FORD AND COMPANY, Columbus, Ohio

 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- ACTUAL VS. ALLOWABLE STRESSES:

LOAD CASE 2: WIND VELOCITY = 69.28 mph with 0.50 inches Radial Ice.
 Note: Per TIA/EIA Sec. 3.1.1.1: Allow a 1/3 stress increase for poles under
 700 feet in height. The allowable stresses
 shown include the factor of 1.333

Segmnt Elev (ft)	[----- ACTUAL STRESSES -----]					Allow. Stress [Fb] (ksi)	Actual/ Allowable [Ftot/Fb] Ratio
	Bending [fb] (ksi)	Axial [fa] (ksi)	Torsion [ft] (ksi)	Shear [fv] (ksi)	Combined [Ftot] (ksi)		
174.00	0.031	0.004	0.000	0.005	0.036	48.00	0.0008
173.00	0.043	0.011	0.007	0.013	0.065	48.00	0.0013
173.00	0.043	0.053	0.125	0.249	0.655	48.00	0.0136
173.00	0.052	0.160	0.193	0.327	0.926	48.00	0.0193
170.00	1.023	0.168	0.184	0.334	1.491	48.00	0.0311
166.00	2.220	0.215	0.283	0.558	2.838	48.00	0.0591
166.00	2.254	0.316	0.343	0.632	3.076	48.00	0.0641
160.00	5.495	0.327	0.314	0.632	6.049	48.00	0.1260
156.00	7.386	0.367	0.397	0.830	8.039	48.00	0.1675
156.00	7.440	0.461	0.448	0.897	8.238	48.00	0.1716
150.00	11.375	0.468	0.412	0.888	12.055	48.00	0.2511
146.00	13.657	0.502	0.483	1.063	14.410	48.00	0.3002
146.00	13.724	0.590	0.526	1.125	14.597	48.00	0.3041
140.00	18.003	0.593	0.487	1.109	18.800	48.00	0.3917
136.00	20.480	0.623	0.548	1.264	21.335	48.00	0.4445
136.00	20.554	0.706	0.585	1.322	21.515	48.00	0.4482
132.50	23.150	0.722	0.561	1.307	24.091	48.00	0.5019
130.00	20.664	0.591	0.450	1.057	21.414	52.00	0.4118
128.00	21.152	0.583	0.427	1.037	21.883	48.00	0.4559
126.00	22.760	0.614	0.492	1.170	23.550	52.00	0.4529
126.00	22.826	0.678	0.519	1.213	23.694	52.00	0.4557
120.00	26.424	0.679	0.484	1.192	27.257	52.00	0.5242
110.00	31.453	0.681	0.433	1.160	32.253	52.00	0.6202
101.00	35.135	0.701	0.407	1.158	35.939	52.00	0.6911
100.00	35.517	0.702	0.403	1.155	36.319	52.00	0.6984
93.00	37.975	0.728	0.376	1.137	38.792	52.00	0.7460
90.00	33.563	0.619	0.314	0.957	34.253	52.00	0.6587
87.50	34.176	0.620	0.306	0.950	34.864	52.00	0.6705
80.00	35.900	0.629	0.285	0.936	36.590	52.00	0.7036
70.00	37.789	0.639	0.260	0.918	38.482	52.00	0.7400
60.00	39.315	0.650	0.238	0.902	40.014	52.00	0.7695
50.00	40.542	0.688	0.219	0.886	41.274	52.00	0.7937
43.50	36.501	0.606	0.184	0.763	37.143	52.00	0.7143
40.00	36.774	0.613	0.178	0.759	37.422	52.00	0.7197
30.00	37.417	0.627	0.165	0.746	38.077	52.00	0.7322
20.00	37.908	0.642	0.153	0.735	38.580	52.00	0.7419
10.00	38.273	0.656	0.142	0.724	38.959	52.00	0.7492
1.00	38.514	0.666	0.133	0.715	39.208	52.00	0.7540

----- (END LOAD CASE 2 -- ACTUAL VS. ALLOWABLE STRESSES) -----

 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

M O N O P O L E B A S E P L A T E D E S I G N D E T A I L S

 Shaft Shape: 18 Sided Polygon Stress Increase: 1.333 Factor
 Base Dia, DF: 60.110 Inches Base Plate Shape ...: Square
 PT-to-PT, DP: 61.037 Inches
 Min Bolt Circle ..: 67.287 Inches Use Bolt Circle: 67.000 Inches

Base Reactions	:	DESIGN	USER
Moment	:	4763.351 Ft-Kips	5000 Ft-Kips
Axial Load	:	41.793 Kips	42 Kips

Anchor Bolt Details	:	DESIGN	USER
Number of Bolts	:	20	20
Bolt Diameter	:	2.250 Inches	2.250 Inches
Bolt Type	:	#18J ASTM A615	#18J ASTM A615
Y-Distance	:	12	12
Mom. of Inertia	:	11318.85 In^4	11222.50 In^4
Bolt Tension, T	:	169.90 Kips	179.10 Kips
Allowable Tension ...:	:	194.81 Kips	194.81 Kips
Bolt Compression, C ..:	:	171.99 Kips	181.20 Kips

Base Plate Details	:	DESIGN	USER
Plate Moment, MPL ...:	:	3085.92 In-Kips	3121.25 In-Kips
Bend Plane, W	:	35.24 Inches	33.23 Inches
Plate Thickness, t ...:	:	3.091 Inches	3.000 Inches
Plate Width	:	67.420 Inches	66.000 Inches
Plate Steel	:	ASTM A572 GRADE 55 (55 KSI)	ASTM A572 GRADE 55 (55 KSI)
Gross Weight	:	3984.30 Lbs	3705.90 Lbs
Net Weight	:	3011.20 Lbs	2761.40 Lbs
Allowable Stress	:	54.99 Ksi	54.99 Ksi
Actual Stress	:	54.99 Ksi	62.62 Ksi
Act./Allow Ratio	:	1.00	1.14

B A S E P L A T E D E S I G N S U M M A R Y

USE FOLLOWING SPECIFICATIONS:

Plate Thickness	:	3.000 Inches	Number of Bolts ...:	20
Plate Width/Diameter :	:	66.000 Inches (Square)	Bolt Circle	67.00 Inches
Plate Weight	:	3.706 Kips	Bolt Diameter	2.25 Inches
	:		Bolt Type	#18J ASTM A615

 INPUT: SPREAD FOOTING (PAD and PIER) FOR POLES

POLE LOADS: POLE WEIGHT = 42.00 kips (pole, antenna, ice, mounts, etc.)
 OVERTURNING MOMENT = 5000.00 ft-k (at the top of the pier)
 TOTAL HORIZONTAL = 38.90 kips (at the top of the pier)
 DESIGN SAFETY FACTOR AGAINST OVERTURNING = 1.50

CONCRETE: CONCRETE STRENGTH = 3000 psi at 28 days
 REINFORCING STEEL STRENGTH = 60000 psi (ASTM A615 grade 60)

SOIL: WATER TABLE BELOW BOTTOM OF FOOTING
 SOIL WT = 110 pcf (dry)
 ALLOWABLE SOIL BEARING = 3000 psf

FOOTING SIZE: WIDTH = 26.0 ft LENGTH = 26.0 ft
 THICKNESS = 3.50 ft DEPTH = 8.00 ft to bottom
 PIERS = 8.00 ft square PIER 0.5 ft above grade
 CONCRETE WEIGHT = 150 pcf

 OUTPUT: SPREAD FOOTING (PAD and PIER) FOR POLES

VOLUME OF CONCRETE = 2686 ft³ (99.48 cubic yards)

WEIGHT OF POLE =====> 42.00 kips
 WEIGHT OF CONCRETE => 402.90 kips (2686 x 0.150)
 WEIGHT OF SOIL =====> 302.94 kips (2754 x 0.110)

 TOTAL WEIGHT = 747.84 kips

OVERTURNING MOMENT = 5000.00 ft-k + (38.90 k x 8.50 ft) = 5331 ft-kips
 RESISTING MOMENT = 747.84 k x (26.00 ft / 2) = 9722 ft-kips

SAFETY FACTOR = Mresist / O.T.M. = 9722 / 5331 = 1.82 > 1.50 O.K.

ULTIMATE OVERTURNING MOMENT = 5331 ft-k x 1.50 = 7996 ft-kips
 ULTIMATE NET SOIL BEARING PRESSURE = 7429 psf

GROSS SOIL BEARING = 3266 psf (includes soil overburden)
 SOIL OVERBURDEN = 880 psf (soil overburden)
 NET SOIL BEARING = 2386 psf < 3000 psf O.K.

BENDING MOMENT IN PIER = 5000 ft-k + (38.90 k x 5.00 ft) = 5195 ft-kips
 AREA OF REINF STEEL REQUIRED IN THE PIER = 60.73 sq in (40 no. 11 bars)
 (.5 % = 46.08 sq in)

BENDING MOMENT IN FOOTING = 5775 ft-kips
 FOOTING REINFORCING = 1.80 in²/ft = 30 no. 11 bars @ 10.43 in. o.c.
 (.18 % = 0.91 in²/ft)

BENDING SHEAR IN THE FOOTING = 624.07 kips
 ALLOWABLE BENDING SHEAR = 838.02 kips O.K.

Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design.....: 80 MPH/ 69 MPH + 1/2" radial ice
 Owner.....: Crown Castle USA Client: Summit Manufacturing, LLC (
 Status.....: Final Design Revision: Rev. Date :

S U M M A R Y O F C U R R E N T C A I S S O N D E S I G N

Diameter (ft): 8.00 Compression (kips): 42.00 Friction S.F: 2.00
 Min. Depth (ft): 24.50 Horizontal (kips): 38.90 Lateral S.F: 2.00
 Depth Used (ft): 27.00 Uplift (kips): 0.00 Concrete S.F: 1.30
 Rebar Area (in²) ..: 37.44 Moment (Ft-kips) ..: 5000.0 Concrete F'c (psi) : 3000.0
 Rebar Used:(24)#11 Full Cohesion (ft): 24.00 Steel Cover (in) ..: 4.00
 Water at (ft): 10.00 Rock at (ft): 99.00

SOIL PROFILE :

Soil Layer	Layer Thickness (ft)	Unit Weight (pcf)	Ult. Friction (psf)	Skin Friction (psf)	Allowable Bearing (psf)	Friction Angle- Phi (deg)	Passive Coeff.- KP	Cohesion (c) (psf)
1	3.00	120.00	0.00	0.00	0.00	0.00	1.000	0.00
2	7.00	120.00	100.00	3000.00	33.00	33.00	3.392	0.00
3	3.00	57.60	100.00	3000.00	33.00	33.00	3.392	0.00
4	11.00	57.60	100.00	3000.00	32.00	32.00	3.255	0.00
5	13.00	52.60	100.00	2000.00	0.00	0.00	1.000	1000.00

LATERAL / MOMENT CAPACITY (CHECK) :

	Min Design	Actual Design
Caisson Diameter (ft)	8.00	8.00
Height Above Grade (ft)	0.50	0.50
Depth Below Grade (ft)	24.50	27.00
Concrete Volume (CY)	46.54	51.20
Applied Moment From Loads (Working), Mwork(Ft-kip):	5661.30	5686.59
Resisting Moment From Soil (Ult), Mult(Ft-kip):	11706.94	12930.80
Moment S.F. (Mult / Mwork)	2.07	2.27
Applied Horizontal Load (Working), Hwork (Kips) ..:	38.90	38.90
Horizontal Soil Resistance (Ultimate), Hult (Kips):	80.69	82.46
Horizontal S.F. (Hult / Hwork)	2.07	2.12
Center of Rotation (from grade) (ft)	16.50	17.15
Inflection Point (Max Design Moment Location (ft) :	5.10	5.10
Maximum Factored Design Moment for Reinf. (Ft-kip):	6340.71	6340.71
Area Steel Required From Loads (in ²)	31.80	31.80
ACI Minimum Steel (0.5%) (in ²)	36.19	36.19
Area Reinf. Steel Provided (in ²)	37.44	37.44

UPLIFT CAPACITY CHECK :

Actual Uplift on Caisson (Kips)	0.00	0.00
Allowable Uplift Capacity (Kips)	177.81	196.04

COMPRESSION CAPACITY CHECK :

Actual Compression on Caisson (Kips)	42.00	42.00
Total Compression (Includes Concrete Wt.) (Kips) ..:	107.35	113.63
Allowable Compression Capacity (Kips)	127.55	130.69

CAISSON DESIGN:

USE: 8.00 ft Diameter X 27.50 ft Long (Concrete Volume = 51.20 CY)
 Reinf: (24)#11 Vert, w/Closed Ties: (12)#5 @6.0", remaining ties @18.0" (ASTM A615)

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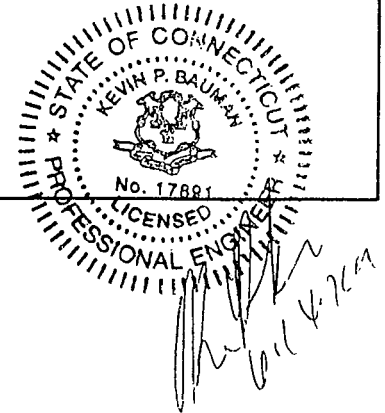
JOB DATA			
Page 1 of 3	Job No.	29200-812	
By SWL	Design No.	SUMMIT # 10073	
Chk'd By DWH	Date	06-09-2000	
	Rev. No.	Rev. Date	
Pole	173' MONOPOLE		
Site	ROCKY HILL: HARTFORD CO., CT		
Owner	CROWN CASTLE USA		
Ref. No.			
Design	80 MPH/ 69 MPH + 1/2" RADIAL ICE ACCORDING TO TIA/EIA-222-F 1996		

LOAD CASES			
CASE 1	80 MPH WITH NO ICE	DESIGN WIND	
CASE 2	69 MPH WITH 1/2" RADIAL ICE	REDUCED WIND WITH ICE	
CASE 3	50 MPH WITH NO ICE	OPERATIONAL WIND	

POLE SPECIFICATIONS	
Pole Shape Type:	18-SIDED POLYGON
Taper:	0.208006 IN/FT
Shaft Steel:	ASTM A607 GRADE 60 & 65
Base PL Steel:	ASTM A572 GRADE 55 (55 KSI)
Anchor Bolts:	2 1/4" Ø x 8'-0" LONG #18J ASTM A615 GRADE 75

ANTENNA LIST		
No.	Elev.	Description
-	TOP	5/8" LIGHTNING ROD
1-12	TOP	(12) SWEDCOM ALP-9212-N
-	TOP	14' LOW PROFILE PLATFORM
13-24	166.00	(12) SWEDCOM ALP-9212-N
-	166.00	14' LOW PROFILE PLATFORM
25-36	156.00	(12) SWEDCOM ALP-9212-N
-	156.00	14' LOW PROFILE PLATFORM
37-48	146.00	(12) SWEDCOM ALP-9212-N
-	146.00	14' LOW PROFILE PLATFORM
49-60	136.00	(12) SWEDCOM ALP-9212-N
-	136.00	14' LOW PROFILE PLATFORM
61-72	126.00	(12) SWEDCOM ALP-9212-N
-	126.00	14' LOW PROFILE PLATFORM
73-74	101.00	(2) GPS ANTENNA W/ MOUNT

STEP BOLTS FULL HEIGHT.
 ANTENNA FEED LINES RUN INSIDE OF POLE.



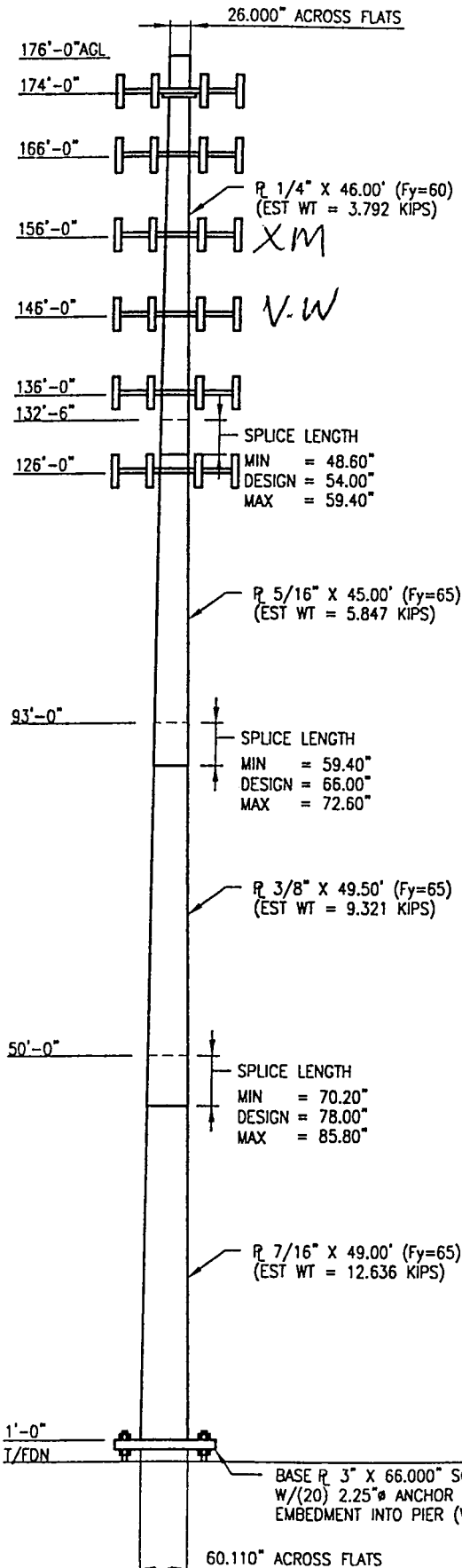
Elevation	80 MPH WIND		50 MPH WIND	
	Lateral Deflection (Inches)	Rotation (sway) (degrees)	Lateral Deflection (Inches)	Rotation (sway) (degrees)
TOP	127.1	6.231	49.5	2.434

SHAFT SECTION DATA					
Shaft Section	Section Length (feet)	Plate Thickness (in.)	Lap Splice (in.)	Diameter Across Flats (inches)	
				⊙ Top	⊙ Bottom
1	46.00	0.2500	54.00	26.000	35.568
2	45.00	0.3125	66.00	34.132	43.493
3	49.50	0.3750	78.00	41.723	52.020
4	49.00	0.4375		49.918	60.110

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

BASE REACTIONS FOR FOUNDATION DESIGN

MOMENT = 5000 ft-kips
 SHEAR = 38.9 kips
 AXIAL = 42.0 kips



SUMMIT MANUFACTURING INC.

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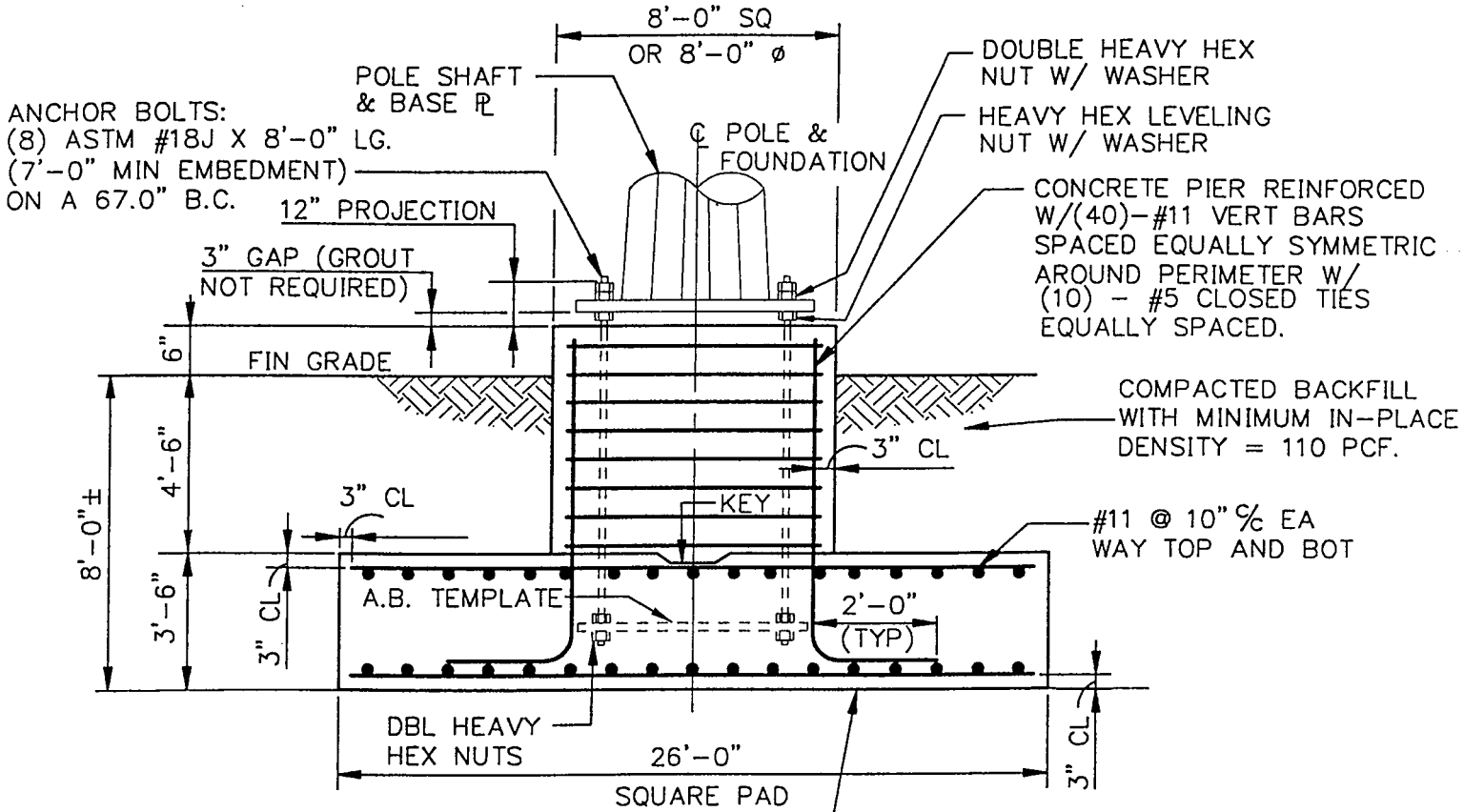
PAUL J. FORD AND COMPANY STRUCTURAL ENGINEERS

250 East Broad Street, Suite 500, Columbus, Ohio 43215
 (614)-221-6679 FAX (614)-221-0166

Pole 173 FT MONOPOLE
 Location HARTFORD COUNTY, CT
 Site ROCKY HILL
 Owner CROWN CASTLE
 Design 80 MPH / 69 MPH + 1/2" RADIAL ICE

Page 2 Of 3
 By SWL Date 6-13-2000
 Summit No. 10073 Job No. 29200-812
 Revision No. _____ Date _____

According to TIA/EIA-222-E 1991 & TIA/EIA-222-F 1996

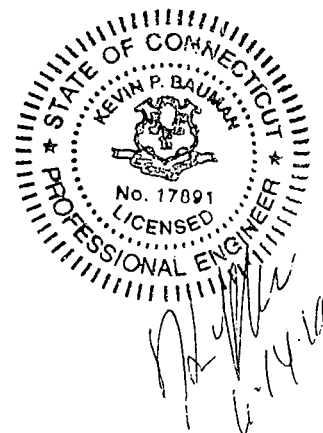


PAD & PIER FOUNDATION

FOUNDATION SHALL BEAR ON UNDISTURBED NATIVE SOIL WITH A MINIMUM ALLOWABLE BEARING CAPACITY OF 3000 PSF. (REFER TO GEOTECHNICAL REPORT)

NOTES:

1. ALL STRUCTURAL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF AT LEAST 3000 PSI AT 28 DAYS.
2. REINFORCING STEEL SHALL CONFORM TO ASTM A615 (GRADE 60) EXCEPT PIER TIES MAY BE ASTM A615 GRADE 40).
3. TOTAL CONCRETE = 99.5 CUBIC YARDS.
4. FOUNDATION DESIGN BASED UPON GEOTECHNICAL EXPLORATION REPORT NO. 8961.07.01, PREPARED BY CLOUGH, HARBOUR & ASSOCIATES, DATED 4-17-2000.
5. CONTRACTOR SHALL READ THE GEOTECHNICAL REPORT AND CONSULT THE GEOTECHNICAL ENGINEER AS NECESSARY PRIOR TO CONSTRUCTION.
6. FOUNDATION DESIGN BASED ON THE FOLLOWING SERVICE LOADS:
 OVERTURNING MOMENT = 5000 FT*KIPS SHEAR = 38.9 KIPS AXIAL = 42.0 KIPS

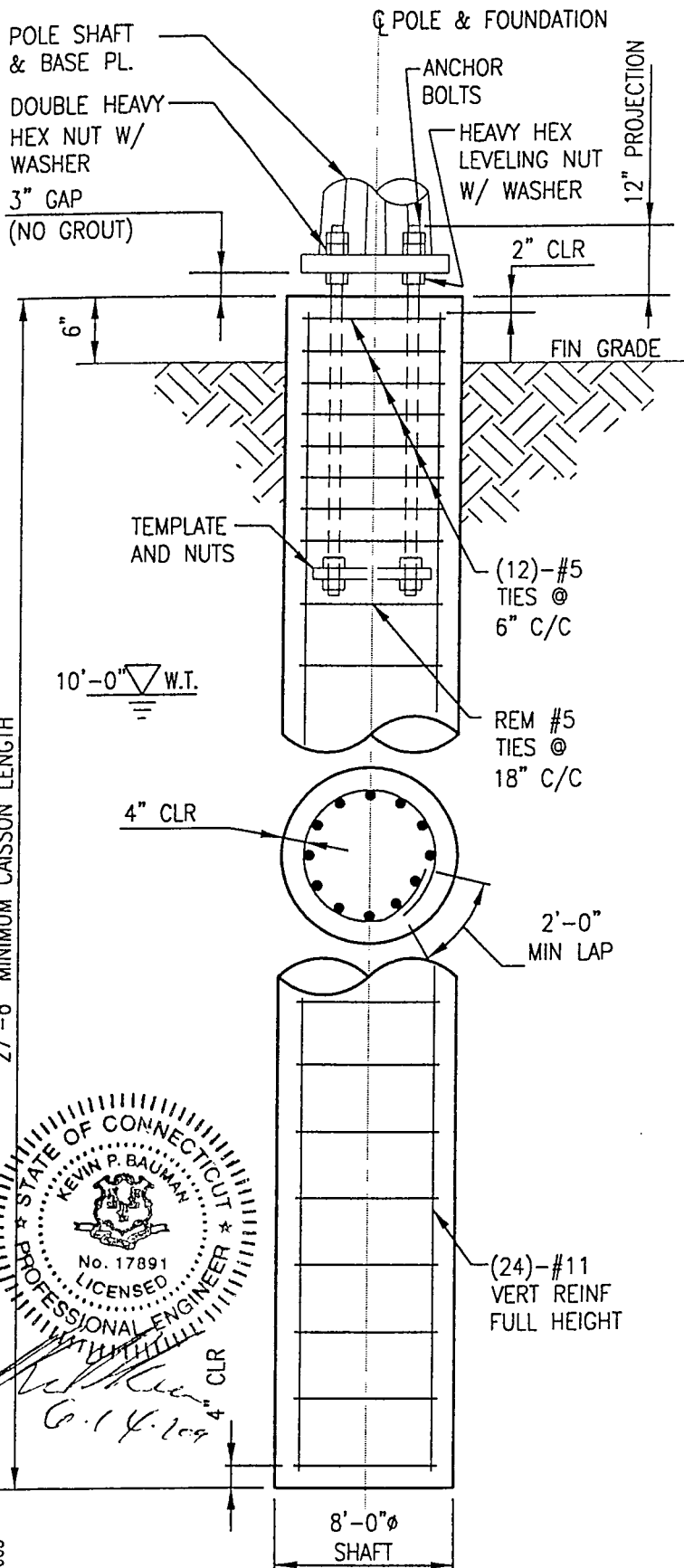


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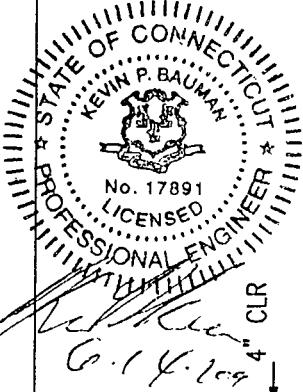


JOB DATA		
Page 3 of 3	Job No.	29200-812
By SWL	Design No.	SUMMIT # 10073
Chk'd By DWH <i>Su</i>	Date	06-09-2000
	Rev. No.	Rev. Date
Pole	173' MONOPOLE	
Site	ROCKY HILL: HARTFORD CO., CT	
Owner	CROWN CASTLE USA	
Ref. No.		
Design	80 MPH/ 69 MPH + 1/2" RADIAL ICE ACCORDING TO TIA/EIA-222-F 1996	

THERE ARE TWO NOTCHES ON THE ANCHOR BOLT TEMPLATES LOCATED 180° APART. THE CONTRACTOR SHALL POSITION THE ANCHOR BOLTS AND TEMPLATES IN THE FOUNDATION PER THE SUMMIT MANUFACTURING ANCHOR BOLT TEMPLATE DRAWING.

NOTES:

- ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS. CONCRETE SHALL BE AIR ENTRAINED (6±1.5%). CONCRETE SHALL HAVE A MAXIMUM WATER/CEMENT RATIO OF 0.4. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH "THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", ACI 318, LATEST EDITION. FOUNDATION INSTALLATION SHALL BE IN ACCORDANCE WITH ACI 336, "STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF DRILLED PIERS", LATEST EDITION.
- REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A-615 (GRADE 60) EXCEPT THAT CAISSON TIES MAY BE ASTM A-615 (GRADE 40). ALL REINFORCING DETAILS SHALL CONFORM TO "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", ACI 315, LATEST EDITION, UNLESS DETAILED OTHERWISE ON THIS DRAWING.
- SEE PAGE 1 FOR ANCHOR BOLT QUANTITY, SIZE, LENGTH, AND BOLT CIRCLE.
- TOTAL CONCRETE = 51.5 CUBIC YARDS.
- FOUNDATION DESIGN IS BASED UPON GEOTECHNICAL EXPLORATION REPORT
 PREPARED BY: CLOUGH, HARBOUR & ASSOCIATES, LLP
 REPORT NO.: 8961.07.01
 DATED: 04-17-2000
- CONTRACTOR SHALL READ THE GEOTECHNICAL REPORT AND CONSULT THE GEOTECHNICAL ENGINEER AS NECESSARY PRIOR TO CONSTRUCTION.
- GEOTECHNICAL REPORT INDICATES GROUNDWATER WAS ENCOUNTERED AT 10'-0" BELOW GRADE.
- THE FOUNDATION WAS DESIGNED USING THE FOLLOWING SERVICE LOADS:
 MOMENT: 5000 FT-KIPS
 SHEAR: 38.9 KIPS
 AXIAL: 42.0 KIPS
- CONTRACTOR SHALL DETERMINE THE MEANS AND METHODS TO SUPPORT THE DRILLED PIER EXCAVATION, REFER TO GEOTECHNICAL REPORT FOR RECOMMENDATIONS.



CAISSON (DRILLED PIER) FOUNDATION

292008124003

Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

S U M M A R Y O F A N A L Y S I S R E S U L T S

Pole Height.....: 173.00 ft
 Top Diameter.....: 26.000 in
 Bottom Diameter.....: 60.110 in
 Pole Shape.....: 18-Sided Polygon
 Splice Joint Type...: Taper shaft - Slip Joint Splice
 Shaft Taper.....: 0.208006 (in/ft)
 Shaft Steel Weight...: 31.597 kips

POLE SHAFT PROPERTIES:

Shaft Section Number	Section Length (ft)	Wall Thickness [t] (in)	Steel Yield [Fy] (ksi)	Top Diameter [Dt] (in)	Bottom Diameter [Db] (in)	Slip Joint Overlap (in)
1.	46.000	0.25000	60	26.000	35.568	54.00
2.	45.000	0.31250	65	34.132	43.493	66.00
3.	49.500	0.37500	65	41.723	52.020	78.00
4.	49.000	0.43750	65	49.918	60.110	

POLE SHAFT SECTION MAXIMUM FORCES AND MOMENTS:

Shaft Section Number	Wind Load No.	Wind Speed (mph)	Radial Ice (in)	At Base of Section				Max. Ratio Actual/ Allowable [Ftot/Fb]
				Sect. Elev. (ft)	Axial Load (kips)	Horiz. Shear (kips)	Bending Moment (ft-kips)	
1.	1	80.0	0.00	132.50	12.058	21.997	529.534	0.5866
2.	1	80.0	0.00	93.00	20.035	29.296	1634.748	0.8831
3.	1	80.0	0.00	50.00	29.391	32.998	3022.266	0.9488
4.	1	80.0	0.00	1.00	41.793	37.047	4763.351	0.9106

>> MAXIMUM BASE REACTIONS : 41.793 37.047 4763.351 <<

POLE DEFLECTION AND ROTATION AT TOP AND AT HIGHEST MICROWAVE DISH ELEVATION:

Wind Load No.	Wind Speed (mph)	Radial Ice (in)	Location	Elev (ft)	Deflection (in)	Rotation (deg)	Max. Allowable Rotation Limit (deg)
1.	80.0	0.00	Top	174.00	127.063	6.231	
2.	69.3	0.50	Top	174.00	105.671	5.206	
3.	50.0	0.00	Top	174.00	49.527	2.434	

PJF_Pole (tm) - Monopole Design Program
 Windows Version 1.28.0100 Tue Jun 13, 2000 - 11:08:17 am
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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

Pole Height : 173 ft
 Pole Shape : 18-Sided Polygon
 Pole Type : Taper shaft - Slip Joint Splice
 Pole Taper : 0.208006 (in/ft)

INPUT TUBE PROPERTIES:

Tube Sect No.	Top / Splice Elev (ft)	Bot Tube Elev (ft)	Tube Length (ft)	Wall Thick [t] (in)	Steel [Fy] (ksi)	Top Diam [Dt] (in)	Bot Diam [Db] (in)	Slip Joint Overlap (in)
1.	174.00	128.00	46.000	0.25000	60	26.000	35.568	54.00
2.	132.50	87.50	45.000	0.31250	65	34.132	43.493	66.00
3.	93.00	43.50	49.500	0.37500	65	41.723	52.020	78.00
4.	50.00	1.00	49.000	0.43750	65	49.918	60.110	

TUBE SECTION PROPERTIES:

Tube Sect No.	Section Weight (kips)	Location	Elev (ft)	Diam. Across Flats (in)	Wall Thick [t] (in)	[W/t] Ratio	Diam/ Thick [D/t] Ratio	Area (in ²)	Ix (in ⁴)
1	3.792	@Top	174.0	26.000	0.2500	16.57	104.00	20.43	1711.2
		@Splice	132.5	34.632		22.66	138.53	27.28	4073.3
		@Bot	128.0	35.568		23.32	142.27	28.02	4415.1
2	5.847	@Top	132.5	34.132	0.3125	17.50	109.22	33.54	4845.9
		@Splice	93.0	42.348		22.13	135.51	41.69	9305.0
		@Bot	87.5	43.493		22.78	139.18	42.83	10085.6
3	9.321	@Top	93.0	41.723	0.3750	17.86	111.26	49.21	10627.3
		@Splice	50.0	50.668		22.06	135.11	59.86	19122.6
		@Bot	43.5	52.020		22.70	138.72	61.47	20706.7
4	12.636	@Top	50.0	49.918	0.4375	18.36	114.10	68.71	21246.3
		@Bot	1.0	60.110		22.46	137.39	82.86	37265.2

 Total Shaft Steel Weight = 31.597 kips

PJF_Pole (tm) - Monopole Design Program

Windows Version 1.28.0100

Tue Jun 13, 2000 - 11:08:17 am

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Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
Description : 173' Monopole - Rocky Hill: Hartford Co., CT
Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
Status..... : Final Design Revision: Rev. Date :

Segment Properties:

(@ Max Segment = 10 ft)

Tube Segmt No.	Segment Feature Location	Segment Elev. (ft)	Diam. Across Flats (in)	Wall Thick [t] (in)	[W/t] Ratio	Diam/ Thick [D/t] Ratio	Area (in ²)	Ix (in ⁴)
1.	top	174.000	26.000	0.25000	16.57	104.00	20.43	1711.2
2.	<arm [1]>	173.000	26.208	0.25000	16.72	104.83	20.60	1753.0
3.	<arm [2]>	173.000	26.208	0.25000	16.72	104.83	20.60	1753.0
4.	<arm [3]>	173.000	26.208	0.25000	16.72	104.83	20.60	1753.0
5.		170.000	26.832	0.25000	17.16	107.33	21.09	1882.4
6.	<arm [4]>	166.000	27.664	0.25000	17.75	110.66	21.75	2064.8
7.	<arm [5]>	166.000	27.664	0.25000	17.75	110.66	21.75	2064.8
8.		160.000	28.912	0.25000	18.63	115.65	22.74	2359.8
9.	<arm [6]>	156.000	29.744	0.25000	19.22	118.98	23.40	2571.3
10.	<arm [7]>	156.000	29.744	0.25000	19.22	118.98	23.40	2571.3
11.		150.000	30.992	0.25000	20.10	123.97	24.39	2911.7
12.	<arm [8]>	146.000	31.824	0.25000	20.68	127.30	25.05	3154.6
13.	<arm [9]>	146.000	31.824	0.25000	20.68	127.30	25.05	3154.6
14.		140.000	33.072	0.25000	21.56	132.29	26.04	3543.6
15.	<arm [10]>	136.000	33.904	0.25000	22.15	135.62	26.70	3820.0
16.	<arm [11]>	136.000	33.904	0.25000	22.15	135.62	26.70	3820.0
17.	top sec(2)	132.500	34.632	0.25000	22.66	138.53	27.28	4073.3
18.		130.000	34.652	0.31250	17.79	110.89	34.06	5072.9
19.	bot sec(1)	128.000	35.568	0.31250	18.31	113.82	34.97	5489.8
20.	<arm [12]>	126.000	35.484	0.31250	18.26	113.55	34.88	5450.6
21.	<arm [13]>	126.000	35.484	0.31250	18.26	113.55	34.88	5450.6
22.		120.000	36.732	0.31250	18.96	117.54	36.12	6051.6
23.		110.000	38.812	0.31250	20.14	124.20	38.19	7148.8
24.	<arm [14]>	101.000	40.684	0.31250	21.19	130.19	40.04	8243.1
25.		100.000	40.892	0.31250	21.31	130.86	40.25	8371.2
26.	top sec(3)	93.000	42.348	0.31250	22.13	135.51	41.69	9305.0
27.		90.000	42.347	0.37500	18.15	112.93	49.96	11115.7
28.	bot sec(2)	87.500	42.867	0.37500	18.39	114.31	50.57	11534.0
29.		80.000	44.427	0.37500	19.13	118.47	52.43	12851.5
30.		70.000	46.508	0.37500	20.10	124.02	54.91	14759.1
31.		60.000	48.588	0.37500	21.08	129.57	57.38	16846.8
32.	top sec(4)	50.000	50.668	0.37500	22.06	135.11	59.86	19122.6
33.	bot sec(3)	43.500	51.270	0.43750	18.90	117.19	70.58	23035.9
34.		40.000	51.998	0.43750	19.19	118.85	71.60	24039.8
35.		30.000	54.078	0.43750	20.03	123.61	74.48	27068.1
36.		20.000	56.158	0.43750	20.87	128.36	77.37	30340.6
37.		10.000	58.238	0.43750	21.71	133.12	80.26	33866.7
38.	base	1.000	60.110	0.43750	22.46	137.39	82.86	37265.2

Total Number of Antennas / Arms = 14

PJF_Pole (tm) - Monopole Design Program
 Windows Version 1.28.0100 Tue Jun 13, 2000 - 11:08:17 am
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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design.....: 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

ANTENNA AND ARM PROPERTIES AND LOAD DATA:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph

Ant Arm No.	Arm Mount. Elev. (ft)	Load Applic. Elev. (ft)	Arm Length (ft)	Ice Load Case	Antenna Area [CaAa] (sf)	Antenna Force [qzGhCaAa] (lbs)	Antenna Weight (lbs)
[1]	173.000	178.000	2.0000	No Ice:	1.00	44.81	100.00
	Description: 5/8" Lightning Rod				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.619		No Ice:	26.518	44.815	
[2]	173.000	173.000	0.0000	No Ice:	66.66	2963.01	324.00
	Description: (12) Swedcom ALP-9212-N				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.605		No Ice:	26.303	44.452	
[3]	173.000	173.000	2.0000	No Ice:	21.52	956.60	1300.00
	Description: 14' Low Profile Platform				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.605		No Ice:	26.303	44.452	
[4]	166.000	166.000	0.0000	No Ice:	66.66	2928.25	324.00
	Description: (12) Swedcom ALP-9212-N				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.587		No Ice:	25.994	43.930	
[5]	166.000	166.000	2.0000	No Ice:	21.52	945.38	1300.00
	Description: 14' Low Profile Platform				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.587		No Ice:	25.994	43.930	
[6]	156.000	156.000	0.0000	No Ice:	66.66	2876.72	324.00
	Description: (12) Swedcom ALP-9212-N				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.559		No Ice:	25.537	43.157	
[7]	156.000	156.000	2.0000	No Ice:	21.52	928.74	1300.00
	Description: 14' Low Profile Platform				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.559		No Ice:	25.537	43.157	
[8]	146.000	146.000	0.0000	No Ice:	66.66	2822.79	324.00
	Description: (12) Swedcom ALP-9212-N				[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.529		No Ice:	25.058	42.348	
[9]	146.000	146.000	2.0000	No Ice:	21.52	911.33	1300.00
	Description: 14' Low Profile Platform				[qz]	[qz] [Gh]	

		[Gh]	[Kz]		(psf)	(psf)	
		1.69	1.529	No Ice:	25.058	42.348	
[10]	136.000	136.000	0.0000	No Ice:	66.66	2766.14	324.00
	Description: (12) Swedcom ALP-9212-N						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.499	No Ice:	(psf) 24.555	(psf) 41.498	
[11]	136.000	136.000	2.0000	No Ice:	21.52	893.04	1300.00
	Description: 14' Low Profile Platform						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.499	No Ice:	(psf) 24.555	(psf) 41.498	
[12]	126.000	126.000	0.0000	No Ice:	66.66	2706.43	324.00
	Description: (12) Swedcom ALP-9212-N						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.466	No Ice:	(psf) 24.025	(psf) 40.602	
[13]	126.000	126.000	2.0000	No Ice:	21.52	873.76	1300.00
	Description: 14' Low Profile Platform						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.466	No Ice:	(psf) 24.025	(psf) 40.602	
[14]	101.000	101.000	2.0000	No Ice:	12.00	457.39	420.00
	Description: GPS Antenna w/ Mount						
		[Gh]	[Kz]		[qz]	[qz] [Gh]	
		1.69	1.377	No Ice:	(psf) 22.554	(psf) 38.116	

PJF_Pole (tm) - Monopole Design Program
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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT LOADS:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph

Design Loads per TIA/EIA-222-F Standard; Gust Factor Gh = 1.69
 Pole DL Overload Factor = 1

Per TIA/EIA Table 1: Note 3: For all cross sectional shapes,
 Force Coefficient [Cf] need not exceed 1.2
 for any value of C. (Where C=sqrt(Kz)*V*D.)

Top of Segment Elev. (ft)	Expos Coeff [Kz]	Veloc Press [qz] (psf)	Pole Veloc Coeff [C]	Force Coeff [Cf]	Projected Area Shaft [Ae] (sf)	Segment [Cf Ae] (sf)	Wind Force (lbs)	Shaft Segment Weight (lbs)
174.000	1.608	26.35	219.80	0.650	2.175	1.414	62.96	69.81
173.000	1.605	26.30	221.38	0.650	0.000	0.000	0.00	0.00
173.000	1.605	26.30	221.38	0.650	0.000	0.000	0.00	0.00
173.000	1.605	26.30	221.38	0.650	2.193	1.425	63.35	70.37
170.000	1.597	26.17	226.08	0.650	6.682	4.343	192.42	214.47
166.000	1.587	25.99	232.30	0.650	6.838	4.445	195.92	219.53
166.000	1.587	25.99	232.30	0.650	2.314	1.504	66.08	74.30
160.000	1.570	25.72	241.51	0.650	14.248	9.261	404.36	457.59
156.000	1.559	25.54	247.56	0.650	7.358	4.783	207.16	236.38
156.000	1.559	25.54	247.56	0.650	2.487	1.617	69.78	79.92
150.000	1.541	25.25	256.51	0.650	15.288	9.937	426.07	491.28
146.000	1.529	25.06	262.38	0.650	7.878	5.121	217.69	253.22
146.000	1.529	25.06	262.38	0.650	2.661	1.729	73.24	85.53
140.000	1.511	24.76	271.04	0.650	16.328	10.613	446.32	524.98
136.000	1.499	24.56	276.71	0.650	8.398	5.459	227.47	270.07
136.000	1.499	24.56	276.71	0.650	2.834	1.842	76.44	91.15
132.500	1.488	24.37	281.60	0.650	8.596	5.587	230.83	699.91
130.000	1.480	24.24	281.00	0.650	8.637	5.614	230.49	346.64
128.000	1.473	24.13	287.79	0.650	5.886	3.826	156.22	236.29
126.000	1.466	24.03	286.46	0.650	2.948	1.916	77.99	118.35
126.000	1.466	24.03	286.46	0.650	2.966	1.928	78.27	119.06
120.000	1.446	23.69	294.48	0.650	18.158	11.803	475.35	729.08
110.000	1.411	23.11	307.31	0.650	31.650	20.573	812.62	1271.29
101.000	1.377	22.55	318.23	0.650	29.967	19.479	750.62	1204.19
100.000	1.373	22.49	319.40	0.650	3.416	2.221	84.40	137.31
93.000	1.345	22.03	327.36	0.650	24.374	15.843	595.12	1770.67
90.000	1.332	21.82	325.82	0.650	10.561	6.865	253.97	508.70
87.500	1.321	21.65	328.50	0.650	7.127	4.633	169.97	343.35
80.000	1.288	21.10	336.12	0.650	29.202	18.981	685.11	1407.09
70.000	1.240	20.31	345.21	0.650	38.063	24.741	864.24	1834.68
60.000	1.186	19.44	352.80	0.650	39.796	25.868	867.08	1918.92
50.000	1.126	18.45	358.44	0.650	41.498	26.974	861.61	3343.39
43.500	1.082	17.73	355.56	0.650	25.375	16.494	503.46	1426.35
40.000	1.057	17.31	356.31	0.650	17.263	11.221	331.69	970.56
30.000	1.000	16.38	360.52	0.650	44.371	28.841	812.33	2495.19
20.000	1.000	16.38	374.39	0.650	46.105	29.968	829.79	2593.48
10.000	1.000	16.38	388.25	0.650	47.838	31.095	860.98	2691.76
2.000	1.000	16.38	399.35	0.650	39.519	25.687	711.25	2224.17

Summation TOTAL = 13972.66 31529.00

----- (END LOAD CASE 1 -- POLE SHAFT LOADS) -----

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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- AXIAL AND SHEAR FORCES:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph

Tube Segment No.	Segment Elevation (ft)	Axial Load (kips)	Cumulative Axial Load (kips)	Horiz. Shear (kips)	Cumulative Horiz. Shear (kips)
1.	174.000	0.070	0.070	0.063	0.063
2.	173.000	0.100	0.170	0.045	0.108
3.	173.000	0.324	0.494	2.963	3.071
4.	173.000	1.370	1.864	1.020	4.091
5.	170.000	0.214	2.079	0.192	4.283
6.	166.000	0.544	2.622	3.124	7.407
7.	166.000	1.374	3.996	1.011	8.419
8.	160.000	0.458	4.454	0.404	8.823
9.	156.000	0.560	5.014	3.084	11.907
10.	156.000	1.380	6.394	0.999	12.906
11.	150.000	0.491	6.886	0.426	13.332
12.	146.000	0.577	7.463	3.040	16.372
13.	146.000	1.386	8.848	0.985	17.357
14.	140.000	0.525	9.373	0.446	17.803
15.	136.000	0.594	9.967	2.994	20.797
16.	136.000	1.391	11.359	0.969	21.766
17.	132.500	0.700	12.058	0.231	21.997
18.	130.000	0.347	12.405	0.230	22.227
19.	128.000	0.236	12.641	0.156	22.384
20.	126.000	0.442	13.084	2.784	25.168
21.	126.000	1.419	14.503	0.952	26.120
22.	120.000	0.729	15.232	0.475	26.595
23.	110.000	1.271	16.503	0.813	27.408
24.	101.000	1.624	18.127	1.208	28.616
25.	100.000	0.137	18.265	0.084	28.700
26.	93.000	1.771	20.035	0.595	29.296
27.	90.000	0.509	20.544	0.254	29.550
28.	87.500	0.343	20.887	0.170	29.720
29.	80.000	1.407	22.295	0.685	30.405
30.	70.000	1.835	24.129	0.864	31.269
31.	60.000	1.919	26.048	0.867	32.136
32.	50.000	3.343	29.391	0.862	32.998
33.	43.500	1.426	30.818	0.503	33.501
34.	40.000	0.971	31.788	0.332	33.833
35.	30.000	2.495	34.284	0.812	34.645
36.	20.000	2.593	36.877	0.830	35.475
37.	10.000	2.692	39.569	0.861	36.336
38.	2.000	2.224	41.793	0.711	37.047
Base	1.000		41.793		37.047

----- (END LOAD CASE 1 -- AXIAL AND SHEAR FORCE) -----

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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
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 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- MOMENTS and DEFLECTIONS:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph

Segmnt Elev (ft)	[----- MOMENTS (ft-kips) -----]				[--DEFLECTIONS (inch)-----]		
	From Ant/ Arm	From Shaft Wind	From P-Delta Effects	Total Moment	No P-Delta Effects	Total W/ P-Delta Effects	Total Rotation (deg)
174.00	0.179	0.000	0.000	0.179	121.598	127.063	6.231
173.00	0.224	0.063	0.000	0.287	121.598	127.063	6.231
173.00	0.224	0.063	0.000	0.287	121.598	127.063	6.231
173.00	0.224	0.063	0.054	0.341	120.348	125.753	6.231
170.00	12.117	0.634	0.688	13.439	116.596	121.823	6.228
166.00	27.975	2.300	1.392	31.666	112.848	117.897	6.215
166.00	27.975	2.300	1.677	31.952	111.600	116.590	6.215
160.00	75.003	6.788	4.403	86.195	104.139	108.774	6.170
156.00	106.355	11.142	5.869	123.367	100.433	104.892	6.121
156.00	106.355	11.142	6.407	123.905	99.204	103.605	6.121
150.00	176.217	19.773	10.619	206.609	91.889	95.944	6.019
146.00	222.791	26.961	12.813	262.564	88.282	92.166	5.931
146.00	222.791	26.961	13.588	263.339	87.091	90.919	5.931
140.00	315.056	39.945	19.163	374.164	80.042	83.539	5.769
136.00	376.567	50.101	22.011	448.678	76.593	79.928	5.642
136.00	376.567	50.101	22.995	449.663	75.460	78.742	5.642
132.50	443.196	59.980	26.358	529.534	72.095	75.220	5.518
130.00	490.788	67.610	29.863	588.260	68.794	71.766	5.437
128.00	528.861	74.069	32.220	635.151	66.625	69.496	5.370
126.00	566.935	80.841	33.409	681.184	65.547	68.368	5.301
126.00	566.935	80.841	34.623	682.398	64.483	67.254	5.301
120.00	702.637	103.043	42.688	848.368	58.232	60.715	5.074
110.00	928.807	146.464	56.126	1131.397	48.465	50.502	4.647
101.00	1132.360	192.573	68.022	1392.955	40.440	42.117	4.227
100.00	1155.434	198.115	69.354	1422.903	39.596	41.235	4.179
93.00	1316.955	239.280	78.513	1634.748	33.960	35.350	3.835
90.00	1386.178	258.197	82.503	1726.879	31.689	32.980	3.700
87.50	1443.864	274.534	85.140	1803.537	30.221	31.448	3.589
80.00	1616.922	326.765	95.443	2039.130	24.705	25.694	3.252
70.00	1847.666	403.951	107.649	2359.266	18.619	19.351	2.799
60.00	2078.410	489.799	118.858	2687.067	13.443	13.961	2.344
50.00	2309.154	584.302	128.810	3022.266	9.176	9.523	1.892
43.50	2459.137	650.295	134.364	3243.796	7.037	7.300	1.629
40.00	2539.897	687.287	137.770	3364.955	5.775	5.988	1.489
30.00	2770.641	798.539	145.170	3714.350	3.170	3.284	1.094
20.00	3001.385	917.954	150.727	4070.066	1.350	1.398	0.708
10.00	3232.129	1045.807	154.162	4432.098	0.301	0.311	0.331
1.00	3439.799	1168.346	155.205	4763.351	0.000	0.000	0.000

----- (END LOAD CASE 1 -- MOMENTS AND DEFLECTIONS) -----

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 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- ACTUAL VS. ALLOWABLE STRESSES:

LOAD CASE 1: BASIC WIND VELOCITY = 80.00 mph
 Note: Per TIA/EIA Sec. 3.1.1.1: Allow a 1/3 stress increase for poles under
 700 feet in height. The allowable stresses
 shown include the factor of 1.333

Segmnt Elev (ft)	[----- ACTUAL STRESSES -----]					Allow. Stress [Fb] (ksi)	Actual/ Allowable [Ftot/Fb] Ratio
	Bending [fb] (ksi)	Axial [fa] (ksi)	Torsion [ft] (ksi)	Shear [fv] (ksi)	Combined [Ftot] (ksi)		
174.00	0.017	0.003	0.000	0.006	0.023	48.00	0.0005
173.00	0.026	0.008	0.004	0.010	0.042	48.00	0.0009
173.00	0.026	0.024	0.147	0.297	0.772	48.00	0.0161
173.00	0.031	0.091	0.232	0.396	1.095	48.00	0.0228
170.00	1.167	0.099	0.221	0.405	1.667	48.00	0.0347
166.00	2.585	0.121	0.342	0.679	3.233	48.00	0.0673
166.00	2.608	0.184	0.417	0.772	3.470	48.00	0.0723
160.00	6.434	0.196	0.382	0.774	6.926	48.00	0.1443
156.00	8.694	0.214	0.483	1.015	9.279	48.00	0.1933
156.00	8.732	0.273	0.547	1.100	9.447	48.00	0.1968
150.00	13.398	0.282	0.503	1.091	13.956	48.00	0.2908
146.00	16.138	0.298	0.589	1.304	16.760	48.00	0.3492
146.00	16.186	0.353	0.644	1.382	16.907	48.00	0.3522
140.00	21.275	0.360	0.596	1.364	21.900	48.00	0.4562
136.00	24.262	0.373	0.670	1.554	24.934	48.00	0.5195
136.00	24.315	0.425	0.717	1.626	25.071	48.00	0.5223
132.50	27.430	0.442	0.687	1.609	28.154	48.00	0.5866
130.00	24.482	0.364	0.551	1.302	25.053	52.00	0.4818
128.00	25.072	0.362	0.522	1.277	25.624	48.00	0.5338
126.00	27.018	0.375	0.602	1.440	27.621	52.00	0.5312
126.00	27.066	0.416	0.636	1.494	27.729	52.00	0.5332
120.00	31.373	0.422	0.593	1.469	31.995	52.00	0.6153
110.00	37.424	0.432	0.531	1.432	38.009	52.00	0.7309
101.00	41.886	0.453	0.496	1.426	42.470	52.00	0.8167
100.00	42.348	0.454	0.491	1.423	42.930	52.00	0.8256
93.00	45.329	0.481	0.458	1.402	45.922	52.00	0.8831
90.00	40.082	0.411	0.382	1.180	40.584	52.00	0.7805
87.50	40.839	0.413	0.373	1.173	41.339	52.00	0.7950
80.00	42.948	0.425	0.347	1.157	43.451	52.00	0.8356
70.00	45.294	0.439	0.317	1.136	45.802	52.00	0.8808
60.00	47.216	0.454	0.290	1.117	47.732	52.00	0.9179
50.00	48.788	0.491	0.266	1.100	49.336	52.00	0.9488
43.50	43.985	0.437	0.224	0.947	44.468	52.00	0.8552
40.00	44.344	0.444	0.217	0.943	44.833	52.00	0.8622
30.00	45.211	0.460	0.201	0.928	45.713	52.00	0.8791
20.00	45.897	0.477	0.186	0.915	46.413	52.00	0.8926
10.00	46.435	0.493	0.173	0.903	46.965	52.00	0.9032
1.00	46.812	0.504	0.162	0.892	47.351	52.00	0.9106

----- (END LOAD CASE 1 -- ACTUAL VS. ALLOWABLE STRESSES) -----

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 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

ANTENNA AND ARM PROPERTIES AND LOAD DATA:

LOAD CASE 2: WIND VELOCITY = 69.28 mph + 0.50 inches Radial Ice.

Ant Arm No.	Arm Mount. Elev. (ft)	Load Applic. Elev. (ft)	Arm Length (ft)	Ice Load Case	Antenna Area [CaAa] (sf)	Antenna Force [qzGhCaAa] (lbs)	Antenna Weight (lbs)
[1]	173.000	178.000	2.0000	W/ Ice:	2.50	84.03	150.00
Description: 5/8" Lightning Rod					[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.619		W/ Ice:	19.888	33.611	
[2]	173.000	173.000	0.0000	W/ Ice:	72.99	2433.46	864.00
Description: (12) Swedcom ALP-9212-N					[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.605		W/ Ice:	19.727	33.339	
[3]	173.000	173.000	2.0000	W/ Ice:	22.90	763.46	2100.00
Description: 14' Low Profile Platform					[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.605		W/ Ice:	19.727	33.339	
[4]	166.000	166.000	0.0000	W/ Ice:	72.99	2404.91	864.00
Description: (12) Swedcom ALP-9212-N					[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.587		W/ Ice:	19.496	32.948	
[5]	166.000	166.000	2.0000	W/ Ice:	22.90	754.50	2100.00
Description: 14' Low Profile Platform					[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.587		W/ Ice:	19.496	32.948	
[6]	156.000	156.000	0.0000	W/ Ice:	72.99	2362.59	864.00
Description: (12) Swedcom ALP-9212-N					[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.559		W/ Ice:	19.153	32.368	
[7]	156.000	156.000	2.0000	W/ Ice:	22.90	741.22	2100.00
Description: 14' Low Profile Platform					[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.559		W/ Ice:	19.153	32.368	
[8]	146.000	146.000	0.0000	W/ Ice:	72.99	2318.30	864.00
Description: (12) Swedcom ALP-9212-N					[qz] (psf)	[qz] [Gh] (psf)	
		[Gh] [Kz] 1.69 1.529		W/ Ice:	18.793	31.761	
[9]	146.000	146.000	2.0000	W/ Ice:	22.90	727.33	2100.00
Description: 14' Low Profile Platform					[qz]	[qz] [Gh]	

	[Gh]	[Kz]		(psf)	(psf)	
	1.69	1.529	W/ Ice:	18.793	31.761	
[10]	136.000	136.000	0.0000	W/ Ice:	72.99	2271.77 864.00
	Description: (12) Swedcom ALP-9212-N					
	[Gh]	[Kz]		[qz]	[qz] [Gh]	
	1.69	1.499	W/ Ice:	(psf) 18.416	(psf) 31.124	
[11]	136.000	136.000	2.0000	W/ Ice:	22.90	712.73 2100.00
	Description: 14' Low Profile Platform					
	[Gh]	[Kz]		[qz]	[qz] [Gh]	
	1.69	1.499	W/ Ice:	(psf) 18.416	(psf) 31.124	
[12]	126.000	126.000	0.0000	W/ Ice:	72.99	2222.74 864.00
	Description: (12) Swedcom ALP-9212-N					
	[Gh]	[Kz]		[qz]	[qz] [Gh]	
	1.69	1.466	W/ Ice:	(psf) 18.019	(psf) 30.452	
[13]	126.000	126.000	2.0000	W/ Ice:	22.90	697.35 2100.00
	Description: 14' Low Profile Platform					
	[Gh]	[Kz]		[qz]	[qz] [Gh]	
	1.69	1.466	W/ Ice:	(psf) 18.019	(psf) 30.452	
[14]	101.000	101.000	2.0000	W/ Ice:	16.00	457.39 640.00
	Description: GPS Antenna w/ Mount					
	[Gh]	[Kz]		[qz]	[qz] [Gh]	
	1.69	1.377	W/ Ice:	(psf) 16.915	(psf) 28.587	

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Tue Jun 13, 2000 - 11:08:17 am

 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC ()
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT LOADS:

LOAD CASE 2: WIND VELOCITY = 69.28 mph with 0.50 inches Radial Ice.

Design Loads per TIA/EIA-222-F Standard; Gust Factor Gh = 1.69
 Pole DL Overload Factor = 1

Per TIA/EIA Table 1: Note 3: For all cross sectional shapes,
 Force Coefficient [Cf] need not exceed 1.2
 for any value of C. (Where C=sqrt(Kz)*V*D.)

Top of Segment Elev. (ft)	Expos Coeff [Kz]	Veloc Press [qz] (psf)	Pole Veloc Coeff [C]	Force Coeff [Cf]	Projected Area Shaft Segment [Ae] (sf)	Segment [Cf Ae] (sf)	Segment Wind Force (lbs)	Shaft Segment Weight (lbs)
174.000	1.608	19.76	190.35	0.650	2.259	1.468	49.03	86.22
173.000	1.605	19.73	191.72	0.650	0.000	0.000	0.00	0.00
173.000	1.605	19.73	191.72	0.650	0.000	0.000	0.00	0.00
173.000	1.605	19.73	191.72	0.650	2.276	1.479	49.32	86.91
170.000	1.597	19.63	195.79	0.650	6.932	4.506	149.72	264.88
166.000	1.587	19.50	201.18	0.650	7.088	4.607	152.31	271.09
166.000	1.587	19.50	201.18	0.650	2.397	1.558	51.34	91.74
160.000	1.570	19.29	209.15	0.650	14.748	9.586	313.91	564.96
156.000	1.559	19.15	214.39	0.650	7.608	4.945	160.65	291.79
156.000	1.559	19.15	214.39	0.650	2.571	1.671	54.08	98.64
150.000	1.541	18.94	222.14	0.650	15.788	10.262	330.00	606.36
146.000	1.529	18.79	227.23	0.650	8.128	5.283	168.45	312.49
146.000	1.529	18.79	227.23	0.650	2.744	1.784	56.65	105.54
140.000	1.511	18.57	234.73	0.650	16.828	10.938	344.99	647.75
136.000	1.499	18.42	239.64	0.650	8.648	5.621	175.68	333.19
136.000	1.499	18.42	239.64	0.650	2.917	1.896	59.02	112.44
132.500	1.488	18.28	243.87	0.650	8.846	5.750	178.16	863.36
130.000	1.480	18.18	243.35	0.650	8.887	5.777	177.87	411.53
128.000	1.473	18.10	249.23	0.650	6.053	3.934	120.49	280.50
126.000	1.466	18.02	248.08	0.650	3.032	1.971	60.14	140.50
126.000	1.466	18.02	248.08	0.650	3.049	1.982	60.35	141.33
120.000	1.446	17.77	255.02	0.650	18.658	12.128	366.33	865.40
110.000	1.411	17.33	266.14	0.650	32.484	21.114	625.52	1508.77
101.000	1.377	16.92	275.59	0.650	30.717	19.966	577.06	1428.89
100.000	1.373	16.87	276.61	0.650	3.500	2.275	64.85	162.92
93.000	1.345	16.52	283.50	0.650	24.957	16.222	457.02	2100.72
90.000	1.332	16.37	282.17	0.650	10.811	7.027	194.98	587.84
87.500	1.321	16.24	284.49	0.650	7.294	4.741	130.46	396.75
80.000	1.288	15.83	291.09	0.650	29.869	19.415	525.56	1625.82
70.000	1.240	15.23	298.96	0.650	38.896	25.283	662.37	2119.65
60.000	1.186	14.58	305.53	0.650	40.630	26.409	663.93	2216.72
50.000	1.126	13.84	310.42	0.650	42.332	27.516	659.19	3861.77
43.500	1.082	13.30	307.92	0.650	25.875	16.819	385.04	1616.12
40.000	1.057	12.98	308.57	0.650	17.597	11.438	253.57	1099.64
30.000	1.000	12.29	312.22	0.650	45.205	29.383	620.69	2826.88
20.000	1.000	12.29	324.23	0.650	46.938	30.510	633.59	2938.00
10.000	1.000	12.29	336.24	0.650	48.672	31.636	656.99	3049.12
2.000	1.000	12.29	345.84	0.650	40.185	26.120	542.44	2519.30

Summation TOTAL = 10731.76 36635.57

----- (END LOAD CASE 2 -- POLE SHAFT LOADS) -----

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 Windows Version 1.28.0100 Tue Jun 13, 2000 - 11:08:17 am
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 Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design.....: 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- AXIAL AND SHEAR FORCES:

LOAD CASE 2: WIND VELOCITY = 69.28 mph with 0.50 inches Radial Ice.

Tube Segment No.	Segment Elevation (ft)	Axial Load (kips)	Cumulative Axial Load (kips)	Horiz. Shear (kips)	Cumulative Horiz. Shear (kips)
1.	174.000	0.086	0.086	0.049	0.049
2.	173.000	0.150	0.236	0.084	0.133
3.	173.000	0.864	1.100	2.433	2.567
4.	173.000	2.187	3.287	0.813	3.379
5.	170.000	0.265	3.552	0.150	3.529
6.	166.000	1.135	4.687	2.557	6.086
7.	166.000	2.192	6.879	0.806	6.892
8.	160.000	0.565	7.444	0.314	7.206
9.	156.000	1.156	8.600	2.523	9.729
10.	156.000	2.199	10.798	0.795	10.525
11.	150.000	0.606	11.405	0.330	10.855
12.	146.000	1.176	12.581	2.487	13.341
13.	146.000	2.206	14.787	0.784	14.125
14.	140.000	0.648	15.434	0.345	14.470
15.	136.000	1.197	16.632	2.447	16.918
16.	136.000	2.212	18.844	0.772	17.689
17.	132.500	0.863	19.707	0.178	17.868
18.	130.000	0.412	20.119	0.178	18.045
19.	128.000	0.280	20.399	0.120	18.166
20.	126.000	1.004	21.404	2.283	20.449
21.	126.000	2.241	23.645	0.758	21.207
22.	120.000	0.865	24.511	0.366	21.573
23.	110.000	1.509	26.019	0.626	22.198
24.	101.000	2.069	28.088	1.034	23.233
25.	100.000	0.163	28.251	0.065	23.298
26.	93.000	2.101	30.352	0.457	23.755
27.	90.000	0.588	30.940	0.195	23.950
28.	87.500	0.397	31.337	0.130	24.080
29.	80.000	1.626	32.962	0.526	24.606
30.	70.000	2.120	35.082	0.662	25.268
31.	60.000	2.217	37.299	0.664	25.932
32.	50.000	3.862	41.160	0.659	26.591
33.	43.500	1.616	42.777	0.385	26.976
34.	40.000	1.100	43.876	0.254	27.230
35.	30.000	2.827	46.703	0.621	27.851
36.	20.000	2.938	49.641	0.634	28.484
37.	10.000	3.049	52.690	0.657	29.141
38.	2.000	2.519	55.210	0.542	29.684
Base	1.000		55.210		29.684

----- (END LOAD CASE 2 -- AXIAL AND SHEAR FORCE) -----

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 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
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 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- MOMENTS and DEFLECTIONS:

LOAD CASE 2: WIND VELOCITY = 69.28 mph with 0.50 inches Radial Ice.

Segmnt Elev (ft)	[----- MOMENTS (ft-kips) -----]				[--DEFLECTIONS (inch)-----]		
	From Ant/ Arm	From Shaft Wind	From P-Delta Effects	Total Moment	No P-Delta Effects	Total W/ P-Delta Effects	Total Rotation (deg)
174.00	0.336	0.000	0.000	0.336	98.516	105.671	5.206
173.00	0.420	0.049	0.000	0.469	98.516	105.671	5.206
173.00	0.420	0.049	0.000	0.469	98.516	105.671	5.206
173.00	0.420	0.049	0.100	0.569	97.502	104.578	5.206
170.00	10.263	0.493	1.023	11.779	94.460	101.299	5.203
166.00	23.387	1.790	2.017	27.193	91.420	98.022	5.192
166.00	23.387	1.790	2.443	27.619	90.408	96.932	5.192
160.00	62.029	5.280	6.308	73.616	84.358	90.411	5.153
156.00	87.790	8.663	8.343	104.796	81.352	87.172	5.112
156.00	87.790	8.663	9.112	105.565	80.356	86.099	5.112
150.00	145.055	15.366	14.994	175.415	74.426	79.709	5.025
146.00	183.232	20.944	18.016	222.191	71.501	76.559	4.950
146.00	183.232	20.944	19.105	223.281	70.536	75.520	4.950
140.00	258.771	31.015	26.823	316.609	64.822	69.367	4.813
136.00	309.130	38.887	30.721	378.739	62.027	66.358	4.705
136.00	309.130	38.887	32.090	380.108	61.109	65.370	4.705
132.50	363.640	46.543	36.728	446.911	58.382	62.436	4.601
130.00	402.576	52.453	41.486	496.516	55.707	59.558	4.532
128.00	433.724	57.456	44.667	535.847	53.949	57.668	4.476
126.00	464.873	62.700	46.264	573.836	53.075	56.728	4.417
126.00	464.873	62.700	47.918	575.490	52.213	55.801	4.417
120.00	575.839	79.885	58.805	714.529	47.148	50.358	4.226
110.00	760.783	113.470	76.628	950.881	39.234	41.861	3.867
101.00	927.232	149.106	92.102	1168.440	32.734	34.890	3.515
100.00	946.184	153.387	93.818	1193.388	32.050	34.157	3.474
93.00	1078.846	185.177	105.525	1369.549	27.485	29.269	3.186
90.00	1135.702	199.781	110.534	1446.016	25.646	27.301	3.073
87.50	1183.081	212.390	113.826	1509.296	24.457	26.029	2.980
80.00	1325.219	252.689	126.569	1704.477	19.990	21.255	2.698
70.00	1514.737	312.206	141.417	1968.359	15.062	15.996	2.320
60.00	1704.255	378.358	154.822	2237.434	10.873	11.533	1.941
50.00	1893.772	451.135	166.538	2511.445	7.421	7.861	1.565
43.50	2016.959	501.933	172.943	2691.835	5.690	6.023	1.346
40.00	2083.290	530.400	176.841	2790.531	4.669	4.940	1.230
30.00	2272.808	615.984	185.225	3074.017	2.562	2.707	0.903
20.00	2462.325	707.803	191.437	3361.565	1.091	1.152	0.584
10.00	2651.843	806.064	195.230	3653.137	0.243	0.256	0.273
1.00	2822.409	900.199	196.371	3918.979	0.000	0.000	0.000

----- (END LOAD CASE 2 -- MOMENTS AND DEFLECTIONS) -----

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 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design..... : 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

POLE SHAFT SEGMENTS -- ACTUAL VS. ALLOWABLE STRESSES:

LOAD CASE 2: WIND VELOCITY = 69.28 mph with 0.50 inches Radial Ice.
 Note: Per TIA/EIA Sec. 3.1.1.1: Allow a 1/3 stress increase for poles under
 700 feet in height. The allowable stresses
 shown include the factor of 1.333

Segmnt Elev (ft)	[----- ACTUAL STRESSES -----]					Allow. Stress [Fb] (ksi)	Actual/ Allowable [Ftot/Fb] Ratio
	Bending [fb] (ksi)	Axial [fa] (ksi)	Torsion [ft] (ksi)	Shear [fv] (ksi)	Combined [Ftot] (ksi)		
174.00	0.031	0.004	0.000	0.005	0.036	48.00	0.0008
173.00	0.043	0.011	0.007	0.013	0.065	48.00	0.0013
173.00	0.043	0.053	0.125	0.249	0.655	48.00	0.0136
173.00	0.052	0.160	0.193	0.327	0.926	48.00	0.0193
170.00	1.023	0.168	0.184	0.334	1.491	48.00	0.0311
166.00	2.220	0.215	0.283	0.558	2.838	48.00	0.0591
166.00	2.254	0.316	0.343	0.632	3.076	48.00	0.0641
160.00	5.495	0.327	0.314	0.632	6.049	48.00	0.1260
156.00	7.386	0.367	0.397	0.830	8.039	48.00	0.1675
156.00	7.440	0.461	0.448	0.897	8.238	48.00	0.1716
150.00	11.375	0.468	0.412	0.888	12.055	48.00	0.2511
146.00	13.657	0.502	0.483	1.063	14.410	48.00	0.3002
146.00	13.724	0.590	0.526	1.125	14.597	48.00	0.3041
140.00	18.003	0.593	0.487	1.109	18.800	48.00	0.3917
136.00	20.480	0.623	0.548	1.264	21.335	48.00	0.4445
136.00	20.554	0.706	0.585	1.322	21.515	48.00	0.4482
132.50	23.150	0.722	0.561	1.307	24.091	48.00	0.5019
130.00	20.664	0.591	0.450	1.057	21.414	52.00	0.4118
128.00	21.152	0.583	0.427	1.037	21.883	48.00	0.4559
126.00	22.760	0.614	0.492	1.170	23.550	52.00	0.4529
126.00	22.826	0.678	0.519	1.213	23.694	52.00	0.4557
120.00	26.424	0.679	0.484	1.192	27.257	52.00	0.5242
110.00	31.453	0.681	0.433	1.160	32.253	52.00	0.6202
101.00	35.135	0.701	0.407	1.158	35.939	52.00	0.6911
100.00	35.517	0.702	0.403	1.155	36.319	52.00	0.6984
93.00	37.975	0.728	0.376	1.137	38.792	52.00	0.7460
90.00	33.563	0.619	0.314	0.957	34.253	52.00	0.6587
87.50	34.176	0.620	0.306	0.950	34.864	52.00	0.6705
80.00	35.900	0.629	0.285	0.936	36.590	52.00	0.7036
70.00	37.789	0.639	0.260	0.918	38.482	52.00	0.7400
60.00	39.315	0.650	0.238	0.902	40.014	52.00	0.7695
50.00	40.542	0.688	0.219	0.886	41.274	52.00	0.7937
43.50	36.501	0.606	0.184	0.763	37.143	52.00	0.7143
40.00	36.774	0.613	0.178	0.759	37.422	52.00	0.7197
30.00	37.417	0.627	0.165	0.746	38.077	52.00	0.7322
20.00	37.908	0.642	0.153	0.735	38.580	52.00	0.7419
10.00	38.273	0.656	0.142	0.724	38.959	52.00	0.7492
1.00	38.514	0.666	0.133	0.715	39.208	52.00	0.7540

----- (END LOAD CASE 2 -- ACTUAL VS. ALLOWABLE STRESSES) -----

Job No.....: 29200-812 Design No: Summit # 10073 Engineer : BAJ
 Description : 173' Monopole - Rocky Hill: Hartford Co., CT
 Design.....: 80 MPH/ 69 MPH + 1/2" radial ice
 Owner..... : Crown Castle USA Client: Summit Manufacturing, LLC (
 Status..... : Final Design Revision: Rev. Date :

M O N O P O L E B A S E P L A T E D E S I G N D E T A I L S

Shaft Shape: 18 Sided Polygon Stress Increase: 1.333 Factor
 Base Dia, DF: 60.110 Inches Base Plate Shape ...: Square
 PT-to-PT, DP: 61.037 Inches
 Min Bolt Circle ..: 67.287 Inches Use Bolt Circle: 67.000 Inches

Base Reactions : DESIGN USER

Moment: 4763.351 Ft-Kips 5000 Ft-Kips
 Axial Load: 41.793 Kips 42 Kips

Anchor Bolt Details : DESIGN USER

Number of Bolts: 20 20
 Bolt Diameter: 2.250 Inches 2.250 Inches
 Bolt Type: #18J ASTM A615 #18J ASTM A615
 Y-Distance: 12 12
 Mom. of Inertia: 11318.85 In⁴ 11222.50 In⁴
 Bolt Tension, T: 169.90 Kips 179.10 Kips
 Allowable Tension ...: 194.81 Kips 194.81 Kips
 Bolt Compression, C ..: 171.99 Kips 181.20 Kips

Base Plate Details : DESIGN USER

Plate Moment, MPL: 3085.92 In-Kips 3121.25 In-Kips
 Bend Plane, W: 35.24 Inches 33.23 Inches
 Plate Thickness, t ...: 3.091 Inches 3.000 Inches
 Plate Width: 67.420 Inches 66.000 Inches
 Plate Steel: ASTM A572 GRADE 55 (55 KSI) ASTM A572 GRADE 55 (55 KSI)
 Gross Weight: 3984.30 Lbs 3705.90 Lbs
 Net Weight: 3011.20 Lbs 2761.40 Lbs
 Allowable Stress: 54.99 Ksi 54.99 Ksi
 Actual Stress: 54.99 Ksi 62.62 Ksi
 Act./Allow Ratio: 1.00 1.14

B A S E P L A T E D E S I G N S U M M A R Y

USE FOLLOWING SPECIFICATIONS:

Plate Thickness: 3.000 Inches Number of Bolts ...: 20
 Plate Width/Diameter : 66.000 Inches (Square) Bolt Circle: 67.00 Inches
 Plate Weight: 3.706 Kips Bolt Diameter: 2.25 Inches
 Bolt Type: #18J ASTM A615

 INPUT: SPREAD FOOTING (PAD and PIER) FOR POLES

 POLE LOADS: POLE WEIGHT = 42.00 kips (pole, antenna, ice, mounts, etc.)
 OVERTURNING MOMENT = 5000.00 ft-k (at the top of the pier)
 TOTAL HORIZONTAL = 38.90 kips (at the top of the pier)
 DESIGN SAFETY FACTOR AGAINST OVERTURNING = 1.50

 CONCRETE: CONCRETE STRENGTH = 3000 psi at 28 days
 REINFORCING STEEL STRENGTH = 60000 psi (ASTM A615 grade 60)

 SOIL: WATER TABLE BELOW BOTTOM OF FOOTING
 SOIL WT = 110 pcf (dry)
 ALLOWABLE SOIL BEARING = 3000 psf

 FOOTING SIZE: WIDTH = 26.0 ft LENGTH = 26.0 ft
 THICKNESS = 3.50 ft DEPTH = 8.00 ft to bottom
 PIERS = 8.00 ft square PIER 0.5 ft above grade
 CONCRETE WEIGHT = 150 pcf

 OUTPUT: SPREAD FOOTING (PAD and PIER) FOR POLES

 VOLUME OF CONCRETE = 2686 ft³ (99.48 cubic yards)

 WEIGHT OF POLE =====> 42.00 kips
 WEIGHT OF CONCRETE => 402.90 kips (2686 x 0.150)
 WEIGHT OF SOIL =====> 302.94 kips (2754 x 0.110)

 TOTAL WEIGHT = 747.84 kips

 OVERTURNING MOMENT = 5000.00 ft-k + (38.90 k x 8.50 ft) = 5331 ft-kips
 RESISTING MOMENT = 747.84 k x (26.00 ft / 2) = 9722 ft-kips

 SAFETY FACTOR = Mresist / O.T.M. = 9722 / 5331 = 1.82 > 1.50 O.K.

 ULTIMATE OVERTURNING MOMENT = 5331 ft-k x 1.50 = 7996 ft-kips
 ULTIMATE NET SOIL BEARING PRESSURE = 7429 psf

 GROSS SOIL BEARING = 3266 psf (includes soil overburden)
 SOIL OVERBURDEN = 880 psf (soil overburden)
 NET SOIL BEARING = 2386 psf < 3000 psf O.K.

 BENDING MOMENT IN PIER = 5000 ft-k + (38.90 k x 5.00 ft) = 5195 ft-kips
 AREA OF REINF STEEL REQUIRED IN THE PIER = 60.73 sq in (40 no. 11 bars)
 (.5 % = 46.08 sq in)

 BENDING MOMENT IN FOOTING = 5775 ft-kips
 FOOTING REINFORCING = 1.80 in²/ft = 30 no. 11 bars @ 10.43 in. o.c.
 (.18 % = 0.91 in²/ft)

 BENDING SHEAR IN THE FOOTING = 624.07 kips
 ALLOWABLE BENDING SHEAR = 838.02 kips O.K.

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 Status..... : Final Design Revision: Rev. Date :

S U M M A R Y O F C U R R E N T C A I S S O N D E S I G N

Diameter (ft): 8.00 Compression (kips): 42.00 Friction S.F: 2.00
 Min. Depth (ft) ...: 24.50 Horizontal (kips) : 38.90 Lateral S.F: 2.00
 Depth Used (ft) ...: 27.00 Uplift (kips): 0.00 Concrete S.F: 1.30
 Rebar Area (in^2) .: 37.44 Moment (Ft-kips) .: 5000.0 Concrete F'c (psi) : 3000.0
 Rebar Used:(24)#11 Full Cohesion (ft): 24.00 Steel Cover (in) ...: 4.00
 Water at (ft): 10.00 Rock at (ft): 99.00

SOIL PROFILE :

Soil Layer	Layer Thickness (ft)	Unit Weight (pcf)	Ult. Friction (psf)	Skin Friction (psf)	Allowable Bearing (psf)	Friction Angle- Phi (deg)	Passive Coeff.- KP	Cohesion (c) (psf)
1	3.00	120.00	0.00	0.00	0.00	0.00	1.000	0.00
2	7.00	120.00	100.00	3000.00	33.00	33.00	3.392	0.00
3	3.00	57.60	100.00	3000.00	33.00	33.00	3.392	0.00
4	11.00	57.60	100.00	3000.00	32.00	32.00	3.255	0.00
5	13.00	52.60	100.00	2000.00	0.00	0.00	1.000	1000.00

LATERAL / MOMENT CAPACITY (CHECK) :

	Min Design	Actual Design
Caisson Diameter (ft)	8.00	8.00
Height Above Grade (ft)	0.50	0.50
Depth Below Grade (ft)	24.50	27.00
Concrete Volume (CY)	46.54	51.20
Applied Moment From Loads (Working), Mwork(Ft-kip):	5661.30	5686.59
Resisting Moment From Soil (Ult), Mult(Ft-kip):	11706.94	12930.80
Moment S.F. (Mult / Mwork)	2.07	2.27
Applied Horizontal Load (Working), Hwork (Kips) ...:	38.90	38.90
Horizontal Soil Resistance (Ultimate), Hult (Kips):	80.69	82.46
Horizontal S.F. (Hult / Hwork)	2.07	2.12
Center of Rotation (from grade) (ft)	16.50	17.15
Inflection Point (Max Design Moment Location (ft) :	5.10	5.10
Maximum Factored Design Moment for Reinf. (Ft-kip):	6340.71	6340.71
Area Steel Required From Loads (in^2)	31.80	31.80
ACI Minimum Steel (0.5%) (in^2)	36.19	36.19
Area Reinf. Steel Provided (in^2)	37.44	37.44

UPLIFT CAPACITY CHECK :

Actual Uplift on Caisson (Kips)	0.00	0.00
Allowable Uplift Capacity (Kips)	177.81	196.04

COMPRESSION CAPACITY CHECK :

Actual Compression on Caisson (Kips)	42.00	42.00
Total Compression (Includes Concrete Wt.) (Kips) ..:	107.35	113.63
Allowable Compression Capacity (Kips)	127.55	130.69

CAISSON DESIGN:

USE: 8.00 ft Diameter X 27.50 ft Long (Concrete Volume = 51.20 CY)
 Reinf: (24)#11 Vert, w/Closed Ties: (12)#5 @6.0", remaining ties @18.0" (ASTM A615)