



STATE OF CONNECTICUT  
CONNECTICUT SITING COUNCIL

October 22, 2001

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

Thomas J. Regan, Esq.  
Brown, Rudnick, Freed & Gesmer, P.C.  
185 Asylum Street, CityPlace I  
Hartford, CT 06103-3402

RE: **TS-SPRINT-025-011009** - Sprint Spectrum, L.P. request for an order to approve tower sharing at an existing telecommunications facility located at 1119 Summit Road, Cheshire, Connecticut.

Dear Attorney Regan:

At a public meeting held October 17, 2001, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

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

The proposed shared use is to be implemented as specified in your letter dated October 9, 2001.

Thank you for your attention and cooperation.

Very truly yours,

Mortimer A. Gelston  
Chairman

MAG/RKE/laf

- c: Honorable Sandra R. Mouris, Council Chairman, Town of Cheshire
- John L. Salomone, Town Manager, Town of Cheshire
- Richard A. Pfurr, Town Planner, Town of Cheshire
- Kenneth C. Baldwin, Esq., Robinson & Cole LLP
- Sandy M. Carter, Verizon Wireless

American Telephone and Telegraph Company  
P.O. Box 1329  
Morristown, NJ 07960

Attn: John Upchurch

AT&T - 120 Universal Drive, North Haven, CT 06473

*ERP/it*  
*ERP*

Operating Frequency (MHz)	Number of Transmitters	Effective Radiated Power (ERP) Per Transmitter (Watts)	Total ERP (Watts)	Antenna Height (Feet)	Distance From Base of Tower (Feet)	Calculated Power Density (mW/cm <sup>2</sup> )	Maximum Permissible Exposure*	% MPE
1900	6	100	300	118	0	0.007756	1	0.7756%

\*Requirements set forth in OET Bulletin 65. Based on NCRP Report No. 86 and ANS/IEEE C95.1-1992

\* AT&T parameters taken from Candid Communications information

CT43XC820 - 120 Universal Drive, North Haven, CT 06473  
 Power Density Analysis of Sprint PCS Antennas mounted at 98ft centerline. Assumes Max ERP and vertical antenna pattern effects.

Operating Frequency (MHz)	Number of Trans.	Effective Radiated Power (ERP) Per Transmitter (Watts)	Total ERP (Watts)	Antenna Height (Feet)	Distance From Base of Tower (Feet)	Calculated Power Density (mW/cm <sup>2</sup> )	Maximum Permissible Exposure*	%MPE
1962.5	11	555.3	6108.3	98	0	0.000206	1	0.0206%
1962.5	11	555.3	6108.3	98	50	0.000164	1	0.0164%
1962.5	11	555.3	6108.3	98	100	0.000101	1	0.0101%
1962.5	11	555.3	6108.3	98	150	0.000062	1	0.0062%
1962.5	11	555.3	6108.3	98	200	0.000040	1	0.0040%
1962.5	11	555.3	6108.3	98	250	0.000027	1	0.0027%
1962.5	11	555.3	6108.3	98	300	0.000020	1	0.0020%
1962.5	11	555.3	6108.3	98	400	0.000012	1	0.0012%
1962.5	11	555.3	6108.3	98	500	0.000008	1	0.0008%

\*Requirements set forth in OET Bulletin 65. Based on NCRP Report No. 86 and ANS/IEEE C95.1-1992

Value calculated using antenna pattern factor referenced on cumulative sheet.

CT43XC844 - Crown Castle Tower, 1119 Summit Road, Cheshire, Connecticut  
 Worst Case Power Density Analysis of Sprint PCS Antennas @ Base of tower. Assumes Max ERP & No Antenna Pattern Adjustment

Operating Frequency (MHz)	Number of Trans.	Effective Radiated Power Per Transmitter (Watts)	Total ERP (Watts)	Antenna Height (Feet)	Distance From Base of Roof Top (Feet)	Calculated Power Density (mW/cm <sup>2</sup> )	Maximum Permissible Exposure* (mW/cm <sup>2</sup> )	%MPE
1962.5	11	477.09	5247.99	147.5	0	0.086838	1	8.6838%
1962.5	11	477.09	5247.99	147.5	50	0.077888	1	7.7888%
1962.5	11	477.09	5247.99	147.5	100	0.059493	1	5.9493%
1962.5	11	477.09	5247.99	147.5	150	0.042689	1	4.2689%
1962.5	11	477.09	5247.99	147.5	200	0.030592	1	3.0592%
1962.5	11	477.09	5247.99	147.5	250	0.022423	1	2.2423%
1962.5	11	477.09	5247.99	147.5	300	0.016905	1	1.6905%
1962.5	11	477.09	5247.99	147.5	350	0.013097	1	1.3097%
1962.5	11	477.09	5247.99	147.5	400	0.010395	1	1.0395%
1962.5	11	477.09	5247.99	147.5	450	0.008425	1	0.8425%
1962.5	11	477.09	5247.99	147.5	500	0.006952	1	0.6952%

\*Requirements set forth in OET Bulletin 65. Based on NCRP Report No. 86 and ANSI/IEEE C95.1-1992



# STATE OF CONNECTICUT

## CONNECTICUT SITING COUNCIL

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

October 9, 2001

Sandra R. Mouris  
Council Chairman  
Town of Cheshire  
Town Hall  
84 South Main Street  
Cheshire, CT 06410

RE: **TS-SPRINT-025-011009** - Sprint Spectrum, L.P. request for an order to approve tower sharing at an existing telecommunications facility located at 1119 Summit Road, Cheshire, Connecticut.

Dear Ms. Mouris:

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

The Council will consider this item at the next meeting scheduled for October 17, 2001, at 1:30 p.m. in Hearing Room Two, Ten Franklin Square, New Britain, Connecticut.

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

Thank you for your cooperation and consideration.

Very truly yours,

A handwritten signature in black ink, appearing to read 'Joel M. Rinebold', written over a large, stylized circular flourish.

Joel M. Rinebold  
Executive Director

JMR/RKE/laf

Enclosure: Notice of Tower Sharing

c: Richard A. Pfurr, Town Planner, Town of Cheshire  
John L. Salomone, Town Manager, Town of Cheshire

THOMAS J. REGAN  
ATTORNEY AT LAW

Direct Dial: 860.509.6522  
E-Mail: tregan@brfg.com

<http://www.brownrudnick.com>

October 9, 2001

**VIA HAND DELIVERY**

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



**RE: Tower Sharing Proposal**

Dear Chairman Gelston:

Enclosed please find an original and twenty-five copies of Sprint Spectrum, L.P.'s Tower Sharing Proposal to co-locate on the Crown Castle tower located at 1119 Summit Road in Cheshire, Connecticut. Also enclosed is a check for \$500.00 to cover the filing fee.

The Chairman of the Town Council for the Town of Cheshire was sent a complete copy of this Tower Sharing Proposal.

Very truly yours,

**BROWN RUDNICK FREED & GESMER, P.C.**

By: Thomas J. Regan /cmm  
Thomas J. Regan

TJR/cmm  
Enclosures  
cc: David J. Borowy, Chairman, Town Council

## CONNECTICUT SITING COUNCIL

In re:

Request of Sprint Spectrum, L.P. d/b/a Sprint :  
PCS for the Approval of the Shared Use of the :  
Existing Telecommunications Facility Located at :  
1119 Summit Road, Cheshire, Connecticut : October 9, 2001

### TOWER SHARING PROPOSAL

Sprint proposes herein to share a telecommunications tower (the "Tower") and associated compound located at 1119 Summit Road in Cheshire, Connecticut (collectively, the "Facility").

Pursuant to Connecticut General Statutes § 16-50aa (the "Statute"), Sprint requests a finding from the Connecticut Siting Council (the "Council") that the shared use of this Facility is technically, legally, environmentally and economically feasible, will meet public safety concerns, will avoid the unnecessary proliferation of towers and is in the public interest. Sprint further requests an order approving the proposed shared use of this Facility.

The purpose of this request is to use an existing facility to meet Sprint's coverage needs in the Cheshire area and to avoid the construction of an additional tower in Cheshire.

#### A. Existing Facility

The Facility is located at 1119 Summit Road and is owned by Crown Castle. (Exhibit A – title sheet with zoning/location map). Crown Castle is in the process of constructing a one hundred seventy-foot (170') monopole at the Facility.



## B. Proposed Project

Sprint proposes the installation of twelve (12) antennas mounted on a triangular platform with four (4) antennas per sector, with the centerline at one hundred forty seven feet (147'). Sprint also proposes the installation of a small global positioning system antenna at fifty feet (50') on the southwest side of the Tower. The base station equipment associated with the antennas will be located in a fourteen-foot by twenty-foot (14' x 20') lease area at the base of the Tower inside the existing compound area. The concrete equipment pad measures approximately eight feet and six inches by twenty feet (8'-6" x 20') and is equipped with an ice cover. (Exhibit A – compound plan and tower elevation).

## C. Technical Feasibility

Consistent with the requirements of the Statute, it is technical feasible for Sprint to co-locate on this Tower. The existing monopole was designed and constructed to support four (4) carriers. Sprint will be the second carrier located on the Tower. The structural capability of the Tower is described in a monopole specification report by Summit Manufacturing, LLC, dated August 20, 2001, provided as Exhibit B.

Verizon will also be located on the Tower. Sprint has reviewed Verizon's proposed communication facilities for this Tower and has determined that interference is unlikely due to the position and vertical separation of Sprint's antennas. If any interference should occur, Sprint will correct it after the antennas are installed.

#### D. Legal / Economic Feasibility

Sprint has entered into a license agreement with Crown Castle for the purpose of locating Sprint's antennas and associated equipment at the Facility. The Council has the authority pursuant to the Statute to issue orders approving the shared use of the Facility. Therefore, consistent with the Statute, the proposal is both economically and legally feasible.

#### E. Environmental Feasibility

Pursuant to the Statute, the proposal will be environmentally feasible for the following reasons:

- The overall impact on the Town of Cheshire will be decreased with the sharing of a singular tower versus the proliferation of many towers.
- The proposal will not increase the height of the Tower or the size of the compound.
- The proposal will have an insignificant visual impact with the addition of four panel antennas per sector.
- There will be no increased impact on any wetlands or water resources.
- There will be no increased impact on air quality because no air pollutants will be generated during the normal operation of the Facility.

- There will only be a brief, slight increase in noise pollution during the construction of the equipment building pad and the attachment of the antennas.
- During construction, the proposed project will generate a small amount of traffic as workers arrive and depart and materials are delivered. Upon completion, traffic will be limited to an average of one monthly maintenance and inspection visit.
- The total frequency electromagnetic radiation of the power density measured at the site will not be at or above the standard adopted by the Federal Communications Commission (the "FCC"). Attached as Exhibit C is a worst case power density analysis for the operation of Sprint PCS's antennas at the Facility as measured at the base of the Tower and a cumulative analysis for Sprint's and Verizon's antennas. The power density for the proposed installation, calculated at the base of the existing Tower, is  $0.86838 \text{ mW/cm}^2$  for Sprint and  $0.0236 \text{ mW/cm}^2$  for Verizon. The cumulative maximum permissible exposure is 12.74% based on the NCRP standard. These calculations show that Sprint will be well below the FCC mandated limits in all locations around the existing Tower, even with extremely conservative assumptions.


F. Public Safety Concerns / Benefits

In accordance with the Statute, there are no known public safety concerns associated with this proposal. Moreover, Sprint will be enhancing the communication needs of the citizens of the community. This section of Cheshire is a mixture of residential and commercial properties and contains roads with significant levels of traffic. By locating its antennas on this Tower, Sprint will be providing coverage to the northeast section of Cheshire. More specifically, Sprint will provide coverage for approximately two and eight tenths (2.8) miles along I-84 and one and eight tenths (1.8) miles along Route 70, as well as provide connectivity between Sprint's existing sites in Waterbury and Cheshire.

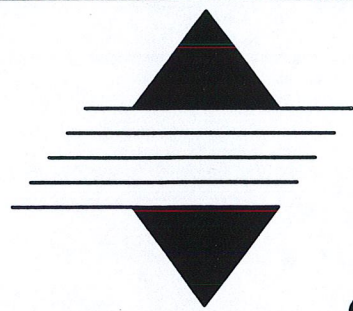
Conclusion

For the reasons stated above, the attachment of Sprint's antennas to this Tower would meet all the requirements set forth in the Statute. This proposal is technically, legally, environmentally and economically feasible and meets all public safety concerns. Therefore, Sprint respectfully requests that the Council approve this request for the shared use of the existing telecommunications facility located at 1119 Summit Road in Cheshire, Connecticut.

Sprint Spectrum, L.P.  
d/b/a Sprint PCS

By:  \_\_\_\_\_  
Thomas J. Regan, Esq.  
Brown, Rudnick, Freed & Gesmer, P.C.  
185 Asylum Street, CityPlace I  
Hartford, CT 06103-3402  
Phone - (860) 509-6522  
Fax - (860) 509-6501

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# Sprint PCS

SITE I.D.# CT43XC844

1119 SUMMIT ROAD  
CHESHIRE, CONNECTICUT 06410

**GENERAL NOTES**

1. ADA COMPLIANCE: FACILITY IS NOT STAFFED AND NOT NORMALLY OCCUPIED.
2. FOR ADDITIONAL NOTES AND DETAILS, SEE ACCOMPANYING DRAWINGS.

**PROJECT DESCRIPTION**

PROPOSED INSTALLATION OF A WIRELESS TELECOMMUNICATIONS FACILITY. SPRINT PCS ANTENNAS SHALL BE MOUNTED ON A PROPOSED CROWN ATLANTIC TOWER WITH GROUND MOUNTED EQUIPMENT

**PROJECT INFORMATION**

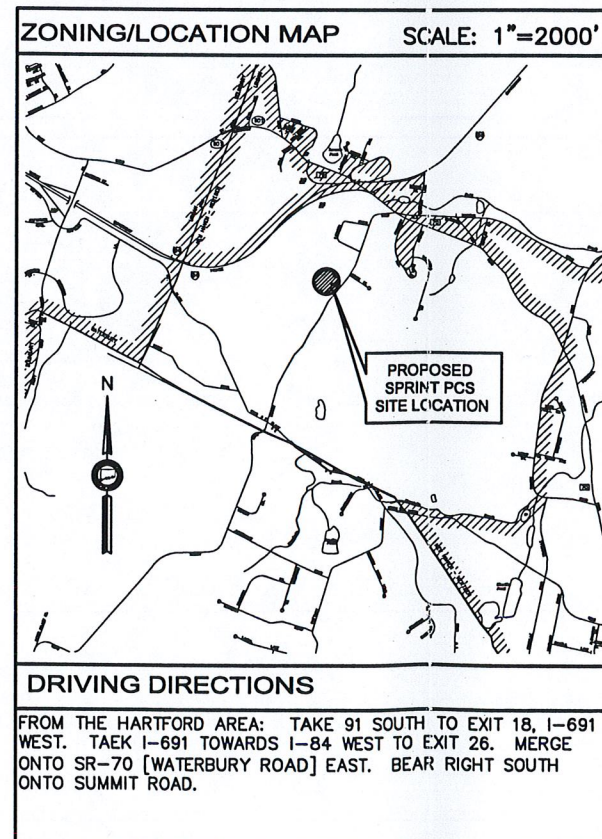
**SITE NAME:**  
**SITE ADDRESS:** 1119 SUMMIT ROAD  
CHESHIRE, CONNECTICUT 06410  
**PROPERTY OWNER:** CROWN CASTLE  
**CONTACT PERSON:** DAVID EALES  
400 WEST CUMMINGS PARK SUITE 4050  
WOBURN, MASSACHUSETTS 01801  
(781) 932-1313  
**LATITUDE:** 41° 32' 11"  
**LONGITUDE:** 72° 57' 28.2"

**PROJECT DIRECTORY**

**APPLICANT:** SPRINT SPECTRUM LP dba SPRINT PCS  
1 INTERNATIONAL BOULEVARD  
MAHWAH, NJ 07495  
**ENGINEER:** URS CORPORATION AES  
795 BROOK STREET, BUILDING 5  
ROCKY HILL, CT 06067  
(860) 529-8882  
**LAND SURVEYOR:** URS CORPORATION AES  
500 ENTERPRISE DRIVE  
ROCKY HILL, CT 06067  
(860) 529-8882

**SHEET INDEX**

T-1	TITLE SHEET
SC-1	COMPOUND PLAN AND TOWER ELEVATION



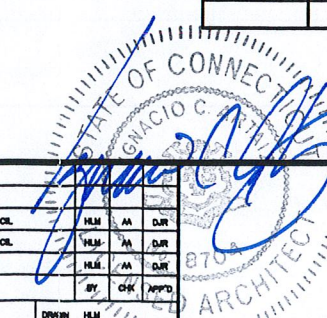
**URS CORPORATION AES**  
795 ENTERPRISE DRIVE  
ROCKY HILL, CONNECTICUT  
1-(860)-529-8882

1119 SUMMIT ROAD  
CHESHIRE, CONNECTICUT 06410  
SITE I.D.# CT43XC844

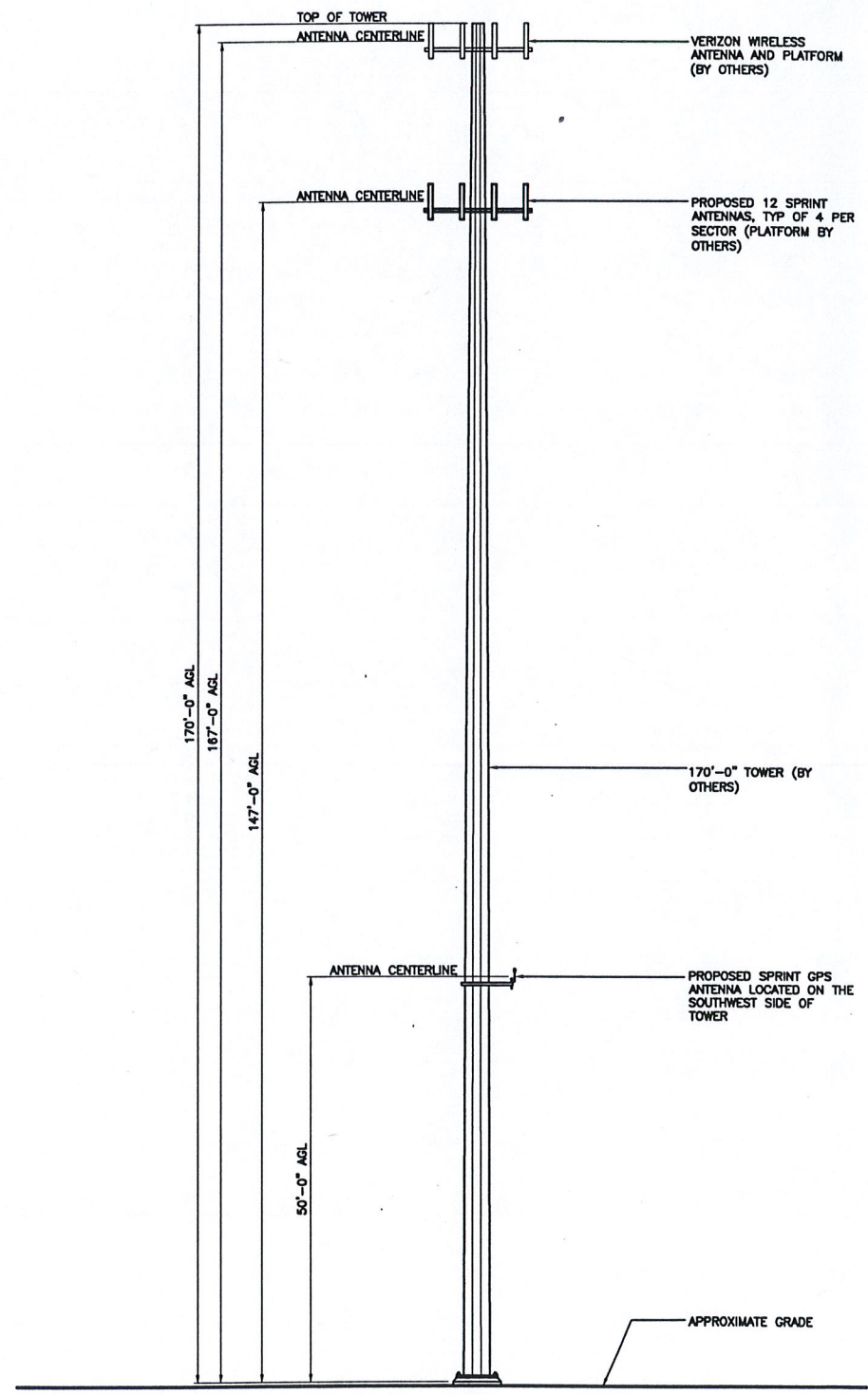
**Sprint PCS**  
HARTFORD MTA

NO.	DATE	REVISIONS	BY	CHK	APPD.

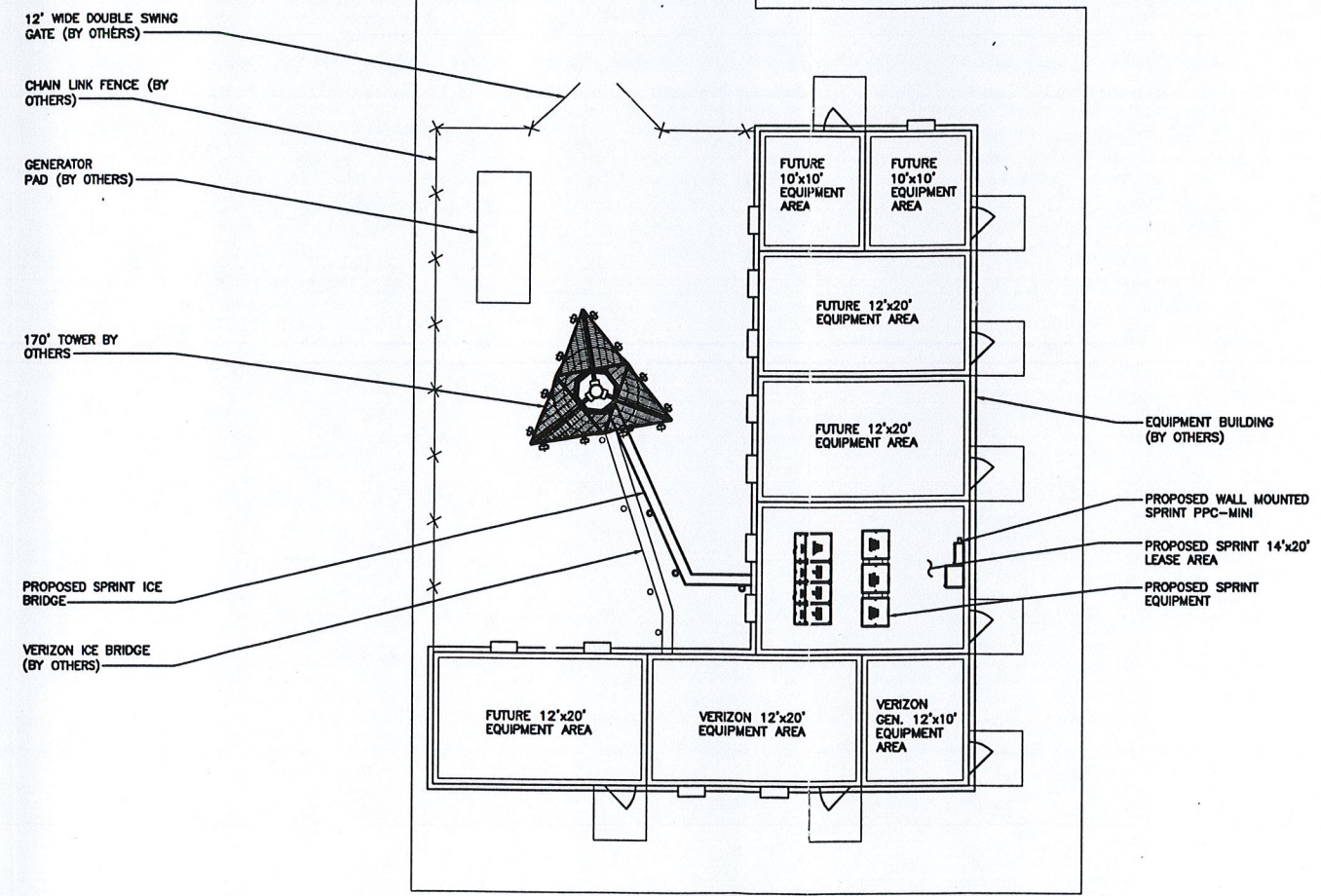
SCALE: AS NOTED DESIGNED: DJR DRAWN: HJM



**Sprint PCS**  
TITLE SHEET  
JOB NO. F302072.12/F03 DRAWING NUMBER T-1 REV 2



2 TOWER ELEVATION  
SC-1 SCALE: 3/32" = 1'-0"



1 COMPOUND PLAN  
SC-1 SCALE: 1/8" = 1'-0"



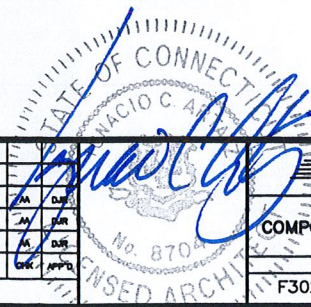
**URS CORPORATION AES**  
795 ENTERPRISE DRIVE  
ROCKY HILL, CONNECTICUT  
1-(860)-529-8882

1119 SUMMIT ROAD  
CHESHIRE, CONNECTICUT 06410  
SITE I.D.# CT43XC844

**Sprint PCS**  
HARTFORD MTA

NO.	DATE	REVISIONS	BY	CHK.	APP'D.
28-27-01		ISSUED FOR SITING COUNCIL	HJM	JA	DJS
28-13-01		ISSUED FOR SITING COUNCIL	HJM	JA	DJS
28-12-01		ISSUED FOR REVIEW	HJM	JA	DJS

SCALE: AS NOTED DESIGNED: DJR DRAWN: HJM



**Sprint PCS**

COMPOUND PLAN AND TOWER ELEVATION

JOB NO.	DRAWING NUMBER	REV
F302072.12/F03	SC-1	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

Exhibit B



**PAUL J. FORD AND COMPANY**  
 STRUCTURAL ENGINEERS  
 250 East Broad Street, Suite 500, Columbus, Ohio 43215  
 (614) 221-6679 Fax: (614) 448-4105 www.PJFweb.com

JOB DATA			
Page 1 of 3	Job No.	29201-0692	
By MFP	Design No.	SUMMIT #14620	
Chk'd By <i>KSS</i>	Date		
	Rev. No. 1	Rev. Date	08-20-2001
Pole	170-FT MONOPOLE		
Site	801367; CHESHIRE, NEW HAVEN CO., CT		
Owner	CROWN CASTLE		
Ref. No.			
Design	90 + SIMULTANEOUS 1/2" RADIAL ICE ACCORDING TO TIA/EIA-222-F 1996		

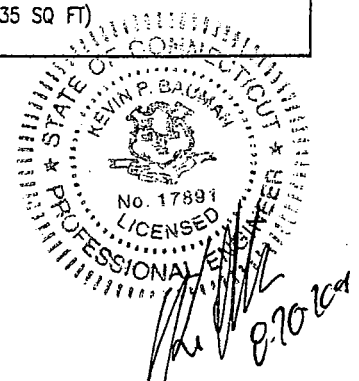
⚠ INCREASED WIND VELOCITY TO 90 MPH, REMOVED BOTTOM TWO CARRIERS.

LOAD CASES			
CASE 1	90 MPH WITH 1/2" RADIAL ICE	WIND W/	SIMULTANEOUS ICE
CASE 2	50 MPH WITH NO ICE	OPERATIONAL	WIND

POLE SPECIFICATIONS	
Pole Shape Type:	18-SIDED POLYGON
Taper:	0.233024 IN/FT
Shaft Steel:	ASTM A607 GRADE 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
-	TOP	14' LOW PROFILE PLATFORM (CAAA = 35 SQ FT)
1	TOP	PANEL ANTENNAS (CAAA = 40 SQ FT)
-	158.00	14' LOW PROFILE PLATFORM (CAAA = 35 SQ FT)
2	158.00	PANEL ANTENNAS (CAAA = 40 SQ FT)
-	148.00	14' LOW PROFILE PLATFORM (CAAA = 35 SQ FT)
3	148.00	PANEL ANTENNAS (CAAA = 40 SQ FT)
-	138.00	14' LOW PROFILE PLATFORM (CAAA = 35 SQ FT)
4	138.00	PANEL ANTENNAS (CAAA = 40 SQ FT)

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



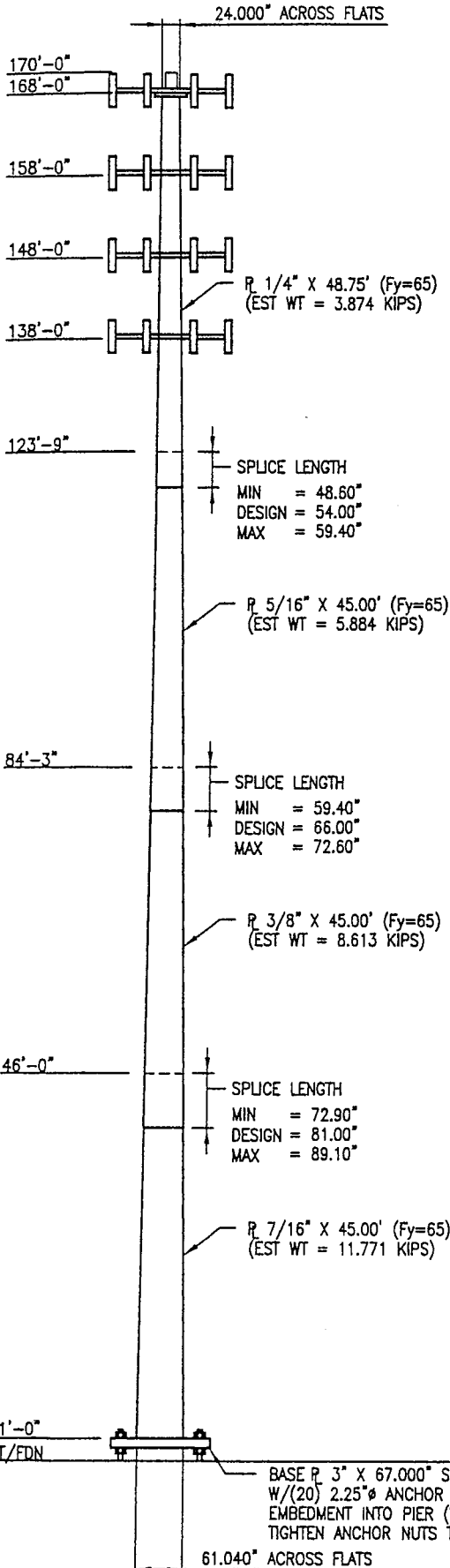
Elevation	90 MPH WIND		50 MPH WIND	
	Lateral Deflection (Inches)	Rotation (sway) (degrees)	Lateral Deflection (Inches)	Rotation (sway) (degrees)
TOP	109.1	5.793	31.4	1.662

SHAFT SECTION DATA					
Shaft Section	Section Length (feet)	Plate Thickness (in.)	Lap Splice (in.)	Diameter Across Flats (inches)	
				@ Top	@ Bottom
1	48.75	0.2500	54.00	24.000	35.360
2	45.00	0.3125	66.00	33.811	44.297
3	45.00	0.3750	81.00	42.391	52.877
4	45.00	0.4375		50.554	61.040

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

BASE REACTIONS FOR FOUNDATION DESIGN

MOMENT = 5100 ft-kips  
 SHEAR = 42 kips  
 AXIAL = 55 kips



G:\TOWER\DRAWINGS\MONOPOLE\292-2001\292010692R4001.DWG MPLAHOVINSK MON 20-AUG-2001 9:05:50 AM

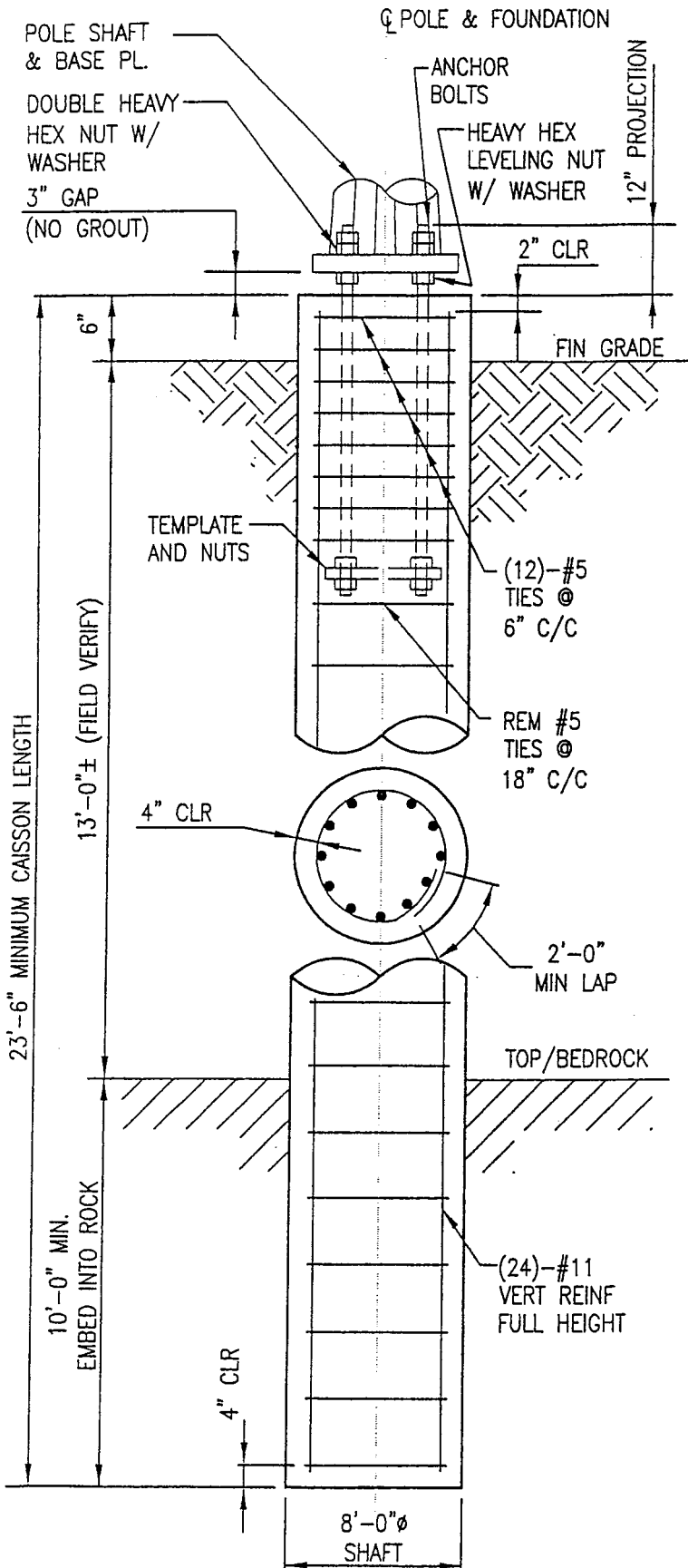


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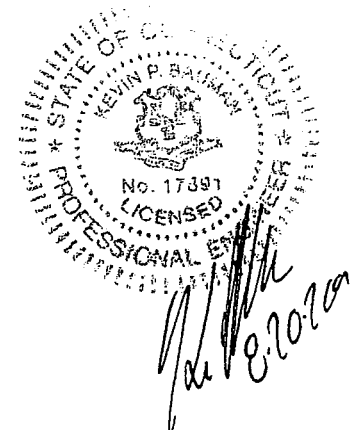


JOB DATA			
Page 2 of 3	Job No.	29201-0692	
By MFP	Design No.	SUMMIT #14620	
Chk'd By <i>VJS</i>	Date		
	Rev. No. 1	Rev. Date	08-20-2001
Pole	170-FT MONOPOLE		
Site	801367; CHESHIRE, NEW HAVEN CO., CT		
Owner	CROWN CASTLE USA		
Ref. No.			
Design	90 MPH + SIMULTANEOUS 1/2" RADIAL ICE ACCORDING TO TIA/EIA-222-F 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 = 44 CUBIC YARDS.
- FOUNDATION DESIGN IS BASED UPON GEOTECHNICAL EXPLORATION REPORT PREPARED BY: CLOUGH, HARBOUR & ASSOCIATES LLP  
 REPORT NO.: 8961.07.08  
 DATED: 05-15-2001
- CONTRACTOR SHALL READ THE GEOTECHNICAL REPORT AND CONSULT THE GEOTECHNICAL ENGINEER AS NECESSARY PRIOR TO CONSTRUCTION.
- THE FOUNDATION WAS DESIGNED USING THE FOLLOWING SERVICE LOADS:  
 MOMENT: 5100 FT-KIPS  
 SHEAR: 42 KIPS  
 AXIAL: 55 KIPS



## CAISSON (DRILLED PIER) FOUNDATION

# SUMMIT MANUFACTURING, LLC

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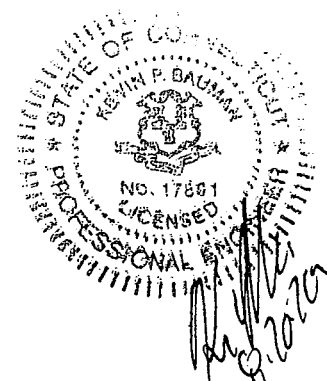
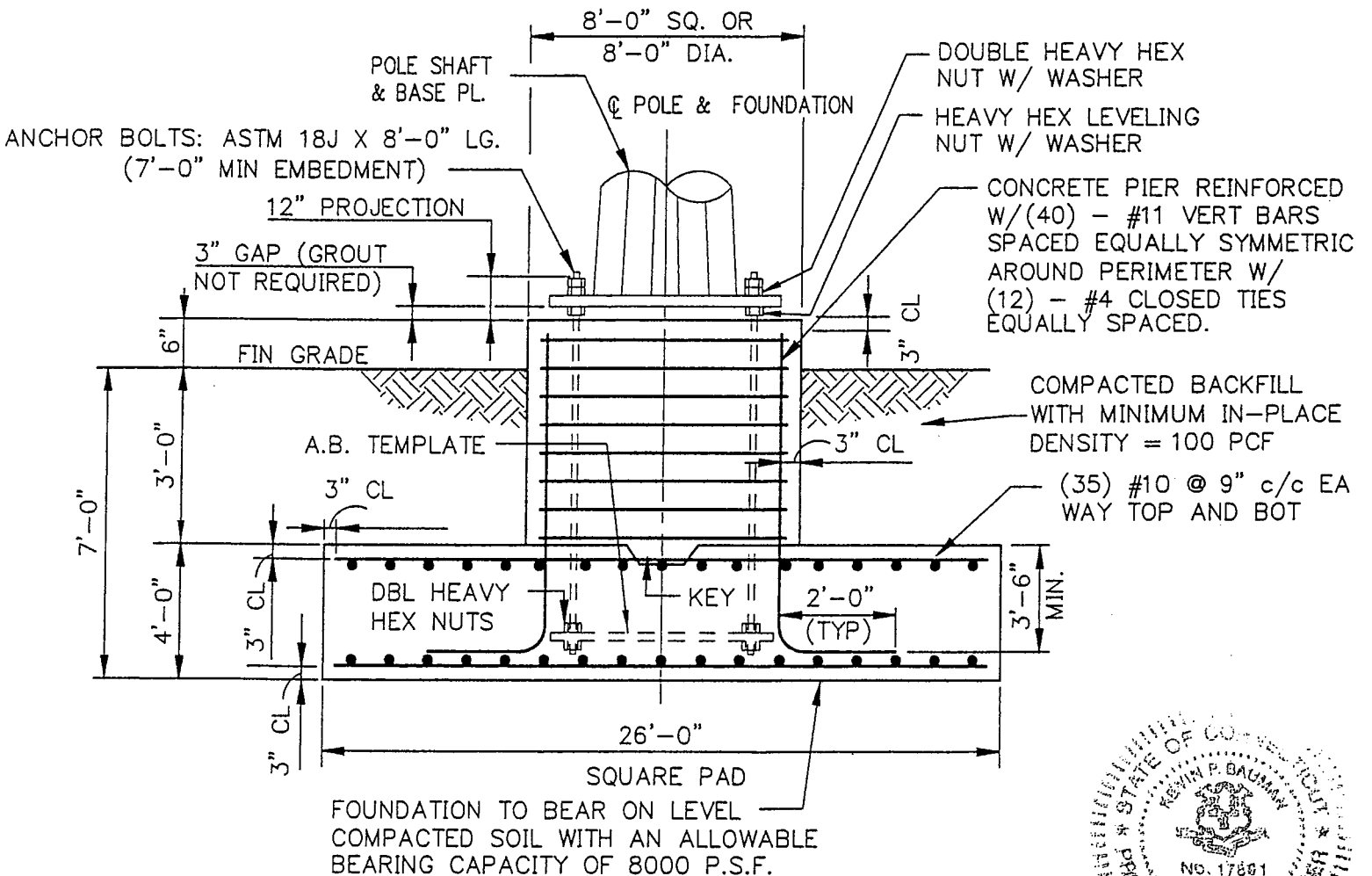
**NOTES:**

1. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS.
2. REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A-615 (GRADE 60) EXCEPT THAT PIER TIES MAY BE ASTM A-615 (GRADE 40).
3. SEE PAGE 1 FOR ANCHOR BOLT QUANTITY, SIZE, LENGTH, AND BOLT CIRCLE.
4. CONTRACTOR SHALL READ THE GEOTECHNICAL REPORT AND CONSULT THE GEOTECHNICAL ENGINEER AS NECESSARY PRIOR TO CONSTRUCTION.

JOB DATA			
Page 3 of 3	Job No.	29201-0692	
By MFP	Design No.	SUMMIT #14620	
Chk'd By KJS	Date	Rev. No. 1	Rev. Date 08-20-2001
Pole	170-FT MONOPOLE		
Site	801367; CHESHIRE, NEW HAVEN CO., CT		
Owner	CROWN CASTLE USA		
Ref. No.			
Design	90 MPH + SIMULTANEOUS 1/2" RADIAL ICE ACCORDING TO TIA/EIA-222-F 1996		

FOUNDATION SPECIFICATIONS	
Volume Concrete Required:	109 CUBIC YARDS
Soils Report:	CLOUGH HARBOUR & ASSOCIATES LLP 8961.07.08 06-06-2001

DESIGN CRITERIA	
Moment:	5100 FT-KIPS
Shear:	42 KIPS
Axial:	55 KIPS



## PAD AND PIER FOUNDATION

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-----  
 Job No.....: 29201-0692 Design No: SUMMIT #14620 Engineer : MFP  
 Description : 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT  
 Design..... : 90 + SIMULTANEOUS 1/2" RADIAL ICE  
 Owner..... : Crown Castle Client: Summit Manufacturing, LLC (  
 Status..... : Final Design Revision: 1 Rev. Date : 08/20/2001  
 -----

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.....: 167.00 ft  
 Top Diameter.....: 24.000 in  
 Bottom Diameter.....: 61.040 in  
 Pole Shape.....: 18-Sided Polygon  
 Splice Joint Type.....: Taper shaft - Slip Joint  
 Shaft Taper.....: 0.233024 (in/ft)  
 Shaft Steel Weight.....: 30.141 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.	48.750	0.25000	65	24.000	35.360	54.00
2.	45.000	0.31250	65	33.811	44.297	66.00
3.	45.000	0.37500	65	42.391	52.877	81.00
4.	45.000	0.43750	65	50.554	61.040	

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	90.0	0.50	123.75	16.549	21.338	637.131	0.6636
2.	1	90.0	0.50	84.25	25.223	25.386	1611.417	0.8458
3.	1	90.0	0.50	46.00	37.994	29.672	2709.093	0.8331
4.	1	90.0	0.50	1.00	54.519	34.488	4174.987	0.7781

>> MAXIMUM BASE REACTIONS : 54.519 34.488 4174.987 <<

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.	90.0	0.50	Top	168.00	109.147	5.793	
2.	50.0	0.00	Top	168.00	31.352	1.662	

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-----
Job No.....: 29201-0692          Design No: SUMMIT #14620      Engineer : MFP
Description : 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT
Design..... : 90 + SIMULTANEOUS 1/2" RADIAL ICE
Owner.....  : Crown Castle          Client: Summit Manufacturing, LLC (
Status..... : Final Design          Revision: 1   Rev. Date : 08/20/2001
-----

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-----
Pole Height : 167 ft
Pole Shape  : 18-Sided Polygon
Pole Type   : Taper shaft - Slip Joint
Pole Taper  : 0.233024 (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.	168.00	119.25	48.750	0.25000	65	24.000	35.360	54.00
2.	123.75	78.75	45.000	0.31250	65	33.811	44.297	66.00
3.	84.25	39.25	45.000	0.37500	65	42.391	52.877	81.00
4.	46.00	1.00	45.000	0.43750	65	50.554	61.040	

## 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 <sup>2</sup> )	Ix (in <sup>4</sup> )
1	3.874	@Top	168.0	24.000	0.2500	15.16	96.00	18.84	1342.6
		@Splice	123.8	34.311		22.44	137.25	27.03	3960.3
		@Bot	119.3	35.360		23.18	141.44	27.86	4337.4
2	5.884	@Top	123.8	33.811	0.3125	17.31	108.20	33.23	4709.3
		@Splice	84.3	43.016		22.51	137.65	42.35	9755.1
		@Bot	78.8	44.297		23.23	141.75	43.63	10660.1
3	8.613	@Top	84.3	42.391	0.3750	18.17	113.04	50.01	11150.1
		@Splice	46.0	51.304		22.36	136.81	60.62	19857.6
		@Bot	39.3	52.877		23.10	141.00	62.49	21754.8
4	11.771	@Top	46.0	50.554	0.4375	18.61	115.55	69.59	22076.5
		@Bot	1.0	61.040		22.84	139.52	84.15	39034.8

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-----
Total Shaft Steel Weight = 30.141 kips
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-----  
 Job No.....: 29201-0692                    Design No: SUMMIT #14620                    Engineer : MFP  
 Description : 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT  
 Design..... : 90 + SIMULTANEOUS 1/2" RADIAL ICE  
 Owner..... : Crown Castle                    Client: Summit Manufacturing, LLC (  
 Status..... : Final Design                    Revision: 1    Rev. Date : 08/20/2001  
 -----

## 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 <sup>2</sup> )	Ix (in <sup>4</sup> )
1.	top	168.000	24.000	0.25000	15.16	96.00	18.84	1342.6
2.	<arm [1]>	168.000	24.000	0.25000	15.16	96.00	18.84	1342.6
3.	<arm [2]>	168.000	24.000	0.25000	15.16	96.00	18.84	1342.6
4.	<arm [3]>	168.000	24.000	0.25000	15.16	96.00	18.84	1342.6
5.		160.000	25.864	0.25000	16.48	103.46	20.32	1684.2
6.	<arm [4]>	158.000	26.330	0.25000	16.81	105.32	20.69	1777.8
7.	<arm [5]>	158.000	26.330	0.25000	16.81	105.32	20.69	1777.8
8.		150.000	28.194	0.25000	18.12	112.78	22.17	2187.0
9.	<arm [6]>	148.000	28.660	0.25000	18.45	114.64	22.54	2298.2
10.	<arm [7]>	148.000	28.660	0.25000	18.45	114.64	22.54	2298.2
11.		140.000	30.525	0.25000	19.77	122.10	24.02	2780.9
12.	<arm [8]>	138.000	30.991	0.25000	20.09	123.96	24.39	2911.3
13.	<arm [9]>	138.000	30.991	0.25000	20.09	123.96	24.39	2911.3
14.		130.000	32.855	0.25000	21.41	131.42	25.87	3473.7
15.	top sec(2)	123.750	34.311	0.25000	22.44	137.25	27.03	3960.3
16.		120.000	34.685	0.31250	17.81	110.99	34.09	5087.5
17.	bot sec(1)	119.250	34.860	0.31250	17.91	111.55	34.27	5165.5
18.		110.000	37.015	0.31250	19.12	118.45	36.40	6193.9
19.		100.000	39.346	0.31250	20.44	125.91	38.71	7450.0
20.		90.000	41.676	0.31250	21.75	133.36	41.03	8865.5
21.	top sec(3)	84.250	43.016	0.31250	22.51	137.65	42.35	9755.1
22.		80.000	43.381	0.37500	18.63	115.68	51.19	11957.3
23.	bot sec(2)	78.750	43.672	0.37500	18.77	116.46	51.53	12201.9
24.		70.000	45.711	0.37500	19.73	121.90	53.96	14008.1
25.		60.000	48.042	0.37500	20.83	128.11	56.73	16280.9
26.		50.000	50.372	0.37500	21.92	134.32	59.51	18787.1
27.	top sec(4)	46.000	51.304	0.37500	22.36	136.81	60.62	19857.6
28.		40.000	51.952	0.43750	19.18	118.75	71.53	23976.1
29.	bot sec(3)	39.250	52.127	0.43750	19.25	119.15	71.77	24220.9
30.		30.000	54.282	0.43750	20.11	124.07	74.77	27379.0
31.		20.000	56.613	0.43750	21.05	129.40	78.00	31089.5
32.		10.000	58.943	0.43750	21.99	134.73	81.24	35121.0
33.	base	1.000	61.040	0.43750	22.84	139.52	84.15	39034.8

-----  
 Total Number of Antennas / Arms = 9  
 -----

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-----  
 Job No.....: 29201-0692 Design No: SUMMIT #14620 Engineer : MFP  
 Description: 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT  
 Design..... : 90 + SIMULTANEOUS 1/2" RADIAL ICE  
 Owner..... : Crown Castle Client: Summit Manufacturing, LLC (   
 Status..... : Final Design Revision: 1 Rev. Date : 08/20/2001  
 -----

ANTENNA AND ARM PROPERTIES AND LOAD DATA:

LOAD CASE 1: WIND VELOCITY = 90.00 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]	168.000	171.000	2.0000	W/ Ice:	0.50	28.04	100.00
	Description: 5/8" Lightning Rod						
		[ Gh ] [ Kz ]			[ qz ]	[qz] [Gh]	
		1.69 1.600		W/ Ice:	33.179	56.072	
[2]	168.000	168.000	2.0000	W/ Ice:	40.00	2231.58	2100.00
	Description: 14' Low Profile Platform (CAAA = 35 SQ FT)						
		[ Gh ] [ Kz ]			[ qz ]	[qz] [Gh]	
		1.69 1.592		W/ Ice:	33.012	55.790	
[3]	168.000	168.000	2.0000	W/ Ice:	40.00	2231.58	500.00
	Description: Panel Antennas (CaAa = 40 SQ FT)						
		[ Gh ] [ Kz ]			[ qz ]	[qz] [Gh]	
		1.69 1.592		W/ Ice:	33.012	55.790	
[4]	158.000	158.000	2.0000	W/ Ice:	40.00	2192.80	2100.00
	Description: 14' Low Profile Platform (CAAA = 35 SQ FT)						
		[ Gh ] [ Kz ]			[ qz ]	[qz] [Gh]	
		1.69 1.564		W/ Ice:	32.438	54.820	
[5]	158.000	158.000	2.0000	W/ Ice:	40.00	2192.80	500.00
	Description: Panel Antennas (CaAa = 40 SQ FT)						
		[ Gh ] [ Kz ]			[ qz ]	[qz] [Gh]	
		1.69 1.564		W/ Ice:	32.438	54.820	
[6]	148.000	148.000	2.0000	W/ Ice:	40.00	2152.21	2100.00
	Description: 14' Low Profile Platform (CAAA = 35 SQ FT)						
		[ Gh ] [ Kz ]			[ qz ]	[qz] [Gh]	
		1.69 1.535		W/ Ice:	31.837	53.805	
[7]	148.000	148.000	2.0000	W/ Ice:	40.00	2152.21	500.00
	Description: Panel Antennas (CaAa = 40 SQ FT)						
		[ Gh ] [ Kz ]			[ qz ]	[qz] [Gh]	
		1.69 1.535		W/ Ice:	31.837	53.805	
[8]	138.000	138.000	2.0000	W/ Ice:	40.00	2109.62	2100.00
	Description: 14' Low Profile Platform (CAAA = 35 SQ FT)						
		[ Gh ] [ Kz ]			[ qz ]	[qz] [Gh]	
		1.69 1.505		W/ Ice:	31.207	52.741	
[9]	138.000	138.000	2.0000	W/ Ice:	40.00	2109.62	500.00
	Description: Panel Antennas (CaAa = 40 SQ FT)						
		[ Gh ] [ Kz ]			[ qz ]	[qz] [Gh]	
		1.69 1.505		W/ Ice:	31.207	52.741	

[ Gh ] [ Kz ]  
1.69 1.505

W/ Ice: (psf)  
31.207

(psf)  
52.741

---

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 Job No.....: 29201-0692 Design No: SUMMIT #14620 Engineer : MFP  
 Description : 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT  
 Design..... : 90 + SIMULTANEOUS 1/2" RADIAL ICE  
 Owner..... : Crown Castle Client: Summit Manufacturing, LLC (  
 Status..... : Final Design Revision: 1 Rev. Date : 08/20/2001  
 -----

POLE SHAFT LOADS:

LOAD CASE 1: WIND VELOCITY = 90.00 mph with 0.50 inches Radial Ice.

Design Loads per TIA/EIA-222-F Standard; Gust Factor ..... Gh = 1.69  
 Pole DL Overload Factor = 1.3

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 Wind Force (lbs)	Shaft Segment Weight (lbs)
168.000	1.592	33.01	227.11	0.650	0.000	0.000	0.00
168.000	1.592	33.01	227.11	0.650	0.000	0.000	0.00
168.000	1.592	33.01	227.11	0.650	0.000	0.000	0.00
168.000	1.592	33.01	227.11	0.650	2.093	1.360	75.90
160.000	1.570	32.55	243.05	0.650	17.443	11.338	627.60
158.000	1.564	32.44	246.99	0.650	2.268	1.474	80.95
158.000	1.564	32.44	246.99	0.650	2.287	1.487	81.50
150.000	1.541	31.96	262.52	0.650	18.997	12.348	671.28
148.000	1.535	31.84	266.35	0.650	2.462	1.600	86.27
148.000	1.535	31.84	266.35	0.650	2.481	1.613	86.78
140.000	1.511	31.34	281.43	0.650	20.550	13.358	712.33
138.000	1.505	31.21	285.14	0.650	2.656	1.727	91.25
138.000	1.505	31.21	285.14	0.650	2.676	1.739	91.72
130.000	1.480	30.68	299.72	0.650	22.104	14.368	750.53
123.750	1.459	30.25	310.82	0.650	17.378	11.296	581.03
120.000	1.446	29.99	312.82	0.650	11.070	7.195	366.00
119.250	1.443	29.93	314.12	0.650	0.748	0.486	24.58
110.000	1.411	29.25	329.72	0.650	30.903	20.087	1004.17
100.000	1.373	28.46	345.73	0.650	32.845	21.349	1039.75
90.000	1.332	27.62	360.74	0.650	34.786	22.611	1070.00
84.250	1.307	27.10	368.84	0.650	18.115	11.775	544.21
80.000	1.288	26.71	369.23	0.650	18.346	11.925	541.99
78.750	1.282	26.59	370.88	0.650	3.728	2.423	108.89
70.000	1.240	25.71	381.72	0.650	34.422	22.374	987.31
60.000	1.186	24.60	392.44	0.650	40.091	26.059	1105.52
50.000	1.126	23.35	400.89	0.650	42.033	27.321	1104.48
46.000	1.100	22.80	403.48	0.650	17.326	11.262	437.90
40.000	1.057	21.91	400.50	0.650	25.136	16.338	615.77
39.250	1.051	21.79	400.76	0.650	1.107	0.720	26.51
30.000	1.000	20.74	407.12	0.650	45.292	29.440	1049.41
20.000	1.000	20.74	424.59	0.650	47.234	30.702	1075.91
10.000	1.000	20.74	442.07	0.650	49.176	31.964	1120.15
2.000	1.000	20.74	456.05	0.650	40.739	26.480	927.96

Summation TOTAL = 17087.65 44019.04

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



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Job No.....: 29201-0692          Design No: SUMMIT #14620      Engineer : MFP
Description : 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT
Design.....: 90 + SIMULTANEOUS 1/2" RADIAL ICE
Owner.....  : Crown Castle                Client: Summit Manufacturing, LLC (
Status..... : Final Design                Revision: 1   Rev. Date : 08/20/2001
-----

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## POLE SHAFT SEGMENTS -- AXIAL AND SHEAR FORCES:

LOAD CASE 1: WIND VELOCITY = 90.00 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.	168.000	0.000	0.000	0.000	0.000
2.	168.000	0.100	0.100	0.028	0.028
3.	168.000	2.100	2.200	2.232	2.260
4.	168.000	0.599	2.799	2.307	4.567
5.	160.000	0.826	3.625	0.628	5.195
6.	158.000	2.208	5.833	2.274	7.468
7.	158.000	0.609	6.441	2.274	9.743
8.	150.000	0.903	7.345	0.671	10.414
9.	148.000	2.217	9.562	2.238	12.653
10.	148.000	0.618	10.180	2.239	14.892
11.	140.000	0.980	11.160	0.712	15.604
12.	138.000	2.227	13.387	2.201	17.805
13.	138.000	0.628	14.015	2.201	20.006
14.	130.000	1.057	15.072	0.751	20.757
15.	123.750	1.477	16.549	0.581	21.338
16.	120.000	0.642	17.191	0.366	21.704
17.	119.250	0.043	17.235	0.025	21.728
18.	110.000	1.795	19.030	1.004	22.732
19.	100.000	1.912	20.942	1.040	23.772
20.	90.000	2.028	22.970	1.070	24.842
21.	84.250	2.253	25.223	0.544	25.386
22.	80.000	1.257	26.481	0.542	25.928
23.	78.750	0.256	26.736	0.109	26.037
24.	70.000	2.362	29.098	0.987	27.025
25.	60.000	2.754	31.852	1.106	28.130
26.	50.000	2.891	34.744	1.104	29.235
27.	46.000	3.250	37.994	0.438	29.672
28.	40.000	1.986	39.980	0.616	30.288
29.	39.250	0.088	40.068	0.027	30.315
30.	30.000	3.583	43.650	1.049	31.364
31.	20.000	3.740	47.390	1.076	32.440
32.	10.000	3.898	51.288	1.120	33.560
33.	2.000	3.231	54.519	0.928	34.488
Base	1.000		54.519		34.488

```

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

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 Description : 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT  
 Design..... : 90 + SIMULTANEOUS 1/2" RADIAL ICE  
 Owner..... : Crown Castle Client: Summit Manufacturing, LLC (  
 Status..... : Final Design Revision: 1 Rev. Date : 08/20/2001  
 -----

POLE SHAFT SEGMENTS -- MOMENTS and DEFLECTIONS:

LOAD CASE 1: WIND VELOCITY = 90.00 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)
168.00	0.084	0.000	0.000	0.084	103.365	109.147	5.793
168.00	0.084	0.000	0.000	0.084	103.365	109.147	5.793
168.00	0.084	0.000	0.000	0.084	103.365	109.147	5.793
168.00	0.084	0.000	0.223	0.307	102.216	107.930	5.793
160.00	36.014	2.780	2.780	41.573	93.043	98.207	5.763
158.00	44.996	4.268	3.145	52.410	91.900	96.996	5.748
158.00	44.996	4.268	3.733	52.997	90.760	95.788	5.748
150.00	116.011	13.523	9.187	138.720	81.718	86.206	5.640
148.00	133.764	16.684	9.912	160.360	80.599	85.021	5.602
148.00	133.764	16.684	10.850	161.298	79.488	83.844	5.602
140.00	239.214	32.839	19.027	291.079	70.750	74.588	5.400
138.00	265.576	37.775	20.082	323.433	69.679	73.453	5.339
138.00	265.576	37.775	21.333	324.684	68.620	72.332	5.339
130.00	404.780	61.227	31.863	497.870	60.369	63.598	5.046
123.75	513.533	83.777	39.821	637.131	54.514	57.404	4.775
120.00	578.785	99.125	45.004	722.914	51.010	53.698	4.624
119.25	591.835	102.352	45.353	739.540	50.779	53.455	4.594
110.00	752.789	146.871	59.260	958.921	42.016	44.193	4.200
100.00	926.794	204.842	73.066	1204.702	34.116	35.852	3.749
90.00	1100.799	273.351	86.478	1460.628	27.122	28.477	3.284
84.25	1200.851	317.615	92.950	1611.417	23.971	25.157	3.014
80.00	1274.803	352.637	99.548	1726.988	21.048	22.079	2.838
78.75	1296.554	363.303	100.850	1760.708	20.488	21.489	2.787
70.00	1448.808	442.816	112.243	2003.867	15.804	16.563	2.429
60.00	1622.813	544.028	124.018	2290.858	11.364	11.897	2.025
50.00	1796.817	656.299	134.569	2587.686	7.717	8.071	1.629
46.00	1866.419	704.294	138.379	2709.093	6.477	6.771	1.473
40.00	1970.822	779.536	143.720	2894.078	4.899	5.119	1.263
39.25	1983.873	789.202	143.943	2917.017	4.835	5.052	1.238
30.00	2144.827	913.394	151.866	3210.086	2.650	2.766	0.925
20.00	2318.831	1057.836	157.858	3534.525	1.126	1.174	0.596
10.00	2492.836	1213.235	161.581	3867.652	0.250	0.261	0.278
1.00	2649.440	1362.830	162.717	4174.987	0.000	0.000	0.000

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

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 Windows Version 3.00.0006 Mon Aug 20, 2001 - 8:52:13 am  
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-----  
 Job No.....: 29201-0692 Design No: SUMMIT #14620 Engineer : MFP  
 Description : 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT  
 Design..... : 90 + SIMULTANEOUS 1/2" RADIAL ICE  
 Owner..... : Crown Castle Client: Summit Manufacturing, LLC (  
 Status..... : Final Design Revision: 1 Rev. Date : 08/20/2001  
 -----

POLE SHAFT SEGMENTS -- ACTUAL VS. ALLOWABLE STRESSES:

LOAD CASE 1: WIND VELOCITY = 90.00 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)		
168.00	0.009	0.000	0.000	0.000	0.009	52.00	0.0002
168.00	0.009	0.005	0.003	0.003	0.018	52.00	0.0003
168.00	0.009	0.117	0.239	0.239	0.838	52.00	0.0161
168.00	0.033	0.149	0.475	0.484	1.671	52.00	0.0321
160.00	3.890	0.178	0.409	0.510	4.368	52.00	0.0840
158.00	4.729	0.282	0.587	0.720	5.498	52.00	0.1057
158.00	4.782	0.311	0.779	0.939	5.899	52.00	0.1135
150.00	10.896	0.331	0.679	0.937	11.571	52.00	0.2225
148.00	12.184	0.424	0.816	1.120	13.046	52.00	0.2509
148.00	12.255	0.452	0.975	1.318	13.313	52.00	0.2560
140.00	19.466	0.465	0.859	1.296	20.277	52.00	0.3899
138.00	20.976	0.549	0.966	1.456	21.930	52.00	0.4217
138.00	21.057	0.575	1.100	1.637	22.145	52.00	0.4259
130.00	28.689	0.583	0.977	1.601	29.611	52.00	0.5694
123.75	33.631	0.612	0.896	1.575	34.510	52.00	0.6636
120.00	30.028	0.504	0.704	1.270	30.723	52.00	0.5908
119.25	30.407	0.503	0.696	1.265	31.096	52.00	0.5980
110.00	34.914	0.523	0.617	1.246	35.584	52.00	0.6843
100.00	38.763	0.541	0.546	1.225	39.424	52.00	0.7581
90.00	41.833	0.560	0.486	1.208	42.495	52.00	0.8172
84.25	43.291	0.596	0.456	1.196	43.980	52.00	0.8458
80.00	38.173	0.517	0.375	1.011	38.765	52.00	0.7455
78.75	38.394	0.519	0.370	1.008	38.986	52.00	0.7497
70.00	39.840	0.539	0.337	0.999	40.445	52.00	0.7778
60.00	41.185	0.561	0.305	0.989	41.806	52.00	0.8040
50.00	42.271	0.584	0.277	0.980	42.910	52.00	0.8252
46.00	42.643	0.627	0.267	0.977	43.323	52.00	0.8331
40.00	38.206	0.559	0.224	0.845	38.809	52.00	0.7463
39.25	38.248	0.558	0.222	0.843	38.850	52.00	0.7471
30.00	38.776	0.584	0.205	0.837	39.401	52.00	0.7577
20.00	39.213	0.608	0.188	0.830	39.860	52.00	0.7665
10.00	39.547	0.631	0.173	0.824	40.215	52.00	0.7734
1.00	39.776	0.648	0.162	0.818	40.459	52.00	0.7781

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

-----  
 Job No.....: 29201-0692 Design No: SUMMIT #14620 Engineer : MFP  
 Description : 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT  
 Design.....: 90 + SIMULTANEOUS 1/2" RADIAL ICE  
 Owner.....: Crown Castle Client: Summit Manufacturing, LLC (  
 Status.....: Final Design Revision: 1 Rev. Date : 08/20/2001  
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 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 .....	61.040 Inches	Base Plate Shape ...:	Square
PT-to-PT, DP .....	61.982 Inches		
Min Bolt Circle ..:	68.232 Inches	Use Bolt Circle ...:	68.000 Inches

-----  
 Base Reactions : DESIGN USER  
 Moment .....: 4174.99 Ft-Kips 4174.99 Ft-Kips  
 Axial Load .....: 54.52 Kips 54.52 Kips  
 -----

Anchor Bolt Details : DESIGN USER  
 Number of Bolts .....: 16 20  
 Bolt Diameter .....: 2.250 Inches 2.250 Inches  
 Bolt Type .....: #18J ASTM A615 #18J ASTM A615  
 Y-Distance .....: 9 12  
 Mom. of Inertia .....: 9311.21 In<sup>4</sup> 11560.00 In<sup>4</sup>  
 Bolt Tension, T .....: 183.56 Kips 147.35 Kips  
 Allowable Tension ...: 194.81 Kips 194.81 Kips  
 Bolt Compression, C ..: 186.97 Kips 150.08 Kips  
 -----

Base Plate Details : DESIGN USER  
 Plate Moment, MPL ....: 2689.40 In-Kips 2611.37 In-Kips  
 Bend Plane, W .....: 31.26 Inches 33.71 Inches  
 Plate Thickness, t ...: 3.064 Inches 3.000 Inches  
 Plate Width .....: 65.266 Inches 67.000 Inches  
 Plate Steel .....: ASTM A572 GRADE 55 (55 KSI) ASTM A572 GRADE 55 (55 KSI)  
 Gross Weight .....: 3701.20 Lbs 3819.00 Lbs  
 Net Weight .....: 2724.30 Lbs 2847.40 Lbs  
 Allowable Stress .....: 54.99 Ksi 54.99 Ksi  
 Actual Stress .....: 54.99 Ksi 51.64 Ksi  
 Act./Allow Ratio .....: 1.00 0.94  
 -----

-----  
 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 :	67.000 Inches (Square)	Bolt Circle .....	68.00 Inches
Plate Weight .....	3.819 Kips	Bolt Diameter .....	2.25 Inches
		Bolt Type .....	#18J ASTM A615

-----  
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 -----

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): 55.00    Friction S.F .....: 2.00  
 Min. Depth (ft) ....: 23.00    Horizontal (kips) : 42.00    Lateral S.F .....: 2.00  
 Depth Used (ft) ....: 23.00    Uplift (kips) ....: 0.00    Concrete S.F .....: 1.30  
 Rebar Area (in^2) ..: 37.44    Moment (Ft-kips) ..: 5100.0    Concrete F'c (psi) : 3000.0  
 Rebar Used .....: (24)#11    Full Cohesion (ft): 24.00    Steel Cover (in) ...: 4.00  
 Water at (ft) .....: 99.00    Rock at (ft) .....: 13.00  
 -----

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	100.00	0.00	0.00	0.00	0.00	1.000	0.00
2	10.50	135.00	0.00	3000.00	35.00	35.00	3.690	0.00
3	20.00	135.00	0.00	40000.00	35.00	35.00	3.690	0.00

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) .....	23.00	23.00
Concrete Volume (CY) .....	43.75	43.75
Applied Moment From Loads (Working), Mwork (Ft-kip):	5826.60	5826.60
Resisting Moment From Soil (Ult), Mult (Ft-kip) ...:	12398.55	12398.55
Moment S.F. (Mult / Mwork) .....	2.13	2.13
Applied Horizontal Load (Working), Hwork (Kips) ...:	42.00	42.00
Horizontal Soil Resistance (Ultimate), Hult (Kips):	87.63	87.63
Horizontal S.F. (Hult / Hwork) .....	2.09	2.09
Center of Rotation (from grade) (ft) .....	16.80	16.80
Inflection Point (Max Design Moment Location) (ft) :	5.30	5.30
Maximum Factored Design Moment for Reinf. (Ft-kip):	7342.56	7342.56
Area Steel Required From Loads (in^2) .....	37.20	37.20
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) .....	141.75	141.75

COMPRESSION CAPACITY CHECK :

Actual Compression on Caisson (Kips) .....	55.00	55.00
Total Compression (Includes Concrete Wt.) (Kips) ..:	116.58	116.58
Allowable Compression Capacity (Kips) .....	2010.62	2010.62

CAISSON DESIGN:

USE: 8.00 ft Diameter X 23.50 ft Long (Concrete Volume = 43.75 CY)  
 Reinf: (24)#11 Vert, w/Closed Ties: (12)#5 @6.0", remaining ties @18.0" (ASTM A615)

PJF\_Pole (tm) - Monopole Design Program  
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Job No.....: 29201-0692 Design No: SUMMIT #14620 Engineer : MFP  
Description : 170-Ft Monopole - 801367; CHESHIRE, NEW HAVEN CO., CT  
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Status..... : Final Design Revision: 1 Rev. Date : 08/20/2001  
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S U M M A R Y O F S P R E A D F O O T I N G D E S I G N  
-----

INPUT :

TOWER LOADS :

Pole Weight : 55.00 kips (pole, antenna, ice, mounts, etc.)  
Overturning Moment : 5100.00 ft-kip (at Top of Pier)  
Total Horizontal Load : 42.00 kips (at Top of Pier)  
Overturning Safety Factor : 1.50

CONCRETE :

Concrete Strength : 3000.00 psi at 28 Days  
Reinforced Steel Strength : 60000.00 psi (ASTM A615 grade 60)

SOIL :

Water Table Below Bottom Of Footing  
Soil Density : 100.00 pcf (dry)  
Allowable Soil Bearing : 8000.00 psf

FOOTING SIZE :

Width : 26.00 ft Length : 26.00 ft  
Thickness : 4.00 ft Depth : 7.00 ft Below Grade  
Pier Size : 8.00 ft square Pier : 0.50 ft Above Grade  
Concrete Density : 150.00 pcf

OUTPUT :

Volume of Concrete : 2928.00 ft<sup>3</sup> (108.44 Cubic Yards)  
Weight of Tower : 55.00 kips  
Weight of Concrete : 439.20 kips (2928.00 ft<sup>3</sup> x 0.150 k/ft<sup>3</sup>)  
Weight of Soil : 183.60 kips (1836.00 ft<sup>3</sup> x 0.10 k/ft<sup>3</sup>)  
-----  
Total Weight : 677.80 kips  
Overturning Moment : 5100.00 ft-k + (42.00 k x 7.50 ft) = 5415.00 ft-kips  
Resisting Moment : 677.80 k x 26.00 ft/2 = 8811.40 ft-kips

Safety Factor = Mresist / O.T.M. = 8811.40 / 5415.00 = 1.63 > 1.50 O.K.

Ultimate Overturning Moment: 5415.00 ft-k x 1.50 = 8122.50 ft-kips  
Ultimate Net Soil Bearing : 16399.44 psf  
Gross Soil Bearing : 3468.32 psf (Includes Soil Overburden)  
Soil Overburden : 700.00 psf (Soil Overburden)  
Net soil Bearing : 2768.32 psf < 8000.00 psf O.K.

Bending Moment in Pier : 5100.00 ft-k + (42.00 k x 3.50 ft) = 5247.00 ft-kips  
Area of Steel Required : 61.42 in<sup>2</sup> (40 no. 11 Bars) (0.5 % = 46.08 in<sup>2</sup>)

Bending Moment in Footing : 5866.25 ft-kips  
Footing Reinforcing : 1.55 in<sup>2</sup>/ft = 32 no. 10 bars @ 9.81 in. o.c.  
(0.18 % = 1.04 in<sup>2</sup>/ft)

Bending Shear in Footing : 547.01 kips  
Allowable Bending Shear : 972.10 kips O.K.

**CT43XC844 - Crown Castle Tower, 1119 Summit Road, Cheshire CT 06410**

**Cumulative Worst Case Power Density Analysis of Sprint PCS and Verizon antennas**

Operator (Name)	Operating Frequency (MHz)	Distance to Target (feet)	Calculated Power Density (mW/cm <sup>2</sup> )	Maximum Permissible Exposure <sup>a</sup> (mW/cm <sup>2</sup> )	Fraction of MPE (%)
Verizon	870 - 880 MHz	167.5	0.023600	0.582	4.05%
Sprint PCS	1962.5	147.5	0.086838	1.00	8.68%
<b>Total Percentage of Maximum Permissible Exposure</b>					<b>12.74%</b>

<sup>a</sup> Based on information provided by Verizon