ROBINSON & COLE LLP

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
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kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

December 28, 2012

Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-040-120906 – 60 South Main Street, East Granby, Connecticut**
EM-VER-053-120907 – 89 Dr. Nott Drive, Franklin, Connecticut
EM-VER-058-120828 – 1439 Voluntown Road, Griswold, Connecticut
EM-VER-059-120828 – 75 Roberts Road, Groton, Connecticut
EM-VER-056-121009 – 30 Higley Road, Granby, Connecticut
EM-VER-084-121002 – 10 Bona Street, Milford, Connecticut

Completion of Construction Activity

Dear Ms. Roberts:

The purpose of this letter is to notify the Siting Council that construction activity associated with the above-referenced Cellco Partnership d/b/a Verizon Wireless telecommunications facilities has been completed.

If you have any questions or need any additional information regarding this facility please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter

12012089-v1

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

October 3, 2012

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

RE: **EM-VER-040-120906** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 60 South Main Street, East Granby, Connecticut.

Dear Attorney Baldwin:

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

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated September 5, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/CDM/jbw

c: The Honorable James M. Hayden, First Selectman, Town of East Granby
Dinesh Patel,Zoning Enforcement Officer, Town of East Granby
Crown Castle

CSC
CONNECTICUT SITING COUNCIL

ROBINSON & COLE

EM-VER-040-120906

KENNETH C. BALDWIN

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Also admitted in Massachusetts

September 5, 2012

Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap**
60 South Main Street, East Granby, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 67-foot level on an existing 97-foot tower at the above-referenced address. The tower is owned by Crown Castle. Cellco's use of the tower was approved by the Council in 2010. Cellco now intends to replace three (3) of its existing antennas with three (3) model BXA-171063-12BF PCS antennas at the same 67-foot level. Attached behind Tab 1 are the specifications for the replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to James M. Hayden, First Selectman of the Town of East Granby. A copy of this letter is also being sent to Galasso Holdings LLC, the owner of the property on which the tower is located.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas will be located at the 67-foot level on the existing 97-foot tower.

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundaries.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed modifications. (See Tab 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
James M. Hayden, East Granby First Selectman
Galasso Holdings LLC
Sandy M. Carter

Amphenol ANTENNA SOLUTIONS

BXA-171063-12BF-EDIN-X

Replace "X" with desired electrical downtilt.

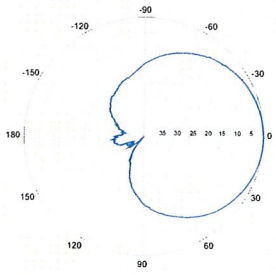
X-Pol | FET Panel | 63° | 19.0 dBi

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	4.5°	4.5°	4.5°
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt (X)	0, 2, 5		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		

Mechanical Characteristics		
Dimensions Length x Width x Depth	1820 x 154 x 105 mm	71.7 x 6.1 x 4.1 in
Depth with z-brackets	133 mm	5.2 in
Weight without mounting brackets	6.8 kg	15 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.28 m² Side: 0.19 m²	Front: 3.1 ft² Side: 2.1 ft²
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N	Front: 103 lbf Side: 68 lbf

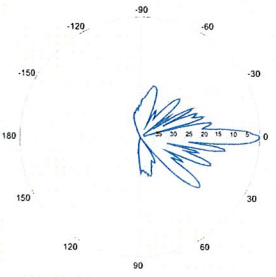
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12BF-EDIN-X-FP		

BXA-171063-12BF-EDIN-X



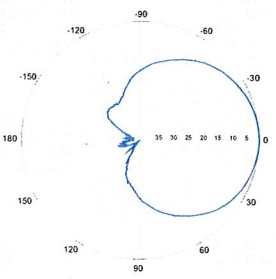
Horizontal | 1710-1880 MHz

BXA-171063-12BF-EDIN-0



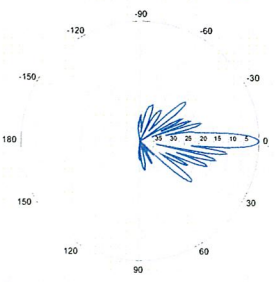
0° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-X



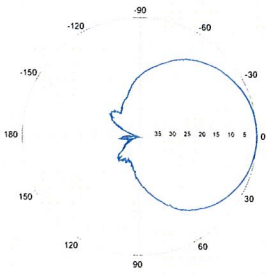
Horizontal | 1850-1990 MHz

BXA-171063-12BF-EDIN-0



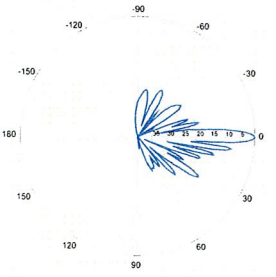
0° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-X



Horizontal | 1920-2170 MHz

BXA-171063-12BF-EDIN-0

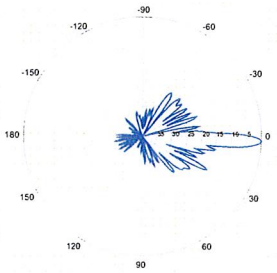


0° | Vertical | 1920-2170 MHz

BXA-171063-12BF-EDIN-X

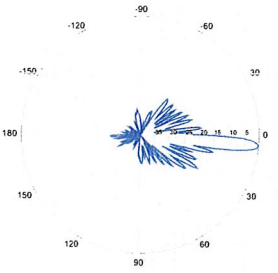
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12BF-EDIN-2



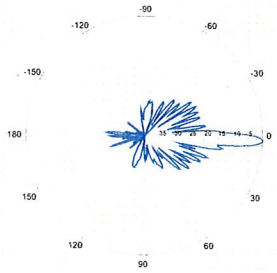
2° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-5



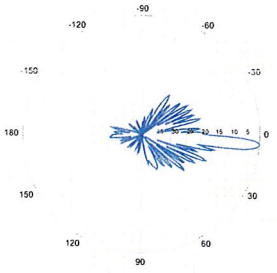
5° | Vertical | 1710-1880 MHz

BXA-171063-12BF-EDIN-2



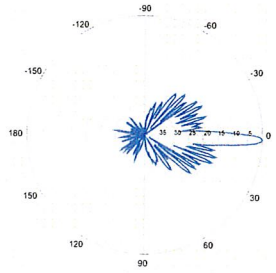
2° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-5



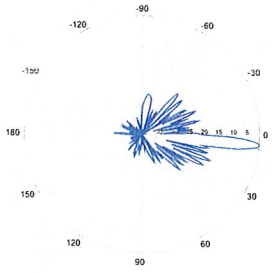
5° | Vertical | 1850-1990 MHz

BXA-171063-12BF-EDIN-2



2° | Vertical | 1920-2170 MHz

BXA-171063-12BF-EDIN-5



5° | Vertical | 1920-2170 MHz

	General	Power	Density					
Site Name: East Granby 3								
Tower Height: Verizon @ 67Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	565	76	0.0703	880	0.5867	1.20%	
*AT&T UMTS	2	875	76	0.1089	1900	1.0000	1.09%	
*AT&T GSM	1	283	76	0.0176	880	0.5867	0.30%	
*AT&T GSM	4	525	76	0.1307	1900	1.0000	1.31%	
*AT&T LTE	1	1615	76	0.1005	734	0.4893	2.05%	
*MetroPCS	3	727	82	0.1166	2140	1.0000	11.66%	
*Sprint	8	250	96.5	0.0772	1962.5	1.0000	7.72%	
*VoiceStream	8	248	89.75	0.0886	1930	1.0000	8.86%	
Verizon PCS	**4**	**290**	**67**	**0.0929**	**1970**	**1.0000**	**9.29%**	
Verizon Cellular	**8**	**282**	**67**	**0.1807**	**869**	**0.5793**	**31.19%**	
Verizon AWS	**1**	**703**	**67**	**0.0563**	**2145**	**1.0000**	**5.63%**	
Verizon 700	**1**	**913**	**67**	**0.0731**	**698**	**0.4653**	**15.72%**	
								96.02%
* Source: Siting Council								

Pier Structural Engineering Corp.
55 Northfield Drive E, Suite 198
Waterloo, ON N2K 3T6
Tel: 519-885-3806
Fax: 519-886-0076
www.p-sec.ca

Specializing in Communication Tower Engineering

May 25, 2012

Eva Morales, Tower Structural Analyst
Crown Castle USA Inc.
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Subject:	**Structural Analysis Report**	
Carrier Designation:	Carrier Co-Locate:	**Verizon Wireless**
	Carrier Site Number:	**N/A**
	Carrier Site Name:	**East Granby 3**
Crown Castle Designation:	Crown Castle BU Number:	**876399**
	Crown Castle Site Name:	**(F) E. GRANBY 4Q2000 / GALASSO**
	Crown Castle JDE Job Number:	**188504**
	Crown Castle WO Number:	**496949**
Engineering Firm Designation:	P-SEC Project Number:	**6651**
Site Data:	**60 South Main St., EAST GRANBY, Hartford County, CT** **Latitude *41° 56' 29.59"*, Longitude *-72° 44' 19.248"*** **98-ft Monopole**	

Dear Eva Morales,

Pier Structural Engineering Corp. (P-SEC) is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 466372, in accordance with application 150683, revision 3.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and the 2005 CT State Building Code based upon a wind speed of 80 mph fastest mile.

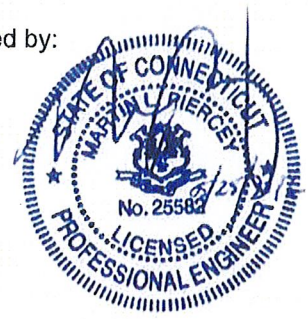
We at P-SEC appreciate the opportunity of providing our continuing professional services to you and Crown Castle USA Inc. If you have any questions or need further assistance on this or any other projects please give us a call.

Prepared by:

Ryan Heska

Ryan Heska, E.I.T.

Reviewed by:



tnxTower Report - version 6.0.4.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 98-ft monopole tower designed by ENGINEERED ENDEAVORS, INC. in September of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F. The tower was reinforced by IETS in 2009.

2) ANALYSIS CRITERIA

The following design parameters have been used in our analysis:

Design Standard:		TIA/EIA-222-F standard and 2005 CT Building Code Requirements
County/State:		Hartford County, CT
Wind Speeds:	*CASE 1*	80 mph (fastest mile)
	CASE 2	28.1 mph (fastest mile) with 1" radial solid ice *(per ASCE7 ice map)*
	CASE 3	50 mph (fastest mile) for Serviceability
Allowable Stress:		Increased 1/3rd

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
67	67	3	antel	BXA-171063-12BF	--	--	1

Notes:
1) Proposed equipment

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
94	96.5	1	andrew	HBX-6516DS-VTM	6	1-1/4	1
		1	antel	BXA-80063/4CF			
		4	decibel	DB980H65E-M	2	7/8	
89	94	1	--	Platform Mount [LP 601-1]			
	89	3	ems wireless	RR90-17-02DP	6	7/8	1
		1	--	Platform Mount [LP 305-1]			
82	83	3	andrew	HBX-6516DS-VTM	6	7/8	1
	82	3	--	T-Arm Mounts [TA 601-1]	1	5/16	
74	76	6	powerwave	7770.00	18	7/8	1
		6	powerwave	LGP21401			
		6	powerwave	LGP21903			
67	74	1	--	Platform Mount [LP 303-1]			
	67	3	antel	BXA-185063/12CFx2	--	--	2
		3	antel	BXA-70063/6CFx2	18	1-5/8	1
		6	antel	LPA-80063/6CFx2			
47	49	1	--	Platform Mount [LP 304-1]	1	1/2	1
		1	lucent	KS24019-L112A			
	47	1	--	Side Arm Mount [SO 701-1]			

Notes:
1) Existing equipment
2) Existing equipment to be replaced by proposed

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
96.5	96.5	12	dapa	48000	--	--
87.5	87.5	12	dapa	48000	--	--
77.5	77.5	12	dapa	48000	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E. dated 7/25/2000	1531971	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEI, Job No. 7832 dated 9/22/2000	2066334	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI, Job No. 7832 dated 9/22/2000	1613691	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	IETS, Proj. No. 2009-70644 dated 11/4/2009	2529017	CCISITES
4-POST-MODIFICATION INSPECTION	IETS, Proj. No. 2010-70158 dated 7/7/2010	2682749	CCISITES
APPLICATION	Verizon, Revision #3 dated 5/18/2012	150683	CCISITES

3.1) Analysis Method

tnxTower (6.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

This analysis may be affected if any assumptions are not valid or have been made in error. P-SEC should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary) – LC5

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	98 - 82.7891	Pole	TP15.28x12x0.1875	1	-2.67	450.82	23.3	Pass
L2	82.7891 - 45.2865	Pole	TP22.86x14.3839x0.25	2	-9.32	902.77	92.5	Pass
L3	45.2865 - 0	Pole	TP32x21.6345x0.3125	3	-15.98	1633.95	99.0	Pass
							Summary	
						Pole (L3)	99.0	Pass
						RATING =	**99.0**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
2	Anchor Rods	--	79.1	Pass
2	Base Plate	--	71.8	Pass
2	Foundation	--	94.5	Fail

Structure Rating (max from all components) =	**99.0%**

Notes: 1) See full member breakdown and section capacities in Appendix A.
2) See additional documentation in Appendix C for supporting calculations.
3) Stresses up to 105% (steel) and 110% (foundations) are within engineering tolerance and considered acceptable.

4.1) Recommendations

The existing 98-ft monopole located in Hartford County ((F) E. GRANBY 4Q2000 / GALASSO), CT **is structurally acceptable** based on the TIA/EIA-222-F standard and the 2005 CT State Building Code Requirements based upon a wind speed of 80 mph fastest mile.

No modifications are required for the proposed loading.

Should you have any questions, please call us anytime at 519-885-3806.

encl.
876399-150683 SA Report-20120525.doc

APPENDIX A

TNXTOWER OUTPUT

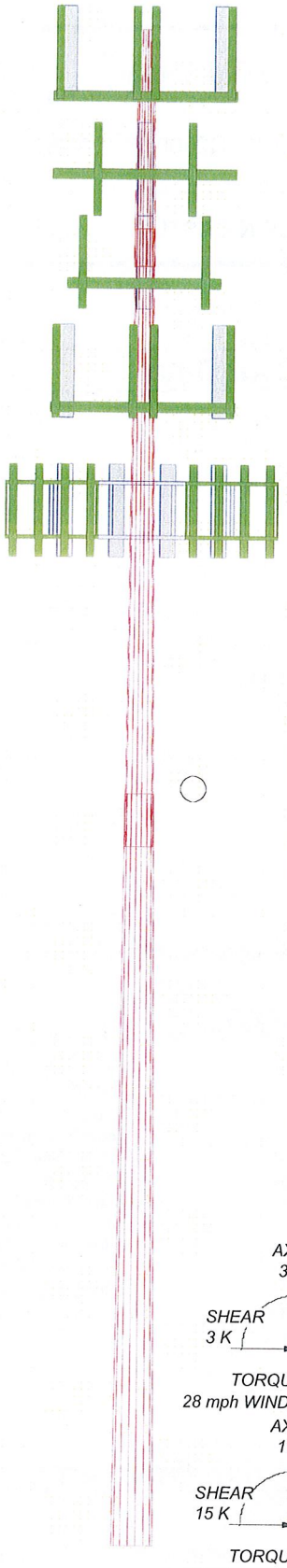
Section	3	2	1
Length (ft)	48'8-13/32"	39'11-1/32"	15'2-17/32"
Number of Sides	18	18	18
Thickness (in)	0.3125	0.2500	0.1875
Socket Length (ft)		3'5-1/32"	2'5-1/32"
Top Dia (in)	21.6345	14.3839	12.0000
Bot Dia (in)	32.0000	22.8600	15.2800
Grade		A572-65	
Weight (K)	4.4	2.0	0.4

98.0 ft

82.8 ft

45.3 ft

0.0 ft



DESIGNED APPURTENANCE LOADING

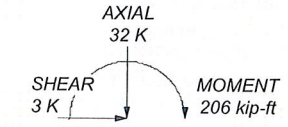
TYPE	ELEVATION	TYPE	ELEVATION
(2) DB980H65E-M w/ Mount Pipe (Carrier 94' E)	94	(2) 7770.00 w/ Mount Pipe (Carrier 74' E)	74
HBX-6516DS-VTM w/ Mount Pipe (Carrier 94' E)	94	(2) 7770.00 w/ Mount Pipe (Carrier 74' E)	74
BXA-80063/4CF w/ Mount Pipe (Carrier 94' E)	94	(2) LGP21401 (Carrier 74' E)	74
(2) DB980H65E-M w/ Mount Pipe (Carrier 94' E)	94	(2) LGP21401 (Carrier 74' E)	74
8'x2 1/2" Pipe Mount (Carrier 94' E)	94	(2) LGP21401 (Carrier 74' E)	74
8'x2 1/2" Pipe Mount (Carrier 94' E)	94	(2) LGP21903 (Carrier 74' E)	74
8'x2 1/2" Pipe Mount (Carrier 94' E)	94	(2) LGP21903 (Carrier 74' E)	74
Platform Mount [LP 601-1] (Carrier 94' E)	94	(2) LGP21903 (Carrier 74' E)	74
RR90-17-02DP w/ Mount Pipe (Carrier 89' E)	89	Platform Mount [LP 303-1] (Carrier 74' E)	74
RR90-17-02DP w/ Mount Pipe (Carrier 89' E)	89	BXA-70063/6CFx2 w/ Mount Pipe (Carrier 67' E)	67
RR90-17-02DP w/ Mount Pipe (Carrier 89' E)	89	BXA-70063/6CFx2 w/ Mount Pipe (Carrier 67' E)	67
5' x 2" Pipe Mount (Carrier 89' E)	89	BXA-70063/6CFx2 w/ Mount Pipe (Carrier 67' E)	67
5' x 2" Pipe Mount (Carrier 89' E)	89	(2) LPA-80063/6CFx2 w/ Mount Pipe (Carrier 67' E)	67
5' x 2" Pipe Mount (Carrier 89' E)	89	(2) LPA-80063/6CFx2 w/ Mount Pipe (Carrier 67' E)	67
Platform Mount [LP 305-1] (Carrier 89' E)	89	(2) LPA-80063/6CFx2 w/ Mount Pipe (Carrier 67' E)	67
HBX-6516DS-VTM w/ Mount Pipe (Carrier 82' E)	82	BXA-171063-12BF w/ Mount Pipe (Carrier 67' P)	67
HBX-6516DS-VTM w/ Mount Pipe (Carrier 82' E)	82	BXA-171063-12BF w/ Mount Pipe (Carrier 67' P)	67
HBX-6516DS-VTM w/ Mount Pipe (Carrier 82' E)	82	BXA-171063-12BF w/ Mount Pipe (Carrier 67' P)	67
5' x 2" Pipe Mount (Carrier 82' E)	82	Platform Mount [LP 304-1] (Carrier 67' E)	67
5' x 2" Pipe Mount (Carrier 82' E)	82	KS24019-L112A (Carrier 47' E)	47
5' x 2" Pipe Mount (Carrier 82' E)	82	Side Arm Mount [SO 701-1] (Carrier 47' E)	47
T-Arm Mount [TA 601-3] (Carrier 82' E)	82		
(2) 7770.00 w/ Mount Pipe (Carrier 74' E)	74		

MATERIAL STRENGTH

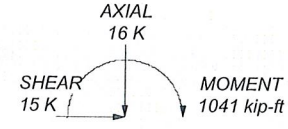
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 28 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. ----------
6. E - Existing, R/MLA - Reserved, P - Proposed
7. Proposed loading at 67ft elevation
8. Reserved loading at 76ft elevation not inlcuded
9. TOWER RATING: 99%



TORQUE 0 kip-ft
28 mph WIND - 1.0000 in ICE



TORQUE 0 kip-ft
REACTIONS - 80 mph WIND

Pier Structural Engineering Corp.
55 Northfield Drive E Suite 198
Waterloo, ON N2K 3T6
Phone: (519) 885-3806
FAX: (519) 886-0076
Consulting Engineers

Job:	***PSEC 6651 (for Verizon)***		
Project:	***876399 - GRANBY 4Q2000 (GALASSO)***		
Client: CROWN CASTLE	Drawn by: rheska	App'd:	
Code: TIA/EIA-222-F	Date: 05/25/12	Scale: NTS	
Path: H:\PROJECTS\6651 - CCI - 876399 - (F) E. Granby 4Q2000 (Galasso)\876399-LC5-20120525.er		Dwg No. E-1	

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

- Tower is located in Hartford County, Connecticut.
- Basic wind speed of 80 mph.
- Nominal ice thickness of 1.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 28 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 50 mph.

--.

- E - Existing, R/MLA - Reserved, P - Proposed.
- Proposed loading at 67ft elevation.
- Reserved loading at 76ft elevation not inlcuded.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.333.
- Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
√ Escalate Ice
Always Use Max Kz
Use Special Wind Profile
√ Include Bolts In Member Capacity
√ Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
SR Members Have Cut Ends
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
√ Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
√ All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feedline Torque
√ Include Angle Block Shear Check

Poles

√ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	98'-82'9-15/32"	15'2-17/32"	2'5-1/32"	18	12.0000	15.2800	0.1875	0.7500	A572-65 (65 ksi)
L2	82'9-15/32"-45'3 -15/32"	39'11-1/32"	3'5-1/32"	18	14.3839	22.8600	0.2500	1.0000	A572-65 (65 ksi)
L3	45'3-15/32"-0'	48'8-13/32"		18	21.6345	32.0000	0.3125	1.2500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	12.1851	7.0299	123.9285	4.1934	6.0960	20.3295	248.0200	3.5156	1.7820	9.504
	15.5157	8.9819	258.4813	5.3578	7.7622	33.2998	517.3028	4.4918	2.3593	12.583
L2	15.1268	11.2152	283.0538	5.0175	7.3070	38.7373	566.4800	5.6087	2.0916	8.366
	23.2127	17.9410	1158.7402	8.0266	11.6129	99.7806	2319.0051	8.9722	3.5834	14.333
L3	22.7067	21.1488	1214.7315	7.5693	10.9903	110.5272	2431.0613	10.5764	3.2577	10.425
	32.4937	31.4300	3987.1110	11.2491	16.2560	245.2701	7979.4683	15.7180	5.0820	16.262

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 98'-82'9-15/32"				1	1	1		
L2 82'9-15/32"-45' 3-15/32"				1	1	1		
L3 45'3-15/32"-0'				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
**										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1-1/4" Line (Carrier 94' E)	B	No	Inside Pole	94' - 5'	6	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
7/8" Line (Carrier 94' E)	B	No	Inside Pole	94' - 5'	2	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
						2" Ice	0.00	0.33
						4" Ice	0.00	0.33
**								
7/8" Line (Carrier 89' E)	B	No	Inside Pole	89' - 5'	6	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
						2" Ice	0.00	0.33
						4" Ice	0.00	0.33
**								
7/8" Line	A	No	CaAa (Out Of	82' - 67'	6	No Ice	0.05	0.33

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
(Carrier 82' E)			Face)			1/2" Ice	0.06	1.30
						1" Ice	0.07	2.88
						2" Ice	0.09	7.88
						4" Ice	0.12	25.20
7/8" Line	A	No	CaAa (Out Of	67' - 5'	6	No Ice	0.00	0.33
(Carrier 82' E)			Face)			1/2" Ice	0.00	1.30
						1" Ice	0.00	2.88
						2" Ice	0.00	7.88
						4" Ice	0.00	25.20
ATCB-B01(5/16)	A	No	CaAa (Out Of	82' - 5'	1	No Ice	0.00	0.07
(Carrier 82' E)			Face)			1/2" Ice	0.00	0.30
						1" Ice	0.00	0.53
						2" Ice	0.00	0.97
						4" Ice	0.00	1.88
**								
7/8" Line	B	No	Inside Pole	74' - 5'	12	No Ice	0.00	0.33
(Carrier 74' E)						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
						2" Ice	0.00	0.33
						4" Ice	0.00	0.33
**								
1-5/8" Line	A	No	CaAa (Out Of	67' - 5'	18	No Ice	0.03	0.82
(Carrier 67' E)			Face)			1/2" Ice	0.03	2.33
						1" Ice	0.03	4.46
						2" Ice	0.04	10.54
						4" Ice	0.05	30.04
**								
1/2" Line	B	No	Inside Pole	47' - 5'	1	No Ice	0.00	0.15
(Carrier 47' E)						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
**								

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) DB980H65E-M w/ Mount	A	From Leg	3.00	0.0000	94'	No Ice	4.04	3.62	0.03
Pipe			0'			1/2" Ice	4.50	4.48	0.06
(Carrier 94' E)			2'6"			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
HBX-6516DS-VTM w/	B	From Leg	3.00	0.0000	94'	No Ice	3.60	3.24	0.03
Mount Pipe			0'			1/2" Ice	4.00	3.91	0.06
(Carrier 94' E)			2'6"			1" Ice	4.43	4.56	0.10
						2" Ice	5.37	5.91	0.20
						4" Ice	7.36	8.88	0.50
BXA-80063/4CF w/ Mount	B	From Leg	3.00	0.0000	94'	No Ice	5.40	3.42	0.03
Pipe			0'			1/2" Ice	5.84	4.02	0.07
(Carrier 94' E)			2'6"			1" Ice	6.30	4.64	0.11
						2" Ice	7.24	5.92	0.23
						4" Ice	9.26	8.93	0.56
(2) DB980H65E-M w/ Mount	C	From Leg	3.00	0.0000	94'	No Ice	4.04	3.62	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Pipe (Carrier 94' E)			0' 2'6"			1/2" Ice	4.50	4.48	0.06
						1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
8'x2 1/2" Pipe Mount (Carrier 94' E)	A	From Leg	3.00 0' 0'	0.0000	94'	No Ice	2.30	2.30	0.04
						1/2" Ice	3.13	3.13	0.06
						1" Ice	3.62	3.62	0.08
						2" Ice	4.62	4.62	0.14
						4" Ice	6.73	6.73	0.33
8'x2 1/2" Pipe Mount (Carrier 94' E)	B	From Leg	3.00 0' 0'	0.0000	94'	No Ice	2.30	2.30	0.04
						1/2" Ice	3.13	3.13	0.06
						1" Ice	3.62	3.62	0.08
						2" Ice	4.62	4.62	0.14
						4" Ice	6.73	6.73	0.33
8'x2 1/2" Pipe Mount (Carrier 94' E)	C	From Leg	3.00 0' 0'	0.0000	94'	No Ice	2.30	2.30	0.04
						1/2" Ice	3.13	3.13	0.06
						1" Ice	3.62	3.62	0.08
						2" Ice	4.62	4.62	0.14
						4" Ice	6.73	6.73	0.33
Platform Mount [LP 601-1] (Carrier 94' E)	C	None		0.0000	94'	No Ice	28.47	28.47	1.12
						1/2" Ice	33.59	33.59	1.51
						1" Ice	38.71	38.71	1.91
						2" Ice	48.95	48.95	2.69
						4" Ice	69.43	69.43	4.26
**									
RR90-17-02DP w/ Mount Pipe (Carrier 89' E)	A	From Leg	3.00 0' 0'	0.0000	89'	No Ice	4.59	3.32	0.03
						1/2" Ice	5.09	4.09	0.07
						1" Ice	5.58	4.78	0.11
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
RR90-17-02DP w/ Mount Pipe (Carrier 89' E)	B	From Leg	3.00 0' 0'	0.0000	89'	No Ice	4.59	3.32	0.03
						1/2" Ice	5.09	4.09	0.07
						1" Ice	5.58	4.78	0.11
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
RR90-17-02DP w/ Mount Pipe (Carrier 89' E)	C	From Leg	3.00 0' 0'	0.0000	89'	No Ice	4.59	3.32	0.03
						1/2" Ice	5.09	4.09	0.07
						1" Ice	5.58	4.78	0.11
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
5' x 2" Pipe Mount (Carrier 89' E)	A	From Leg	3.00 0' 0'	0.0000	89'	No Ice	1.00	1.00	0.03
						1/2" Ice	1.39	1.39	0.04
						1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
5' x 2" Pipe Mount (Carrier 89' E)	B	From Leg	3.00 0' 0'	0.0000	89'	No Ice	1.00	1.00	0.03
						1/2" Ice	1.39	1.39	0.04
						1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
5' x 2" Pipe Mount (Carrier 89' E)	C	From Leg	3.00 0' 0'	0.0000	89'	No Ice	1.00	1.00	0.03
						1/2" Ice	1.39	1.39	0.04
						1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
Platform Mount [LP 305-1] (Carrier 89' E)	C	None		0.0000	89'	No Ice	18.01	18.01	1.12
						1/2" Ice	23.33	23.33	1.35

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	28.65	28.65	1.58
						2" Ice	39.29	39.29	2.05
						4" Ice	60.57	60.57	2.97
**									
HBX-6516DS-VTM w/ Mount Pipe (Carrier 82' E)	A	From Leg	4.00 0' 1'	0.0000	82'	No Ice	3.60	3.24	0.03
						1/2" Ice	4.00	3.91	0.06
						1" Ice	4.43	4.56	0.10
						2" Ice	5.37	5.91	0.20
						4" Ice	7.36	8.88	0.50
HBX-6516DS-VTM w/ Mount Pipe (Carrier 82' E)	B	From Leg	4.00 0' 1'	0.0000	82'	No Ice	3.60	3.24	0.03
						1/2" Ice	4.00	3.91	0.06
						1" Ice	4.43	4.56	0.10
						2" Ice	5.37	5.91	0.20
						4" Ice	7.36	8.88	0.50
HBX-6516DS-VTM w/ Mount Pipe (Carrier 82' E)	C	From Leg	4.00 0' 1'	0.0000	82'	No Ice	3.60	3.24	0.03
						1/2" Ice	4.00	3.91	0.06
						1" Ice	4.43	4.56	0.10
						2" Ice	5.37	5.91	0.20
						4" Ice	7.36	8.88	0.50
5' x 2" Pipe Mount (Carrier 82' E)	A	From Leg	4.00 0' 0'	0.0000	82'	No Ice	1.00	1.00	0.03
						1/2" Ice	1.39	1.39	0.04
						1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
5' x 2" Pipe Mount (Carrier 82' E)	B	From Leg	4.00 0' 0'	0.0000	82'	No Ice	1.00	1.00	0.03
						1/2" Ice	1.39	1.39	0.04
						1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
5' x 2" Pipe Mount (Carrier 82' E)	C	From Leg	4.00 0' 0'	0.0000	82'	No Ice	1.00	1.00	0.03
						1/2" Ice	1.39	1.39	0.04
						1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
T-Arm Mount [TA 601-3] (Carrier 82' E)	C	None		0.0000	82'	No Ice	10.90	10.90	0.73
						1/2" Ice	14.65	14.65	0.93
						1" Ice	18.40	18.40	1.13
						2" Ice	25.90	25.90	1.52
						4" Ice	40.90	40.90	2.32
**									
(2) 7770.00 w/ Mount Pipe (Carrier 74' E)	A	From Leg	3.00 0' 2'	0.0000	74'	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe (Carrier 74' E)	B	From Leg	3.00 0' 2'	0.0000	74'	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe (Carrier 74' E)	C	From Leg	3.00 0' 2'	0.0000	74'	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) LGP21401 (Carrier 74' E)	A	From Leg	3.00 0'	0.0000	74'	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2'			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) LGP21401 (Carrier 74' E)	B	From Leg	3.00 0' 2'	0.0000	74'	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
						1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) LGP21401 (Carrier 74' E)	C	From Leg	3.00 0' 2'	0.0000	74'	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
						1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) LGP21903 (Carrier 74' E)	A	From Leg	3.00 0' 2'	0.0000	74'	No Ice	0.27	0.18	0.01
						1/2" Ice	0.34	0.25	0.01
						1" Ice	0.43	0.32	0.02
						2" Ice	0.62	0.49	0.03
						4" Ice	1.10	0.94	0.07
(2) LGP21903 (Carrier 74' E)	B	From Leg	3.00 0' 2'	0.0000	74'	No Ice	0.27	0.18	0.01
						1/2" Ice	0.34	0.25	0.01
						1" Ice	0.43	0.32	0.02
						2" Ice	0.62	0.49	0.03
						4" Ice	1.10	0.94	0.07
(2) LGP21903 (Carrier 74' E)	C	From Leg	3.00 0' 2'	0.0000	74'	No Ice	0.27	0.18	0.01
						1/2" Ice	0.34	0.25	0.01
						1" Ice	0.43	0.32	0.02
						2" Ice	0.62	0.49	0.03
						4" Ice	1.10	0.94	0.07
Platform Mount [LP 303-1] (Carrier 74' E)	C	None		0.0000	74'	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
						4" Ice	48.34	48.34	3.10
**									
BXA-70063/6CFx2 w/ Mount Pipe (Carrier 67' E)	A	From Leg	4.00 0' 0'	0.0000	67'	No Ice	7.97	5.40	0.04
						1/2" Ice	8.61	6.55	0.10
						1" Ice	9.22	7.41	0.17
						2" Ice	10.46	9.18	0.33
						4" Ice	13.07	12.93	0.79
BXA-70063/6CFx2 w/ Mount Pipe (Carrier 67' E)	B	From Leg	4.00 0' 0'	0.0000	67'	No Ice	7.97	5.40	0.04
						1/2" Ice	8.61	6.55	0.10
						1" Ice	9.22	7.41	0.17
						2" Ice	10.46	9.18	0.33
						4" Ice	13.07	12.93	0.79
BXA-70063/6CFx2 w/ Mount Pipe (Carrier 67' E)	C	From Leg	4.00 0' 0'	0.0000	67'	No Ice	7.97	5.40	0.04
						1/2" Ice	8.61	6.55	0.10
						1" Ice	9.22	7.41	0.17
						2" Ice	10.46	9.18	0.33
						4" Ice	13.07	12.93	0.79
(2) LPA-80063/6CFx2 w/ Mount Pipe (Carrier 67' E)	A	From Leg	4.00 0' 0'	0.0000	67'	No Ice	10.58	10.67	0.05
						1/2" Ice	11.24	11.93	0.14
						1" Ice	11.87	12.91	0.24
						2" Ice	13.16	14.92	0.48
						4" Ice	15.87	19.16	1.09
(2) LPA-80063/6CFx2 w/ Mount Pipe (Carrier 67' E)	B	From Leg	4.00 0' 0'	0.0000	67'	No Ice	10.58	10.67	0.05
						1/2" Ice	11.24	11.93	0.14
						1" Ice	11.87	12.91	0.24

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	13.16	14.92	0.48
						4" Ice	15.87	19.16	1.09
(2) LPA-80063/6CFx2 w/ Mount Pipe (Carrier 67' E)	C	From Leg	4.00 0' 0'	0.0000	67'	No Ice	10.58	10.67	0.05
						1/2" Ice	11.24	11.93	0.14
						1" Ice	11.87	12.91	0.24
						2" Ice	13.16	14.92	0.48
						4" Ice	15.87	19.16	1.09
BXA-171063-12BF w/ Mount Pipe (Carrier 67' P)	A	From Leg	4.00 0' 0'	0.0000	67'	No Ice	4.97	5.23	0.04
						1/2" Ice	5.52	6.39	0.08
						1" Ice	6.04	7.26	0.14
						2" Ice	7.09	9.05	0.27
						4" Ice	9.36	12.82	0.67
BXA-171063-12BF w/ Mount Pipe (Carrier 67' P)	B	From Leg	4.00 0' 0'	0.0000	67'	No Ice	4.97	5.23	0.04
						1/2" Ice	5.52	6.39	0.08
						1" Ice	6.04	7.26	0.14
						2" Ice	7.09	9.05	0.27
						4" Ice	9.36	12.82	0.67
BXA-171063-12BF w/ Mount Pipe (Carrier 67' P)	C	From Leg	4.00 0' 0'	0.0000	67'	No Ice	4.97	5.23	0.04
						1/2" Ice	5.52	6.39	0.08
						1" Ice	6.04	7.26	0.14
						2" Ice	7.09	9.05	0.27
						4" Ice	9.36	12.82	0.67
Platform Mount [LP 304-1] (Carrier 67' E)	C	None		0.0000	67'	No Ice	17.46	17.46	1.35
						1/2" Ice	22.44	22.44	1.62
						1" Ice	27.42	27.42	1.90
						2" Ice	37.38	37.38	2.45
						4" Ice	57.30	57.30	3.55
**									
KS24019-L112A (Carrier 47' E)	A	From Leg	3.00 0' 2'	0.0000	47'	No Ice	0.16	0.16	0.01
						1/2" Ice	0.22	0.22	0.01
						1" Ice	0.30	0.30	0.01
						2" Ice	0.48	0.48	0.02
						4" Ice	0.95	0.95	0.06
Side Arm Mount [SO 701-1] (Carrier 47' E)	A	None		0.0000	47'	No Ice	0.85	1.67	0.07
						1/2" Ice	1.14	2.34	0.08
						1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
						4" Ice	3.17	7.03	0.18
**									

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	98 - 82.7891	Pole	Max Tension	5	0.00	0.00	-0.00
			Max. Compression	14	-5.85	0.00	0.03
			Max. Mx	5	-2.68	-30.38	-0.28
			Max. My	2	-2.68	0.28	30.06
			Max. Vy	5	4.08	-30.38	-0.28
			Max. Vx	2	-4.05	0.28	30.06
			Max. Torque	9			-0.08
L2	82.7891 - 45.2865	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-20.90	0.00	2.54

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	5	-9.32	-369.04	-0.92
			Max. My	2	-9.33	1.24	367.94
			Max. Vy	5	12.75	-369.04	-0.92
			Max. Vx	2	-12.72	1.24	367.94
			Max. Torque	10			-0.12
L3	45.2865 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.49	0.00	7.97
			Max. Mx	5	-15.98	-1039.18	-1.33
			Max. My	2	-15.98	2.48	1037.48
			Max. Vy	5	14.74	-1039.18	-1.33
			Max. Vx	2	-14.71	2.48	1037.48
			Max. Torque	10			-0.24

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	32.49	-0.00	-0.00
	Max. H_x	11	16.00	14.72	0.02
	Max. H_z	2	16.00	0.02	14.69
	Max. M_x	2	1037.48	0.02	14.69
	Max. M_z	5	1039.18	-14.72	-0.02
	Max. Torsion	4	0.24	-12.73	7.32
	Min. Vert	11	16.00	14.72	0.02
	Min. H_x	5	16.00	-14.72	-0.02
	Min. H_z	8	16.00	-0.02	-14.69
	Min. M_x	8	-1035.18	-0.02	-14.69
	Min. M_z	11	-1039.18	14.72	0.02
	Min. Torsion	10	-0.24	12.73	-7.32

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	98 - 82.7891	31.074	37	2.6068	0.0018
L2	85.2057 - 45.2865	24.143	37	2.5339	0.0013
L3	48.7031 - 0	7.864	37	1.5375	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
94'	(2) DB980H65E-M w/ Mount Pipe	37	28.889	2.5945	0.0018	13396
89'	RR90-17-02DP w/ Mount Pipe	37	26.176	2.5688	0.0016	7441
82'	HBX-6516DS-VTM w/ Mount Pipe	37	22.451	2.4902	0.0013	4101
74'	(2) 7770.00 w/ Mount Pipe	37	18.373	2.3286	0.0011	2663
67'	BXA-70063/6CFx2 w/ Mount Pipe	37	15.039	2.1390	0.0009	2037

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
47'	KS24019-L112A	37	7.339	1.4800	0.0005	1320

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	98 - 82.7891 (1)	TP15.28x12x0.1875	15'2-17/32"	0'	0.0	39.000	8.6718	-2.67	338.20	0.008
L2	82.7891 - 45.2865 (2)	TP22.86x14.3839x0.25	39'11-1/32"	0'	0.0	39.000	17.3654	-9.32	677.25	0.014
L3	45.2865 - 0 (3)	TP32x21.6345x0.3125	48'8-13/32"	0'	0.0	39.000	31.4300	-15.98	1225.77	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	98 - 82.7891 (1)	TP15.28x12x0.1875	30.55	11.817	39.000	0.303	0.00	0.000	39.000	0.000
L2	82.7891 - 45.2865 (2)	TP22.86x14.3839x0.25	369.96	47.509	39.000	1.218	0.00	0.000	39.000	0.000
L3	45.2865 - 0 (3)	TP32x21.6345x0.3125	1041.31	50.947	39.000	1.306	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	98 - 82.7891 (1)	TP15.28x12x0.1875	4.10	0.473	26.000	0.036	0.00	0.000	26.000	0.000
L2	82.7891 - 45.2865 (2)	TP22.86x14.3839x0.25	12.77	0.735	26.000	0.057	0.06	0.004	26.000	0.000
L3	45.2865 - 0 (3)	TP32x21.6345x0.3125	14.76	0.470	26.000	0.036	0.18	0.004	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	98 - 82.7891 (1)	0.008	0.303	0.000	0.036	0.000	0.311 ✓	1.333	H1-3+VT ✓

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L2	82.7891 - 45.2865 (2)	0.014	1.218	0.000	0.057	0.000	1.233 ✔	1.333	H1-3+VT ✔
L3	45.2865 - 0 (3)	0.013	1.306	0.000	0.036	0.000	1.320 ✔	1.333	H1-3+VT ✔

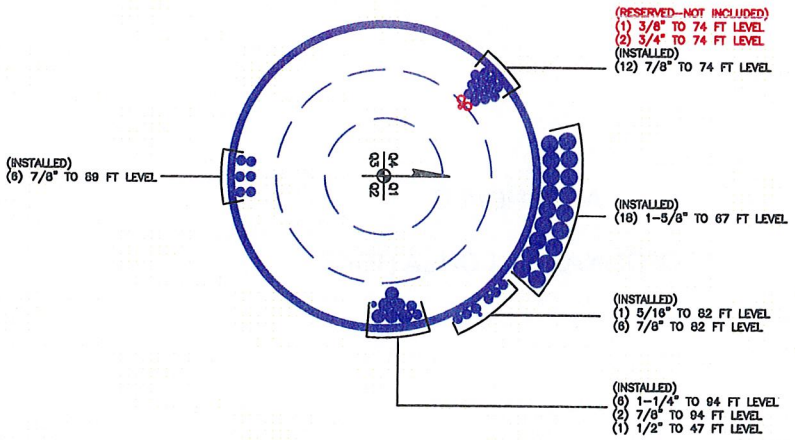
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	98 - 82.7891	Pole	TP15.28x12x0.1875	1	-2.67	450.82	23.3	Pass
L2	82.7891 - 45.2865	Pole	TP22.86x14.3839x0.25	2	-9.32	902.77	92.5	Pass
L3	45.2865 - 0	Pole	TP32x21.6345x0.3125	3	-15.98	1633.95	99.0	Pass
							Summary	
						Pole (L3)	99.0	Pass
						RATING =	**99.0**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

TX LINE LAYOUT



BUSINESS UNIT: 876399 TOWER ID: C_BASELEVEL

Clients

CROWN CASTLE

Professional Stamp

Revisions

No.	Description	Date
A	ISSUED FOR REVIEW	05.25.12

Engineering Firm
P-SEC
ph: 519-885-3806
fx: 519-886-0076
www.p-sec.ca
PIER STRUCTURAL ENGINEERING CORP
55 NORTHFIELD DR. E, SUITE 198
WATERLOO, ON N2K 3T6

PSEC Job No.
6651

Site Name
876399
GRANBY 4Q2000
(GALASSO)

Site Design

Sheet Title
TX LINES

Drawn by	Sheet
RH	A-1
Checked by	
Approved By	

APPENDIX C

ADDITIONAL CALCULATIONS

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#: *876399*
Site Name: *GRANBY 4Q2000 (GALASSO)*
App #: *150683 rev 3*

Enter Load Factors Below:		
For P (DL)	1.2	<---- Enter Factor
For P,V, and M (WL)	1.35	<---- Enter Factor

Pad & Pier Data		
Base PL Dist. Above Pier:	3	in
Pier Dist. Above Grade:	12	in
Pad Bearing Depth, D:	5	ft
Pad Thickness, T:	3	ft
Pad Width=Length, L:	17	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	5	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	25.00	ft^2
Pier Height:	3.00	ft
Soil (above pad) Height:	2.00	ft

Soil Parameters		
Unit Weight, γ:	125.0	pcf
Ultimate Bearing Capacity, qn:	8.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	34.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	6.00	ksf
Passive Pres. Coeff., Kp	3.54	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	20.3	kips
Pad Force Location Above D:	1.29	ft
ϕ(Passive Pressure Moment):	26.04	ft-kips
Factored O.T. M(WL), "1.6W":	1531.9	ft-kips
Factored OT (MW-Msoil), M1	1505.88	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	1.35	ft
Sum of Soil Wedges Wt:	7.95	kips
Soil Wedges ecc, K1:	4.42	ft
Ftg+Soil above Pad wt:	207.3	kips
Unfactored (Total ftg-soil Wt):	215.25	kips
1.2D. **No Soil Wedges.**	267.96	kips
0.9D. **With Soil Wedges**	208.12	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	16	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	15	kips
Unfactored WL Moment, M:	1041	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	19.2	kips
0.90	0.9D+1.6W, Pu:	14.4	kips
1.35	Vu:	20.25	kips
	Mu:	1405.35	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	267.96	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	1505.88	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	5.62	ft
Orthogonal qu=	2.74	ksf
qu/ϕ*qn Ratio=	**45.61%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	3.97	ft
Diagonal qu=	3.27	ksf
qu/ϕ*qn Ratio=	**54.48%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	208.12	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	1474.24	ft-kips

Orthogonal ecc3 = M2/P2 =	7.08	ft
Ortho Non Bearing Length,NBL=	14.17	ft
Orthogonal qu=	4.32	ksf
Diagonal qu=	4.27	ksf

Max Reaction Moment (ft-kips) so that qu=ϕ*qn = 100% Capacity Rating			
Actual M:	1041.00		
M Orthogonal:	1102.17	**94.45%**	**Pass**
M Diagonal:	1102.17	**94.45%**	**Pass**

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#: *876399*
Site Name: *Grandby 4Q2000 (Galasso,*
App #: *150683 rev 3*

Pole Manufacturer:	*Other*

Reactions		
Moment:	1041	ft-kips
Axial:	16	kips
Shear:	15	kips

If No stiffeners, Criteria:	AISC ASD	<-Only Applcable to Unstiffened Cases

Anchor Rod Data		
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	40	in

Plate Data		
Diam:	46	in
Thick:	1.5	in
Grade:	60	ksi
Single-Rod B-eff:	12.70	in

Stiffener Data (Welding at both sides)		
Config:	3	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.375	in
Fillet V. Weld:	0.375	in
Width:	6	in
Height:	18	in
Thick:	0.5	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi
Clear Space between Stiffeners (b):	5	in

Pole Data		
Diam:	32	in
Thick:	0.3125	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	154.2 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	79.1% Pass	

Base Plate Results

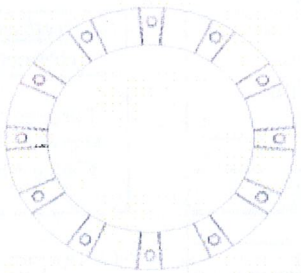
	Shear Check Only	Stiffened
Base Plate Stress:	8.8 ksi	Service, ASD
Allowable Plate Stress:	32.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	27.5% Pass	Y.L. Length: N/A, Roark

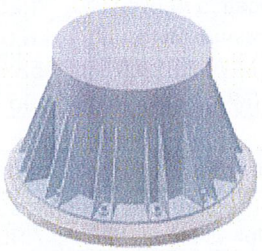
Stiffener Results

Horizontal Weld :	71.8% Pass
Vertical Weld:	23.9% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	13.9% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	56.0% Pass
Plate Comp. (AISC Bracket):	57.0% Pass

Pole Results

Pole Punching Shear Check:	7.8% Pass





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

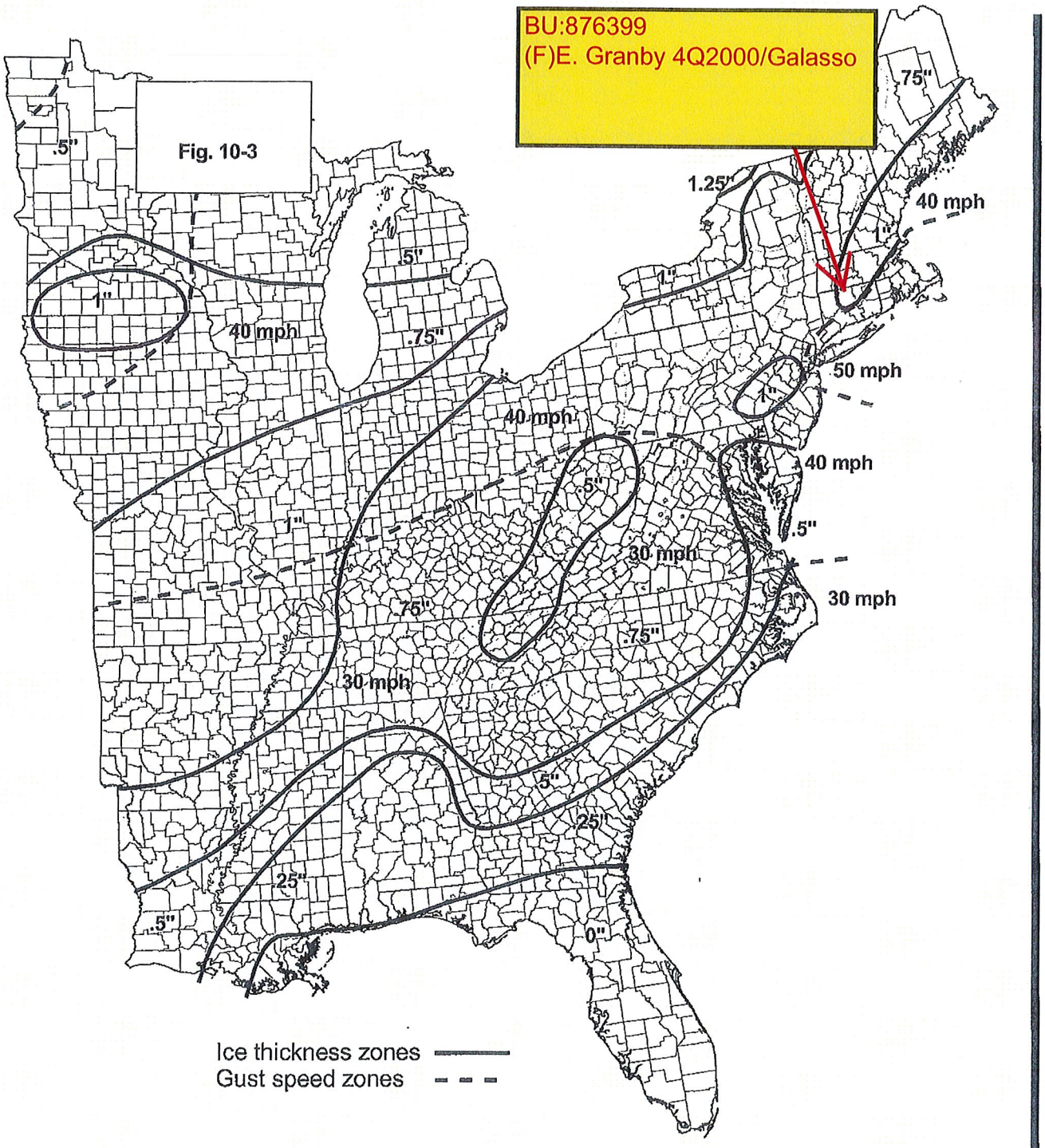


FIGURE 10-2 (continued) 50-YEAR MEAN RECURRENCE INTERVAL UNIFORM ICE THICKNESSES DUE TO FREEZING RAIN WITH CONCURRENT 3-SECOND GUST SPEEDS: CONTIGUOUS 48 STATES.