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Also admitted in Massachusetts

EM-VER-023-121004

October 3, 2012

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

Re: **Notice of Exempt Modification – Antenna Swap**
96 Powder Mill Road, Canton, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 147-foot level on an existing 180-foot tower at the above-referenced address. The tower is owned by SBA. Cellco's use of the tower was approved by the Council in 2001. Cellco now intends to replace all of its existing antennas with four (4) model LPA-80080-4CF cellular antennas; two (2) model LPA-80063-4CF cellular antennas; two (2) model BXA-171085-8CF PCS antennas; one (1) model BXA-171063-8CF PCS antenna; and three (3) model BXA-70063-6CF LTE antennas, all at the same level. Cellco also intend to install six (6) coax cable diplexers behind it's antennas. Attached behind Tab 1 are the specifications for the replacement antennas and diplexers.

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 Richard Barlow, First Selectman of the Town of Canton. A copy of this letter is also being sent to Properties One 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 and diplexers will be located at the same 147-foot level on the existing tower.

2. The proposed modifications do 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 confirming that the tower and foundation can support Cellco's proposed modifications. (See Tab 3). Please note that contrary to note number 1, included in the recommendations section of the Structural Analysis, Cellco does not intend to install any new coax cables at this time.

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

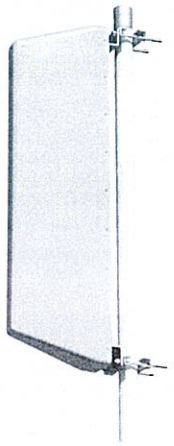
Enclosures
Copy to:
Richard Barlow, Canton First Selectman
Properties One LLC
Sandy M. Carter

LPA-80080-4CF-EDIN-X

V-Pol | Log Periodic | 80° | 12.5 dBd

Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

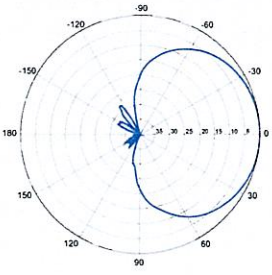


Electrical Characteristics	
Frequency bands	806-960 MHz
Polarization	Vertical
Horizontal beamwidth	80°
Vertical beamwidth	15°
Gain	12.5 dBd (14.6 dBi)
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10, 12, 14
Impedance	50Ω
VSWR	≤1.4:1
Upper sidelobe suppression (0°)	-14.2 dB
Front-to-back ratio (+/-30°)	-34.7 dB
Null fill	15% (-16.48 dB)
Input power	500 W
Lightning protection	Direct Ground
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)

Mechanical Characteristics		
Dimensions Length x Width x Depth	1200 x 140 x 335 mm	47.2 x 5.5 x 13.2 in
Depth of antenna with z-bracket	375 mm	14.8 in
Weight without mounting brackets	5.4 kg	12 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.17 m² Side: 0.40 m²	Front: 1.8 ft² Side: 4.3 ft²
Wind load @ 161 km/hr (100 mph)	Front: 254 N Side: 574 N	Front: 57 lbf Side: 129 lbf

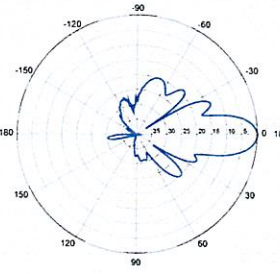
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit (0-20°)	21699999	50-102 mm 2.0-4.0 in	5.4 kg 12 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80080-4CF-EDIN-X



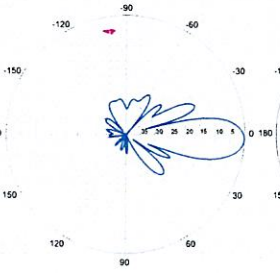
Horizontal

LPA-80080-4CF-EDIN-0



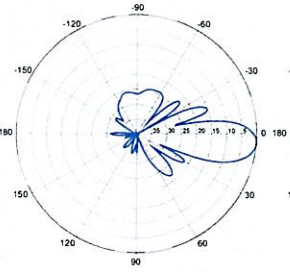
0° | Vertical

LPA-80080-4CF-EDIN-2



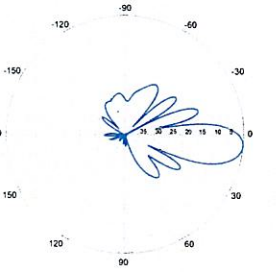
2° | Vertical

LPA-80080-4CF-EDIN-4



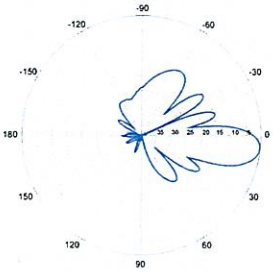
2° | Vertical

LPA-80080-4CF-EDIN-5



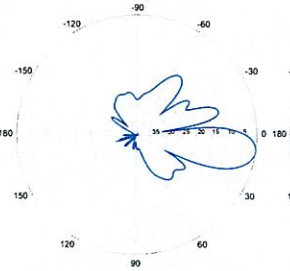
5° | Vertical

LPA-80080-4CF-EDIN-6



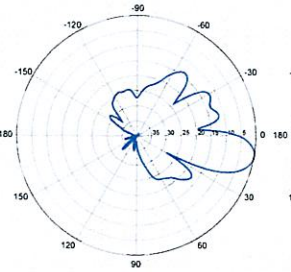
6° | Vertical

LPA-80080-4CF-EDIN-8



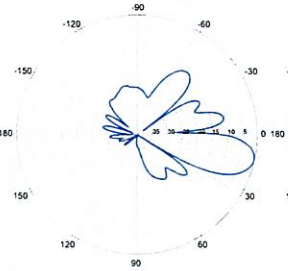
8° | Vertical

LPA-80080-4CF-EDIN-10



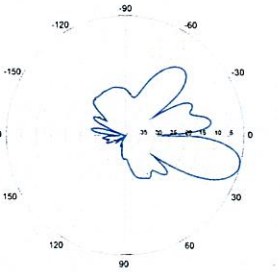
10° | Vertical

LPA-80080-4CF-EDIN-12



12° | Vertical

LPA-80080-4CF-EDIN-14



14° | Vertical

Amphenol ANTENNA SOLUTIONS

LPA-80063-4CF-EDIN-X

V-Pol | Log Periodic | 63° | 13.0 dBd

Replace "X" with desired electrical downtilt.

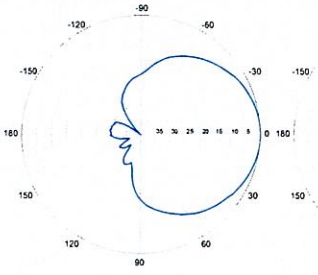
Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	
Frequency bands	806-960 MHz
Polarization	Vertical
Horizontal beamwidth	63°
Vertical beamwidth	15°
Gain	13.0 dBd (15.1 dBi)
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10, 12, 14
Impedance	50Ω
VSWR	≤1.4:1
Upper sidelobe suppression (0°)	-15.7 dB
Front-to-back ratio (+/-30°)	-31.7 dB
Null fill	5% (-26.02 dB)
Input power	500 W
Lightning protection	Direct Ground
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)

Mechanical Characteristics		
Dimensions Length x Width x Depth	1205 x 385 x 332 mm	47.4 x 15.2 x 13.1 in
Depth of antenna with z-bracket	372 mm	14.6 in
Weight without mounting brackets	9.1 kg	20 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.46 m² Side: 0.39 m²	Front: 5.0 ft² Side: 4.2 ft²
Wind load @ 161 km/hr (100 mph)	Front: 660 N Side: 550 N	Front: 149 lbf Side: 124 lbf

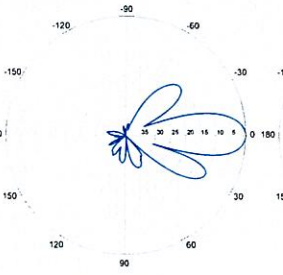
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit (0-20°)	21699999	50-102 mm 2.0-4.0 in	5.4 kg 12 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80063-4CF-EDIN-X



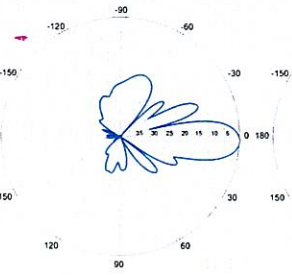
Horizontal

LPA-80063-4CF-EDIN-0



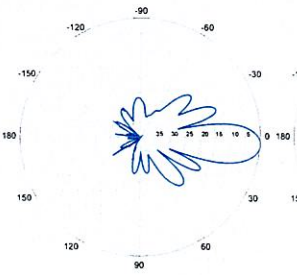
0° | Vertical

LPA-80063-4CF-EDIN-2



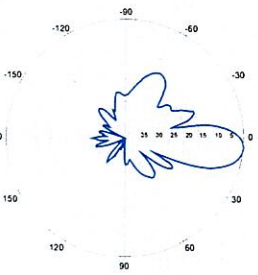
2° | Vertical

LPA-80063-4CF-EDIN-4



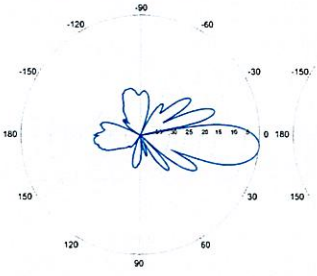
4° | Vertical

LPA-80063-4CF-EDIN-5



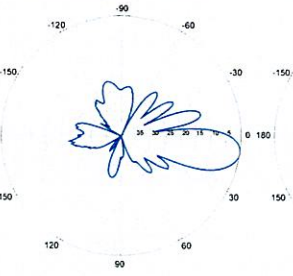
5° | Vertical

LPA-80063-4CF-EDIN-6



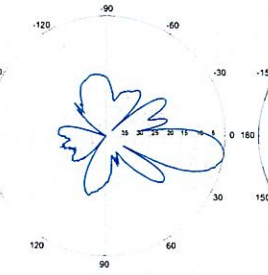
6° | Vertical

LPA-80063-4CF-EDIN-8



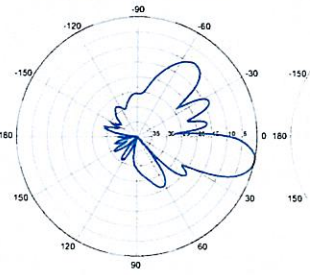
8° | Vertical

LPA-80063-4CF-EDIN-10



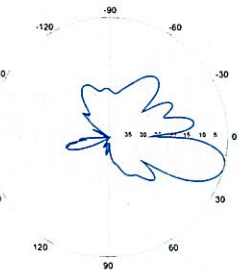
10° | Vertical

LPA-80063-4CF-EDIN-12



12° | Vertical

LPA-80063-4CF-EDIN-14



14° | Vertical

BXA-171085-8CF-EDIN-X

Replace "X" with desired electrical downtilt.

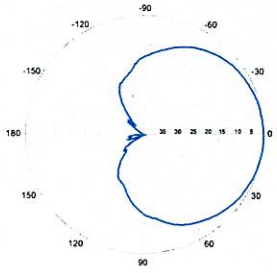
X-Pol | FET Panel | 85° | 16.4 dBi

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	88°	85°	80°
Vertical beamwidth	7°	7°	7°
Gain	13.5 dBd / 15.6 dBi	13.9 dBd / 16.0 dBi	14.3 dBd / 16.4 dBi
Electrical downtilt (X)	0, 2, 4		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 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 / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		

Mechanical Characteristics		
Dimensions Length x Width x Depth	1232 x 154 x 105 mm	48.5 x 6.1 x 4.1 in
Depth with t-brackets	133 mm	5.2 in
Weight without mounting brackets	4.8 kg	10.5 lbs
Survival wind speed	296 km/hr	184 mph
Wind area	Front: 0.19 m² Side: 0.14 m²	Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 lbf

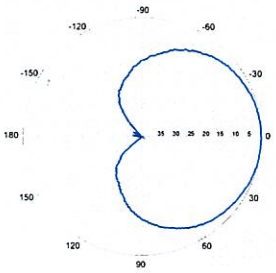
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171085-8CF-EDIN-X-FP		

BXA-171085-8CF-EDIN-X



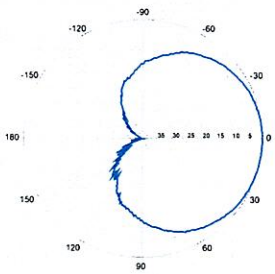
Horizontal | 1710-1880 MHz

BXA-171085-8CF-EDIN-X



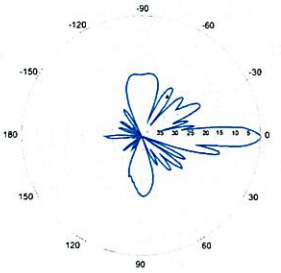
Horizontal | 1850-1990 MHz

BXA-171085-8CF-EDIN-X



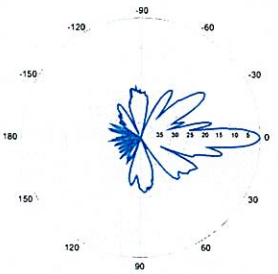
Horizontal | 1920-2170 MHz

BXA-171085-8CF-EDIN-0



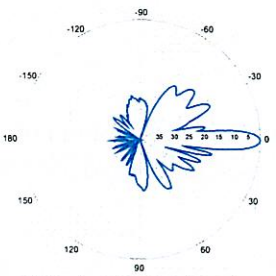
0° | Vertical | 1710-1880 MHz

BXA-171085-8CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171085-8CF-EDIN-0



0° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-X

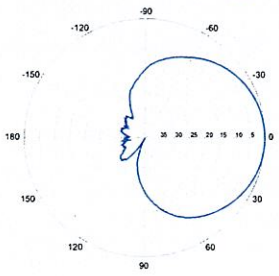
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 17.4 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	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 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 / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1232 x 154 x 105 mm		48.5 x 6.1 x 4.1 in
Depth with t-brackets	133 mm		5.2 in
Weight without mounting brackets	4.8 kg		10.5 lbs
Survival wind speed	296 km/hr		184 mph
Wind area	Front: 0.19 m² Side: 0.14 m²		Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N		Front: 63 lbf Side: 50 lbf

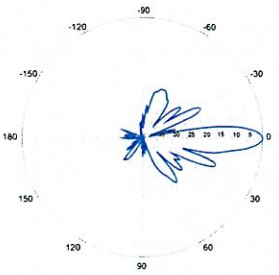
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8CF-EDIN-X-FP		

BXA-171063-8CF-EDIN-X



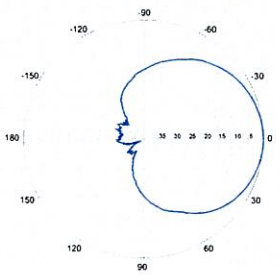
Horizontal | 1710-1880 MHz

BXA-171063-8CF-EDIN-0



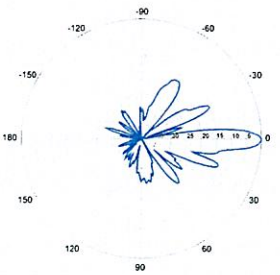
0° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-X



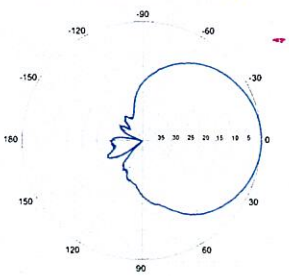
Horizontal | 1850-1990 MHz

BXA-171063-8CF-EDIN-0



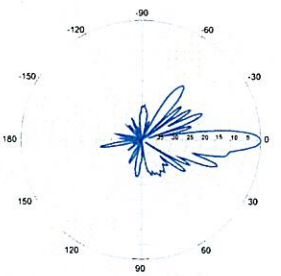
0° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-X



Horizontal | 1920-2170 MHz

BXA-171063-8CF-EDIN-0

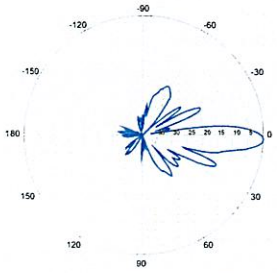


0° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-X

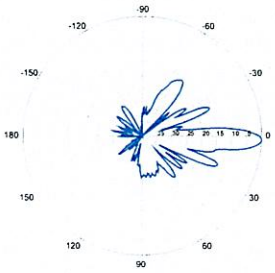
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8CF-EDIN-2



2° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-2



2° | Vertical | 1850-1990 MHz

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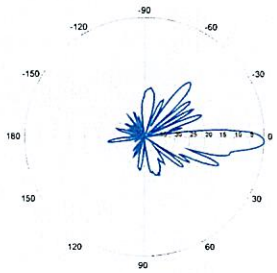
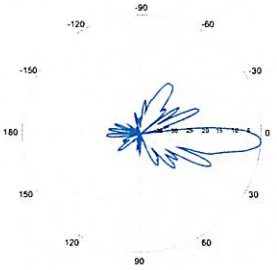


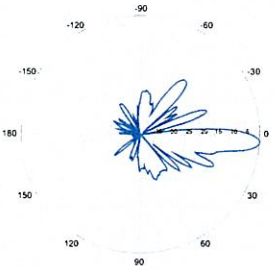
2° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-4



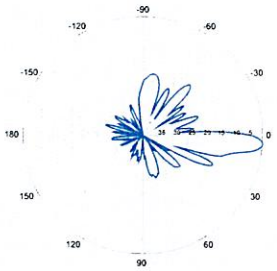
4° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-4



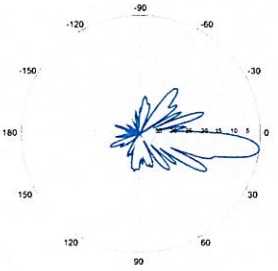
4° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-4



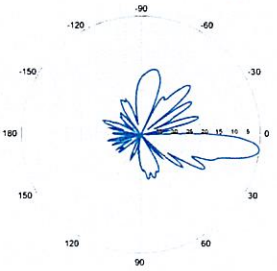
4° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-8



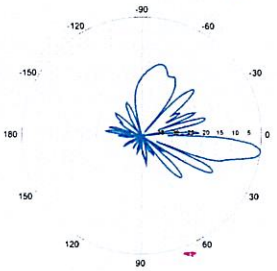
8° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-8



8° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-8



8° | Vertical | 1920-2170 MHz

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

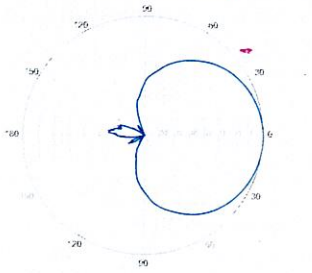
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m² Side: 0.24 m²	Front: 5.5 ft² Side: 2.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

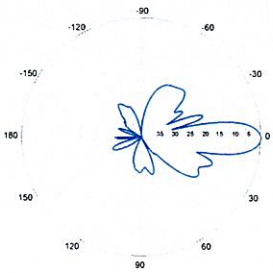
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



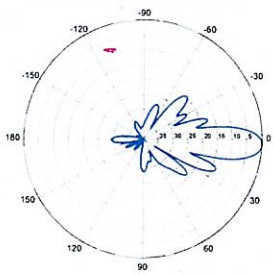
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

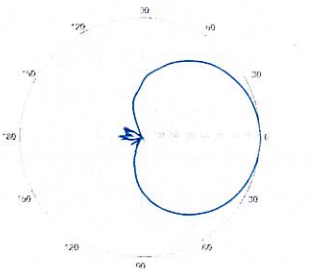


0° | Vertical | 750 MHz

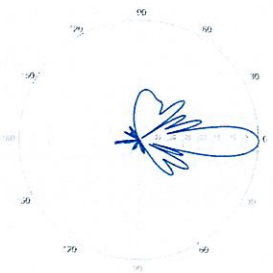
BXA-70063-6CF-EDIN-2



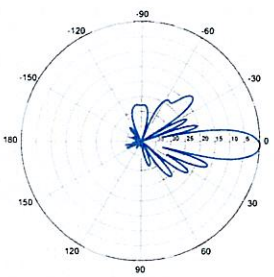
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz

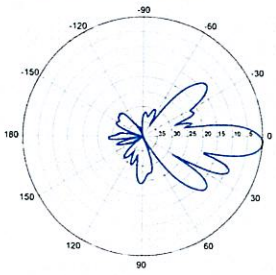


2° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-X

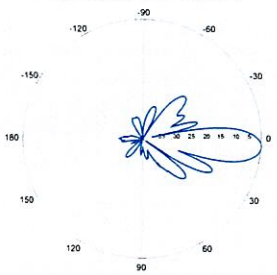
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



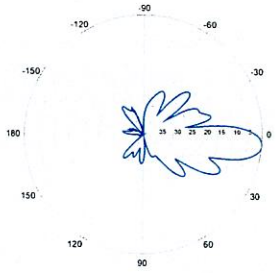
3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4

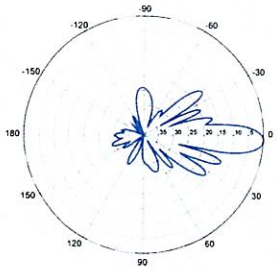


4° | Vertical | 750 MHz

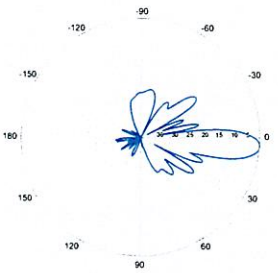
BXA-70063-6CF-EDIN-5



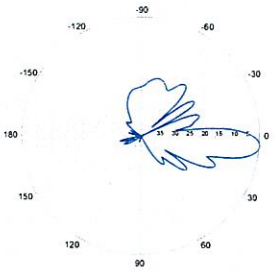
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

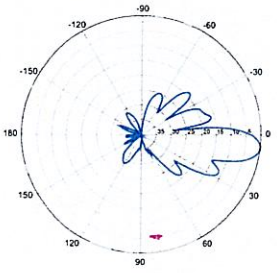


4° | Vertical | 850 MHz



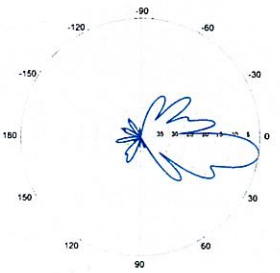
5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



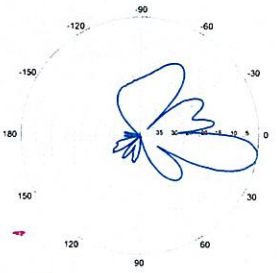
6° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-8

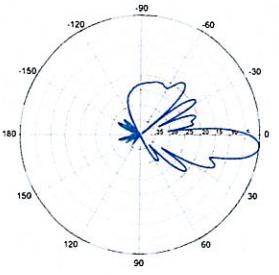


8° | Vertical | 750 MHz

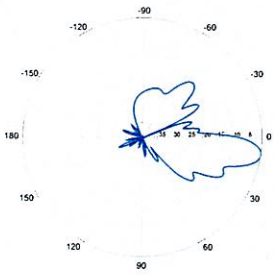
BXA-70063-6CF-EDIN-10



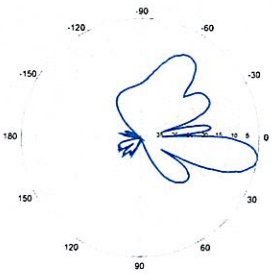
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

Product Data Sheet **FD9R6004/2C-3L**

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.

Features/Benefits

- **LTE ready design**
- **Extremely Low Insertion Loss**
- **High level of Rejection between bands – Protection against interferences**
- **Extremely High Power Handling Capability**
- **Integrated DC block/bypass versions available**
- **Very compact & small size design – Easy installation and reduced tower load**
- **In-line long-neck connectors for easy connection & waterproofing**
- **Exceptional reliability & environmental protection (IP 67)**
- **Equipped with 1 * Breathable Vent – Prevent any humidity inside the product**
- **Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)**
- **Grounding already provided through the mounting bracket**
- **Kit available for easy dual mount**

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Application	LTE700, GSM900, UMTS, GSM1800, Cellular 800, PCS
Frequency Range 1, MHz	698-960
Frequency Range 2, MHz	1710-2200
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 1710-2170MHz path, with mounting hardware SEM2-1A
Mounting	Wall Mounting: With 4 screws (maximum 6mm diameter); Pole Mounting: With included clamp set 40-110mm (1.57-4.33)
Return Loss All Ports Min/Typ, dB	19/23
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss, Path 1, dB	0.07 typ.
Insertion Loss, Path 2, dB	0.13 typ.
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 57/70@1710-2200MHz
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	No
DC Pass in High Frequency Path	Yes
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

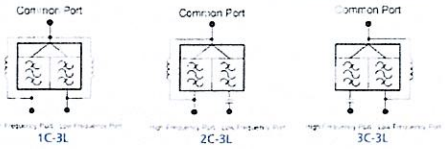
Notes

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Other Documentation

FD9R6004/2C-3L Installation Instructions: Wideband_Diplexer_Installation_Rev5.pdf

Selection Guide Diplexer 698-960 / 1710-2200MHz					
	Model Number	Full DC Pass	DC Pass High Band	DC Pass Low Band	Mounting Hardware Included
Single	FD9R6004/1C-3L				X
	FD9R6004/2C-3L				X
	FD9R6004/3C-3L				X
Dual	KIT-FD9R6004/1C-DL				X
	KIT-FD9R6004/2C-DL				X
	KIT-FD9R6004/3C-DL				X



The FD9R6004 Series is upgradeable to a Dual Diplexer kit by means of 2 diplexers and mounting hardware kits SEM2-1A and SEM2-3

Mounting Hardware and Ground Cable Ordering Information		
Model Number	**Description**	
SEM2-1A	Mounting Hardware, Pole mount ø40-110mm (Included with the Single and Dual Diplexer) Wall Screws M6 (Not included with the product)	
SEM2-3	Assembly kit for 2 pcs of FD9R6004/xC-3L (Can be ordered separately but included with the Dual Diplexer Kit)	
CA020-2	Ground Cable, 2m, includes lugs (Optional)	
CA030-2	Ground Cable, 2m, includes lugs (Optional)	
SEM6	Mounting Hardware for 6 Diplexers, Tower Base (Optional)	

	General	Power	Density					
Site Name: Collinsville 2								
Tower Height: Verizon @ 147Ft.								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*Sprint	11	122	180	0.0149	1962.5	1.0000	1.49%	
*Pocket	3	631	167	0.0244	2130	1.0000	2.44%	
*Cingular UMTS	1	500	137	0.0096	880	0.5867	1.63%	
*Cingular GSM	4	296	137	0.0227	880	0.5867	3.87%	
*Cingular GSM	2	427	137	0.0164	1900	1.0000	1.64%	
Verizon PCS	**11**	**240**	**147**	**0.0439**	**1970**	**1.0000**	**4.39%**	
Verizon Cellular	**9**	**250**	**147**	**0.0374**	**869**	**0.5793**	**6.46%**	
Verizon AWS	**1**	**583**	**147**	**0.0097**	**2145**	**1.0000**	**0.97%**	
Verizon 700	**1**	**823**	**147**	**0.0137**	**698**	**0.4653**	**2.94%**	
								25.83%
* Source: Siting Council								

FDH Engineering, Inc., 6521 Meridien Drive Raleigh, NC 27616, Ph. 919.755.1012

Structural Analysis for SBA Network Services, Inc.

180' Monopole Tower

SBA Site Name: South Canton
SBA Site ID: CT01722-S
Verizon Site ID: 507
Verizon Site Name: Collinsville 2

FDH Project Number 12-06272E S1

Analysis Results

Tower Components	52.2 %	Sufficient
Foundation	99.6 %	Sufficient

Prepared By:

Jonathan C. Holmes

Jonathan C. Holmes, EI
Project Engineer

Reviewed By:

Christopher M. Murphy

Christopher M. Murphy, PE
President
CT PE License No. 25842

FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
(919) 755-1012
info@fdh-inc.com

August 7, 2012

Prepared pursuant to ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Canton, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads pursuant to the *Structural Standard for Antenna Supporting Structures and Antennas, ANSI/TIA-222-G.* Information pertaining to the existing/proposed antenna loading, current tower geometry, geotechnical data, and member sizes was obtained from:

- Valmont Microflect (Order No. 12156-00) Communication Pole Design Calculations dated August 3, 2000
- Valmont Microflect (Order No. 12156-00) Communication Pole Record Drawings dated August 3, 2000
- FDH Engineering, Inc. (Project No. 12-06272E G1) Geotechnical Evaluation of Subsurface Conditions dated August 6, 2012
- FDH Engineering, Inc. (Project No. 12-06272E N1) Dispersive Wave Propagation Testing and Rebar Investigation of an Existing Tower Foundation dated August 1, 2012
- SBA Network Services, Inc.

The *basic design wind speed* per the *ANSI/TIA-222-G* standard is 100 mph without ice and 50 mph with 1" radial ice. Ice is considered to increase in thickness with height. Furthermore, this structure as analyzed as a Class II structure in Exposure Category C with a topographic factor of 1.

Conclusions

With the existing and proposed antennas from Verizon in place at 147 ft, the tower meets the requirements of the *ANSI/TIA-222G* standard provided the **Recommendations** listed below are satisfied. Furthermore, given the foundation dimensions listed in the FDH Engineering, Inc. Dispersive Wave Propagation Testing and Rebar Investigation of an Existing Tower Foundation dated August 1, 2012 (see FDH Project No. 12-06272E N1) and using the given soil parameters (see FDH Engineering, Inc. Project No. 12-06272E G1), the foundation should have the necessary capacity to support both the proposed and existing loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Engineering, Inc. is accurate (i.e., the steel data, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the *ANSI/TIA-222-G* standard are met with the existing and proposed loading in place, we have the following recommendations:

1. The proposed coax should be installed inside the pole's shaft.
2. The proposed diplexers should be installed directly behind the proposed panel antennas.

APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Engineering, Inc. should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
177	(6) Decibel DB980H90E-M	(6) 1-5/8	Sprint	177	(1) Platform W/ Handrails
167	(3) Kathrein 742 213	(6) 1-5/8	Pocket	167	(3) Pipe Mounts
147	(6) Decibel DB844H90E-SXY (6) Decibel DB950F85E-M	(12) 1-5/8	Verizon	147	(1) 13' Low-Profile Platform
137	(6) Powerwave 7770 (3) CSS DUO1417-8686-40 (6) Powerwave LGP 21401 TMAs (6) Powerwave LGP 21903 Diplexers	(9) 1-5/8	AT&T	137	(3) T-Arms
70	(1) GPS	(1) 1/2	Sprint	70	(1) Standoff

Proposed Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
147	(3) Antel BXA-70063/6CF (4) Antel LPA-80080/4CF-EDIN (2) Antel BXA 171085-8CF-2 (1) Antel BXA-171063-8CF-2 (2) Antel LPA-80063/4CF (6) RFS FD9R6004/2C-3 Diplexers	(12) 1-5/8	Verizon	147	(1) 13' Low-Profile Platform

RESULTS

The following yield strength of steel for individual members was used for analysis:

Table 2 - Material Strength

Member Type	Yield Strength
Tower Shaft Sections	65 ksi
Base Plate	60 ksi
Anchor Bolts	75 ksi

Table 3 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. *Note: Capacities up to 105% are considered acceptable.* **Table 4** displays the maximum foundation reactions.

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information

Table 3 - Summary of Working Percentage of Structural Components

Section No.	Elevation ft	Component Type	Size	% Capacity	Pass Fail
L1	180 - 131.75	Pole	TP36.25x26.84x0.25	24.0	Pass
L2	131.75 - 91.6667	Pole	TP43.56x34.7261x0.2813	52.2	Pass
L3	91.6667 - 45.4167	Pole	TP52.02x41.7634x0.4375	44.4	Pass
L4	45.4167 - 0	Pole	TP60x49.7146x0.5	49.7	Pass
		Anchor Bolts	(28) 2.25"⌀ w/ BC = 68.62"	39.7	Pass
		Base Plate	PL 74.62" x 2.75" Thk	37.6	Pass

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis *(ANSI/TIA-222-G)*	Original Design *(TIA/EIA-222-F)*
Axial	57 k	53 k
Shear	36 k	39 k
Moment	3,951 k-ft	4,924 k-ft

*Foundation determined to be adequate per independent analysis.

GENERAL COMMENTS

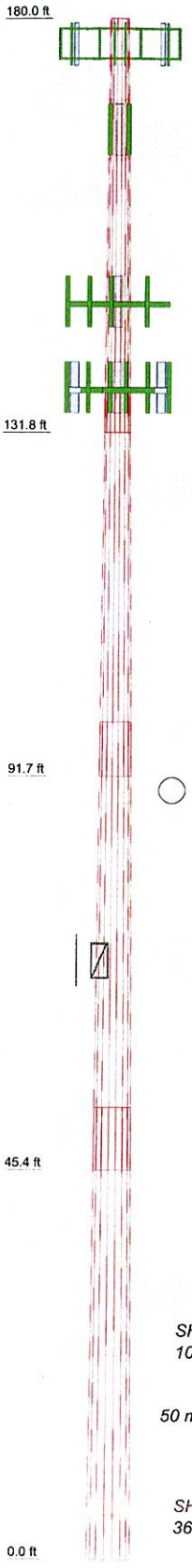
This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Engineering, Inc. should be notified immediately to perform a revised analysis.

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.

APPENDIX

Section	1	2	3	4		
Length (ft)	48.25	45.33	52.58	52.75		4.1
Number of Sides	16	16	16	16		
Thickness (in)	0.2500	0.2813	0.4375	0.5000		
Socket Length (ft)	5.25	6.33	7.33			
Top Dia (in)	26.8400	34.7261	41.7634	49.7146		15.6
Bot Dia (in)	36.2500	43.5600	52.0200	60.0000		11.6
Grade					A572-65	5.4
Weight (K)	4.1	5.4	11.6	15.6		36.6



ALL REACTIONS ARE FACTORED

AXIAL 97 K

SHEAR 10 K *MOMENT 1170 kip-ft*

TORQUE 0 kip-ft

50 mph WIND - 1.0000 in ICE

AXIAL 57 K

SHEAR 36 K *MOMENT 3951 kip-ft*

TORQUE 1 kip-ft

REACTIONS - 100 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB980H90E-M w/Mount Pipe (Sprint)	177	Antel LPA-80063/4CF w/ Mount Pipe (Verizon)	147
(2) DB980H90E-M w/Mount Pipe (Sprint)	177	Antel LPA-80063/4CF w/ Mount Pipe (Verizon)	147
(2) DB980H90E-M w/Mount Pipe (Sprint)	177	(2) RFS FD9R6004 Diplexer (Verizon)	147
(2) Mount Pipe (Sprint)	177	(2) RFS FD9R6004 Diplexer (Verizon)	147
(2) Mount Pipe (Sprint)	177	(2) RFS FD9R6004 Diplexer (Verizon)	147
(2) Mount Pipe (Sprint)	177	Low Profile Platform (Monopole) (Verizon)	147
Platform w/handrails (Monopole) (Sprint)	177	(2) 7770 W/Mount Pipe (ATI)	137
742 213 W/Pipe Mount (Pocket)	167	(2) 7770 W/Mount Pipe (ATI)	137
742 213 W/Pipe Mount (Pocket)	167	(2) 7770 W/Mount Pipe (ATI)	137
742 213 W/Pipe Mount (Pocket)	167	DUO1417-8686-40 w/Mount Pipe (ATI)	137
Antel BXA-70063/6CF W/Mount Pipe (Verizon)	147	DUO1417-8686-40 w/Mount Pipe (ATI)	137
Antel BXA-70063/6CF W/Mount Pipe (Verizon)	147	DUO1417-8686-40 w/Mount Pipe (ATI)	137
Antel BXA-70063/6CF W/Mount Pipe (Verizon)	147	(2) LGP 21401 TMA (ATI)	137
Antel LPA-80080/4CF-EDIN w/ Mount Pipe (Verizon)	147	(2) LGP 21401 TMA (ATI)	137
Antel LPA-80080/4CF-EDIN w/ Mount Pipe (Verizon)	147	(2) LGP 21401 TMA (ATI)	137
(2) Antel LPA-80080/4CF-EDIN w/ Mount Pipe (Verizon)	147	(2) LGP 21903 Diplexer (ATI)	137
Antel BXA 171085-8CF-2 w/Mount Pipe (Verizon)	147	(2) LGP 21903 Diplexer (ATI)	137
Antel BXA 171085-8CF-2 w/Mount Pipe (Verizon)	147	(2) LGP 21903 Diplexer (ATI)	137
Antel BXA-171063-8CF-2 w/Mount Pipe (Verizon)	147	T-Arm (ATI)	137
		T-Arm (ATI)	137
		T-Arm (ATI)	137
		GPS (Sprint)	70
		Standoff (Sprint)	70

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 Exposure C to the TIA-222-G Standard.
3. Tower designed for a 100 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 52.2%

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Tower Analysis

Job: South Canton, CT01722-S			
Project: 12-06272E S1			
Client: SBA Network Services, Inc.	Drawn by: Jonathan Holmes	App'd:	
Code: TIA-222-G	Date: 08/07/12	Scale: NTS	
Path:		Dwg No. E-1	