

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK



CITY OF PORTLAND BUILDING PERMIT

This is to certify that MURRAY W TR FINARD

Located At 1 MONUMENT SQ

Job ID: 2011-10-2521-ALTCOMM

CBL: 032- K-012-001

has permission to replace 12 antennas w/12 new antennas

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statues of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of the buildings and structures, aud of the application on file in the department.

Notification of inspection and written permission procured before this building or part thereof is lathed or otherwise closed-in. 48 HOUR NOTICE IS REQUIRED.

A final inspection must be completed by owner before this building or part thereof is occupied. If a certificate of occupancy is required, it must be

Fire Prevention Officer

Code Enforcement Officer / Plan Reviewer

THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY

PENALTY FOR REMOVING THIS CARD

BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 (ONLY)

or email: buildinginspections@portlandmaine.gov

With the issuance of this permit, the owner, builder or their designee is required to provide adequate notice to the city of Portland Inspections Services for the following inspections. Appointments must be requested 48 to 72 hours in advance of the required inspection. The inspection date will need to be confirmed by this office.

- **Please read the conditions of approval that is attached to this permit!! Contact this office if you have any questions.**
- **Permits expire in 6 months. If the project is not started or ceases for 6 months.**
- **If the inspection requirements are not followed as stated below additional fees may be incurred due to the issuance of a "Stop Work Order" and subsequent release to continue.**

Final Inspection required by the designing engineer and the City of Portland.

The project cannot move to the next phase prior to the required inspection and approval to continue, REGARDLESS OF THE NOTICE OF CIRCUMSTANCES.

IF THE PERMIT REQUIRES A CERTIFICATE OF OCCUPANCY, IT MUST BE PAID FOR AND ISSUED TO THE OWNER OR DESIGNEE BEFORE THE SPACE MAY BE OCCUPIED.



PORTLAND MAINE

Strengthening a Remarkable City, Building a Community for Life • www.portlandmaine.gov

Director of Planning and Urban Development
Penny St. Louis

Job ID: 2011-10-2521-ALTCOMM

Located At: 1 MONUMENT SQ

CBL: 032- K-012-001

Conditions of Approval:

Final sign off required by the designing engineer to be submitted to the City of Portland.

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, FAX: (207) 8716

Job No: 2011-10-2521-ALTCOMM	Date Applied: 10/18/2011	CBL: 032- K-012-001	
Location of Construction: 1 MONUMENT SQ	Owner Name: FINARD MURRAY	Owner Address: ONE MONUMENT SQUARE SUITE 200 PORTLAND, ME 04101	Phone:
Business Name:	Contractor Name: John McGilicuddy	Contractor Address: 49 Brattle St., Arlington, MA 02474	Phone: 617-388-6324
Lessee/Buyer's Name:	Phone:	Permit Type: BLDG - Building	Zone: B-3
Past Use: Office Building	Proposed Use: Same – Office Building – replace 12 old antennas w/ 12 new antennas – same location	Cost of Work: 10000.00	CEO District:
		Fire Dept: ☒ Approved ☐ Denied ☐ N/A	Inspection: B3 Use Group: Type: Antennas IBC09
Proposed Project Description: Replace 12 Rooftop Antennas		Signature: <i>Cpt. [Signature]</i> 11/7/11 Pedestrian Activities District (P.A.D.)	
Permit Taken By:		Zoning Approval	

1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
2. Building Permits do not include plumbing, septic or electrical work.
3. Building permits are void if work is not started within six (6) months of the date of issuance. False informatin may invalidate a building permit and stop all work.

Special Zone or Reviews

- ☐ Shoreland
☐ Wetlands
☐ Flood Zone
☐ Subdivision
☐ Site Plan
☐ Maj ☐ Min ☐ MM

Date: *OK w/ conditions*
11/2/11 ABM

CERTIFICATION

Zoning Appeal

- ☐ Variance
☐ Miscellaneous
☐ Conditional Use
☐ Interpretation
☐ Approved
☐ Denied

Date:

Historic Preservation

- ☐ Not in Dist or Landmark
☒ Does not Require Review
per de b andens
☐ Requires Review
☐ Approved
☐ Approved w/Conditions
☐ Denied

Date: *Any exterior work
requires a separate review
approved thru historic
preservation.*

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the appication is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT

ADDRESS

DATE

PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE

DATE

PHONE



General Building Permit Application

Submitted 10/24/11

If you or the property owner owes real estate or personal property taxes or user charges on any property within the City, payment arrangements must be made before permits of any kind are accepted.

Location/Address of Construction: <u>1 Monument Sq.</u>		
Total Square Footage of Proposed Structure/Area		Square Footage of Lot
Tax Assessor's Chart, Block & Lot Chart# Block# Lot# <u>032-K012001</u>	Applicant * <u>must</u> be owner, Lessee or Buyer* Name <u>John McGilicuddy</u> Address <u>49 Brattle St.</u> City, State & Zip <u>Arlington MA 02474</u>	Telephone: <u>617-388-6324</u>
Lessee/DBA (If Applicable) <u>Verizon Wireless</u> <u>c/o John McGilicuddy</u>	Owner (if different from Applicant) Name <u>Finard Murray</u> Address <u>1 Monument Sq.</u> City, State & Zip <u>Portland, ME 04101</u>	Cost Of Work: <u>\$10,000</u> C of O Fee: \$ _____ Total Fee: \$ _____
Current legal use (i.e. single family) <u>office building - telecom antennas on roof.</u> If vacant, what was the previous use? _____ Proposed Specific use: <u>No change</u> Is property part of a subdivision? _____ If yes, please name _____ Project description: <u>Verizon wireless currently has 12 antennas installed on rooftop. we are looking to swap existing 12 antennas with 12 new ones. No change to antenna location or quantity</u>		
Contractor's name: <u>John McGilicuddy</u> OCT 18 2011 Address: <u>49 Brattle St.</u> City, State & Zip <u>Arlington MA 02474</u> Dept. of Building Inspection City of Portland, Maine Who should we contact when the permit is ready: <u>Kristin Champagne</u> Telephone: <u>781-454-9134</u> Mailing address: <u>49 Brattle St. Arlington MA 02474</u>		

Please submit all of the information outlined on the applicable Checklist. Failure to do so will result in the automatic denial of your permit.

In order to be sure the City fully understands the full scope of the project, the Planning and Development Department may request additional information prior to the issuance of a permit. For further information or to download copies of this form and other applications visit the Inspections Division on-line at www.portlandmaine.gov, or stop by the Inspections Division office, room 315 City Hall or call 874-8703.

I hereby certify that I am the Owner of record of the named property, or that the owner of record authorizes the proposed work and that I have been authorized by the owner to make this application as his/her authorized agent. I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in this application is issued, I certify that the Code Official's authorized representative shall have the authority to enter all areas covered by this permit at any reasonable hour to enforce the provisions of the codes applicable to this permit.

John McGilicuddy

Signature: _____

Date: _____

10-10-11

This is not a permit; you may not commence ANY work until the permit is issued

Kristin Champagne

From: Kristin Champagne
Sent: Friday, October 14, 2011 12:53 PM
To: 'ldobson@portlandmaine.gov'
Cc: 'buildinginspections@portlandmaine.gov'
Subject: Building Permit application
Attachments: MONUMENT_SQ_ME_Structural Analysis_10.14.2011.pdf; MONUMENT SQ, ME FINAL LTE 08-05-11 Rev1.pdf; BP app.pdf; spec sheets.pdf

Building Permit application

Attached are the documents for a building permit application I am submitted to you. Verizon Wireless is looking to swap existing antennas with new ones located on the rooftop of 1 Monument Sq. No change to antenna location or quantity. Documents attached include... bp application, CCA, Structural, spec sheets for existing and proposed antennas and site drawings. In addition to hard copies of all the attached, I will also have the application fee check in this packet (\$120) when it gets to your office. If you have any questions please feel free to contact me at any time.

Thank You
Kristin

Kristin Champagne
Structure Consulting Group
49 Brattle St.
Arlington, MA 02474
M: 781.454.9134
O: 781-791-7724 x32
F: 781.791.7704

10/14/2011



Certificate of Design Application

From Designer:

Hudson Design Group LLC

Date:

8-9-11

Job Name:

Monument Square ME (Verizon Wireless)

Address of Construction:

1 Monument Square, Portland, ME

2003 International Building Code

Construction project was designed to the building code criteria listed below:

Building Code & Year IBC 2009 Use Group Classification (s) Mixed Use - Utility

Type of Construction No Change - Swapping existing antennas for Verizon Wireless

Will the Structure have a Fire suppression system in Accordance with Section 903.3.1 of the 2003 IRC N/A

Is the Structure mixed use? Yes If yes, separated or non separated or non separated (section 302.3) Non-separated

Supervisory alarm System? N/A Geotechnical/Soils report required? (See Section 1802.2) N/A

Structural Design Calculations

N/A Submitted for all structural members (106.1 - 106.11)

Design Loads on Construction Documents (1603)

Uniformly distributed floor live loads (7603.11, 1607)

Floor Area Use	Loads Shown
<u>N/A</u>	<u>N/A</u>

Wind loads (1603.1.4, 1609)

<u>Yes</u>	Design option utilized (1609.1.1, 1609.6)
<u>80 MPH</u>	Basic wind speed (1609.3)
<u>N/A</u>	Building category and wind importance factor, I_w (Table 1604.5, 1609.5)
<u>Exposure C</u>	Wind exposure category (1609.4)
<u>N/A</u>	Internal pressure coefficient (ASCE 7)
<u>N/A</u>	Component and cladding pressures (1609.1.1, 1609.6.2.2)
<u>N/A</u>	Main force wind pressures (7603.1.1, 1609.6.2.1)

Earth design data (1603.1.5, 1614-1623)

<u>N/A</u>	Design option utilized (1614.1)
	Seismic use group ("Category")
	Spectral response coefficients, S_{DS} & S_{D1} (1615.1)
	Site class (1615.1.5)

<u>N/A</u>	Live load reduction
	Roof live loads (1603.1.2, 1607.11)
	Roof snow loads (1603.7.3, 1608)
	Ground snow load, P_g (1608.2)
	If $P_g > 10$ psf, flat-roof snow load, P_f
	If $P_g > 10$ psf, snow exposure factor, E_s
	If $P_g > 10$ psf, snow load importance factor, I_s
	Roof thermal factor, C_t (1608.4)
	Sloped roof snowload, P_g (1608.4)
	Seismic design category (1616.3)
	Basic seismic force resisting system (1617.6.2)
	Response modification coefficient, R , and
	deflection amplification factor, C_d (1617.6.2)
	Analysis procedure (1616.6, 1617.5)
	Design base shear (1617.4, 1617.5.1)

Flood loads (1803.1.6, 1612)

<u>N/A</u>	Flood hazard area (1612.3)
	Elevation of structure

Other loads

<u>N/A</u>	Concentrated loads (1607.4)
	Partition loads (1607.5)
	Misc. loads (Table 1607.4, 1607.6.1, 1607.7, 1607.12, 1607.13, 1610, 1611, 2404)



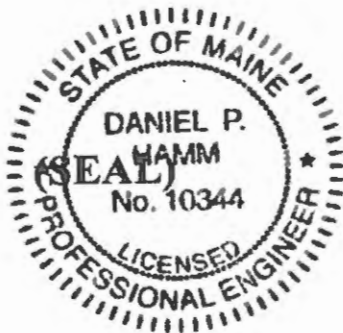
Accessibility Building Code Certificate

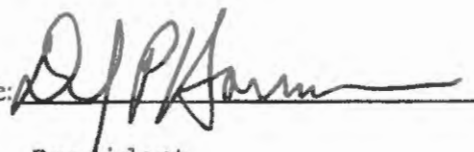
Designer: Daniel P. Hamm, P.E.

Address of Project: 1 Monument Square, Portland, ME

Nature of Project: Antenna modification work to existing
telecommunication site.

The technical submissions covering the proposed construction work as described above have been designed in compliance with applicable referenced standards found in the Maine Human Rights Law and Federal Americans with Disability Act. Residential Buildings with 4 units or more must conform to the Federal Fair Housing Accessibility Standards. Please provide proof of compliance if applicable.



Signature: 

Title: President

Firm: Hudson Design Group LLC

Address: 1600 Osgood St, Suite 2-101 Bld 20N
N. Andover, MA 01845

Phone: 978-557-5553

For more information or to download this form and other permit applications visit the Inspections Division on our website at www.portlandmaine.gov



Certificate of Design

Date: 8-9-11

From: Daniel P. Hamm, P.E.

These plans and / or specifications covering construction work on:

Antenna modification work to existing telecommunication site.

Have been designed and drawn up by the undersigned, a Maine registered Architect / Engineer according to the *2003 International Building Code* and local amendments.



Signature: 

Title: President

Firm: Hudson Design Group LLC

Address: 1600 Osgood St, Suite 2-101 Bld 20N

N. Andover, MA 01845

Phone: 978-557-5553

For more information or to download this form and other permit applications visit the Inspections Division on our website at www.portlandmaine.gov

6 Existing to be removed

Vertically Polarized, Panel 80° / 12 dBd

WPA-80080/4CF

When ordering replace "___" with connector type.

Mechanical specifications

Length	1205 mm	47.4 in
Width	285 mm	11.2 in
Depth	114 mm	4.5 in
Depth with z-bracket	154 mm	6.1 in
⁴⁾ Weight	4.5 kg	9.9 lbs
Wind Area		
Fore/Aft	0.36 m ²	3.9 ft ²
Side	0.15 m ²	1.6 ft ²
Rated Wind Velocity (Safety factor 2.0)	>653 km/hr >406 mph	
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	522 N	117 lbs
Side	233 N	52 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting and Downtilting

Mounting brackets attach to a pipe diameter of Ø50-127 mm (2.0-5.0 in).

Mounting bracket kit #36210002

Downtilt bracket kit #36114003

Electrical specifications

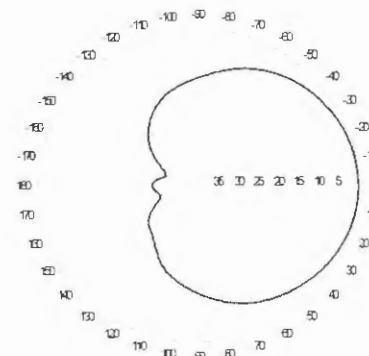
Frequency Range	806-960 MHz
Impedance	50Ω
³⁾ Connector(s)	NE or E-DIN 1 port / center
¹⁾ VSWR	≤ 1.4:1
Polarization	Vertical
¹⁾ Gain	12 dBd
²⁾ Power Rating	500 W
¹⁾ Half Power Angle	
H-Plane	80°
E-Plane	15°
¹⁾ Electrical Downtilt	0°
¹⁾ Null Fill	5-10%
Lightning Protection	Direct Ground

Patented Dipole Design: U.S. Patent No. 6,229,496 B1

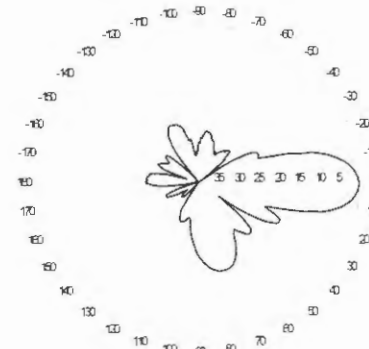
- ¹⁾ Typical values.
- ²⁾ Power rating limited by connector only.
- ³⁾ NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.
- ⁴⁾ The antenna weight listed above does not include the bracket weight.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation pattern¹⁾



Horizontal



Vertical

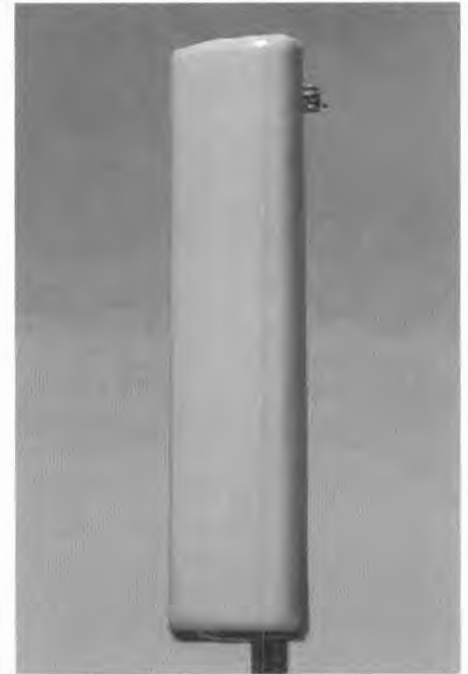
Featuring upper side lobe suppression.

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back ratio.

CF Denotes a Center-Fed Connector.

806-960 MHz



**Amphenol Antel's
Exclusive 3T (True
Transmission Line
Technology)
Antenna Design:**

- Watercut brass feedline assembly for consistent performance.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

This Amphenol Antel antenna is under a five-year limited warranty for repair or replacement.

Antenna available with center-fed connector only.

**Amphenol
Antel, Inc.**
The Antenna Technology Company

Revision Date: 7/2/07

Amphenol Antel, Inc. 1300 Capital Drive Rockford, Illinois 61109 USA Tel. (815) 399-0001
Toll-Free (888) 417-9562 Fax. (815) 399-0156 antel@antelinc.com www.antelinc.com

6 Existing to be removed

Vertically Polarized, Log Periodic 80° / 16.5 dBi

LPA-185080/8CF

When ordering replace "___" with connector type.

Mechanical specifications

Length	1204 mm	47.4 in
Width	104 mm	4.1 in
Depth	150 mm	5.9 in
Depth with t-bracket	178 mm	7.0 in
4) Weight	3.2 kg	7.0 lbs
Wind Area		
Fore/Aft	0.13 m ²	1.4 ft ²
Side	0.14 m ²	1.6 ft ²
Rated Wind Velocity (Safety factor 2.0)	>658 km/hr >409 mph	
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	202 N	45.0 lbs
Side	270 N	60.8 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting and Downtilting

Mounting brackets attach to a pipe diameter of Ø50-102 mm (2.0-4.0 in).

Mounting bracket kit #26799997

Downtilt bracket kit #26799999

The downtilt bracket kit includes the mounting bracket kit.

Electrical specifications

Frequency Range	1850-1990 MHz
Impedance	50Ω
3) Connector(s)	NE or E-DIN 1 port / center
1) VSWR	≤ 1.4:1
Polarization	Vertical
1) Gain	16.5 dBi
2) Power Rating	250 W
1) Half Power Angle	
H-Plane	80°
E-Plane	8°
1) Electrical Downtilt	0°
1) Null Fill	10%
Lightning Protection	Direct Ground

1) Typical values.

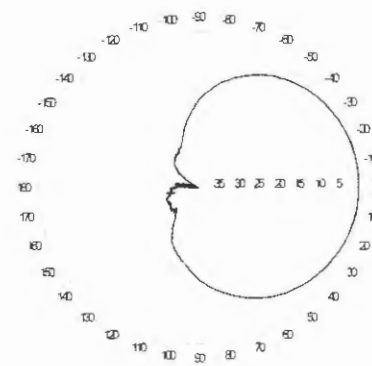
2) Power rating limited by connector only.

3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.

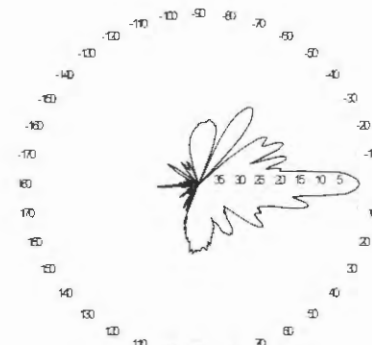
4) The antenna weight listed above does not include the bracket weight.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation pattern¹⁾



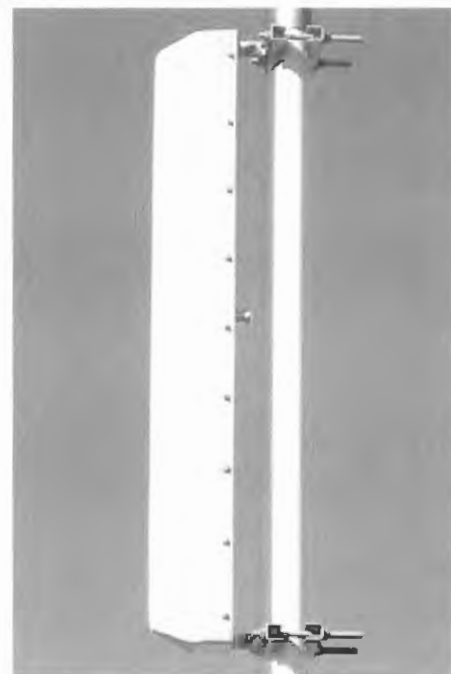
Horizontal



Vertical

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back ratio.



Amphenol Antel's Exclusive 3T (True Transmission Line Technology) Antenna Design:

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

This Amphenol Antel antenna is under a five-year limited warranty for repair or replacement.

Antenna available with center-fed connector only.

CF Denotes a Center-Fed Connector.

1850-1990 MHz

Amphenol Antel, Inc.
The Antenna Technology Company

Revision Date: 7/12/07

Amphenol Antel, Inc. 1300 Capital Drive Rockford, Illinois 61109 USA Tel. (815) 399-0001
Toll-Free (888) 417-9562 Fax. (815) 399-0156 antel@antelinc.com www.antelinc.com



DB846F65ZAXY

Directed Dipole Antenna

Decibel®
Base Station Antennas

- Exceptional azimuth roll off reducing soft hand offs and improving capacity
- Strong null filling for below horizon RF penetration
- Extremely rugged, reliable design yet lightweight for low tower loading
- Air dielectric feed system

ELECTRICAL

Frequency (MHz) :	806 - 896	870 - 960
Polarization :	Vertical	Vertical
Gain (dBd/dBi) :	14.5/16.6	14.8/16.9
Azimuth BW (Deg.):	65	60
Elevation BW (Deg.):	11	10.5
Beam Tilt (Deg.):	0	0
USLS* (dB) :	15	15
Front-To-Back Ratio* (dB) :	40	40
VSWR :	<1.33:1	<1.33:1
PIM3 @ 2 x 20w (dBc) :	-150	-150
Max. Input Power (Watts) :	500	500
Impedance (Ohms) :	50	50
Lightning Protection :	DC Ground	DC Ground

MECHANICAL

Weight :	9.5 kg (21 lb)
Dimensions (LxWxD) :	1,829 x 254 x 216 mm (72 x 10 x 8.5 in)
Max. Wind Area :	0.15 m ² (1.6 ft ²)
Max. Wind Load (@ 100 mph) :	386.9 N (87 lbf)
Max. Wind Speed :	241 km/h (150 mph)
Hardware Material :	Galvanized Steel
Connector Type :	7-16 DIN - Female (1, Back)
Color :	Light Gray
Standard Mounting Hardware :	DB380
Standard Downtilt Mounting Hardware :	DB5083





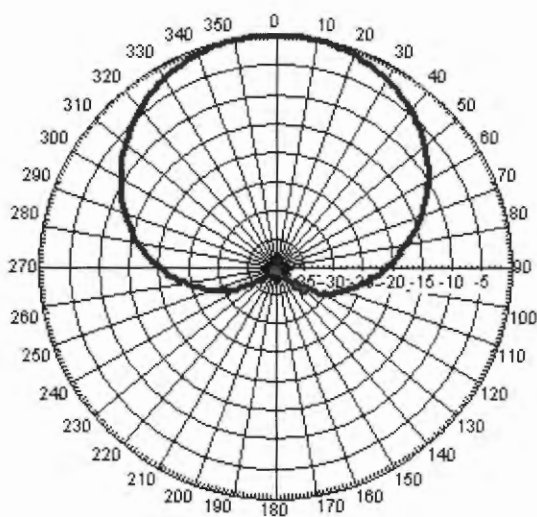
DB846F65ZAXY

Directed Dipole Antenna

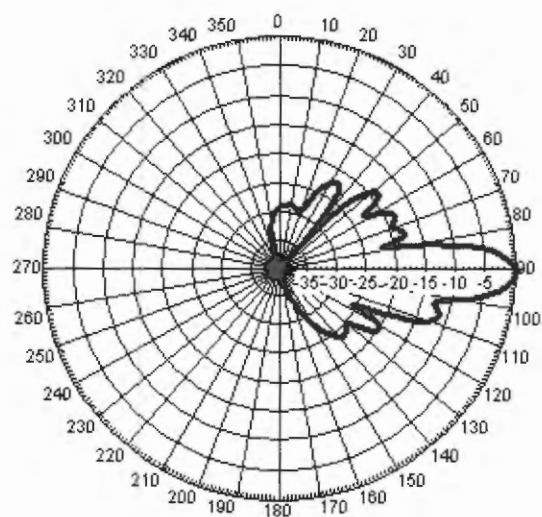
Decibel®
Base Station Antennas

AZIMUTH PATTERN

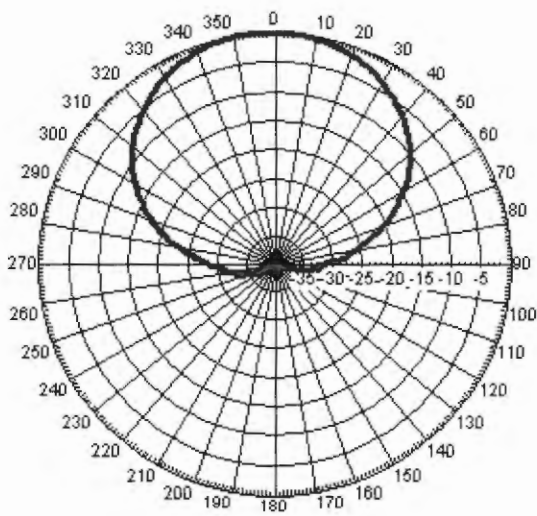
ELEVATION PATTERN



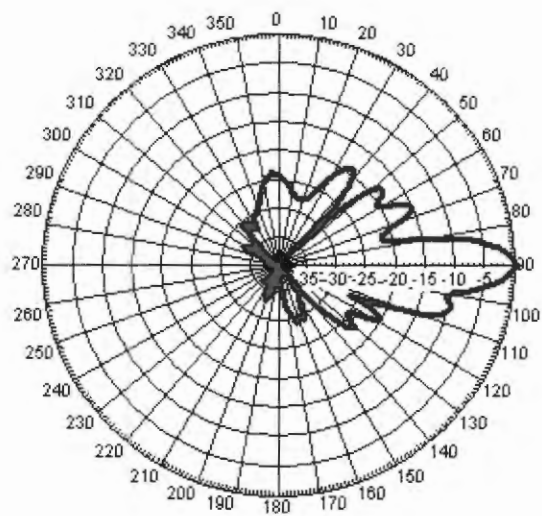
Freq: 850 MHz, Tilt: 0



Freq: 850 MHz, Tilt: 0



Freq: 940 MHz, Tilt: 0



Freq: 940 MHz, Tilt: 0

Andrew Corporation
2601 Telecom Parkway
Richardson, Texas U.S.A 75082-3521
Tel: 214.631.0310

Fax: 214.631.4706
Toll Free Tel: 1.800.676.5342
Fax: 1.800.229.4706
www.andrew.com

* - Indicates Typical
4/13/2007
dbtech@andrew.com

Information correct at date of issue but may be subject to change without notice.

Product Specifications



This specification is PRELIMINARY

LNx-6514DS-VTM

DualPol® Antenna, 698-896 MHz, 65° horizontal beamwidth, RET compatible variable electrical tilt

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site co-locations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings

CHARACTERISTICS

General Specifications

Antenna Type DualPol®
 Brand DualPol® | Teletilt®
 Operating Frequency Band 698 – 896 MHz

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Beamwidth, Horizontal, degrees	65	65
Gain, dBd	13.7	14.2
Gain, dBi	15.8	16.3
Beamwidth, Vertical, degrees	12.0	12.0
Beam Tilt, degrees	0–12	0–12
Upper Sidelobe Suppression (USLS), typical, dB	17	17
Front-to-Back Ratio at 180°, dB	30	30
Isolation, dB	30	30
VSWR Return Loss, db	1.4:1 15.6	1.4:1 15.6
Intermodulation Products, 3rd Order, 2 x 20 W, dBc	-150	-150
Input Power, maximum, watts	400	400
Polarization	±45°	±45°
Impedance, ohms	50	50
Lightning Protection	dc Ground	dc Ground

Product Specifications

LNX-6514DS-VTM

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity	2
Wind Loading, maximum	186.0 lb/ft @ 100 mph
Wind Speed, maximum	241.4 km/h 150.0 mph

Dimensions

Depth	180.3 mm 7.1 in
Length	1828.8 mm 72.0 in
Width	302.3 mm 11.9 in
Net Weight	15.0 kg 33.1 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	LNX-6514DS-R2M
RET System	Teletilt®

Included Products

1 600899A-2

Downtilt Mounting Kit for 4.5 in (114.3 mm) OD round members

Product Specifications



HBX-6516DS-VTM

DualPol® Antenna, 1710–2170 MHz, 65° horizontal beamwidth, RET compatible variable electrical tilt



- Superior azimuth tracking and pattern symmetry
- Field adjustable electrical tilt
- Rugged, reliable design with excellent passive intermodulation suppression
- Fully compatible with Andrew remote electrical tilt system

CHARACTERISTICS

General Specifications

Antenna Type	DualPol®
Brand	DualPol® Teletilt®
Operating Frequency Band	1710 – 2170 MHz

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2170
Beamwidth, Horizontal, degrees	66	65	64
Gain, dBd	15.6	15.9	15.9
Gain, dBi	17.7	18.0	18.0
Beamwidth, Vertical, degrees	7.5	7.0	6.5
Beam Tilt, degrees	0–10	0–10	0–10
Upper Sidelobe Suppression (USLS), typical, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
Isolation, dB	30	30	30
VSWR	1.4:1	1.4:1	1.4:1
3rd Order IMD at 2 x 20 W, dBc	-153	-153	-153
Input Power, maximum, watts	250	250	250
Polarization	±45°	±45°	±45°
Impedance	50	50	50
Lightning Protection	dc Ground	dc Ground	dc Ground

Product Specifications



Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity	2
Wind Area, maximum	0.1 m ² 1.2 ft ²
Wind Loading, maximum	298.0 N @ 100 mph 67.0 lbf @ 100 mph
Wind Speed, maximum	241.4 km/h 150.0 mph

Dimensions

Depth	83.8 mm 3.3 in
Length	1305.6 mm 51.4 in
Width	167.6 mm 6.6 in
Net Weight	4.5 kg 9.9 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed Actuator	HBX-6516DS-R2M
RET System	Teletilt®

Regulatory Compliance/Certifications

Agency
RoHS 2002/95/EC
China RoHS SJ/T 11364-2006

Classification
Compliant by Exemption
Logo 2



Included Products



602030A

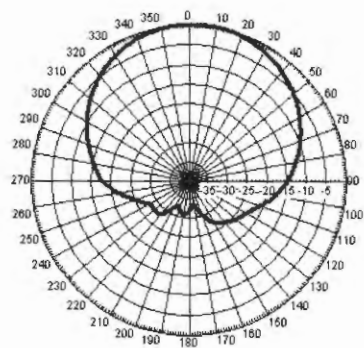
Downtilt Mounting Kit for 4.5 in (114.3 mm) OD round members

Product Specifications

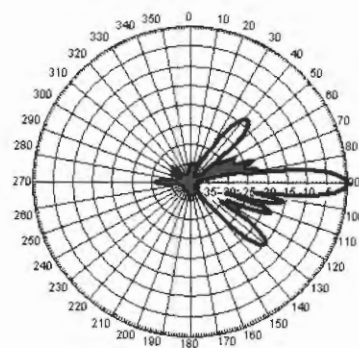


Horizontal Pattern

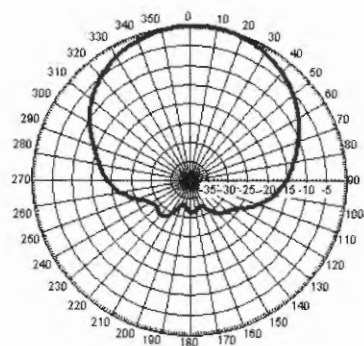
Vertical Pattern



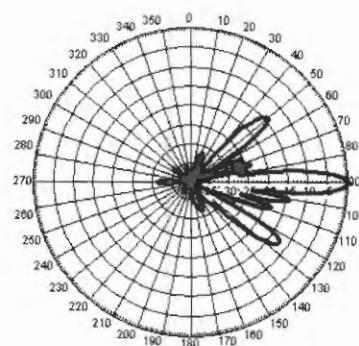
Freq: 1785 MHz, Tilt: 0



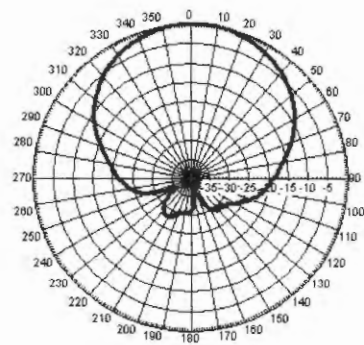
Freq: 1785 MHz, Tilt: 0



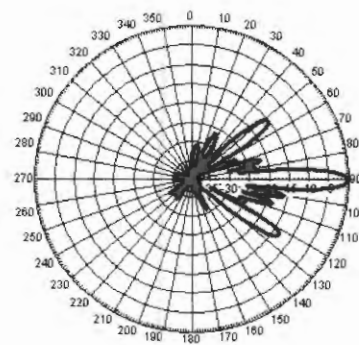
Freq: 1910 MHz, Tilt: 0



Freq: 1910 MHz, Tilt: 0



Freq: 2110 MHz, Tilt: 0



Freq: 2110 MHz, Tilt: 0

From North America, toll free
Telephone: 1-800-255-1479
Fax: 1-800-349-5444

Outside North America
Telephone: +1 708-873-2307
Fax: +1 779-435-8579

© 2008 CommScope, Inc. All rights reserved.
All specifications are subject to change. Please see
www.andrew.com for the most current information.

page 3 of 3
3/11/2008

STRUCTURAL ANALYSIS REPORT

For

Monument Square ME

1 Monument Square
Portland, ME

Antennas Supported on Non-Penetrating Ballasted Sled Mounts



Prepared for:

VERIZON WIRELESS

400 Friberg Parkway
Westborough, MA 01581

Dated:

October 14, 2011

Prepared by:

HUDSON DESIGN GROUP, LLC.

1600 Osgood Street Building 20 North, Suite 2-101
North Andover, MA 01845

Phone: (978) 557-5553

www.hudsondesigngroupllc.com





SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by Verizon Wireless to conduct a structural evaluation of the structure supporting the proposed Verizon Wireless equipment.

This report represents this office's findings, conclusions and recommendations' pertaining to the support of Verizon's proposed equipment.

This office conducted an on-site visual survey of the above areas on October 5, 2011. Attendees included Sergio Anastacio (HDG-Ass't. Project Manager).

CONCLUSION SUMMARY:

Some building plans were available and obtained for our reference. A limited visual survey of the structure was completed in or near the areas of the Proposed Work. Based on our evaluation, we have determined that, in general, structural designs to support the proposed Verizon Wireless Equipment within or near the Proposed Location can be completed and components installed with **NO STRUCTURAL UPGRADES REQUIRED** to the existing structure.

A summary of the proposed support types and attachment locations are as follows:

(6) DB846F65ZAXY Andrew antennas (2 per sector) (72.0"x10.0"x8.5") (Wt. = 21.0 lbs/each).....Supported by existing non-penetrating roof top sled mounts supported on the existing reinforced concrete roof structure.

(3) LNX-6514DS-VTM Andrew antennas (1 per sector) (72.0"x11.9"x7.1") (Wt. = 33.1 lbs/each).....Supported by existing non-penetrating roof top sled mounts supported on the existing reinforced concrete roof structure.

(3) HBX-6516DS-VTM Andrew antennas (1 per sector) (51.0"x6.5"x3.3") (Wt. = 9.9 lbs/each).....Supported by existing non-penetrating roof top sled mounts supported on the existing reinforced concrete roof structure.



EXISTING ROOF CONSTRUCTION:

The existing roof construction consists of a single-ply EPDM membrane over rigid insulation adhered to a reinforced concrete roof slab supported by a series of reinforced concrete beams and columns.

Antenna SUPPORT RECOMMENDATIONS:

- HDG recommends that the new antennas be supported by the existing non-penetrating ballasted roof top sled mounts supported by the existing reinforced concrete roof structure.

HDG has performed ballast calculations to determine whether or not the existing ballast amount on the sled mount is sufficient enough to support the proposed antenna loading. In conclusion the total required ballast amount for the proposed loading required a total of (25) 8"x8"x16" solid concrete blocks per side which is adequate when compared with the as-built condition. No additional ballast weight is required.

HDG does recommend that ballast tie downs be added to the existing sled mounts to prevent from any ballast blocks being removed.



Referenced documents are attached.

DESIGN CRITERIA:

1. International Building Code- 2009 Edition and ASCE 7-05, Minimum Design Loads for Buildings and Other Structures.

Wind Analysis:

Basic Wind Speed: 110 MPH (includes 3-second gust)
Exposure: C

2. EIA/TIA -222- G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

County: Cumberland
Wind Load: 100 mph

3. Approximate height above grade to antennas: 152'-0" +/-

PROPOSED ANTENNA SUPPORT LOCATIONS:



Photo 1: Sample photo of the existing Verizon Antennas secured to the existing roof top sled mount.

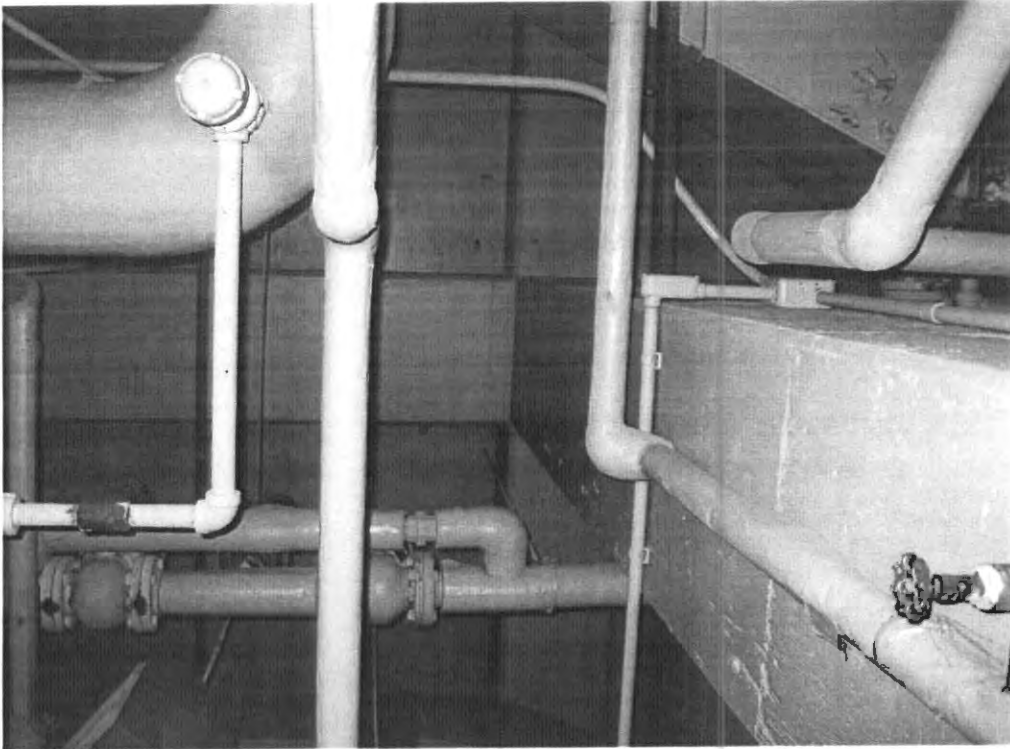


Photo 2: Sample photo of the existing structure (reinforced concrete beams and columns.)



Proposed Drawings



Calculations

Date: 10.14.11
 Project Name: MONUMENT SQUARE
 Project Number: _____
 Designed By: MSK Checked By: _____



2.6.5.2 Velocity Pressure Coeff:

$$K_z = 2.01 (z/z_g)^{2/\alpha}$$

$K_z = 1.541$
 $z = 152 \text{ (ft)}$
 $z_g = 700 \text{ (ft)}$
 $\alpha = 11.5$

$$K_{zmin} \leq K_z \leq 2.01$$

Table 2-4

Exposure	Z_g	α	K_{zmin}	K_e
B	1200 ft	7	0.70	0.90
C	900 ft	9.5	0.85	1
D	700 ft	11.5	1.03	1.10

2.6.6.4 Topographic Factor:

Table 2-5

Topo. Category	K_t	f
2	0.43	1.25
3	0.53	2
4	0.72	1.5

$$K_{zt} = [1 + (K_e K_t / K_h)]^2$$

$$K_h = e^{(f \cdot z/H)}$$

$$K_{zt} = \#DIV/0!$$

$$K_h = \#DIV/0!$$

$$K_e = 0 \text{ (from Table 2-4)}$$

$$K_t = 0 \text{ (from Table 2-5)}$$

$$f = 0 \text{ (from Table 2-5)}$$

$$z = 152$$

$$H = 0 \text{ (Ht. of the crest above surrounding terrain)}$$

$$K_{zt} = 1.00$$

(If Category 1 then $K_{zt} = 1.0$)

Category= **1**

Date: 10.14.11
Project Name: MONUMENT SQ
Project Number: _____
Designed By: MSC Checked By: _____



2.6.7 Gust Effect Factors

2.6.7.1 Self Supporting Lattice Structures

Gh = 1.0 Latticed Structures > 600 ft

Gh = 0.85 Latticed Structures 450 ft or less

Gh = $0.85 + 0.15 [h/150 - 3.0]$ h= ht. of structure

h= 152 Gh= 0.552

2.6.7.2 Guyed Masts Gh= 0.85

2.6.7.3 Pole Structures Gh= 1.1

2.6.7.4 Structures Supported on Other Structures

(Cantilevered tubular or latticed spines, pole, structures on buildings (ht. : width ratio > 5)

Gh= 1.35 Gh= 1.35

Date: 10.14.11
 Project Name: MONUMENT SQ
 Project Number: _____
 Designed By: MSC Checked By: _____



2.6.8 Design Ice Thickness:

$$t_{iz} = 2.0 * t_i * I * K_{iz} * (K_{zt})^{0.35}$$

$$t_{iz} = 2.33$$

$$K_{iz} = [z/33]^{0.10} \leq 1.4$$

$$K_{iz} = 1.17$$

$$t_i = 1$$

$$I = 1$$

$$K_{iz} = 1.17$$

$$K_{zt} = 1$$

Calculating the weight of ice, the cross-sectional area of ice shall be determined by:

$$A_{iz} = \pi * t_{iz} * (D_c + t_{iz})$$

$$D_c = 72 \text{ (in) Largest Dim of Member}$$

$$A_{iz} = 544.10$$

2.6.9 Design Wind Load:

$$F = q_z * G_h * (EPA's)$$

$$q_z = 0.00256 * K_z * K_{zt} * K_d * V_{max}^2$$

$$q_z = 37.48$$

$$K_z = 1.541$$

$$K_{zt} = 1$$

$$K_d = 0.95$$

$$V_{max} = 100$$

Table 2-2

Structure Type	Wind Direction Probability Factor, Kd
Latticed structures with triangular, square or rectangular cross sections	0.85
Tubular pole structures, latticed structures with other cross sections, appurtenances.	0.95

Site Name Monument Square Portland Square

Site No. _____

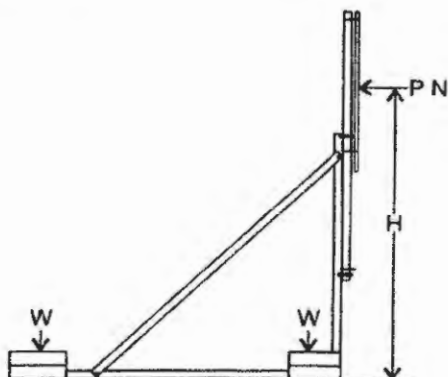
Done by: MSC Checked by: _____

Date: 10/13/2011



Calculate Total Ballast Required for Ballast Mount

Sector A



P= $\downarrow$ 304.00 (lbs.)

H= 72 (in)

N= $\downarrow$ 4

Plan Area of Tripod Mount (Equilateral)

$$A = (L) \times (W)$$

Length= 7.92 (ft)

Width= 7.92 (ft)

A= 62.73 (ft²)

Equation (Valmont Structures Catalog)

$$w = (0.0158)(N)(P)(H) + (58)$$

Total ballast required = (2) w

Safety Factor is 1.5

w= 1441.32 (lbs.)

*Safety Factor

S.F.= 1.5

w= 1441.32 (lbs.)

Total Ballast Required= 2882.64 (lbs.)

Total Blocks Per Side= 25 ((59 lb.) 8"x8"x16" Solid Concrete Blocks)

Total Area Load of Ballast= 45.96 (psf)

Network - New England East

ANTENNA RECOMMENDATION



Date: 3/28/2011
 To Construction Engineer:
 From RF Engineer: John Chizmar
 Site Name: Monument Sq ME

Revision No./Date:

Reason:

Add 6 1-5/8" coax runs for LTE. Replace 2 PCS antennas w/ 1 XP PCS antenna & 1 XP LTE Antenna per sector

Structure Type/Size: Roof Top

LTE Fill-In Project: See Project Tracker
 ANTMO Project: See Project Tracker

	Alpha Face	Beta Face	Gamma Face	GPS
Cellular Antenna Vendor:	Andrew	Andrew	Andrew	PCTel
Cellular Antenna Part No.:	DB846F65ZAXY	DB846F65ZAXY	DB846F65ZAXY	GPS-TMG-HR-26N
Ant. Connector Type:	DIN	DIN	DIN	DIN
Antennas per Face:	2	2	2	1
Antenna Gain (dBd):	14.5	14.5	14.5	
Horizontal Beamwidth (°):	65	65	65	
Vertical Beamwidth (°):	11	11	11	
Azimuth (° ETN):	330	90	225	
Downtilt (°):	3M 0E	4M 0E	2M 0E	
Downtilt Vendor:	Andrew	Andrew	Andrew	
Downtilt Part No.:	DB5083	DB5083	DB5083	
LTE Antenna Vendor:	Andrew	Andrew	Andrew	
LTE Antenna Part No.:	LNx-6514DS-VTM	LNx-6514DS-VTM	LNx-6514DS-VTM	
Ant. Connector Type:	DIN	DIN	DIN	
Antennas per Face:	1	1	1	
Antenna Gain (dBd):	13.7	13.7	13.7	
Horizontal Beamwidth (°):	65	65	65	
Vertical Beamwidth (°):	12	12	12	
Azimuth (° ETN):	330	110	225	
Downtilt (°):	0M 2E	0M 4E	0M 2E	
Downtilt Vendor:	Andrew	Andrew	Andrew	
Downtilt Part No.:	Included	Included	Included	
PCS Antenna Vendor:	Andrew	Andrew	Andrew	
Antenna Part No.:	HBX-6516DS-VTM	HBX-6516DS-VTM	HBX-6516DS-VTM	
Ant. Connector Type:	DIN	DIN	DIN	
Antennas per Face:	1	1	1	
Antenna Gain (dBi):	18	18	18	
Horizontal Beamwidth (°):	65	65	65	
Vertical Beamwidth (°):	7.2	7.2	7.2	
Azimuth (° ETN):	330	90	225	
Downtilt (°):	0M 2E	0M 3E	0M 2E	
Downtilt Vendor:	Andrew	Andrew	Andrew	
Downtilt Part No.:	Included	Included	Included	
Cellular Cable Vendor:	ANDREW CORP	ANDREW CORP	ANDREW CORP	ANDREW CORP
Cellular Cable Size:	1-5/8" Foam Coax	1-5/8" Foam Coax	1-5/8" Foam Coax	1/2" Foam Coax
LTE Cable Vendor:	ANDREW CORP	ANDREW CORP	ANDREW CORP	
LTE Cable Size:	1-5/8" Foam Coax	1-5/8" Foam Coax	1-5/8" Foam Coax	
PCS Cable Vendor:	ANDREW CORP	ANDREW CORP	ANDREW CORP	
PCS Cable Size:	1-5/8" Foam Coax	1-5/8" Foam Coax	1-5/8" Foam Coax	
Number of Cable Runs CELLULAR:	2	2	2	
Number of Cable Runs LTE:	2	2	2	
Number of Cable Runs PCS:	2	2	2	
850MHZ Cable Part No.:	AVA7-50A	AVA7-50A	AVA7-50A	
850MHZ Connector Part No.:	N/A	N/A	N/A	
LTE Cable Part No.:	AVA7-50A	AVA7-50A	AVA7-50A	
LTE Connector Part No.:	N/A	N/A	N/A	
PCS Cable Part No.:	AVA7-50A	AVA7-50A	AVA7-50A	
PCS Connector Part No.:	N/A	N/A	N/A	
Length of Cable Run (ft):	?	?	?	
Centerline Height AGL (ft):	172	172	172	
Diplexer Make-Model:	N/A	N/A	N/A	
Diplexer Quantity:	0	0	0	

8' Jumpers - Antenna End: L4-PDMDM-8 8 foot 1/2 inch Foam Jumper with 7/16 DIN male connectors

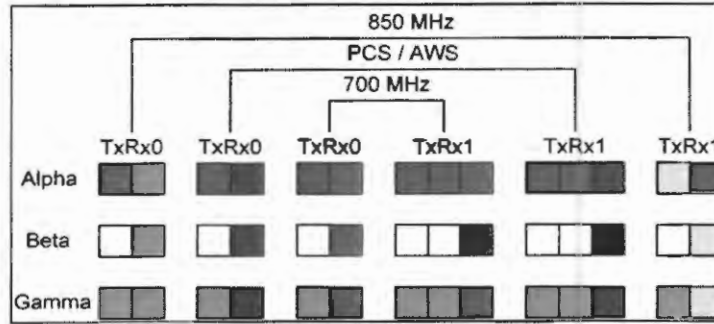
GPS Antenna Location: Roof of equipment shelter; use least obstructed location away from tower

The antenna selections, downtilt angles and azimuth angles were determined by Design Engineering to optimize coverage and minimize interference. This initial design will be employed during the drive test after site activation.

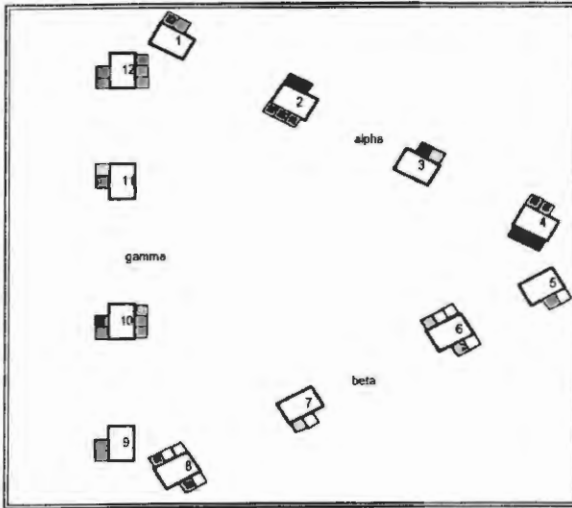
Signatures:

Sys. Perf. Engineer: _____ Date: _____
 RF Design Engineer: _____ Date: _____
 RF Design Manager: _____ Date: _____

Color Code



Antenna Layout



Antenna 1	DB846F65ZAXY	▼
Antenna 2	HBX-6516DS-VTM	▼
Antenna 3	DB846F65ZAXY	▼
Antenna 4	LNK-6514DS-VTM	▼
Antenna 5	DB846F65ZAXY	▼
Antenna 6	HBX-6516DS-VTM	▼
Antenna 7	DB846F65ZAXY	▼
Antenna 8	LNK-6514DS-VTM	▼
Antenna 9	DB846F65ZAXY	▼
Antenna 10	HBX-6516DS-VTM	▼
Antenna 11	DB846F65ZAXY	▼
Antenna 12	LNK-6514DS-VTM	▼

Please evenly space antennas across the sector.

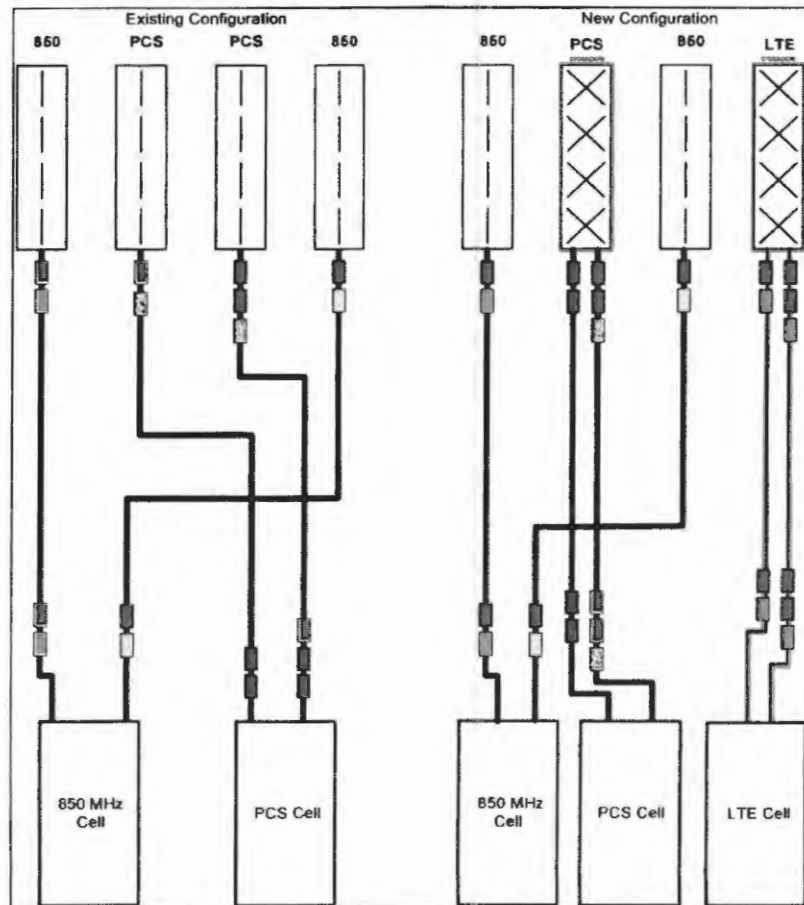
Please evenly space antennas across the sector.

Please evenly space antennas across the sector.

Please evenly space antennas across each sector.

For X-Pole antennas please make the single stripe (BG/BP) the +45 Port

Face Configuration for Monument Sq ME (from behind antennas)





DB846F65ZAXY

Directed Dipole Antenna

Decibel®
Base Station Antennas

- Exceptional azimuth roll off reducing soft hand offs and improving capacity
- Strong null filling for below horizon RF penetration
- Extremely rugged, reliable design yet lightweight for low tower loading
- Air dielectric feed system

ELECTRICAL

Frequency (MHz) :	806 - 896	870 - 960
Polarization :	Vertical	Vertical
Gain (dBd/dBi) :	14.5/16.6	14.8/16.9
Azimuth BW (Deg.):	65	60
Elevation BW (Deg.):	11	10.5
Beam Tilt (Deg.):	0	0
USLS* (dB) :	15	15
Front-To-Back Ratio* (dB) :	40	40
VSWR :	<1.33:1	<1.33:1
PIM3 @ 2 x 20w (dBc) :	-150	-150
Max. Input Power (Watts) :	500	500
Impedance (Ohms) :	50	50
Lightning Protection :	DC Ground	DC Ground

MECHANICAL

Weight :	9.5 kg (21 lb)
Dimensions (LxWxD) :	1,829 x 254 x 216 mm (72 x 10 x 8.5 in)
Max. Wind Area :	0.15 m ² (1.6 ft ²)
Max. Wind Load (@ 100 mph) :	386.9 N (87 lbf)
Max. Wind Speed :	241 km/h (150 mph)
Hardware Material :	Galvanized Steel
Connector Type :	7-16 DIN - Female (1, Back)
Color :	Light Gray
Standard Mounting Hardware :	DB380
Standard Downtilt Mounting Hardware :	DB5083



Andrew Corporation
2601 Telecom Parkway
Richardson, Texas U.S.A 75082-3521
Tel: 214.631.0310

Fax: 214.631.4706
Toll Free Tel: 1.800.676.5342
Fax: 1.800.229.4706
www.andrew.com

* - Indicates Typical
4/13/2007
dbtech@andrew.com

Information correct at date of issue but may be subject to change without notice.



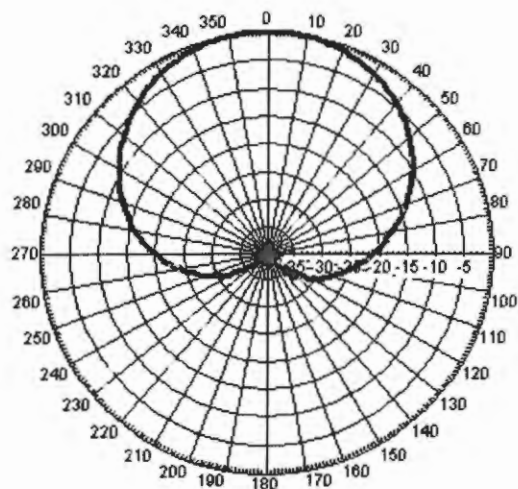
DB846F65ZAXY

Directed Dipole Antenna

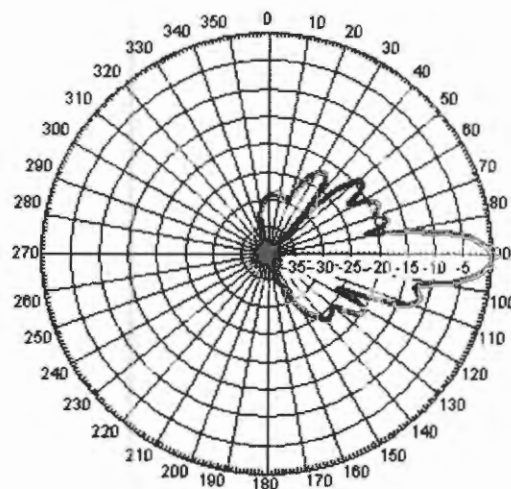
Decibel®
Base Station Antennas

AZIMUTH PATTERN

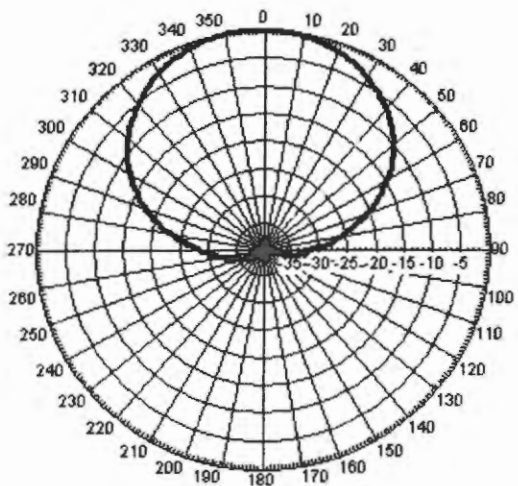
ELEVATION PATTERN



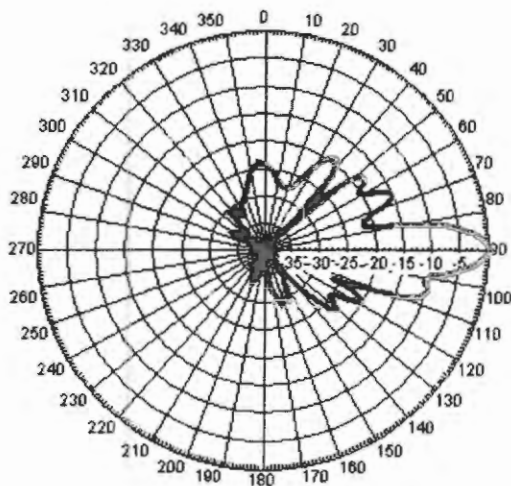
Freq: 850 MHz, Tilt: 0



Freq: 850 MHz, Tilt: 0



Freq: 940 MHz, Tilt: 0



Freq: 940 MHz, Tilt: 0

Andrew Corporation
2601 Telecom Parkway
Richardson, Texas U.S.A 75082-3521
Tel: 214 631.0310

Fax: 214 631 4706
Toll Free Tel: 1.800.676.5342
Fax: 1.800.229.4706
www.andrew.com

* - Indicates Typical
4/13/2007
dbtech@andrew.com

Information correct at date of issue but may be subject to change without notice.

Product Specifications



This specification is PRELIMINARY

LNK-6514DS-VTM

DualPol® Antenna, 698-896 MHz, 65° horizontal beamwidth, RET compatible variable electrical tilt

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site co-locations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings

CHARACTERISTICS

General Specifications

Antenna Type DualPol®
Brand DualPol® | Teletilt®
Operating Frequency Band 698 – 896 MHz

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Beamwidth, Horizontal, degrees	65	65
Gain, dBd	13.7	14.2
Gain, dBi	15.8	16.3
Beamwidth, Vertical, degrees	12.0	12.0
Beam Tilt, degrees	0–12	0–12
Upper Sidelobe Suppression (USLS), typical, dB	17	17
Front-to-Back Ratio at 180°, dB	30	30
Isolation, dB	30	30
VSWR Return Loss, db	1.4:1 15.6	1.4:1 15.6
Intermodulation Products, 3rd Order, 2 x 20 W, dBc	-150	-150
Input Power, maximum, watts	400	400
Polarization	±45°	±45°
Impedance, ohms	50	50
Lightning Protection	dc Ground	dc Ground

Product Specifications

LNK-6514DS-VTM



Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity	2
Wind Loading, maximum	186.0 lb/ft @ 100 mph
Wind Speed, maximum	241.4 km/h 150.0 mph

Dimensions

Depth	180.3 mm 7.1 in
Length	1828.8 mm 72.0 in
Width	302.3 mm 11.9 in
Net Weight	15.0 kg 33.1 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator LNK-6514DS-R2M

RET System Teletilt®

Included Products

600899A-2

Downtilt Mounting Kit for 4.5 in (114.3 mm) OD round members

Product Specifications



HBX-6516DS-VTM

DualPol® Antenna, 1710–2170 MHz, 65° horizontal beamwidth, RET compatible variable electrical tilt



- Superior azimuth tracking and pattern symmetry to minimize any sector overlap
- Field adjustable electrical tilt
- Rugged, reliable design with excellent passive intermodulation suppression
- Fully compatible with Andrew Teletilt® remote control system

CHARACTERISTICS

General Specifications

Antenna Type DualPol®
Brand DualPol® | Teletilt®
Operating Frequency Band 1710 – 2170 MHz

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2170
Beamwidth, Horizontal, degrees	65	65	65
Gain, dBd	15.6	15.9	15.9
Gain, dBi	17.7	18.0	18.0
Beamwidth, Vertical, degrees	7.5	7.0	6.5
Beam Tilt, degrees	0–10	0–10	0–10
Upper Sidelobe Suppression (USLS), typical, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
Isolation, dB	30	30	30
VSWR Return Loss, dB	1.4:1 15.6	1.4:1 15.6	1.4:1 15.6
Intermodulation Products, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power, maximum, watts	300	300	300
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm
Lightning Protection	dc Ground	dc Ground	dc Ground

www.commscope.com/andrew

©2011 CommScope, Inc. All rights reserved.

All trademarks identified by ® or ™ are registered trademarks or trademarks, respectively, of CommScope. All specifications are subject to change.
See www.commscope.com/andrew for the most current information.

page 1 of 3
8/5/2011

Product Specifications

HBX-6516DS-VTM



Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity	2
Radome Material	PVC, UV resistant
Wind Loading, maximum	256.8 N @ 150 km/h 57.7 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph

Dimensions

Depth	83.0 mm 3.3 in
Length	1306.0 mm 51.4 in
Width	166.0 mm 6.5 in
Net Weight	4.5 kg 9.9 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator HBX-6516DS-R2M

Model with Factory Installed AISG 2.0 Actuator HBX-6516DS-A1M

RET System Teletilt®

Regulatory Compliance/Certifications

Agency

RoHS 2002/95/EC
China RoHS SJ/T 11364-2006
ISO 9001:2008

Classification

Compliant by Exemption
Above Maximum Concentration Value (MCV)
Designed, manufactured and/or distributed under this quality management system



INCLUDED PRODUCTS



602030A

Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 114 mm) OD round members

www.commscope.com/andrew

©2011 CommScope, Inc. All rights reserved.

All trademarks identified by ® or ™ are registered trademarks or trademarks, respectively, of CommScope. All specifications are subject to change. See www.commscope.com/andrew for the most current information.

page 2 of 3
8/5/2011

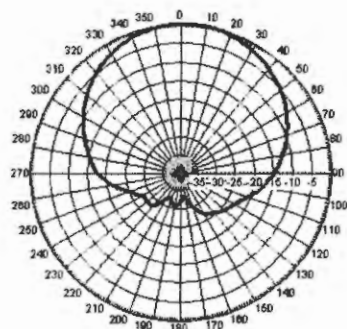
Product Specifications

HBX-6516DS-VTM

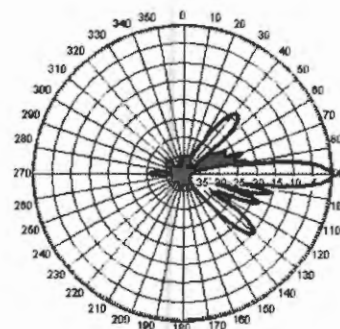


Horizontal Pattern

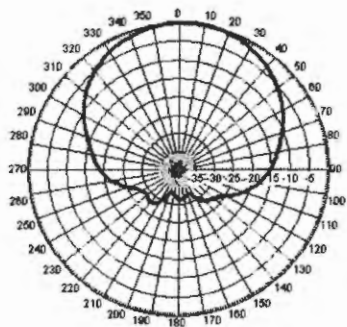
Vertical Pattern



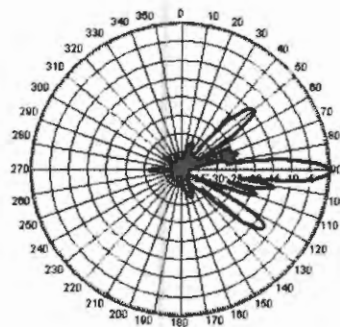
Freq: 1785 MHz, Tilt: 0



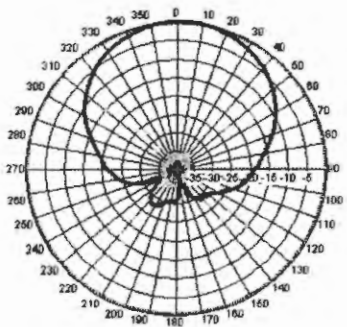
Freq: 1785 MHz, Tilt: 0



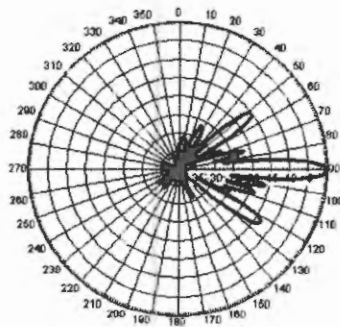
Freq: 1910 MHz, Tilt: 0



Freq: 1910 MHz, Tilt: 0



Freq: 2110 MHz, Tilt: 0



Freq: 2110 MHz, Tilt: 0

www.commscope.com/andrew

©2011 CommScope, Inc. All rights reserved.

All trademarks identified by ® or ™ are registered trademarks or trademarks, respectively, of CommScope. All specifications are subject to change. See www.commscope.com/andrew for the most current information.

page 3 of 3
8/5/2011